ANNUAL DANISH INFORMATIVE INVENTORY REPORT TO UNECE

Emission inventories from the base year of the protocols to year 2012

Scientific Report from DCE – Danish Centre for Environment and Energy No. 94 2014

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Data sheet

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Abstract: This report is a documentation report on the emission inventories for Denmark as reported to the UNECE Secretariat under the Convention on Long Range Transboundary Air Pollution due by 15 February 2014. The report contains information on Denmark's emission inventories regarding emissions of (1) SO_X for the years 1980-2012, (2) NO_X, CO, NMVOC and NH_3 for the years 1985-2012, (3) Particulate matter: TSP, PM_{10}, $PM_{2.5}$ for the years 2000-2012, (4) Heavy Metals: Pb, Cd, Hg, As, Cr, Cu, Ni, Se and Zn for the years 1990-2012, (5) Polyaromatic hydrocarbons (PAH): Benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene, PCDD/F and HCB for the years 1990-2012. Further, the report contains information on background data for emissions inventory.

Keywords: Emission Inventory; Emissions; Projections; UNECE; EMEP; LRTAP; NO_X; CO; NMVOC; SO_X; NH_3; TSP; PM_{10}; $PM_{2.5}$; Pb; Cd; Hg; As; Cr; Cu; Ni; Se; Zn; Polyaromatic hydrocarbons; Dioxin; Benzo(a)pyrene, Benzo(b)fluoranthene

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Summary

I Background information on emission inventories

Annual report

This report is Denmark's Annual Informative Inventory Report (IIR) due March 15, 2014 to the UNECE Convention on Long-Range Transboundary Air Pollution (LRTAP). The report contains information on Denmark's inventories for all years from the base years of the protocols to 2012.

The air pollutants reported under the LRTAP Convention are SO_2, NO_X, NMVOC, CO, NH_3, TSP, PM_{10}, $PM_{2.5}$, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, dioxins/furans, HCB, PCBs and PAHs,.

The annual emission inventory for Denmark is reported in the Nomenclature for Reporting (NFR 2009) format. In December 2008 the current reporting guidelines were adopted by the EMEP Executive Body. Many of the new elements and demands in the reporting guidelines have not been implemented yet. The reason for this is that they require significantly more resources, which are not currently available.

The issues addressed in this report are: trends in emissions, description of each NFR category, uncertainty estimates, recalculations, planned improvements and procedures for quality assurance and control. The structure of the report follows to the extent possible the proposed outline.

Information contained in this report is available to the public on the Danish Centre for Environment and Energy (DCE), Aarhus University's homepage:

http://envs.au.dk/videnudveksling/luft/emissioner/emissioninventory/

and this report and the NFR tables are available on the Eionet central data repository:

http://cdr.eionet.europa.eu/dk/Air_Emission_Inventories/Submission_EMEP_UNECE

Responsible institute

DCE-Danish Centre for Environment and Energy, Aarhus University, is on behalf of the Danish Ministry of the Environment responsible for the annual preparation and submission to the UNECE-LRTAP Convention of the Annual Danish Emissions Report and the inventories in the NFR format. DCE participates in meetings under the UNECE Task Force on Emission Inventories and Projections and the related expert panels, where parties to the convention prepare the guidelines and methodologies on inventories.

II Trends in emissions

Acidifying gases

In 1990, the relative contribution in acid equivalents was almost equal for the three gases SO_2, NO_x and NH_3. In 2012, the most important acidification factor in Denmark is ammonia nitrogen and the relative contributions for SO_2, NO_X and NH_3 were 5 %, 34 % and 61 %, respectively. However, with regard to long-range transport of air pollution, SO_2 and NO_X are still the most important pollutants.

Sulphur dioxide (SO_2)

The main part of the SO_2 emission originates from combustion of fossil fuels, i.e. mainly coal and oil, in public power and district heating plants. From 1990 to 2012, the total emission decreased by 93 %. The large reduction is mainly due to installation of desulphurisation plants and use of fuels with lower content of sulphur in public power and district heating plants. Despite the large reduction of the SO_2 emissions, these plants make up 25 % of the total emission. Also emissions from industrial combustion plants, non-industrial combustion plants and other mobile sources are important. National sea traffic (navigation and fishing) contributes with about 13 % of the total SO_2 emission in 2012. This is due to the use of residual oil with high sulphur content.

Nitrogen oxide (NO_x)

The largest sources of emissions of NO_X are road transport followed by other mobile sources and combustion in energy industries (mainly public power and district heating plants). The transport sector is the sector contributing the most to the emission of NO_X and, in 2012, 49 % of the Danish emissions of NO_X stems from road transport, national navigation, railways and civil aviation. Also emissions from national fishing and off-road vehicles contribute significantly to the NO_X emission. For non-industrial combustion plants, the main sources are combustion of gas oil, natural gas and wood in residential plants. The emissions from energy industries have decreased by 77 % from 1990 to 2012. In the same period, the total emission decreased by 58 %. The reduction is due to the increasing use of catalyst cars and installation of low-NO_X burners and denitrifying units in power plants and district heating plants.

Ammonia (NH_3)

Almost all atmospheric emissions of NH_3 result from agricultural activities. Only a minor fraction originates from road transport (2.0 %) and stationary combustion (0.2 %) in 2012. This share for road transport increased during the 1990's and early 2000's due to growing use of catalyst cars. In more recent years the share is again decreasing due to more advanced catalysts being implemented. The major part of the emission from agriculture stems from livestock manure (80 %) and the largest losses of ammonia occur during the handling of the manure in stables and in field application. Other contributions come from use of mineral fertilisers (10 %), N-excretion on pasture range and paddock (3 %), sewage sludge used as fertiliser, crops and ammonia used for straw treatment (7 %) and field burning (less than 1 %). The total ammonia emission decreased by 39 % from 1990 to 2012. This is due to the active national environmental policy efforts over the past twenty years.

Other air pollutants

Non-methane volatile organic compounds (NMVOC)

The emissions of NMVOC originate from many different sources and can be divided into two main groups: incomplete combustion and evaporation. Road vehicles and other mobile sources such as national navigation vessels and off-road machinery are the main sources of NMVOC emissions from incomplete combustion processes. Road transportation vehicles are still the main contributors, even though the emissions have declined since the introduction of catalyst cars in 1990. The evaporative emissions mainly originate from the use of solvents and the extraction, handling and storage of oil and natural gas. The emissions from the energy industries have increased during the nineties due to the increasing use of stationary gas engines, which have much higher emissions of NMVOC than conventional boilers. The total anthropogenic emissions have decreased by 52 % from 1990 to 2012, largely due to the increased use of catalyst cars and reduced emissions from use of solvents.

Carbon monoxide (CO)

Mobile sources and non-industrial combustion plants contribute significantly to the total emission of this pollutant. Transport is the second largest contributor to the total CO emission. In 1990 a law forbidding the burning of agricultural crop residues in the fields was implemented, which caused a significant reduction in CO emission. The emission decreased further by 51 % from 1990 to 2012, largely because of decreasing emissions from road transportation.

Particulate Matter (PM)

The particulate matter (PM) emission inventory has been reported for the years 2000 onwards. The inventory includes the total emission of particles Total Suspended Particles (TSP), emission of particles smaller than 10 µm (PM_{10}) and emission of particles smaller than 2.5 µm ($PM_{2.5}$).

The largest $PM_{2.5}$ emission sources are residential plants (67 %), road traffic (10 %) and other mobile sources (8 %). For the latter, the most important sources are off-road vehicles and machinery in the industrial sector and in the agricultural/forestry sector (32 % and 37 %, respectively). For the road transport sector, exhaust emissions account for the major part (60 %) of the emissions. The $PM_{2.5}$ emission increased by 3 % from 2000 to 2011, due to an increasing wood consumption in the residential sector counteracted by a decrease in emission from the transport sector and to a less degree from manufacturing industries and construction.

The largest TSP emission sources are the residential sector and the agricultural sector. The TSP emissions from transport are also important and include both exhaust emissions and the non-exhaust emissions from brake and tyre wear and road abrasion. The non-exhaust emissions account for 65 % of the TSP emission from road transport in 2012.

Heavy metals

In general, the most important sources of heavy metal emissions are combustion of fossil fuels and waste. The heavy metal emissions have decreased substantially in recent years, except for Cu. The reductions span from 27 % to 91 % for Zn and Pb, respectively. The reason for the reduced emissions is mainly increased use of gas cleaning devices at power and district heating plants (including waste incineration plants). The large reduction in the Pb emission is due to a gradual shift towards unleaded gasoline, the latter being essential for catalyst cars. The major source of Cu is automobile tyre and break wear (94 % in 2012) and the 30 % increase from 1990 to 2012 owe to increasing mileage.

Cadmium (Cd)

The main sources of emissions of Cd to air are combustion in energy industries (mainly combustion of wood, wood waste and municipal waste) and manufacturing industries (mainly combustion of residual oil). In the transport sector emissions from passenger cars is the main source contributing with 57 % of the sectoral emission in 2012. The emission from non-industrial combustion is dominated by wood combustion in residential plants which accounts for 76 % of the sectoral emission in 2012. Emissions from combustion in residential plants have increased by 97 % since 1990. The decreasing emission from energy industries are related to the decreasing combustion of coal.

Mercury (Hg)

The largest sources of Hg emissions to air are waste incineration and coal combustion in energy industries. Due to improved flue gas cleaning and decreasing coal combustion the emissions from energy industries decreased by 76 % from 1990-2000. The trend has continued in the following years and the corresponding decrease from 1990-2012 is 93 %. Non-industrial combustion is dominated by wood combustion in residential plants while emissions from the waste sector mainly owe to cremation. The variations in emissions from industrial processes owe to shut down in 2002 followed by re-opening and a second shut down in 2005 of the only Danish electro-steelwork.

Lead (Pb)

The main Pb emission sources are combustion in residential plants and energy industries and transport. In earlier years combustion of leaded gasoline was the major contributor to Pb emissions to air but the shift toward use of unleaded gasoline for transport have decreased the Pb emission from transport by 94 % from 1990 to 2012. In the non-industrial combustion sector the dominant source is wood combustion in residential plants. The trend in the Pb emission from non-industrial combustion from 1990 to 2011 is almost constant. This is due to a decrease in emission caused by the shift towards unleaded gasoline, as this sector includes other mobile sources in household, gardening, agriculture, forestry, fishing and military. This is counteracted by an increase in the emission from residential plants. The decreasing emission from energy industries (97 % from 1990 to 2012) is caused by the deceasing coal combustion.

Polycyclic aromatic hydrocarbons (PAHs)

The present emission inventory for polycyclic aromatic hydrocarbons (PAH) includes four PAHs: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene. Benzo(b)fluoranthene and Benzo(a)pyrene contribute the major PAH emission by 34 % and 32 %, respectively in 2012. The most important source of PAHs emissions is combustion of wood in the residential sector making up 71 % of the total emission in 2012. The increasing emission trend is due to increasing combustion of wood in the residential sector. The PAH emission from combustion in residential plants has increased by 93 % from 1990 to 2012.

Dioxins and furans

The major part of the dioxin emission owes to wood combustion in the residential sector, mainly in wood stoves and ovens without flue gas cleaning. Wood combustion in residential plants accounts for 60 % of the national dioxin emission in 2012. The contribution to the total dioxin emission from the waste sector (25 % in 2012) owes to accidental fires, especially building fires. The emissions of dioxins from energy industries mainly owe to the combustion of biomass as wood, wood waste and to a less extend agricultural waste.

Hexachlorobenzene (HCB)

Stationary combustion accounts for 66 % of the estimated national hexachlorobenzene (HCB) emission in 2012. This owes mainly to combustion of municipal solid waste in heating and power plants. Transport is an important source too and has increased by 58 % since 1990 due to increasing diesel consumption. The HCB emission from stationary plants has decreased 74 % since 1990 mainly due to improved flue gas cleaning in MSW incineration plants. The emission from agriculture was very high in the early 1990s due to the use of pesticides containing impurities of HCB. The HCB emission from agriculture decreased by 94 % from 1990 to 1994, and by 99 % from 1990 to 2012, causing the share of HCB emission from agriculture to drop from 69 % in 1990 to 5 % in 2012.

Polychlorinated biphenyls (PCBs)

Transport accounts for 59 % of the estimated national polychlorinated biphenyls (PCBs) emission in 2012. This owes mainly to combustion of diesel in road transport. The emission from transport has decreased by 73 % since 1990 due to the phase out of leaded gasoline, which has a high PCBs emission factor. This has led to diesel fuel use being the most important source of PCBs emissions from transport in later years. The emission from manufacturing industries and non-industrial combustion is dominated by diesel fuel used in non-road machinery.

III Recalculations and Improvements

In general, considerable work is being carried out to improve the inventories. Investigations and research carried out in Denmark and abroad produce new results and findings, which are given consideration and, to the extent which is possible, are included as the basis for emission estimates and as data in the inventory databases. Furthermore, the updates of the EMEP/EEA Guidebook, and the work of the Task Force on Emission Inventories and its expert panels are followed closely in order to be able to incorporate the best scientific information as the basis for the inventories.

The implementation of new results in inventories is made in a way so that improvements, as far as possible, better reflect Danish conditions and circumstances. This is in accordance with good practice. Furthermore, efforts are made to involve as many experts as possible in the reasoning, justification and feasibility of implementation of improvements.

In improving the inventories, care is taken to consider implementation of improvements for the whole time series of inventories to make it consistent. Such efforts lead to recalculation of previously submitted inventories. This submission includes recalculated inventories for the whole time series. The reasoning for the recalculations performed is to be found in the sectoral chapters of this report. The text below focuses on recalculations, in general, and further serves as an overview and summary of the relevant text in the sectoral chapters. For sector specific planned improvements please also refer to the relevant sectoral chapters.

Energy

Improvements and updates of the Danish energy statistics are made regularly by the producer of the statistics, the Danish Energy Agency. In close cooperation with the DEA, these improvements and updates are reflected in the emission inventory for the energy sector. The Danish energy statistics have, for the most part, been aggregated to the SNAP categorisation.

The inventories are still being improved through work to increase the number of large point sources, e.g. power plants, included in the databases as individual point sources. Such an inclusion makes it possible to use plant-specific data for emissions, etc., available e.g. in annual environmental reports from the plants in question.

Stationary Combustion

For stationary combustion plants, the emission estimates for the years 1990-2011 have been updated according to the latest energy statistics published by the Danish Energy Agency. The update included both end use and transformation sectors as well as a source category update. The changes in the energy statistics are largest for the years 2009, 2010 and 2011.

The emission factors for residential wood combustion have been revised according to the EEA Guidebook update (EEA, 2013). This has caused large recalculations for residential plants.

The HCB emission inventory has been improved and an emission inventory for dioxin-like PCB has been elaborated.

Mobile sources

The following recalculations and improvements of the emission inventories have been made since the emission reporting in 2013.

Road transport

Based on the updated version of COPERT IV launched in 2013, new vehicle sub categories have been introduced in the emission inventories for mopeds and passenger cars. For mopeds a division is now made between 2-stroke and 4-stroke engine technologies and for passenger cars small engine sizes below 0.8 l. for gasoline and below 1.4 l. for diesel have been included. Also NO_x emission factors for euro 5 diesel passenger cars have been updated in the model based on the new COPERT IV version.

Small errors in input gasoline fuel consumption for the years 2009-2011 and for input diesel fuel consumption in the years 2010-2011 have been corrected.

The percentage emission change interval and year of largest percentage differences (low %; high %, year) for the different emission components are: SO_2 (-0.5 %; 0.0 %, 2008), NO_x (0.0 %; 4.3 %, 2011), NMVOC (-4.1 %; -1.1 %, 2011), NH_3 (-1.3 %; 0.1 %, 2008) and TSP (-2.1 %; 0.0 %, 2011).

Navigation

Minor changes in ferry input data have been made for the years 2008-2011 causing minor emission changes for domestic navigation. The following largest percentage differences (in brackets) for domestic navigation are noted for: SO_2 (-0.2 %), NO_x (-0.3 %), NMVOC (-0.5 %), NH_3 (0.0 %) and TSP (-0.5 %).

Agriculture/forestry/fisheries

The number and engine size of machine pool tractors has been updated for the years 2007-2011. The number of ATV's has been changed for the years 2009-2011.

Errors in the fuel consumption for fisheries in 2000, 2010 and 2011 have been corrected.

In 2000 the following percentage differences (in brackets) for agriculture/forestry/fisheries are noted for: SO_2 (18.2 %), NO_x (11.1 %), NMVOC (3.1 %), NH_3 (0.0 %) and TSP (3.1 %). due to fuel consumption changes in fisheries.

For other years than 2000, the following largest percentage differences (in brackets) are noted for: SO_2 (-12.1 %), NO_x (-6.4 %), NMVOC (-0.8 %), NH_3 (1.7 %) and TSP (-2.2 %).

Industry

The number of mini loaders has been updated for the years 2004-2011.

The following largest percentage differences (in brackets) for industrial non road machinery are noted for: SO_2 (1.7 %), NO_x (1.6 %), NMVOC (1.9 %), NH_3 (1.6 %) and TSP (3.4 %).

Civil aviation

A small error in the NMVOC emission factor has been corrected for the years 1985-2011, due to CH_4 emission factor updates from 1985-2000 and corrections in the general NMVOC-CH_4 split of VOC. The emission factors are now in line with the factors proposed by the EMEP/EEA emission inventory guidebook. The NMVOC emission percentage differences are between -3.1 % and 1.8 %.

Military

Emission factors derived from the new road transport simulations have caused some emission changes from 1985-2011. The following largest percentage differences (in brackets) for military are noted for: SO_2 (0.0 %), NO_x (2.5 %), NMVOC (-1.1 %), NH_3 (0.2 %) and TSP (-1.7 %).

Fugitive emissions

Service stations

The activity data has been updated for 2009-2011 according to the latest energy statistics published by the Danish Energy Agency. The largest recalculation for 2010 has changed the NMVOC emission by 0.02 ktonnes, corresponding 0.2 % of the total fugitive NMVOC emission in 2010.

Natural gas transmission and distribution

Activity data and IEF for the time series 1990-2011 has been updated for transmission and distribution according to annual environmental reports and the latest national energy statistics, respectively. The largest recalculation for 2002 has changed the NMVOC emission by 0.75 ktonnes, corresponding 4 % of the total fugitive NMVOC emission in 2010.

Venting

EFs for NMVOC have been added for the years 1990-1993 for one gas storage plant. In these years the plant is treated as an area source in the national system, while it is treated separately as a LPS in the following years. EFs are based on data from annual reports for 1995-1999, as no data are available for the years 1990-1994.

Further, a minor error has been applied for venting in 2011, according to the annual report from one of the natural gas storage facilities.

The recalculation has changed the NMVOC emission by 0.02 ktonnes and the CO emission by 0.07 ktonnes for each of the years 1990-1993, corresponding 17% and 25 % of the total fugitive NMVOC and CO emission in 1993, respectively.

Industrial processes

Emissions of HCB and PCBs have been included in the emission inventory. Also, emissions from production of tar products have been included.

Solvent and other product use

Improvements and additions are continuously being implemented due to the comprehensiveness and complexity of the use and application of solvents and solvent containing products in industries and households. The main recalculations and their implications on the emissions in the 2014 reporting include the following:

- Updated statistical data for the activities of tobacco, fireworks, candles and charcoal for barbequing
- Emission factors for NH_3, PCB, HCB, Cu, benzo(b)flouranthene, benzo(k)flouranthene, benzo(a)pyrene and PCBs have been added for charcoal for barbequing and PM_{10} and $PM_{2.5}$ have been added for the burning of candles. Furthermore, emission factors for Cr, TSP, PM_{10} and $PM_{2.5}$ have been updated for charcoal for barbequing.

Agriculture

Compared with the previous NH_3 and PM emissions inventory (submission 2013), some changes and updates have been made, see Table 6.24. These changes cause a relatively high increase in the NH_3 emission for all years (1985–2011) between 5-10 % and a decrease in the PM emission 2000-2011 by 3-5 %.

The emission of NH_3 has increased all years due to change in the emission factor for synthetic fertiliser as a consequence of updating of the EMEP/EEA Guidebook (2013). Some other changes have been made, which slightly increases the emission of NH_3 from manure management; number of geese all years, number of weaners and fattening pigs in 2011 and change of distribution of housings for hens, also in 2011.

Emission of PM TSP decreased all years due to changes of emission factor in the revised EMEP/EEA Guidebook (2013). The overall decrease is mainly due to decrease in emission factor for fattening pigs and weaners.

Waste

For sector 6.C. Waste Incineration; changes were made to the human cremation with flue gas cleaning emission factors for heavy metals (HMs), PAHs and PCDD/Fs, the abatement of these pollutants by the newly installed flue gas cleaning equipment have not previously been included in this report, this change reduces the listed pollutants for 2011. Furthermore, an error has been corrected for the $PM_{2.5}$ emission factor for human cremation, as, correctly described in the text, the $PM_{2.5}$ emission is estimated as 80 % for the

TSP and not 90 % as reported in the last submission; this correction reduces the $PM_{2.5}$ emission for 2000-2010.

For sector 6.D. Waste Other several recalculations were made. NH_3 emission factors for composting of sludge and organic municipal waste have been updated. These new emission factors causes a decrease in NH_3 emissions for 1985-1997 (0.3-0.7 %) and an increase for 1998-2011 (2.1-19.3 %)

For accidental vehicle fires, an update in vehicle population data has given a small decrease in the FSE activity data for accidental tractor and combined harvester fires. In addition to this, the average weight of caravans, motorhomes, combined harvesters and motorcycles/mopeds have been updated to more well-founded expert judgments. Finally the emission factors for particles and heavy metals have been updated. While the changes in activity data leads to a general decrease in emissions for 1980-1999 (-16 % to -5 %) and only subtle changes for 2000-2011 (-5 % to 4 %), the new emission factors results in a strong increase in particle and heavy metal emissions for all years 1980-2011 (1413-1874 %).

There are no recalculations for accidental building fires.

Sammenfatning

I Baggrund for emissionsopgørelser

Årlig rapport

Denne rapport er Danmarks årlige rapport om emissionsopgørelser sendt til UNECE-konventionen om langtransporteret grænseoverskridende luftforurening (LRTAP) 15. marts 2014. Rapporten indeholder oplysninger om Danmarks opgørelser for alle år fra basisårene for protokollerne til 2012.

Luftforureningskomponenterne der rapporteres til LRTAP-konventionen er SO_2, NO_x, NMVOC, CO, NH_3, TSP, PM_{10}, $PM_{2,5}$, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, dioxiner/furaner, HCB, PCBs og PAH.

Den årlige emissionsopgørelse for Danmark rapporteres i NFR 2009-formatet. De nuværende retningslinjer for rapportering blev vedtaget i december 2008 og de nye retningslinjer indeholder en række nye krav til udarbejdelsen af emissionsopgørelserne. Opfyldelsen af disse nye krav er endnu ikke implementeret, da de er væsentligt mere ressourcekrævende, og da der ikke er afsat ressourcer hertil.

Emnerne behandlet i rapporten er: Udvikling i emissioner, beskrivelse af hver NFR-kategori, usikkerheder, genberegninger, planlagte forbedringer og procedure for kvalitetssikring og -kontrol. Strukturen i rapporten følger, så vidt muligt, den foreslåede disposition.

Informationer fra denne rapport er tilgængelige for offentligheden på Aarhus Universitets hjemmeside:

http://envs.au.dk/videnudveksling/luft/emissioner/emissioninventory/

Den fulde rapport samt NFR-skemaer er tilgængelige på Eionets hjemmeside:

http://cdr.eionet.europa.eu/dk/Air_Emission_Inventories/Submission_EMEP_UNECE

Ansvarlig institution

DCE – Nationalt Center for Miljø og Energi, Aarhus Universitet, er på vegne af Miljøministeriet ansvarlig for udarbejdelse af den årlige danske emissionsrapport og opgørelserne i NFR. DCE deltager i møder under UNECEs arbejdsgruppe for emissionsopgørelser og –fremskrivninger samt ekspertpaneler, hvor parter i konventionen udarbejder retningslinjer og metoder for emissionsopgørelserne.

II Udviklingen i emissioner

Forsurende gasser

I 1990 var det relative bidrag af syreækvivalenter næsten ens for de tre gasarter SO_2, NO_x og NH_3. I 2011 var ammoniak den vigtigste forsurende faktor i Danmark og de relative bidrag for SO_2, NO_x og NH_3 var på henholdsvis 5 %, 34 % og 61 %. Med hensyn til langtransporteret luftforurening er det dog stadig SO_2 og NO_x, der er de største kilder.

Svovldioxid (SO_2)

Hovedparten af SO_2-emissionerne stammer fra forbrænding af fossile brændsler, dvs. primært kul og olie, på kraftværker, kraftvarmeværker og fjernvarmeværker. Fra 1990 til 2012 er den totale udledning reduceret med 93 %. Den store reduktion er primært opnået gennem installation af afsvovlingsanlæg og brug af brændsler med lavt svovlindhold på kraftværker og fjernvarmeværker. Trods den store reduktion er disse værker kilde til 25 % af den samlede udledning. Også emissioner fra industrielle forbrændingsanlæg, ikke-industrielle forbrændingsanlæg og andre mobile kilder er væsentlige bidragsydere til emissionen. National søfart (sejlads og fiskeri) bidrager med 13 % af den totale SO_2-emission. Dette skyldes brug af fuelolie med et højt svovlindhold.

Kvælstofilte (NO_x)

Den største kilde til emissioner af NO_x er transportsektoren efterfulgt af andre mobile kilder og forbrænding i energisektoren (hovedsageligt kraftværker og fjernvarmeværker). Transportsektoren er den sektor der bidrager mest til udledningen af NO_x, og i 2012 stammede 49 % af de danske NO_x-emissioner fra vejtransport, national søfart, jernbaner og civil luftfart. Også emissioner fra nationalt fiskeri og off-road-køretøjer (entreprenør-, landbrugsmaskiner, m.m.) bidrager betydeligt til NO_x-emissionen. For ikke-industrielle forbrændingsanlæg er de primære kilder forbrænding af gasolie, naturgas og træ i husholdninger. Emissionerne fra kraftværker og fjernvarmeværker er faldet med 77 % fra 1990 til 2012. I samme periode er den totale emission faldet med 58 %. Reduktionen skyldes øget brug af katalysatorer i biler samt installation af lav-NO_x-brændere og de-NO_x-anlæg på kraftværker og fjernvarmeværker.

Ammoniak (NH_3)

Stort set alle atmosfæriske emissioner af NH_3 stammer fra aktiviteter i landbruget. Kun en mindre del skyldes vejtransport (2,0 %) og stationære kilder (0,2 %). Andelen fra transporten var stigende gennem 1990'erne og i starten af 2000'erne pga. den øgede brug af biler med katalysator. Hovedparten af emissionen fra landbruget stammer fra husdyrgødning (80 %) og de største tab af ammoniak optræder under håndtering af gødningen i stalden og under spredning på marken. Andre bidrag kommer fra brug af kunstgødning (10 %), N-udskillelse af græssende dyr (3 %), slam fra rensningsanlæg brugt som gødning, afgrøder og ammoniakbehandlet halm (7 %) samt markafbrænding (< 1 %). Den totale ammoniakemission er faldet 39 % fra 1990-2012. Dette er et resultat af den nationale miljøpolitik, der er ført gennem de seneste 20 år.

Anden luftforurening

Flygtige organiske forbindelser (NMVOC)

Emissionen af flygtige organiske forbindelser, ekskl. metan (NMVOC), stammer fra mange forskellige kilder og kan opdeles i to hovedgrupper: Ufuldstændig forbrænding og fordampning. Hovedkilderne til NMVOC-emissioner fra ufuldstændige forbrændingsprocesser er brændeovne, vejtrafik og andre mobile kilder, som national sejlads og ikke vejgående maskiner. Køretøjer til vejtransport er fortsat den største bidragsyder, selvom emissionerne er faldet siden introduktionen af biler med katalysator i 1990. Emissionerne fra fordampning stammer hovedsageligt fra brugen af opløsningsmidler. Emissionerne fra energisektoren er steget igennem 1990'erne pga. øget brug af stationære gasmotorer, som har meget højere emissioner af NMVOC end konventionelle kedler. De totale menneskeskabte emissioner er faldet med 52 % fra 1990 til 2012, primært som følge af øget brug af biler med katalysator og reducerede emissioner fra brug af opløsningsmidler.

Kulilte (CO)

Selvom biler med katalysator blev introduceret i 1990, er vejtransport stadig årsag til den største del af den totale CO-emission. Også andre mobile kilder og ikke-industrielle forbrændingsanlæg bidrager betydeligt til den totale emission af denne gas. Faldet i emissioner i 1990 var en konsekvens af loven, der generelt forbyder markafbrænding af halm. Emissionen faldt med 51 % fra 1990 til 2012 hovedsageligt pga. faldende emissioner fra vejtransport.

Partikler (PM)

Emissionsopgørelsen for partikler (Particulate Matter, forkortet PM) er blevet rapporteret for år 2000 og fremefter. Opgørelsen inkluderer den totale emission af partikler: Total Suspended Particles (TSP), emissionen af partikler mindre end 10 µm (PM_{10}) og emissionen af partikler mindre end 2,5 µm ($PM_{2,5}$).

De største kilder til $PM_{2,5}$-emission er husholdninger (67 %), vejtrafik (10 %) og andre mobile kilder (8 %). For den sidstes vedkommende er offroad-køretøjer i industrien samt landbrugs- og skovbrugsmaskiner de vigtigste kilder (hhv. 32 % og 37 %). I transportsektoren tegner udstødningsemissioner sig for størstedelen (60 %). $PM_{2.5}$-emissionen er steget med 3 % fra 2000 til 2011, hovedsageligt pga. det stigende træforbrug i husholdninger, der modsvares af et fald i emissionen fra transport samt i mindre grad fra fremstillingsvirksomhed og bygge- og anlægsvirksomhed.

De største kilder til TSP-emission er landbrugssektoren og husholdningerne. TSP-emissionen fra transport er også vigtig og inkluderer både udstødningsemissioner og ikke-udstødningsrelaterede emissioner fra slid af bremser, dæk og vej. De ikke-udstødningsrelaterede emissioner udgør 65 % af TSP-emissionen fra transport.

Tungmetalle

Generelt er de vigtigste kilder til emissioner af tungmetaller forbrænding af fossile brændsler og affald. Emissionerne af tungmetaller er med undtagelse af kobber, faldet betydeligt de seneste år. Reduktionerne spænder fra 27 % til 91 % for henholdsvis Zn og Pb. Årsagen til de reducerede emissioner er hovedsageligt den øgede brug af røggasrensning på kraftværker og fjernvarmeværker (inklusive affaldsforbrændingsanlæg). Den store reduktion i emissionen af Pb skyldes et løbende skift til fordel for blyfri benzin, som er nødvendigt for biler med katalysator. Den største kilde til emission af kobber er slid af køretøjers dæk og bremser (94 % i 2012). Emissionen herfra er steget 30 % fra 1990 til 2012 pga. en stigning i antal kørte kilometer.

Cadmium (Cd)

De største kilder til Cd-emissioner er forbrænding i energisektoren (hovedsageligt forbrænding af træ og husholdningsaffald) og fremstillingsvirksomhed (hovedsageligt forbrænding af fuelolie). Emissioner fra personbiler er den dominerende kilde i transportsektoren og udgør 57 % i 2012. Emissionen fra ikke-industriel forbrænding domineres af forbrænding af træ i husholdningsanlæg (76 % i 2012). Emissionen fra stationære anlæg i husholdninger er steget med 97 % siden 1990. Faldet i emissionen fra energisektoren skyldes det faldende forbrug af kul.

Kviksølv (Hg)

Den største kilde til Hg-emission er forbrænding af affald og kul i energisektoren. Forbedret røggasrensning og faldende kulforbrug har medført et fald i emissionen fra energisektoren på 76 % fra 1990 til 2012. Emissionen fra ikke-industriel forbrænding kan hovedsageligt tilskrives forbrænding af træ i stationære husholdningsanlæg, mens den væsentligste kilde i affaldssektoren er kremering. Emissionerne fra industrielle processer varierer meget pga. lukning af elektrostålvalseværket i 2002 efterfulgt af genåbning og endnu en lukning i 2005.

Bly (Pb)

Den vigtigste kilde til emission af bly er forbrænding i husholdninger og energisektoren samt transport. I tidligere år var den største kilde forbrænding af blyholdigt benzin, men overgangen til blyfri benzin i transportsektoren har medført et fald i blyemissionen på 94 % fra 1990 til 2012. Forbrænding af træ i husholdningsanlæg er den største kilde til emission af bly fra ikke-industriel forbrænding. Udviklingen i emissionen fra ikke-industriel forbrænding har været stort set konstant fra 1990-2012. Dette skyldes et fald i emissionen pga. overgangen til blyfri benzin, da denne sektor omfatter mobile kilder i husholdninger, havebrug, landbrug, skovbrug, fiskeri og militær; dette modvirkes dog af stigende emissioner fra husholdninger. Emissionen fra energifremstilling er faldet med 97 % i samme periode hovedsageligt pga. faldende forbrug af kul.

Polycycliske aromatiske hydrocarboner (PAH'er)

Den nuværende emissionsopgørelse for polycycliske aromatiske hydrocarboner (PAH'er) inkluderer de fire PAH'er: Benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene og indeno(1,2,3-cd)pyrene. Hovedparten af den samlede PAH-emission kan tilskrives benzo(b)fluoranthene og Benzo(a)pyrene der står for hhv. 34 % og 32 %. Den vigtigste kilde til emission af PAH er forbrænding af træ i husholdningerne, der udgør 71 % af den samlede PAH-emission i 2012. De stigende emissioner skyldes øget forbrænding af træ i brændeovne og kedler i husholdningerne. Emissionen fra stationær forbrænding i husholdninger er steget med 93 % fra 1990 til 2012.

Dioxiner og furaner

Størstedelen af dioxinemissionen skyldes forbrænding i husholdninger, hovedsageligt forbrænding af træ i brændeovne og –kedler uden røggasrensning. Forbrænding af træ i stationære anlæg i husholdninger udgør 60 % af den nationale dioxinemission i 2012. Emissioner fra affaldssektoren udgør 25 % af den nationale total i 2012, og skyldes hovedsageligt brande i bygninger. Forbrænding af træ og halm er den største kilde til dioxin emission fra energifremstilling.

Hexachlorbenzen (HCB)

Stationær forbrænding udgør 66 % af den samlede beregnede hexachlorbenzen(HCB)-emission i 2012. Emissionen stammer hovedsageligt fra forbrænding af affald i kraftvarmeværker og fjernvarmeværker. Transport er også en vigtig kilde, og emissionen er steget med 58 % siden 1990 pga. det stigende dieselforbrug. HCB-emissionen fra stationære anlæg er faldet med 74 % siden 1990 hovedsageligt pga. forbedret røggasrensning på affaldsforbrændingsanlæg. Emissionen fra landbrug var høj i starten af 1990'erne pga. anvendelse af pesticider, der indeholdt urenheder af HCB. HCB-emissionen fra landbrug faldt med 94 % fra 1990 til 1994 og med 99 % fra 1990 til 2012. Dette har medført, at landbrugets andel af den samlede emission er faldet fra 69 % i 1990 til 5 % i 2012.

Polychlorerede bifenyler (PCBs)

Transport udgør 59 % af den samlede beregnede emission af polychlorerede bifenyler (PCBs) I 2012. Det største bidrag kommer fra forbrænding af diesel i vejtransport. Emissionen er faldet med 73 % siden 1990 pga. udfasningen af blyholdig benzin, som har en høj PCBs-emissionsfaktor. Udfasningen af blyholdig benzin har medført, at diesel er blevet den vigtigste kilde til PCBs-emission i de senere år. Emissionen fra fremstillingsvirksomhed & bygge/anlæg samt ikke-industriel forbrænding er domineret af diesel forbrænding i ikke-vejgående maskiner.

III Genberegninger og forbedringer

Generelt pågår der et betydeligt arbejde med at forbedre emissionsopgørelserne. Nye undersøgelser og forskning fra Danmark og udlandet inkluderes så vidt muligt som basis for emissionsestimaterne. Desuden følges arbejdet med opdateringer af EMEP/EEA Guidebook for emissionsopgørelser nøje, med henblik på at indarbejde de bedste videnskabelige informationer som basis for opgørelserne.

Opgørelserne opdateres løbende med ny viden, således at opgørelserne bedst mulig afspejler danske forhold. Ved forbedringer lægges vægt på at opdateringer omfatter hele tidsserier, for at sikre konsistente data. Disse tiltag medfører genberegning af tidligere indberettede opgørelser. Begrundelserne for genberegningerne er inkluderet i de enkelte sektorkapitler i denne rapport. De vigtigste genberegninger for de forskellige sektorer er nævnt nedenfor.

Stationære forbrændingsanlæg

Emissionerne fra stationær forbrænding for årene 1990-2011 er opdateret jf. den senest publicerede energi statistik fra Energistyrelsen. Opdateringen omfatter både slutforbrug og konverteringssektoren samt opdatering af kildekategorier.

Emissionsfaktorerne for træforbrænding i husholdninger er blevet opdateret i henhold til 2013-udgaven af EMEP/EEA Guidebook. Dette har medført betydelige genberegninger for husholdninger.

Emissionsopgørelsen for HCB er blevet forbedret og en emissionsopgørelse for PCBs er blevet udarbejdet.

Transport

Følgende genberegninger og forbedringer af emissionsopgørelsen er udført siden 2013-rapporteringen:

Vejtransport

Baseret på den opdaterede version af COPERT IV, der blev lanceret i 2013, er nye køretøjsunderkategorier blevet introduceret i emissionsopgørelsen for passagerbiler og knallerter. For knallerter skelnes der nu mellem 2-taks og 4-taks motorer, mens der for passagerbiler er oprettet nye kategorier for benzinbiler med motorer < 0,8 l og dieselbiler med motorer < 1,4 l. NO_x emissionsfaktorerne for euro 5-passagerbiler er blevet opdateret i modellen baseret på værdierne i den nye COPERT IV-version.

Små fejl i data for benzinforbruget for årene 2009-2011 og for dieselforbruget for årene 2010-2011 er blevet rettet.

De procentvise intervaller for ændring af emissionerne (min %, max %, år) for de forskellige emissionskomponenter er: SO_2 (-0,5 %; 0,0 %, 2008), NO_x (0,0 %; 4,3 %, 2011), NMVOC (-4,1 %; -1,1 %, 2011), NH_3 (-1,3 %; 0,1 %, 2008) og partikler (-2,1 %; 0,0 %, 2011).

Søfart
Ændrede forudsætninger for færgeoverfart for årene 2008-2011 har medført mindre ændringer af emissionerne for national søfart. De følgende maksimale procentvise ændringer for national søfart (i parenteser) som følge af genberegningen er: SO_2 (-0,2 %), NO_x (-0,3 %), NMVOC (-0,5 %), NH_3 (0,0 %) og partikler (-0,5 %).

Landbrug/skovbrug/fiskeri
Antallet og motorstørrelsen af traktorer på maskinstationer er opdateret for årene 2007-2011. Antallet at terrængående maskiner (ATV'er) er blevet opdateret for årene 2009-2011.

Der er rettet fejl angående brændselsforbruget for fiskeri for årene 2000, 2010 og 2011.

I 2000 er der de følgende procentvise ændringer for landbrug/skovbrug/-fiskeri (i parenteser) som følge af genberegningen er: SO_2 (18,2 %), NO_x (11,1 %), NMVOC (3,1 %), NH_3 (0,0 %) og partikler (3,1 %).

For andre år end 2000 er de maksimale procentvise ændringer for landbrug/skovbrug/fiskeri (i parenteser) som følge af genberegningen er: SO_2 (-12,1 %), NO_x (-6,4 %), NMVOC (-0,8 %), NH_3 (1,7 %) og partikler (-2,2 %).

Industry
Antallet af minilæssere er opdateret for årene 2004-2011.

De følgende maksimale procentvise ændringer for national søfart (i parenteser) som følge af genberegningen er: SO_2 (1,7 %), NO_x (1,6 %), NMVOC (1,9 %), NH_3 (1,6 %) og partikler (3,4 %).

Indenrigsluftfart
En mindre fejl i NMVOC-emissionsfaktoren er blevet rettet for årene 1985-2011, pga. opdateringer af CH_4 emissionsfaktorerne for årene 1985-2000 og ændringer i fordelingen mellem NMVOC og CH_4. Emissionsfaktorerne er nu i overensstemmelse med emissionsfaktorerne i EMEP/EEA Guidebook. De procentvise ændringer i NMVOC-emissionen er mellem -3.1 % and 1.8 %.

Militær
Emissionsfaktorer udledt fra de nye simuleringer af vejtransport har medført ændringer af emissionerne for årene 1985-2011. De procentvise intervaller for ændring af emissionerne for militær (min %, maks. %, år) for de forskellige emissionskomponenter er: SO_2 (0,0 %), NO_x (2,5 %), NMVOC (-1,1 %,), NH_3 (0,2 %) og partikler (-1,7 %).

Flygtige emissioner

Tankstationer
Aktivitetsdata er blevet opdateret for årene 2009-2011 baseret på den nyeste energistatistik offentliggjort af Energistyrelsen. Den største genberegning er

for 2010 og har øget NMVOC-emissionen med 0,02 kton, svarende til 0,2 % af den samlede flygtige NMVOC-emission i 2010.

Naturgas - transmission og distribution

Aktivitetsdata og afledte emissionsfaktorer for tidsserien 1990-2011 er blevet opdateret for transmission og distribution af naturgas baseret på oplysninger i grønne regnskaber og den seneste energistatistik. Den største genberegning er for 2002, hvor emissionen blev øget med 0,75 kton, svarende til 4 % af den samlede flygtige NMVOC-emission i 2002.

Venting

Emissionsfaktorer for NMVOC er blevet tilføjet emissionsdatabasen for årene 1990-1993 for et gaslager. I disse år er anlægget inkluderet som en arealkilde i den nationale emissionsdatabase, mens det er behandlet som en punktkilde i de følgende år. Emissionsfaktorerne er baseret på data fra grønne regnskaber for 1995-1999, da der ikke er tilgængelige data for årene 1990-1994.

En mindre fejl er blevet rettet i 2011 baseret på opdaterede oplysninger i det grønne regnskab fra et af de danske naturgaslagre.

Genberegningen har øget NMVOC-emissionen med 0,02 ton og CO-emissionen med 0.07 ton for hver af årene i perioden 1990-1993, svarende til henholdsvis 17 % og 25 % af den samlede flygtige emission i 1993.

Industrielle processer

Emissioner af HCB og PCBs er blevet inkluderet i emissionsopgørelsen. Derudover er emissioner fra produktionen af tjæreprodukter også blevet inkluderet.

Opløsningsmidler og anden produktanvendelse

Forbedringer og tilføjelser bliver løbende implementeret som følge af omfanget og kompleksiteten af anvendelse af opløsningsmidler, der indeholder produkter i industri og husholdninger. De vigtigste genberegninger i 2014-rapporteringen er følgende:

- Opdaterede statistiske data for anvendeles af tobak, fyrværkeri, lys og grillkul.
- Emissionsfaktorer for NH_3, PCBs, HCB, Cu, benzo(b)flouranthene, benzo(k)flouranthene, benzo(a)pyrene and PCBs er blevet tilføjet den nationale emissionsfaktordatabase for grillkul. PM_{10}- og $PM_{2.5}$-emissionsfaktorer er blevet tilføjet for lys. Derudover er emissionsfaktorerne for Cr, TSP, PM_{10} og $PM_{2.5}$ blevet opdateret for grillkul.

Landbrug

Der er foretaget genberegninger i opgørelsen for NH_3 og PM. Ændringerne har medført en relativ stor stigning i emissionen af NH_3 for alle årene i tidsserien (1985-2011) på mellem 5-10 %, samt et fald i partikelemissionen for årene 2000-2011 på 3-5 %.

Emissionen af NH_3 er steget for alle år pga. opdaterede emissionsfaktorer for handelsgødning. De opdaterede emissionsfaktorer kommer fra 2013-udgaven af EMEP/EEA Guidebook. Der er også foretaget genberegninger af NH_3-emissionen fra gødningshåndtering. Disse skyldes en opdatering af antallet af gæs for alle år, en opdatering af antallet af slagtesvin og smågrise i 2011 samt en opdatering af staldtypefordelingen for høns i 2011.

Emissionen af partikler faldt for alle år i tidsserien pga. opdateringer i partikelemissionsfaktorerne i 2013-udgaven af EMEP/EEA Guidebook. Faldet skyldes hovedsageligt et fald i emissionsfaktorerne for slagtesvin og smågrise.

Affald

For sektor 6C Affaldsforbrænding er der foretaget genberegninger for kremeringer. Indflydelsen af røggasrensning på emissionsfaktorerne for tungmetaller, PAHs samt dioxiner og furaner er taget i betragtning, hvilket reducerer emissionsfaktorerne for disse forureningskomponenter for 2011. Derudover er $PM_{2.5}$-emissionsfaktoren blevet rettet så den udgør 80 % af TSP-emissionsfaktoren og ikke som rapporteret i 2013 90 % af TSP-emissionsfaktoren. Denne fejlretning har medført et fald i emissionen for alle år i tidsserien (2000-2011).

For sektor 6D Øvrig er der foretaget flere genberegninger. NH_3-emissionsfaktorerne for kompostering af slam og organisk affald er blevet opdateret. De nye emissionsfaktorer medfører et fald i NH_3-emissionen for årene 1985-1997 (0,3-0,7 %) samt en stigning i NH_3-emissionen for årene 1998-2011 (2,1-19,3 %).

For bilbrande er der foretaget en opdatering i bestandsdata, som har medført et lille fald i aktivitetsdata for brande i traktorer og mejetærskere. Derudover er gennemsnitsvægtene, der er antaget for campingvogne, campere, mejetærskere, motorcykler og knallerter blevet opdateret på baggrund af mere velfunderede ekspertvurderinger. Emissionsfaktorerne for partikler og tungmetaller er blevet opdateret. Mens ændringerne i aktivitetsdata medfører et fald i emissionerne for 1980-1999 (5-16 %) og mindre ændringer for årene 2000-2011 (-5-4 %), så betyder de nye emissionsfaktorer en betydelig stigning (1413-1874 %) i emissionerne af partikler og tungmetaller for alle år i tidsserien.

Der er ikke nogen genberegninger for husbrande.

1 Introduction

1.1 Background information on emission inventories

DCE (Danish Centre for Environment and Energy), Aarhus University is contracted by the Ministry of the Environment and the Ministry of Climate, Energy and Building to complete emission inventories for Denmark. Department of Environmental Science, Aarhus University is responsible for calculation and reporting of the Danish national emission inventory to EU and the UNFCCC (United Nations Framework Convention on Climate Change) and UNECE CLRTAP (Convention on Long Range Transboundary Air Pollution) conventions.

1.1.1 Annual report

According to the guidelines for reporting emission data under the Convention on Long-Range Transboundary Air Pollution (ECE/EB.AIR/97) prepared by the Task Force on Emission Inventories and Projections and approved by the Executive Body, countries that are parties to the UNECE-Convention on Long-Range Transboundary Air Pollution should annually submit an informative inventory report to the Secretariat. The current reporting Guidelines (ECE/EB.AIR/97) were accepted at the meeting of the Executive Body in December 2008. Due to a lack of resources, it has not been possible to incorporate the new elements of the reporting guidelines in this submission.

New reporting Guidelines were proposed at the meeting of the Executive Body in December 2013. However, at the time of preparation of this report the final decisions from the Executive Body session had not been published.

This report is Denmark's Annual Informative Inventory Report due March 15, 2014. The report contains information on Denmark's inventories for all years from the base years of the protocols to 2012.

The annual emission inventory for Denmark is reported in the Nomenclature for Reporting (NFR) 2009 format.

The issues addressed in this report are: trends in emissions, description of each NFR category, uncertainty estimates, recalculations, planned improvements and procedures for quality assurance and control. The outline in annex V of the reporting guidelines is followed as far as possible.

This report and NFR tables are available to the public on DCE's homepage:
http://envs.au.dk/videnudveksling/luft/emissioner/emissioninventory/

and on the Eionet central data repository:
http://cdr.eionet.europa.eu/dk/Air_Emission_Inventories/Submission_EMEP_UNECE

1.2 A description of the institutional arrangement for inventory preparation

DCE (Danish Centre for Environment and Energy, Aarhus University, is responsible for the annual preparation and submission to the UNECE-LRTAP Convention of the Annual Danish Emissions Report, and the inventories in the NFR Format in accordance with the guidelines. DCE participates in meetings under the UNECE Task Force on Emission Inventories and Projections and the related expert panels where parties to the convention prepare the guidelines and methodologies on inventories. DCE is also responsible for estimating emissions for reporting to the NEC Directive, but the Danish EPA is responsible for the reporting.

The work concerning the annual emission inventory is carried out in co-operation with other Danish ministries, research institutes, organisations and companies:

Danish Energy Agency (DEA), Ministry of Climate, Energy and Building:
Annual energy statistics in a format suitable for the emission inventory work and fuel-use data for the large combustion plants.

Danish Environmental Protection Agency (DEPA), Ministry of the Environment:
Company reporting to e.g. the PRTR. Database on waste.

Statistics Denmark, Ministry of Economic Affairs and the Interior:
Statistical yearbook, production statistics for manufacturing industries, agricultural statistics and import/export/production figures for solvents.

DCA (Danish Centre for Food and Agriculture), Aarhus University:
Data on use of mineral fertiliser, feeding stuff consumption and nitrogen turnover in animals.

The Road Directorate, Ministry of Transport:
Number of vehicles grouped in categories corresponding to the EU classification, mileage (urban, rural, highway), trip speed (urban, rural, highway).

Civil Aviation Agency of Denmark, Ministry of Transport:
City-pair flight data (aircraft type and origin and destination airports) for all flights leaving major Danish airports.

Danish Railways, Ministry of Transport:
Fuel-related emission factors for diesel locomotives.

Danish companies:
Audited environmental reports and direct information gathered from producers and agency enterprises.

Formerly, the provision of data was on a voluntary basis, but now formal agreements are in place with the most important data suppliers, e.g. the Danish Energy Agency and DCA.

1.3 Brief description of the process of inventory preparation. Data collection and processing, data storage and archiving

The background data (activity data and emission factors) for estimation of the Danish emission inventories is collected and stored in central databases located at DCE. The databases are in Access format and handled with software developed by the European Environmental Agency (EEA) and DCE. As input to the databases, various sub-models are used to estimate and aggregate the background data in order to fit the format and level in the central databases. The methodologies and data sources used for the different sectors are described in Chapter 1.4 and Chapters 3 to 7. As part of the QA/QC plan (Chapter 1.5), the data structure for data processing support the pathway from collection of raw data to data compilation, modelling and final reporting.

For each submission, databases and additional tools and submodels are frozen together with the resulting NFR-reporting format. This material is placed on central institutional servers, which are subject to routine back-up services. Material, which has been backed up is archived safely. A further documentation and archiving system is the official journal for DCE, for which obligations apply to DCE, as a governmental institute. In this journal system, correspondence, both in-going and out-going, is registered, which in this case involves the registration of submissions and communication on inventories with the UNECE-LRTAP Secretariat, the European Commission, review teams, etc.

Figure 1.1 shows a schematic overview of the process of inventory preparation. The figure illustrates the process of inventory preparation from the first step of collecting external data to the last step, where the reporting schemes are generated for the UNFCCC and EU (in the CRF format (Common Reporting Format)) and to the United Nations Economic Commission for Europe/Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (UNECE/EMEP) (in the NFR format (Nomenclature For Reporting)). For data handling, the software tool is CollectER (Pulles et al., 1999) and for reporting the software tool is developed by DCE. Data files and programme files used in the inventory preparation process are listed in Table 1.1.

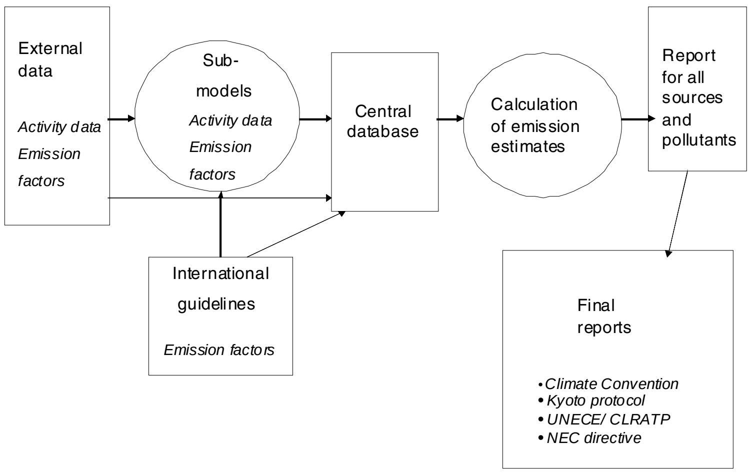

Figure 1.1 Schematic diagram of the process of inventory preparation.

Table 1.1 List of current data structure; data files and programme files in use.

QA/QC Level	Name	Application type	Path	Type	Input sources
4 store	CFR Submissions (UNFCCC and EU) NFR Submissions (UNECE and EU)	External report	U:\ST_ENVS-LUFT-EMI\Inventory\AllYears\8_AllSectors\Level_4a_Storage\	MS Excel, xml	CRF Reporter
3 process	CRF Reporter	Management tool	Working path: local machine Archive path: U:\ST_ENVS-LUFT-EMI\Inventory\AllYears\8_AllSectors\Level_3b_Processes	(exe + mdb)	Manual input and Import-er2CRF
3 process	Importer2CRF	Help tool	U:\ST_ENVS-LUFT-EMI\Inventory\AllYears\8_AllSectors\Level_3b_Processes	MS Access	CRF Report-er, Collec-lec-tEr2CRFand excel files
3 process	CollectER2CRF	Help tool	U:\ST_ENVS-LUFT-EMI\Inventory\AllYears\8_AllSectors\Level_3b_Processes	MS Access	NERIRep
2 process 3 store	NERIRep	Help tool	Working path: U:\ST_ENVS-LUFT-EMI\Inventory\AllYears\8_AllSectors\Level_3a_Storage	MS Access	CollectER databases; dk1972.mdb..dkxxxx.mdb
2 process	CollectER	Management tool	Working path: local machine Archive path: U:\ST_ENVS-LUFT-EMI\Inventory\AllYears\8_AllSectors\Level_2b_Processes	(exe +mdb)	manual input
2 store	dk1980.mdb.dkxxxx.mdb	Datastore	U:\ST_ENVS-LUFT-EMI\Inventory\AllYears\8_AllSectors\Level_2a_Storage	MS Access	CollectER

1.4 Brief description of methodologies and data sources used

Denmark's air emission inventories are based on the EMEP/EEA Guidebook, the CORINAIR methodology as well as the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC, 1997) and the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000). CORINAIR (COoRdination of INformation on AIR emissions) is a European air emission inventory programme for national sector-wise emission estimations, harmonised with the IPCC guidelines. In 2013 a new edition of the EMEP/EEA Guidebook (EEA, 2013) was adopted for use by the EMEP Executive Body, the changes in the 2013 edition have only been reflected to a limited extent in this submission and the changes will be implemented depending on the availability of resources. In 2009 the EMEP/CORINAIR Guidebook changed name to the EMEP/EEA Guidebook (EEA, 2009). In this change the Guidebook switched nomenclature from SNAP to NFR.

The Danish inventory is prepared at the more detailed SNAP level rather than at the NFR level that is only suitable for reporting. To ensure estimates are as timely, consistent, transparent, accurate and comparable as possible, the inventory programme has developed calculation methodologies for most subsectors and software for storage and further data processing.

A thorough description of the CORINAIR inventory programme used for Danish emission estimations is given in Illerup et al. (2000). The CORINAIR calculation principle is to calculate the emissions as activities multiplied by emission factors. Activities are numbers referring to a specific process generating emissions, while an emission factor is the mass of emissions pr unit activity. Information on activities to carry out the CORINAIR inventory is largely based on official statistics. The most consistent emission factors have been used, either as national values or default factors proposed by international guidelines.

A list of all subsectors at the most detailed level is given in Illerup et al. (2000) together with a translation between CORINAIR and IPCC codes for sector classifications.

1.4.1 The specific methodologies regarding stationary combustion

Stationary combustion plants are part of the CRF emission sources 1A1 Energy Industries, 1A2 Manufacturing Industries and 1A4 Other sectors.

The Danish emission inventory for stationary combustion plants is based on the former CORINAIR system. The emission inventory for stationary combustion is based on activity rates from the Danish energy statistics. General emission factors for various fuels, plants and sectors have been determined. Some large plants, such as power plants, are registered individually as large point sources and plant-specific emission data are used.

The fuel consumption rates are based on the official Danish energy statistics prepared by the Danish Energy Agency (DEA). DCE aggregates fuel consumption rates to SNAP categories. The fuel consumption of the NFR category 1A4 Manufacturing industries and construction is disaggregated to subsectors according to the DEA data prepared and reported to Eurostat.

For each of the fuel and SNAP categories (sector and e.g. type of plant), a set of general emission factors has been determined. Some emission factors refer to the EMEP/EEA Guidebook and some are country specific and refer to Danish legislation, Danish research reports or calculations based on emission data from a considerable number of plants.

A number of large plants, e.g. power plants, municipal waste incineration plants and large industrial plants are registered individually as large point sources. This enables use of plant-specific emission factors that refer to emission measurements stated in annual environmental reports. Emission factors of SO_2, NO_X, HM and PM are often plant specific.

Please refer to Chapter 3.2 and Annex 2A for further information on emission inventories for stationary combustion plants.

1.4.2 Specific methodologies regarding transport

The emissions from transport referring to SNAP category 07 (Road transport) and the sub-categories in 08 (Other mobile sources) are made up in the NFR categories; 1A3b (Road transport), 1A2f (Industry-other), 1A3a (Civil aviation), 1A3c (Railways), 1A3d (Navigation), 1A4c (Agriculture/forestry/-fisheries), 1A4a (Commercial/institutional), 1A4b (Residential) and 1A5 (Other).

An internal DCE model with a structure similar to the European COPERT IV emission model (EEA, 2009) is used to calculate the Danish annual emissions for road traffic. The emissions are calculated for operationally hot engines, during cold start and fuel evaporation. The model also includes the emission effect of catalyst wear. Input data for vehicle stock and mileage is obtained from DTU Transport and Statistics Denmark, and is grouped according to average fuel consumption and emission behaviour. For each group, the emissions are estimated by combining vehicle type and annual mileage figures with hot emission factors, cold:hot ratios and evaporation factors (Tier 2 approach).

For air traffic, from 2001 onwards estimates are made on a city-pair level, using flight data provided by the Danish Civil Aviation Agency (CAA-DK) for flights between Danish airports and flights between Denmark and Greenland/Faroe Islands, and LTO and distance-related emission factors from the CORINAIR guidelines (Tier 2 approach). For previous years, the background data consists of LTO/aircraft type statistics from Copenhagen Airport and total LTO numbers from CAA-DK. With appropriate assumptions, consistent time series of emissions are produced back to 1990 and include the findings from a Danish city-pair emission inventory in 1998.

Off-road working machines and equipment are grouped in the following sectors: inland waterways (pleasure craft), agriculture, forestry, industry, and household and gardening. The sources for stock and operational data are various branch organisations and key experts. In general, the emissions are calculated by combining information on the number of different machine types and their respective load factors, engine sizes, annual working hours and emission factors (Tier 2 approach).

The inventory for navigation consists of regional ferries, local ferries and other national sea transport (sea transport between Danish ports and between Denmark and Greenland/Faroe Islands). For regional ferries, the fuel consumption and emissions are calculated as a product of number of round trips per ferry route (Statistics Denmark), sailing time per round trip, share of round trips per ferry, engine size, engine load factor and fuel consumption/emission factor. The estimates take into account the changes in emission factors and ferry specific data during the inventory period.

For the remaining navigation categories, the emissions are calculated simply as a product of total fuel consumption and average emission factors. For each inventory year, this emission factor average comprises the emission factors for all present engine production years, according to engine life times.

Please refer to Chapter 3.3 and Annex 2B for further information on emissions from transport.

1.4.3 The specific methodologies regarding fugitive emissions

Fugitive emissions from oil (1.B.2.a)

Fugitive emissions from oil are estimated according to the methodology described in the Emission Inventory Guidebook (EEA, 2009). The sources include offshore extraction of oil and gas, onshore oil tanks, onshore and offshore loading of ships, and gasoline distribution. Activity data are given in the Danish Energy Statistics by the Danish Energy Agency. The emission factors are based on the figures given in the guidebook except in the case of onshore oil tanks and gasoline distribution where national values are included.

The VOC emissions from petroleum refinery processes cover non-combustion emissions from feed stock handling/storage, petroleum products processing, and product storage/handling. SO_2 is also emitted from non-combustion processes and includes emissions from product processing and sulphur-recovery plants. The emission calculations are based on information from the Danish refineries.

Fugitive emissions from natural gas (1.B.2.b)

Inventories of NMVOC emission from transmission and distribution of natural gas and town gas are based on annual environmental reports from the Danish gas transmission company and annual reports for the gas distribution companies. The annual gas composition is based on from the national transmission company.

Fugitive emissions from flaring (1.B.2.c)

Emissions from flaring offshore, in gas treatment and storage plants, and in refineries are included in the inventory. Emissions calculations are based on annual reports from the Danish Energy Agency and environmental reports from gas storage and treatment plants and the refineries. Calorific values are based on the reports for the EU ETS for offshore flaring, on annual gas quality data from Energinet.dk, and on additional data from the refineries. Emission factors are based on national studies and the EMEP/EEA Guidebook (EEA, 2009).

Please refer to Chapter 3.4 for further information on fugitive emissions from fuels.

1.4.4 Specific methodologies regarding industrial processes

Energy consumption associated with industrial processes and the emissions thereof is included in the inventory for stationary combustion plants. This is due to the overall use of energy balance statistics for the inventory.

Mineral products

The sub-sector includes production of cement, lime, container glass/glass wool, mineral wool, other production (consumption of lime), and roofing and road paving with asphalt. The activity data as well as emission data are primarily based on information from Environmental Reports (In Danish: "Grønne regnskaber") prepared by companies according to obligations under Danish law. Also, data on production and import/export from Statistics Denmark are used. The published information is supplemented with information obtained directly from companies or by use of standard emission factors. The distribution of TSP between PM_{10} and $PM_{2.5}$ is based on European average data.

Chemical industry

The sub-sector includes production of nitric and sulphuric acid (ceased in 1997 and 2004, respectively), catalysts, fertilisers and pesticides. The activity data as well as emission data are based on information from the companies as accounted for and published in the Environmental Reports combined with information obtained by contact to the companies. The distribution of TSP between PM_{10} and $PM_{2.5}$ is based on European average data.

Metal production

The sub-sector includes electro steelwork, production of steel sheets and bars (electro steelwork until 2005 and thereafter, only rolling mills), cast iron, aluminium (ceased in 2008), lead and lead products and various other metal products. The activity data as well as emission data for the steelworks are based on information from the companies as accounted for and published in the Environmental Reports, combined with information obtained through contact with the companies. The activity data for the other processes are based on information from Statistics Denmark combined with Danish average emission factors and standard emission factors. The particle size distribution of TSP (PM_{10} and $PM_{2.5}$) is based on European average data.

Other production

The sub-sector includes breweries, production of spirits and other activities within the food sector e.g. sugar production, meat curing and production of margarine and solid cooking fats. The activity data are obtained from Statistics Denmark and the emission factors are obtained from the EMEP/EEA Guidebook combined with emission factors (EF) derived from specific emission measurements at the companies.

Please refer to Chapter 4 for further information on industrial processes.

1.4.5 Specific methodologies regarding solvent and other product use

The approach for calculating the emissions of Non-Methane Volatile Organic Carbon (NMVOC) from industrial and household use in Denmark focuses on single chemicals rather than activities. This leads to a clearer picture of the influence from each specific chemical, which enables a more detailed differentiation on products and the influence of product use on emissions. The procedure is to quantify the use of the chemicals and estimate the fraction of the chemicals that is emitted as a consequence of use.

The detailed approach in EMEP/EEA Guidebook (2009) is used. Here all relevant consumption data on all relevant solvents must be inventoried or at least those together representing more than 90 % of the total NMVOC emission. Simple mass balances for calculating the use and emissions of chemicals are set up 1) use = production + import – export, 2) emission = use emission factor. Production, import and export figures are extracted from Statistics Denmark, from which a list of more than 400 single chemicals, a few groups and products is generated. For each of these, a "use" amount in tonnes per year (from 1990 to 2012) is calculated. For some chemicals and/or products, e.g. propellants used in aerosol cans and ethanol used in windscreen washing agents, use amounts are obtained from the industry as the information from Statistics Denmark does not comply with required specificity. It is found that approximately 40 different NMVOCs comprise over 95 % of the total use and it is these 40 chemicals that are investigated further. The "use" amounts are distributed across industrial activities according to the Nordic SPIN (Substances in Preparations in Nordic Countries) database, where information on industrial use categories is available in a NACE coding system. The chemicals are also related to specific products according to the Use Category (UCN) system. Emission factors are obtained from regulators, literature or the industry.

The same method is used for calculating emissions from the use of fireworks, tobacco, candles and charcoal for barbeques (BBQ). These activities lead to emissions of SO_2, NO_x, CO, NH_3, particles, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, dioxins/furans and PAHs.

Outputs from the inventory are: a list where the approx. 40 most predominant NMVOCs are ranked according to emissions to air, specification of emissions from industrial sectors and from households, contribution from each chemical to emissions from industrial sectors and households. Furthermore, trends in NMVOC emissions expressed as total NMVOC and single chemical and specified in industrial sectors and households are shown.

Please refer to Chapter 5 and Annex 5E for further information on the emission inventory for solvents.

1.4.6 Specific methodologies regarding agriculture

The emission from agricultural activities covers ammonia emission from manure management and agricultural soils and PM emission from animal production. Furthermore, the inventory includes emission from field burning of straw which covers NH_3, PM, NO_x, CO, NMVOC, SO_2, heavy metals, dioxin and PAH.

Emissions from agricultural activities are estimated according to the methodology described in the EMEP/EEA air pollutant emission inventory guidebook (EEA, 2009). Activity data and national data regarding emission factors are collected, evaluated and discussed in cooperation with Statistics Denmark, DCA-Danish Centre for Food and Agriculture (Aarhus University), the Danish Agricultural Advisory Service, Danish Environmental Protection Agency and the Danish AgriFish Agency. It means that data are evaluated continuously according to the latest knowledge and information.

The Danish agricultural emissions are calculated and managed in a comprehensive model complex called IDA (Integrated Database model for Agricultural emissions), which is used to calculate both air pollutants compounds and greenhouse gas related emissions. The livestock production has a great influence on the Danish agricultural emissions. IDA works with 38 different livestock categories, dependent on livestock category, weight class and age. Each of these subcategories is subdivided according to housing type and manure type, which results in about 200 different combinations of subcategories and housing type and the emissions are calculated from each of these combinations and aggregated to relevant main categories in the reporting format.

Most of the emissions from agricultural activities are directly related to livestock production. The remaining part comes from the use of synthetic fertiliser, growing crops, NH_3 treated straw, field burning of agricultural residues and sewage sludge applied to fields as fertiliser. The number of animals can be considered as the most important activity data in estimation of the agricultural emissions.

The number of animals is mainly based on data from Statistics Denmark. For data covering pigs, bulls and poultry, the number is based on slaughter data also collected from the Agricultural Statistics. The production of sheep, goats and horses typically take place on small farms below 5 hectare, which is not included in the annual statistics and the production of these categories as well as for deer and ostriches are therefore based on the Central House-animal farm Register (CHR) managed by the Ministry of Food, Agriculture and Fisheries.

Data concerning nitrogen excretion, distribution of housing types until 2004 and handling of manure is based on data and information from DCA-Danish Centre for Food and Agriculture at Aarhus University and the Danish Agricultural Advisory Service. From 2005 annual statistics covering housing types are available from the Danish AgriFish Agency.

Data related to use of synthetic fertiliser, both the amount of fertiliser and the nitrogen content is based on statistics published by the Danish AgriFish Agency.

Please refer to Chapter 6 and Appendix 2C for further information on emission inventories for agriculture.

1.4.7 Specific methodologies regarding waste

The waste sector consists of the four main NFR categories 6A Solid waste disposal on land, 6B Wastewater handling, 6C Waste incineration and 6D Other waste.

Emissions from solid waste disposal on land and wastewater handling are currently not estimated.

Waste Incineration covers the cremation of human bodies and animal carcasses. Both are calculated as an activity multiplied by an emission factor.

The Other Waste category includes compost production, accidental building- and vehicle fires

Composting includes four types of biological waste; garden and park waste, organic waste from households and other sources, sludge and home composting of garden and vegetable food waste. Individual emission factors are found for each waste category.

Emissions from building fires are calculated by multiplying the number of building fires with selected emission factors. Six types of buildings are separated with different emission factors; detached houses, undetached houses, apartment buildings, industrial buildings, additional buildings and containers.

Activity data for building fires are classified in four categories; full scale, large, medium and small. The emission factors comply for full scale building fires and the activity data are therefore recalculated as a full scale equivalent where it is assumed that a large, medium and small fire leads to 75 %, 30 % and 5 % of a full scale fire respectively.

Emissions from vehicle fires are calculated by multiplying the total burnt vehicle mass with selected emission factors. 14 different vehicle types are included in the total mass of burned vehicle. Emission factors are not available for different vehicle types, why it is assumed that all the different vehicle types lead to similar emissions. As with accidental building fires, four different sizes are known in relation to damage; full scale (100 % burnout), large (75 %), medium (30 %) and small (5 %).

Please refer to Chapter 7 and Annex 2D for further information on emission inventories for agriculture.

1.5 Key categories

The determination of key categories has not been made due to insufficient resources being available at the moment.

1.6 Information on the Quality Control and Quality Assurance plan including verification and treatment of confidential issues where relevant

In the Danish National Inventory Report to UNFCCC (Nielsen et al., 2013) as well as in the QA/QC manual for the Danish Greenhouse gas inventory (Nielsen et al., 2012), the plan for Quality Control (QC) and Quality Assurance (QA) for greenhouse gas emission inventories prepared by the Danish National Environmental Research Institute is outlined. The plan is in accordance with the guidelines provided by the UNFCCC (IPCC, 1997) and the “Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories” (IPCC, 2000). The ISO 9000 standards are also used as important input for the plan. The plan also, to a limited extent, includes the gases reported to the UNECE-LRTAP Convention. Due to a lack of resources it has not been possible to extend the QA/QC system for the greenhouse gas inventory to also cover the air pollutants.

1.7 General uncertainty evaluation, including data on the overall uncertainty for the inventory totals

The uncertainty estimates are based on the simple Tier 1 approach in the EMEP/CorinAir *Good Practice Guidance for LRTAP Emission Inventories* (Pulles & Aardenne, 2004).

The uncertainty estimates are based on emission data for the base year and year 2012, and on uncertainties for activity rates and emission factors for each of the main SNAP sectors. For particulate matter, the year 2000 is considered as the base year, but for all other pollutants 1990 is used as the base year.

Uncertainty estimates include uncertainty of the total emission as well as uncertainty of the trend. The estimated uncertainties are shown in Table 1.2. The uncertainty estimates include all sectors.

Table 1.2 Danish uncertainty estimates, 2012.

Pollutant	Uncertainty Total emission [%]	Trend 1990[1)]-2012 [%]	Uncertainty Trend [%-age points]
SO_2	16	-93	1.0
NO_x	39	-58	7
NMVOC	23	-52	10
CO	42	-51	14
NH_3	29	-39	13
TSP	251	-4,5	58
PM_{10}	289	-4,7	69
$PM_{2.5}$	347	-2,9	84
Arsenic	196	-76	28
Cadmium	324	-80	51
Chromium	306	-87	32
Copper	945	30	104
Mercury	164	-90	10
Nickel	399	-78	50
Lead	509	-91	35
Selenium	369	-75	49
Zinc	620	-27	222
PCDD/F	670	-66	183
Benzo(b)fluoranthene	841	70	103
Benzo(k)fluoranthene	764	71	207
Benzo(a)pyrene	878	69	68
Indeno(1,2,3-c,d)pyrene	855	33	42
HCB	534	-91	47
PCBs	701	-62	140

[1]The base year for PM is 2000.

1.8 General assessment of the completeness

Annex 3 provides a full and comprehensive explanation on the use of notation keys in the Danish inventory. The Danish emission inventory due 15 February 2014 includes all sources identified by the EMEP/EEA guidebook except the following.

1.8.1 Industrial processes

Categories reported as not estimated:

- Emissions from quarrying and mining of minerals other than coal
- Emissions from construction and demolition
- Emissions from storage, handling and transport of mineral products
- Emissions from storage, handling and transport of chemical products
- Emissions from storage, handling and transport of metal products

- Emissions from pulp and paper production
- Emissions from wood processing
- Emissions from production of POPs
- Emissions from consumption of POPs and heavy metals

1.8.2 Agriculture

Categories reported as not estimated:

- Emissions from farm level agricultural operations
- Emissions from off-farm storage, handling and transport of agricultural products

1.8.3 Waste

Categories reported as not estimated:

- Emissions from solid waste disposal on land
- Emissions from wastewater handling
- Emissions from small scale waste burning

1.8.4 Categories reported as "included elsewhere"

The following table lists the categories reported as IE (included elsewhere) and provides information on where the associated emissions are reported, more detailed information is provided in Annex 3.

Table 1.3. List of categories reported as included elsewhere.

Category reported as IE	Category where emissions are included
1 A 5 a Other stationary (including military)	1 A 4 a i Commercial / institutional: Stationary
2 A 1 Cement production	1 A 2 f i Manufacturing industries and construction, Other
2 A 2 Lime production	1 A 2 f i Manufacturing industries and construction, Other
2 A 3 Limestone and dolomite use	1 A 2 f i Manufacturing industries and construction, Other
2 A 4 Soda ash production and use	1 A 2 f i Manufacturing industries and construction, Other
6 C a Clinical waste incineration	1 A 1 a Public electricity and heat production
6 C b Industrial waste incineration	1 A 1 a Public electricity and heat production
6 C c Municipal waste incineration	1 A 1 a Public electricity and heat production

1.8.5 General description on the use of notation keys

The NFR as reported by Denmark makes use of five notation keys: NO (Not Occurring), NA (Not Applicable), NE (Not Estimated), IE (Included Elsewhere) and NR (Not Reported).

NO is used in instances where the activity does not occur in Denmark, e.g. adipic acid production, buffaloes, etc.

NA is used in instances where the activity occurs in Denmark but the emission of a certain pollutant is not believed to be relevant, e.g. heavy metals from dairy cattle.

NE is used in instances where the activity occurs in Denmark and emissions of a certain pollutant are thought to occur but the emission has not been estimated; see Chapter 1.8.3 and Annex 3.

IE is used where emissions of a certain pollutant or the whole source category are reported under another source category; see Chapter 1.8.4 and Annex 3.

NR is used for pollutants prior to the base year, e.g. PM emissions prior to the year 2000.

1.9 References

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2 Trends in Emissions

2.1 Acidifying gases

Acid deposition of sulphur and nitrogen compounds mainly derives from emissions of SO_2, NO_X and NH_3. The effects of acidification may appear in a number of ways, including defoliation and reduced vitality of trees, and declining fish stocks in acid-sensitive lakes and rivers.

SO_2 and NO_X can be oxidised into sulphate (SO_4^{--}) and nitrate (NO_3^-) - either in the atmosphere or after deposition - resulting in the formation of two and one H^+, respectively. NH_3 may react with H^+ to form ammonium (NH_4^+) and, by nitrification in soil, NH_4^+ is oxidised to NO_3^- and H^+ ions are formed.

Weighting the individual substances according to their acidification effect, total emissions in terms of acid equivalents can be calculated as:

$$A = \frac{m_{SO_2}}{M_{SO_2}} \cdot 2 + \frac{m_{NO_x}}{M_{NO_x}} + \frac{m_{NH_3}}{M_{NH_3}} = \frac{m_{SO_2}}{64} \cdot 2 + \frac{m_{NO_x}}{46} + \frac{m_{NH_3}}{17}$$

where A is the acidification index in Mmole

m_i is the emission of pollutant i in tonnes

M_i is the mole weight [tonne/Mmole] of pollutant i

The actual effect of the acidifying substances depends on a combination of two factors: the amount of acid deposition and the natural capacity of the terrestrial or aquatic ecosystem to counteract the acidification. In areas where the soil minerals easily weather or have a high lime content, acid deposition will be relatively easily neutralised.

Figure 2.1 shows the emission of Danish acidifying gases in terms of acid equivalents. In 1990, the relative contribution in acid equivalents was almost equal for the three gases. In 2012, the most important acidification factor in Denmark is ammonia nitrogen and the relative contributions for SO_2, NO_X and NH_3 were 5 %, 34 % and 61 %, respectively. However, with regard to long-range transport of air pollution, SO_2 and NO_X are still the most important pollutants.

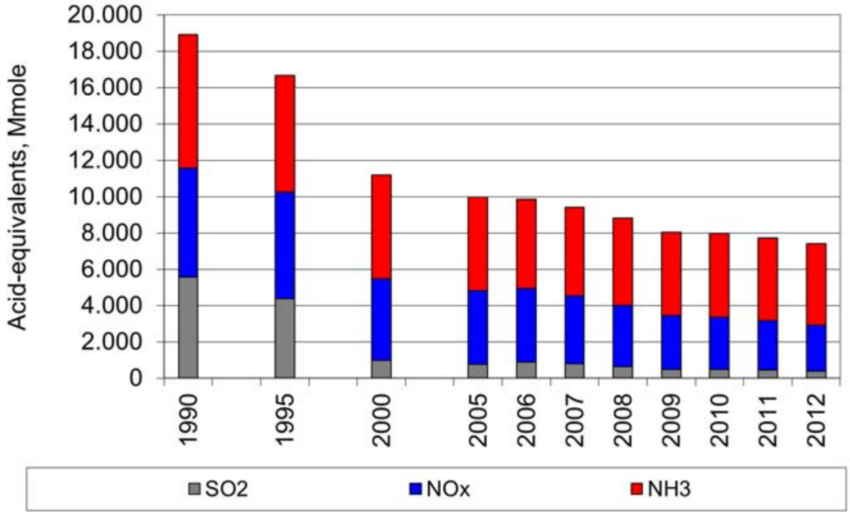
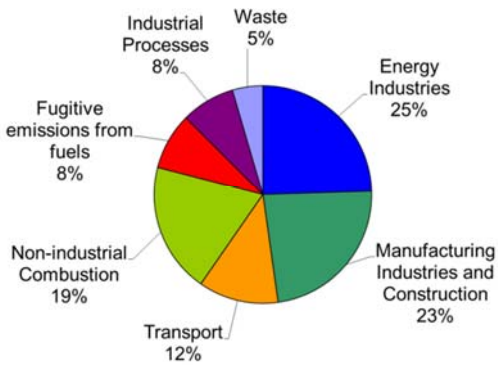


Figure 2.1 Emissions of NH_3, NO_X and SO_2 over time in acid equivalents.

2.2 Description and interpretation of emission trends by gas

2.2.1 Sulphur dioxide (SO_2)

The main part of the sulphur dioxide (SO_2) emission originates from combustion of fossil fuels, i.e. mainly coal and oil, in public power and district heating plants. From 1990 to 2012, the total emission decreased by 93 %. The large reduction is mainly due to installation of desulphurisation plant and use of fuels with lower content of sulphur in public power and district heating plants. Despite the large reduction of the SO_2 emissions, these plants make up 25 % of the total emission. Also emissions from industrial combustion plants, non-industrial combustion plants and other mobile sources are important. National sea traffic (navigation and fishing) contributes with about 13 % of the total SO_2 emission in 2012. This is due to the use of residual oil with high sulphur content.



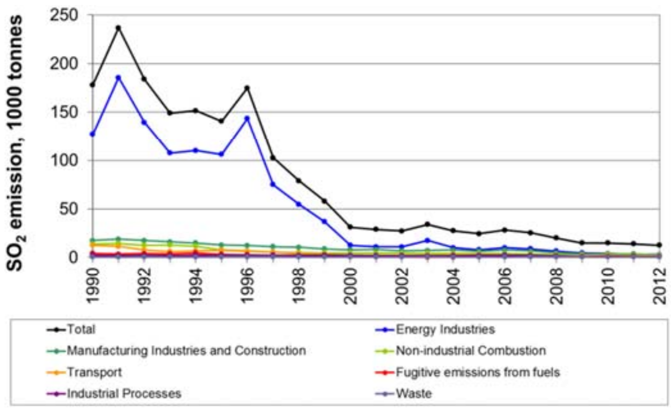


Figure 2.2 SO_2 emissions. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

2.2.2 Nitrogen oxide (NO_x)

The largest sources of emissions of Nitrogen oxide (NO_x) are road transport followed by other mobile sources and combustion in energy industries (mainly public power and district heating plants). The transport sector is the sector contributing the most to the emission of NO_x and, in 2012, 49 % of the Danish emissions of NO_X stems from road transport, national navigation, railways and civil aviation. Also emissions from national fishing and off-road vehicles contribute significantly to the NO_x emission. For non-industrial combustion plants, the main sources are combustion of gas oil, natural gas and wood in residential plants. The emissions from energy industries have decreased by 77 % from 1990 to 2012. In the same period, the total emission decreased by 58 %. The reduction is due to the increasing use of catalyst cars and installation of low-NO_x burners and denitrifying units in power plants and district heating plants.

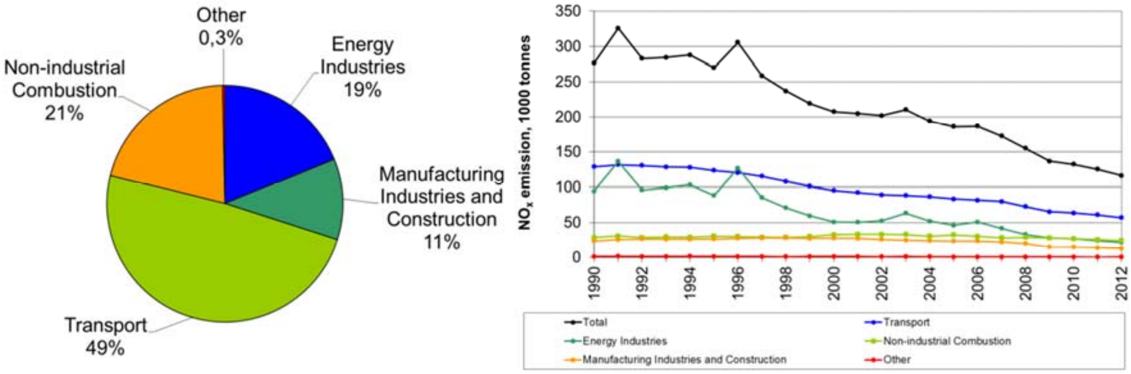


Figure 2.3 NO_X emissions. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

2.2.3 Ammonia (NH_3)

Almost all atmospheric emissions of ammonia (NH_3) result from agricultural activities. Only a minor fraction originates from road transport (2.0 %) and stationary combustion (0.2 %). The share for road transport was increasing during the 1990's and early 2000's due to increasing use of catalyst cars. In more recent years the share has been decreasing due to more advanced catalysts being implemented. The major part of the emission from agriculture stems from livestock manure (80 %) and the largest losses of ammonia occur during the handling of the manure in stables and in field application. Other contributions come from use of mineral fertilisers (10 %), N-excretion on pasture range and paddock (3 %), sewage sludge used as fertiliser, crops and ammonia used for straw treatment (7 %) and field burning (less than 1 %) in 2012. The total ammonia emission decreased by 40 % from 1985 to 2012. This is due to the active national environmental policy efforts over the past twenty years. Due to the action plans for the aquatic environment and the Ammonia Action Plan, a series of measures to prevent loss of nitrogen in agricultural production has been initiated. The measures have included demands for improved utilisation of nitrogen in livestock manure, a ban against field application of livestock manure in winter, prohibition of broadspreading of manure, requirements for establishment of catch crops, regulation of the number of livestock pr hectare and a ceiling for the supply of nitrogen to crops. As a result, despite an increase in the production of pigs and poultry, the ammonia emission has been reduced considerably.

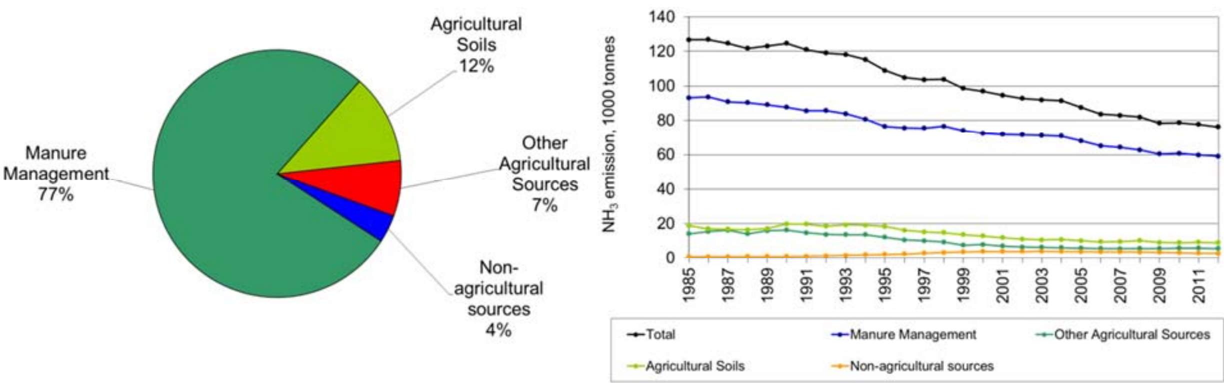


Figure 2.4 NH_3 emissions. Distribution on the main sectors (2012) and time series for 1985 to 2012.

2.3 Other air pollutants

2.3.1 Non-Methane Volatile Organic Compounds (NMVOC)

The emissions of Non-Methane Volatile Organic Compounds (NMVOC) originate from many different sources and can be divided into two main groups: incomplete combustion and evaporation. Road vehicles and other mobile sources such as national navigation vessels and off-road machinery are the main sources of NMVOC emissions from incomplete combustion processes. Road transportation vehicles are still the main contributors, even though the emissions have declined since the introduction of catalyst cars in 1990. The evaporative emissions mainly originate from the use of solvents and the extraction, handling and storage of oil and natural gas. The emissions from the energy industries have increased during the nineties due to the increasing use of stationary gas engines, which have much higher emissions of NMVOC than conventional boilers. The total anthropogenic emissions have decreased by 52 % from 1990 to 2012, largely due to the increased use of catalyst cars and reduced emissions from use of solvents.

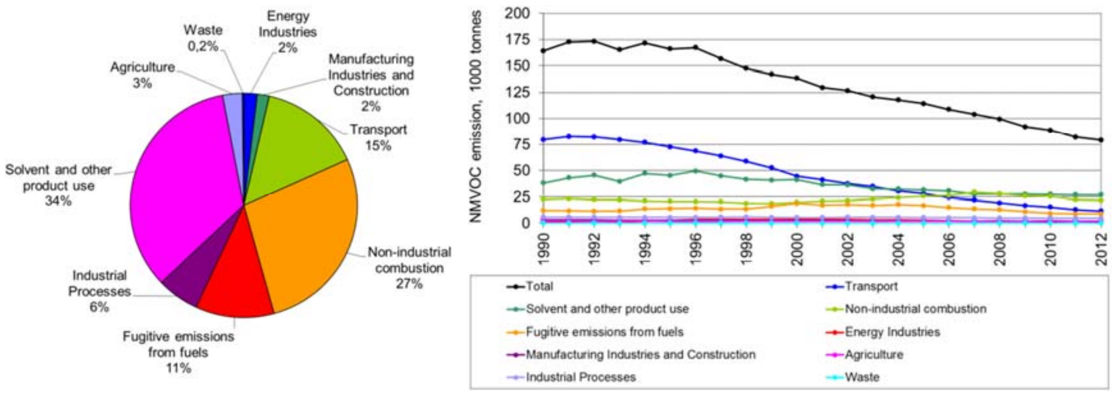


Figure 2.5 NMVOC emissions. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

2.3.2 Carbonmonoxid (CO)

Other mobile sources and non-industrial combustion plants contribute significantly to the total emission of this pollutant. Transport is the second largest contributor to the total CO emission. In 1990 a law forbidding the burning of agricultural crop residues on fields was implemented. This caused significant reduction in CO emission. The emission decreased further by 51 % from 1990 to 2012, largely because of decreasing emissions from road transportation.

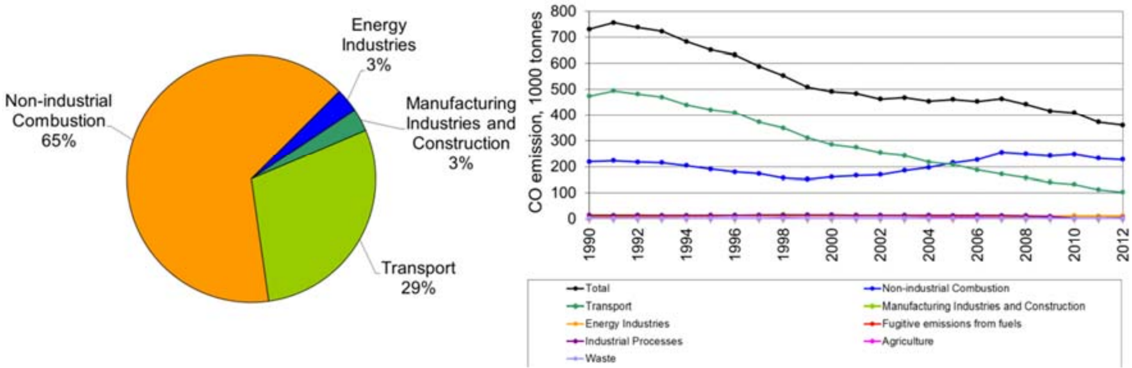


Figure 2.6 CO emissions. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

2.3.3 Particulate Matter (PM)

The particulate matter (PM) emission inventory is reported for the years 2000 onwards. The inventory includes the total emission of particles TSP (Total Suspended Particles), emission of particles smaller than 10 µm (PM_{10}) and emission of particles smaller than 2.5 µm ($PM_{2.5}$).

The largest $PM_{2.5}$ emission sources are residential plants (67 %), road traffic (10 %) and other mobile sources (8 %). For the latter, the most important sources are off-road vehicles and machinery in the industrial sector and in the agricultural/forestry sector (32 % and 37 %, respectively). For the road transport sector, exhaust emissions account for the major part (60 %) of the emissions. The $PM_{2.5}$ emission decreased by 3 % from 2000 to 2012 as the increasing wood consumption in the residential sector has been counterbalanced by decreasing emissions for the remaining sectors, the most important being the Transport sector.

The largest TSP emission sources are the residential sector and the agricultural sector. The TSP emissions from transport are also important and include both exhaust emissions and the non-exhaust emissions from brake and tyre wear and road abrasion. The non-exhaust emissions account for 65 % of the TSP emission from road transport in 2012.

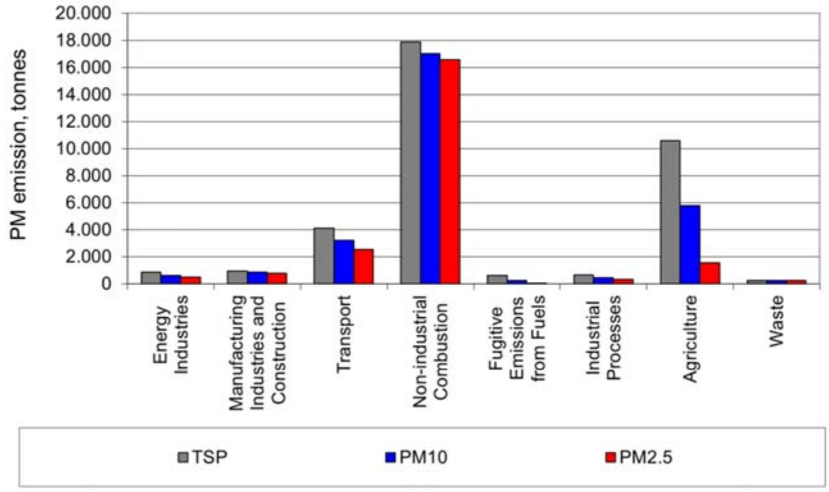
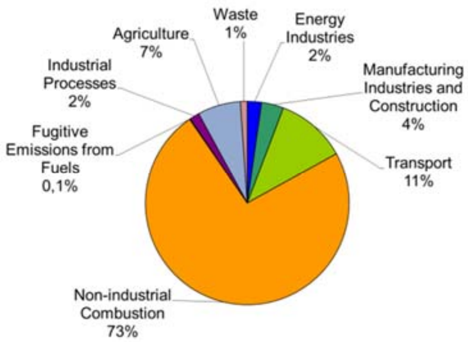


Figure 2.7 PM emissions per sector for 2012.



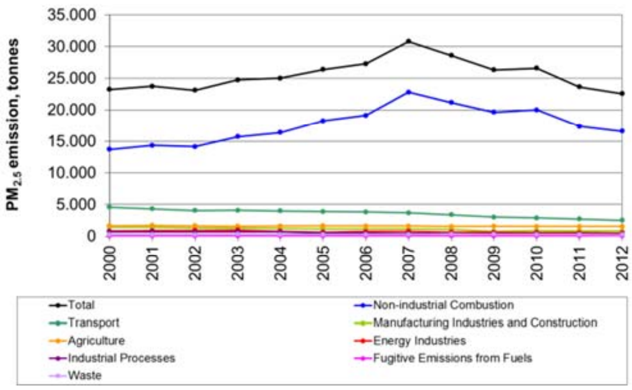


Figure 2.8 $PM_{2.5}$ emissions. Distribution according to the main sectors (2012) and time series for 2000 to 2012.

2.3.4 Heavy metals

In general, the most important sources of heavy metal emissions are combustion of fossil fuels and waste. The heavy metal emissions have decreased substantially in recent years, except for Cu. The reductions span from 27 % to 91 % for Zn and Pb, respectively. The reason for the reduced emissions is mainly increased use of gas cleaning devices at power and district heating plants (including waste incineration plants). The large reduction in the Pb emission is due to a gradual shift towards unleaded gasoline, the latter being essential for catalyst cars. The major source of Cu is automobile tyre and break wear (94 % in 2012) and the 30 % increase from 1990 to 2012 owe to increasing mileage.

Table 2.1 Emissions of heavy metals.

Heavy metals, kilogramme	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
1990	1 307	993	5 904	32 992	3 068	20 853	126 555	4 926	59 473
2012	307	203	757	42 971	314	4 494	11 821	1 242	43 242
Reduction, %	76	80	87	-30	90	78	91	75	27

According to the UNECE Heavy Metal Protocol, the priority metals are Pb, Cd and Hg and the objective is to reduce emissions of these heavy metals.

Cadmium (Cd)

The main sources of emissions of cadmium (Cd) to air are combustion in energy industries (mainly combustion of wood, wood waste and municipal waste) and manufacturing industries (mainly combustion of residual oil). In the transport sector emissions from passenger cars is the main source contributing with 57 % of the sectoral emission in 2012. The emission from non-industrial combustion is dominated by wood combustion in residential plants which accounts for 76 % of the sectoral emission in 2012. Emissions from combustion in residential plants have increased by 97 % since 1990. The decreasing emission from energy industries are related to the decreasing combustion of coal.

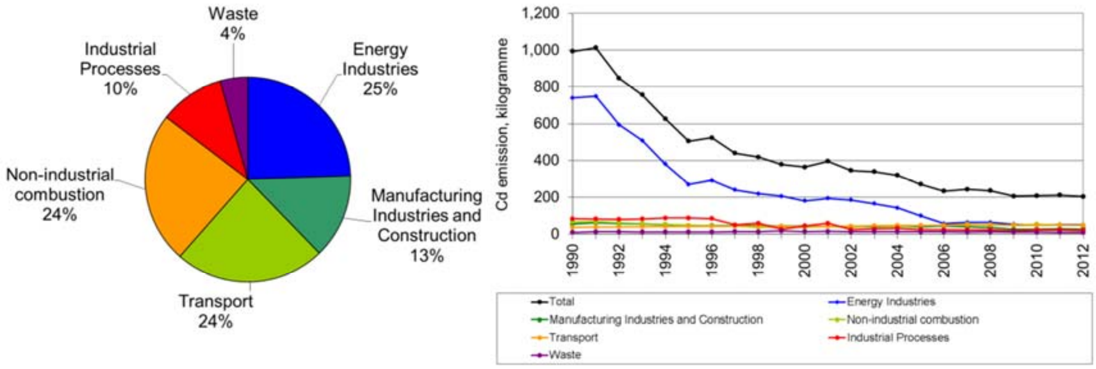


Figure 2.9 Cd emissions. Time series for 1990 to 2012 and distribution by main sector for 2012.

Mercury (Hg)

The largest sources of mercury (Hg) emissions to air are waste incineration and coal combustion in energy industries. Due to improved flue gas cleaning and decreasing coal combustion the emissions from Energy industries decreased by 76 % from 1990-2000. The trend has continued in the following years and the corresponding decrease from 1990-2012 is 93 %. Non-industrial combustion is dominated by wood combustion in residential plants while emissions from the waste sector mainly owe to cremation. The variations in emissions from industrial processes owe to shut down in 2002 followed by re-opening and a second shut down in 2005 of the only Danish electro-steelwork.

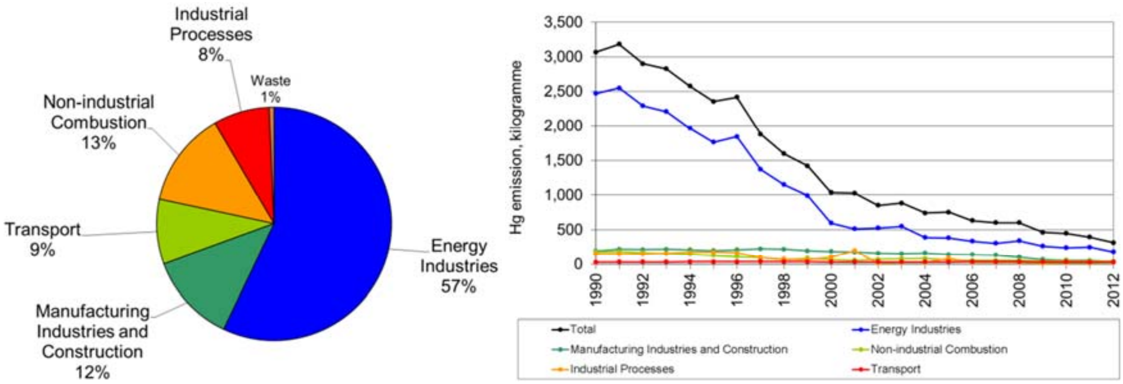


Figure 2.10 Hg emissions. Time series for 1990 to 2012 and distribution by main sector for 2012.

Lead (Pb)

The main lead (Pb) emission sources are combustion in residential plants and energy industries and transport. In earlier years combustion of leaded gasoline was the major contributor to Pb emissions to air but the shift toward use of unleaded gasoline for transport have decreased the Pb emission from transport by 94 % from 1990-2012. In the non-industrial combustion sector the dominant source is wood combustion in residential plants. The trend in the Pb emission from non-industrial combustion from 1990 to 2012 is almost constant. This is due to a decrease in emission caused by the shift towards unleaded gasoline, as this sector includes other mobile sources in household, gardening, agriculture, forestry, fishing and military. This is counteracted by an increase in the emission from residential plants. The decreasing emission from Energy industries (97 % from 1990 to 2012) is caused by the deceasing coal combustion and more efficient particle abatement.

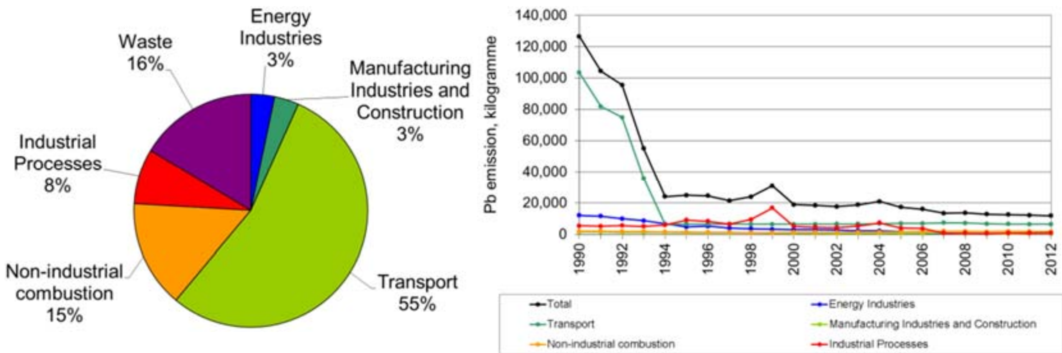


Figure 2.11 Pb emissions. Time series for 1990 to 2012 and distribution by main sector for 2012.

2.3.5 Polycyclic aromatic hydrocarbons (PAHs)

The present emission inventory for polycyclic aromatic hydrocarbons (PAH) includes four PAHs: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene. Benzo(b)fluoranthene and benzo(a)pyrene contribute the major part of the total PAH emission by 34 % and 32 %, respectively in 2012.

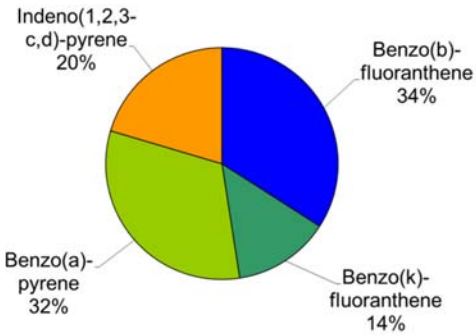


Figure 2.12 PAH emissions. Distribution according to reported PAHs in 2012.

The most important source of PAHs emissions is combustion of wood in the residential sector making up 71 % of the total emission in 2012. The increasing emission trend is due to increasing combustion of wood in the residential sector. The PAH emission from combustion in residential plants has increased by 93 % from 1990 to 2012.

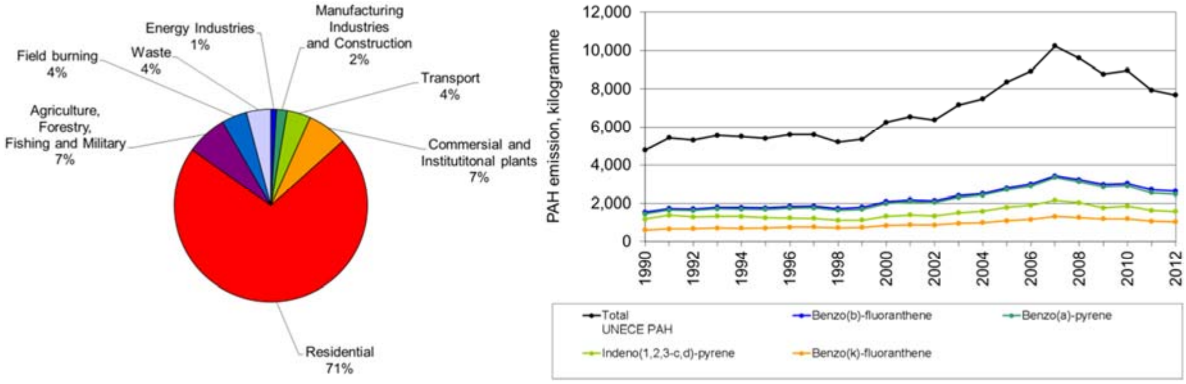


Figure 2.13 PAH emissions. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

2.3.6 Dioxins and furans

The major part of the dioxin emission owes to wood combustion in the residential sector, mainly in wood stoves and ovens without flue gas cleaning. Wood combustion in residential plants accounts for 60 % of the national dioxin emission in 2012. The contribution to the total dioxin emission from the waste sector (25 % in 2012) owes to accidental fires, especially building fires. The emissions of dioxins from energy industries mainly owe to the combustion of biomass as wood, wood waste and to a less extend agricultural waste.

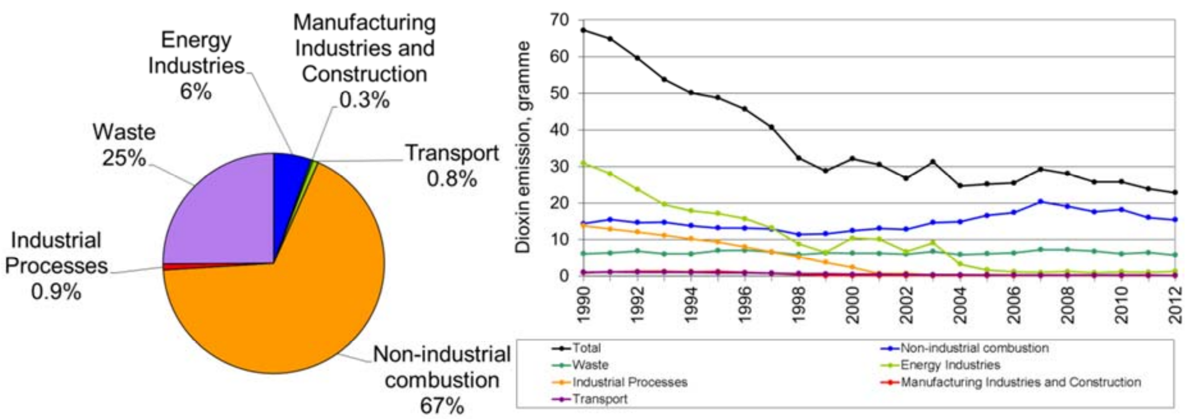


Figure 2.14 Emissions of dioxins and furans. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

2.3.7 Hexachlorobenzene (HCB)

Stationary combustion accounts for 66 % of the estimated national hexachlorobenzene (HCB) emission in 2012. This owes mainly to combustion of municipal solid waste in heating and power plants. Transport is an important source, too, and has increased by 58 % since 1990 due to increasing diesel consumption. The HCB emission from stationary plants has decreased 74 % since 1990 mainly due to improved flue gas cleaning in MSW incineration plants. The emission from agriculture was very high in the early 1990'ties due to the use of pesticides containing impurities of HCB. The HCB emission from agriculture decreased by 94 % from 1990 to 1994 and by 99 % from 1990 to 2012, causing the share of HCB emission from agriculture to drop from 69 % in 1990 to 5 % in 2012. The emission from industrial processes has decreased due to the closure of steel production and secondary aluminium production in Denmark.

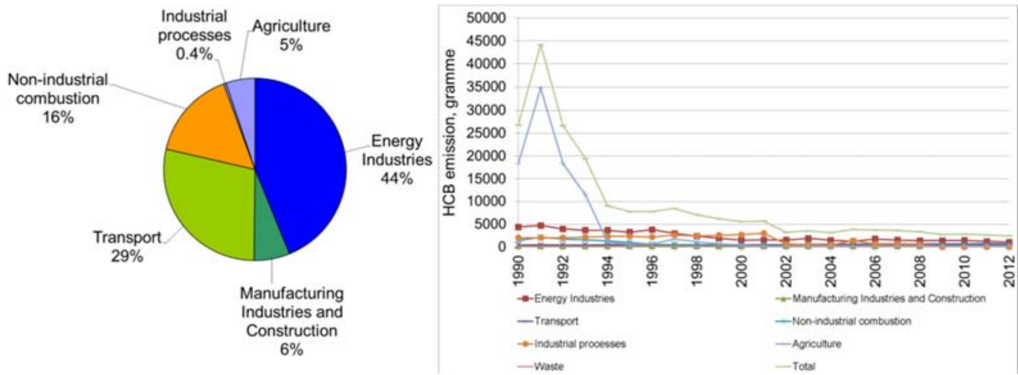


Figure 2.15 HCB emissions. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

2.3.8 Polychlorinated biphenyls (PCBs)

Transport accounts for 59 % of the estimated national polychlorinated biphenyls (PCBs) emission in 2012. This owes mainly to combustion of diesel in road transport. The emission from transport has decreased by 73 % since 1990 due to the phase out of leaded gasoline, which has a high PCBs emission factor. This has led to diesel fuel use being the most important source of PCBs emissions from transport in later years. The emission from manufacturing industries and non-industrial combustion is dominated by diesel fuel used in non-road machinery.

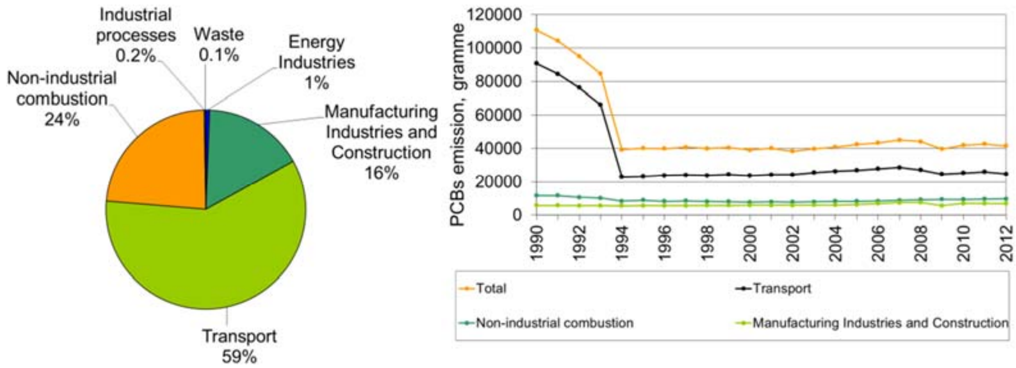


Figure 2.16 PCBs emissions. Distribution according to the main sectors (2012) and time series for 1990 to 2012.

3 Energy (NFR sector 1)

3.1 Overview of the sector

The energy sector is reported in three main chapters:

3.2 Stationary combustion plants (NFR sector 1A1, 1A2 and 1A4)

3.3 Transport (NFR sector 1A2, 1A3, 1A4 and 1A5)

3.4 Fugitive emissions (NFR sector 1B)

Table 3.1.1 shows detailed source categories for the energy sector and plant category in which the sector is discussed in this report.

Table 3.1.1 NFR source categories for the energy sector.

NFR sector	DCE documentation
1 A 1 a Public electricity and heat production	Stationary combustion
1 A 1 b Petroleum refining	Stationary combustion
1 A 1 c Manufacture of solid fuels and other energy industries	Stationary combustion
1 A 2 a Stationary combustion in manufacturing industries and construction: Iron and steel	Stationary combustion, Industry
1 A 2 b Stationary Combustion in manufacturing industries and construction: Non-ferrous metals	Stationary combustion, Industry
1 A 2 c Stationary combustion in manufacturing industries and construction: Chemicals	Stationary combustion, Industry
1 A 2 d Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print	Stationary combustion, Industry
1 A 2 e Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	Stationary combustion, Industry
1 A 2 f i Stationary combustion in manufacturing industries and construction: Other (Please specify in your IIR)	Stationary combustion, Industry
1 A 2 f ii Mobile Combustion in manufacturing industries and construction: (Please specify in your IIR)	Transport
1 A 3 a ii (i) Civil aviation (Domestic, LTO)	Transport
1 A 3 a i (i) International aviation (LTO)	Transport
1 A 3 b i Road transport: Passenger cars	Transport
1 A 3 b ii Road transport:Light duty vehicles	Transport
1 A 3 b iii Road transport:, Heavy duty vehicles	Transport
1 A 3 b iv Road transport: Mopeds & motorcycles	Transport
1 A 3 b v Road transport: Gasoline evaporation	Transport
1 A 3 b vi Road transport: Automobile tyre and brake wear	Transport
1 A 3 b vii Road transport: Automobile road abrasion	Transport
1 A 3 c Railways	Transport
1 A 3 d i (ii) International inland waterways	Transport
1 A 3 d ii National navigation (Shipping)	Transport
1 A 3 e Pipeline compressors	Transport (not occurring)
1 A 4 a i Commercial / institutional: Stationary	Stationary combustion
1 A 4 a ii Commercial / institutional: Mobile	Transport
1 A 4 b i Residential: Stationary plants	Stationary combustion
1 A 4 b ii Residential: Household and gardening (mobile)	Transport
1 A 4 c i Agriculture/Forestry/Fishing: Stationary	Stationary combustion
1 A 4 c ii Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	Transport
1A 4 c iii Agriculture/Forestry/Fishing: National fishing	Transport
1 A 5 a Other stationary (including military)	Stationary combustion
1 A 5 b Other, Mobile (including military, land based and recreational boats)	Transport
1 B 1 a Fugitive emission from solid fuels: Coal mining and handling	Fugitive
1 B 1 b Fugitive emission from solid fuels: Solid fuel transformation	Fugitive
1 B 1 c Other fugitive emissions from solid fuels	Fugitive
1 B 2 a i Exploration, production, transport	Fugitive
1 B 2 a iv Refining / storage	Fugitive
1 B 2 a v Distribution of oil products	Fugitive
1 B 2 b Natural gas	Fugitive
1 B 2 c Venting and flaring	Fugitive
1 B 3 Other fugitive emissions from geothermal energy production , peat and other energy extraction not included in 1 B 2	Fugitive

Summary tables for the emissions from the energy sector are shown below.

Table 3.1.2 SO_2, NO_x, NMVOC, CO and PM emission from the energy sector, 2012.

	NO_x	NMVOC	SO_x	NH_3	$PM_{2.5}$	PM_{10}	TSP	CO
	Gg NO_2	Gg	Gg SO_2	Gg	Gg	Gg	Gg	Gg
1A1 Energy Industries	21.8	1.51	3.07	0.01	0.51	0.62	0.86	11.0
1A2 Manufacturing industries and Construction	12.9	1.35	2.91	0.00	0.79	0.87	0.95	10.4
1A3 Transport	56.8	11.57	1.49	1.46	2.52	3.23	4.14	102.7
1A4 Other Sectors	23.7	21.69	2.40	0.18	16.58	17.01	17.86	227.7
1A5 Other	0.5	0.03	0.02	0.00	0.01	0.01	0.01	0.3
1B1 Fugitive Emissions from fuels, Solid fuels	NA	NA	NA	NA	0.02	0.24	0.60	NA
1B2 Fugitive Emissions from fuels, Oil and Natural gas	0.1	8.87	1.06	0.00	0.00	0.00	0.00	0.2
1 B 3 Other fugitive emissions from geothermal energy production , peat and other energy extraction not included in 1 B 2	NA	NA	NA	NA	NA	NA	NA	NA
Energy, Total	115.8	45.02	10.94	1.65	20.44	21.98	24.42	352.2

Table 3.1.3 HM emissions from the energy sector, 2012.

	Pb	Cd	Hg	As	Cr	Cu	Ni	Se	Zn
	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
1A1 Energy Industries	0.39	0.05	0.18	0.11	0.18	0.18	0.54	0.56	0.48
1A2 Manufacturing industries and Construction	0.40	0.03	0.04	0.08	0.09	0.11	1.53	0.08	1.47
1A3 Transport	6.43	0.05	0.03	0.04	0.20	40.65	1.87	0.06	26.30
1A4 Other Sectors	1.71	0.05	0.04	0.04	0.12	0.35	0.31	0.08	5.13
1A5 Other	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
1B1 Fugitive Emissions from fuels, Solid fuels	NA	NA	NA	NA	NA	NA	NA	NA	NA
1B2 Fugitive Emissions from fuels, Oil and Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
1 B 3 Other fugitive emissions from geothermal energy production , peat and other energy extraction not included in 1 B 2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Energy, Total	8.97	0.18	0.29	0.27	0.59	41.30	4.24	0.79	33.47

Table 3.1.4 PAH, dioxin and HCB emission from the energy sector, 2012.

	PCDD/ PCDF	Benzo(a)-pyrene	Benzo(b)-fluoran-thene	Benzo(k)-fluoran-thene	Indeno-(1,2,3-cd)-pyrene	HCB	PCB
	g I-Teq	Mg	Mg	Mg	Mg	kg	kg
1A1 Energy Industries	1.26	0.01	0.03	0.02	0.01	1.05	0.25
1A2 Manufacturing industries and Construction	0.07	0.03	0.08	0.02	0.01	0.15	6.79
1A3 Transport	0.18	0.07	0.08	0.09	0.07	0.68	24.70
1A4 Other Sectors	15.41	2.17	2.22	0.80	1.35	0.37	9.55
1A5 Other	0.00	0.00	0.00	0.00	0.00	0.01	0.19
1B1 Fugitive Emissions from fuels, Solid fuels	NA	NA	NA	NA	NA	NA	NA
1B2 Fugitive Emissions from fuels, Oil and Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1 B 3 Other fugitive emissions from geothermal energy production , peat and other energy extraction not included in 1 B 2	NA	NA	NA	NA	NA	NA	NA
Energy, Total	16.92	2.27	2.42	0.93	1.44	2.26	41.48

3.2 Stationary combustion (NFR sector 1A1, 1A2 and 1A4)

This chapter includes stationary combustion plants in the NFR sectors 1A1, 1A2 and 1A4.

3.2.1 Source category description

Source category definition

In the Danish emission database, all activity rates and emissions are defined in SNAP sector categories (Selected Nomenclature for Air Pollution) according to the CORINAIR system[1]. The emission inventories are prepared from a complete emission database based on the SNAP sectors. Aggregation to the NFR sector codes is based on a correspondence list between SNAP and NFR enclosed in Annex 2A-1. Stationary combustion is defined as combustion activities in the SNAP sectors 01-03, not including SNAP 0303.

Stationary combustion plants are included in the emission source subcategories:

- 1A1 Energy, Fuel consumption, Energy Industries
- 1A2 Energy, Fuel consumption, Manufacturing Industries and Construction
- 1A4 Energy, Fuel consumption, Other Sectors

The emission and fuel consumption data included in tables and figures in Chapter 3.2 only include emissions originating from stationary combustion plants of a given NFR sector. The NFR sector codes have been applied unchanged, but some sector names have been changed to reflect the stationary combustion element of the source.

Emission share from stationary combustion compared to national total

Table 3.2.1 gives an overview of the emission share from stationary combustion compared to national total. Main emission sources are discussed in chapter 3.2.3. Key category analysis has not been performed.

[1] And some additional SNAP added for industrial combustion.

Table 3.2.1 Emission share from stationary combustion compared to national total.

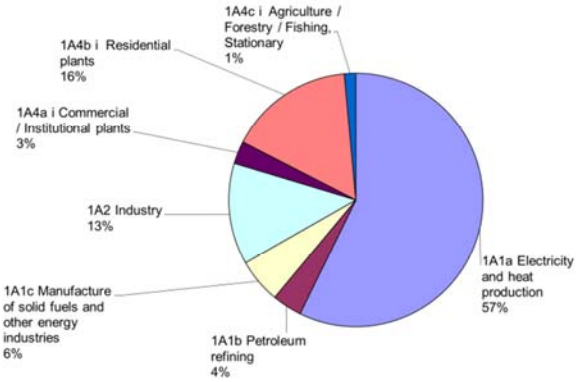
Pollutant	Emission share, %	Pollutant	Emission share, %
SO_2	64	Hg	79
NO_x	28	Ni	52
NMVOC	20	Pb	21
CO	35	Se	56
NH_3	0.2	Zn	13
TSP	50	HCB	57
PM_{10}	60	PCDD/F	73
$PM_{2.5}$	72	Benzo(a)pyrene	89
As	73	Benzo(b)fluoranthene	88
Cd	57	Benzo(k)fluoranthene	79
Cr	48	Indeno(123cd)pyrene	86
Cu	1		

3.2.2 Fuel consumption data

In 2012, the total fuel consumption for stationary combustion plants was 439 PJ of which 310 PJ was fossil fuels and 129 PJ was biomass.

Fuel consumption distributed according to the stationary combustion subcategories is shown in Figure 3.2.1 and Figure 3.2.2. The majority - 57 % - of all fuels is combusted in the source category, *Public electricity and heat production*. Other source categories with high fuel consumption are *Residential plants* and *Industry*.

Fuel consumption including biomass



Fuel consumption, fossil fuels

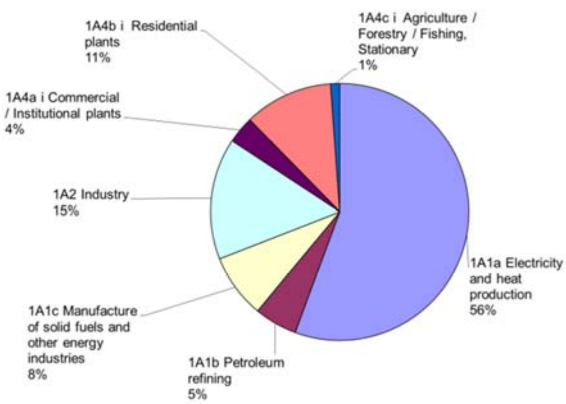


Figure 3.2.1 Fuel consumption of stationary combustion source categories, 2012. Based on DEA (2013a).

Coal, natural gas and wood are the most utilised fuels for stationary combustion plants. Coal is mainly used in power plants and natural gas is used in power plants and decentralised combined heating and power (CHP) plants, as well as in industry, district heating, residential plants and offshore gas turbines (see Figure 3.2.2). Wood is mainly applied for public electricity and heat production and in residential plants.

Detailed fuel consumption rates are shown in Annex 2A-2.

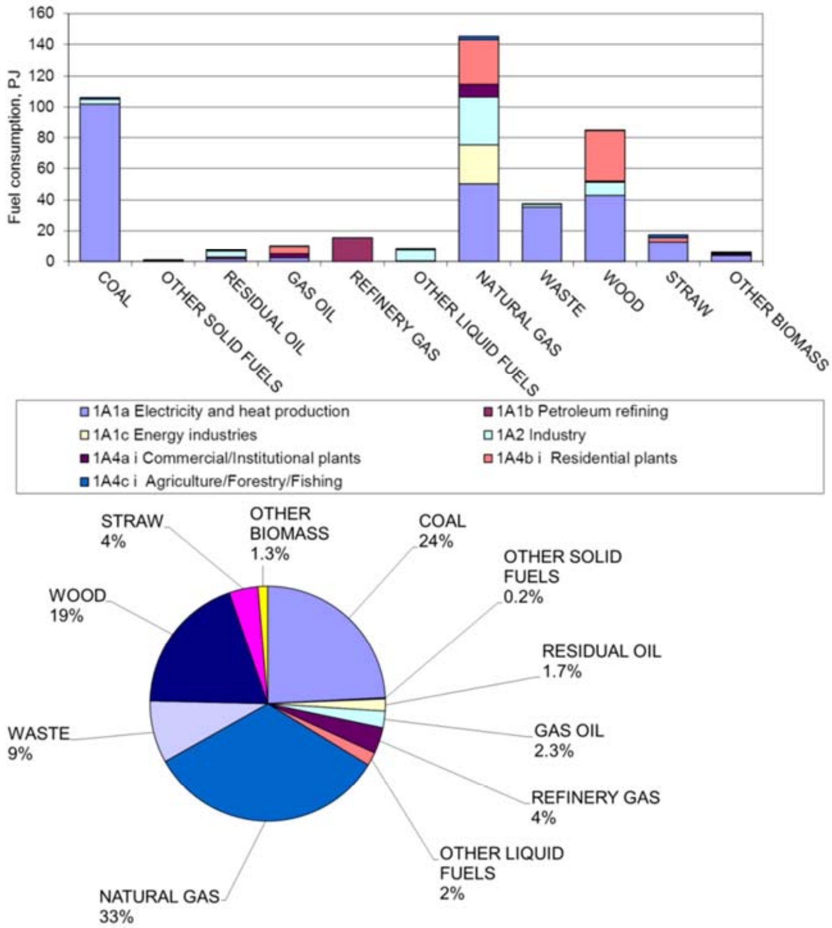


Figure 3.2.2 Fuel consumption of stationary combustion 2012, disaggregated to fuel type. Based on DEA (2013a).

Fuel consumption time series for stationary combustion plants are presented in Figure 3.2.3[2]. The fuel consumption for stationary combustion was 12 % lower in 2012 than in 1990, while the fossil fuel consumption was 32 % lower and the biomass fuel consumption 3.2 times the level in 1990.

The consumption of natural gas, waste and biomass has increased since 1990 whereas the consumption of coal has decreased.

[2] Time series 1980 onwards are included in Annex 2A-10.

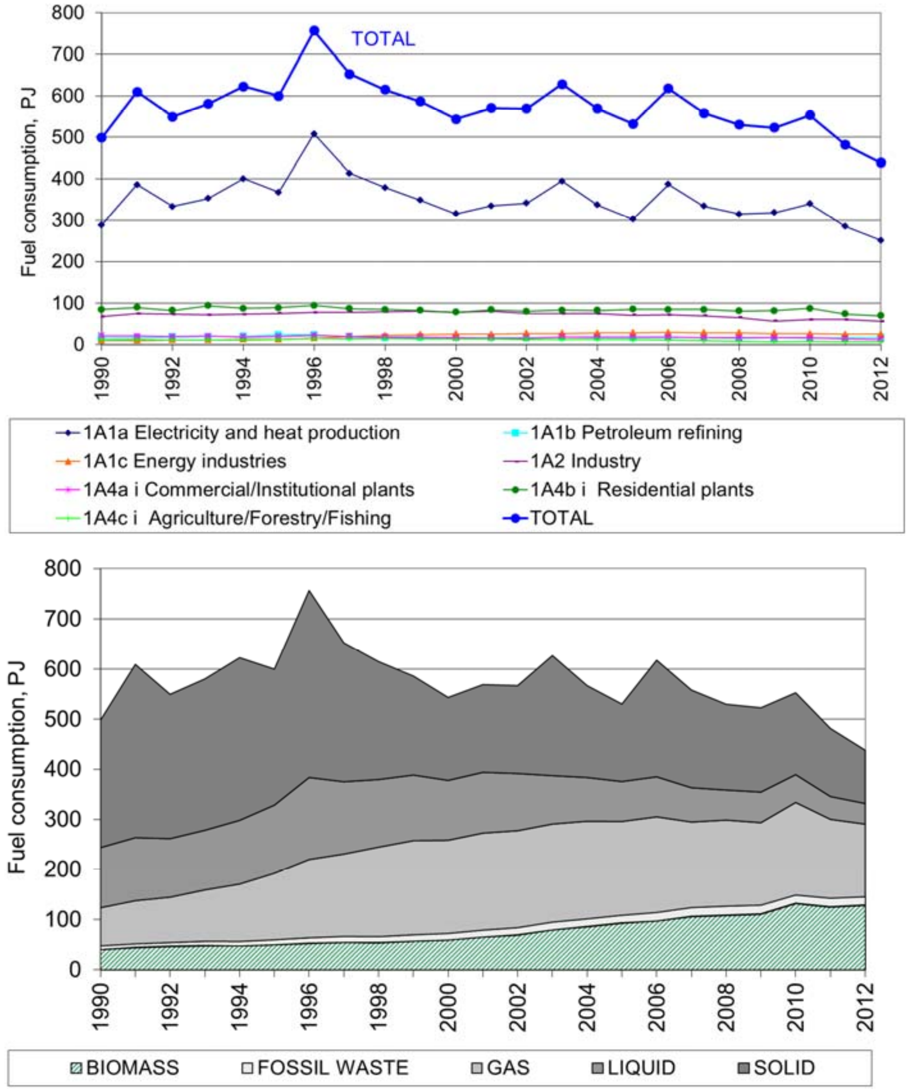


Figure 3.2.3 Fuel consumption time series, stationary combustion. Based on DEA (2013a).

The fluctuations in the time series for fuel consumption are mainly a result of electricity import/export, but also of outdoor temperature variations from year to year. This, in turn, leads to fluctuations in emission levels. The fluctuations in electricity trade, fuel consumption and NO_x emission are illustrated and compared in Figure 3.2.4. In 1990, the Danish electricity import was large causing relatively low fuel consumption, whereas the fuel consumption was high in 1996 due to a large electricity export. In 2012, the net electricity import was 18.8, whereas there was a 4.7 PJ electricity import in 2011. The large electricity export that occurs some years is a result of low rainfall in Norway and Sweden causing insufficient hydropower production in both countries.

To be able to follow the national energy consumption as well as for statistical and reporting purposes, the Danish Energy Agency produces a correction of the actual fuel consumption without random variations in electricity imports/exports and in ambient temperature. This fuel consumption trend is also illustrated in Figure 3.2.4. The corrections are included here to explain the fluctuations in the time series for fuel rate and emissions.

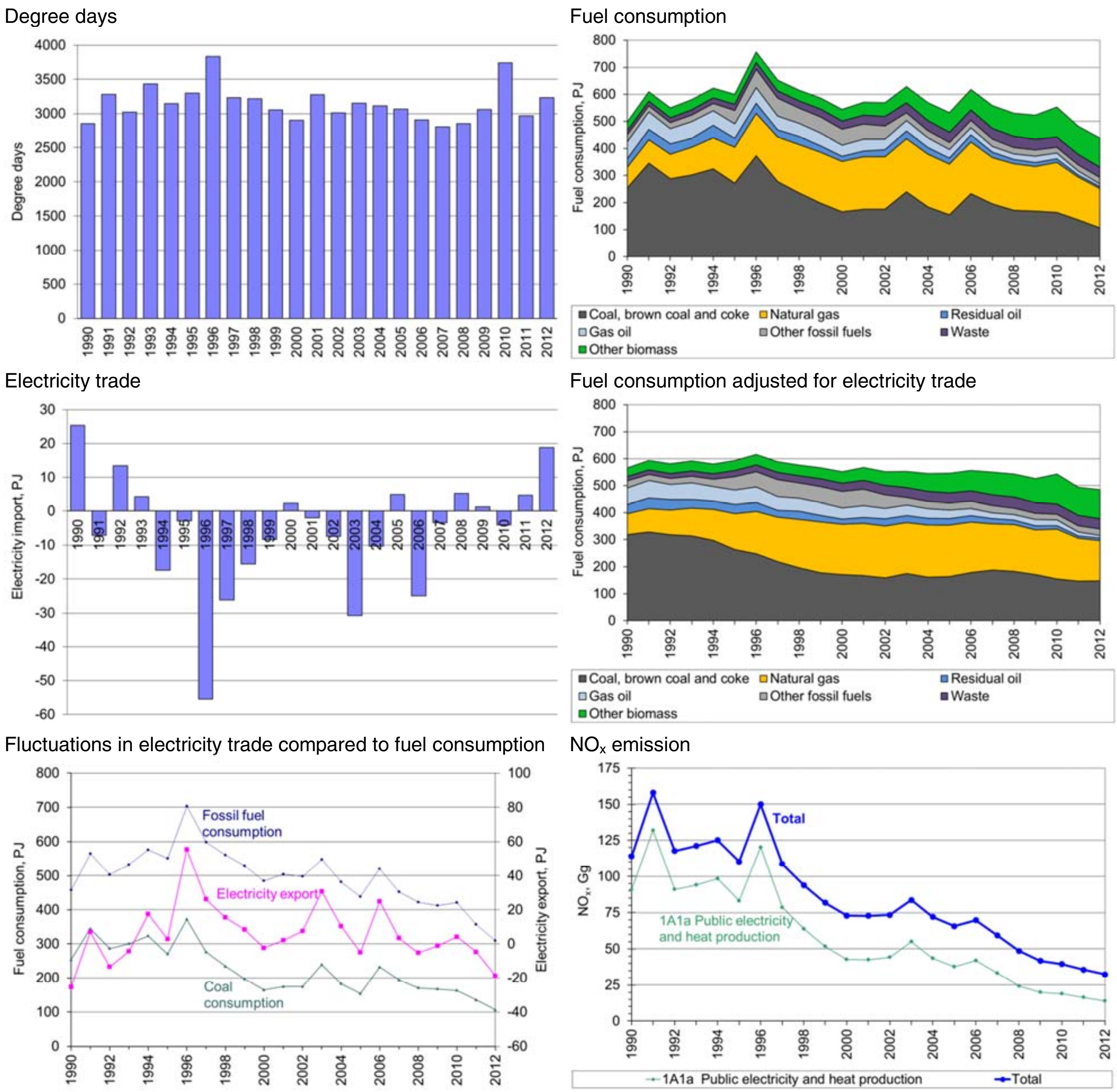


Figure 3.2.4 Comparison of time series fluctuations for electricity trade, fuel consumption and NO_x emission. Based on DEA (2013a).

Fuel consumption time series for the subcategories to stationary combustion are shown in Figure 3.2.5 – 3.2.7.

Fuel consumption for *Energy Industries* fluctuates due to electricity trade as discussed above. The fuel consumption in 2012 was 7 % lower than in 1990. The fluctuation in electricity production is based on fossil fuel consumption in the subcategory *Public electricity and Heat Production*. The energy consumption in *Other energy industries* is mainly natural gas used in gas turbines in the off-shore industry. The biomass fuel consumption in *Energy Industries* in 2012 added up to 79 PJ, which is 4.8 times the level in 1990 and a 5 % increase since 2011.

The fuel consumption in *Industry* was 17 % lower in 2012 than in 1990 (Figure 3.2.6). The fuel consumption in industrial plants has decreased considerably as a result of the financial crisis. However, the fuel consumption is unchanged since 2009. The biomass fuel consumption in *Industry* in 2012 added up to 9 PJ which is a 53 % increase since 1990.

The fuel consumption in *Other Sectors* decreased 24 % since 1990 (Figure 3.2.7) and decreased 7 % since 2011. The biomass fuel consumption in *Other sectors* in 2012 added up to 41 PJ which is 2.2 times the consumption in 1990 and a 1 % decrease since 2011. Wood consumption in residential plants in 2012 was 2.2 times the consumption in year 2000.

Time series for subcategories are shown in Chapter 3.2.4.

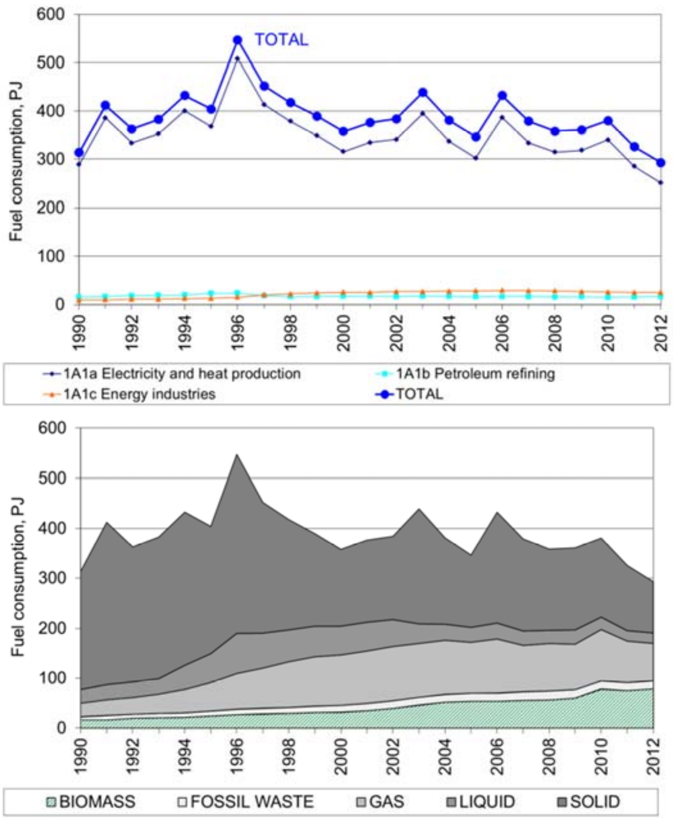


Figure 3.2.5 Fuel consumption time series for subcategories - 1A1 Energy Industries.

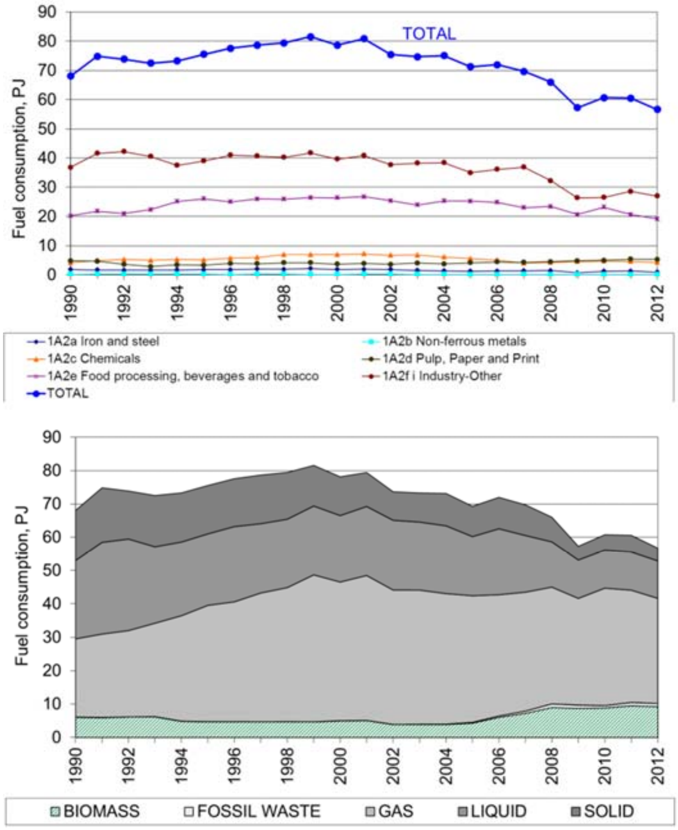


Figure 3.2.6 Fuel consumption time series for subcategories - 1A2 Industry.

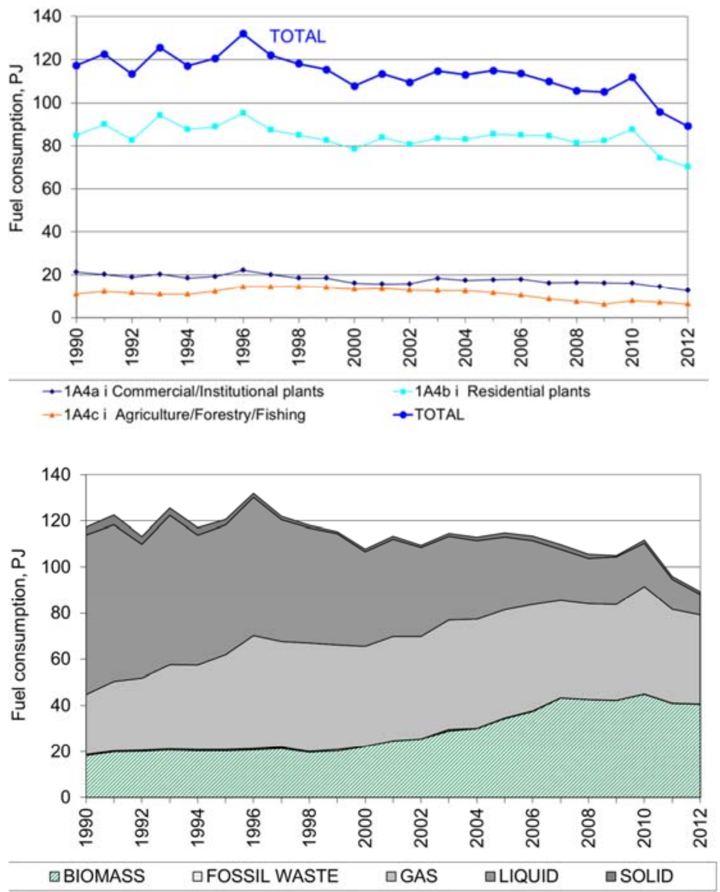


Figure 3.2.7 Fuel consumption time series for subcategories - 1A4 Other Sectors.

3.2.3 Emissions

SO_2

Stationary combustion is the most important emission source for SO_2 accounting for 64 % of the national emission. Table 3.2.2 presents the SO_2 emission inventory for the stationary combustion subcategories.

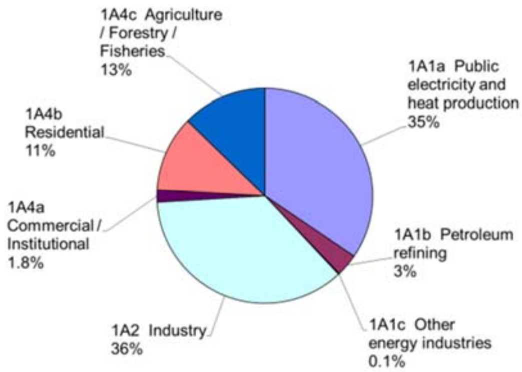
Public electricity and heat production is the largest emission source accounting for 35 % of the emission. However, the SO_2 emission share is lower than the fuel consumption share for this source category, which is 57 %. This is a result of effective flue gas desulphurisation equipment installed in power plants combusting coal. In the Danish inventory, the source category *Public electricity and heat production* is further disaggregated. Figure 3.2.8 shows the SO_2 emission from *Public electricity and heat production* on a disaggregated level. Power plants >300MW$_{th}$ are the main emission source, accounting for 41 % of the emission.

The SO_2 emission from industrial plants adds up to 36 % of the emission from stationary combustion, a remarkably high emission share compared with fuel consumption. The main emission sources in the industrial category are combustion of coal and residual oil, but emissions from the cement industry is also a considerable emission source. Until year 2000, the SO_2 emission from the industrial category only accounted for a small part of the emission from stationary combustion, but as a result of reduced emissions from power plants, the share has now increased.

The time series for SO_2 emission from stationary combustion is shown in Figure 3.2.9. The SO_2 emission from stationary combustion plants has decreased by 95 % since 1990. The large emission decrease is mainly a result of the reduced emission from *Public electricity and heat production*, made possible due to installation of desulphurisation plants and due to the use of fuels with lower sulphur content. Despite the considerable reduction in emission from public electricity and heat production plants, these still account for 35 % of the emission from stationary combustion, as mentioned above. The emission from other source categories also decreased considerably since 1990. Time series for subcategories are shown in Chapter 3.2.4.

Table 3.2.2 SO_2 emission from stationary combustion plants, 2012[1)]

		SO_2, Mg
1A1a	Public electricity and heat production	2782
1A1b	Petroleum refining	273
1A1c	Other energy industries	11
1A2	Industry	2903
1A4a	Commercial/Institutional	147
1A4b	Residential	922
1A4c	Agriculture/Forestry/Fisheries	1023
Total		8061



1) Only emission from stationary combustion plants in the source categories is included.

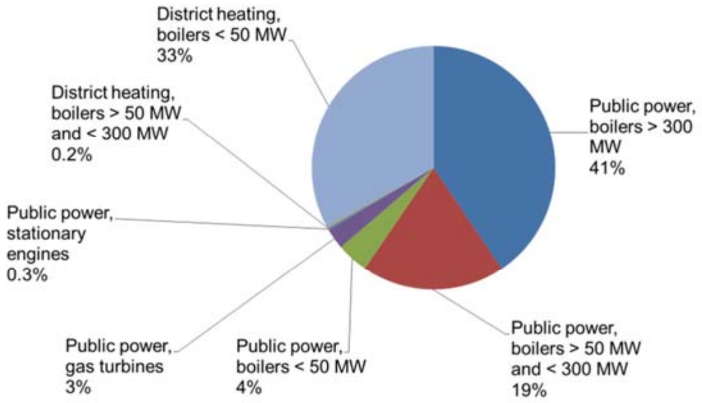


Figure 3.2.8 Disaggregated SO_2 emissions from 1A1a Energy and heat production.

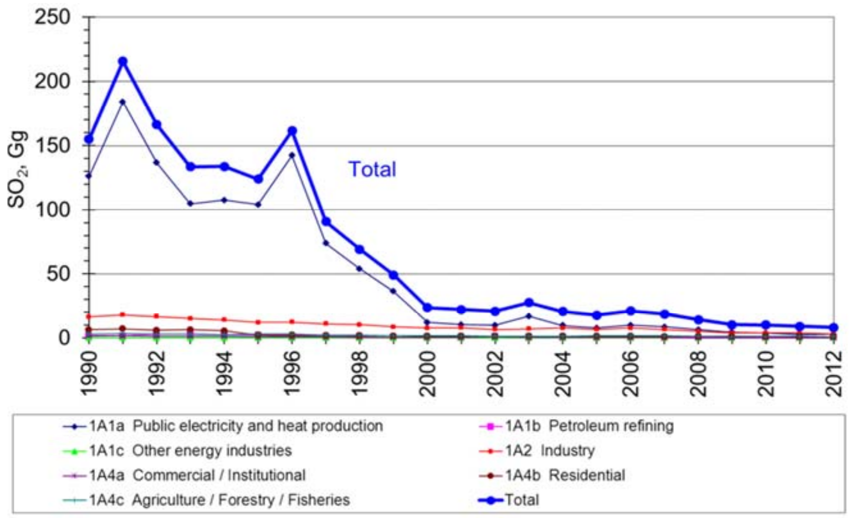


Figure 3.2.9 SO_2 emission time series for stationary combustion.

NO_x

Stationary combustion accounts for 28% of the national NO_x emission. Table 3.2.3 shows the NO_x emission inventory for stationary combustion subcategories.

Public electricity and heat production is the largest emission source accounting for 43 % of the emission from stationary combustion plants. The emission from public power boilers > 300 MW_{th} accounts for 29 % of the emission in this subcategory.

Industrial combustion plants are also an important emission source accounting for 17 % of the emission. The main industrial emission source is cement production, which accounts for 30 % of the emission.

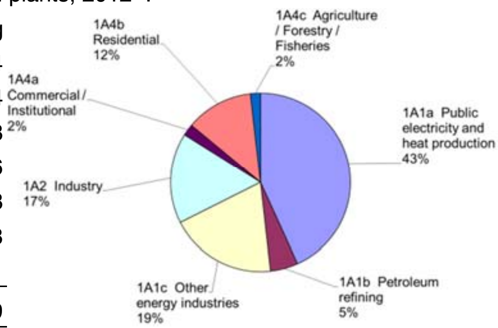
Residential plants account for 12 % of the NO_x emission. The fuel origin of this emission is mainly wood accounting for 61 % of the residential plant emission.

Other energy industries, which is mainly off-shore gas turbines accounts for 19 % of the NO_x emission.

Time series for NO_x emission from stationary combustion are shown in Figure 3.2.10. NO_x emission from stationary combustion plants has decreased by 72 % since 1990. The reduced emission is largely a result of the reduced emission from public electricity and heat production due to installation of low NO_x burners, selective catalytic reduction (SCR) units and selective non-catalytic reduction (SNCR) units. The fluctuations in the time series follow the fluctuations in public electricity and heat production, which, in turn, result from electricity trade fluctuations.

Table 3.2.3 NO_x emission from stationary combustion plants, 2012[1)].

	NOx, Mg
1A1a Public electricity and heat production	13 994
1A1b Petroleum refining	1 604
1A1c Other energy industries	6 248
1A2 Industry	5 316
1A4a Commercial/Institutional	678
1A4b Residential	3 928
1A4c Agriculture/Forestry/Fisheries	581
Total	32 349



1) Only emission from stationary combustion plants in the source categories is included.

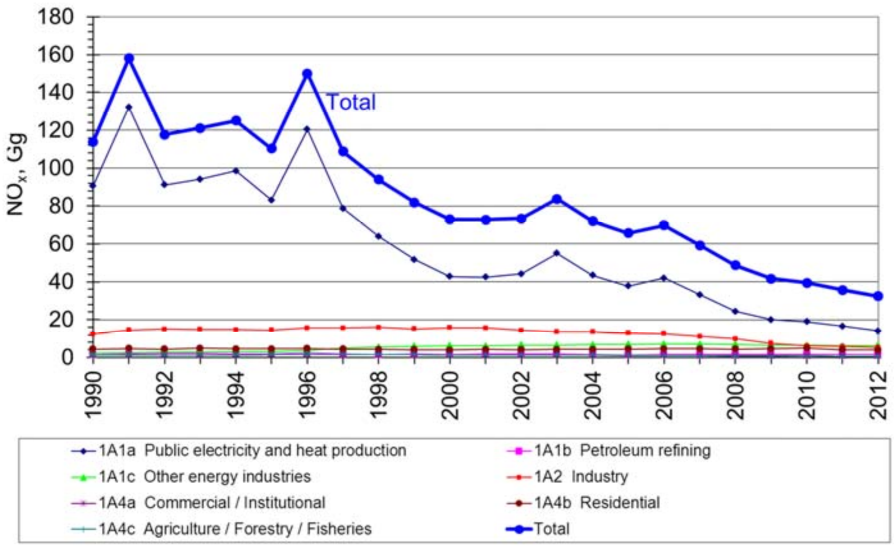


Figure 3.2.10 NO_x emission time series for stationary combustion.

NMVOC

Stationary combustion plants account for 20 % of the national NMVOC emission. Table 3.2.4 presents the NMVOC emission inventory for the stationary combustion subcategories.

Residential plants are the largest emission source accounting for 85 % of the emission from stationary combustion plants. For residential plants NMVOC is mainly emitted from wood and straw combustion, see Figure 3.2.11.

Public electricity and heat production is also a considerable emission source, accounting for 9 % of the emission. Lean-burn gas engines have a relatively high NMVOC emission factor and are the most important emission source in this subcategory (see Figure 3.2.11). The gas engines are either natural gas or biogas fuelled.

The time series for NMVOC emission from stationary combustion is shown in Figure 3.2.12. The emission has increased by 12 % from 1990. The increased emission is mainly a result of the increasing wood consumption in residential plants and of the increased use of lean-burn gas engines in CHP plants.

The emission from residential plants increased 15 % since 1990. The NMVOC emission from wood combustion in 2012 was 2.3 times the 1990 level due to increased wood consumption. However, the emission factor has decreased since 1990 due to installation of modern stoves and boilers with improved combustion technology. Further, the emission from straw combustion in farmhouse boilers has decreased (75 %) over this period due to both a decreasing emission factor and decrease in straw consumption in this source category.

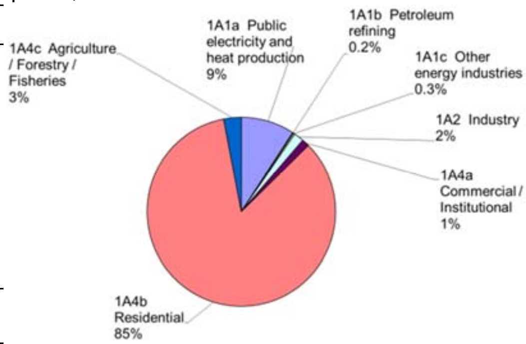
The use of wood in residential boilers and stoves was relatively low in 1998-99 resulting in a lower emission level.

The increasing consumption of wood in residential plants ceased in 2007. The improved technology that has been implemented in residential wood combustion have led to lower emission factors and thus decreasing NMVOC emission since 2007.

Table 3.2.4 NMVOC emission from stationary combustion plants, 2012[1)].

	NMVOC, Mg
1A1a Public electricity and heat production	1 445
1A1b Petroleum refining	24
1A1c Other energy industries	40
1A2 Industry	271
1A4a Commercial/Institutional	201
1A4b Residential	13 289
1A4c Agriculture/Forestry/Fisheries	476
Total	15 746

1) Only emission from stationary combustion plants in the categories is included.



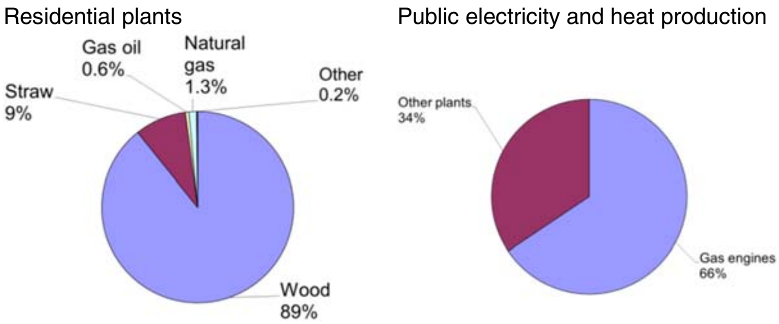


Figure 3.2.11 NMVOC emission from Residential plants and from Public electricity and heat production, 2012.

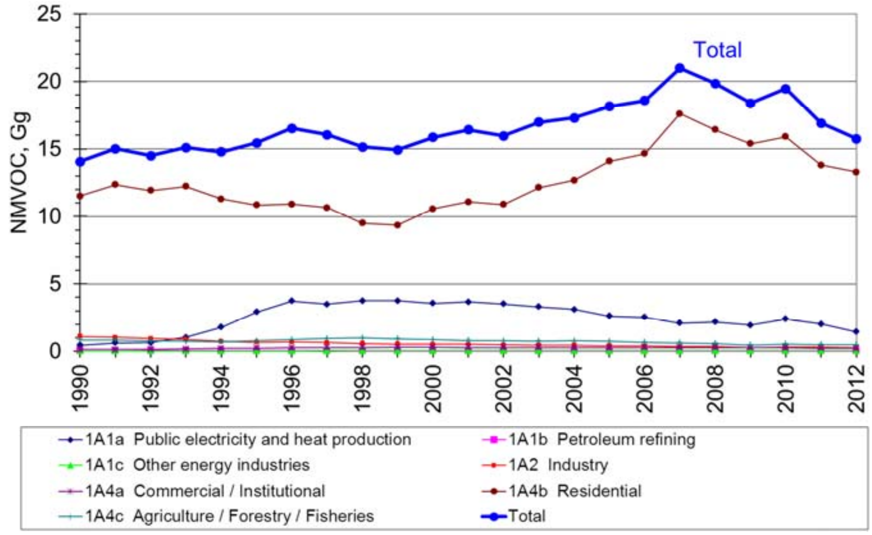


Figure 3.2.12 NMVOC emission time series for stationary combustion.

CO

Stationary combustion accounts for 35 % of the national CO emission. Table 3.2.5 presents the CO emission inventory for stationary combustion subcategories.

Residential plants are the largest emission source, accounting for 80 % of the emission. Wood combustion accounts for 88 % of the emission from residential plants, see Figure 3.2.13. This is in spite of the fact that the fuel consumption share is only 47 %. Combustion of straw is also a considerable emission source whereas the emission from other fuels used in residential plants is almost negligible.

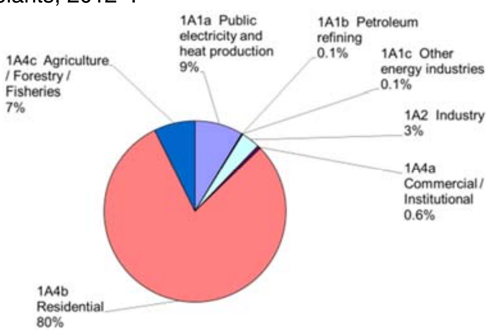
The time series for CO emission from stationary combustion is shown in Figure 3.2.14. The emission has increased by 5 % from 1990. The time series for CO from stationary combustion plants follow the time series for CO emission from residential plants.

The increase of wood consumption in residential plants in 1999-2007 is reflected in the time series for CO emission. The consumption of wood in residential plants in 2012 was 3.6 times the 1990 level. The decreased emission in 2007-2012 is a result of implementation of improved residential wood combustion technologies and the fact that the rapid increase of wood consumption until 2007 have stopped.

Both consumption and CO emission factor for have decreased for residential straw combustion plants since 1990.

Table 3.2.5 CO emission from stationary combustion plants, 2012[1)].

	CO, Mg
1A1a Public electricity and heat production	10 728
1A1b Petroleum refining	126
1A1c Other energy industries	120
1A2 Industry	4 201
1A4a Commercial/Institutional	715
1A4b Residential	99 781
1A4c Agriculture/Forestry/Fisheries	9131
Total	124 802



1) Only emission from stationary combustion plants in the source categories is included.

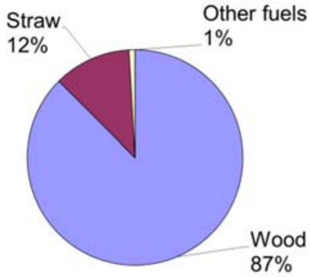


Figure 3.2.13 CO emission sources, residential plants, 2012.

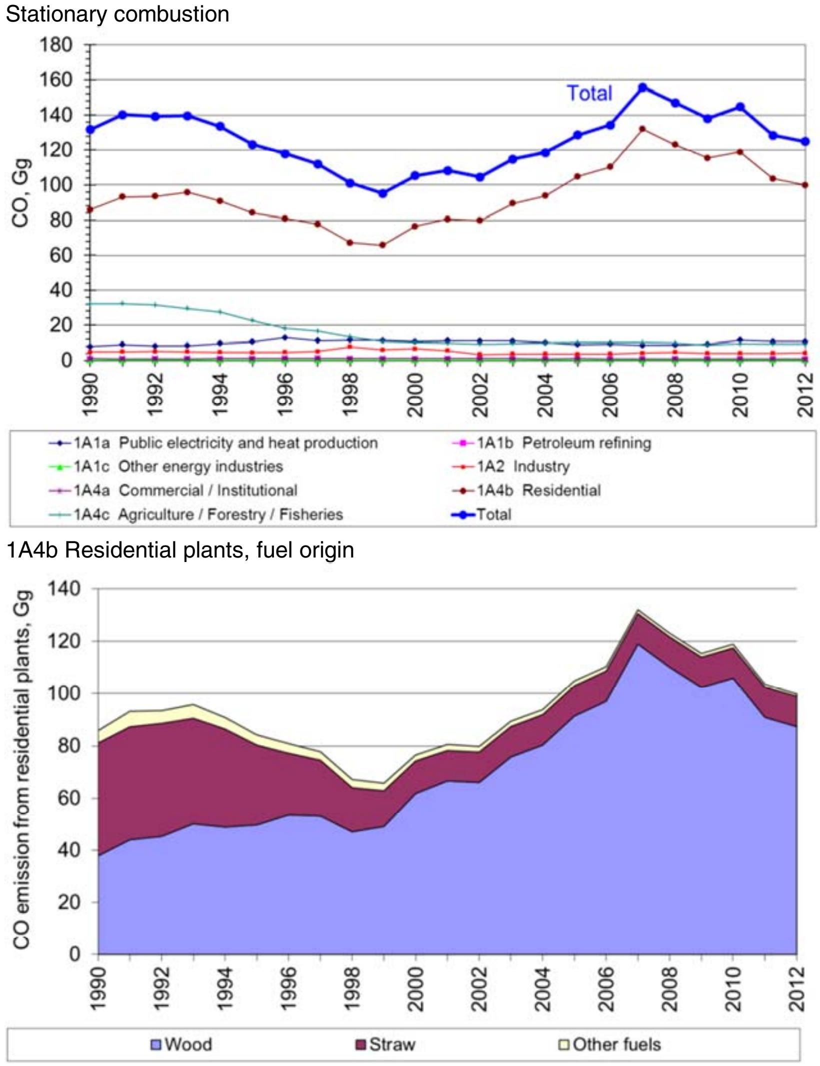


Figure 3.2.14 CO emission time series for stationary combustion.

NH_3

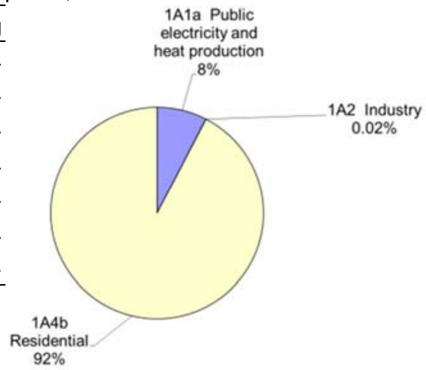
Stationary combustion plants accounted for only 0.2 % of the national NH_3 emission in 2012.

Table 3.2.6 shows the NH_3 emission inventory for the stationary combustion subcategories. Residential plants account for 92 % of the emission. Wood combustion accounts for 94 % of the emission from residential plants.

The time series for the NH_3 emission is presented in Figure 3.2.15. The NH_3 emission has increased to 2.8 times the 1990 level.

Table 3.2.6 NH_3 emission from stationary combustion plants, 2012[1].

	NH_3, Mg
1A1a Public electricity and heat production	14
1A1b Petroleum refining	-
1A1c Other energy industries	-
1A2 Industry	0.04
1A4a Commercial/Institutional	-
1A4b Residential	174
1A4c Agriculture/Forestry/Fisheries	-
Total	189



1) Only the emission from stationary combustion plants in the source categories is included.

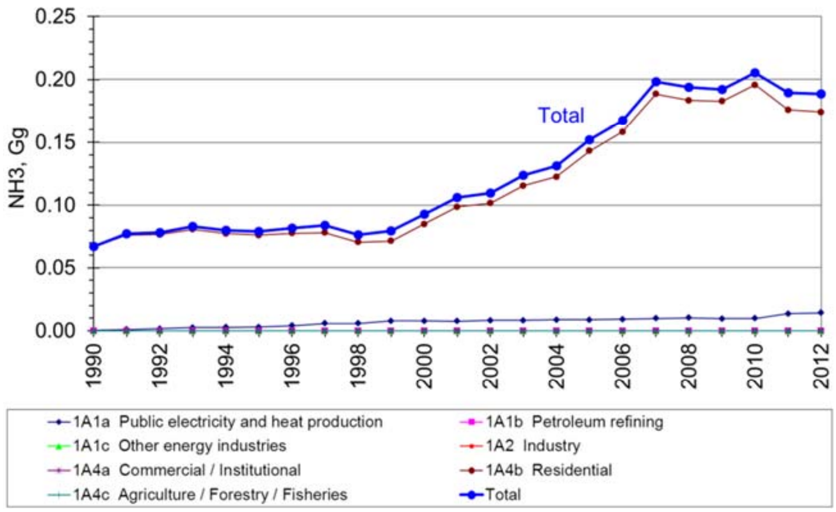


Figure 3.2.15 NH_3 emission time series, stationary combustion plants.

Particulate matter (PM)

TSP from stationary combustion accounts for 50 % of the national emission. The emission shares for PM_{10} and $PM_{2.5}$ are 60 % and 72 %, respectively.

Table 3.2.7 and Figure 3.2.16 show the PM emission inventory for the stationary combustion subcategories. Residential plants are the largest emission source accounting for 92 % of the $PM_{2.5}$ emission from stationary combustion plants.

The primary sources of PM emissions are:

- Residential boilers, stoves and fireplaces combusting wood
- Farmhouse boilers combusting straw
- Power plants primarily combusting coal
- Coal and residual oil combusted in industrial boilers and processes

The PM emission from wood combusted in residential plants is the predominant source. Thus, 88 % of the $PM_{2.5}$ emission from stationary combustion is emitted from residential wood combustion. This corresponds to 64 % of the national emission. A literature review (Nielsen et al., 2003) and a Nordic project (Sternhufvud et al., 2004) has demonstrated that the emission factor uncertainty for residential combustion of wood in stoves and boilers is notably high.

Figure 3.2.17 shows the fuel consumption and the $PM_{2.5}$ emission of residential plants. Wood combustion accounts for 96 % of the $PM_{2.5}$ emission from residential plants in spite of a wood consumption share of 47 %.

Emission inventories for PM have been reported for the years 2000-2012. The time series for PM emission from stationary combustion is shown in Figure 3.2.18. The emission of TSP, PM_{10} and $PM_{2.5}$ has increased 20 %, 21 % and 23 %, respectively, since year 2000. The increase is caused by the increased wood combustion in residential plants. However, the PM emission factors have decreased for this emission source category due to installation of modern stoves and boilers. The stabilisation of wood consumption in residential plants in 2007-2012 has resulted in a decrease of PM emission from stationary combustion in recent years.

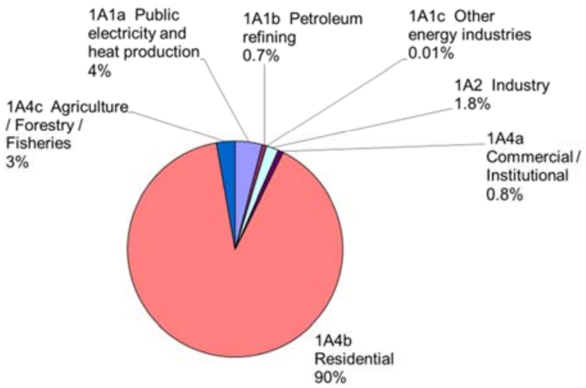
The time series for PM emission from stationary combustion plants follows the time series for PM emission from residential plants.

Table 3.2.7 PM emission from stationary combustion plants, 2012[1)].

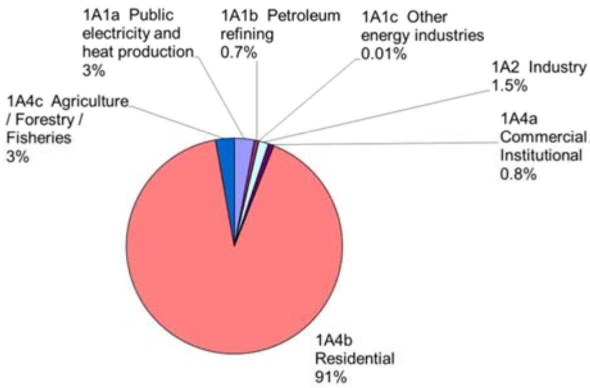
		TSP, Mg	PM_{10}, Mg	$PM_{2.5}$, Mg
1A1a	Public electricity and heat production	736	508	401
1A1b	Petroleum refining	119	111	107
1A1c	Other energy industries	3	2	1
1A2	Industry	333	250	177
1A4a	Commercial/Institutional	143	141	133
1A4b	Residential	16 274	15 455	15 064
1A4c	Agriculture/Forestry/Fisheries	507	476	446
Total		18 114	16 941	16 328

1) Only emission from stationary combustion plants in the source categories is included.

TSP



PM_{10}



$PM_{2.5}$

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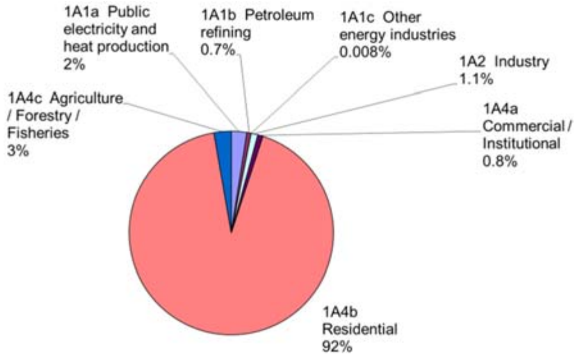


Figure 3.2.16 PM emission sources, stationary combustion plants, 2012.

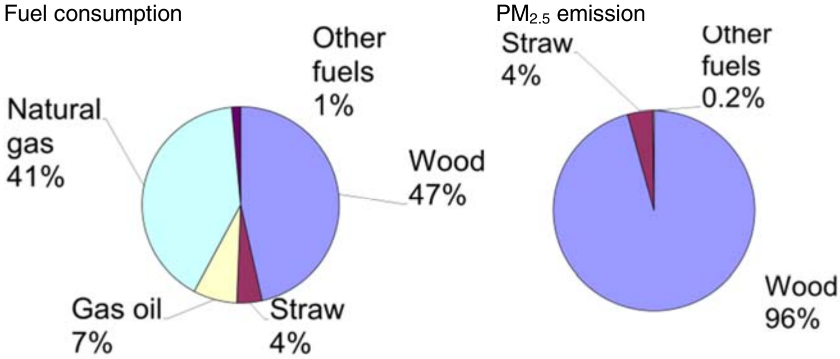


Figure 3.2.17 Fuel consumption and $PM_{2.5}$ emission from residential plants.

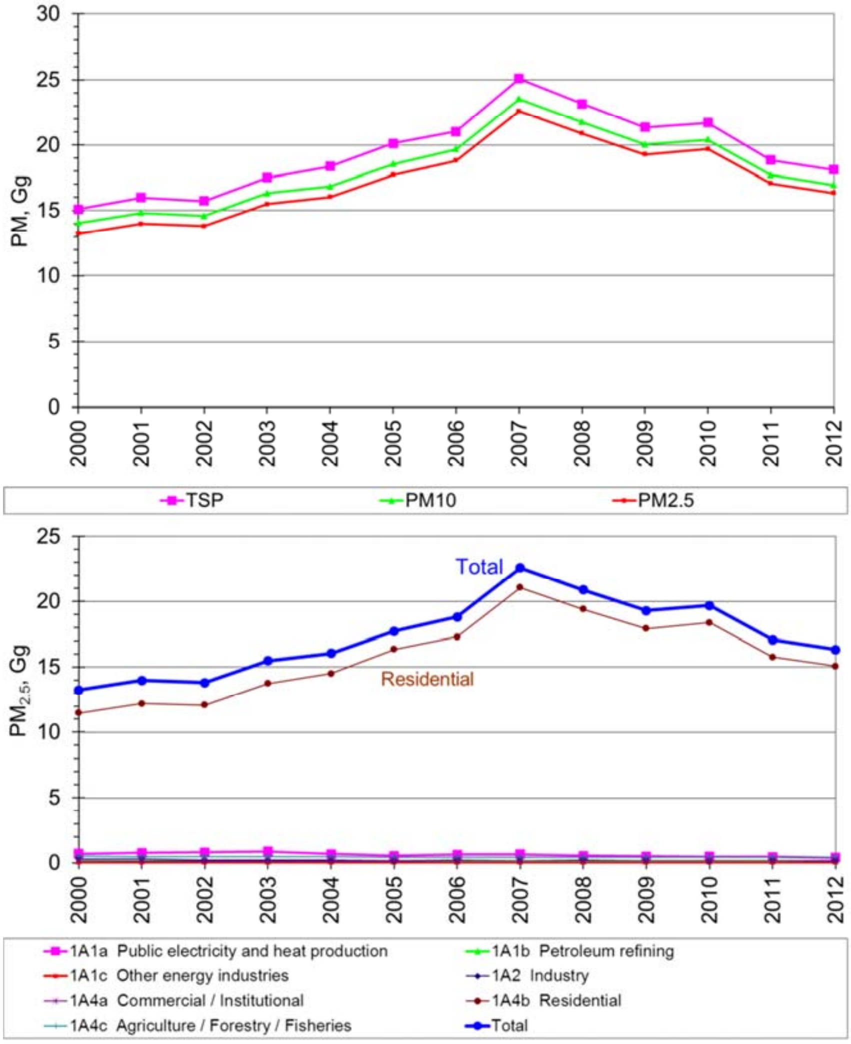


Figure 3.2.18 PM emission time series for stationary combustion.

Heavy metals

Stationary combustion plants are among the most important emission sources for heavy metals. The emission share for stationary combustion compared to national total is shown for each metal in Table 3.2.8.

Table 3.2.8 and Figure 3.2.19 present the heavy metal emission inventory for the stationary combustion subcategories. The source categories *Public electricity and heat production*, *Residential* and *Industry* are the main emission sources. The emission share for waste incineration plants has decreased considerably since the year 2000 due to installation of new improved flue gas cleaning technology that was initiated based on lower emission limit values in Danish legislation (DEPA 2011a).

Table 3.2.8 Heavy metal emission from stationary combustion plants, 2012[1)].

	As, kg	Cd, kg	Cr, kg	Cu, kg	Hg, kg	Ni, kg	Pb, kg	Se, kg	Zn, kg
1A1a Public electricity and heat production	76	27	154	134	155	220	320	450	372
1A1b Petroleum refining	32	23	24	47	22	316	68	108	104
1A1c Other energy industries	3	0	0	0	3	0	0	0	0
1A2 Industry	78	24	81	104	37	1523	385	81	957
1A4a Commercial/Institutional	3	1	4	4	2	61	5	1	24
1A4b Residential	23	37	76	288	18	126	1425	19	3661
1A4c Agriculture/Forestry/Fisheries	8	5	23	39	11	106	237	31	514
Total	223	117	361	616	248	2352	2440	690	5632
Emission share from stationary combustion	73%	57%	48%	1%	79%	52%	21%	56%	13%

1) Only emission from stationary combustion plants in the source categories is included.

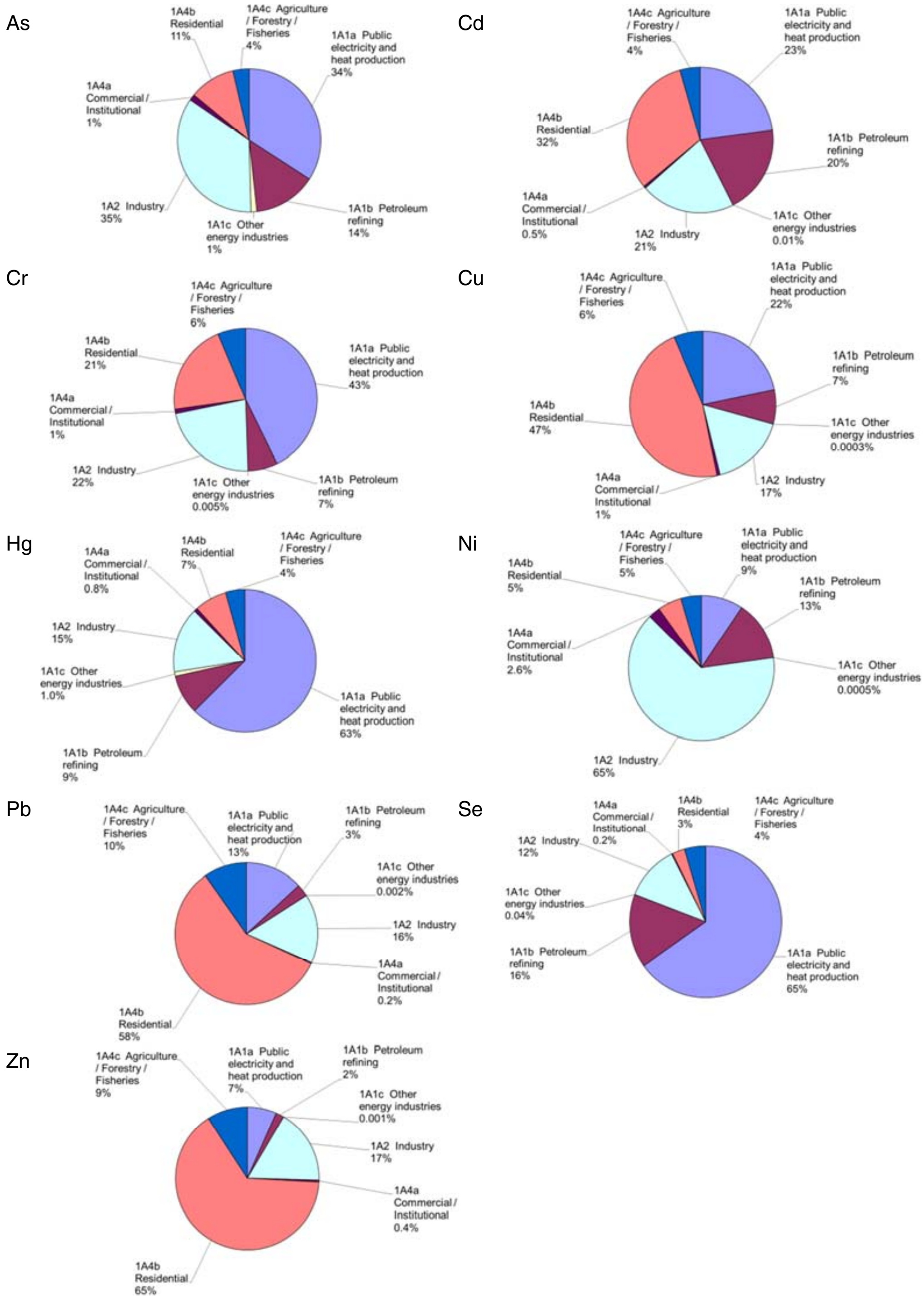


Figure 3.2.19 Heavy metal emission sources, stationary combustion plants, 2012.

The time series for heavy metal emissions are provided in Figure 3.2.20. Emissions of all heavy metals have decreased considerably (77 % - 91 %) since 1990, see Table 3.2.9. Emissions have decreased despite increased incineration of waste. This has been made possible due to installation and improved performance of gas cleaning devices in waste incineration plants and also in large power plants, the latter being a further important emission source.

Table 3.2.9 Decrease in heavy metal emission 1990-2012.

Pollutant	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Decrease since 1990, %	81	86	93	83	91	86	84	83	77

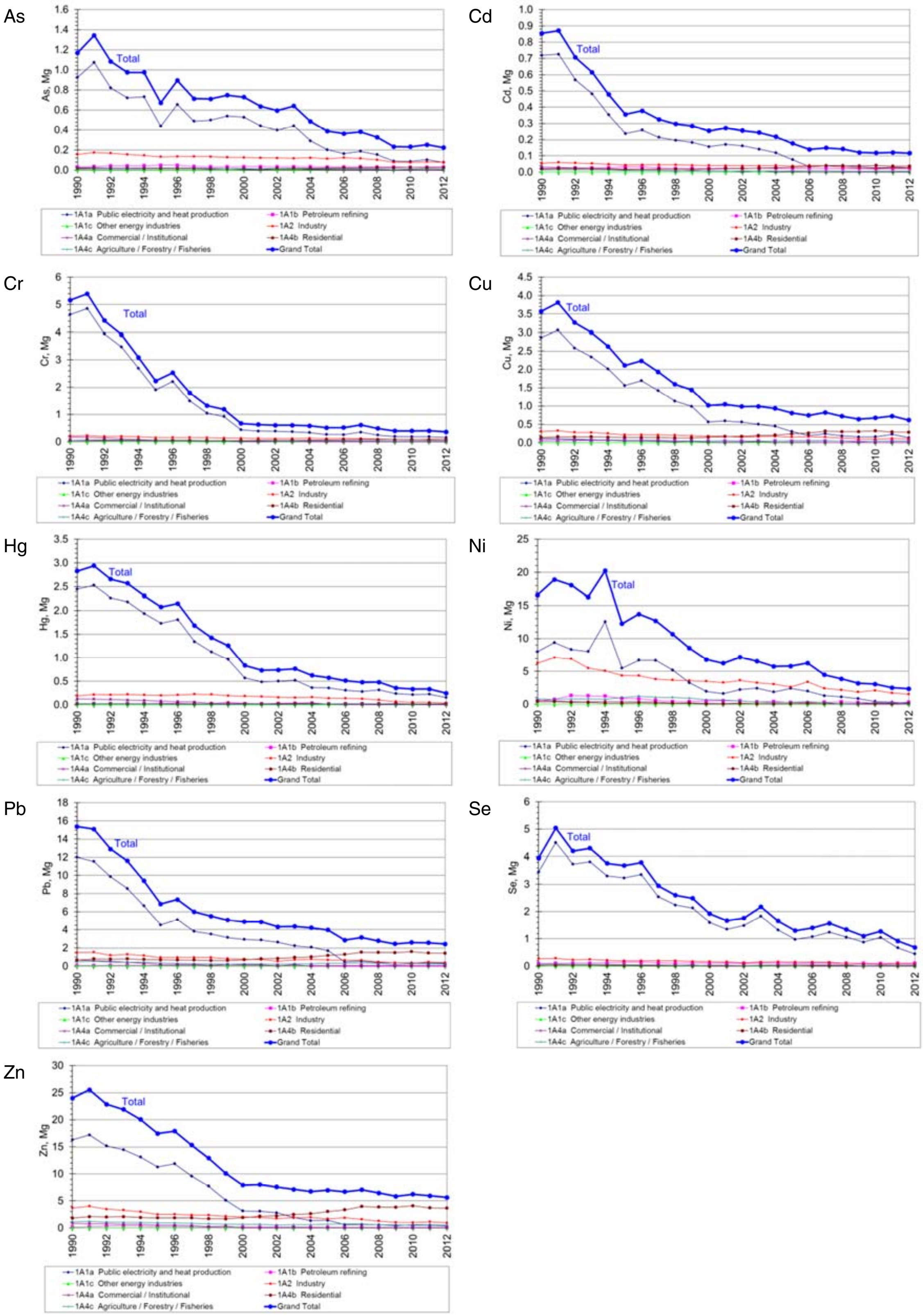


Figure 3.2.20 Heavy metal emission time series, stationary combustion plants.

Polycyclic aromatic hydrocarbons (PAH)

Stationary combustion plants accounted for more than 79 % of the PAH emission in 2012.

Table 3.2.10 and Figure 3.2.21 present the PAH emission inventories for the stationary combustion subcategories. Residential combustion is the largest emission source accounting for more than 79 % of the emission. Combustion of wood is the predominant source, accounting for more than 97 % of the PAH emission from residential plants, see Figure 3.2.22.

The time series for PAH emissions are presented in Figure 3.2.23. The increasing (36 % - 94 %) emission trend for PAH is a result of the increased combustion of wood in residential plants. The time series for wood combustion in residential plants is also provided in Figure 3.2.23. The stabilisation of the consumption of wood in residential plants since 2007 is reflected in the PAH emission time series.

Table 3.2.10 PAH emission from stationary combustion plants, 2012[1)].

	Benzo(a)-Pyrene, kg	Benzo(b)-fluoranthene, kg	Benzo(k)-fluoranthene, kg	Indeno(1,2,3-c,d)pyrene, kg
1A1a Public electricity and heat production	8	34	22	6
1A1b Petroleum refining	0	0	0	0
1A1c Other energy industries	0	0	0	0
1A2 Industry	22	78	14	3
1A4a Commercial/Institutional	148	194	64	105
1A4b Residential	1882	1861	689	1061
1A4c Agriculture/Forestry/Fisheries	131	146	31	173
Total	2190	2314	822	1349
Emission share from stationary combustion	89%	88%	79%	86%

1) Only emission from stationary combustion plants in the source categories is included.

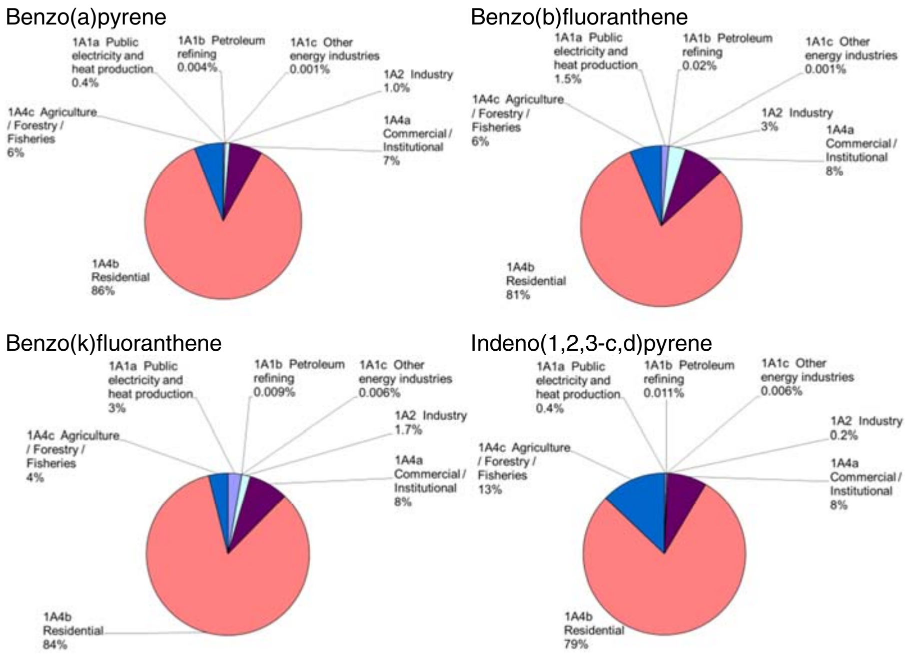


Figure 3.2.21 PAH emission sources, stationary combustion plants, 2012.

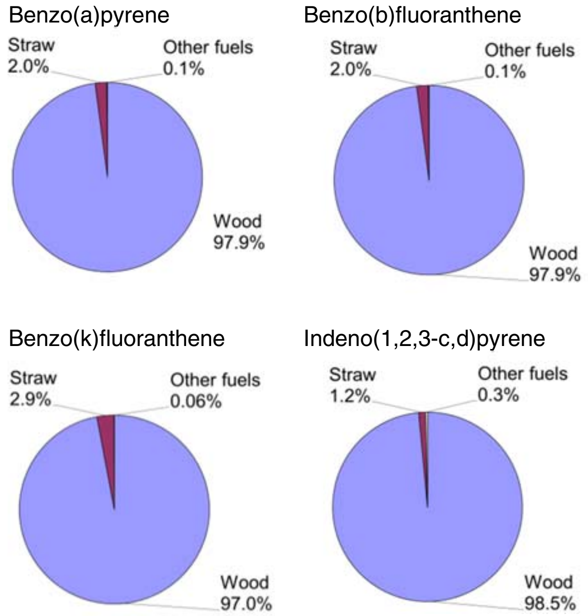


Figure 3.2.22 PAH emission from residential combustion plants (stationary), fuel origin.

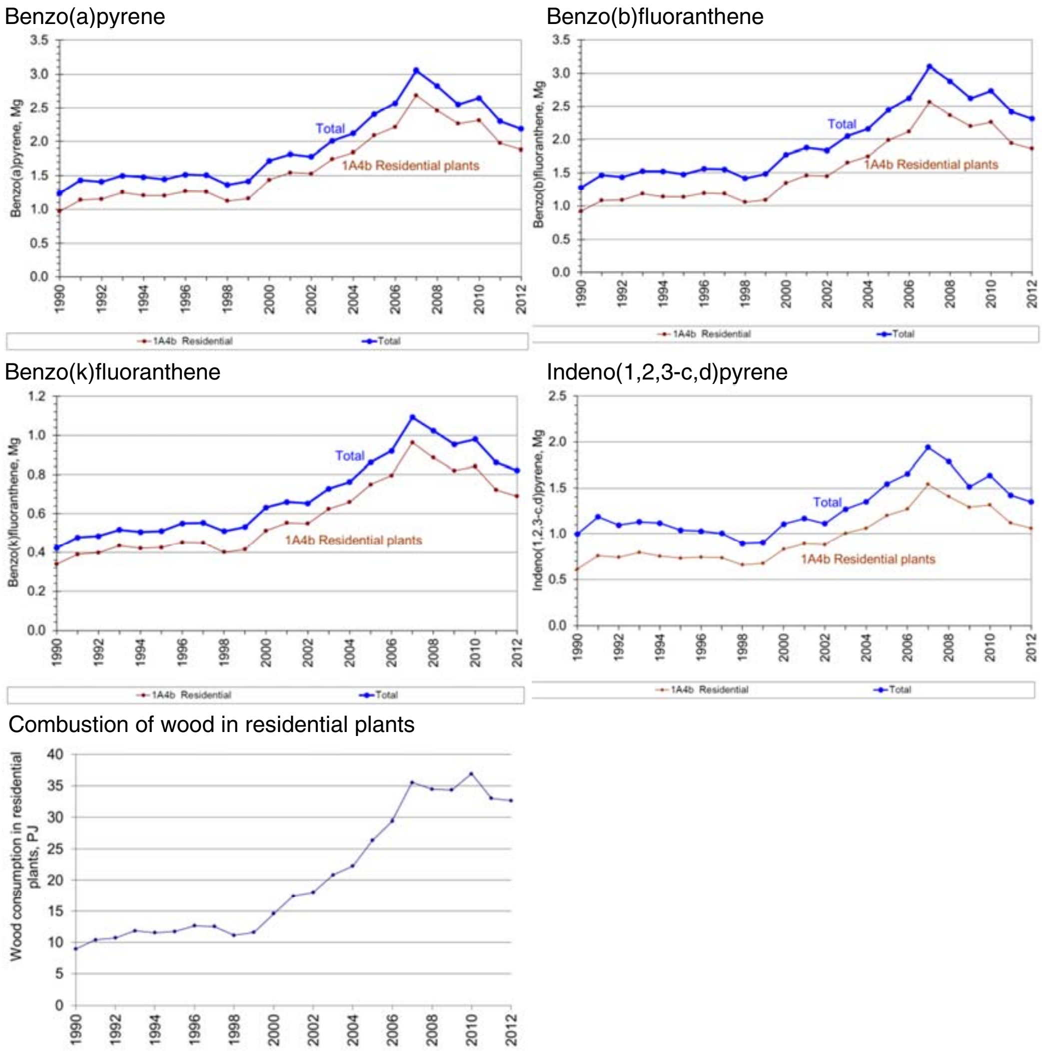


Figure 3.2.23 PAH emission time series, stationary combustion plants. Comparison with wood consumption in residential plants.

Polychlorinated dibenzodioxins and -furans (PCDD/F)

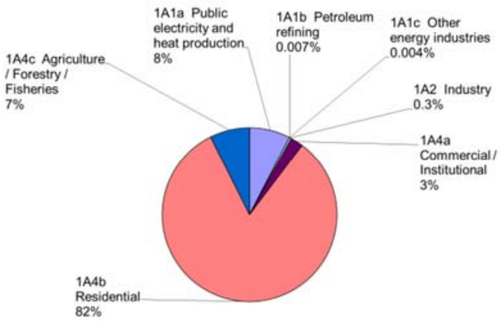
Stationary combustion plants accounted for 73 % of the national emission of polyclorinated dibenzodioxins and –furans (PCDD/F) in 2012.

Table 3.2.11 presents the PCDD/F emission inventories for the stationary combustion subcategories. In 2012, the emission from residential plants accounted for 82 % of the emission. Combustion of wood is the predominant source accounting for 88 % of the emission from residential plants (Figure 3.2.24).

The time series for PCDD/F emission is presented in Figure 3.2.25. The PCDD/F emission has decreased 64 % since 1990 mainly due to installation of dioxin filters in waste incineration plants. The emission from residential plants has increased due to increased wood consumption in this source category.

Table 3.2.11 PCDD/F emission from stationary combustion plants, 2012[1).]

	PCDD/F, g I-teq
1A1a Public electricity and heat production	1.25
1A1b Petroleum refining	0.001
1A1c Other energy industries	0.001
1A2 Industry	0.06
1A4a Commercial/Institutional	0.39
1A4b Residential	13.68
1A4c Agriculture/Forestry/Fisheries	1.22
Total	16.61



1) Only emission from stationary combustion plants in the source categories is included.

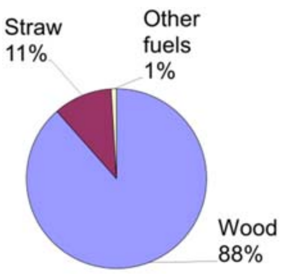


Figure 3.2.24 PCDD/F emission from residential plants, fuel origin.

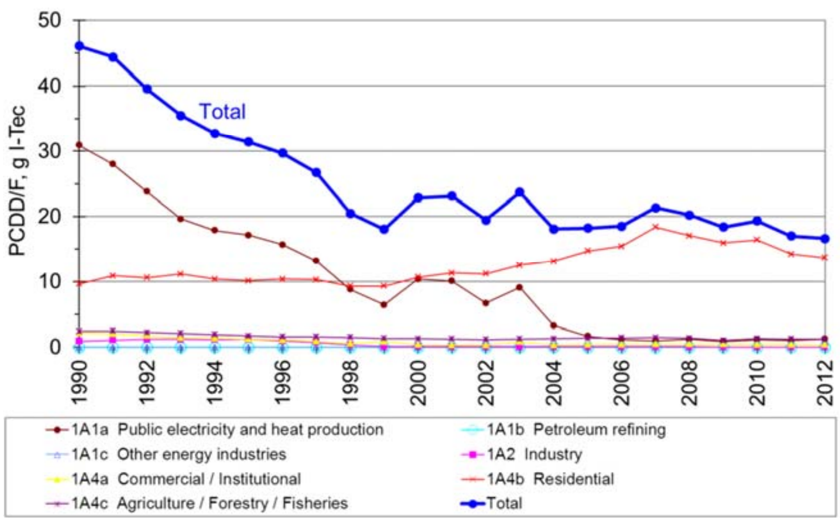


Figure 3.2.25 PCDD/F emission time series, stationary combustion plants.

Hexachlorobenzene (HCB)

Stationary plants accounted for more than 57 % of the estimated national emission of hexachlorobenzene (HCB) in 2012.

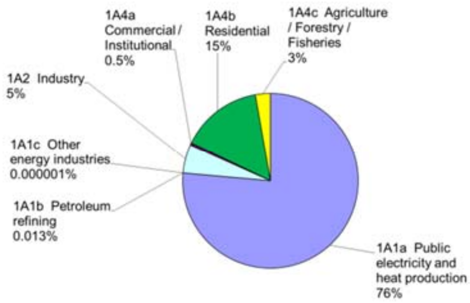
Table 3.2.12 shows the HCB emission inventory for the stationary combustion subcategories. *Public electricity and heat production* account for 76 % of the emission. Residential plants account for 15 % of the emission.

The time series for HCB emission is presented in Figure 3.2.26. The HCB emission has decreased 74 % since 1990 mainly due to improved flue gas cleaning in waste incineration plants. The emission from residential plants has increased due to increased wood consumption in this source category.

Table 3.2.12 HCB emission from stationary combustion plants, 2012[1)].

	HCB, kg
1A1a Public electricity and heat production	1.052
1A1b Petroleum refining	0.0002
1A1c Other energy industries	0.00000001
1A2 Industry	0.073
1A4a Commercial/Institutional	0.006
1A4b Residential	0.207
1A4c Agriculture/Forestry/Fisheries	0.038
Total	1.376

1) Only the emission from stationary combustion plants in the source categories is included.



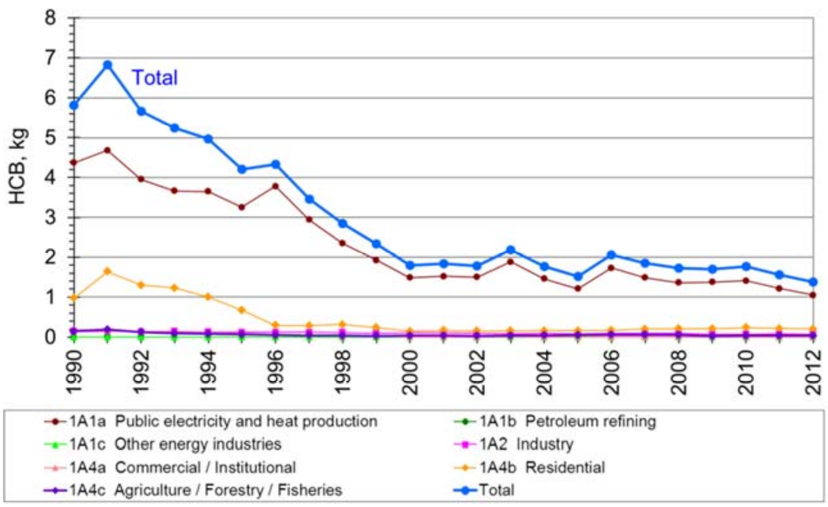


Figure 3.2.26 HCB emission time series, stationary combustion plants.

Polychlorinated biphenyls (PCB)

The previous Danish emission inventories did not include polychlorinated biphenyls (PCB) emissions.

PCB can be emitted in any chemical process involving chloride and organic carbon or emitted due to incomplete combustion of PCB in fuel (waste incineration). In Denmark, waste with high levels of PCB is only incinerated in plants with permission to incinerate this waste fraction as it requires a high combustion temperature.

Different references for PCB emissions are not directly comparable because some PCB emission data are reported for individual PCB congeners, some as a sum of a specified list of PCB congeners and some PCB emission data are reported as toxic equivalence (teq) based on toxicity equivalence factors (TEF) for 12 dioxin-like PCB congeners. The emission measurements reported by Thistlethwaite (2001a and 2001b) show that the emission of non-dioxin-like PCBs is high compared to the emission of dioxin-like PCBs.

Furthermore, teq values based on TEF are reported as WHO_{2005}-teq or WHO_{1998}-teq. This difference is however typically less than 50%[3].

For stationary combustion the emission inventory is a sum of dioxin-like PCB (dl-PCB) emission, no teq values applied.

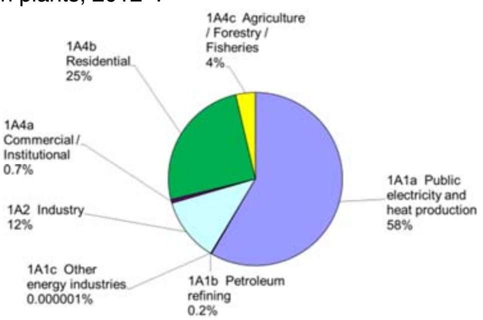
Stationary plants accounted for 1 % of the estimated national PCB emission in 2012.

Table 3.2.13 shows the dl-PCB emission inventory for the stationary combustion subcategories. *Public electricity and heat production* account for 58 % of the emission. Residential plants account for 25 % of the emission.

The time series for dl-PCB emission is presented in Figure 3.2.26. The dl-PCB emission has decreased 63 % since 1990. The decrease is mainly a result of the flue gas cleaning devices that have been installed in waste incineration plants for dioxin reduction.

Table 3.2.13 PCB emission from stationary combustion plants, 2012[1)].

	PCB, kg
1A1a Public electricity and heat production	0.250
1A1b Petroleum refining	0.001
1A1c Other energy industries	0.000
1A2 Industry	0.051
1A4a Commercial/Institutional	0.003
1A4b Residential	0.108
1A4c Agriculture/Forestry/Fisheries	0.016
Total	0.427



1) Only the emission from stationary combustion plants in the source categories is included.

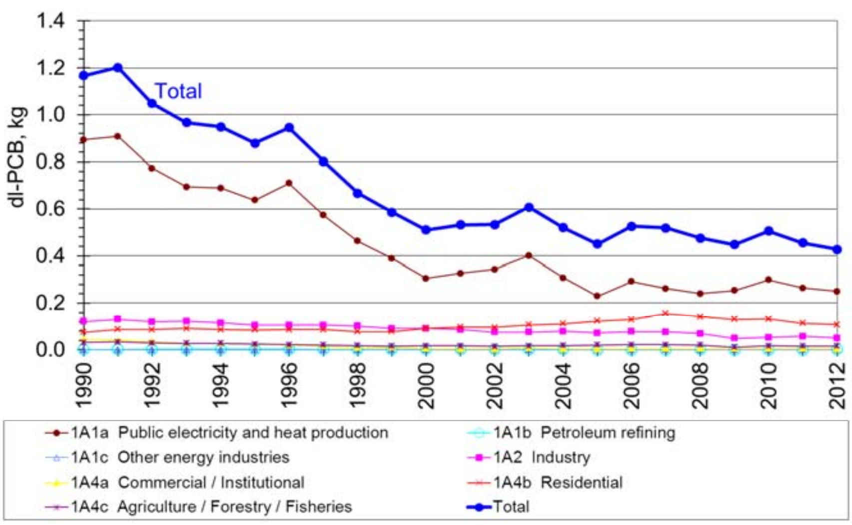


Figure 3.2.26 PCB emission time series, stationary combustion plants.

[3] Data have been compared for a few datasets in which each dioxin-like PCB congener was specified

3.2.4 Trend for subsectors

In addition to the data for stationary combustion, this chapter presents and discusses data for each of the subcategories in which stationary combustion is included. Time series are presented for fuel consumption and emissions.

1A1 Energy industries

The emission source category *1A1 Energy Industries* consists of the subcategories:

- 1A1a Public electricity and heat production
- 1A1b Petroleum refining
- 1A1c Other energy industries

Figure 3.2.27 – 3.2.31 present time series for the *Energy Industries*. *Public electricity and heat production* is the largest subcategory accounting for the main part of all emissions. Time series are discussed below for each subcategory.

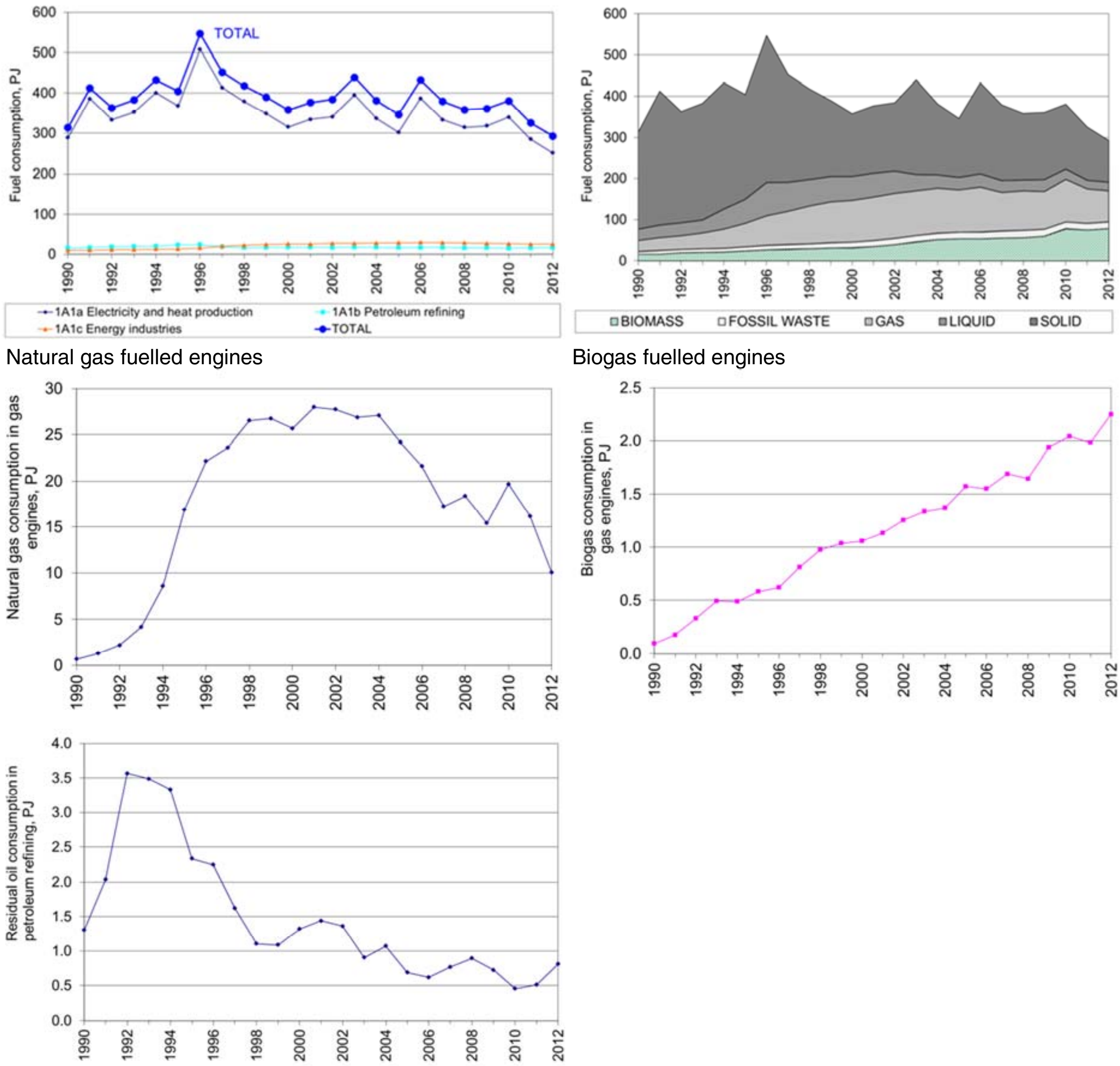


Figure 3.2.27 Time series for fuel consumption, 1A1 Energy industries.

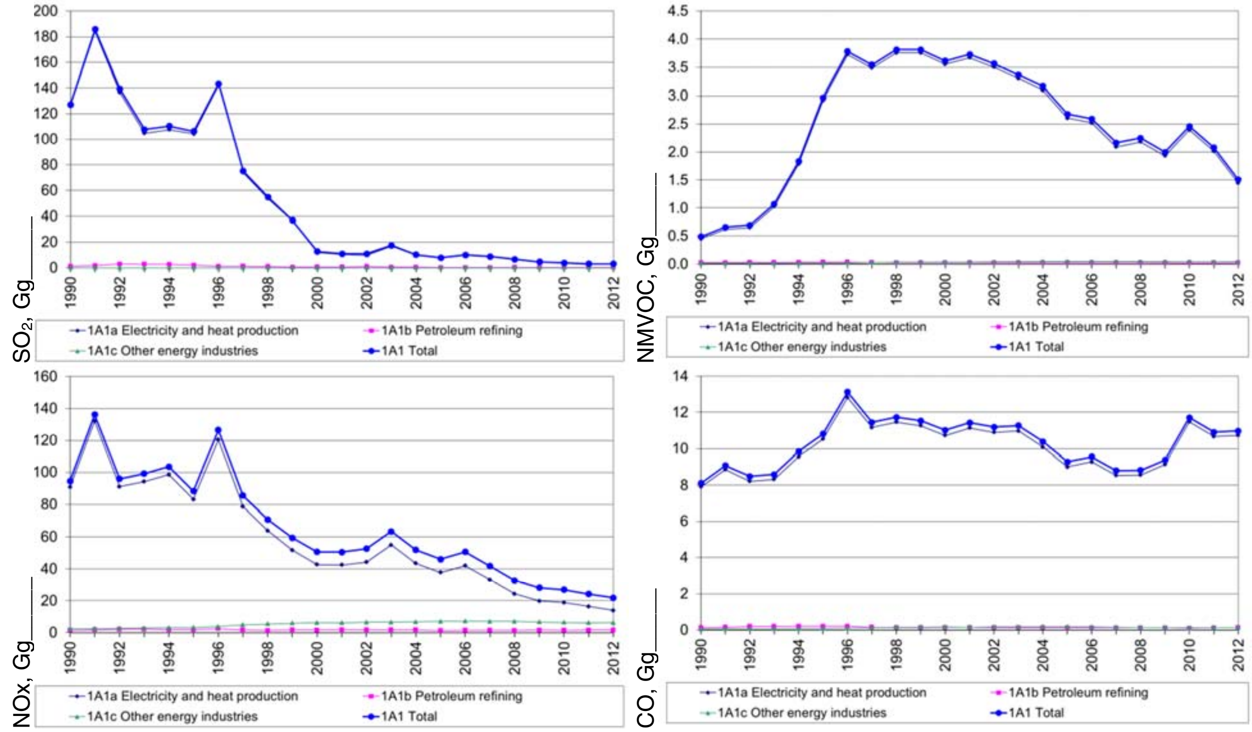


Figure 3.2.28 Time series for SO_2, NO_x, NMVOC and CO emission, 1A1 Energy industries.

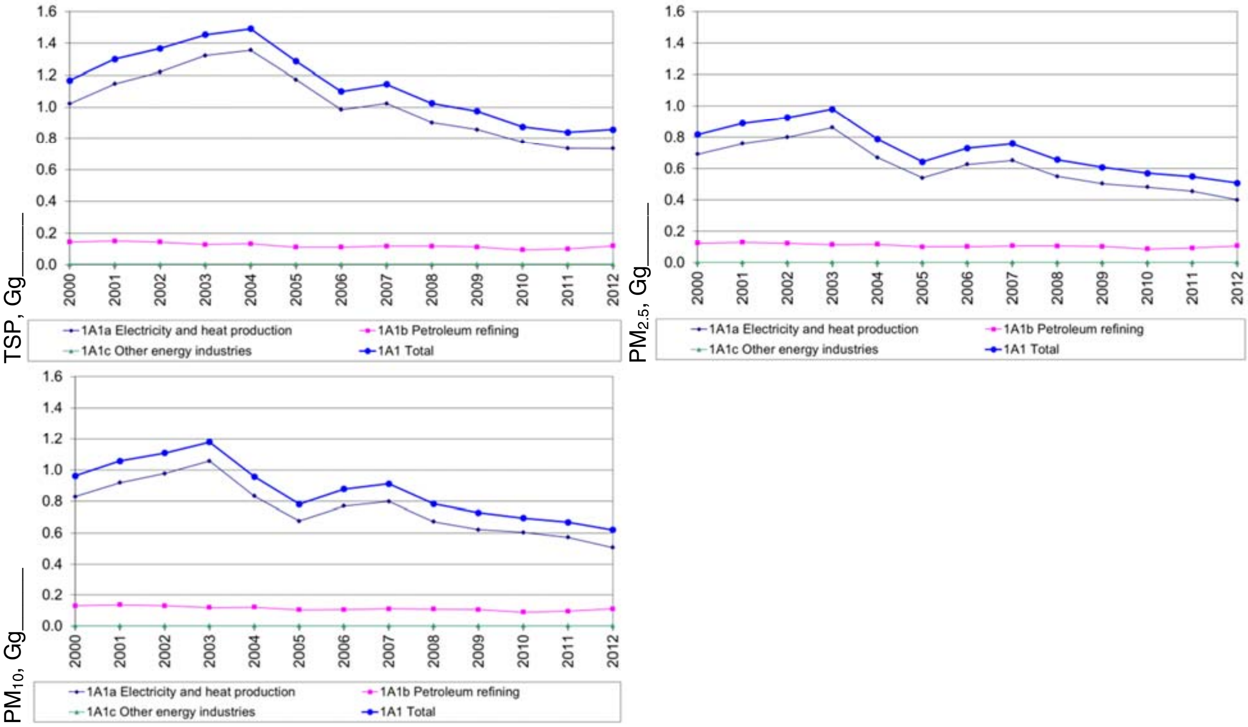


Figure 3.2.29 Time series for PM emission, 1A1 Energy industries.

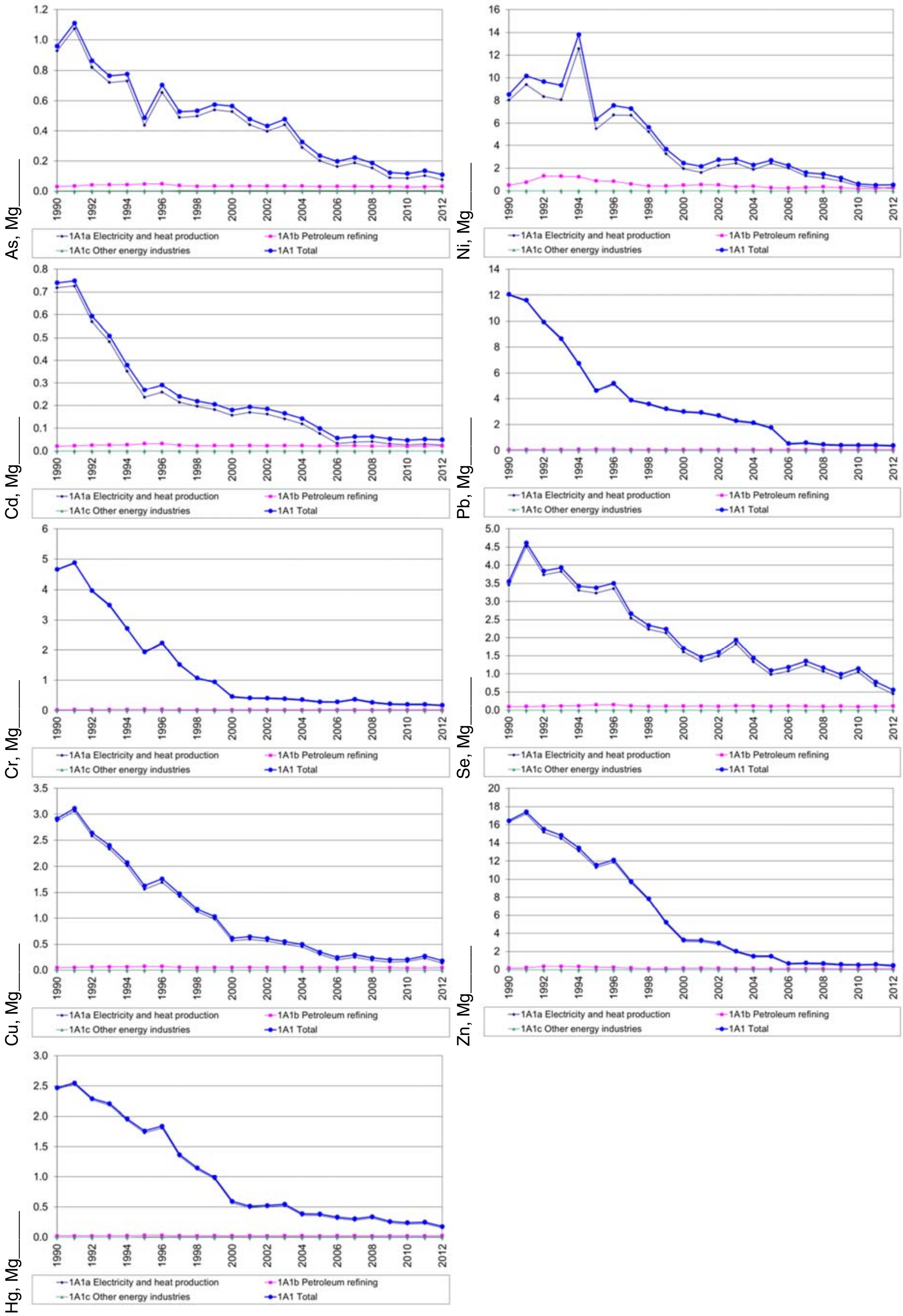


Figure 3.2.30 Time series for HM emission, 1A1 Energy industries.

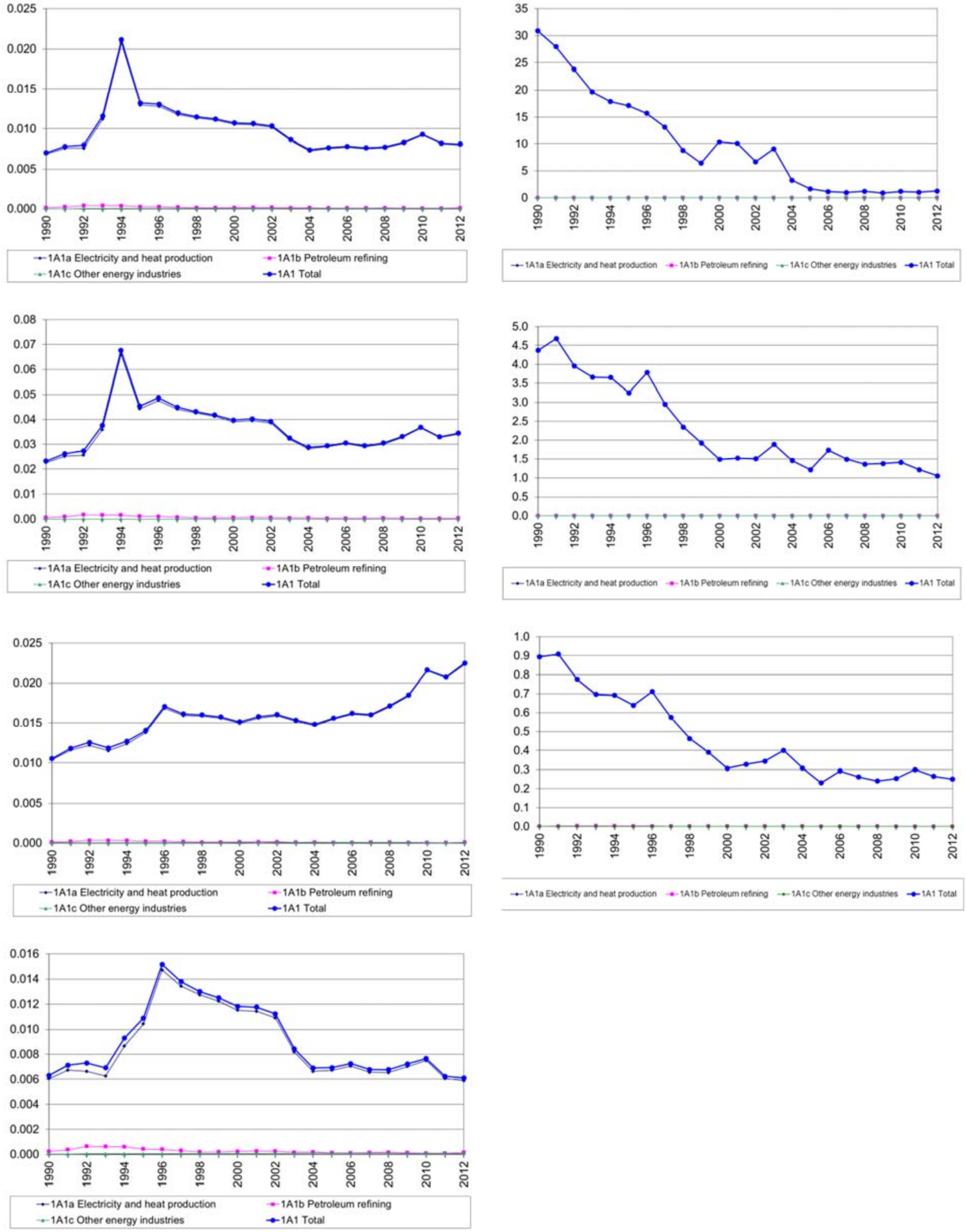


Figure 3.2.31 Time series for PAH, PCDD/F, HCB and dl-PCB emission, 1A1 Energy industries.

1A1a Public electricity and heat production

Public electricity and heat production is the largest source category regarding fuel consumption for stationary combustion. Figure 3.2.32 shows the time series for fuel consumption and emissions of SO_2, NO_x, NMVOC and CO.

The fuel consumption in public electricity and heat production was 13 % lower in 2012 than in 1990. As discussed in Chapter 3.2.2 the fuel consumption fluctuates mainly as a consequence of electricity trade. Coal is the fuel that is affected the most by the fluctuating electricity trade. Coal is the main fuel in the source category even in years with electricity import. The coal consumption in 2012 was 57 % lower than in 1990. Natural gas is also an important fuel and the consumption of natural gas has increased since 1990. A considerable part of the natural gas is combusted in gas engines (Figure 3.2.27). The consumption of waste and biomass has increased.

The SO_2 emission has decreased 98 % from 1990 to 2012. This decrease is a result of both lower sulphur content in fuels and installation and improved performance of desulphurisation plants. The emission was higher in 2012 than in 2011, but the emission has however decreased 64 % since 2005.

The NO_x emission has decreased 85 % since 1990 due to installation of low NO_x burners, selective catalytic reduction (SCR) units and selective non-catalytic reduction (SNCR) units. The fluctuations in time series follow the fluctuations in fuel consumption and electricity trade.

The emission of NMVOC in 2012 was 3.2 times the 1990 emission level. This is a result of the large number of gas engines that has been installed in Danish CHP plants. The decreasing emission in 2004-2012 is results of the time series for natural gas consumption in gas engines (Figure 3.2.27). In addition the emission of NMVOC from engines decreased in 1995-2007 as a result of introduction of an emission limits for unburned hydrocarbon[4] (DEPA 2005).

The CO emission was 35 % higher in 2012 than in 1990. The fluctuations follow the fluctuations of the fuel consumption. In addition, the emission from gas engines is considerable.

[4] Including methane.

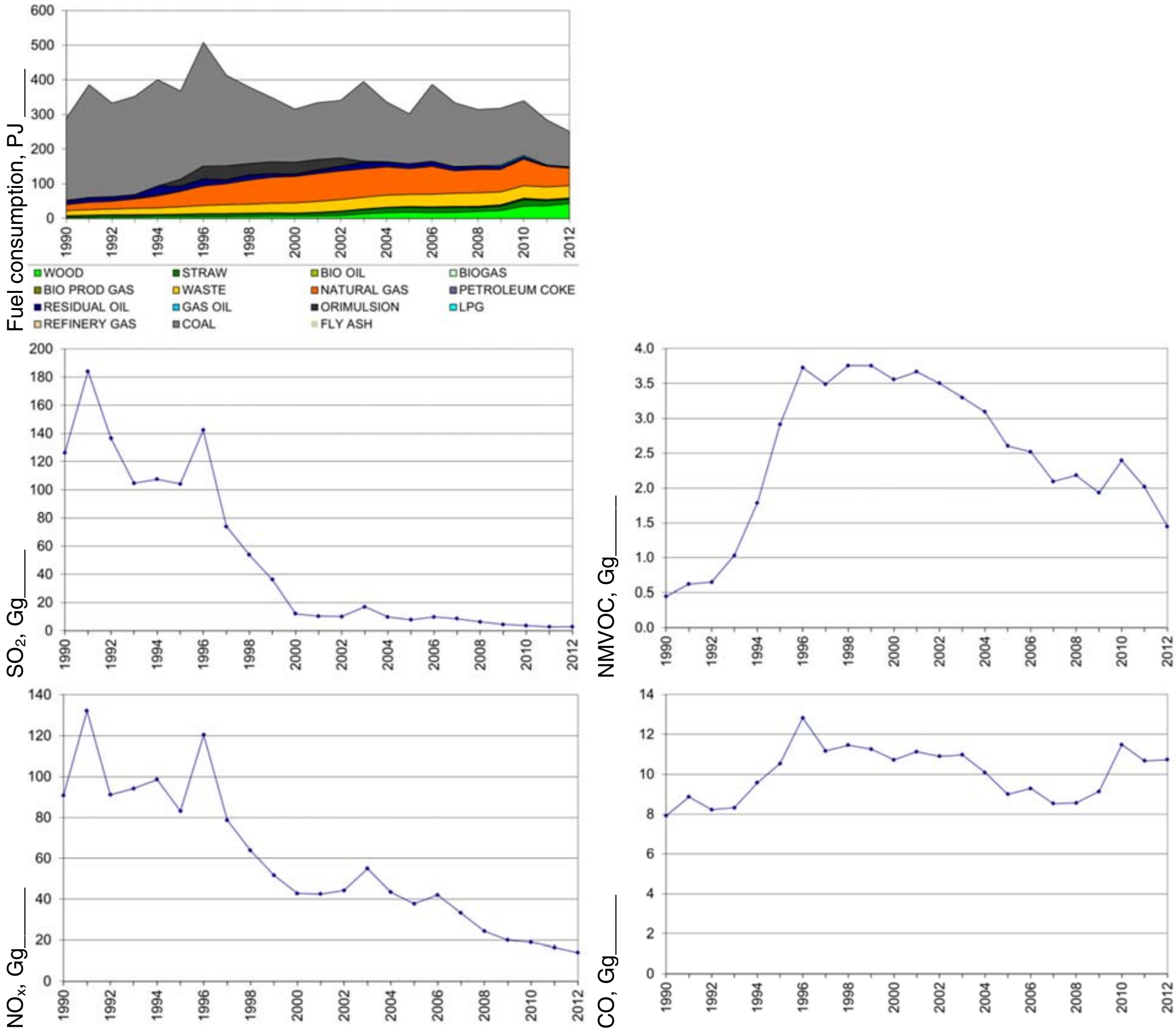


Figure 3.2.32 Time series for 1A1a Public electricity and heat production.

1A1b Petroleum refining

Petroleum refining is a small source category regarding both fuel consumption and emissions for stationary combustion. Presently two refineries are operating in Denmark. Figure 3.2.33 shows the time series for fuel consumption and emissions.

The significant decrease in both fuel consumption and emissions in 1996 is a result of the closure of a third refinery.

The fuel consumption has increased 9 % since 1990.

The emission of SO_2 has shown a pronounced decrease (74 %) since 1990, mainly because decreased consumption of residual oil (38%) also shown in Figure 3.2.33. The increase in SO_2 emission in 1990-1992 also follows the residual oil consumption. The NO_x emission in 2012 was 10 % higher in 2012 than in 1990. Since 2005, data for both SO_2 and NO_x are plant specific data stated by the refineries.

The NMVOC emission time series follows the time series for fuel consumption.

A description of the Danish emission inventory for fugitive emissions from fuels is given in Plejdrup et al. (2011) and in Chapter 3.4.

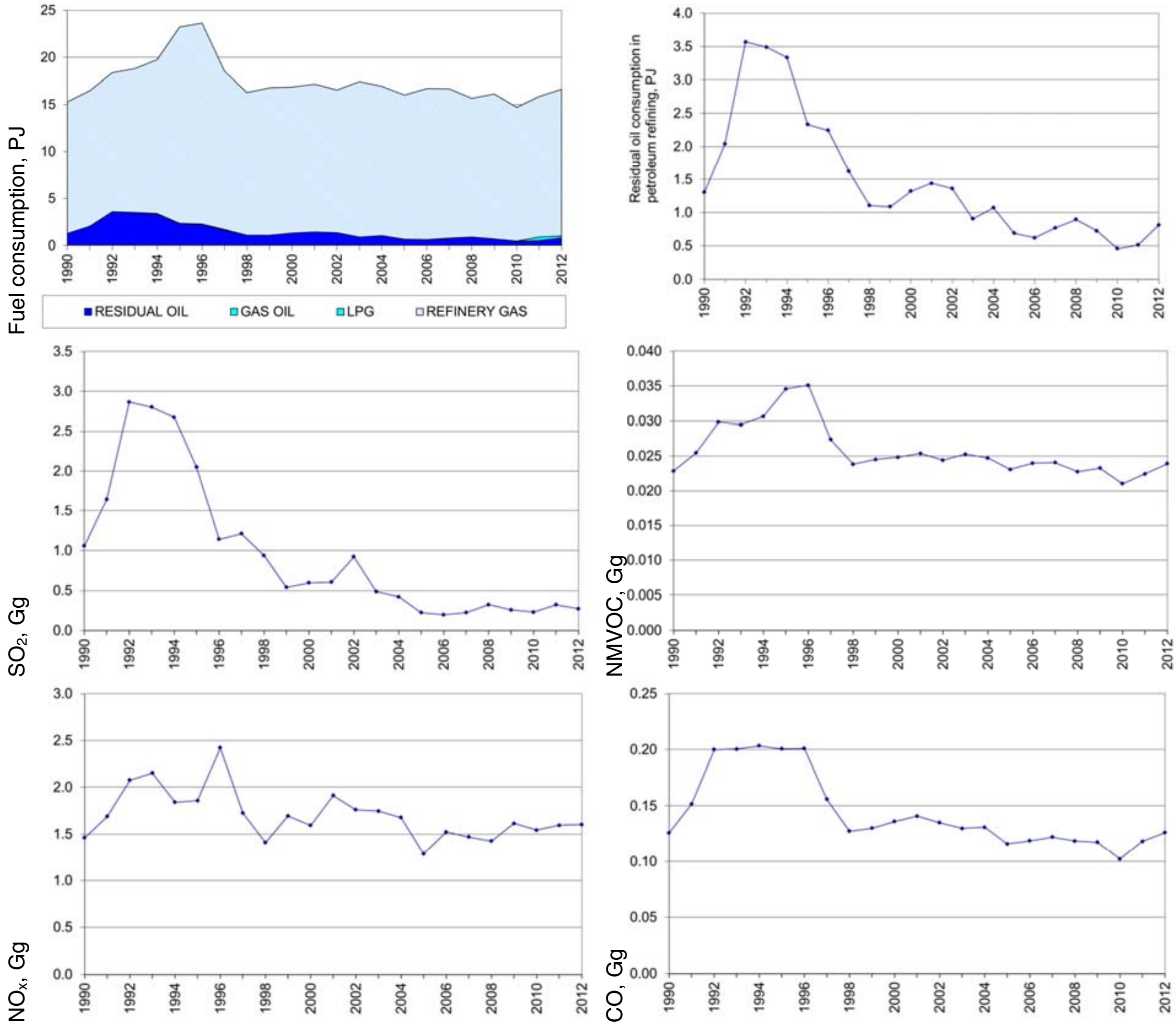


Figure 3.2.33 Time series for 1A1b Petroleum refining.

1A1c Other energy industries

The source category *Other energy industries* comprises natural gas consumption in the off-shore industry and in addition a small consumption in the Danish gas treatment plant[5]. Gas turbines are the main plant type. Figure 3.2.34 shows the time series for fuel consumption and emissions.

The fuel consumption in 2012 was 2.6 times the consumption in 1990. The fuel consumption has decreased since 2008.

The emissions follow the increase of fuel consumption.

The decrease of CO emission in 2005 – 2007 is a result of a lower emission factor. This decrease of emission factor is valid for gas turbines in cogeneration plants, but might not be valid for off shore gas turbines. However, the same emission factors have been assumed for CO emission due to the lack of data from off shore gas turbines.

[5] Nybro.

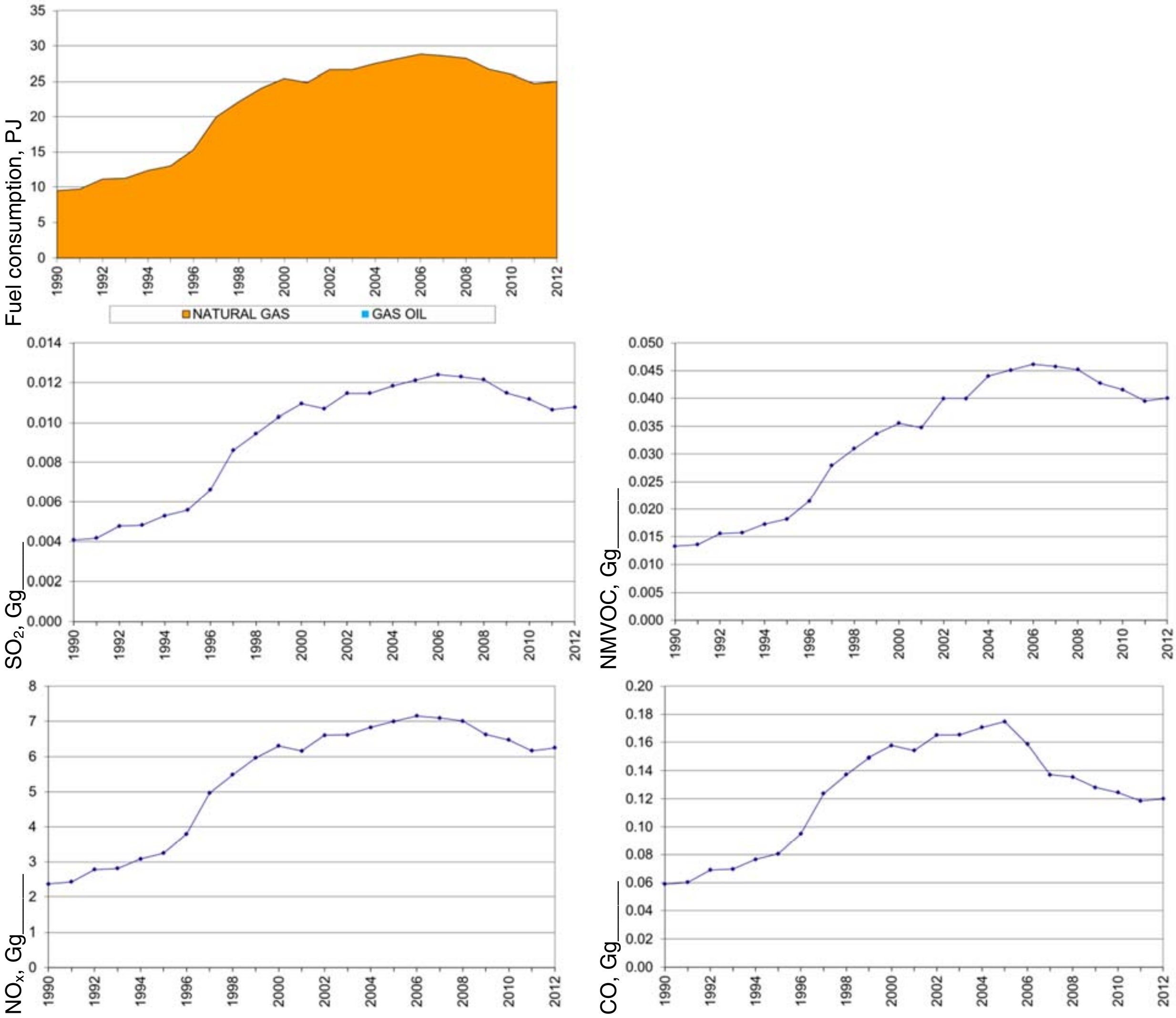


Figure 3.2.34 Time series for 1A1c Other energy industries.

1A2 Industry

Manufacturing industries and construction (Industry) consists of both stationary and mobile sources. In this chapter, only stationary sources are included.

The emission source category *1A2 Industry* consists of the subcategories:

- 1A2a Iron and steel
- 1A2b Non-ferrous metals
- 1A2c Chemicals
- 1A2d Pulp, Paper and Print
- 1A2e Food processing, beverages and tobacco
- 1A2f i Industry-Other

Figure 3.2.35 - 3.2.39 show the time series for fuel consumption and emissions. The subsector *Industry – Other* is the main subsector for fuel consumption and emissions. *Food processing, beverages and tobacco* is also an important subsector.

The total fuel consumption in industrial combustion was 17 % lower in 2012 than in 1990. The consumption of natural gas has increased since 1990 whereas the consumption of coal has decreased. The consumption of residual oil has decreased, but the consumption of petroleum coke increased. The biomass consumption has increased 53 % since 1990.

The SO_2 emission has decreased 82 % since 1990. This is mainly a result of lower consumption of residual oil in the industrial sector (Figure 3.2.35). Further, the sulphur content of residual oil and several other fuels has decreased since 1990 due to legislation and tax laws.

The NO_x emission has decreased 57 % since 1990 due to the reduced emission from industrial boilers in general. Cement production is the main emission source accounting for more than 50 % of the industrial emission in 1990-2009[6]. In 2012, the NO_x emission from cement industry was 33 % of the industrial emission. The NO_x emission from cement production was reduced 75 % since 1990. The reduced emission is a result of installation of SCR on all production units at the cement production plant in 2004-2007[7] and improved performance of the SCR units in recent years. A NO_x tax was introduced in 2010 (DMT, 2008).

The NMVOC emission has decreased 75 % since 1990. The decrease is mainly a result of decreased emission factor for combustion of wood in industrial boilers. The emission from gas engines has however increased considerably after 1995 due to the increased fuel consumption that is a result of the installation of a large number of industrial CHP plants (Figure 3.2.35). The NMVOC emission factor for gas engines is much higher than for boilers regardless of the fuel.

The CO emission in 2012 was 11 % lower than in 1990. The main source of emission is combustion in *Industry – Other*, primarily in wood and cement production. The CO emission from mineral wool production is included in the industry sector (2A7d).

The large decrease of Hg emission since 2009 is related to a large decrease of particulate matter emission and to a large decrease of coal consumption since 2009.

[6] More than 65 % of sector 1A2f i
[7] To meet emission limit

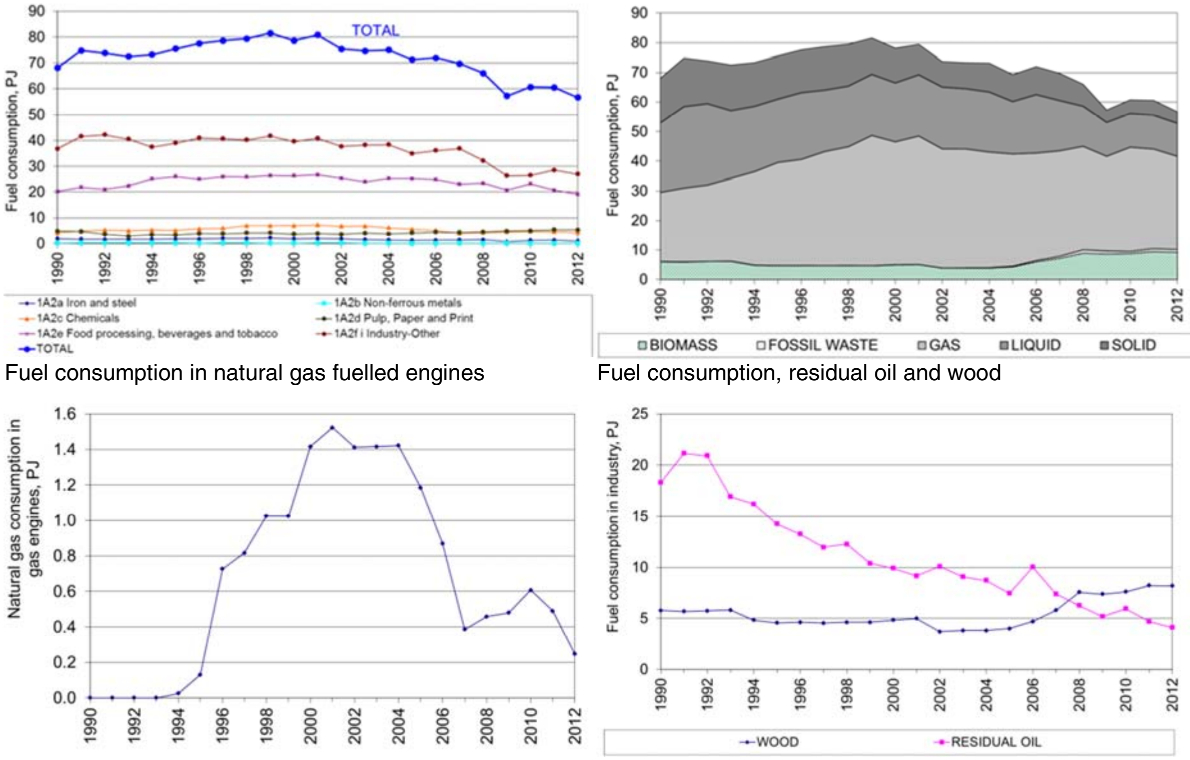


Figure 3.2.35 Time series for fuel consumption, 1A2 Industry.

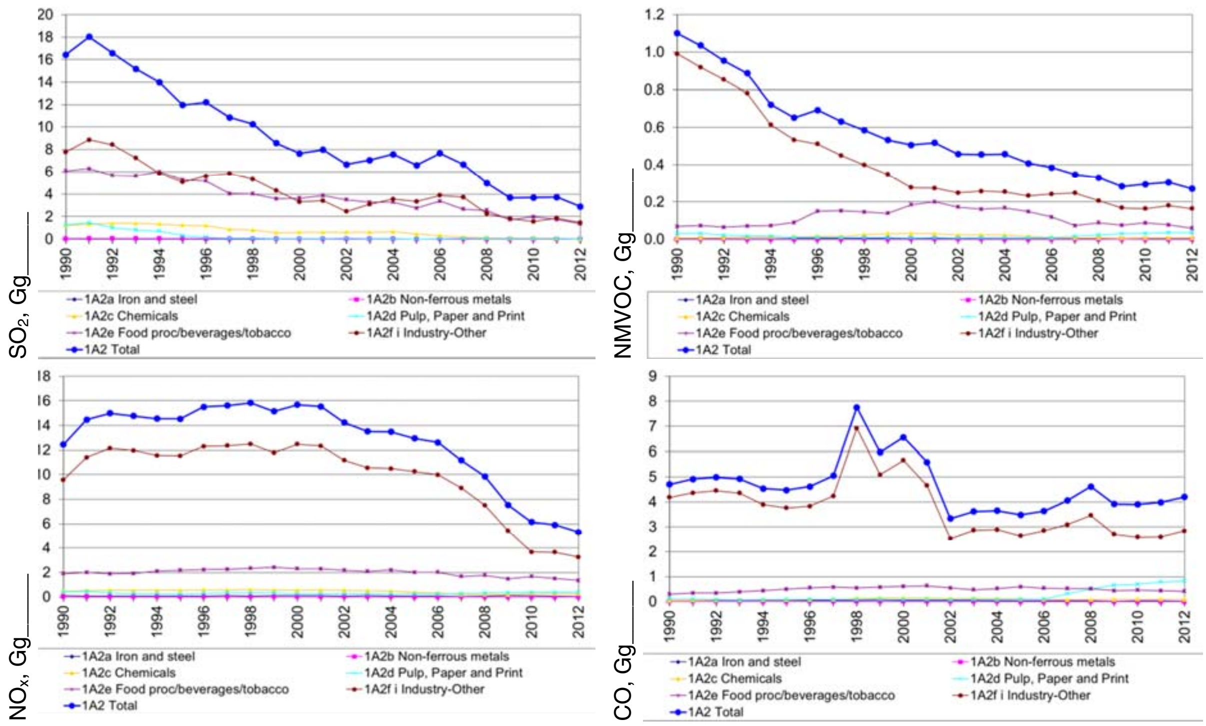


Figure 3.2.36 Time series for SO_2, NO_x, NMVOC and CO emission, 1A2 Industry.

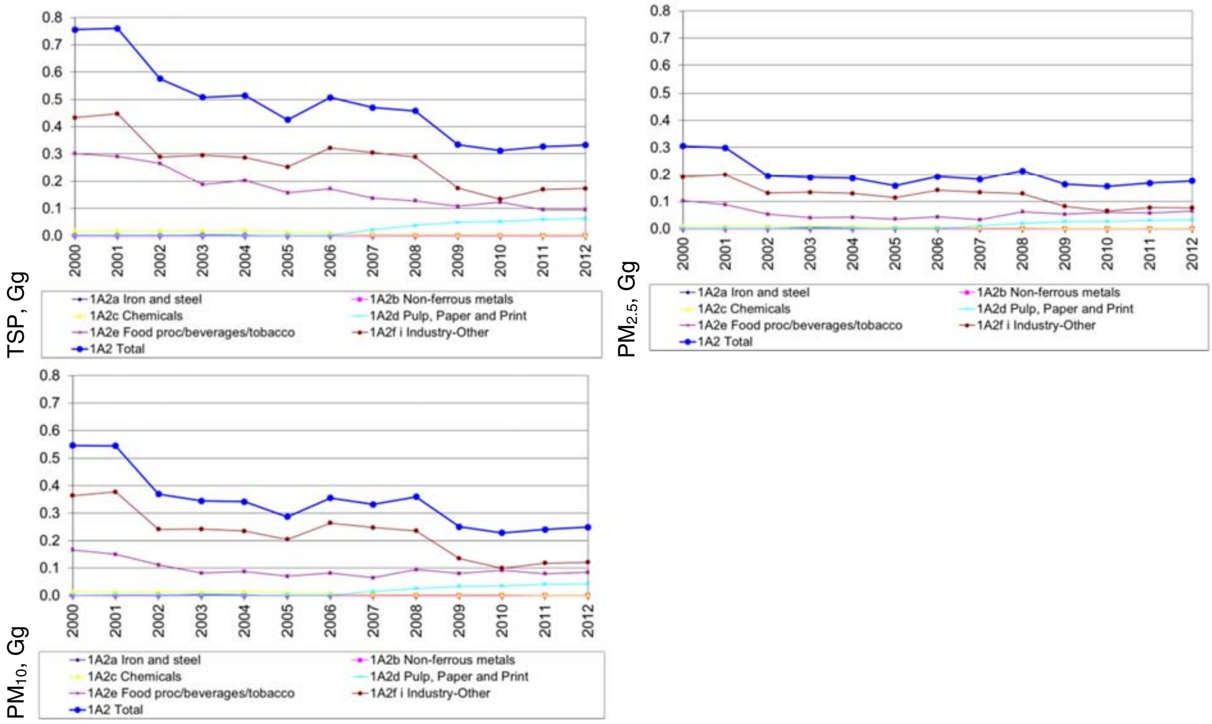


Figure 3.2.37 Time series for PM emission, 1A2 Industry.

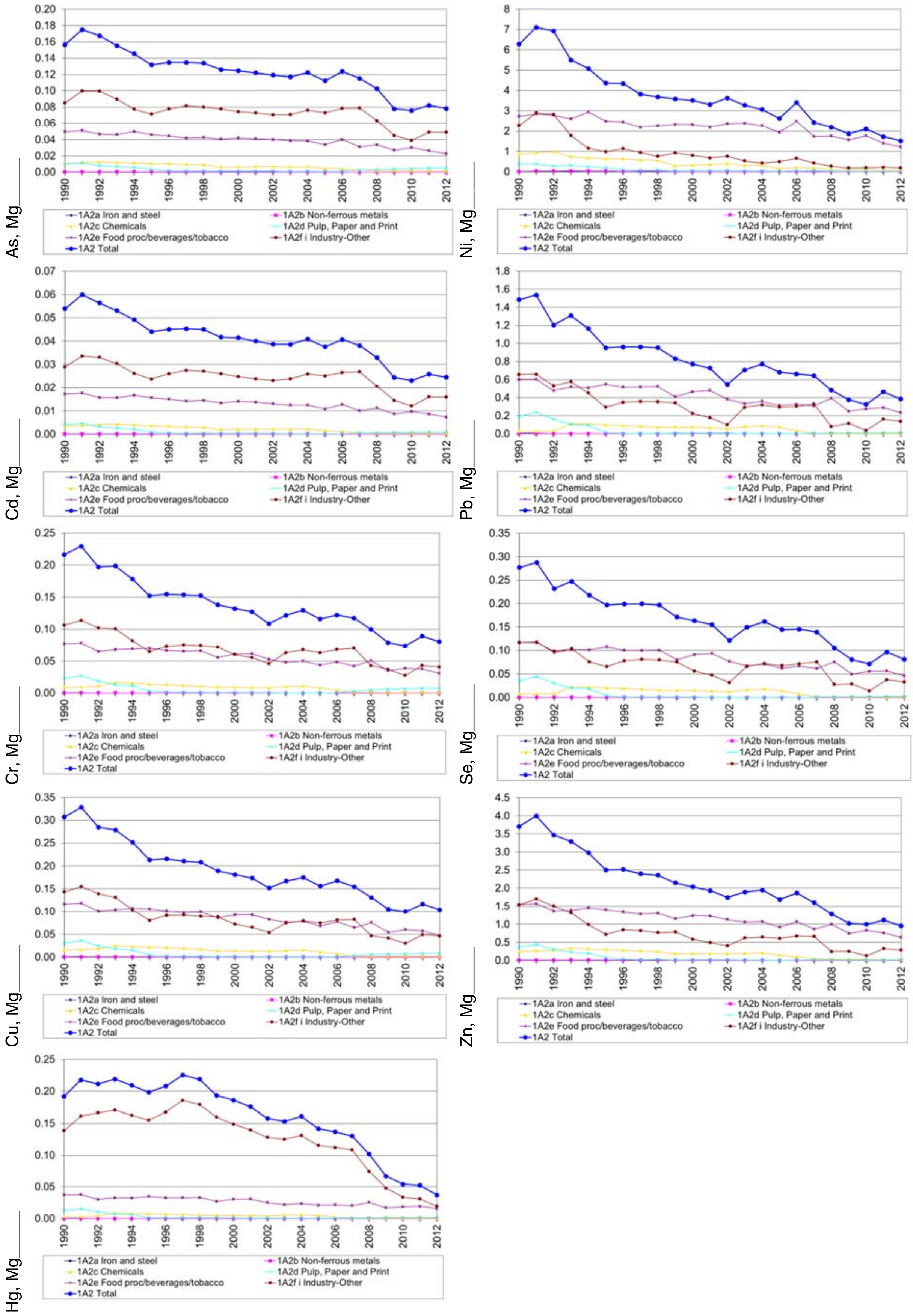


Figure 3.2.38 Time series for HM emission, 1A2 Industry.

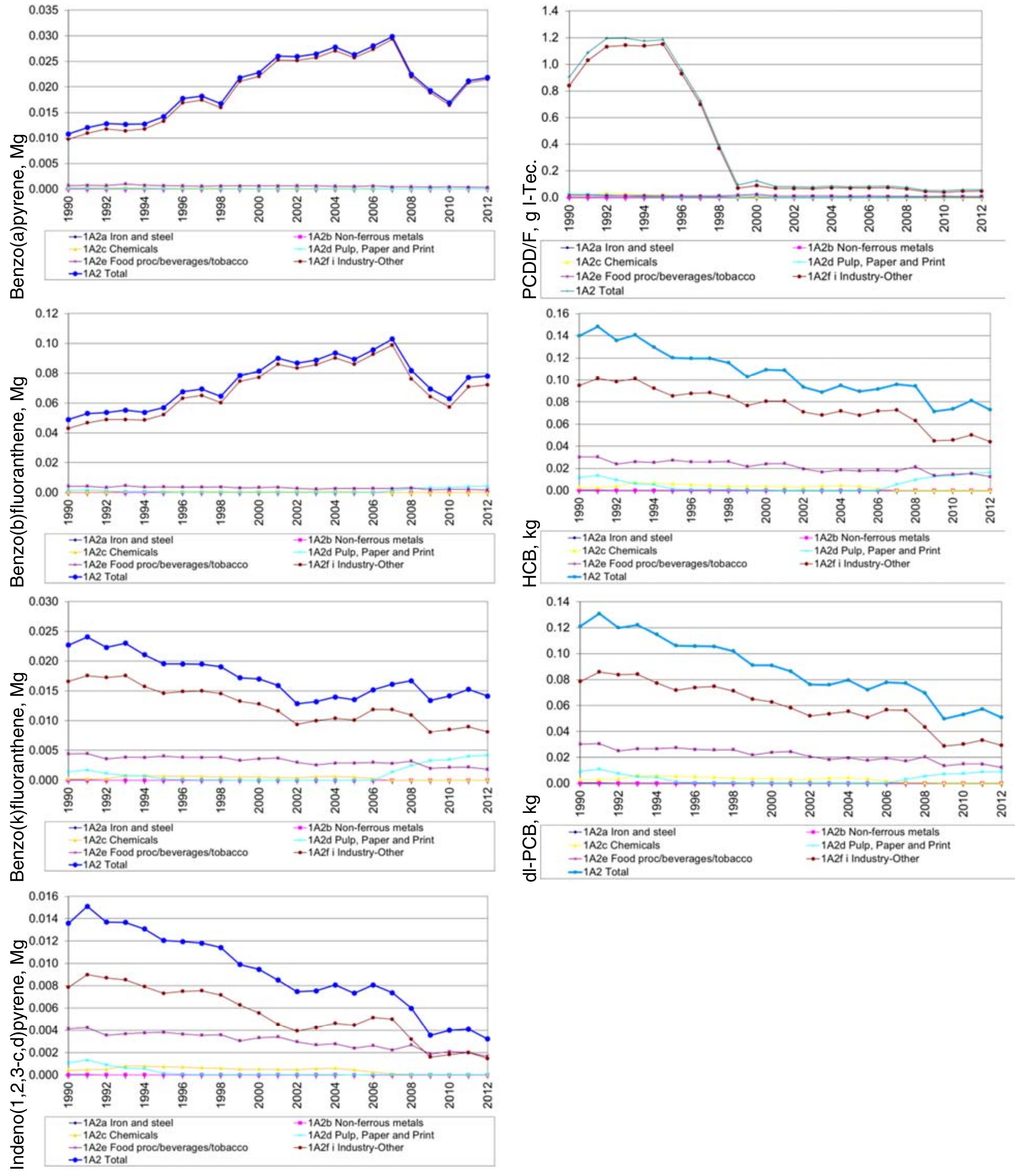


Figure 3.2.39 Time series for PAH, PCDD/F, HCB and dioxin-like PCB emission, 1A2 Industry.

1A2a Iron and steel

Iron and steel is a very small emission source category. Figure 3.2.40 shows the time series for fuel consumption and emissions of SO_2, NO_x, NMVOC and CO.

Natural gas is the main fuel in the subsector.

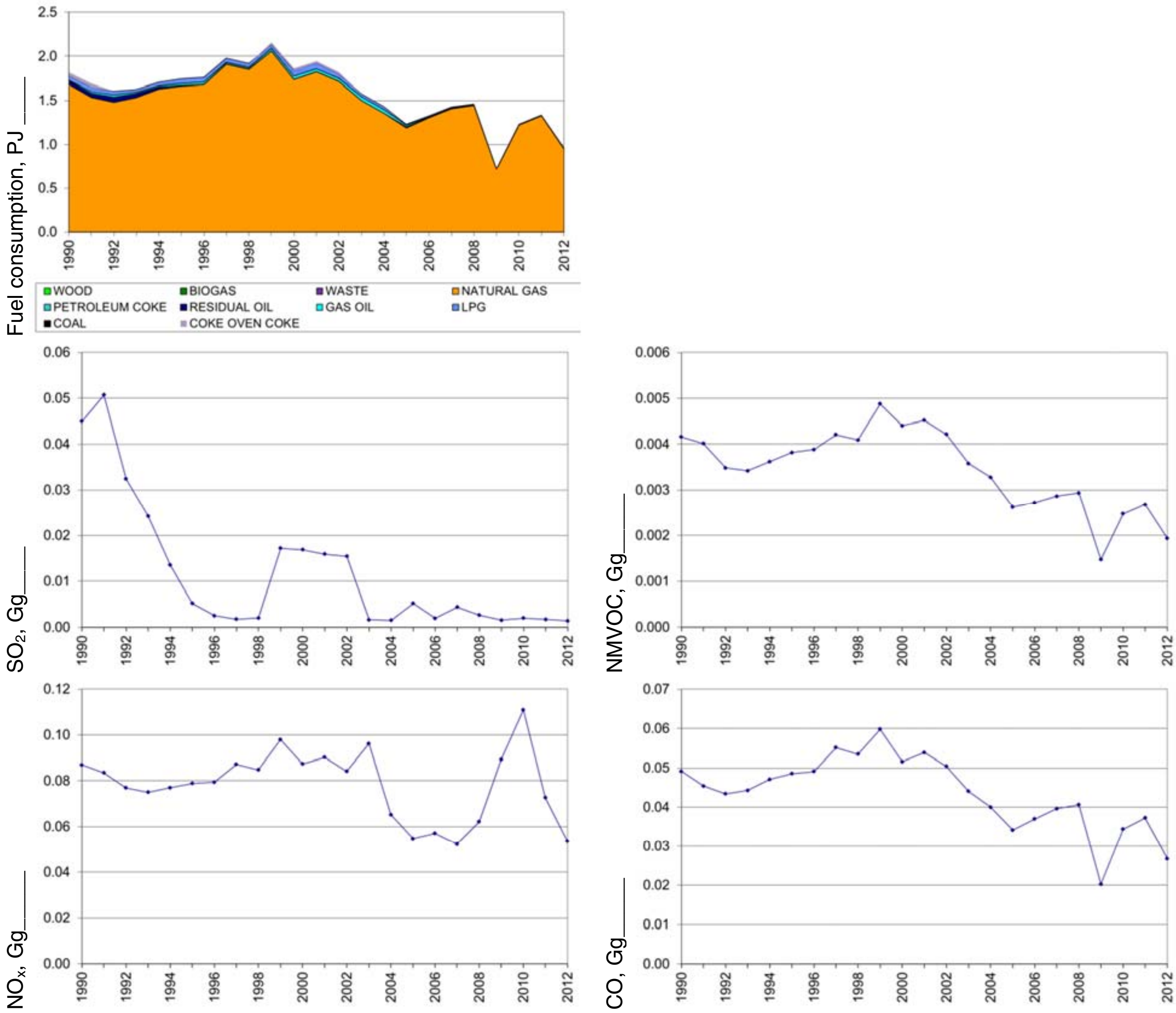


Figure 3.2.40 Time series for 1A2a Iron and steel.

1A2b Non-ferrous metals

Non-ferrous metals is a very small emission source category. Figure 3.2.41 shows the time series for fuel consumption and emissions of SO_2, NO_x, NMVOC and CO.

Natural gas is the main fuel in the subsector. The consumption of residual oil has decreased and the SO_2 emission follows this fuel consumption for residual oil. The emissions of NO_x, NMVOC and CO follow the fuel consumption.

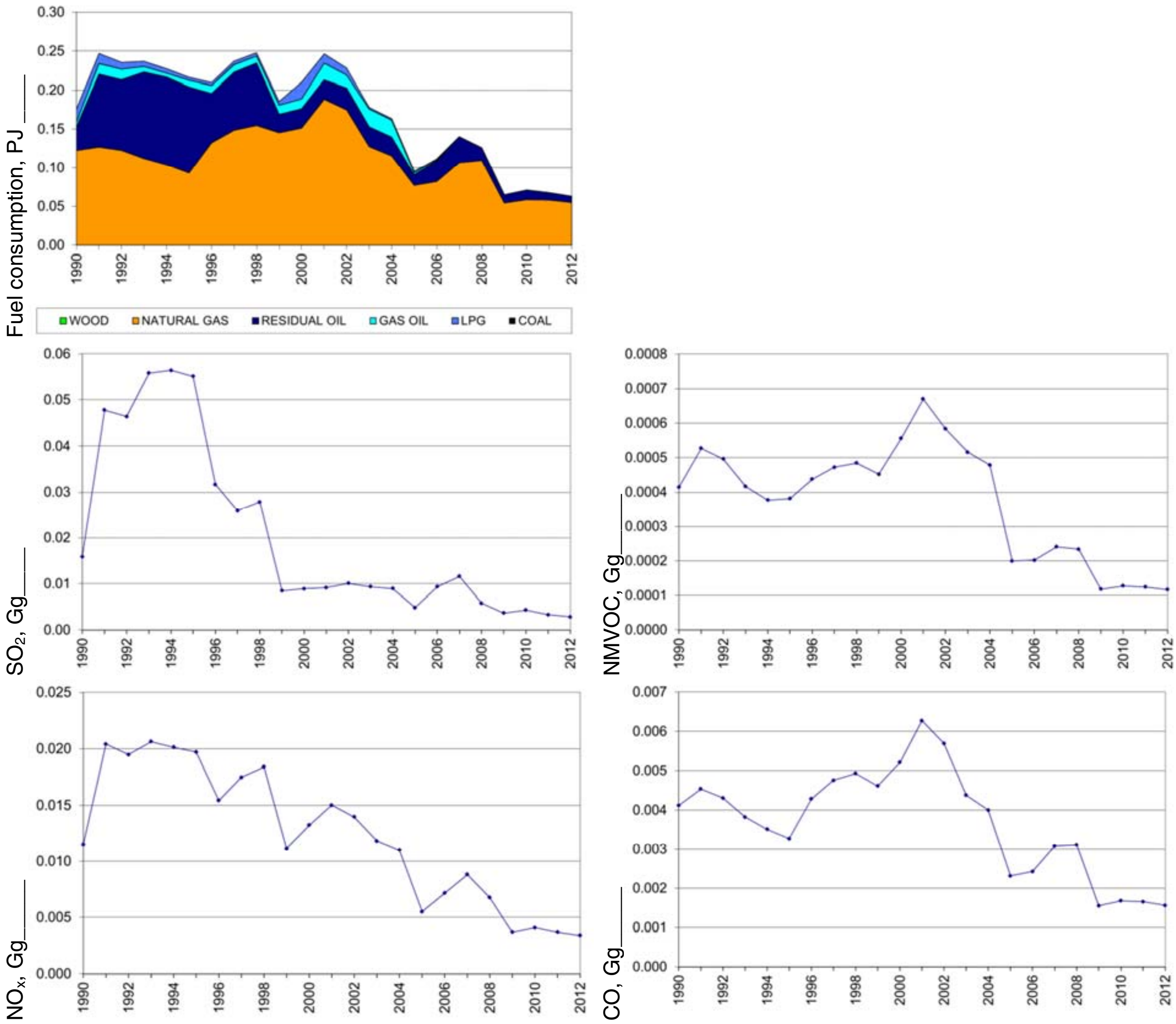


Figure 3.2.41 Time series for 1A2b Non-ferrous metals.

1A2c Chemicals

Chemicals is a minor emission source category. Figure 3.2.42 shows the time series for fuel consumption and emissions of SO_2, NO_x, NMVOC and CO.

Natural gas is the main fuel in this subsector. The consumption of residual oil has decreased and the SO_2 emission follows this fuel consumption.

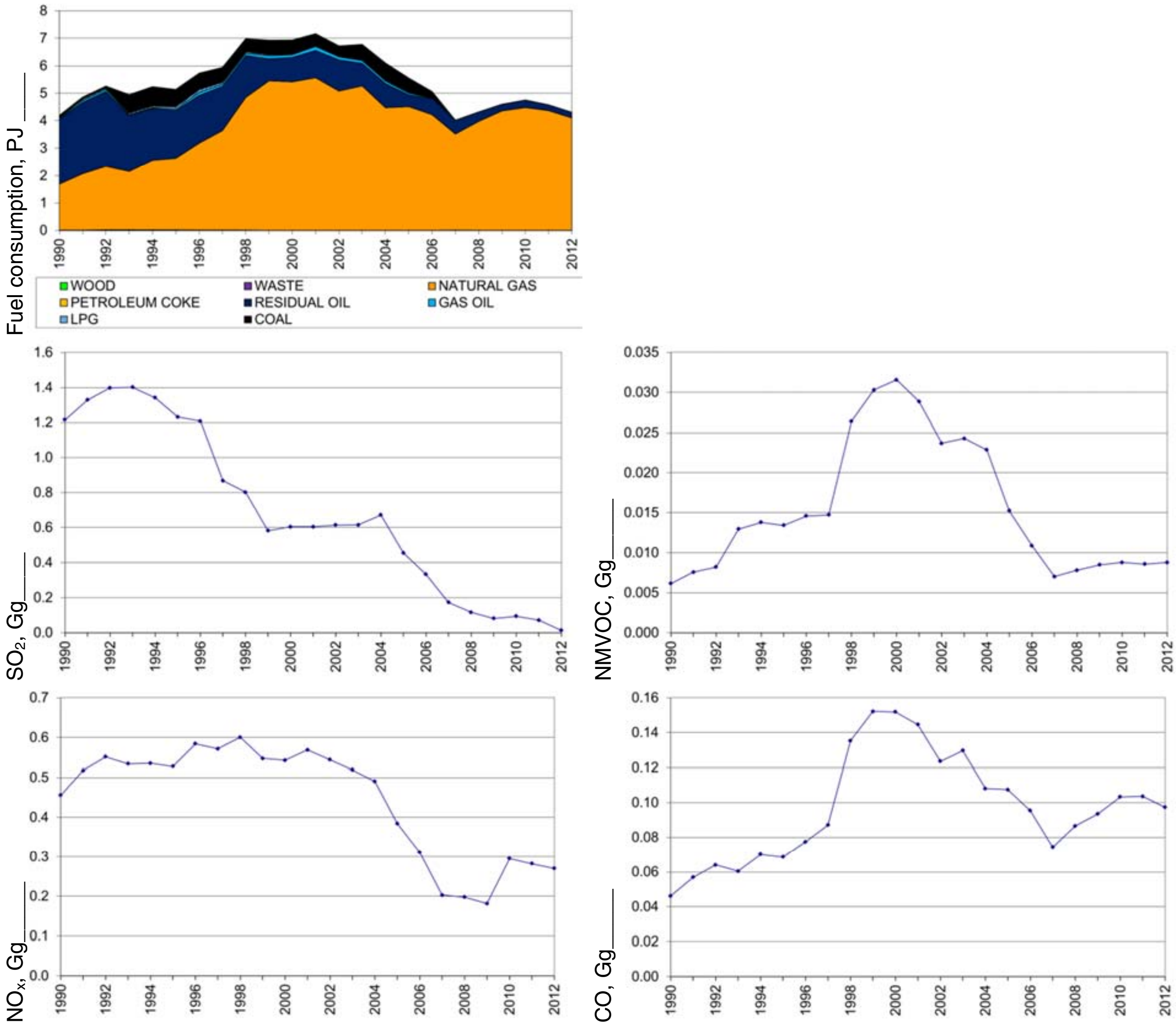


Figure 3.2.42 Time series for 1A2c Chemicals.

1A2d Pulp, paper and print

Pulp, paper and print is a minor emission source category. Figure 3.2.43 shows the time series for fuel consumption and emissions of SO_2, NO_x, NMVOC and CO.

Natural gas - and since 2007 also wood - are the main fuels in the subsector. The consumption of coal and residual oil has decreased and this is reflected in the SO_2 emission time series. The increased consumption of wood since 2007 has resulted in a considerable increase in NMVOC and CO emission in 2007-2012.

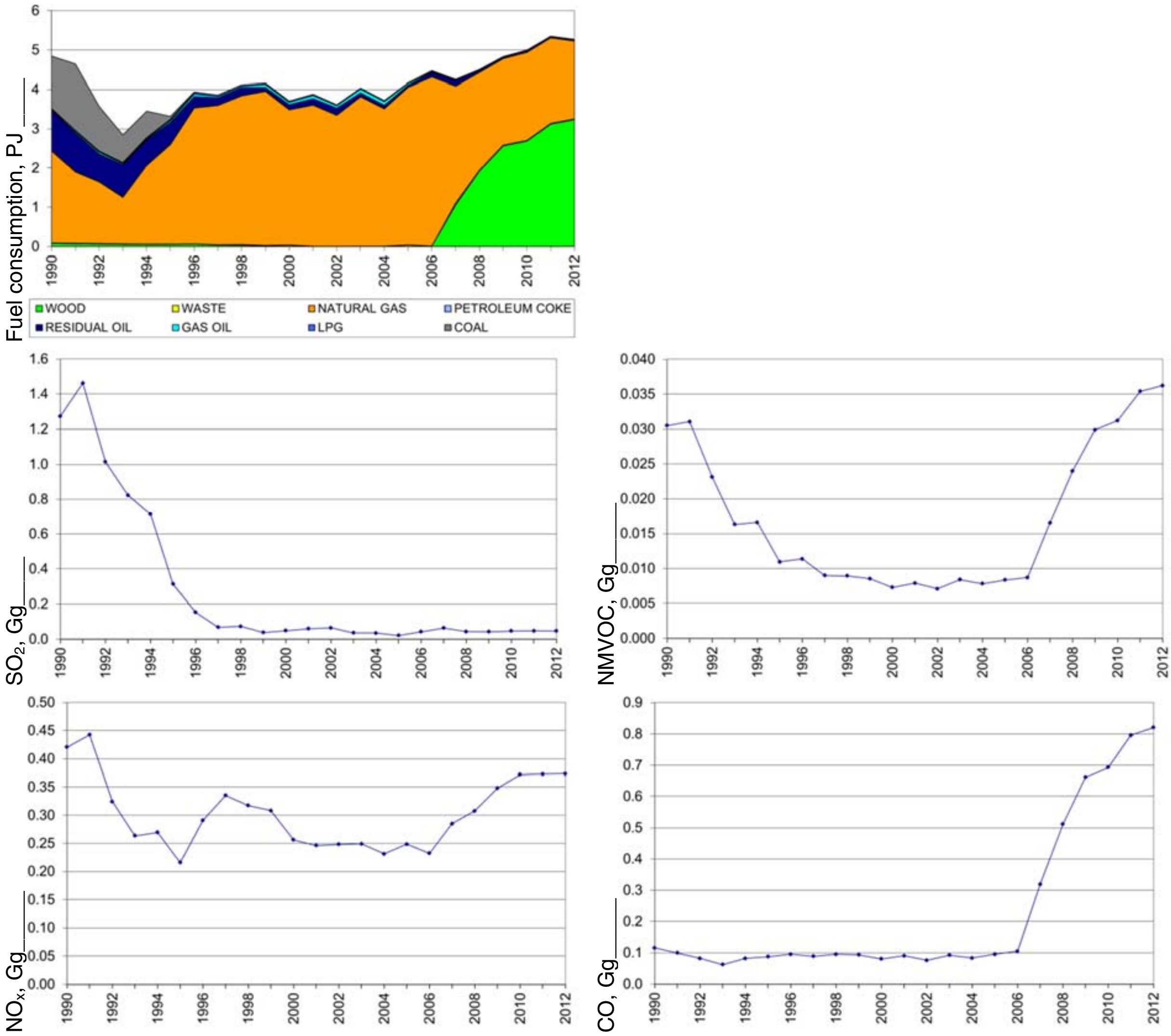


Figure 3.2.43 Time series for 1A2d Pulp, paper and print.

1A2e Food processing, beverages and tobacco

Food processing, beverages and tobacco is a considerable industrial subsector. Figure 3.2.44 shows the time series for fuel consumption and emissions of SO_2, NO_x, NMVOC and CO.

Natural gas and residual oil are the main fuels in the subsector. The consumption of residual oil has decreased and this is reflected in the SO_2 emission time series. The consumption of natural gas has increased.

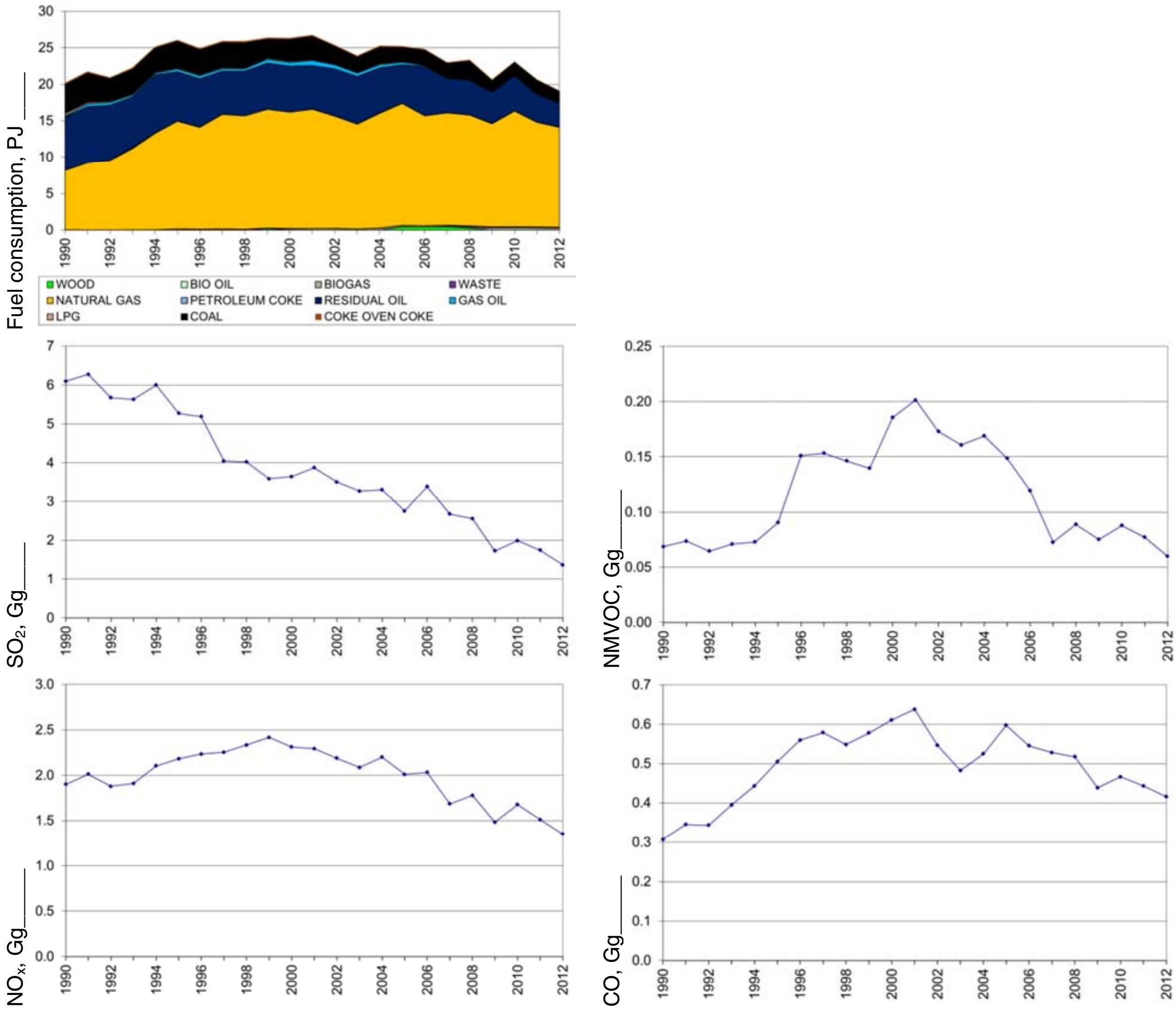


Figure 3.2.44 Time series for 1A2e Food processing, beverages and tobacco.

1A2f Industry – other

Industry - other is a considerable industrial subsector. Figure 3.2.45 shows the time series for fuel consumption and emissions of SO_2, NO_x, NMVOC and CO. The subsector includes cement production that is a major industrial emission source in Denmark.

Natural gas is the main fuels in the subsector in recent years. The consumption of coal and residual oil has decreased.

The NO_x time series is discussed above on page 85.

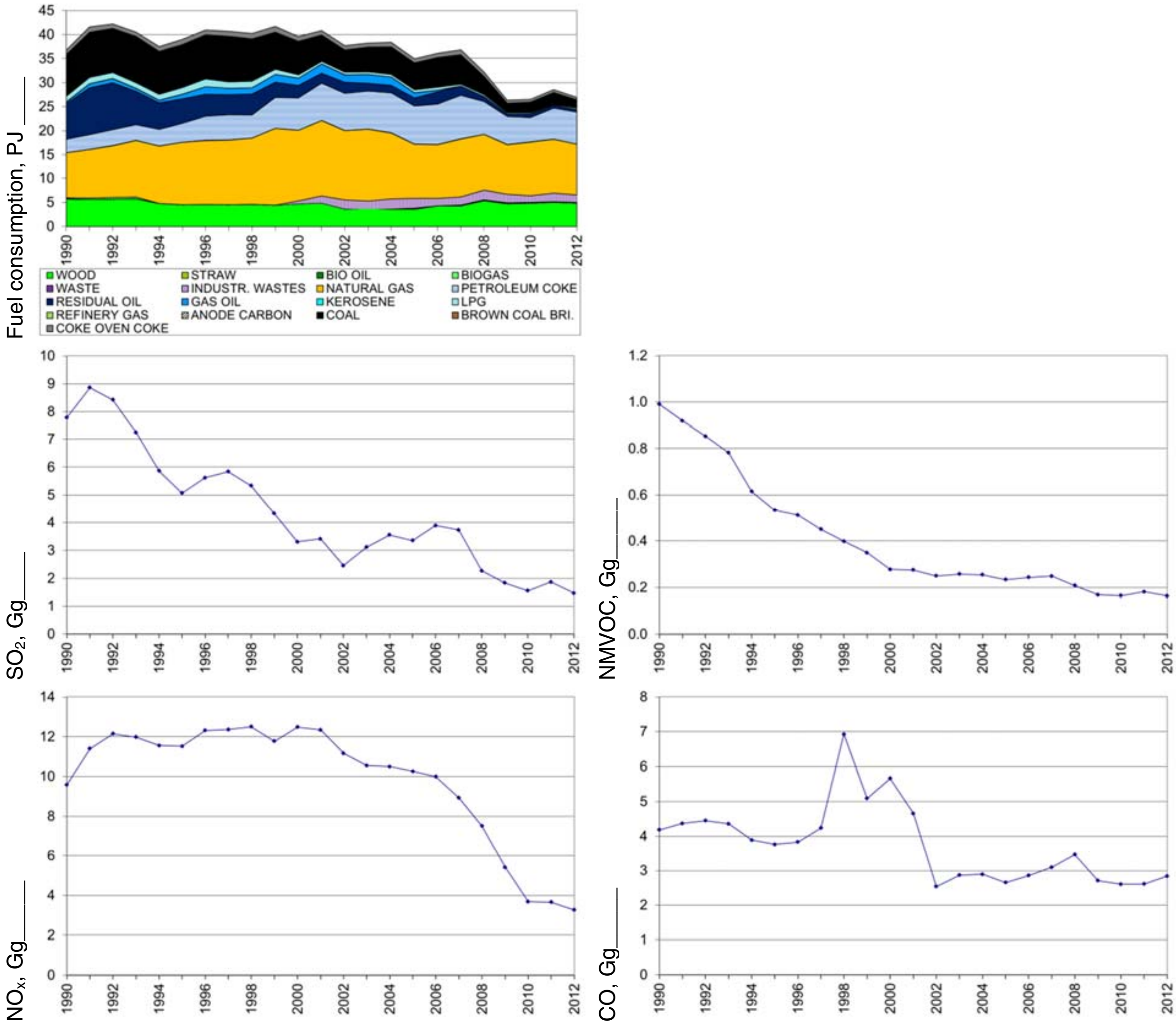


Figure 3.2.45 Time series for 1A2f Industry - other.

1A4 Other Sectors

The emission source category *1A4 Other Sectors* consists of the subcategories:

1A4a Commercial/Institutional plants.

1A4b Residential plants.

1A1c Agriculture/Forestry.

Figure 3.2.46 – 3.2.50 present time series for this emission source category. *Residential plants* is the largest subcategory accounting for the largest part of all emissions. Time series are discussed below for each subcategory.

The HCB emission time series follows the fuel consumption of coal in residential plants. The HCB emission factor for coal used in residential plants is high compared to other fuels.

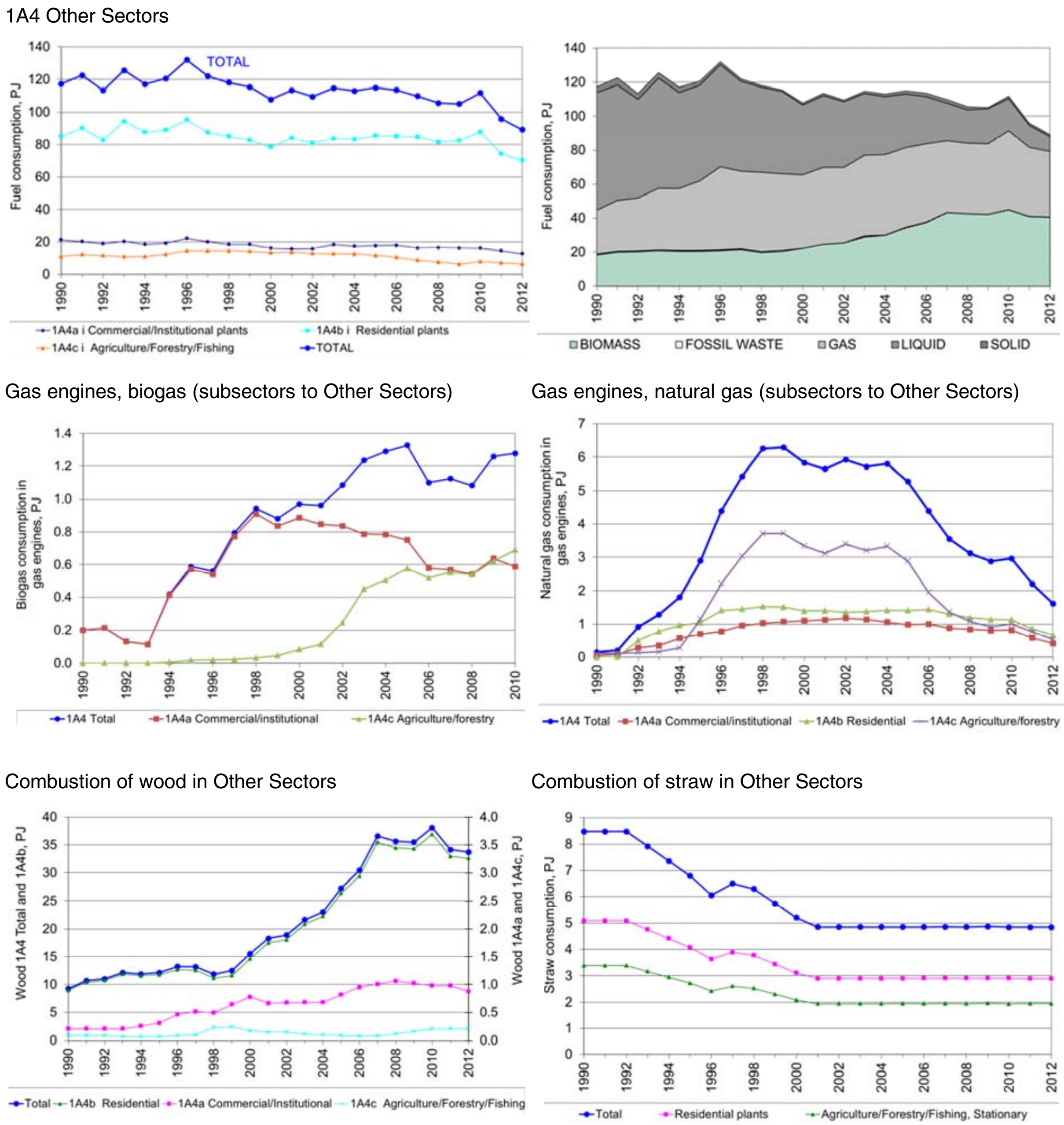


Figure 3.2.46 Time series for fuel consumption, 1A4 Other Sectors.

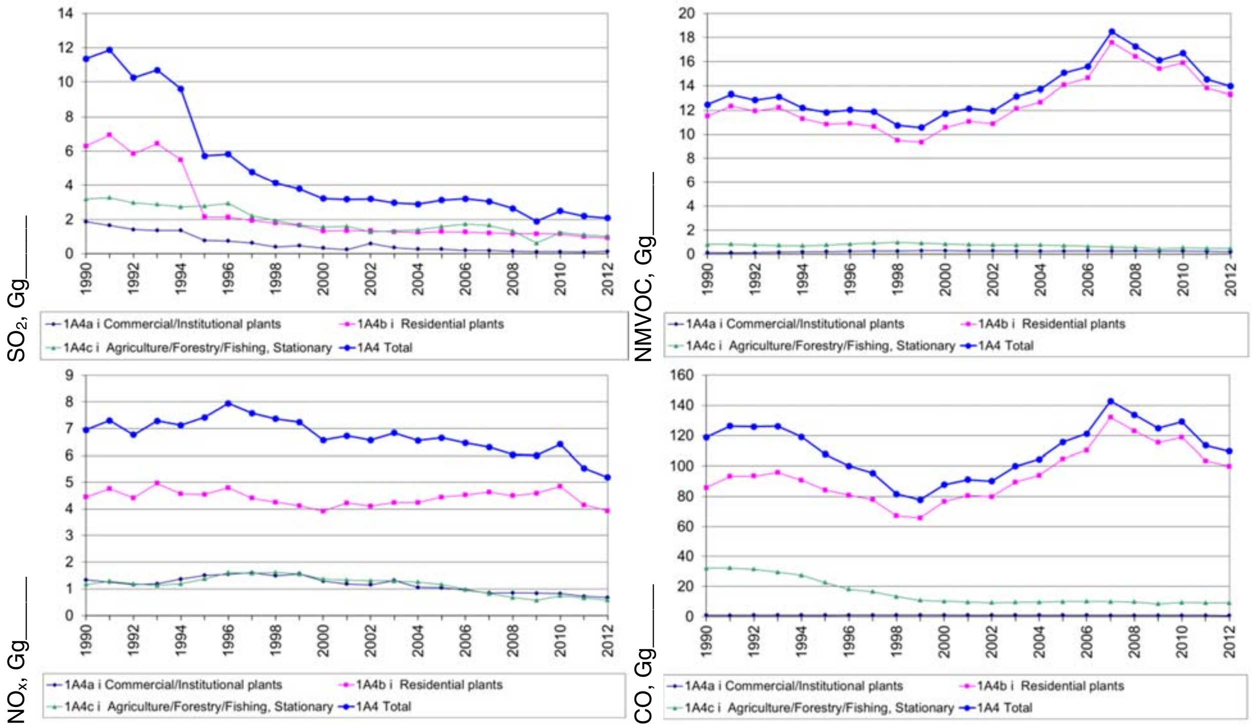


Figure 3.2.47 Time series for SO_2, NO_x, NMVOC and CO emission, 1A4 Other Sectors.

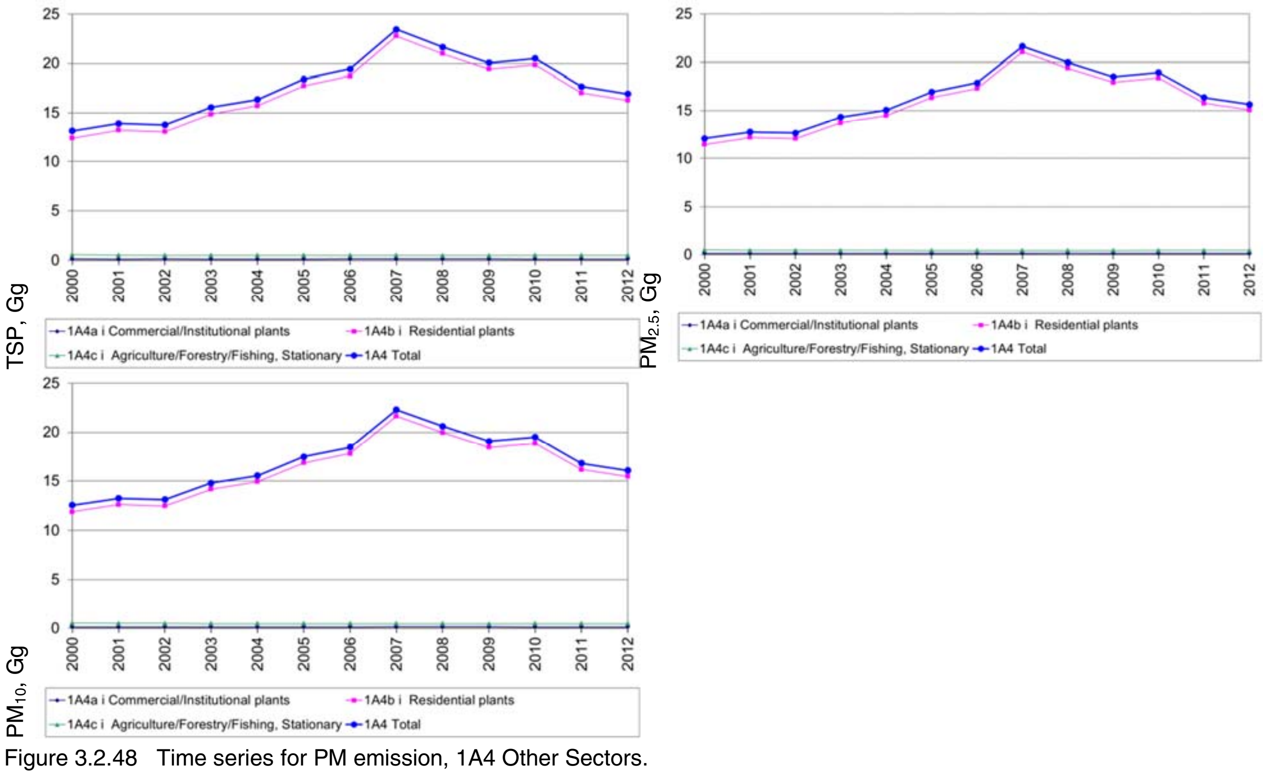


Figure 3.2.48 Time series for PM emission, 1A4 Other Sectors.

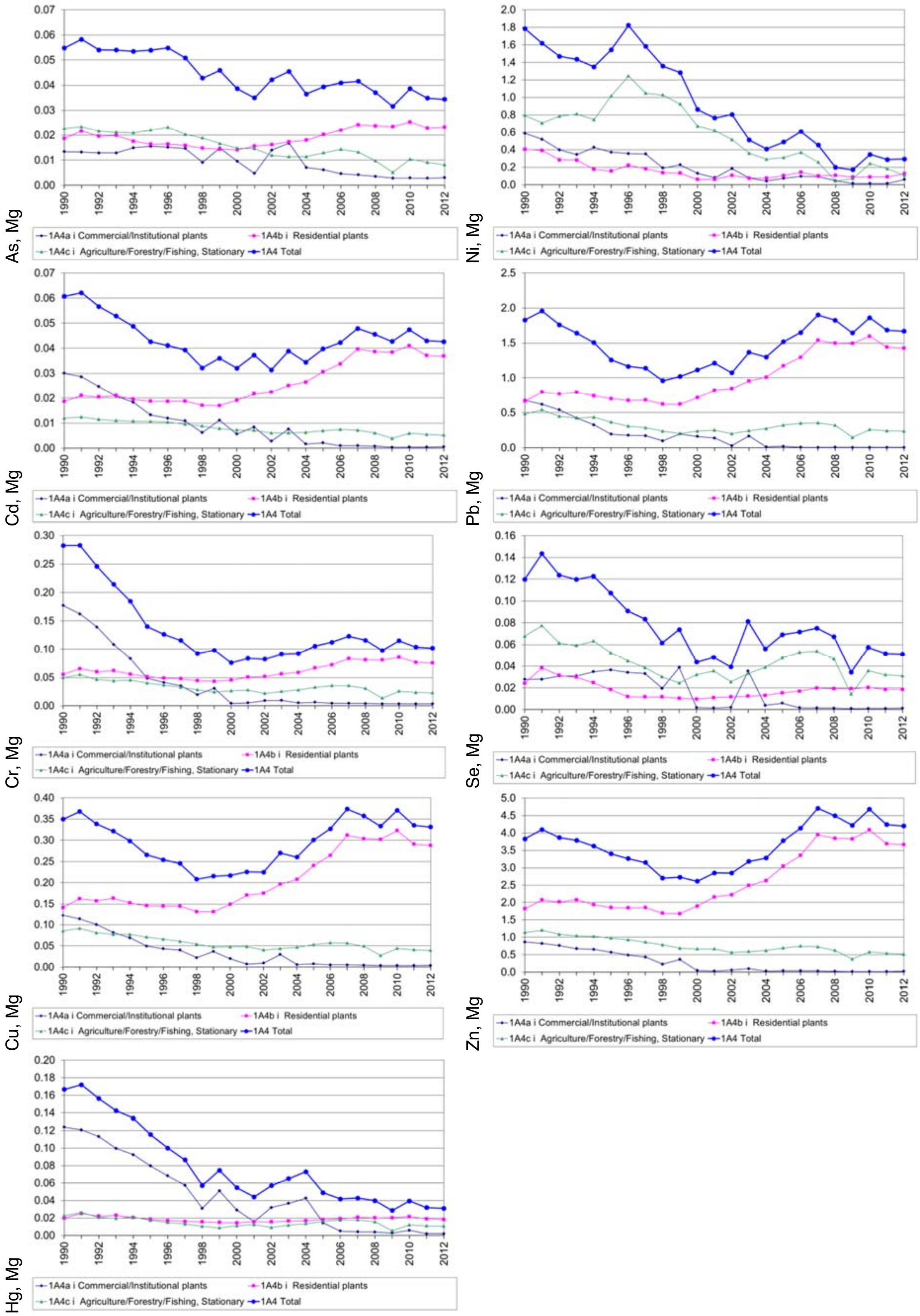


Figure 3.2.49 Time series for HM emission, 1A4 Other Sectors.

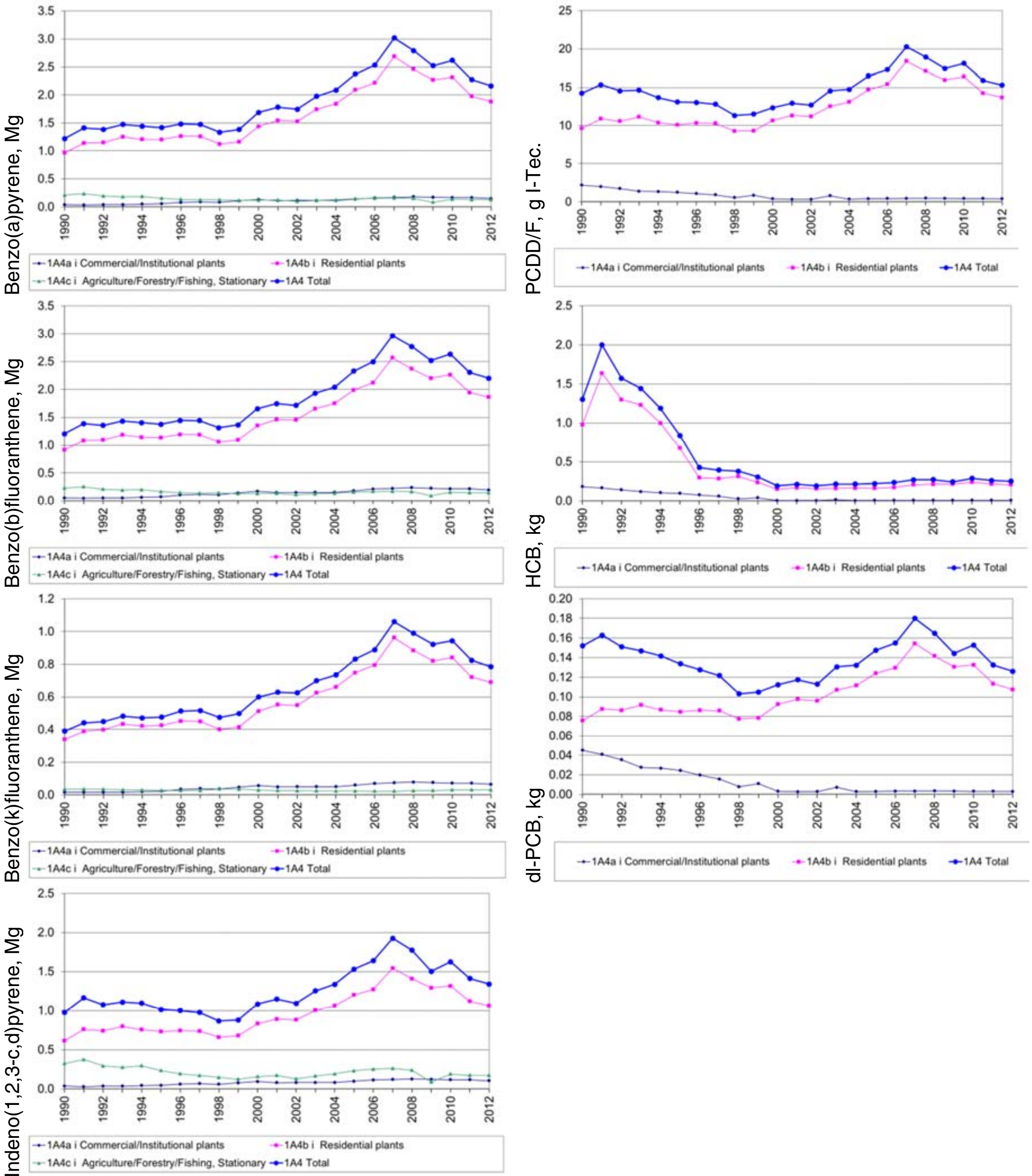


Figure 3.2.50 Time series for PAH, PCDD/F, HCB and dioxin-like PCB emission, 1A4 Other Sectors.

1A4a Commercial and institutional plants

The subcategory *Commercial and institutional plants* has low fuel consumption and emissions compared to the other stationary combustion emission source categories. Figure 3.2.51 shows the time series for fuel consumption and emissions.

The fuel consumption in commercial/institutional plants has decreased 41 % since 1990 and there has been a change of fuel type. The fuel consumption consists mainly of gas oil and natural gas. The consumption of gas oil has decreased and the consumption of natural gas has increased since 1990. The consumption of wood and biogas has also increased. The wood consumption in 2012 was 4.3 times the consumption in 1990 (see Figure 3.2.46).

The SO_2 emission has decreased 92 % since 1990. The decrease is a result of both the change of fuel from gas oil to natural gas and of the lower sulphur content in gas oil and in residual oil. The lower sulphur content (0.05 % for gas oil since 1995 and 0.7 % for residual oil since 1997) is a result of Danish tax laws (DEPA, 1998).

The NO_x emission was 49 % lower in 2012 than in 1990. The decrease is mainly a result of the lower fuel consumption but also the change from gas oil to natural gas has contributed to the decrease. The emission from gas engines and wood combustion has increased.

The NMVOC emission in 2012 was 1.5 times the 1990 emission level. The large increase is a result of the increased combustion of wood that is the main source of emission. The increased consumption of natural gas in gas engines (Figure 3.2.46) also contributes to the increased NMVOC emission.

The CO emission has decreased 25 % since 1990. The emission from wood and from natural gas fuelled engines and boilers has increased whereas the emission from gas oil has decreased. This is a result of the change of fuels used in the sector.

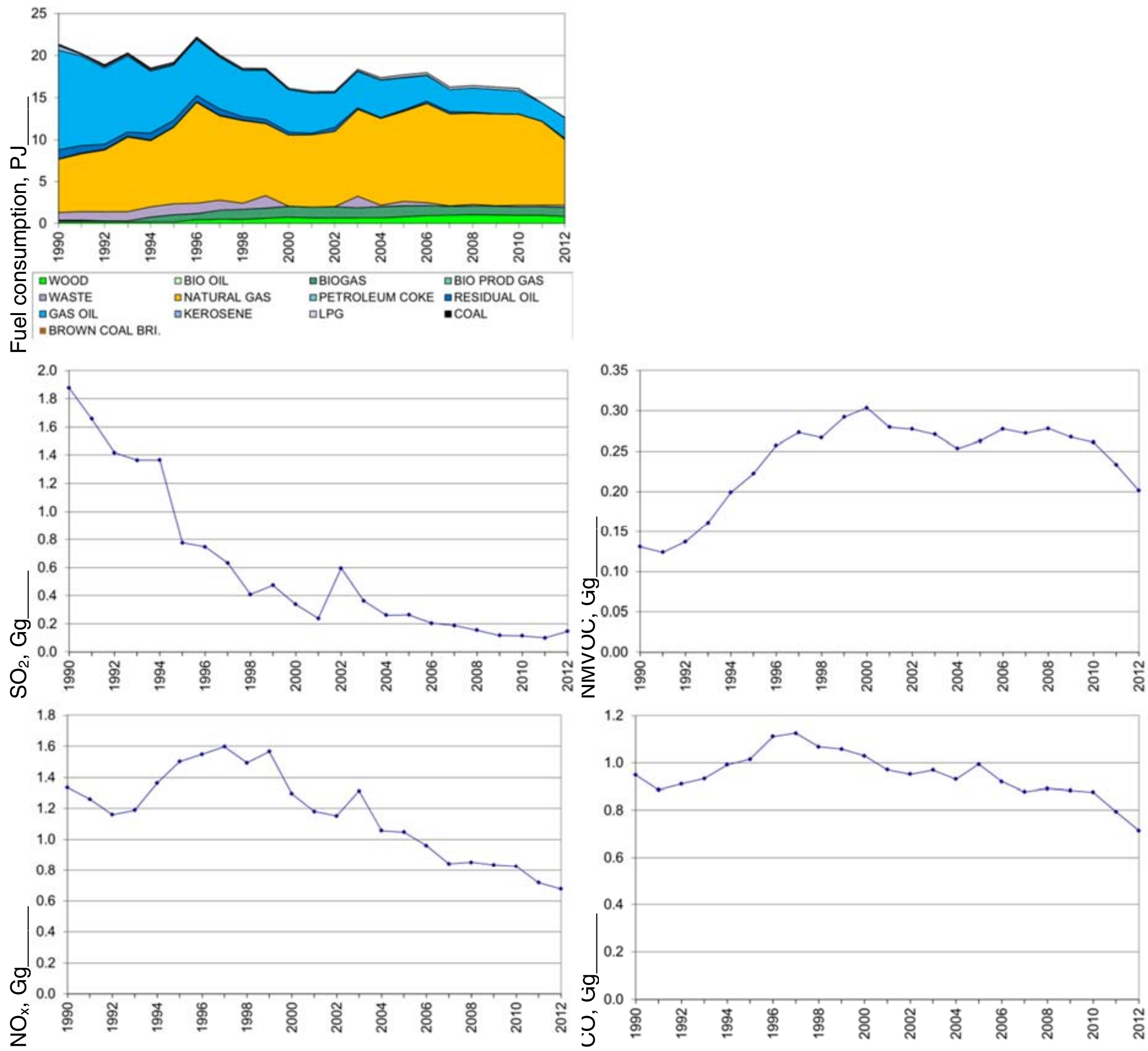


Figure 3.2.51 Time series for 1A4a Commercial /institutional.

1A4b Residential plants

The emission source category *Residential plants* consists of both stationary and mobile sources. In this chapter, only stationary sources are included. Figure 3.2.52 shows the time series for fuel consumption and emissions.

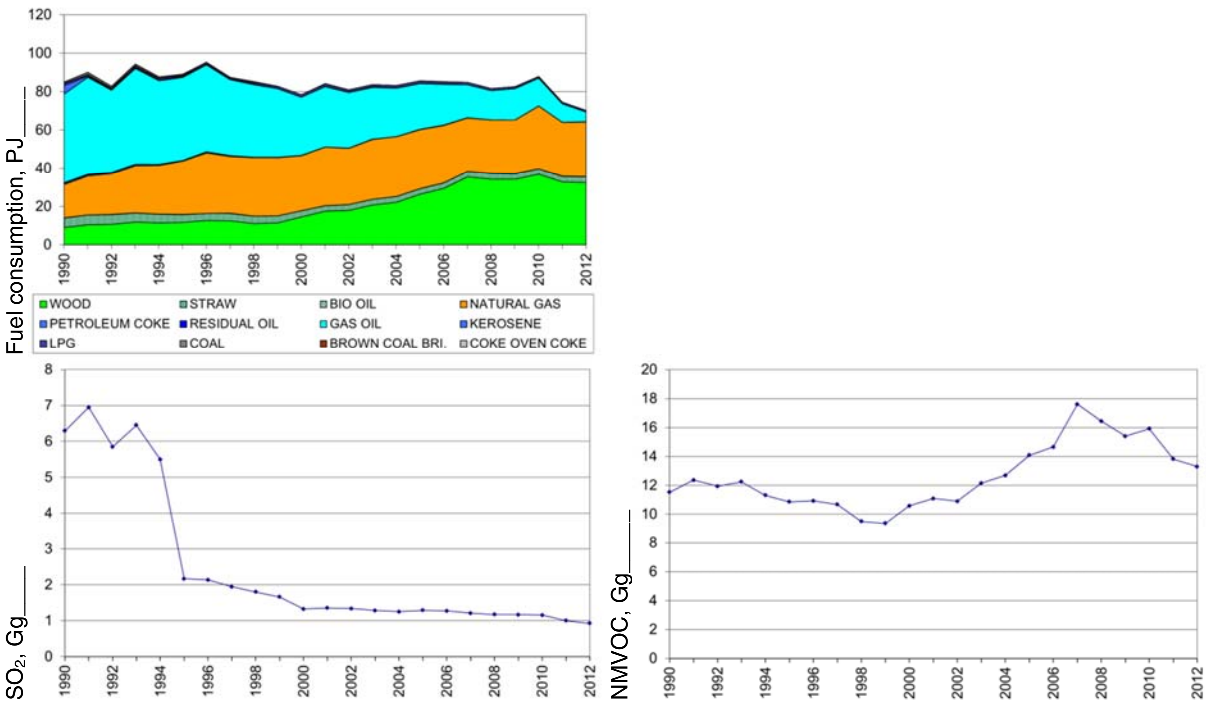
For residential plants, the total fuel consumption was 17 % lower in 2012 than in 1990. The large decrease from 2010 to 2011 is caused by higher temperature in the winter season of 2011. The consumption of gas oil has decreased since 1990 whereas the consumption of wood has increased considerably (3.6 times the 1990 level). The consumption of natural gas has also increased since 1990.

The large decrease (85 %) of SO_2 emission from residential plants is mainly a result of a change of sulphur content in gas oil since 1995. The lower sulphur content (0.05 %) is a result of Danish tax laws (DEPA, 1998). In addition, the consumption of gas oil has decreased and the consumption of natural gas that results in very low SO_2 emissions has increased.

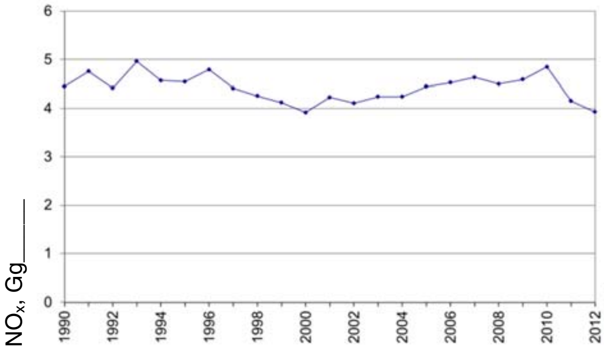
The NO_x emission has increased by 12 % since 1990 due to the increased emission from wood combustion. The emission factor for wood is higher than for gas oil.

The emission of NMVOC has increased 15 % since 1990 as a result of the increased combustion of wood. The emission factor for wood has decreased since 1990, but not as much as the increase in consumption of wood. The emission factors for wood and straw are higher than for liquid or gaseous fuels.

The CO emission has increased 16 % due to the increased use of wood that is the main source of emission. The emission from combustion of straw has decreased since 1990.



Continued



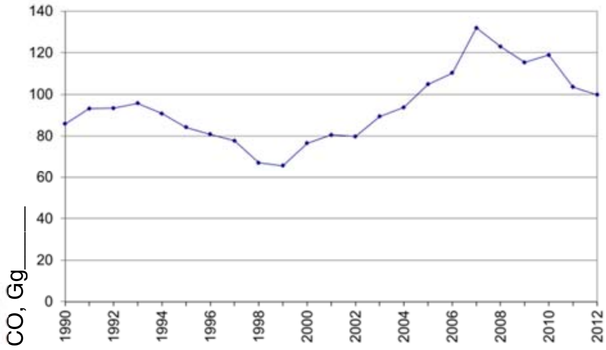


Figure 3.2.52 Time series for 1A4b Residential plants.

1A4c Agriculture/forestry

The emission source category *Agriculture/forestry* consists of both stationary and mobile sources. In this chapter, only stationary sources are included. Figure 3.2.53 shows the time series for fuel consumption and emissions.

For plants in agriculture/forestry, the fuel consumption has decreased 42 % since 1990. A remarkable decrease of fuel consumption has taken place since year 2000.

The type of fuel that has been applied has changed since 1990. In the years 1994-2004, the consumption of natural gas was high, but in recent years, the consumption decreased again. A large part of the natural gas consumption has been applied in gas engines (Figure 3.2.46). Most CHP plants in agriculture/forestry based on gas engines came in operation in 1995-1999. The decrease in later years is a result of the liberalisation of the electricity market.

The consumption of straw has decreased since 1990. The consumption of both residual oil and gas oil has increased after 1990 but has decreased again in recent years.

The SO_2 emission was 68 % lower in 2012 than in 1990. The emission decreased mainly in the years 1996-2002. The main emission sources are coal, residual oil and straw.

The emission of NO_x was 50 % lower in 2012 than in 1990.

The emission of NMVOC has decreased 42 % since 1990. The major emission source is combustion of straw. The consumption of straw has decreased since 1990. The emission from gas engines has increased mainly due to increased fuel consumption.

The CO emission has decreased 72 % since 1990. The major emission source is combustion of straw. In addition to the decrease of straw consumption, the emission factor for straw has also decreased since 1990.

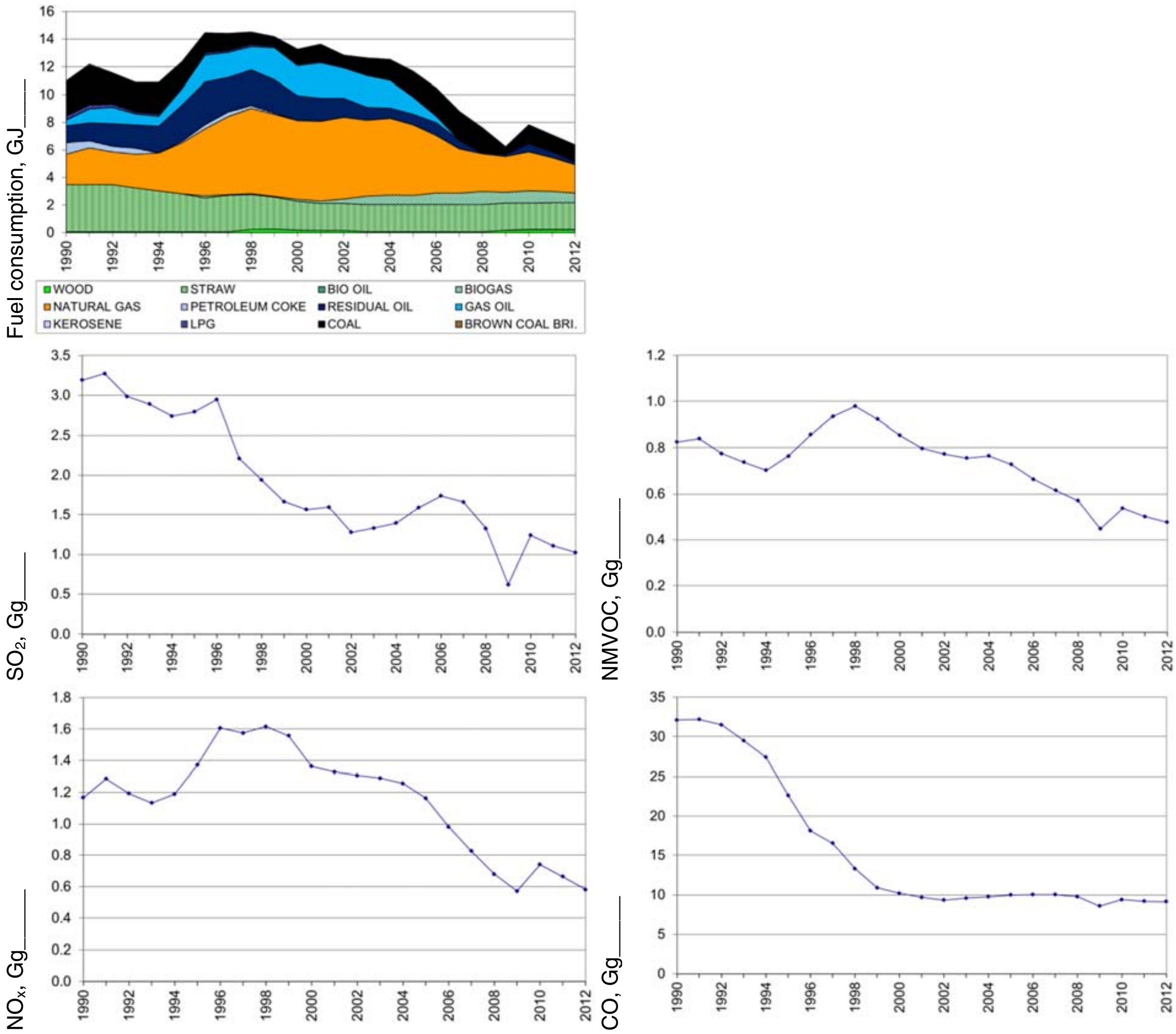


Figure 3.2.53 Time series for 1A4c Agriculture/Forestry.

3.2.5 Methodological issues

The Danish emission inventory is based on the CORINAIR (CORe INventory on AIR emissions) system, which is a European program for air emission inventories. CORINAIR includes methodology structure and software for inventories. The methodology is described in the EMEP/CORINAIR Emission Inventory Guidebook 3rd edition, 2007 update, prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections (EEA 2007). Emission data are stored in an Access database, from which data are transferred to the reporting formats.

The emission inventory for stationary combustion is based on activity rates from the Danish energy statistics. General emission factors for various fuels, plants and sectors have been determined. Some large plants, such as power plants, are registered individually as large point sources and plant-specific emission data are used.

Tiers

The emission inventory is based on the methodology referred to as Tier 2 and Tier 3 in the IPCC Guidelines (IPCC 1996).

Large point sources

Large emission sources such as power plants, industrial plants and refineries are included as large point sources in the Danish emission database. Each point source may consist of more than one part, e.g. a power plant with several units. By registering the plants as point sources in the database, it is possible to use plant-specific emission factors.

In the inventory for the year 2012, 62 stationary combustion plants are specified as large point sources. These point sources include:

- Power plants and decentralised CHP plants.
- Waste incineration plants.
- Large industrial combustion plants.
- Petroleum refining plants.

The criteria for selection of point sources consist of the following:

All centralized power plants, including smaller units.

- All units with a capacity of above 25 MW_e.
- All district heating plants with an installed effect of 50 MW_{th} or above and significant fuel consumption.
- All waste incineration plants obligated to report environmental data annually according to Danish law (DEPA 2011).
- Industrial plants,
- With an installed effect of 50 MW_{th} or above and significant fuel consumption.
- With a significant process related emission.

The fuel consumption of stationary combustion plants registered as large point sources in the 2012 inventory was 225 PJ. This corresponds to 51 % of the overall fuel consumption for stationary combustion.

A list of the large point sources for 2012 and the fuel consumption rates is provided in Annex 2A-6. The number of large point sources registered in the databases increased from 1990 to 2012.

The emissions from a point source are based either on plant specific emission data or, if plant specific data are not available, on fuel consumption data and the general Danish emission factors. Annex 2A-6 shows which of the emission data for large point sources are plant-specific and the corresponding share of the emission from stationary combustion.

The emission shares from point sources with plant specific data are shown in Table 3.2.14.

Table 3.2.14 Emission share, plant specific data.

Pollutant	Share from plant specific data, %
SO_2	52
NO_x	43
NMVOC	0.02
CO	2.7
NH_3	3.3
TSP	2.8
PM_{10}	2.2
$PM_{2.5}$	1.7
As	10
Cd	7
Cr	16
Cu	6
Hg	55
Ni	2.4
Pb	2.8
Se	57
Zn	4
PCDD/F	2

SO_2 and NO_x emissions from large point sources are often plant-specific based on continuous emission measurements. Emissions of CO, NMVOC, PM, heavy metals and PCDD/F are also plant-specific for some plants. Plant-specific emission data are obtained from:

- Annual environmental reports / environmental reporting available on the Danish EPA home page[8] (PRTR data)
- Annual plant-specific reporting of SO_2 and NO_x from power plants >25MW$_e$ prepared for the Danish Energy Agency (DEA) and Energinet.dk
- Emission data reported by DONG Energy and Vattenfall, the two major power plant operators
- Emission data reported from industrial plants

Annual environmental reports for the plants include a considerable number of emission data sets. Emission data from annual environmental reports are, in general, based on emission measurements, but some emissions have potentially been calculated from general emission factors.

If plant-specific emission factors are not available, general area source emission factors are used.

Area sources

Fuels not combusted in large point sources are included as source category specific area sources in the emission database. Plants such as residential boilers, small district heating plants, small CHP plants and some industrial boilers are defined as area sources. Emissions from area sources are based on fuel consumption data and emission factors. Further information on emission factors is provided below.

[8] http://www3.mst.dk/Miljoeoplysninger/PrtrPublicering/Index

Activity rates, fuel consumption

The fuel consumption rates are based on the official Danish energy statistics prepared by DEA. DCE aggregates fuel consumption rates to SNAP categories. Some fuel types in the official Danish energy statistics are added to obtain a less detailed fuel aggregation level cf. Annex 2A-3. The calorific values on which the energy statistics are based are also enclosed in Annex 2A-3. The calorific values shown in the annex are default values but if available plant specific reporting to the energy statistics is based on plant specific calorific values. The correspondence list between the energy statistics and SNAP categories is enclosed in Annex 2A-9.

The fuel consumption of the NFR category *Manufacturing industries and construction* (corresponding to SNAP category 03) is disaggregated into industrial subsectors based on the DEA data set aggregated for the Eurostat reporting (DEA 2013c).

Both traded and non-traded fuels are included in the Danish energy statistics. Thus, for example, estimation of the annual consumption of non-traded wood is included.

Petroleum coke purchased abroad and combusted in Danish residential plants (border trade of 628 TJ in 2012) is not included in the Danish inventory. This is in agreement with the IPCC Guidelines (1996).

The fuel consumption data for large point sources refer to the EU Emission Trading Scheme (EU ETS) data for plants for which the Danish CO_2 emission inventory also refer to EU ETS.

For all other large point sources, the fuel consumption refers to a DEA database (DEA 2013b). The DEA compiles a database for the fuel consumption of each district heating and power-producing plant, based on data reported by plant operators.

The fuel consumption of area sources is calculated as total fuel consumption minus fuel consumption of large point sources.

The Danish national energy statistics includes three fuels used for non-energy purposes, bitumen, white spirit and lubricants. The total consumption for non-energy purposes is relatively low, e.g. 11.5 PJ in 2012. The use of white spirit is included in the inventory in *Solvent and other product use*. The emissions associated with the use of bitumen and lubricants are included in *Industrial Processes.*

In Denmark, all waste incineration is utilised for heat and power production. Thus, incineration of waste is included as stationary combustion in the source category *Energy* (subcategories *1A1*, *1A2* and *1A4).*

Fuel consumption data are presented in Chapter 3.2.2.

Town gas

Town gas has been included in the fuel category natural gas. The consumption of town gas in Denmark is very low, e.g. 0.6 PJ in 2012. In 1990, the town gas consumption was 1.6 PJ and the consumption has been steadily decreasing throughout the time series.

In Denmark, town gas is produced based on natural gas. The use of coal for town gas production ceased in the early 1980s.

An indicative composition of town gas according to the largest supplier of town gas in Denmark is shown in Table 3.2.15 (KE, 2013).

Table 3.2.15 Composition of town gas currently used (KE, 2013).

Component	Town gas, % (mol.)
Methane	43.9
Ethane	2.9
Propane	1.1
Butane	0.5
Carbon dioxide	0.4
Nitrogen	40.5
Oxygen	10.7

In earlier years, the composition of town gas was somewhat different. Table 3.2.16 is constructed with the input from Københavns Energi (KE) (Copenhagen Energy) and Danish Gas Technology Centre (DGC), (Jeppesen, 2007; Kristensen, 2007). The data refer to three measurements performed several years apart; the first in 2000 and the latest in 2005.

Table 3.2.16 Composition of town gas, information from the period 2000-2005.

Component	Town gas, % (mol.)
Methane	22.3-27.8
Ethane	1.2-1.8
Propane	0.5-0.9
Butane	0.13-0.2
Higher hydrocarbons	0-0.6
Carbon dioxide	8-11.6
Nitrogen	15.6-20.9
Oxygen	2.3-3.2
Hydrogen	35.4-40.5
Carbon monoxide	2.6-2.8

Due to the scarce data available and the very low consumption of town gas compared to consumption of natural gas, the methodology will be applied unchanged in future inventories.

Emission factors

For each fuel and SNAP category (sector and e.g. type of plant), a set of general area source emission factors has been determined. The emission factors are either nationally referenced or based on the international guidebooks: EMEP/EEA Guidebook (EEA, 2013)[9] and IPCC Reference Manual (IPCC, 1996).

A complete list of emission factors including time series and references is provided in Annex 2A-4.

SO_2 and NO_x emission factors

Emission factors for SO_2 and NO_x are listed in Annex 2A-4. The appendix includes references and time series. Further details about the references, addi-

[9] And former editions of the EMEP/EEA Guidebook.

tional references, assumptions and discussions are included in Nielsen et al. (2014). An extract from this report have been enclosed in Annex 2A-12.

The emission factors refer to:

- The EMEP/EEA Guidebook: EEA (2013) and former editions.
- The IPCC Guidelines, Reference Manual (IPCC, 1996).
- Danish legislation:
- Danish research reports including:
  - Two emission measurement programs for decentralised CHP plants (Nielsen et al. 2010; Nielsen & Illerup, 2003).
  - Research and emission measurements programs for biomass fuels.
  - Research and environmental data from the gas sector.
- Aggregated emission factors for residential wood combustion based on technology distribution (Hessberg & Justesen, 2013) and technology specific emission factors (EEA, 2013; DEPA, 2010).
- Calculations based on plant-specific emissions from a considerable number of power plants.
- Calculations based on plant-specific emission data from a considerable number of waste incineration plants. These data refer to annual environmental reports published by plant operators.
- Sulphur content data from oil companies and the Danish gas transmission company, Energinet.dk.
- Additional personal communication.

Emission factor time series have been estimated for a considerable number of the emission factors. These are provided in Annex 2A-4.

NMVOC emission factors

Emission factors for NMVOC are listed in Annex 2A-4. The annex includes references and time series. The emission factors for NMVOC refer to:

- An emission measurement program for decentralised CHP plants (Nielsen et al., 2010a).
- The EMEP/EEA Guidebook (EEA, 2009).
- Aggregated emission factor based on the technology distribution for residential wood combustion and guidebook (EEA, 2013) emission factors. Technology distribution based on Hessberg & Justesen (2013).
- DGC Danish Gas Technology Centre 2001, Naturgas – Energi og miljø (DGC, 2001).
- Gruijthuijsen L.v. & Jensen J.K., 2000. Energi- og miljøoversigt, Danish Gas Technology Centre 2000 (In Danish).

CO emission factors

Emission factors for CO are listed in Annex 2A-4. The annex includes references and time series. The emission factors for CO refer to:

- The EMEP/EEA Guidebook (EEA, 2009) and the former update (EEA, 2007).
- IPCC Guidelines (IPCC, 1997)
- An emission measurement program for decentralised CHP plants (Nielsen et al., 2010a).
- Danish legislation (DEPA, 2001a)

- Aggregated emission factor based on the technology distribution for residential wood combustion and guidebook (EEA, 2013) emission factors. Technology distribution based on Hessberg & Justesen (2013).
- DCE estimate based on annual environmental reports for Danish waste incineration plants without power production, year 2000.
- Nikolaisen et al. (1998)
- Jensen & Nielsen (1990)
- Bjerrum (2002)
- Sander (2002)
- Gruijthuijsen & Jensen (2000)

NH_3 emission factors

Emission factors have been included for residential wood combustion, residential straw combustion, waste incineration in public power production and residential combustion of coal and coke oven coke. The emission factor for waste incineration plants refers to a Danish emission measurement programme (Nielsen et al., 2010a) and all other emission factors refer to the EMEP/EEA Guidebook (EEA, 2009). Time series have not been estimated..

Particulate matter (PM) emission factors

Emission factors for PM and references for the emission factors are listed in Annex 2A-4. The emission factors are based on:

- The TNO/CEPMEIP emission factor database (CEPMEIP, 2001).

In addition, a considerable number of country-specific factors referring to:

- Danish legislation:
  - DEPA (2001a), The Danish Environmental Protection Agency, Luftvejledningen (legislation from Danish Environmental Protection Agency).
  - DEPA (1990), The Danish Environmental Protection Agency, Bekendtgørelse 698 (legislation from Danish Environmental Protection Agency).
- Calculations based on plant-specific emission data from a considerable number of waste incineration plants.
- Aggregated emission factors for residential wood combustion based on technology distribution (Hessberg & Justesen, 2013) and technology specific emission factors (EEA, 2013; DEPA, 2010b).
- Two emission measurement programs for decentralised CHP plants (Nielsen et al., 2010a; Nielsen & Illerup, 2003).
- An emission measurement program for large power plants (Livbjerg et al., 2001).
- Research leading to the first Danish PM emission inventory for stationary combustion (Nielsen et al., 2003)
- Additional personal communication concerning straw combustion in residential plants.

Emission factor time series have been estimated for residential wood combustion and waste incineration. All other emission factors have been considered constant in 2000-2012.

Heavy metals emission factors

Emission factors for 2012 for heavy metals (HM) are shown in Annex 2A-4. The annex includes references and time series. The emission factors refer to:

- Two emission measurement programs carried out on Danish decentralised CHP plants (Nielsen et al., 2010a; Nielsen & Illerup, 2003).
- Implied Emission Factors for power plants based on plant specific data reported by the power plant owners.
- Research concerning heavy metal emission factors representative for Denmark (Illerup et al., 1999).
- A CONCAWE study (Denier van der Gon & Kuenen, 2010)
- Data for Danish natural gas (Gruijthuijsen, 2001; Energinet.dk homepage)
- Emission factors without national reference all refer to EEA (2009).

Time series have been estimated for coal and for waste incineration. For all other sources, the same emission factors have been applied for 1990-2012.

The heavy metal emission inventory has been documented in detail in Nielsen et al. (2013c).

PAH emission factors

Emission factors 2012 for PAH are shown in Annex 2A-4. The appendix includes references. The PAH emission factors refer to:

- Research carried out by TNO (Berdowski et al., 1995).
- Research carried out by Statistics Norway (Finstad et al., 2001).
- An emission measurement program performed on biomass fuelled plants. The project was carried out for the Danish Environmental Protection Agency (Jensen & Nielsen, 1996).
- Two emission measurement programs carried out on Danish decentralised CHP plants (Nielsen et al., 2010a; Nielsen & Illerup, 2003).
- Additional information from the gas sector (Jensen, 2001).

For residential wood combustion, country specific emission factors have been aggregated based on technology distribution in the sector (Hessberg & Justesen, 2013) and technology specific emission factors (EEA, 2013; DEPA 2010b).

Emission factor time series have been estimated for residential wood combustion, natural gas fuelled engines, biogas fuelled engines and waste incineration plants. All other emission factors have been considered constant from 1990 to 2012. In general, emission factors for PAH are uncertain.

PCDD/F emission factors

Emission factors 2012 for PCDD/F are shown in Annex 2A-4.

The emission factor for residential wood combustion refers to technology specific emission factors (EEA 2013; DEPA 2010) and to updated technology distribution data (Hessberg & Justesen, 2013).

The emission factors for decentralised CHP plants[10] refer to an emission measurement program for these plants (Nielsen et al. 2010a).

[10] Natural gas fuelled engines, biogas fuelled engines, gasoil fuelled engines, engines fuelled by biomass producer gas, CHP plants combusting straw or wood and waste incineration plants.

All other emission factors refer to research regarding PCDD/F emission carried out by NERI (now DCE) to prepare a new PCDD/F emission inventory (Henriksen et al., 2006).

Time series have been estimated for residential wood combustion and for incineration of waste. For all other sources, the same emission factors have been applied for 1990-2012.

HCB emission factors

The HCB emission inventory has been improved since last year. HCB emission factors have been added for all fuels and some existing emission factors have been revised. The improved HCB emission inventory has been documented in Nielsen et al. (2014).

Table 3.2.17 shows the emission factors and references for the Danish emission factors.

Table 3.2.17 Emission factors for HCB, stationary combustion

Fuel	NFR (SNAP)	Emission factor, ng/GJ	Reference
Coal	1A1, 1A2	6,700	Grochowalski & Konieczyński (2008); EEA (2013)
Coal	1A4b	1,200,000	Syc et al. (2011)
Coal	1A4a and 1A4c	23,000	Syc et al. (2011)
Other solid fuels	1A1, 1A2	6,700	Assumed equal to coal.
Other solid fuels	1A4	1,200,000	Assumed equal to coal.
Liquid fuels[1)]	1A1, 1A2, 1A4	220	Nielsen et al. (2010)
Gaseous fuels	1A1, 1A2, 1A4	-	Negligible
Waste	1A1, 1A2, 1A4	4300	Nielsen et al. (2010). A time series have been estimated. The emission factor for 1990 (190,000 ng/GJ) refer to Pacyna et al. (2003).
Wood	1A1, 1A2	5,000	EEA (2013)
Wood	1A4	5,000	EEA (2013)
Straw	1A1, 1A2	113	Nielsen et al. (2010)
Straw	1A4	5,000	EEA (2013)
Biogas	1A1, 1A2, 1A4	190	Nielsen et al. (2010)
Producer gas	1A1, 1A2, 1A4	800	Nielsen et al. (2010)

Except LPG and refinery gas

For coal, the emission factor from Grochowalski & Konieczyński (2008) will be applied for energy industries and for industrial plants. This emission factor is also applied in the EEA Guidebook (EEA, 2013).

For residential plants, the emission factor 1,200,000 ng/GJ will be applied referring to Syc et al. (2011). For commercial/institutional plants and for plants in agriculture / forestry the lower end of the value in Syc et al. (2011) (23,000 ng/GJ) will be applied.

The emission factor for gas oil fuelled CHP engines (220 ng/GJ) referring to Nielsen et al. (2010) will be applied for all liquid fuels except for LPG and refinery gas.

For gaseous fuels, LPG and refinery gas no data are available and the emission is negligible.

For waste combustion, emission data from Danish plants are available and these data will be applied (Nielsen et al., 2010). The emission factor 4,300 ng/GJ will be applied for 2005 onwards. The HCB emission factor for 1990 refers to Pacyna et al. (2003). The emission of HCB is related to emission of PCDD/F and the decline rate between 1990 and 2005 is based on the decline rate for PCDD/F.

Recent emission measurements from Polish industrial waste incineration plants confirms the emission factor level for waste incineration considering that the PCDD/F emission level is 15 times the PCDD/F emission level for Danish plants.

For wood combustion, the emission factors from EEA (2013) will be applied for both energy industries, industrial plants and for non-industrial plants. For residential wood combustion, it would be relevant to estimate a time series. However, the currently available data are considered insufficient for this estimate.

The Cl content in straw is higher than in wood (Villeneuve et al., 2012) and thus the emission from straw combustion might potentially be higher. However, the emission factor for CHP plants combusting straw reported in Nielsen et al. (2010) is lower than the emission factor applied for wood.

The emission factor for energy industries and industrial combustion refer to Nielsen et al. (2010). For non-industrial plants, the EEA (2013) emission factor will be applied.

The emission factors for biogas and producer gas both refer to Nielsen et al (2010).

PCB emission factors

The PCB emission inventory has been improved since last year. The improved PCB emission inventory has been documented in Nielsen et al. (2014).

PCB emission is strongly related to the Cl content of the fuel (Syc et al., 2011) and to the emission level for PCDD/F (Hedman et al., 2006; Syc et al., 2011; Pandelova et al., 2009).

The Cl content of straw, bark and manure is higher than for wood (Villeneuve et al., 2012). Villeneuve et al. (2012) states the Cl contents 50-60 mg/kg wood, 100-370 mg/kg bark, 1000-7000 mg/kg straw.

Different references for PCB emissions are not directly comparable because some PCB emission data are reported for individual PCB congeners, some as a sum of a specified list of PCB congeners and some PCB emission data are reported as toxic equivalence (teq) based on toxicity equivalence factors (TEF) for 12 dioxin-like PCB congeners. The emission measurements reported by Thistlethwaite (2001a and 2001b) show that the emission of non-dioxin-like PCBs is high compared to the emission of dioxin-like PCBs.

Furthermore, teq values based on TEF are reported as WHO_{2005}-teq or WHO_{1998}-teq. This difference is however typically less than 50%[11].

Table 3.2.18 shows the emission factors that have been selected for the Danish PCB emission inventory and reference for each emission factor. All emission factors are dioxin-like PCBs (but not teq values). PCB emission factors have been added for all fuels except LPG, refinery gas and natural gas. The emission from these three fuels is considered negligible.

Table 3.2.18 Emission factors for ∑dl-PCB, stationary combustion, 2012.

Fuel	NFR (SNAP)	Emission factor, ∑ dl-PCB, ng/GJ	Emission factor, PCB, ng WHO_{1998}-teq/GJ	Reference
Coal	1A1	839	3.16	Grochowalski & Konieczyński (2008)
Coal	1A2	5,700	53	Thistlethwaite (2001a)
Coal	1A4	7,403	66	Syc et al. (2011)
Other solid fuels	1A1	839	3.16	Assumed equal to coal.
Other solid fuels	1A2	5,700	53	Assumed equal to coal.
Other solid fuels	1A4	7,403	66	Assumed equal to coal.
Residual oil	1A1, 1A2, 1A4	839	3.2	The teq value refers to Dyke et al. (2003). The TEQ value is equal to the emission factor for coal combustion in power plants and the sum of dioxin-like PCB congeners has been assumed equal to the corresponding factor for coal.
Gas oil	1A1, 1A2, 1A4	93	0.11	Nielsen et al. (2010)
Other liquid fuels[1)]	1A1, 1A2, 1A4	93	0.11	Assumed equal to gas oil.
Gaseous fuels	1A1, 1A2, 1A4	-	-	Negligible
Waste	1A1, 1A2, 1A4	109 (time series)	0.28 (time series)	Nielsen et al. (2010). A time series have been estimated. The emission factor for 1990 (46,000 ng/GJ or 117 ng WHO1998teq/GJ) have been estimated based on the assumption that the PCB emission factor time series follow the PCDD/F time series.
Wood	1A1, 1A2, 1A4a/c	2,800	21	Thistlethwaite (2001a)
Wood	1A4b	3,179 (time series)	23.9 (time series)	Hedman et al. (2006). A time series have been estimated based on time series for technologies applied in Denmark.
Straw	1A1, 1A2	3,110	31.2	Assumed equal to residential plants.
Straw	1A4	3,110	31.2	Syc et al. (2011)
Biogas	1A1, 1A2, 1A4	90	0.13	Nielsen et al. (2010)
Producer gas	1A1, 1A2, 1A4	144	0.17	Nielsen et al. (2010)

Except LPG and refinery gas.

The emission factor for waste incineration refers to recent Danish field measurements. Historical data are not available, but a time series have been estimated based on the assumption that the dl-PCB emission factor follows the PCDD/-F emission factor. The estimated emission factor for 1990 is 45,671 ng/GJ or 117 ng WHO-teq/GJ. This emission level is confirmed by other references (Kakareka & Kukharchyk, 2005; Andrijewski et al., 2004). The emission factor time series is shown in Table 3.2.19.

[11] Data have been compared for a few datasets in which each dioxin-like PCB congener was specified

For residential wood combustion, technology specific emission factors in toxicological equivalence are available from Hedman et al. (2006). However, sums of dioxin-like PCBs are not included in the reference. The emission factors for dioxin-like PCBs have been estimated based on the data for toxicological equivalence and the sum of dioxin-like PCBs in Thistlethwaite (2001a). Thus, the teq factors referring to Hedman (2006) have been multiplied by 2800/21. This assumption is highly uncertain, but the resulting emission factors seem to be in agreement with other references for residential wood combustion. A technology distribution time series for residential wood combustion in Denmark is available and have been applied for estimating the time series for the aggregated emission factor shown in Table 3.2.19.

Emission factor time series for waste incineration and for residential wood combustion are shown in Table 3.2.19.

Table 3.2.19 Emission factor time series for waste incineration and for residential wood combustion

Year	Waste incineration		Residential wood combustion	
	∑dl-PCB, ng/GJ	dl-PCB, ng WHO-teq/ GJ	∑dl-PCB, ng/GJ	dl-PCB, ng WHO-teq/ GJ
1990	45671	117	5468	41.1
1991	38063	98	5468	41.1
1992	30433	78	5468	41.1
1993	22825	59	5468	41.1
1994	19773	51	5468	41.1
1995	16721	43	5468	41.1
1996	13690	35	5468	41.1
1997	10638	27	5468	41.1
1998	7586	19	5468	41.1
1999	5515	14	5468	41.1
2000	3423	9	5468	41.1
2001	3423	9	4894	36.8
2002	3423	9	4657	35.0
2003	3423	9	4589	34.5
2004	1766	4.5	4513	33.9
2005	109	0.28	4298	32.3
2006	109	0.28	4055	30.5
2007	109	0.28	4082	30.7
2008	109	0.28	3836	28.8
2009	109	0.28	3532	26.6
2010	109	0.28	3348	25.2
2011	109	0.28	3179	23.9
2012	109	0.28	3025	22.7

Emission factors for residential wood combustion

For the pollutants NOx, NMVOC, CO, NH_3[12], TSP, PM_{10}, $PM_{2.5}$, PCDD/F, PCB and PAH emission factors have been based on fuel consumption data and emission factors for 10 different technologies. Technology categories, emission factors and implied emission factors for 2012 are shown in Table

[12] The revised NH_3 emission factors have not been included in this annual reporting. This is an error that will be corrected in the next emission inventory.

3.2.20. For other pollutants, time series have not been estimated and the emission factors are shown in Annex 2A-4.

References and assumptions for each of the emission factors shown in Table 3.2.20 are included in Annex 2A-4.

Table 3.2.20 Technology specific emission factors for residential wood combustion.

Technology	NO_x, g/GJ	NMVOC, g/GJ	CO, g/GJ	NH_3, g/GJ	TSP, g/GJ	PM_{10}, g/GJ	$PM_{2.5}$, g/GJ	PCDD/F, ng/GJ	dl-PCB, ng/GJ	Benzo (a) pyrene, mg/GJ	Benzo (b) fluoranthe-ne, mg/GJ	Benzo (k) fluoranthe-ne, mg/GJ	Indeno (1.2.3-c,d) pyrene, mg/GJ
Old stove	50	1200	8000	70	1000	950	930	800	7049	121	111	42	71
New stove	50	600	4000	70	800	760	740	800	7049	121	111	42	71
Stove according to resent Danish legislation (2008)	80	350	4000	37	640	608	608	250	931	61	56	21	36
Eco labelled stove/new advanced stove	95	175	1117	37	222	211	206	100	466	10	16	5	4
Other stoves	50	600	4000	70	800	760	740	800	7049	121	111	42	71
Old boilers with hot water storage	80	350	4000	74	1000	950	900	550	7049	121	111	42	71
Old boilers without hot water storage	80	350	4000	74	2000	1900	1800	550	7049	121	111	42	71
New boilers with hot water storage	95	175	1117	37	222	211	206	100	466	10	16	5	4
New boilers without hot water storage	95	350	2234	37	444	422	413	200	931	20	32	10	8
Pellet boilers	50	1200	8000	70	1000	950	930	800	7049	121	111	42	71
IEF residential wood combustion, 2012	74	363	2676	42.8	477	453	442	371	2997	56464	55827	20502	32029

Implied emission factors

A considerable part of the emission data for waste incineration plants and large power plants are plant-specific. Thus, the area source emission factors do not necessarily represent average values for these plant categories. To attain a set of emission factors that expresses the average emission for power plants combusting coal and for waste incineration plants, implied emission factors have been calculated for these two plant categories. The implied emission factors are presented in Annex 2A-5. The implied emission factors are calculated as total emission divided by total fuel consumption.

3.2.6 Uncertainty

According to the Good Practice Guidance for LRTAP Emission Inventories (Pulles & Aardenne, 2004) uncertainty estimates should be estimated

Uncertainty estimates include uncertainty with regard to the total emission inventory as well as uncertainty with regard to trends.

Methodology

The Danish uncertainty estimates are based on the simple Tier 1 approach.

The uncertainty estimates are based on emission data for the base year and year 2012 as well as on uncertainties for fuel consumption and emission factors for each of the main SNAP source categories. For particulate matter, 2000 is considered to be the base year, but for all other pollutants, the base year is 1990. The applied uncertainties for activity rates and emission factors are default values referring to Pulles & Aardenne (2004). The uncertainty for PM is, however, estimated by DCE. The default uncertainties for emission factors are given in letter codes representing an uncertainty range. It has been assumed that the uncertainties were in the lower end of the range for all sources and pollutants. The applied uncertainties for emission factors are listed in Table 3.2.21. The uncertainty for fuel consumption in stationary combustion plants is assumed to be 2 %.

Table 3.2.21 Uncertainty rates for emission factors, %.

SNAP source category	SO_2	NO_x	NMVOC	CO	NH_3	PM	HM	PAH	HCB	PCDD/F	PCB
01	10	20	50	20	1000	50	100	100	1000	500	1000
02	20	50	50	50	1000	500	1000	1000	1000	1000	1000
03	10	20	50	20	1000	50	100	100	1000	1000	1000

Results

The uncertainty estimates for stationary combustion emission inventories are shown in Table 3.2.22. Detailed calculation sheets are provided in Annex 2A-7.

The total emission uncertainty is 7.5 % for SO_2, 16 % for NO_x, 45 % for NMVOC and 44 % for CO. For PM, heavy metals, HCB, PCDD/F, PCB and PAH the uncertainty estimates are larger than 100 %.

Table 3.2.22 Uncertainty estimates, tier 1 approach, 2012.

Pollutant	Uncertainty Total emission, %	Trend 1990-2012, %	Uncertainty Trend, %-age points
SO_2	±7.5	-95	±0.3
NO_x	±16	-72	±2
NMVOC	±45	12	±6
CO	±44	-5	±3
NH_3	±927	180	±283
TSP [1)]	±467	20	±37
PM_{10} [1)]	±474	21	±34
$PM_{2.5}$ [1)]	±479	23	±27
As	±166	-81	±22
Cd	±368	-86	±41
Cr	±287	-93	±16
Cu	±539	-83	±76
Hg	±145	-91	±6
Ni	±142	-86	±6
Pb	±684	-84	±90
Se	±110	-83	±8
Zn	±746	-77	±138
HCB	±788	-76	±12
PCDD/F	±922	-64	±245
Benzo(b)fluoranthene	±951	81	±15
Benzo(k)fluoranthene	±955	94	±66
Benzo(a)pyrene	±986	77	±5
Indeno(1,2,3-c,d)pyrene	±993	36	±18
PCB	±667	-63	±89

[1)] The base year for PM is year 2000.

3.2.7 Source specific QA/QC and verification

An updated quality manual for the Danish emission inventories has been published in 2013 (Nielsen et al. 2013). The quality manual describes the concepts of quality work and definitions of sufficient quality, critical control points and a list of Point for Measuring (PM). Details about the source specific QA/QC is included in Annex 2A-11.

Documentation concerning verification of the Danish emission inventories has been published by Fauser et al. (2013).

A reviewed sector report for stationary combustion will be published in 2014 (Nielsen et al., 2014b). Former editions of the sector report for stationary combustion (Nielsen et al. 2010) has been reviewed by external experts in 2004, 2006 and 2009.

3.2.8 Source specific improvements and recalculations

For stationary combustion plants, the emission estimates for the years 1990-2011 have been updated according to the latest energy statistics published by the Danish Energy Agency. The update included both end use and transformation sectors as well as a source category update. The changes in the energy statistics are largest for the years 2009, 2010 and 2011.

The emission factors for residential wood combustion have been revised according to the EEA Guidebook update (EEA, 2013). This have caused large recalculations for residential plants. This also cause the large recalculations for the total PAH emission from stationary combustion.

The HCB emission inventory have been improved and an emission inventory for dioxin-like PCB have been added.

Recalculations for stationary combustion as a whole are shown in Table 3.2.23.

Table 3.2.23 Recalculations for stationary combustion, emissions reported in 2014 compared to emissions reported in 2013.

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011
					Percent					
SO_2	100.1	100.1	99.7	99.2	99.4	97.9	98.3	98.7	100.7	99.8
NO_x	98.7	99.0	99.6	98.7	98.4	97.5	97.1	96.8	96.6	97.0
NMVOC	100.8	101.0	101.2	102.7	103.8	104.7	105.1	105.3	105.9	106.2
CO	98.6	98.1	97.3	94.7	94.7	93.7	93.3	92.8	92.7	91.9
TSP			103.3	103.3	102.5	102.4	102.3	102.4	102.6	102.4
PM_{10}			103.2	103.1	102.3	102.3	102.3	102.3	102.4	102.2
$PM_{2.5}$			102.0	101.8	101.3	101.1	101.2	101.1	101.2	101.2
NH_3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.1	100.0	100.0
As	100.3	100.5	100.4	101.3	101.8	101.6	102.0	103.2	104.4	103.8
Cd	100.1	100.3	100.4	100.9	101.5	101.2	101.4	101.8	102.5	102.2
Cr	100.0	100.1	100.3	100.6	101.0	100.6	100.8	101.1	102.5	101.9
Cu	100.1	100.2	100.4	100.8	101.4	101.0	101.2	101.5	102.5	101.8
Hg	100.0	100.0	97.3	89.9	87.2	84.5	85.2	85.8	100.8	100.5
Ni	101.6	102.2	104.0	107.9	108.8	112.7	116.5	123.5	127.5	134.8
Pb	100.0	100.1	100.1	100.1	100.8	100.2	100.3	100.3	101.7	100.7
Se	100.0	100.0	100.1	100.2	100.4	100.2	100.2	100.3	100.9	100.7
Zn	100.3	100.4	100.9	101.6	102.4	101.9	102.3	102.8	103.7	103.1
HCB	182.7	225.7	279.1	330.9	394.7	346.3	318.4	314.0	293.5	274.7
PCDD/F	100.2	94.4	102.5	98.1	101.7	100.3	99.8	99.5	99.4	98.4
Benzo(a)pyrene	100.0	100.2	100.0	100.0	100.1	100.0	100.0	99.9	100.2	100.1
Benzo(b)fluoranthene	61.0	58.2	57.1	56.4	57.2	56.0	56.3	56.0	56.7	57.4
Benzo(k)fluoranthene	39.0	37.0	36.8	35.7	36.3	35.6	36.1	36.3	36.3	36.9
Indeno(123cd)pyrene	63.7	61.0	59.9	58.3	59.0	57.8	57.5	56.4	56.5	56.2
PCB	New	New	New	New	New	New	New	New	New	New

3.2.9 Source specific planned improvements

A number of improvements are planned for the stationary combustion inventories:

1) Improved documentation for emission factors.

The reporting of, and references for, the applied emission factors will be further developed in future inventories.

2) Improved uncertainty estimate.

The current uncertainty estimates are based on SNAP main categories and default uncertainties. The source categories will be changed to NFR categories and country specific uncertainty estimates included for some of the main emission sources.

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3.3 Transport and other mobile sources (NFR sector 1A2, 1A3, 1A4 and 1A5)

The emission inventory basis for mobile sources is fuel consumption information from the Danish energy statistics. In addition, background data for road transport (fleet and mileage), air traffic (aircraft type, flight numbers, origin and destination airports), national sea transport (fuel surveys, ferry technical data, number of return trips, sailing time) and non-road machinery (engine no., engine size, load factor and annual working hours) are used to make the emission estimates sufficiently detailed. Emission data mainly comes from the EMEP/EEA Air Pollutant Emission Inventory Guidebook (EMEP/EEA, 2013). However, for railways, measurements specific to Denmark are used.

In the Danish emission database, all activity rates and emissions are defined in SNAP sector categories (Selected Nomenclature for Air Pollution), according to the CollectER system. The emission inventories are prepared from a complete emission database based on the SNAP sectors. The aggregation to the sector codes used for both the UNFCCC and UNECE Conventions is based on a correspondence list between SNAP and CFR/NFR classification codes shown in Table 3.3.1 below (mobile sources only).

Table 3.3.1 SNAP – CRF/NFR correspondence table for transport.

SNAP classification	CRF classification	NFR classification
07 Road transport	1A3b Transport-Road	1A3bi Road transport: Passenger cars
		1A3bii Road transport:Light duty vehicles
		1A3biii Road transport:Heavy duty vehicles
		1A3biv Road transport: Mopeds & motorcycles
0801 Military	1A5 Other	1A5b Other, Mobile (military)
0802 Railways	1A3c Railways	1A3c Railways
0803 Inland waterways	1A3d Transport-Navigation	1A3dii National navigation (Shipping)
080402 National sea traffic	1A3d Transport-Navigation	1A3dii National navigation (Shipping)
080403 National fishing	1A4c Agriculture/forestry/fisheries	1A4ciii Agriculture/Forestry/Fishing: National fishing
080404 International sea traffic	1A3d Transport-Navigation (international)	1A3di International navigation (Shipping)
080501 Dom. airport traffic (LTO < 1000 m)	1A3a Transport-Civil aviation	1A3aii Civil aviation (Domestic,LTO
080502 Int. airport traffic (LTO < 1000 m)	1A3a Transport-Civil aviation (international)	1A3ai Civil aviation (International, LTO)
080503 Dom. cruise traffic (> 1000 m)	1A3a Transport-Civil aviation	1A3aii (ii) Civil aviation (Domestic,Cruise)
080504 Int. cruise traffic (> 1000 m)	1A3a Transport-Civil aviation (international)	1A3ai (ii) Civil aviation (International, Cruise)
0806 Agriculture	1A4c Agriculture/forestry/fisheries	1A4cii Agriculture/Forestry/Fishing: Off-road agriculture/forestry
0807 Forestry	1A4c Agriculture/forestry/fisheries	1A4cii Agriculture/Forestry/Fishing: Off-road agriculture/forestry
0808 Industry	1A2f Industry-Other	1A2f Manufacturing industries/Construction (mobile)
0809 Household and gardening	1A4b Residential	1A4bii Residential: Household and gardening (mobile)
0811 Commercial and institutional	1A4a Commercial and institutional	1A4aii Commercial/Institutional: Mobile

Military transport activities (land and air) refer to the CRF/NFR sector Other (1A5), while the Transport-Navigation sector (1A3d) comprises national sea transport (SNAP code 080402, ship movements between two Danish ports) and recreational craft (SNAP code 0803).

For aviation, Landing and Take Off ((LTO)[1] refers to the part of flying, which is below 1000 m. This part of the aviation emissions (SNAP codes 080501 and 080502) are included in the national emissions total as prescribed by the UNECE reporting rules. According to UNFCCC the national emissions for aviation comprise the emissions from domestic LTO (0805010) and domestic cruise (080503). The fuel consumption and emission development for aviation explained in the following are based on UNFCCC categorization, in order to be consistent with the Danish NIR report.

Agricultural and forestry non-road machinery (SNAP codes 0806 and 0807) is accounted for in the Agriculture/forestry/fisheries (1A4c) sector together with fishing activities (SNAP code 080403).

For mobile sources, internal database models for road transport, air traffic, sea transport and non-road machinery have been set up at DCE, Aarhus University, in order to produce the emission inventories. The output results from the DCE models are calculated in a SNAP format, as activity rates (fuel consumption) and emission factors, which are then exported directly to the central Danish CollectER database.

Apart from national inventories, the DCE models are used also as a calculation tool in research projects, environmental impact assessment studies, and to produce basic emission information which requires various aggregation levels.

3.3.1 Source category description

The following description of source categories explains the development in fuel consumption and emissions for road transport and other mobile sources.

Fuel consumption

Table 3.3.2 Fuel consumption (PJ) for domestic transport in 2012 in NFR sectors.

NFR ID	Fuel consumption (PJ)
Industry-Other (1A2f)	13,9
Civil Aviation (1A3a)	1,8
Road (1A3b)	160,9
Railways (1A3c)	3,4
Navigation (1A3d)	6,6
Comm./Inst. (1A4a)	2,3
Residential (1A4b)	0,9
Agri./for./fish. (1A4c)	24,9
Military (1A5)	1,6
Total	216.4

Table 3.3.2 shows the fuel consumption for domestic transport based on DEA statistics for 2012 in NFR sectors. The fuel consumption figures in time series 1985-2012 are given in Annex 2.B.16 (NFR format) and are shown for 2012 in Annex 2.B.15 (CollectER format). Road transport has a major share of the fuel consumption for domestic transport. In 2012 this sector's fuel consumption share is 74 %, while the fuel consumption shares for Agricul-

[1] A LTO cycle consists of the flying modes approach/descent, taxiing, take off and climb out. In principle the actual times-in-modes rely on the actual traffic circumstances, the airport configuration, and the aircraft type in question.

ture/forestry/fisheries and Industry-Other are 11 and 6 %, respectively. For the remaining sectors the total fuel consumption share is 9 %.

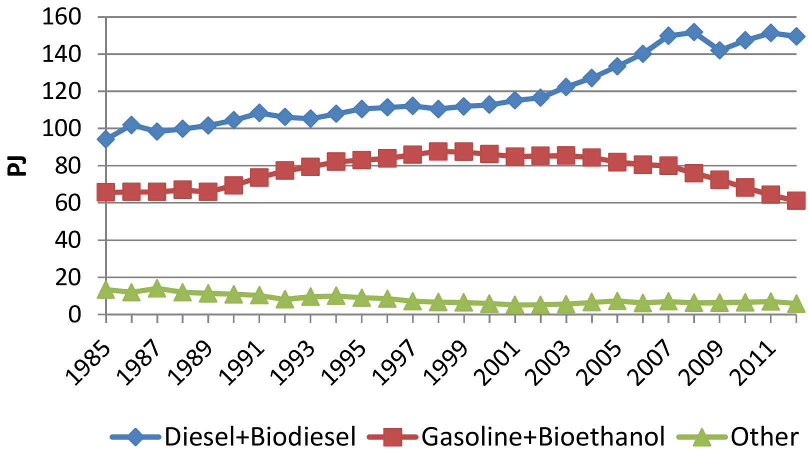


Figure 3.3.1 Fuel consumption per fuel type for domestic transport 1985-2012.

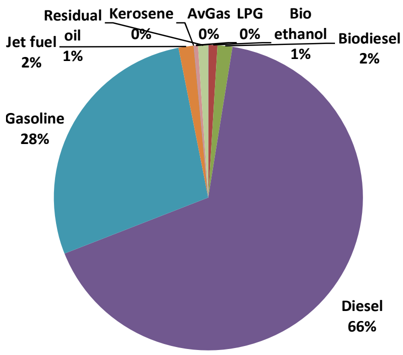


Figure 3.3.2 Fuel consumption share pr fuel type for domestic transport in 2012.

From 1985 to 2012, diesel (sum of diesel and biodiesel) and gasoline (sum of gasoline and E5) fuel consumption has changed by 59 % and - 7 %, respectively (Figure 3.3.1), and in 2012 the fuel consumption shares for diesel and gasoline were 66 % and 28 %, respectively (not shown). Other fuels only have a 6 % share of the domestic transport total (Figure 3.3.2). Almost all gasoline is used in road transportation vehicles. Gardening machinery and recreational craft are merely small consumers. Regarding diesel, there is considerable fuel consumption in most of the domestic transport categories, whereas a more limited use of residual oil and jet fuel is being used in the navigation sector and by aviation (civil and military flights), respectively[2].

Road transport

As shown in Figure 3.3.3, the fuel consumption for road transport[3] has generally increased until 2007, except from a small fuel consumption decline noted in 2000. The impact of the global financial crisis on fuel consumption for road transport becomes visible for 2008 and 2009. The fuel consumption development is due to a decreasing trend in the use of gasoline fuels from 1999 onwards combined with a steady growth in the use of diesel until 2007. Within sub-sectors, passenger cars represent the most fuel-consuming vehi-

[2] Biofuels are sold at gas filling stations and are assumed to be used by road transport vehicles.
[3] The sum share of bioethanol and biodiesel in the gasoline and diesel fuel blends for road transport is 5.3 %, in 2012.

cle category, followed by heavy-duty vehicles, light duty vehicles and 2-wheelers, in decreasing order (Figure 3.3.4).

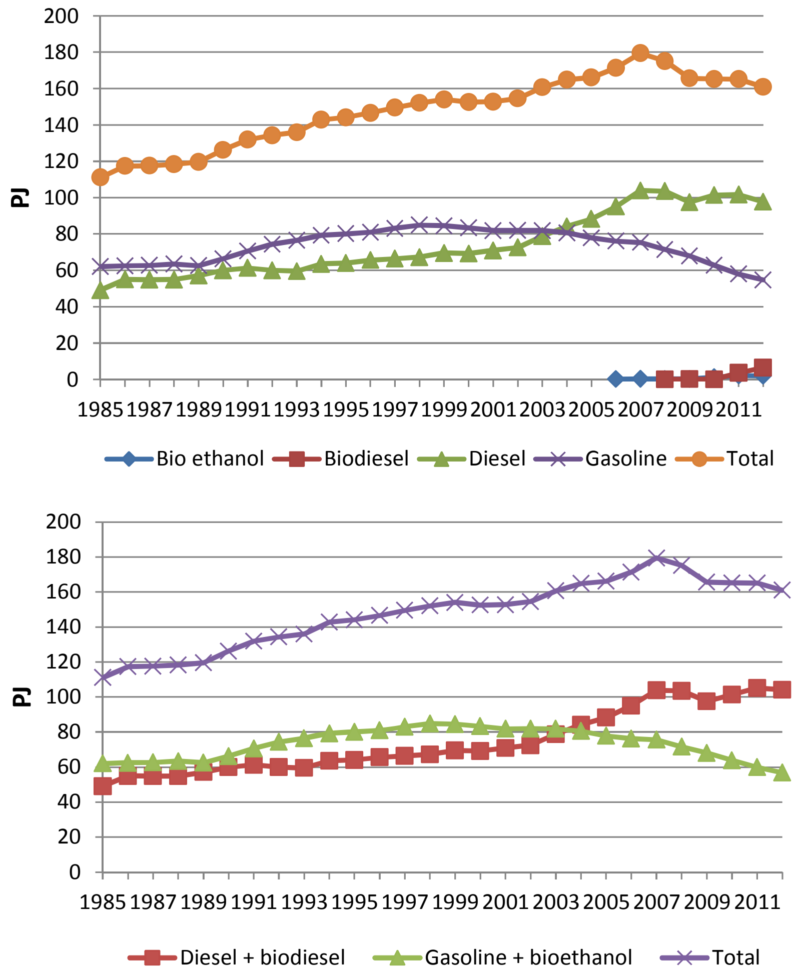


Figure 3.3.3 Fuel consumption pr fuel type and as totals for road transport 1985-2012.

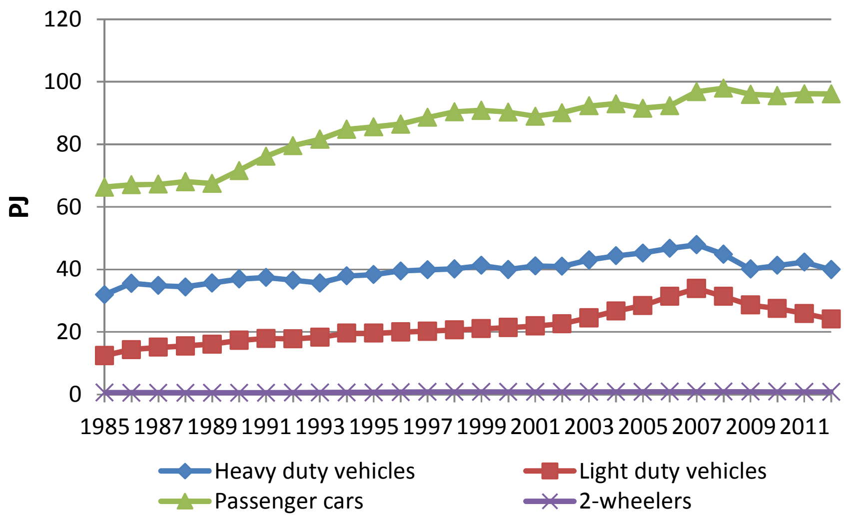


Figure 3.3.4 Total fuel consumption pr vehicle type for road transport 1985-2012.

As shown in Figure 3.3.5 fuel consumption for gasoline passenger cars dominates the overall gasoline consumption trend. The development in diesel fuel consumption in recent years (Figure 3.3.6) is characterised by increasing fuel consumption for diesel passenger cars, while declines in the fuel consumption for trucks and buses (heavy-duty vehicles) and light duty vehicles are noted for 2008- 2009, 2012, and 2008-2012, respectively.

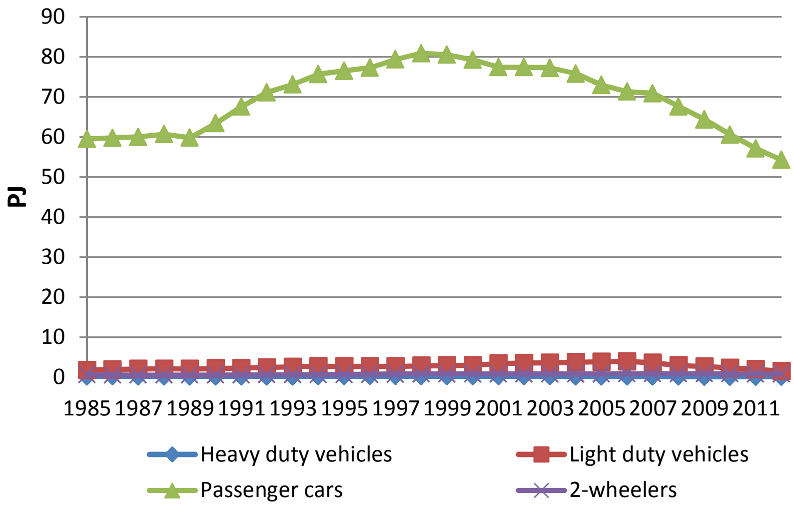


Figure 3.3.5 Gasoline fuel consumption pr vehicle type for road transport 1985-2012.

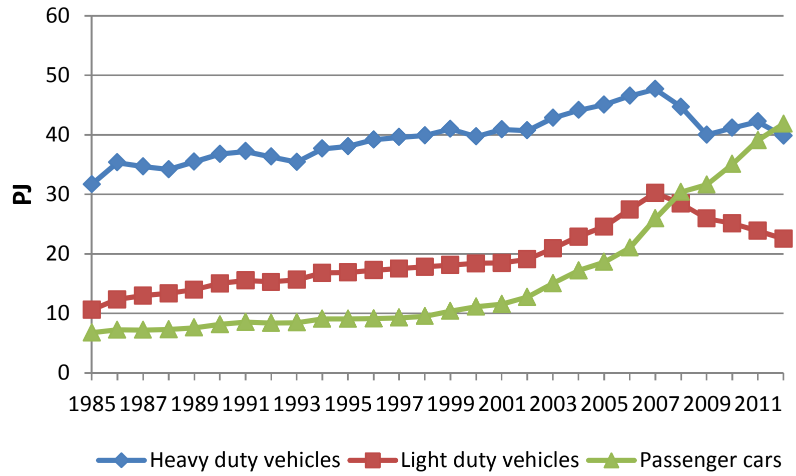


Figure 3.3.6 Diesel fuel consumption pr vehicle type for road transport 1985-2012.

In 2012, fuel consumption shares for gasoline passenger cars, heavy-duty vehicles, diesel passenger cars, diesel light duty vehicles and gasoline light duty vehicles were 34, 26, 25, 14 and 1 %, respectively (Figure 3.3.7).

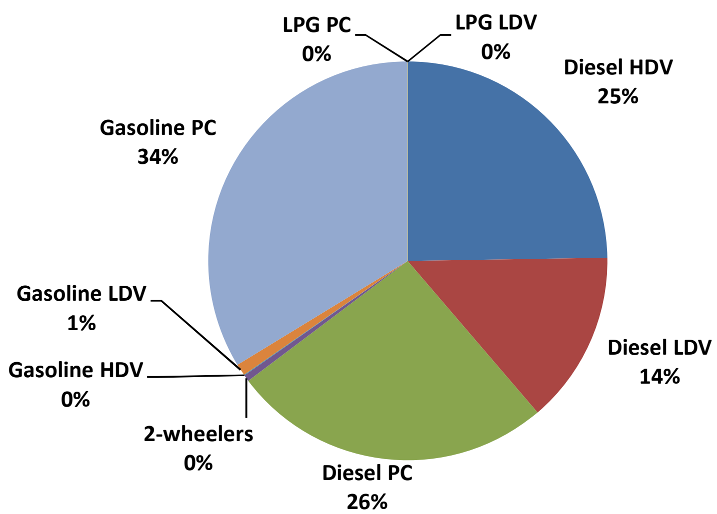


Figure 3.3.7 Fuel consumption share (PJ) pr vehicle type for road transport in 2012.

Other mobile sources

It must be noted that the fuel consumption figures behind the Danish inventory for mobile equipment in the agriculture, forestry, industry, household and gardening (residential), and inland waterways (part of navigation) sectors, are less certain than for other mobile sectors. For these types of machinery, the DEA statistical figures do not directly provide fuel consumption information, and fuel consumption totals are subsequently estimated from activity data and fuel consumption factors. For recreational craft the latest historical year is 2004.

As seen in Figure 3.3.8, classified according to CRF the most important sectors are Agriculture/forestry/fisheries (1A4c), Industry-other (mobile machinery part of 1A2f) and Navigation (1A3d). Minor fuel consuming sectors are Civil Aviation (1A3a), Railways (1A3c), Other (military mobile fuel consumption: 1A5), Commercial/institutional (1A4a) and Residential (1A4b).

The 1985-2012 time series are shown pr fuel type in Figures 3.3.9-3.3.12 for diesel, gasoline and jet fuel, respectively.

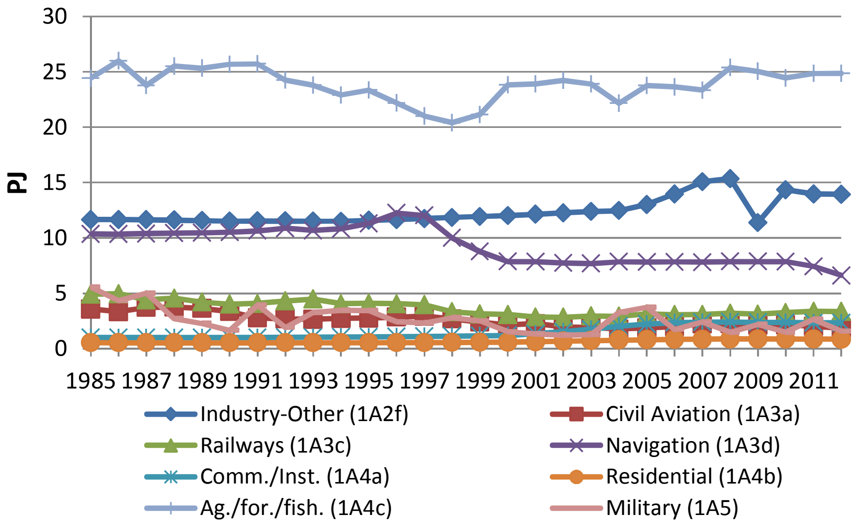


Figure 3.3.8 Total fuel consumption in CRF sectors for other mobile sources 1985-2012.

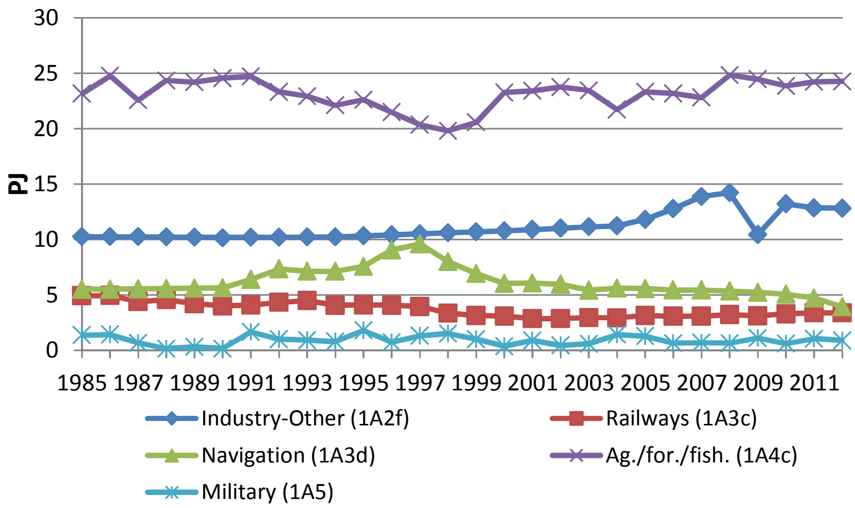


Figure 3.3.9 Diesel fuel consumption in CRF sectors for other mobile sources 1985-2012.

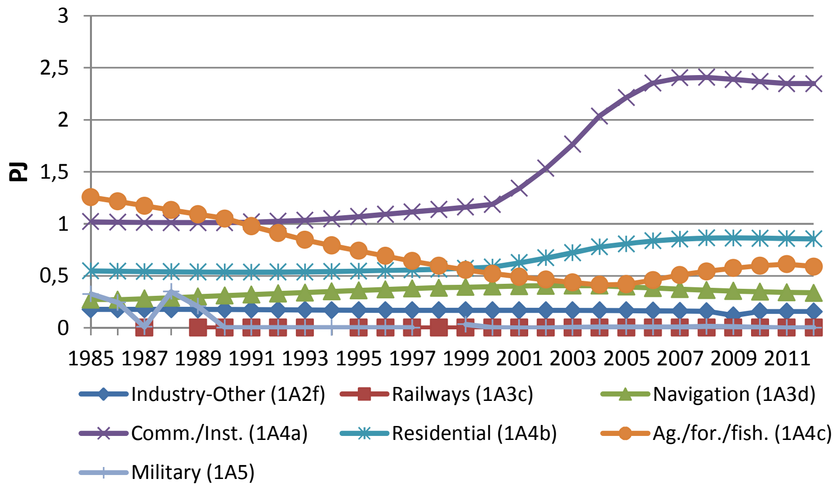


Figure 3.3.10 Gasoline fuel consumption in CRF sectors for other mobile source 1985-2012.

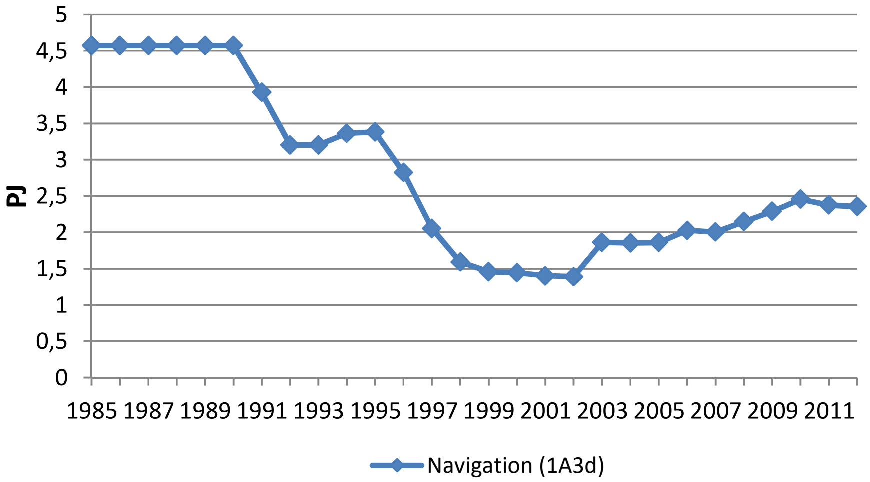


Figure 3.3.11 Residual oil fuel consumption in CRF sectors for other mobile sources 1985-2012.

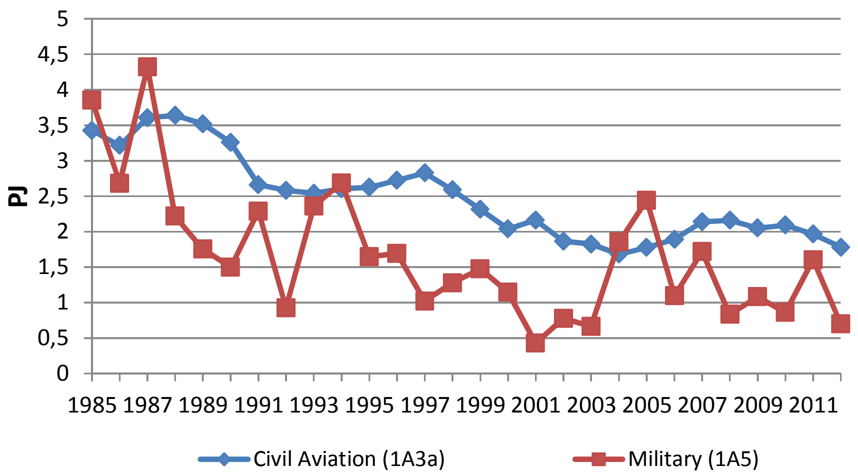


Figure 3.3.12 Jet fuel consumption in CRF sectors for other mobile sources 1985-2012.

In terms of diesel, the fuel consumption decreases for agricultural machines until 2000, due to fewer numbers of tractors and harvesters. After that, the increase in the engine sizes of new sold machines has more than outbalanced the trend towards smaller total stock numbers. The fuel consumption for industry has increased from the beginning of the 1990's, due to an increase in the activities for construction machinery. The fuel consumption increase has been very pronounced in 2005-2008, for 2009; however, the global financial crisis has a significant impact on the building and construction activities. For fisheries, the development in fuel consumption reflects the activities in this sector.

The Navigation sector comprises national sea transport (fuel consumption between two Danish ports including sea travel directly between Denmark and Greenland/Faroe Islands) and recreational craft. For the latter category, fuel consumption has increased significantly from 1990 to 2004 due to the rising number diesel-fuelled private boats. For national sea transport, the diesel fuel consumption curve reflects the combination of traffic and ferries in use for regional ferries. From 1998 to 2000, a significant decline in fuel consumption is apparent. The most important explanation here is the closing of ferry service routes in connection with the opening of the Great Belt Bridge in 1997. The fuel consumption decreases in 2011 and 2012 are due to reductions in the number of round trips made by regional ferries. For railways, the gradual shift towards electrification explains the lowering trend in diesel fuel consumption and the emissions for this transport sector. The fuel consumed (and associated emissions) to produce electricity is accounted for in the stationary combustion part of the Danish inventories.

The largest gasoline fuel consumption is found for household and gardening machinery in the Commercial/Institutional (1A4a) and Residential (1A4b) sectors. Especially from 2001-2006, a significant fuel consumption increase is apparent due to considerable growth in the machinery stock. The decline in gasoline fuel consumption for Agriculture/forestry/fisheries (1A4c) is due to the gradual phasing out of gasoline-fuelled agricultural tractors.

In terms of residual oil there has been a substantial decrease in the fuel consumption for regional ferries. The fuel consumption decline is most significant from 1990-1992 and from 1997-1999.

The considerable variations from one year to another in military jet fuel consumption are due to planning and budgetary reasons, and the passing demand for flying activities. Consequently, for some years, a certain amount of jet fuel stock-building might disturb the real picture of aircraft fuel consumption. Civil aviation has decreased until 2004, since the opening of the Great Belt Bridge in 1997, both in terms of number of flights and total jet fuel consumption. After 2004 an increase in the consumption of jet fuel is noted until 2007/2008.

Bunkers

The residual oil and diesel oil fuel consumption fluctuations reflect the quantity of fuel sold in Denmark to international ferries, international warships, other ships with foreign destinations, transport to Greenland and the Faroe Islands, tank vessels and foreign fishing boats. For jet petrol, the sudden fuel consumption drop in 2002 is explained by the recession in the air traffic sector due to the events of September 11, 2001 and structural changes in the aviation business. In 2009, the impact of the global financial crisis on flying activities becomes very visible.

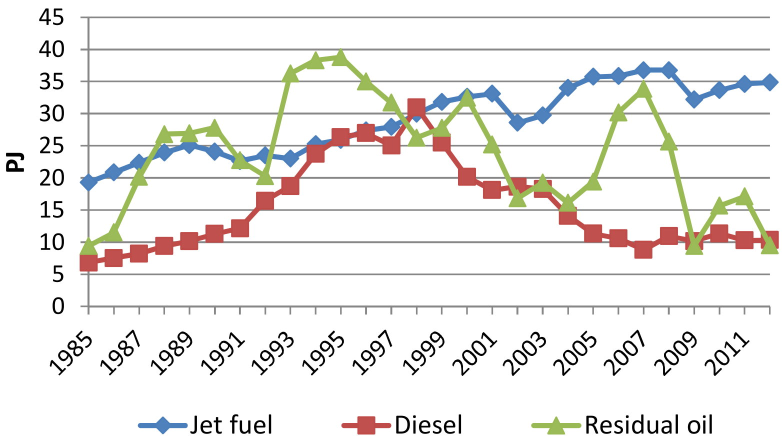


Figure 3.3.13 Bunker fuel consumption 1985-2012.

Emissions of SO_2, NO_X, NMVOC, CO, NH_3, TSP, PM_{10} and $PM_{2.5}$

In Table 3.3.3 the SO_2, NO_X, NMVOC, CO NH_3, TSP, PM_{10} and $PM_{2.5}$ emissions for road transport and other mobile sources are shown for 2012 in NFR sectors. For particulate matter (PM; TSP, PM_{10} and $PM_{2.5}$), only the exhaust emission contributions are included in Table 3.3.3. Non-exhaust TSP, PM_{10} and $PM_{2.5}$ emissions are treated in a separate section below. The emission figures in the time series 1985-2012 are given in Annex 2.B.16 (NFR format) and are shown for 2012 in Annex 2.B.15 (CollectER format).

From 1985 to 2012, the road transport emissions of SO_2, NO_X, NMVOC, CO and PM (all size fractions) have decreased by 99, 53, 86, 83 and 70 %, respectively (Figures 3.3.14-3.3.18), whereas the NH_3 emissions have increased by 2220 % during the same time period (Figure 3.3.19).

For other mobile sources, the emission changes for SO_2, NO_X, NMVOC, CO and PM (all size fractions) are -83, -27, -33, +11 and -64 %, respectively (Figures 3.3.21-3.3.25). The NH_3 emissions have increased by 34 % during the same time period (Figure 3.3.26).

Table 3.3.3 Emissions of SO_2, NO_X, NMVOC, CO NH_3, TSP, PM_{10} and $PM_{2.5}$ in 2012 for road transport and other mobile sources.

NFR ID	SO_2	NO_x	NMVOC	CO	NH_3	TSP	PM_{10}	$PM_{2.5}$
	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
Industry-Other (1A2f)	6	7 597	1 076	6 239	2	617	617	617
Civil Aviation (1A3a)	42	579	98	607	0	3	3	3
Railways (1A3c)	2	2 531	190	425	1	82	82	82
Navigation (1A3d)	1 334	8 692	749	5 030	0	268	266	265
Comm./Inst. (1A4a)	1	219	3 636	72 587	0	67	67	67
Residential (1A4b)	0	92	1 953	26 236	0	15	15	15
Ag./for./fish. (1A4c)	311	18 163	2 137	19 246	4	858	856	856
Military (1A5)	17	492	33	270	0	11	11	11
Total other mobile	1 713	38 366	9 873	130 639	8	1 920	1 917	1 915
Road (1A3b)	71	44 316	10 439	96 022	1 456	1 311	1 311	1 311
Total mobile	1 784	82 682	20 312	226 661	1 464	5 702	4 794	4 087

Road transport

The step-wise lowering of the sulphur content in diesel fuel has given rise to a substantial decrease in the road transport emissions of SO_2 (Figure 3.3.14). In 1999, the sulphur content was reduced from 500 ppm to 50 ppm (reaching gasoline levels), and for both gasoline and diesel the sulphur content was reduced to 10 ppm in 2005. Since Danish diesel and gasoline fuels have the same sulphur percentages, at present, the 2012 shares for SO_2 emissions and fuel consumption for passenger cars, heavy-duty vehicles, light-duty vehicles and 2-wheelers are the same in each case: 60, 25, 15 and 0 %, respectively (Figure 3.3.20).

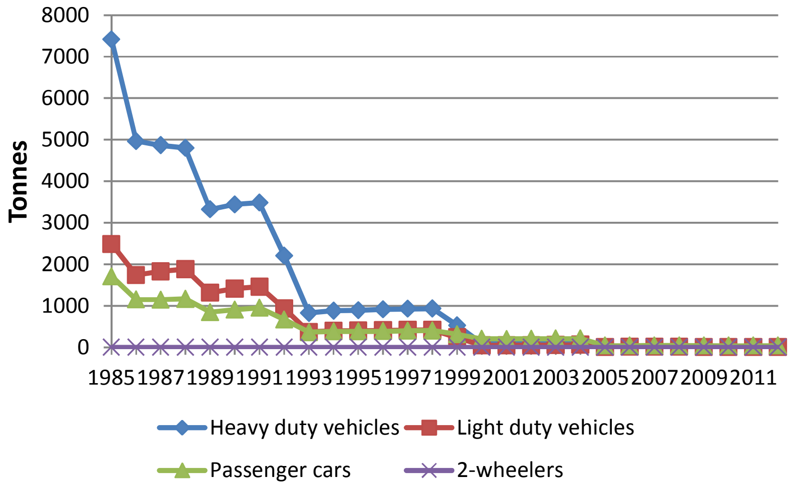


Figure 3.3.14 SO_2 emissions (tonnes) pr vehicle type for road transport 1985-2012.

Historically, the emission totals of NMVOC and CO have been very dominated by the contributions coming from private cars, as shown in Figures 3.3.16- 3.3.17. However, the NMVOC and CO (and NO_x) emissions from this vehicle type have shown a steady decreasing tendency since the introduction of private catalyst cars in 1990 (EURO I) and the introduction of even more emission-efficient EURO II, III, IV and V private cars (introduced in 1997, 2001, 2006 and 2011, respectively).

In the case of NO_x, the real traffic emissions for heavy duty vehicles do not follow the reductions as intended by the EU emission legislation. This is due to the so-called engine cycle-beating effect. Outside the legislative test cycle stationary measurement points, the electronic engine control for heavy duty Euro II and III engines switches to a fuel efficient engine running mode, thus leading to increasing NO_x emissions (Figure 3.3.15). However, the reduction in transport activities due to the global financial crisis causes the NO_x emissions for heavy duty vehicles to decrease significantly in 2008 and 2009.

Exhaust particulate emissions from road transportation vehicles are well below $PM_{2.5}$. The emissions from light- and heavy-duty vehicles have significantly decreased since the mid-1990s due to gradually stricter EURO emission standards. In recent years until 2008 the environmental benefit of introducing diesel private cars with lower particulate emissions since 1990 has been more than outbalanced by an increase in sales of new vehicles. After 2008 the PM emissions gradually become lower due to the increasing number of Euro V cars equipped with particulate filter sold in Denmark from 2006 onwards (Figure 3.3.18).

An undesirable environmental side effect of the introduction of catalyst cars is the increase in the emissions of NH_3 from the first two generations of catalyst cars (Euro I and II) compared to conventional cars. The emission factors for later catalytic converter technologies are considerably lower than the ones for Euro I and II, thus causing the emissions to decrease from 2001 onwards (Figure 3.3.19).

The 2012 emission shares for heavy-duty vehicles, passenger cars, light-duty vehicles and 2-wheelers for NO_x (41, 44, 15 and 0 %), NMVOC (4, 62, 7 and 13 %), CO (6, 80, 6 and 8 %), PM (21, 45, 32 and 2 %) and NH_3 (1, 97, 2 and 0 %), are also shown in Figure 3.3.20.

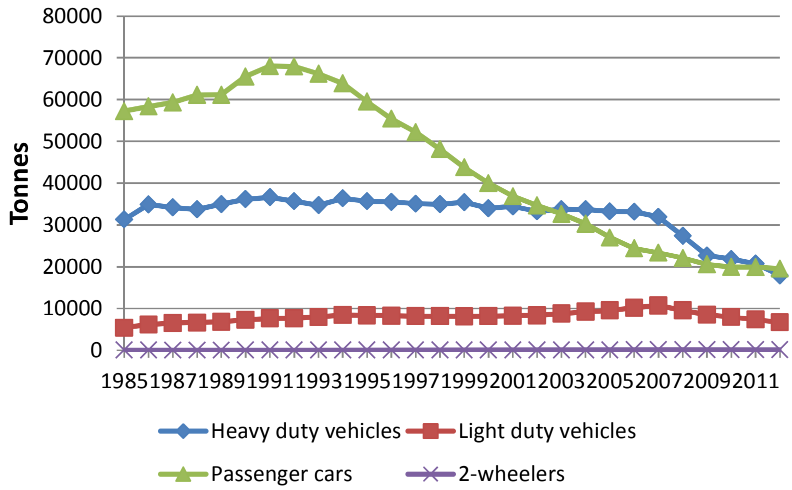


Figure 3.3.15 NO_X emissions (tonnes) pr vehicle type for road transport 1985-2012.

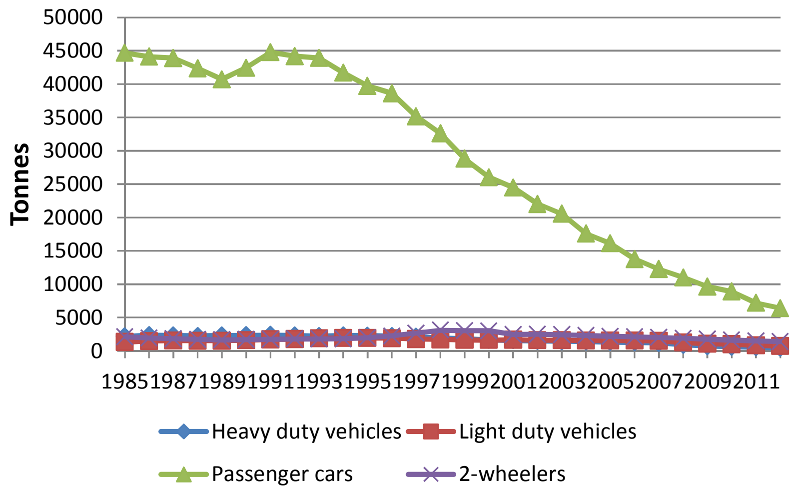


Figure 3.3.16 NMVOC emissions (tonnes) pr vehicle type for road transport 1985-2012.

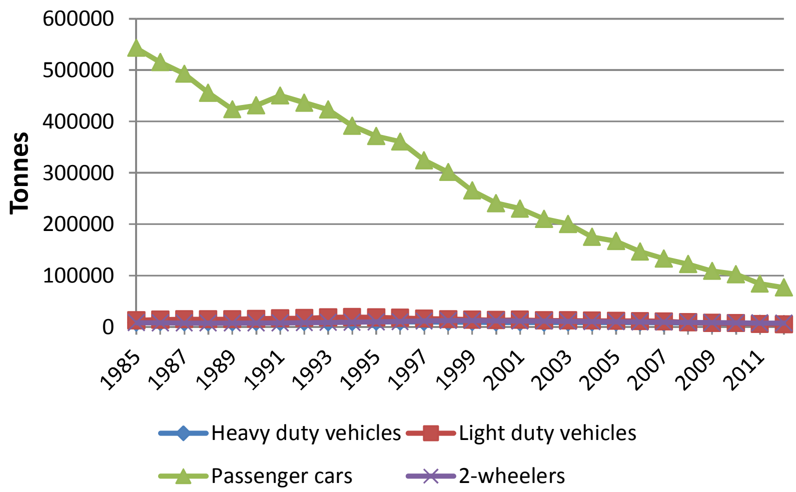


Figure 3.3.17 CO emissions (tonnes) pr vehicle type for road transport 1985-2012.

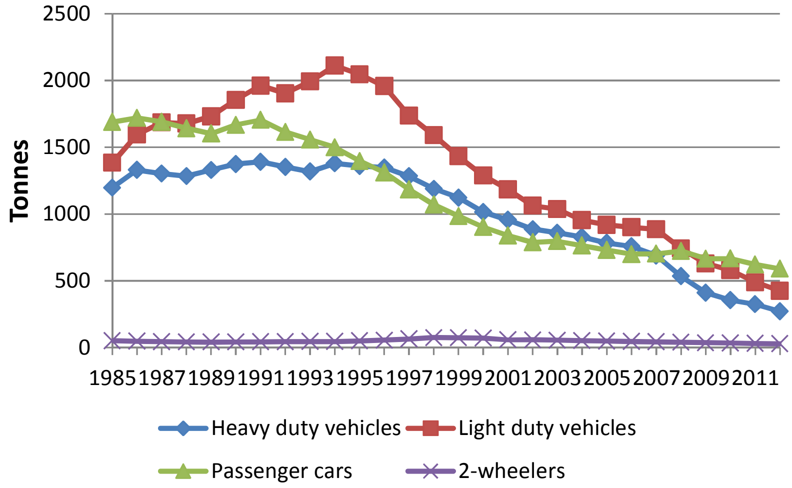


Figure 3.3.18 PM emissions (tonnes) pr vehicle type for road transport 1985-2012.

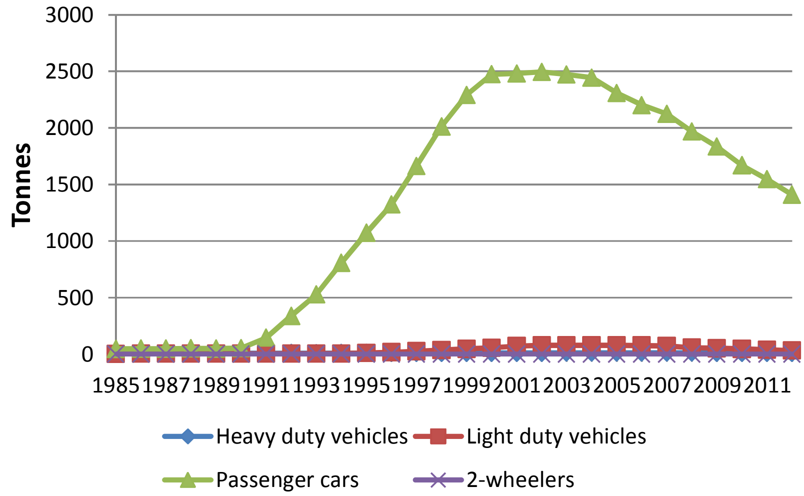


Figure 3.3.19 NH_3 emissions (tonnes) pr vehicle type for road transport 1985-2012.

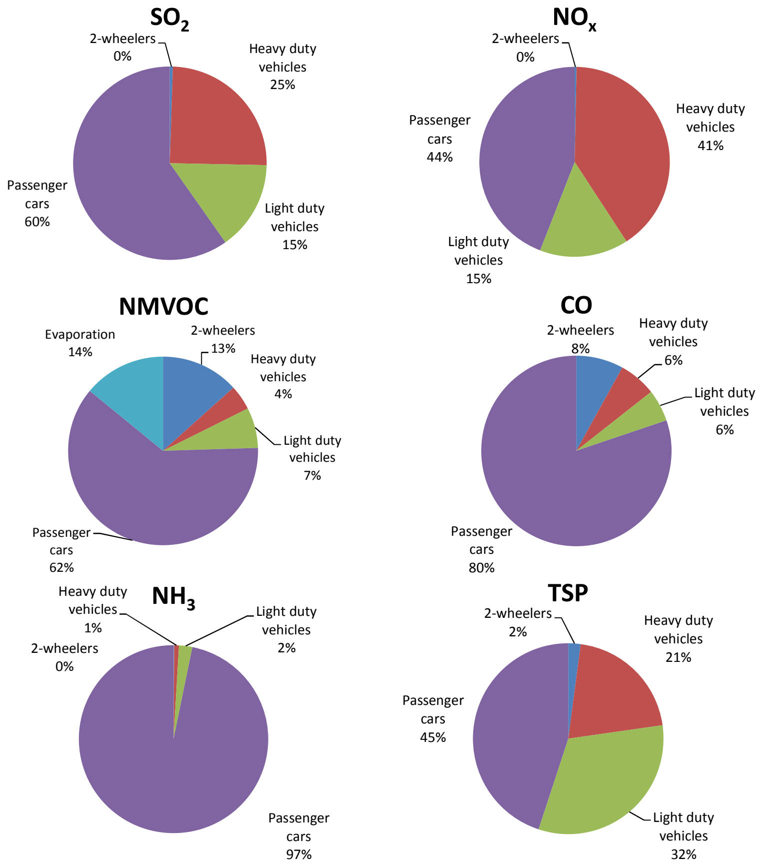


Figure 3.3.20 SO_2, NO_X, NMVOC, CO, NH_3 and PM emission shares pr vehicle type for road transport in 2012.

Other mobile sources

For SO_2 the trends in the Navigation (1A3d) emissions shown in Figure 3.3.21 mainly follow the development of the heavy fuel oil consumption (Figure 3.3.11). Though, from 1993 to 1995 relatively higher contents of sulphur in the fuel (estimated from sales) cause a significant increase in the emissions of SO_2. The SO_2 emissions for Fisheries (1A4c) correspond with the development in the consumption of marine gas oil. The main explanation for the development of the SO_2 emission curves for Railways (1A3c) and non-road machinery in Agriculture/forestry (1A4c) and Industry (1A2f), are the stepwise sulphur content reductions for diesel used by machinery in these sectors.

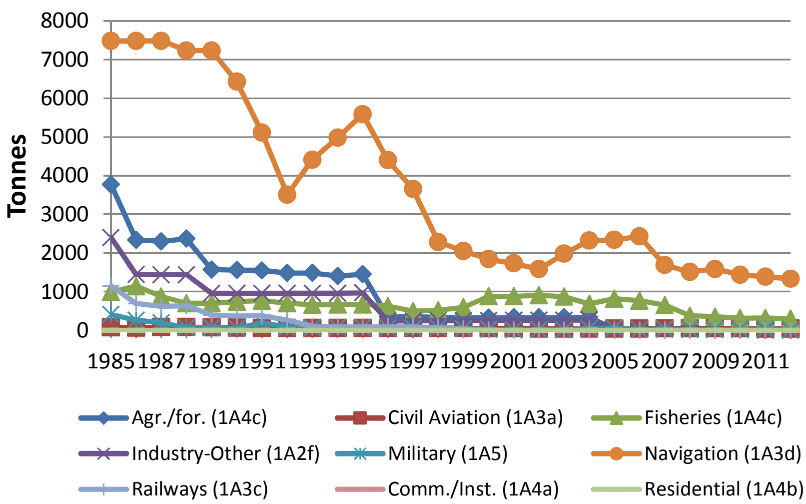


Figure 3.3.21 SO_2 emissions (ktonnes) in NFR sectors for other mobile sources 1985-2012.

In general, the emissions of NO_X, NMVOC and CO from diesel-fuelled working equipment and machinery in agriculture, forestry and industry have decreased slightly since the end of the 1990s due to gradually strengthened emission standards given by the EU emission legislation directives. For industry, the emission impact from the global financial crisis becomes very visible for 2009.

NO_X emissions mainly come from diesel machinery, and the most important sources are Agriculture/forestry/fisheries (1A4c), Navigation (1A3d), Industry (1A2f) and Railways (1A3c), as shown in Figure 3.3.22. The 2012 emission shares are 48, 23, 20 and 7 %, respectively (Figure 3.3.27). Minor emissions come from the sectors, Civil Aviation (1A3a), Military (1A5) and Residential (1A4b).

The NO_X emission trend for Navigation, Fisheries and Agriculture is determined by fuel consumption fluctuations for these sectors, and the development of emission factors. For ship engines the emission factors tend to increase for new engines until mid-1990s. After that, the emission factors gradually reduce until 2000, bringing them to a level comparable with the emission limits for new engines in this year. For agricultural machines, there have been somewhat higher NO_x emission factors for 1991-stage I machinery, and an improved emission performance for stage I and II machinery since the late 1990s.

The emission development from 1985 to 2008 for industry NO_x is the product of a fuel consumption increase, most pronounced from 2005-2008, and a development in emission factors as explained for agricultural machinery. For railways, the gradual shift towards electrification explains the declining trend in diesel fuel consumption and NO_X emissions for this transport sector until 2001.

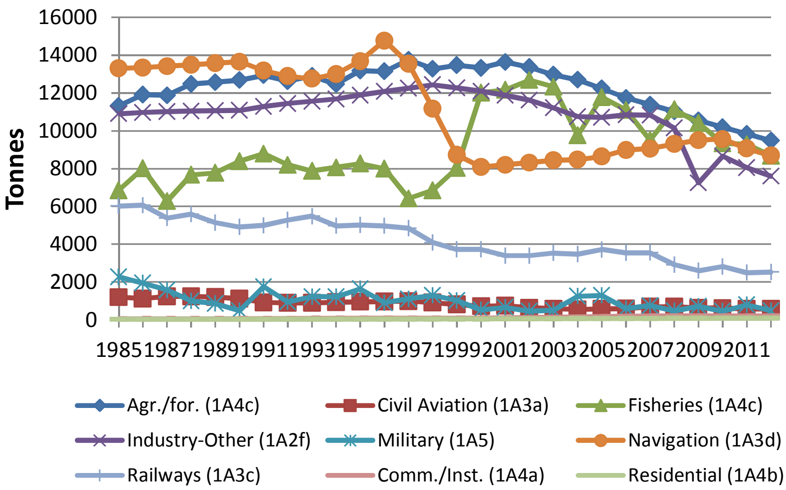


Figure 3.3.22 NO_X emissions (tonnes) in NFR sectors for other mobile sources 1985-2012.

The 1985-2012 time series of NMVOC and CO emissions are shown in Figures 3.3.23 and 3.3.24 for other mobile sources. The 2012 sector emission shares are shown in Figure 3.3.27. For NMVOC, the most important sectors are Commercial/Institutional (1A4a), Agriculture/forestry/fisheries (1A4c), Residential (1A4b), Industry (1A2f) and Navigation (1A3d) with 2012 emission shares of 37, 22, 20, 11 and 7 %, respectively. The same five sectors also contribute with most of the CO emissions. For Commercial/Institutional (1A4a), Residential (1A4b), Agriculture/forestry/fisheries (1A4c), Industry

(1A2f) and Navigation (1A3d) the emission shares are 56, 20, 15, 5 and 4 %, respectively. Minor NMVOC and CO emissions come from Railways (1A3c), Civil Aviation (1A3a) and Military (1A5).

For NMVOC and CO, the significant emission increases for the commercial/institutional and residential sectors after 2000 are due to the increased number of gasoline working machines. Improved NMVOC emission factors for diesel machinery in agriculture and gasoline equipment in forestry (chain saws) are the most important explanations for the NMVOC emission decline in the Agriculture/forestry/fisheries sector. This explanation also applies for the industrial sector, which is dominated by diesel-fuelled machinery. From 1997 onwards, the NMVOC emissions from Navigation decrease due to the gradually phase-out of the 2-stroke engine technology for recreational craft. The main reason for the significant 1985-2006 CO emission decrease for Agriculture/forestry-/fisheries is the phasing out of gasoline tractors.

As shown in Figure 3.3.27, for other mobile sources the largest TSP contributors in 2011 are Agriculture/forestry/fisheries (1A4c), Industry (1A2f) and Navigation (1A3d), with emission shares of 44, 32 and 14 %, respectively. The remaining sectors: Railways (1A3c), Civil aviation (1A3a), Military (1A5) and Residential (1A4b) represent only minor emission sources.

The 1985-2012 TSP emissions for navigation and fisheries are determined by the fuel consumption fluctuations in these years, and the development of the emission factors, which to a major extent is a function of the fuel sulphur content. The emission development for Agriculture/forestry is determined by the generally decreasing total diesel fuel consumption and gradually reducing emission factors over the time period.

The TSP emission development for industrial non-road machinery is the product of a fuel consumption increase from 1985 to 2008 and a development in emission factors, as explained for agricultural machinery. The TSP emission explanations for railways are the same as for NO_x (Figure 3.3.22).

The amounts of NH_3 emissions calculated for other mobile sources are very small. The largest emission sources are Agriculture-/forestry/fisheries (1A4c), Industry (1A2f), Railways (1A3c) and Military (1A5), with emission shares of 49, 30, 8 and 5 %, respectively.

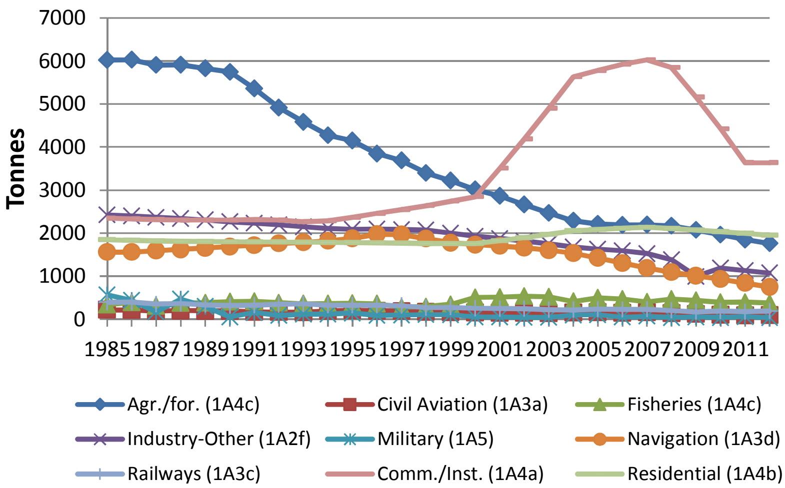


Figure 3.3.23 NMVOC emissions (tonnes) in NFR sectors for other mobile sources 1985-2012.

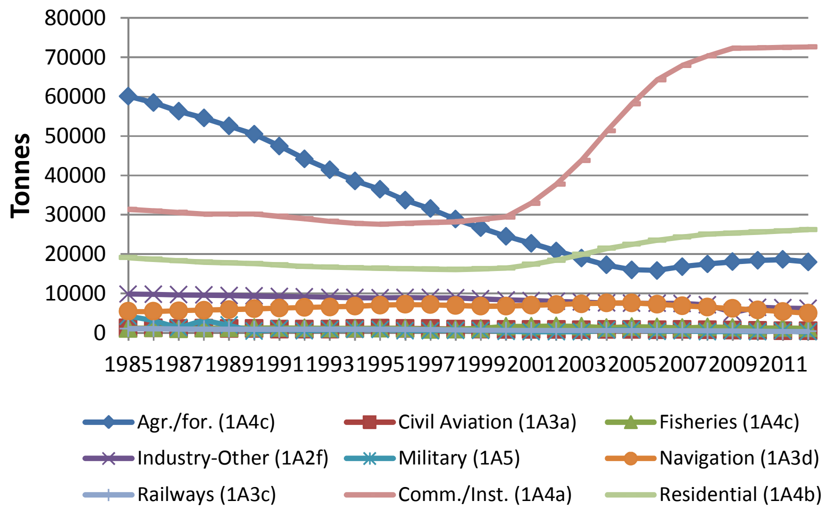


Figure 3.3.24 CO emissions (tonnes) in NFR sectors for other mobile sources 1985-2012.

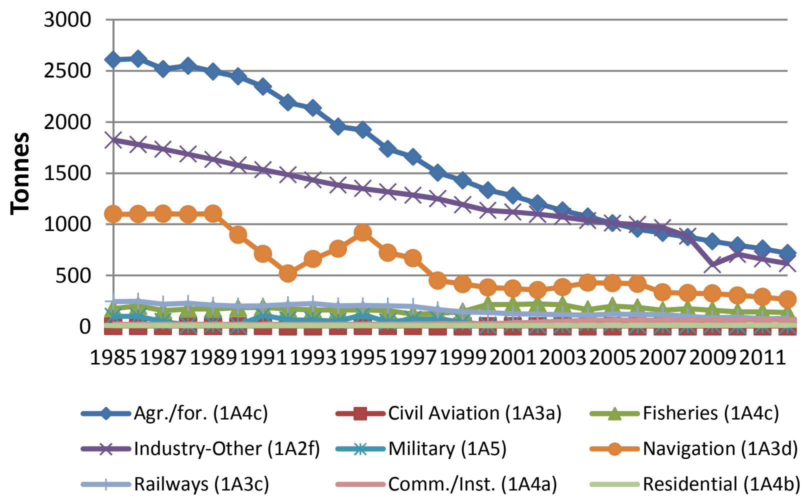


Figure 3.3.25 TSP emissions (tonnes) in NFR sectors for other mobile sources 1985-2012.

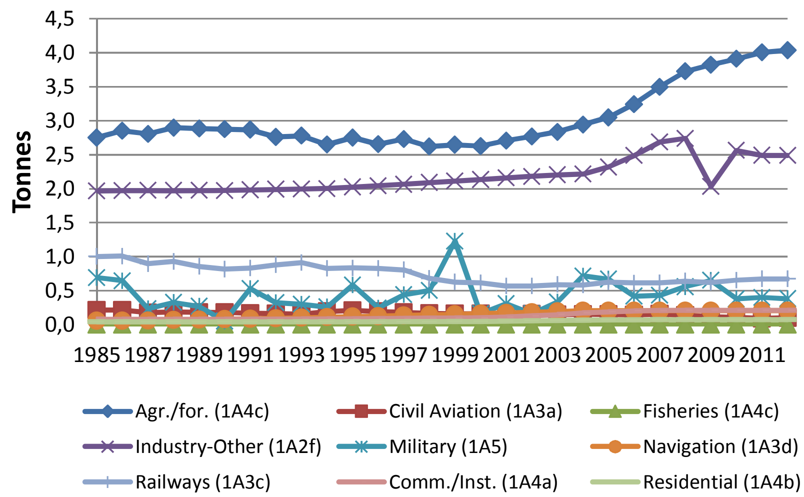


Figure 3.3.26 NH_3 emissions (tonnes) in NFR sectors for other mobile sources 1985-2012.

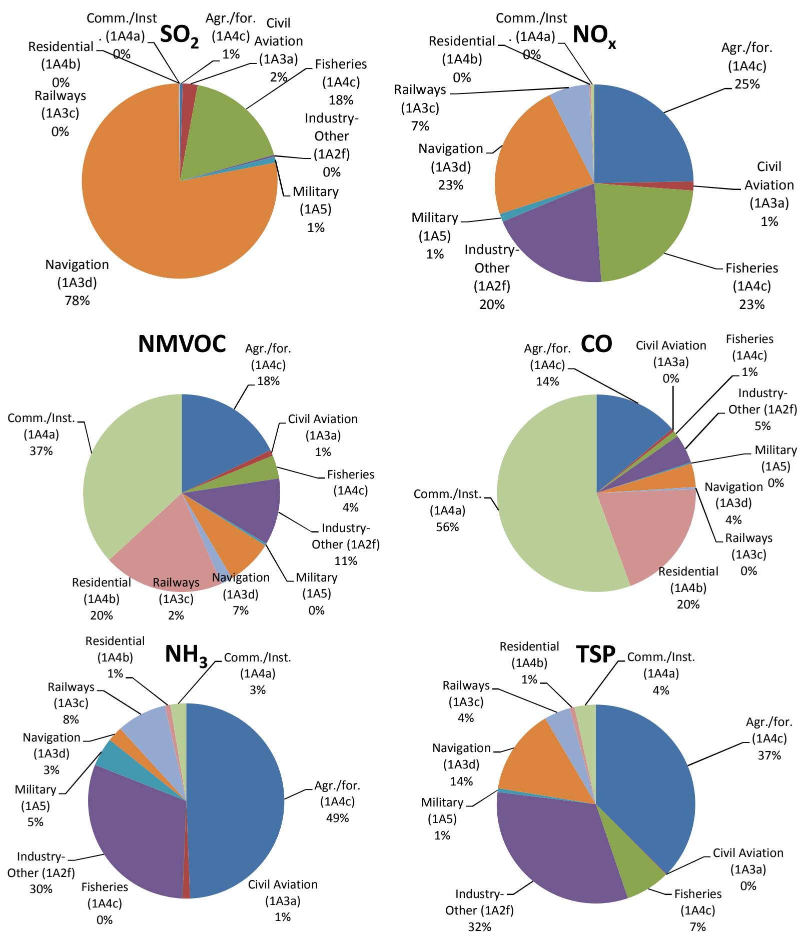


Figure 3.3.27 SO_2, NO_X, NMVOC, CO, NH_3 and PM emission shares pr vehicle type for other mobile sources in 2012.

Non-exhaust emissions of TSP, PM_{10} and $PM_{2.5}$

Apart from the exhaust emission estimates of particulate matter (PM), the Danish emission inventories also comprise the non-exhaust PM emissions coming from road transport brake and tyre wear, and road abrasion.

In Table 3.3.4, the non-exhaust TSP, PM_{10} and $PM_{2.5}$ emissions for road transport are shown for 2012 in NFR sectors. The activity data and emission factors are also shown in Annex 2.B.15.

Table 3.3.4 Emissions of TSP, PM_{10} and $PM_{2.5}$ in 2012 from road transport and other mobile sources.

NFR Sector	TSP tonnes	PM_{10} tonnes	$PM_{2.5}$ tonnes
Road brake wear	504	494	197
Road tyre wear	883	530	371
Road abrasion	1 084	542	293
Total Road non-exhaust	2 471	1 566	860

The respective source category distributions for TSP, PM_{10} and $PM_{2.5}$ emissions are identical for each of the non-exhaust emission type's brake wear, tyre wear and road abrasion, and, hence, only the PM_{10} distributions are shown in Figure 3.3.28. For tyre wear and road abrasion passenger cars caused the highest emissions in 2012, followed by trucks, light-duty vehicles, buses and 2-wheelers. For brake wear the most dominant emissions come from passenger cars followed by light-duty vehicles, trucks, buses and 2-wheelers.

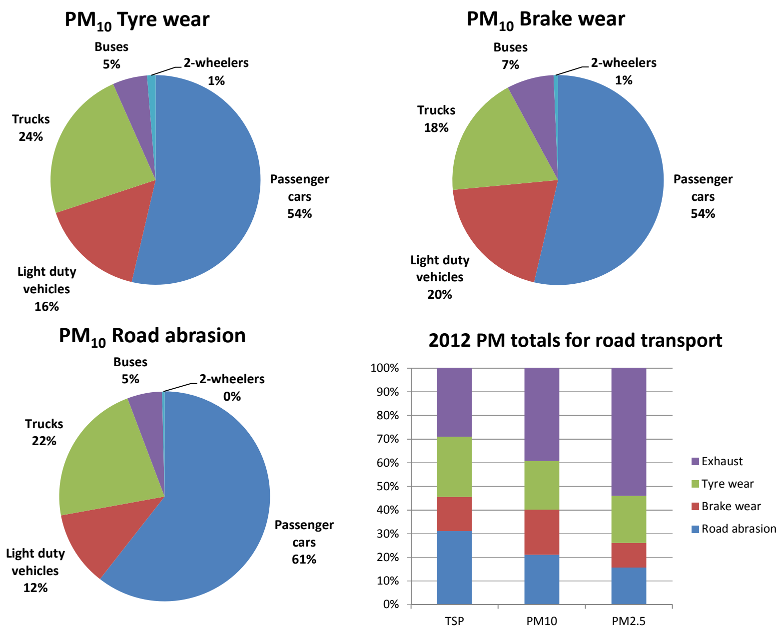


Figure 3.3.28 Brake and tyre wear and road abrasion PM_{10} emission shares and PM exhaust/non-exhaust distributions for road traffic in 2012.

Figure 3.3.28 also shows the exhaust/non-exhaust distribution of the total particulate emissions from road transport, for each of the size classes TSP, PM_{10} and $PM_{2.5}$. The exhaust emission shares of total road transport TSP, PM_{10} and $PM_{2.5}$ are 29, 39 and 54 %, respectively, in 2012. For brake and tyre wear and road abrasion the TSP shares are 14, 25 and 31 %, respectively. The same three sources have PM_{10} shares of 19, 21 and 21 %, respectively, and $PM_{2.5}$ shares of 10, 20 and 16 %, respectively. In general, the non-exhaust shares of total particulate emissions are expected to increase in the future as total exhaust emissions decline. The latter emission trend is due to the step-wise strengthening of exhaust emission standards for all vehicle types.

Heavy metals

In Table 3.3.5, the heavy metal emissions for road transport and other mobile sources are shown for 2012 in NFR sectors. The emission figures in the time series 1990-2012 are given in Annex 2.B.16 (NFR format) and are shown for 1990 and 2012 in Annex 2.B.15 (CollectER format).

Table 3.3.5 Heavy metal emissions in 2012 for road transport and other mobile sources.

NFR Sector	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
	kg	kg	kg	kg	kg	kg	kg	kg	kg
Industry-Other (1A2f)	0	3	9	7	2	3	15	0	511
Civil Aviation (1A3a)	0	0	0	0	0	0	848	0	3
Railways (1A3c)	0	1	2	2	0	1	4	0	126
Navigation (1A3d)	32	3	15	33	5	1731	20	37	140
Comm./Inst. (1A4a)	0	1	1	2	0	1	2	0	118
Residential (1A4b)	0	0	0	1	0	0	1	0	43
Agric./forestry/fish. (1A4c)	8	5	18	16	10	14	35	30	769
Military (1A5)	0	0	1	0	0	0	49	0	38
Total other mobile	40	12	46	61	17	1 750	973	67	1 749
Road exhaust (1A3b)	1	39	97	115	23	41	184	0	7 715
Road Brake wear	5	4	57	40 480	0	56	5 243	10	8 582
Road Tyre wear	1	2	3	14	0	23	71	18	9656
Road abrasion	0	0	22	11	0	17	51	0	82
Total Road non-exhaust	6	6	82	40 505	0	96	5 365	28	18 321
Total mobile	46	57	225	40 681	40	1 887	6 521	95	27 784

The heavy metal emission estimates for road transport are based on a national research study made by Winther and Slentø (2010). The latter study calculate the exhaust related emissions from fuel and engine oil as well as the wear related emissions from tyre, brake and road wear. Apart from Pb, the emission factors only deviate to a less extent due to changes in fleet and mileage composition over the years, which bring relative changes in fuel consumption per fuel type, engine oil use and aggregated emission factors for brake, tyre and road wear.

The most important exhaust related emissions for road transport are Cd, Cr, Hg and Zn. the most important wear related emissions are Cu and Pb almost solely coming from tyre wear, and Zn from brake and tyre wear. For other mobile sources, the most important emission contributions are calculated for Ni, Se and As, coming from the use of marine diesel oil in fisheries and navigation and residual oil in navigation.

The Figures 3.3.29 and 3.3.30 show the heavy metal emission distributions for all road transport sources split into vehicle categories, and for other mobile sectors, respectively.

For non-road mobile machinery in agriculture, forestry, industry, commercial/institutional and recreational, as well as military and railways, fuel related emission factors from road transport are used derived for the year 2009.

For civil aviation jet fuel no emissions are estimated due to lack of emission data, whereas for aviation gasoline fuel related emission factors for road transport gasoline is used derived for the year 2009, except for Pb where national data exist.

For navigation and fisheries, the heavy metal emission factors are fuel related, and are taken from the EMEP/EEA guidebook.

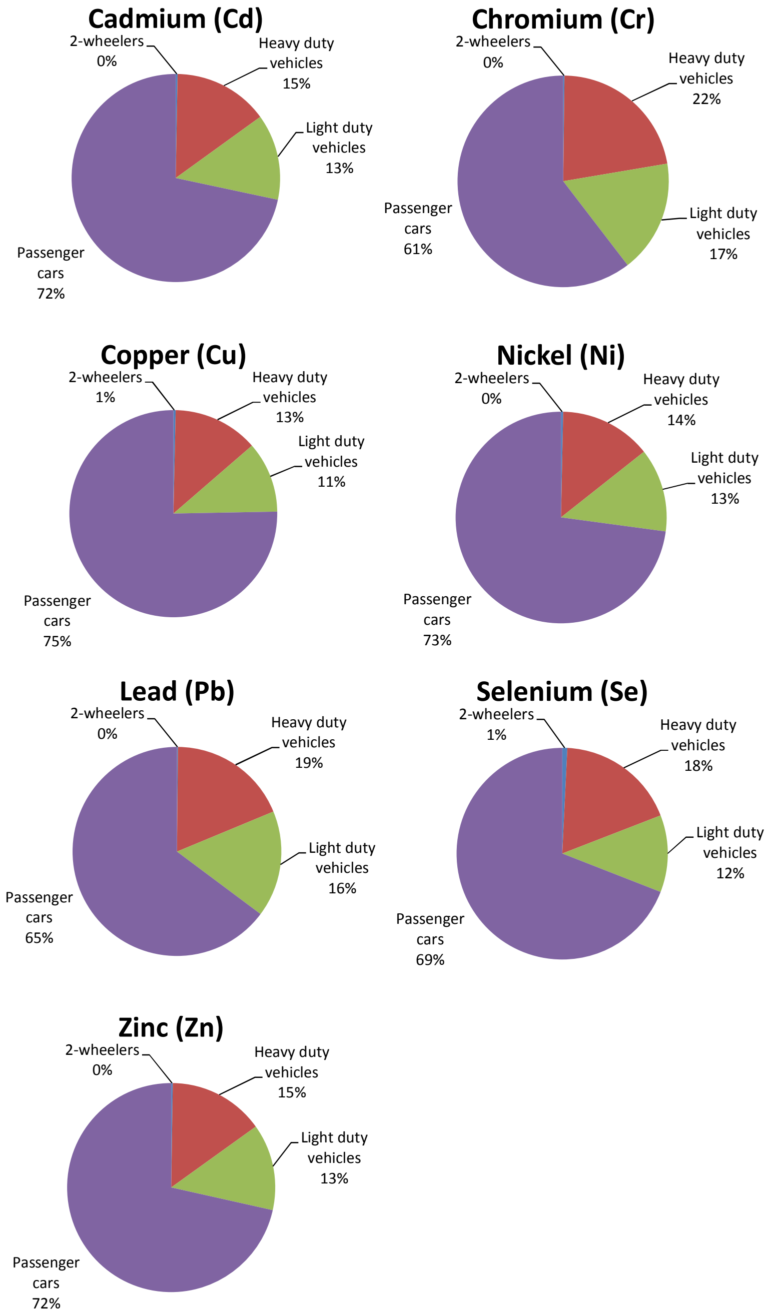


Figure 3.3.29 Heavy metal emission shares for road transport in 2012.

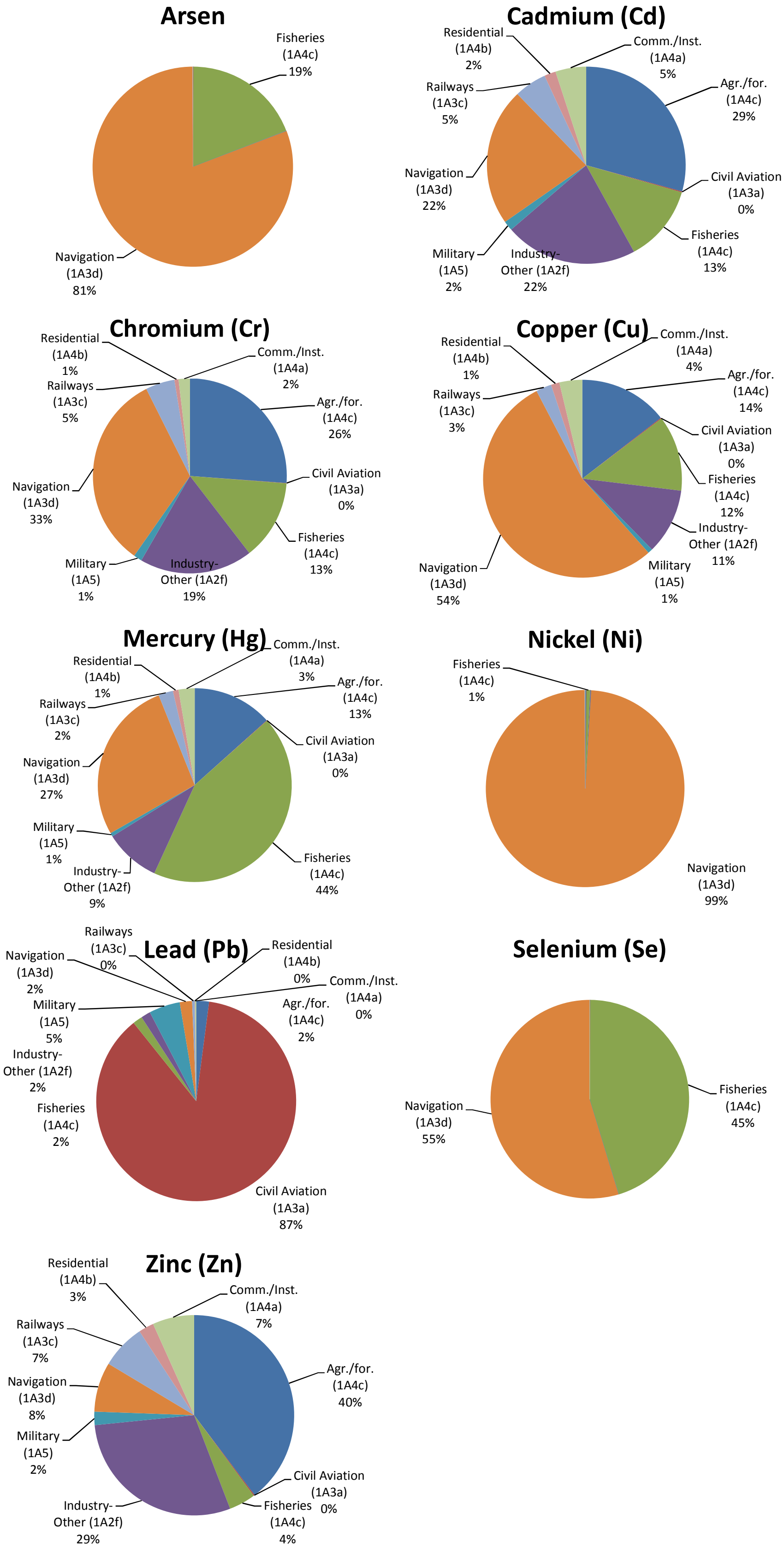


Figure 3.3.30 Heavy metal emission shares for other mobile sources in 2012.

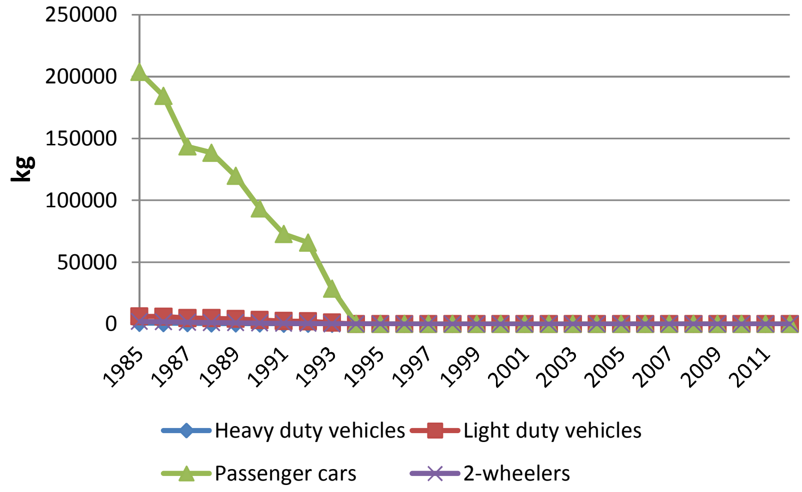


Figure 3.3.31 Pb emissions (kg) pr vehicle type for road transport 1985-2012.

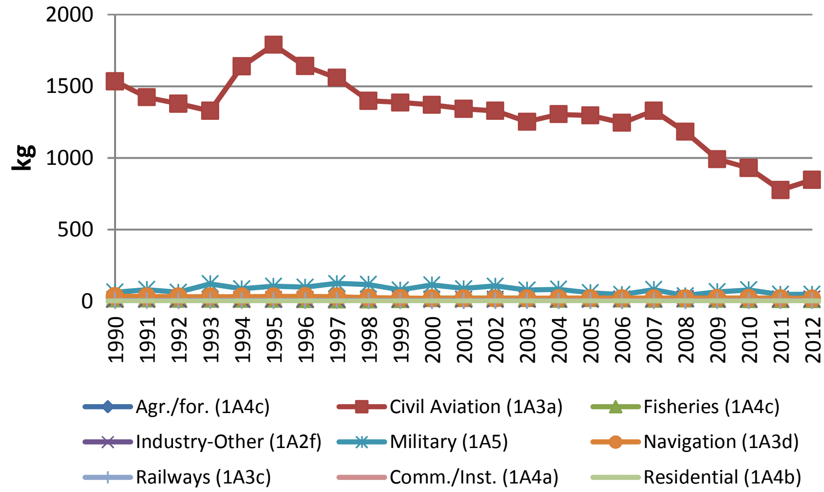


Figure 3.3.32 Pb emissions (kg) in NFR sectors for other mobile sources 1990-2012.

Dioxin and PAH

In Table 3.3.6, the dioxin, PAH, HCB and PCB emissions for road transport and other mobile sources are shown for 2012 in NFR sectors. The emission figures in the time series 1990-2012 are given in Annex 2.B.16 (NFR format) and are shown for 1990 and 2012 in Annex 2.B.15 (CollectER format).

Table 3.3.6 Dioxin, PAH, HCB and PCB emissions in 2012 for road transport and other mobile sources.

NFR ID	HCB	Dioxins/ Furans	Flouranthene	Benzo(b) flouranthene	Benzo(k) flouranthene	Benzo(a) pyrene	Benzo-(g,h,i) perylene	Indeno (1,2,3-c,d) pyrene	PCB
	g	g	kg	kg	kg	kg	kg	kg	g
Industry-Other (1A2f)	0.079	0.010	56	7	6	3	6	3	7
Civil Aviation (1A3a)	0.000	0.000	0	0	0	0	0	0	0
Railways (1A3c)	0.021	0.002	5	1	1	0	0	0	2
Navigation (1A3d)	0.020	0.069	40	3	2	1	5	4	1
Comm./Inst. (1A4a)	0.000	0.012	10	0	0	0	2	1	0
Residential (1A4b)	0.000	0.004	4	0	0	0	1	0	0
Agri./for./fish. (1A4c)	0.122	0.093	128	13	11	6	18	12	9
Military (1A5)	0.005	0.001	4	0	0	0	0	0	0
Total other mobile	0	0	247	25	21	10	32	21	19
Road (1A3b)	0.641	0.112	887	77	84	64	122	68	22
Total mobile	0.888	0.304	1134	102	105	75	154	89	41

For mobile sources, road transport displays the largest emission of dioxins and PAH. The dioxin emission share for road transport is 37 % of all mobile emissions in 2012, whereas Agriculture/forestry-/fisheries and Navigation have smaller shares of 31 and 14 %. For the different PAH components, road transport shares are around 80 % of total emissions for mobile sources. The remaining emissions almost solely come from Agriculture/forestry-/fisheries, Navigation and Industry with Agriculture/forestry/fisheries as the largest source.

Figures 3.3.33 and 3.3.34 show the dioxin and PAH emission distributions into vehicle categories and other mobile sectors, respectively.

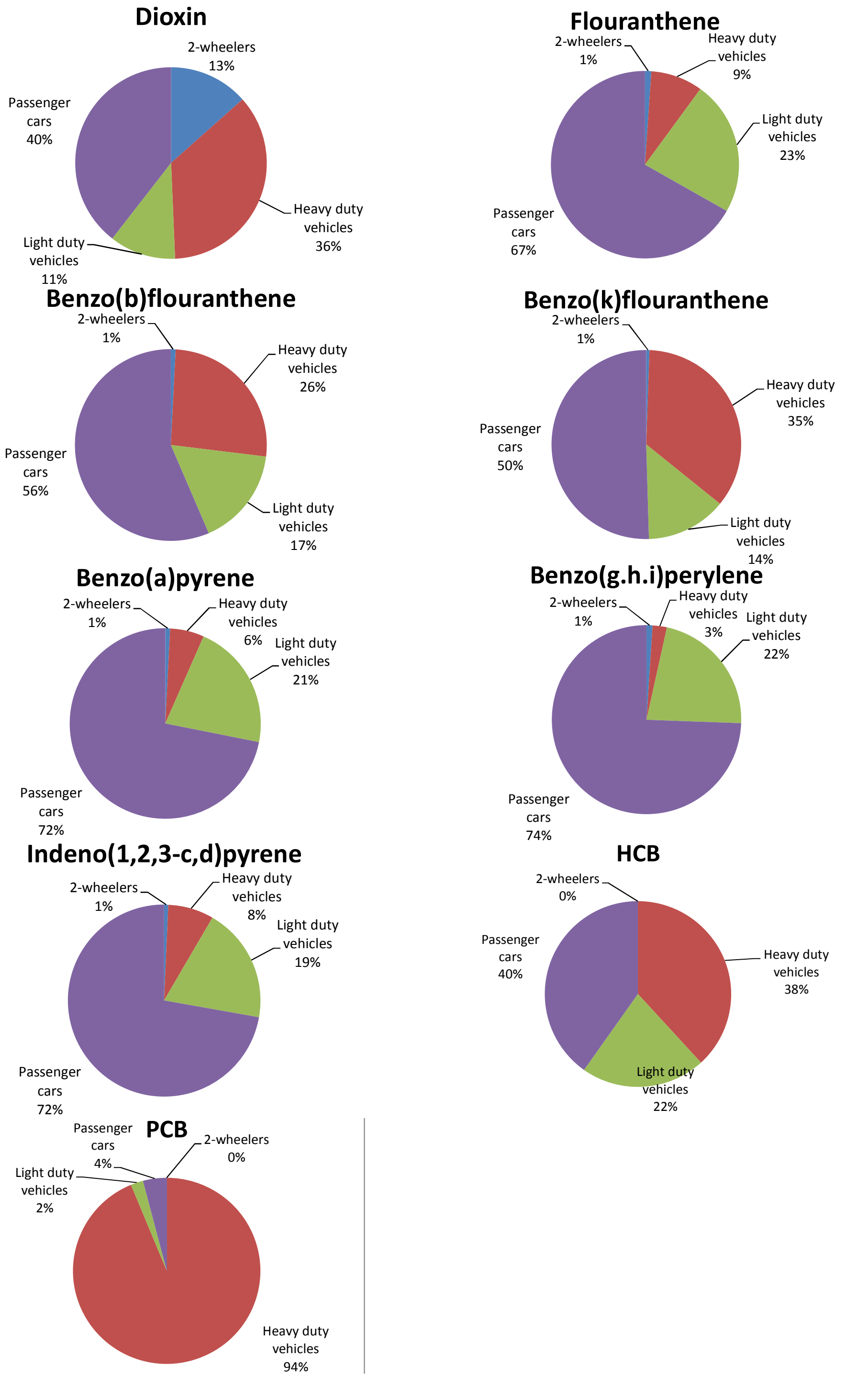


Figure 3.3.33   Dioxin, PAH, HCB and PCB emission shares for road transport in 2012.

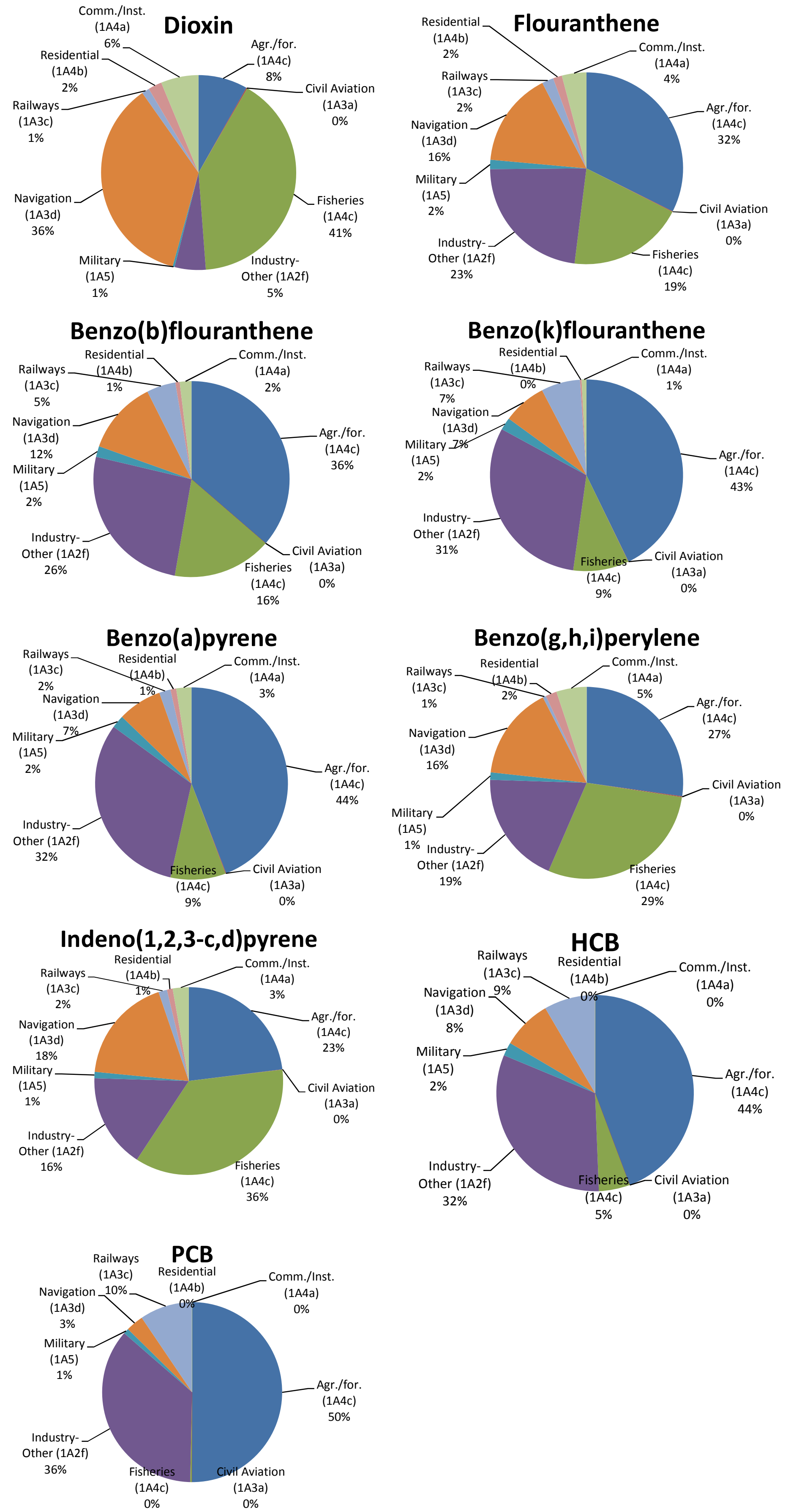


Figure 3.3.34 Dioxin, PAH, HCB and PCB emission shares for other mobile sources in 2012.

Bunkers

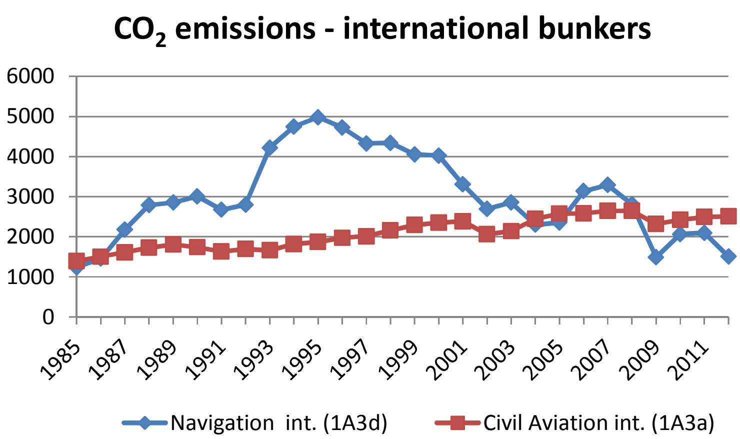
The most important emissions from bunker fuel consumption (fuel consumption for international transport) are SO_2 and NO_x. The bunker emission totals are shown in Table 3.3.7 for 2012, split into sea transport and civil aviation. All emission figures in the 1985-2012 time series are given in Annex 2.B.16 (NFR format). In Annex 2.B.15, the emissions are also given in CollectER format for 2012.

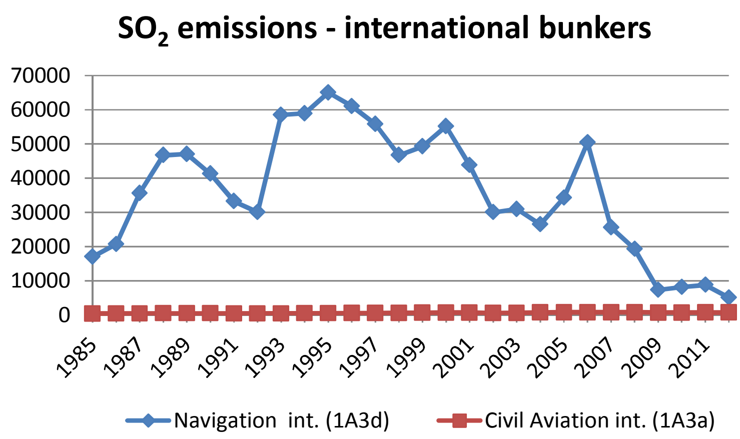
Table 3.3.7 Emissions in 2012 for international transport.

CRF sector	SO_2	NO_X	NMVOC	CO	NH_3	TSP
	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
Navigation int. (1A3d)	5 136	36 524	1 199	3 955		641
Civil Aviation int. (1A3a)	801	10 628	379	1 776	0	40
International total	5 937	47 153	1 578	5 731	0	681

The differences in emissions between navigation and civil aviation are much larger than the differences in fuel consumption and display a poor emission performance for international sea transport. In broad terms, the emission trends shown in Figure 3.3.35 are similar to the fuel consumption development.

However, for navigation minor differences occur for the emissions of SO_2 and NO_X due to varying amounts of marine gas oil and residual oil, and for SO_2 and NO_X the development in the emission factors also have an impact on the emission trends. For civil aviation, apart from the annual consumption of jet fuel, the development of the NO_X emissions is also due to yearly variations in LTO/aircraft type (earlier than 2001) and city-pair statistics (2001 onwards).





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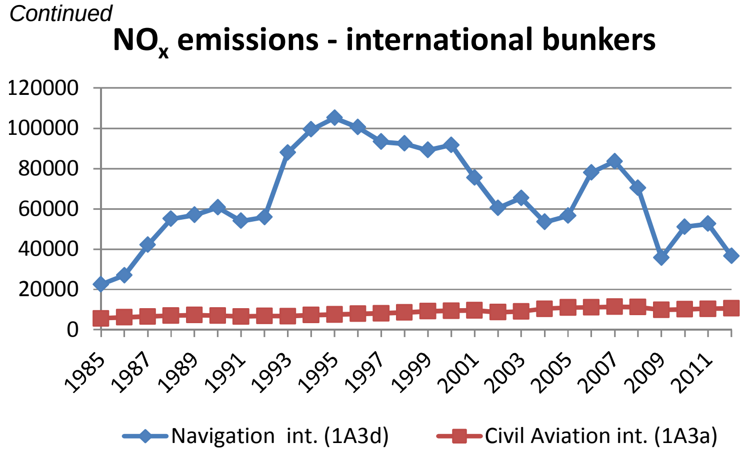


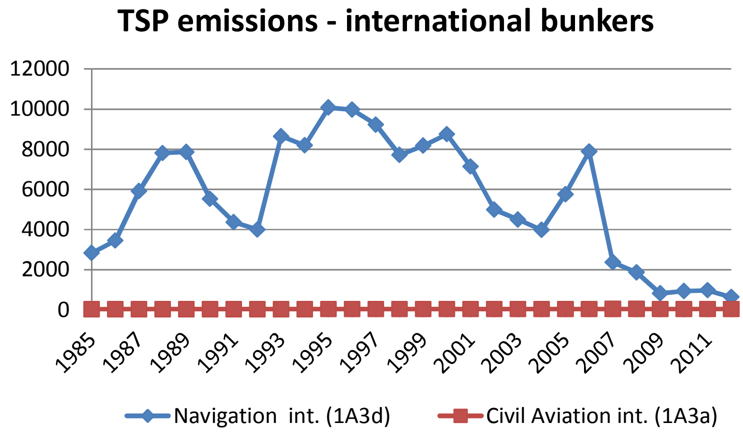


Figure 3.3.35 CO_2, SO_2, NO_X and TSP emissions for international transport 1985-2012.

3.3.2 Methodological issues

The description of methodologies and references for the transport part of the Danish inventory is given in two sections: one for road transport and one for the other mobile sources.

Methodology and references for Road Transport

For road transport, the detailed methodology is used to make annual estimates of the Danish emissions, as described in the EMEP/EEA Air Pollutant Emission Inventory Guidebook (EMEP/EEA, 2013). The actual calculations are made with a model developed by ENVS, using the European COPERT IV model methodology explained by (EMEP/EEA, 2013). In COPERT, fuel consumption and emission simulations can be made for operationally hot engines, taking into account gradually stricter emission standards and emission degradation due to catalyst wear. Furthermore, the emission effects of cold-start and evaporation are simulated.

Vehicle fleet and mileage data

Corresponding to the COPERT IV fleet classification, all present and future vehicles in the Danish fleet are grouped into vehicle classes, sub-classes and layers. The layer classification is a further division of vehicle sub-classes into groups of vehicles with the same average fuel consumption and emission behaviour, according to EU emission legislation levels. Table 3.3.8 gives an overview of the different model classes and sub-classes, and the layer level with implementation years are shown in Annex 2.B.1.

Fleet and annual mileage data are provided by DTU Transport for the vehicle categories present in COPERT IV (Jensen, 2013). DTU Transport use data from the Danish vehicle register kept by Statistics Denmark. The vehicle register data consist of vehicle type (passenger cars, vans, trucks, buses, mopeds, motorcycles), fuel type, vehicle weight, gross vehicle weight, engine size (passenger cars registered from 2005+), Euro class (trucks and buses registered from 1997+), NEDC type approval fuel efficiency value (passenger cars registered from 1997+) and vehicle first registration year.

In order to establish engine size data for passenger cars registered before 2005, a weight class-engine size transformation key is used examined by Cowi (2008) for new Danish cars from 1998. For the years before 1998, data for 1998 is used, and for the years 1999-2004 a linear interpolation between 1998 and 2005 weight class-engine size relations is used. For trucks, truck driver registration notes gathered by Statistics Denmark are used to split the fleet figures of ordinary trucks into number of solo trucks and truck-trailer combinations. Further the registration notes make it possible to assume the average total vehicle weight of the truck trailer combination. For articulated trucks also, the registration notes make it possible to assume the average total vehicle weight of the full articulated truck.

Danish mileage data comes from the Danish Road Directorate based on the Danish vehicle inspection programme. Total mileage per year and vehicle category are derived for the years 1985-2012, together with a more detailed mileage matrix examined for the year 2008 (based on detailed vehicle inspection data analysis). The detailed mileage matrix contains annual mileage per vehicle subcategory for new vehicles and for every vintage back in time, which determines the yearly mileage reduction percentages as a function of vehicle age. In a first step, the detailed mileage matrix is combined with corresponding fleet numbers in order to estimate intermediate total mileages for each year on a detailed fleet level. Next, each year's detailed (intermediate) mileage figures are scaled according to the difference between true and intermediate total mileage per vehicle subcategory.

DTU Transport (Jensen, 2013) also provides information of the mileage split between urban, rural and highway driving based on traffic monitoring data. The respective average speeds come from The Danish Road Directorate (Ekman, 2005). Additional data for the moped fleet and motorcycle fleet disaggregation is given by The National Motorcycle Association (Markamp, 2013).

Table 3.3.8 Model vehicle classes and sub-classes, trip speeds and mileage split.

			Trip speed [km pr h]		
Vehicle classes	Fuel type	Engine size/weight	Urban	Rural	Highway
PC	Gasoline	< 1.4 l.	40	70	100
PC	Gasoline	1.4 – 2 l.	40	70	100
PC	Gasoline	> 2 l.	40	70	100
PC	Diesel	< 2 l.	40	70	100
PC	Diesel	> 2 l.	40	70	100
PC	LPG		40	70	100
PC	2-stroke		40	70	100
LDV	Gasoline		40	65	80
LDV	Diesel		40	65	80
LDV	LPG		40	65	80
Trucks	Gasoline		35	60	80
Trucks	Diesel	Rigid 3,5 - 7,5t	35	60	80
Trucks	Diesel	Rigid 7,5 - 12t	35	60	80
Trucks	Diesel	Rigid 12 - 14 t	35	60	80
Trucks	Diesel	Rigid 14 - 20t	35	60	80
Trucks	Diesel	Rigid 20 - 26t	35	60	80
Trucks	Diesel	Rigid 26 - 28t	35	60	80
Trucks	Diesel	Rigid 28 - 32t	35	60	80
Trucks	Diesel	Rigid >32t	35	60	80
Trucks	Diesel	TT/AT 14 - 20t	35	60	80
Trucks	Diesel	TT/AT 20 - 28t	35	60	80
Trucks	Diesel	TT/AT 28 - 34t	35	60	80
Trucks	Diesel	TT/AT 34 - 40t	35	60	80
Trucks	Diesel	TT/AT 40 - 50t	35	60	80
Trucks	Diesel	TT/AT 50 - 60t	35	60	80
Trucks	Diesel	TT/AT >60t	35	60	80
Urban buses	Gasoline		30	50	70
Urban buses	Diesel	< 15 tonnes	30	50	70
Urban buses	Diesel	15-18 tonnes	30	50	70
Urban buses	Diesel	> 18 tonnes	30	50	70
Coaches	Gasoline		35	60	80
Coaches	Diesel	< 15 tonnes	35	60	80
Coaches	Diesel	15-18 tonnes	35	60	80
Coaches	Diesel	> 18 tonnes	35	60	80
Mopeds	Gasoline		30	30	-
Motorcycles	Gasoline	2 stroke	40	70	100
Motorcycles	Gasoline	< 250 cc.	40	70	100
Motorcycles	Gasoline	250 – 750 cc.	40	70	100
Motorcycles	Gasoline	> 750 cc.	40	70	100

In addition data from a survey made by the Danish Road Directorate (Hansen, 2010) has given information of the total mileage driven by foreign trucks on Danish roads in 2009. This mileage contribution has been added to the total mileage for Danish trucks on Danish roads, for trucks > 16 tonnes of gross vehicle weight. The data has been further processed by DTU Transport; by using appropriate assumptions the mileage have been backcasted to 1985 and forecasted to 2012.

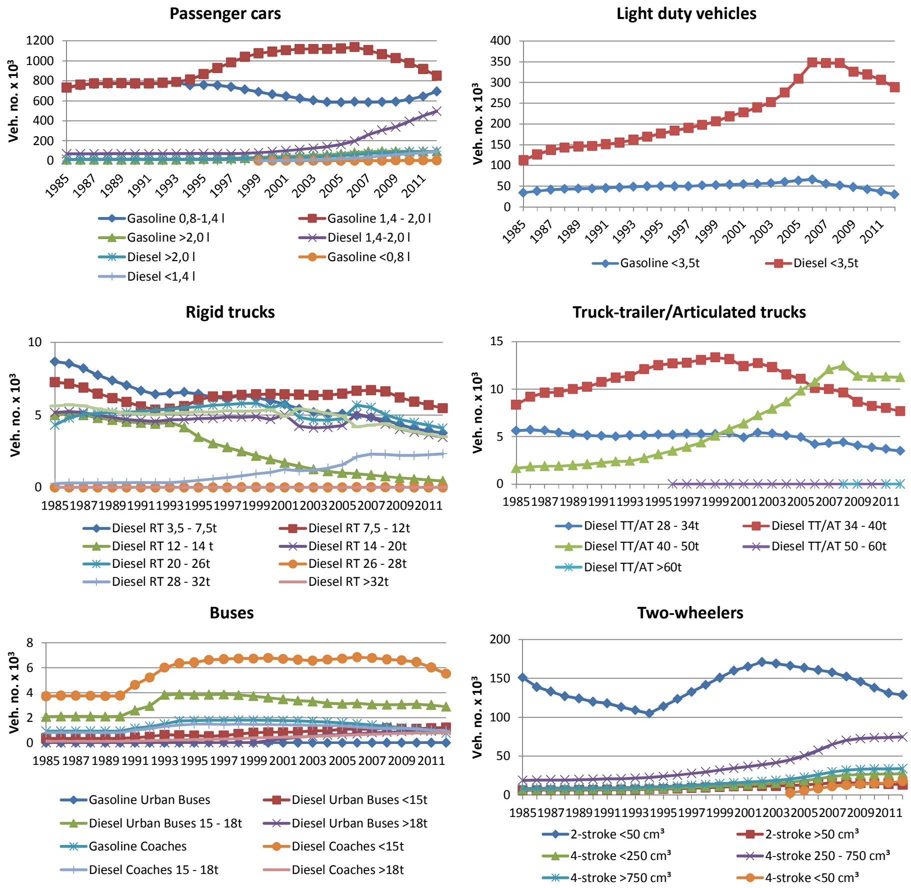


Figure 3.3.36 Number of vehicles in sub-classes in 1985-2012.

For passenger cars, the engine size differentiation is less certain for the years before 2005. The increase in the total number of passenger cars is mostly due to a growth in the number of gasoline cars with engine sizes between 1.4 and 2 litres (from 1990-2002) and diesel cars between 1.4 and 2 litres (from the 2000's up to now). Until 2005, there has been a decrease in the number of gasoline cars with an engine size smaller than 1.4 litres. These cars, however, have also increased in numbers during the later years. Since the late 1990's small cars (< 0.8 l gasoline and <1.4 l. diesel) has slowly begun to penetrate the fleet.

There has been a considerable growth in the number of diesel light-duty vehicles from 1985 to 2006; the number of vehicles has however decreased somewhat after 2006.

For the truck-trailer and articulated truck combinations there is a tendency towards the use of increasingly larger trucks throughout the time period. The decline in fleet numbers for many of the truck categories in 2007/2008 and until 2009 is caused by the impact of the global financial crisis and the reflagging of Danish commercial trucks to companies based in the neighbouring countries.

The number of urban buses has been almost constant between 1985 and 2012. The sudden change in the level of coach numbers from 1994 to 1995 is due to uncertain fleet data.

The reason for the significant growth in the number of mopeds from 1994 to 2002 is the introduction of the so-called Moped 45 vehicle type. From 2004 onwards there is a gradual switch from 2-stroke to 4-stroke in new sales for this vehicle category. For motorcycles, the number of vehicles has grown in general throughout the entire 1985-2012 period. The increase is, however, most visible from the mid-1990s and onwards.

The vehicle numbers are summed up in layers for each year (Figure 3.3.37) by using the correspondence between layers and first year of registration:

$$N_{j,y} = \sum_{i=FYear(j)}^{LYear(j)} N_{i,y} \qquad (1)$$

Where N = number of vehicles, j = layer, y = year, i = first year of registration.

Weighted annual mileages pr layer are calculated as the sum of all mileage driven pr first registration year divided by the total number of vehicles in the specific layer.

$$M_{j,y} = \frac{\sum_{i=FYear(j)}^{LYear(j)} N_{i,y} \cdot M_{i,y}}{\sum_{i=FYear(j)}^{LYear(j)} N_{i,y}} \qquad (2)$$

Since 2006 economical incitements have been give to private vehicle owners to buy Euro 5 diesel passenger cars and vans in order to bring down the particulate emissions from diesel vehicles. The estimated sales between 2006 and 2010 have been examined by the Danish EPA and are included in the fleet data behind the Danish inventory (Winther, 2011).

For heavy duty trucks, there is a slight deviation from the strict correspondence between EU emission layers and first registration year.

In this case, specific Euro class information for most of the vehicles from 2001 onwards is incorporated into the fleet and mileage data model developed by Jensen (2013). For inventory years before 2001, and for vehicles with no Euro information the normal correspondence between layers and first year of registration is used.

Vehicle numbers and weighted annual mileages pr layer are shown in Annex 2.B.1 and 3.B.2 for 1985-2012. The trends in vehicle numbers pr layer are also shown in Figure 3.3.37. The latter figure shows how vehicles complying with the gradually stricter EU emission levels (EURO I, II, III, IV, V etc.) have been introduced into the Danish motor fleet.

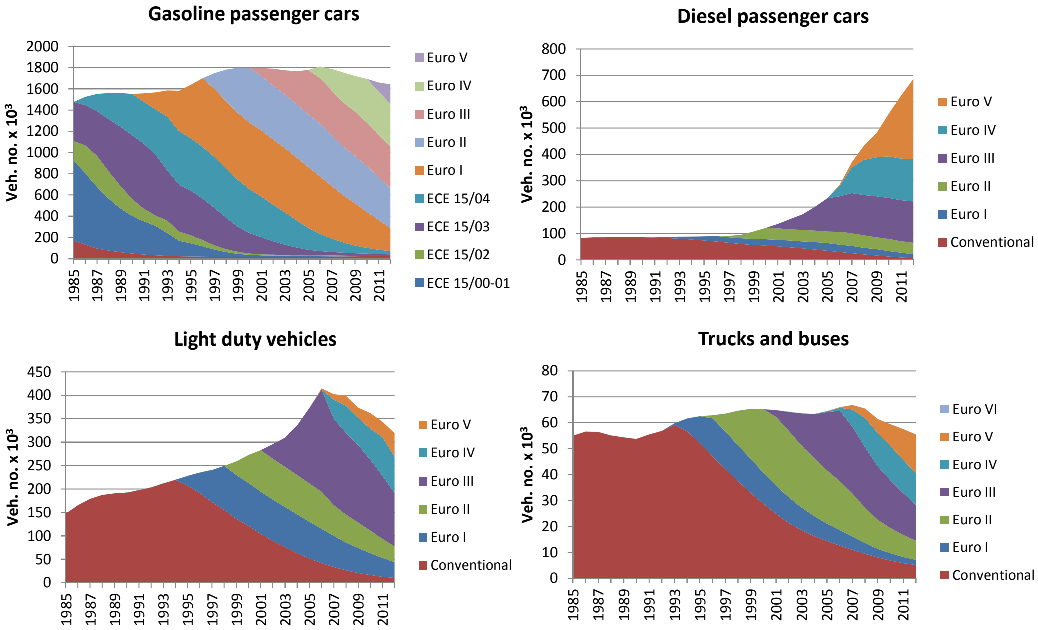


Figure 3.3.37 Layer distribution of vehicle numbers pr vehicle type in 1985-2012.

Emission legislation

For Euro 1-4 passenger cars and light duty trucks, the chassis dynamometer test cycle used in the EU for emission approval is the NEDC (New European Driving Cycle), see Nørgaard and Hansen (2004). The test cycle is also used also for fuel consumption measurements. The NEDC cycle consists of two parts, the first part being a 4-time repetition (driving length: 4 km) of the ECE test cycle. The latter test cycle is the so-called urban driving cycle[4] (average speed: 19 km pr h). The second part of the test is the run-through of the EUDC (Extra Urban Driving Cycle) test driving segment, simulating the fuel consumption under rural and highway driving conditions. The driving length of EUDC is 7 km at an average speed of 63 km pr h. More information regarding the fuel measurement procedure can be found in the EU-directive 80/1268/EØF.

For NOx, VOC (NMVOC + CH4), CO and PM, the emissions from road transport vehicles have to comply with the different EU directives listed in Table 3.3.9. The emission directives distinguish between three vehicle classes according to vehicle reference mass[5]: Passenger cars and light duty trucks (<1305 kg), light duty trucks (1305-1760 kg) and light duty trucks (>1760 kg).The specific emission limits are shown in Annex 2.B.3.

In practice, the emissions from vehicles in traffic are different from the legislation limit values and, therefore, the latter figures are considered to be too inaccurate for total emission calculations. A major constraint is that the emission approval test conditions reflect only to a small degree the large variety of emission influencing factors in the real traffic situation, such as cumulated mileage driven, engine and exhaust after treatment maintenance levels and driving behaviour.

Therefore, in order to represent the Danish fleet and to support average national emission estimates, emission factors must be chosen which derive

[4] For Euro 3 and on, the emission approval test procedure was slightly changed. The 40 s engine warm up phase before start of the urban driving cycle was removed.
[5] Reference mass: net vehicle weight + mass of fuel and other liquids + 100 kg.

from numerous emissions measurements, using a broad range of real world driving patterns and a sufficient number of test vehicles. It is similar important to have separate fuel consumption and emission data for cold-start emission calculations and gasoline evaporation (hydrocarbons).

For heavy-duty vehicles (trucks and buses), the emission limits are given in g pr kWh and the measurements are carried out for engines in a test bench, using the EU ESC (European Stationary Cycle) and ETC (European Transient Cycle) test cycles, depending on the Euro norm and exhaust gas after-treatment system installed. A description of the test cycles is given by Nørgaard and Hansen, 2004). Measurement results in g pr kWh from emission approval tests cannot be directly used for inventory work. Instead, emission factors used for national estimates must be transformed into g pr km, and derived from a sufficient number of measurements which represent the different vehicle size classes, Euro engine levels and real world variations in driving behaviour.

In terms of the sulphur content in the fuels used by road transportation vehicles, the EU directive 2003/17/EF describes the fuel quality standards agreed by the EU. In Denmark, the sulphur content in gasoline and diesel was reduced to 10 ppm in 2005, by means of a fuel tax reduction for fuels with 10 ppm sulphur contents.

Table 3.3.9 Overview of the existing EU emission directives for road transport vehicles.

Vehicle category	Emission layer	EU directive	First reg. date
Passenger cars (gasoline)	PRE ECE	-	-
	ECE 15/00-01	70/220 - 74/290	1972[a]
	ECE 15/02	77/102	1981[b]
	ECE 15/03	78/665	1982[c]
	ECE 15/04	83/351	1987[d]
	Euro I	91/441	1.10.1990[e]
	Euro II	94/12	1.1.1997
	Euro III	98/69	1.1.2001
	Euro IV	98/69	1.1.2006
	Euro V	715/2007	1.1.2011
	Euro VI	715/2007	1.9.2015
Passenger cars (diesel and LPG)	Conventional	-	-
	ECE 15/04	83/351	1987[d]
	Euro I	91/441	1.10.1990[e]
	Euro II	94/12	1.1.1997
	Euro III	98/69	1.1.2001
	Euro IV	98/69	1.1.2006
	Euro V	715/2007	1.1.2011
	Euro VI	715/2007	1.9.2015
Light duty trucks (gasoline and diesel)	Conventional	-	-
	ECE 15/00-01	70/220 - 74/290	1972[a]
	ECE 15/02	77/102	1981[b]
	ECE 15/03	78/665	1982[c]
	ECE 15/04	83/351	1987[d]
	Euro I	93/59	1.10.1994
	Euro II	96/69	1.10.1998
	Euro III	98/69	1.1.2002
	Euro IV	98/69	1.1.2007
	Euro V	715/2007	1.1.2012
	Euro VI	715/2007	1.9.2016
Heavy duty vehicles	Euro 0	88/77	1.10.1990
	Euro I	91/542	1.10.1993
	Euro II	91/542	1.10.1996
	Euro III	1999/96	1.10.2001
	Euro IV	1999/96	1.10.2006
	Euro V	1999/96	1.10.2009
	Euro VI	595/2009	1.10.2013
Mopeds	Conventional	-	-
	Euro I	97/24	2000
	Euro II	2002/51	2004
	Euro III	2002/51	2014[f]
	Euro IV	168/2013	2017
	Euro V	168/2013	2021
Motor cycles	Conventional		0
	Euro I	97/24	2000
	Euro II	2002/51	2004
	Euro III	2002/51	2007
	Euro IV	168/2013	2017
	Euro V	168/2013	2021

a,b,c,d: Expert judgement suggest that Danish vehicles enter into the traffic before EU directive first registration dates. The effective inventory starting years are a: 1970; b: 1979; c: 1981; d: 1986.
e: The directive came into force in Denmark in 1991 (EU starting year: 1993).

Fuel consumption and emission factors

Trip-speed dependent basis factors for fuel consumption and emissions are taken from the COPERT model using trip speeds as shown in Table 3.3.8. The factors are listed in Annex 2.B.4. For EU emission levels not represented by actual data, the emission factors are scaled according to the reduction factors given in Annex 2.B.5.

The fuel consumption and emission factors used in the Danish inventory come from the COPERT IV model. The source for these data is various European measurement programmes. In general the COPERT data are transformed into trip-speed dependent fuel consumption and emission factors for all vehicle categories and layers.

For passenger cars, real measurement results are behind the emission factors for Euro 1-4 vehicles, and those earlier. For light duty trucks the measurements represent Euro 1 and prior vehicle technologies. For mopeds and motorcycles, updated fuel consumption and emission figures are behind the conventional and Euro 1-3 technologies. For heavy-duty trucks and buses the experimental basis is computer simulated emission factors for Euro 0-V engines.

Adjustment for fuel efficient vehicles

In the Danish fleet and mileage database kept by DTU Transport, the type approval fuel efficiency value based on the NEDC driving cycle (TA_{NEDC}) is registered for each single car. Further, a modified fuel efficiency value (TA_{inuse}) is calculated using TA_{NEDC}, vehicle weight and engine size as input parameters. The TA_{inuse} value better reflects the fuel consumption associated with the NEDC driving cycle under real (“inuse”) traffic conditions (Emisia, 2012).

From 2006 up to last historical year represented by fleet data, the average CO_2 emission factor (by fleet number) is calculated for each year’s new sold cars, based on the registered TA_{NEDC} values. Using the average CO_2 emission factor for the last historical year as starting point, the average emission factor for each year’s new sold cars are linearly reduced, until the emission factor reaches 95 g CO_2 /km in 2020.

From 2006 up to last historical year, the average CO_2 emission factor (by fleet number) is also calculated for each year’s new sold cars, and for each fuel type/engine size combination, based on TA_{NEDC} and TA_{inuse}.

The linear reduction of the average emission factor for each year’s new sold cars is then used to reduce the CO_2 emission factors for new sold cars based on TA_{inuse}, between last historical year and 2020, for each of the fuel type/engine size fleet segments.

Subsequently for each layer and inventory year, CO_2 emission factors are calculated based on TA_{inuse} and weighted by total mileage. On the same time corresponding layer specific CO_2 factors from COPERT IV are set up valid for Euro 4+ vehicles in the COPERT model. The COPERT IV CO_2 factors are derived from fuel consumption factors included in the COPERT IV model (EMEP/EEA, 2013) that represent the COPERT test vehicles under the NEDC driving cycle in real world traffic ($TA_{COPERT\ IV,inuse}$).

Adjustment for EGR, SCR and filter retrofits

In COPERT IV updated emission factors have recently been made available for Euro V heavy duty vehicles using EGR and SCR exhaust emission after-treatment systems, respectively. The estimated new sales of Euro V diesel trucks equipped with EGR and SCR during the 2006-2010 time periods has been examined by Hjelgaard and Winther (2011). These inventory fleet data are used in the Danish inventory to calculate weighted emission factors for Euro V trucks in different size categories.

During the 2000's urban environmental zones have been established in Danish cities in order to bring down the particulate emissions from diesel fuelled heavy duty vehicles. Driving in these environmental zones prescribe the use of diesel particulate filters. The Danish EPA has provided the estimated number of Euro I-III urban buses and Euro II-III trucks and tourist buses which have been retrofitted with filters during the 2000's. These retrofit data are included in the Danish inventory by assuming that particulate emissions are lowered by 80 % compared with the emissions from the same Euro technology with no filter installed (Winther, 2011).

For all vehicle categories/technology levels not represented by measurements, the emission factors are produced by using reduction factors. The latter factors are determined by assessing the EU emission limits and the relevant emission approval test conditions, for each vehicle type and Euro class.

Adjustment for biofuel usage

A literature review carried out in the Danish research project REBECA revealed no significant changes in emission factors between neat gasoline and E5 gasoline-ethanol blends for the combustion related emission components; NO_x, CO and VOC (Winther et al., 2012). Hence, due to the current low ethanol content in today's road transport gasoline, no modifications of the neat gasoline based COPERT emission factors are made in the inventories in order to account for ethanol usage.

REBECa results published by Winther (2009) have shown that the emission impact of using diesel-biodiesel blends is very small at low biodiesel blend ratios. Consequently no bio fuel emission factor adjustments are needed for diesel vehicles as well. However, adjustment of the emission factors for diesel vehicles will be made if the biodiesel content of road transport diesel fuel increases to a more significant level in the future.

Deterioration factors

For three-way catalyst cars the emissions of NO_X, NMVOC and CO gradually increase due to catalyst wear and are, therefore, modified as a function of total mileage by the so-called deterioration factors. Even though the emission curves may be serrated for the individual vehicles, on average, the emissions from catalyst cars stabilise after a given cut-off mileage is reached due to OBD (On Board Diagnostics) and the Danish inspection and maintenance programme.

For each year, the deterioration factors are calculated pr first registration year by using deterioration coefficients and cut-off mileages, as given in EMEP/EEA (2013), for the corresponding layer. The deterioration coefficients are given for the two driving cycles: "Urban Driving Cycle" (UDF) and "Extra Urban Driving Cycle" (EUDF: urban and rural), with trip speeds of 19 and 63 km pr h, respectively.

Firstly, the deterioration factors are calculated for the corresponding trip speeds of 19 and 63 km pr h in each case determined by the total cumulated mileage less than or exceeding the cut-off mileage. The Formulas 3 and 4 show the calculations for the "Urban Driving Cycle":

$$UDF = U_A \cdot MTC + U_B \text{, MTC < U}_{\text{MAX}} \tag{3}$$

$$UDF = U_A \cdot U_{MAX} + U_B \text{, MTC >= U}_{\text{MAX}} \tag{4}$$

where UDF is the urban deterioration factor, U_A and U_B the urban deterioration coefficients, MTC = total cumulated mileage and U_{MAX} urban cut-off mileage.

In the case of trip speeds below 19 km pr h the deterioration factor, DF, equals UDF, whereas for trip speeds exceeding 63 km pr h, DF=EUDF. For trip speeds between 19 and 63 km pr h the deterioration factor, DF, is found as an interpolation between UDF and EUDF. Secondly, the deterioration factors, one for each of the three road types, are aggregated into layers by taking into account vehicle numbers and annual mileage levels pr first registration year:

$$DF_{j,y} = \frac{\sum_{i=FYear(j)}^{LYear(j)} DF_{i,y} \cdot N_{i,y} \cdot M_{i,y}}{\sum_{i=FYear(j)}^{LYear(j)} DF_{i,y} \cdot N_{i,y}} \tag{5}$$

where DF is the deterioration factor.

For N_2O and NH_3, COPERT IV takes into account deterioration as a linear function of mileage for gasoline fuelled EURO 1-4 passenger cars and light duty vehicles. The level of emission deterioration also relies on the content of sulphur in the fuel. The deterioration coefficients are given in EMEP/EEA (2013), for the corresponding layer. A cut-off mileage of 250.000 km is behind the calculation of the modified emission factors, and for the Danish situation the low sulphur level interval is assumed to be most representative.

Emissions and fuel consumption for hot engines

Emissions and fuel-use results for operationally hot engines are calculated for each year and for layer and road type. The procedure is to combine fuel consumption and emission factors (and deterioration factors for catalyst vehicles), number of vehicles, annual mileage levels and the relevant road-type shares given in Table 3.3.8. For non-catalyst vehicles this yields:

$$E_{j,k,y} = EF_{j,k,y} \cdot S_k \cdot N_{j,y} \cdot M_{j,y} \tag{6}$$

Here E = fuel consumption/emission, EF = fuel consumption/emission factor, S = road type share and k = road type.

For catalyst vehicles the calculation becomes:

$$E_{j,k,y} = DF_{j,k,y} \cdot EF_{j,k,y} \cdot S_k \cdot N_{j,y} \cdot M_{j,y} \tag{7}$$

Extra emissions and fuel consumption for cold engines

Extra emissions of NO_X, VOC, CH_4, CO, PM, NH_3 and fuel consumption from cold start are simulated separately. For SO_2, the extra emissions are derived from the cold start fuel consumption results.

Each trip is associated with a certain cold-start emission level and is assumed to take place under urban driving conditions. The number of trips is distributed evenly across the months. First, cold emission factors are calculated as the hot emission factor times the cold:hot emission ratio. Secondly, the extra emission factor during cold start is found by subtracting the hot emission factor from the cold emission factor. Finally, this extra factor is applied on the fraction of the total mileage driven with a cold engine (the β-factor) for all vehicles in the specific layer.

The cold:hot ratios depend on the average trip length and the monthly ambient temperature distribution. The Danish temperatures for 2013 are given in Cappelen et al. (2013). For previous years, temperature data are taken from similar reports available from The Danish Meteorological Institute (www.dmi.dk). The cold:hot ratios are equivalent for gasoline fuelled conventional passenger cars and vans and for diesel passenger cars and vans, respectively, see EMEP/EEA (2013). For conventional gasoline and all diesel vehicles the extra emissions become:

$$CE_{j,y} = \beta \cdot N_{j,y} \cdot M_{j,y} \cdot EF_{U,j,y} \cdot (CEr - 1) \qquad (8)$$

Where CE is the cold extra emissions, β = cold driven fraction, CEr = Cold:Hot ratio.

For catalyst cars, the cold:hot ratio is also trip speed dependent. The ratio is, however, unaffected by catalyst wear. The Euro I cold:hot ratio is used for all future catalyst technologies. However, in order to comply with gradually stricter emission standards, the catalyst light-off temperature must be reached in even shorter periods of time for future EURO standards. Correspondingly, the β-factor for gasoline vehicles is reduced step-wise for Euro II vehicles and their successors.

For catalyst vehicles the cold extra emissions are found from:

$$CE_{j,y} = \beta_{red} \cdot \beta_{EUROI} \cdot N_{j,y} \cdot M_{j,y} \cdot EF_{U,j,y} \cdot (CEr_{EUROI} - 1) \qquad (9)$$

where β_{red} = the β reduction factor.

For CH_4, specific emission factors for cold driven vehicles are included in COPERT IV. The β and β_{red} factors for VOC are used to calculate the cold driven fraction for each relevant vehicle layer. The NMVOC emissions during cold start are found as the difference between the calculated results for VOC and CH_4.

For NH_3, specific cold start emission factors are also proposed by COPERT IV. For catalyst vehicles, however, just like in the case of hot emission factors, the emission factors for cold start are functions of cumulated mileage (emission deterioration). The level of emission deterioration also relies on the content of sulphur in the fuel. The deterioration coefficients are given in EMEP/EEA (2013), for the corresponding layer. For cold start, the cut-off mileage and sulphur level interval for hot engines are used, as described in the deterioration factors paragraph.

Evaporative emissions from gasoline vehicles

For each year, evaporative emissions of hydrocarbons are simulated in the model as hot and warm running losses, hot and warm soak loss and diurnal emissions. The calculation approach is the same as in COPERT III. All emission types depend on RVP (Reid Vapour Pressure) and ambient temperature. The emission factors are shown in Ntziachristos et al. (2000).

Running loss emissions originate from vapour generated in the fuel tank while the vehicle is running. The distinction between hot and warm running loss emissions depends on engine temperature. In the model, hot and warm running losses occur for hot and cold engines, respectively. The emissions are calculated as annual mileage (broken down into cold and hot mileage totals using the β-factor) times the respective emission factors. For vehicles equipped with evaporation control (catalyst cars), the emission factors are only one tenth of the uncontrolled factors used for conventional gasoline vehicles.

$$R_{j,y} = N_{j,y} \cdot M_{j,y} \cdot ((1-\beta) \cdot HR + \beta \cdot WR) \qquad (10)$$

Where R is running loss emissions and HR and WR are the hot and warm running loss emission factors, respectively.

In the model, hot and warm soak emissions for carburettor vehicles also occur for hot and cold engines, respectively. These emissions are calculated as number of trips (broken down into cold and hot trip numbers using the β-factor) times respective emission factors:

$$S_{j,y}{}^{C} = N_{j,y} \cdot \frac{M_{j,y}}{l_{trip}} \cdot ((1-\beta) \cdot HS + \beta \cdot WS) \qquad (11)$$

Where S^C is the soak emission, l_{trip} = the average trip length, and HS and WS are the hot and warm soak emission factors, respectively. Since all catalyst vehicles are assumed to be carbon canister controlled, no soak emissions are estimated for this vehicle type. Average maximum and minimum temperatures pr month are used in combination with diurnal emission factors to estimate the diurnal emissions from uncontrolled vehicles $E^d(U)$:

$$E_{j,y}{}^{d}(U) = 365 \cdot N_{j,y} \cdot e^{d}(U) \qquad (12)$$

Each year's total is the sum of each layer's running loss, soak loss and diurnal emissions.

Fuel consumption balance

The calculated fuel consumption in COPERT IV must equal the statistical fuel sale totals according to the UNFCCC and UNECE emissions reporting format. The statistical fuel sales for road transport are derived from the Danish Energy Authority data (see DEA, 2013). The DEA data are further processed for gasoline in order to account for e.g. non-road and recreational craft fuel consumption, which are not directly stated in the statistics, please refer to paragraph 1.1.4 for further information regarding the transformation of DEA fuel data.

The standard approach to achieve a fuel balance in annual emission inventories is to multiply the annual mileage with a fuel balance factor derived as the ratio between simulated and statistical fuel figures for gasoline and diesel, respectively. This method is also used in the present model.

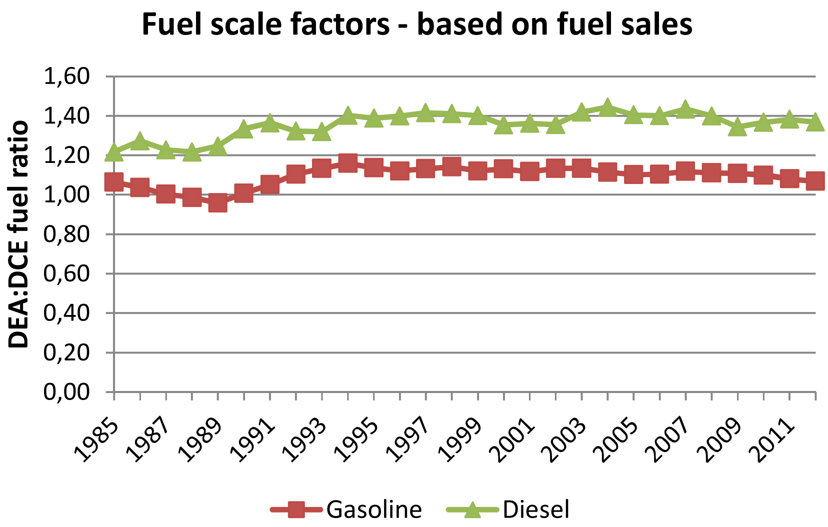


Figure 3.3.38 DEA:DCE Fuel ratios (mileage adjustment factors) based on DEA fuel sales data and DCE fuel consumption estimates.

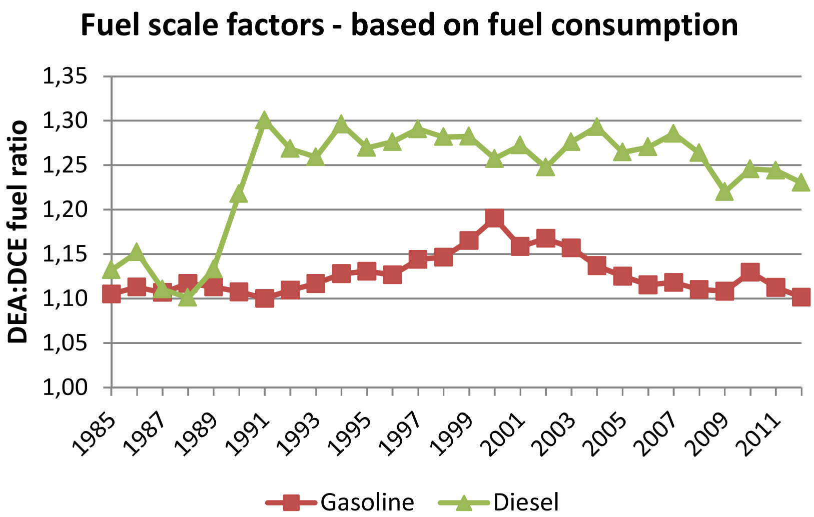


Figure 3.3.39 DEA:DCE Fuel ratios and (mileage adjustment factors) based on DEA fuel consumption data and DCE fuel consumption estimates.

In the figures 3.3.38 and 3.3.39 the COPERT IV:DEA gasoline and diesel fuel consumption ratios are shown for fuel sales and fuel consumption from 1985-2011. The data behind the figures are also listed in Annex 2.B.8. The fuel consumption figures are related to the traffic on Danish roads by Danish vehicles and foreign trucks.

Pr fuel type, all mileage numbers are equally scaled in order to obtain fuel equilibrium, and hence the mileage factors used are the reciprocal values of the COPERT IV:DEA fuel consumption: fuel sales ratio.

The reasons for the differences between DEA sales figures and bottom-up fuel estimates are mostly due to a combination of the uncertainties related to COPERT IV fuel consumption factors, allocation of vehicle numbers in sub-categories, annual mileage, trip speeds and mileage splits for urban, rural and highway driving conditions.

The final fuel consumption and emission factors are shown in Annex 2.B.7 for 1985-2012. The total fuel consumption and emissions are shown in Annex 2.B.8, pr vehicle category and as grand totals, for 1985-2012 (and NFR format in Annex 2.B.16. In Annex 2.B.15, fuel consumption and emission factors as well as total emissions are given in CollectER format for 2012.

In Table 3.3.10, the aggregated emission factors for SO_2, NO_X, NMVOC and TSP are shown in CollectER format for Danish road transport.

Table 3.3.10 Fuel-based emission factors for SO_2, NO_X, NMVOC, CO, NH_3 and TSP for road transport in Denmark (2012).

SNAP ID	Category	Fuel typeMode		Emission factors[1] [g pr GJ]					
				SO_2	NO_X	NMVOC	CO	NH_3	TSP
070101	Passenger cars	Highway	Bio ethanol	0,00	133,00	31,74	695,05	32,49	1,02
070101	Passenger cars	Highway	Biodiesel	0,00	345,09	4,01	12,92	0,51	12,10
070101	Passenger cars	Highway	Diesel	0,47	345,09	4,01	12,92	0,51	12,10
070101	Passenger cars	Highway	Gasoline	0,46	133,00	31,74	695,05	32,49	1,02
070101	Passenger cars	Highway	LPG	0,00	245,42	39,01	1401,42	0,00	10,05
070102	Passenger cars	Rural	Bio ethanol	0,00	110,36	36,67	555,44	33,65	0,97
070102	Passenger cars	Rural	Biodiesel	0,00	288,67	5,25	24,66	0,54	10,09
070102	Passenger cars	Rural	Diesel	0,47	288,67	5,25	24,66	0,54	10,09
070102	Passenger cars	Rural	Gasoline	0,46	110,36	36,67	555,44	33,65	0,97
070102	Passenger cars	Rural	LPG	0,00	267,71	59,24	542,88	0,00	14,45
070103	Passenger cars	Urban	Bio ethanol	0,00	138,64	295,15	3243,70	7,68	0,88
070103	Passenger cars	Urban	Biodiesel	0,00	290,68	16,07	71,75	0,37	18,31
070103	Passenger cars	Urban	Diesel	0,47	290,68	16,07	71,75	0,37	18,31
070103	Passenger cars	Urban	Gasoline	0,46	138,64	295,15	3243,70	7,68	0,88
070103	Passenger cars	Urban	LPG	0,00	134,04	138,14	937,64	0,00	11,64
070201	Light duty vehicles	Highway	Bio ethanol	0,00	164,40	19,61	555,42	22,93	1,37
070201	Light duty vehicles	Highway	Biodiesel	0,00	283,25	18,22	122,71	0,37	18,27
070201	Light duty vehicles	Highway	Diesel	0,47	283,25	18,22	122,71	0,37	18,27
070201	Light duty vehicles	Highway	Gasoline	0,46	164,40	19,61	555,42	22,93	1,37
070201	Light duty vehicles	Highway	LPG	0,00	136,68	20,73	1046,75	0,00	10,04
070202	Light duty vehicles	Rural	Bio ethanol	0,00	143,84	28,80	420,31	22,65	1,22
070202	Light duty vehicles	Rural	Biodiesel	0,00	295,92	20,62	105,18	0,40	14,95
070202	Light duty vehicles	Rural	Diesel	0,47	295,92	20,62	105,18	0,40	14,95
070202	Light duty vehicles	Rural	Gasoline	0,46	143,84	28,80	420,31	22,65	1,22
070202	Light duty vehicles	Rural	LPG	0,00	149,37	31,44	435,27	0,00	14,45
070203	Light duty vehicles	Urban	Bio ethanol	0,00	130,10	200,38	3760,68	4,44	0,74
070203	Light duty vehicles	Urban	Biodiesel	0,00	275,24	42,60	141,68	0,26	25,22
070203	Light duty vehicles	Urban	Diesel	0,47	275,24	42,60	141,68	0,26	25,22
070203	Light duty vehicles	Urban	Gasoline	0,46	130,10	200,38	3760,68	4,44	0,74
070203	Light duty vehicles	Urban	LPG	0,00	78,75	73,39	563,91	0,00	11,94
070301	Heavy duty vehicles	Highway	Bio ethanol	0,00	1037,78	474,61	7610,35	0,28	55,35
070301	Heavy duty vehicles	Highway	Biodiesel	0,00	392,17	7,43	136,80	0,31	6,18
070301	Heavy duty vehicles	Highway	Diesel	0,47	392,17	7,43	136,80	0,31	6,18
070301	Heavy duty vehicles	Highway	Gasoline	0,46	1037,78	474,61	7610,35	0,28	55,35
070302	Heavy duty vehicles	Rural	Bio ethanol	0,00	1141,55	820,40	8371,39	0,30	60,88
070302	Heavy duty vehicles	Rural	Biodiesel	0,00	454,93	10,02	134,81	0,29	6,64
070302	Heavy duty vehicles	Rural	Diesel	0,47	454,93	10,02	134,81	0,29	6,64
070302	Heavy duty vehicles	Rural	Gasoline	0,46	1141,55	820,40	8371,39	0,30	60,88
070303	Heavy duty vehicles	Urban	Bio ethanol	0,00	456,62	696,09	7102,99	0,20	40,59
070303	Heavy duty vehicles	Urban	Biodiesel	0,00	570,34	14,75	149,48	0,25	8,10
070303	Heavy duty vehicles	Urban	Diesel	0,47	570,34	14,75	149,48	0,25	8,10

Continued									
070303	Heavy duty vehicles	Urban	Gasoline	0,46	456,62	696,09	7102,99	0,20	40,59
070400	Mopeds	Urban	Bio ethanol	0,00	145,74	4413,69	7300,73	1,06	76,35
070400	Mopeds	Urban	Gasoline	0,46	145,74	4413,69	7300,73	1,06	76,35
070501	Motorcycles	Highway	Bio ethanol	0,00	270,47	651,06	10392,91	1,27	15,72
070501	Motorcycles	Highway	Gasoline	0,46	270,47	651,06	10392,91	1,27	15,72
070502	Motorcycles	Rural	Bio ethanol	0,00	192,46	650,59	9619,73	1,55	19,14
070502	Motorcycles	Rural	Gasoline	0,46	192,46	650,59	9619,73	1,55	19,14
070503	Motorcycles	Urban	Bio ethanol	0,00	118,83	802,17	9267,95	1,51	18,65
070503	Motorcycles	Urban	Gasoline	0,46	118,83	802,17	9267,95	1,51	18,65

[1] References. SO_2: Country specific; NO_X, NMVOC, CO, NH_3 and PM: COPERT IV.

Non-exhaust particulate emissions from road transport

The TSP, PM_{10} and $PM_{2.5}$ emissions arising from tyre and brake wear (SNAP 0707) and road abrasion (SNAP 0708) are estimated for the years 2000-2012 as prescribed by the UNECE convention reporting format. The emissions are calculated by multiplying the total annual mileage pr vehicle category with the correspondent average emission factors for each source type. The calculation procedure is consistent with the COPERT IV model approach used to estimate the Danish national emissions coming from exhaust. A more thorough explanation of the calculations is given by Winther and Slentø (2010). Emission factors are taken from EMEP/EEA (2013) and specific Danish tyre wear data are gathered by Winther and Slentø (2010). The emission factors and total emissions for 2012 are shown in Annex 2.B.15.

Methodologies and references for other mobile sources

Other mobile sources are divided into several sub-sectors: sea transport, fishery, air traffic, railways, military, and working machinery and materiel in the industry, forestry, agriculture and household and gardening sectors. The emission calculations are made using the detailed method as described in the EMEP/EEA Air Pollutant Emission Inventory Guidebook (EMEP/EEA, 2013) for air traffic, off-road working machinery and equipment, and ferries, while for the remaining sectors the simple method is used.

3.3.3 Activity data

Air traffic

The activity data for air traffic consists of air traffic statistics provided by the Danish Transport Authority and Copenhagen Airport. Fuel statistics for jet fuel consumption and aviation gasoline are obtained from the Danish energy statistics (DEA, 2013).

For 2001 onwards, pr flight records are provided by the Danish Transport Authority as data codes for aircraft type, and origin and destination airports (city-pairs).

Subsequently the aircraft types are separated by DCE into larger aircraft using jet fuel (jet engines, turbo props, helicopters) and small aircraft types with piston engines using aviation gasoline. This is done by using different aircraft dictionaries, internet look-ups and by communication with the Danish Transport Authority. Each of the larger aircraft type is then matched with a representative type for which fuel consumption and emission data are available from the EMEP/EEA databank. Relevant for this selection is aircraft maximum take off mass, engine types, and number of engines. A more thorough explanation is given in Winther (2001a, b).

Annex 2.B.10 shows the correspondence table between the actual aircraft type codes and representative aircraft types behind the Danish inventory. Annex 2.B.10 also show the number of LTO's per representative aircraft type for domestic and international flights starting from Copenhagen Airport and other airports, respectively[6], in a time series from 2001-2012. The airport split is necessary to make due to the differences in LTO emission factors (c.f. section 3.3.4).

The same type of LTO activity data for the flights for Greenland and the Faroe Islands are shown in Annex 2.B.10 also, further detailed into an origin-destination airport matrix and having flight distances attached. This level of detail satisfies the demand from UNFCCC to provide precise documentation for the part of the inventory for the Kingdom of Denmark being outside the Danish mainland.

In the later years many flights in Denmark are being made by the new aircraft types CRJ9, E70, E170 and E175. These aircraft types are not represented by data in the EMEP/EEA databank. Instead new fuel consumption and emission factors have been calculated using fuel consumption and emission indexes from the ICAO Engine Exhaust Emission Database (www.caa.co.uk) for the CFM34-8C5 engine type which is installed in CRJ9, E70, E170 and E175. For LTO the fuel consumption and emission indexes are directly available from the ICAO database. For cruise, distance related indexes are calculated by weighting the baseline CFM34-8C5 indexes with the development in distance related emission indexes for the B737 400 representative aircraft type taken from the EMEP/EEA database.

The ideal flying distance (great circle distance) between the city-pairs is calculated by DCE in a separate database. The calculation algorithm uses a global latitude/altitude coordinate table for airports. In cases when airport coordinates are not present in the DCE database, these are looked up on the internet and entered into the database accordingly.

For inventory years prior to 2001, detailed LTO/aircraft type statistics are obtained from Copenhagen Airport (for this airport only), while information of total take-off numbers for other Danish airports is provided by the Danish Transport Authority. The assignment of representative aircraft types for Copenhagen Airport is done as described above. For the remaining Danish airports representative aircraft types are not directly assigned. Instead appropriate average assumptions are made relating to the fuel consumption and emission data part.

[6] Excluding flights for Greenland and the Faroe Islands. These flights are separately listed in Annex 2.B.10.

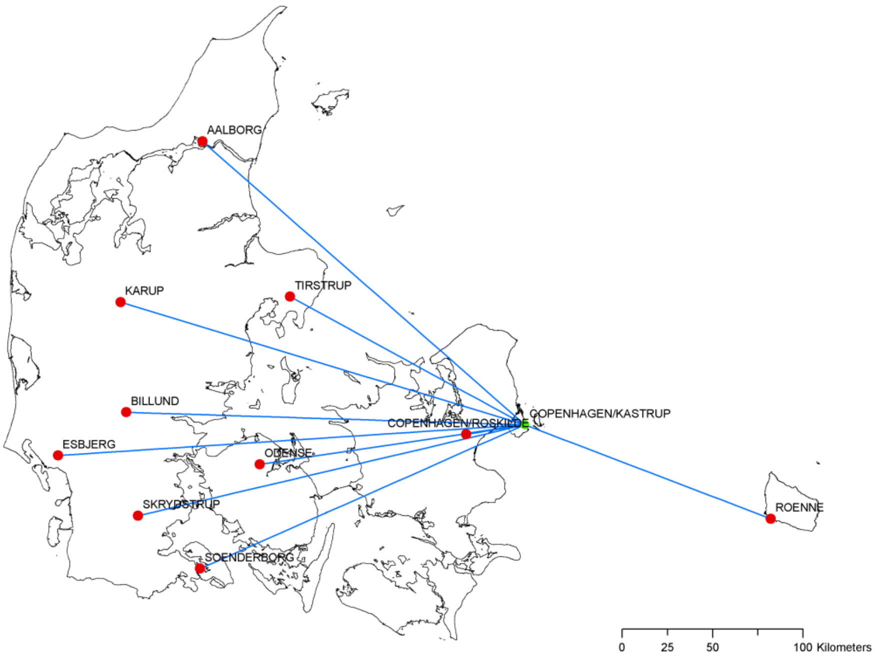


Figure 3.3.40 Most frequent domestic flying routes for large aircraft in Denmark.

Copenhagen Airport is the starting or end point for most of the domestic aviation made by large aircraft in Denmark (Figure 3.3.40; routes to Greenland/Faroe Islands are not shown). Even though many domestic flights not touching Copenhagen Airport are also reported in the flight statistics kept by the Danish Transport Authority, these flights, however, are predominantly made with small piston engine aircraft using aviation gasoline. Hence, the consumption of jet fuel by flights not using Copenhagen is merely marginal.

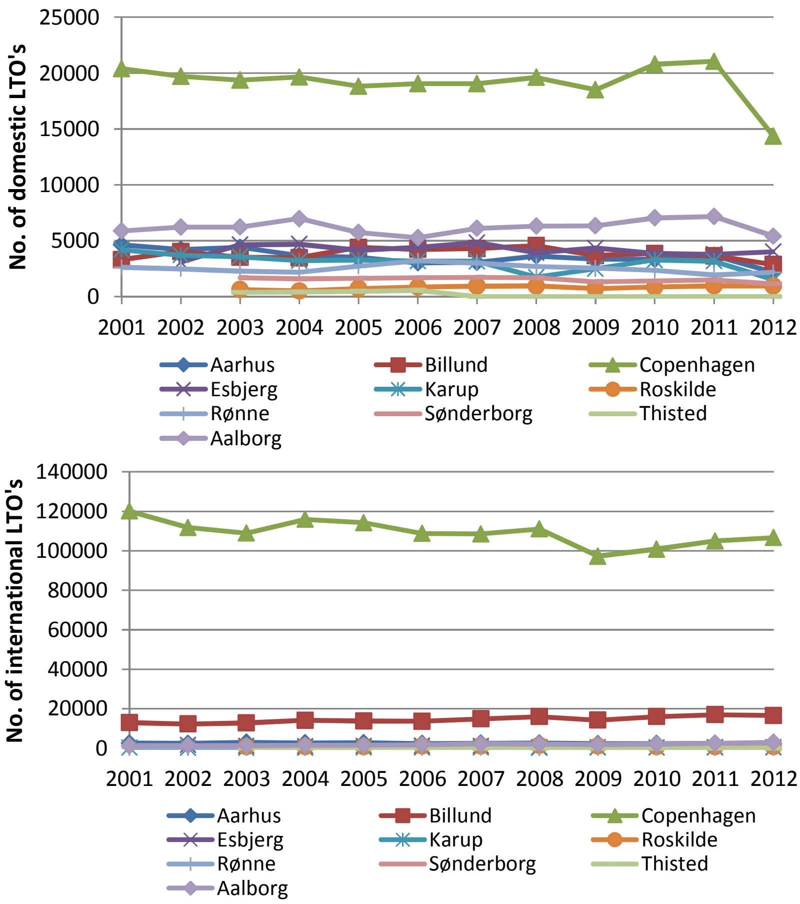


Figure 3.3.41 No. of LTO's for the most important airports in Denmark 2001-2012.

Figure 3.3.41 shows the number of domestic and international LTO's for Danish airports[7], in a time series from 2001-2012.

Non-road working machinery and equipment

Non-road working machinery and equipment are used in agriculture, forestry and industry, for household/gardening purposes and in inland waterways (recreational craft). Information on the number of different types of machines, their respective load factors, engine sizes and annual working hours has been provided by Winther et al. (2006) for the years until 2004. For later inventory years, supplementary stock data are annually provided by the Association of Danish Agricultural Machinery Dealers and the Association of Producers and Distributors of Fork Lifts in Denmark. The stock development from 1985-2012 for the most important types of machinery are shown in Figures 3.3.42-3.3.49 below. The stock data are also listed in Annex 2.B.11, together with figures for load factors, engine sizes and annual working hours. As regards stock data for the remaining machinery types, please refer to (Winther et al., 2006).

It is important to note that from key experts in the field of industrial non-road activities a significant decrease in the activities is assumed for 2009 due to the global financial crisis. This reduction is in the order of 25 % for 2009 for industrial non-road in general (pers. comm. Per Stjernqvist, Volvo Construction Equipment 2010). For fork lifts 5 % and 20 % reductions are assumed for 2008 and 2009, respectively (pers. comm. Peter H. Møller, Rocla A/S).

For agriculture, the total number of agricultural tractors and harvesters per year are shown in the Figures 3.3.42-3.3.43, respectively. The figures clearly show a decrease in the number of small machines, these being replaced by machines in the large engine-size ranges.

[7] Flights for Greenland and the Faroe Islands are included under domestic in the figure.

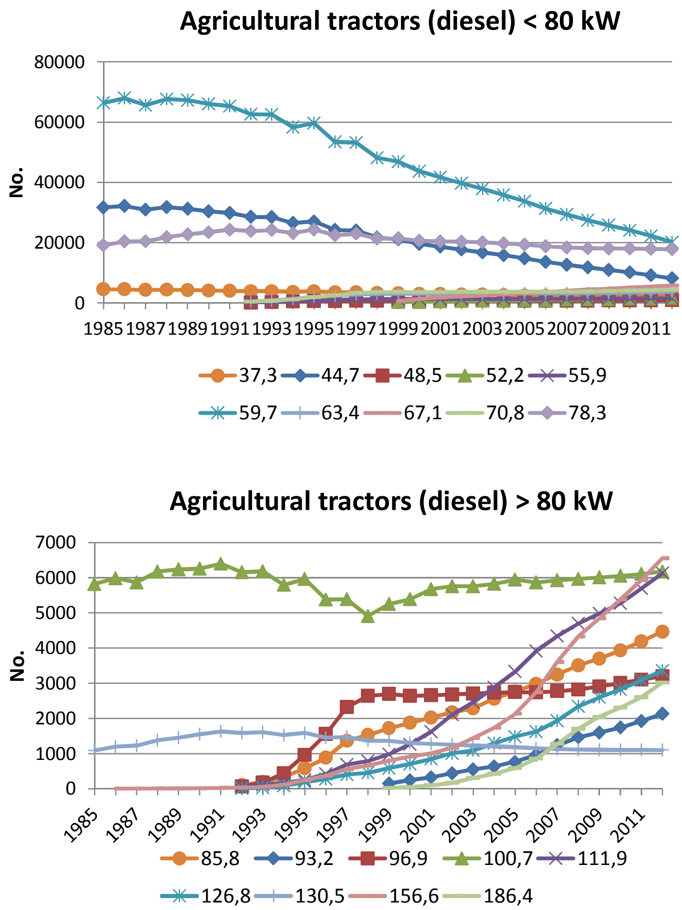


Figure 3.3.42 Total numbers in kW classes for tractors from 1985 to 2012.

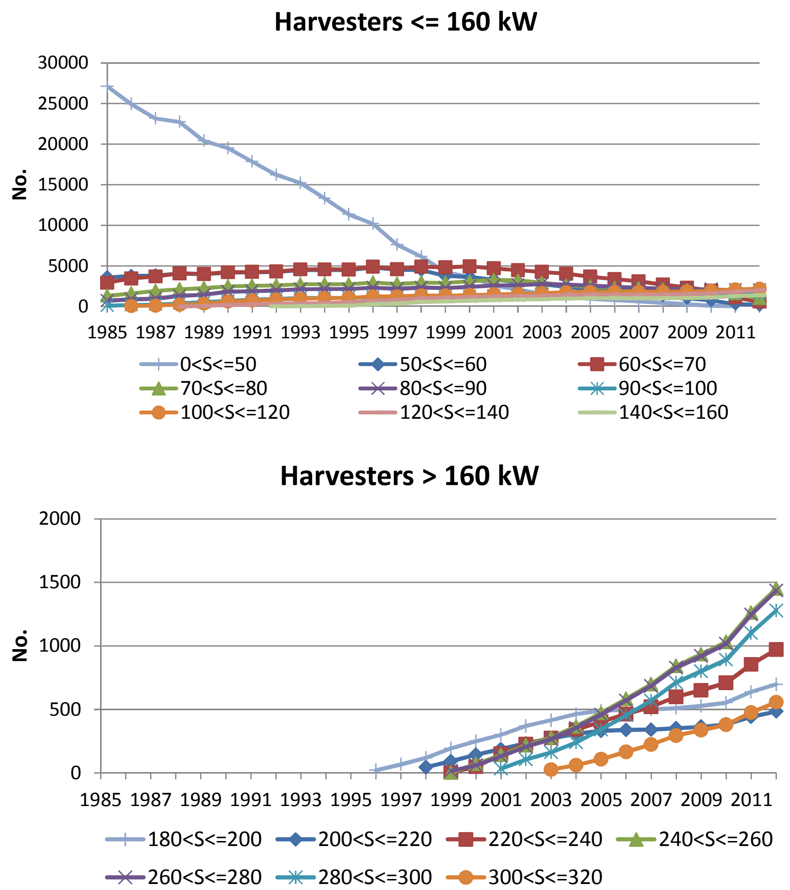
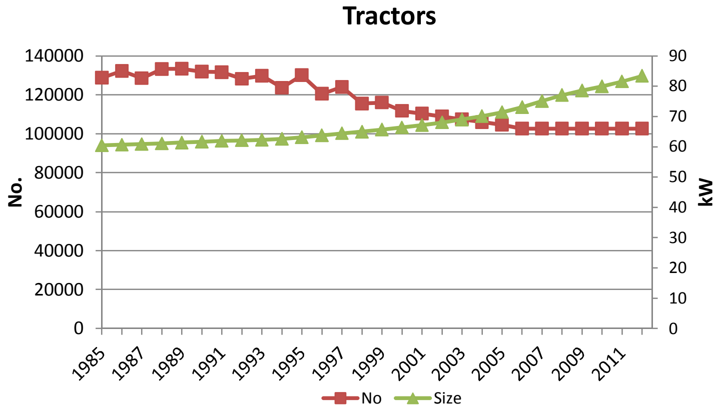


Figure 3.3.43 Total numbers in kW classes for harvesters from 1985 to 2012.

The tractor and harvester developments towards fewer vehicles and larger engines, shown in Figure 3.3.44, are very clear. From 1985 to 2012, tractor and harvester numbers decrease by around 20 % and 46 %, respectively, whereas the average increase in engine size for tractors is 38 %, and 202 % for harvesters, in the same time period.



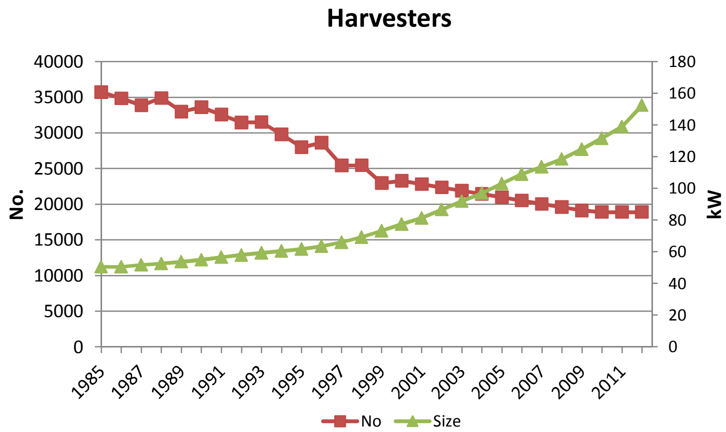


Figure 3.3.44 Total numbers and average engine size for tractors and harvesters from 1985 to 2012.

The most important machinery types for industrial use are different types of construction machinery and fork lifts. The Figures 3.3.45 and 3.3.46 show the 1985-2012 stock development for specific types of construction machinery and diesel fork lifts. Due to lack of data, the construction machinery stock for 1990 is used also for 1985-1989. For most of the machinery types there is an increase in machinery numbers from 1990 onwards, due to increased construction activities. It is assumed that track type excavators/wheel type loaders (0-5 tonnes), and telescopic loaders first enter into use in 1991 and 1995, respectively.

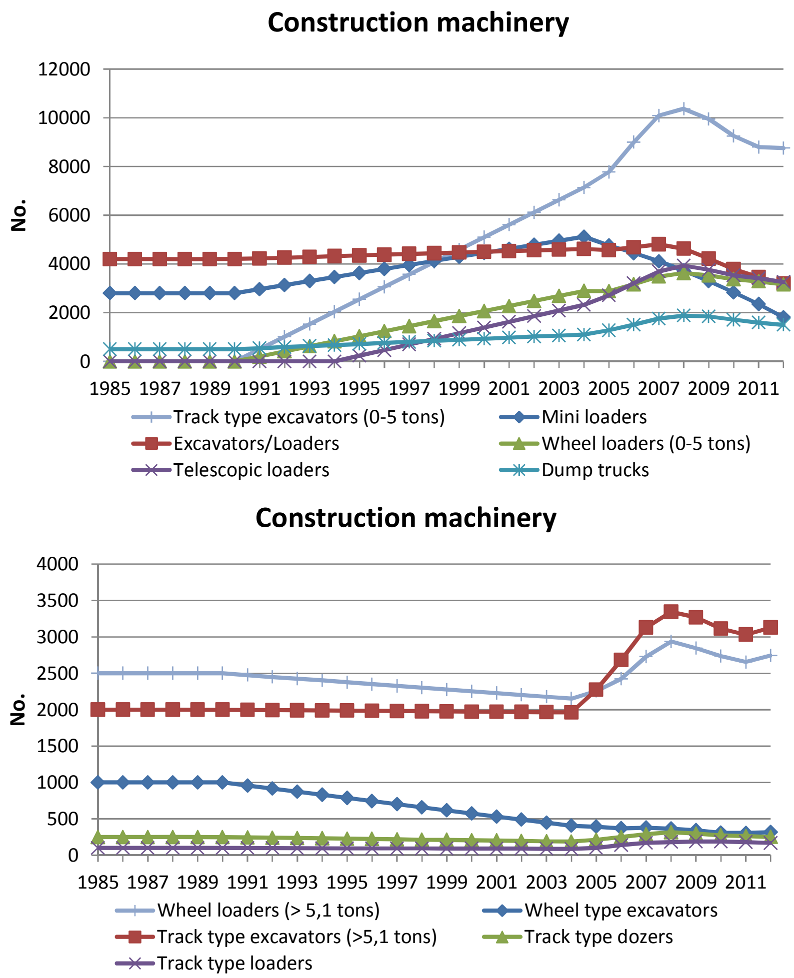


Figure 3.3.45 1985-2012 stock development for specific types of construction machinery.

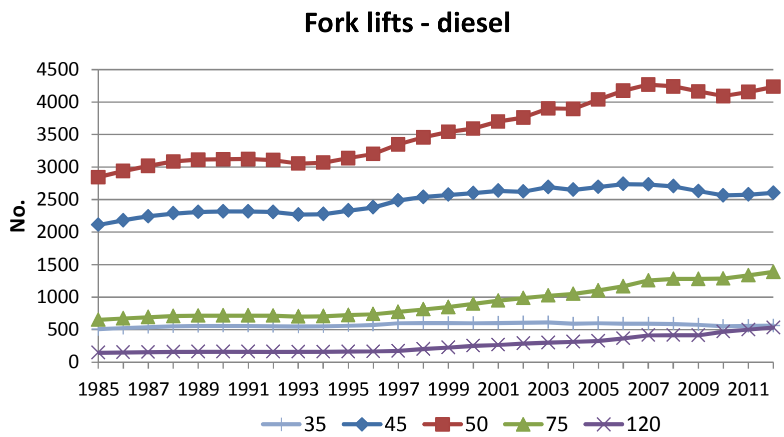
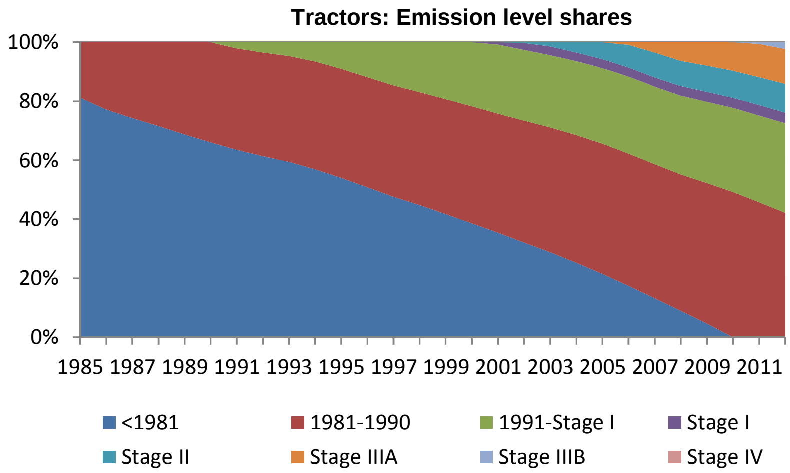
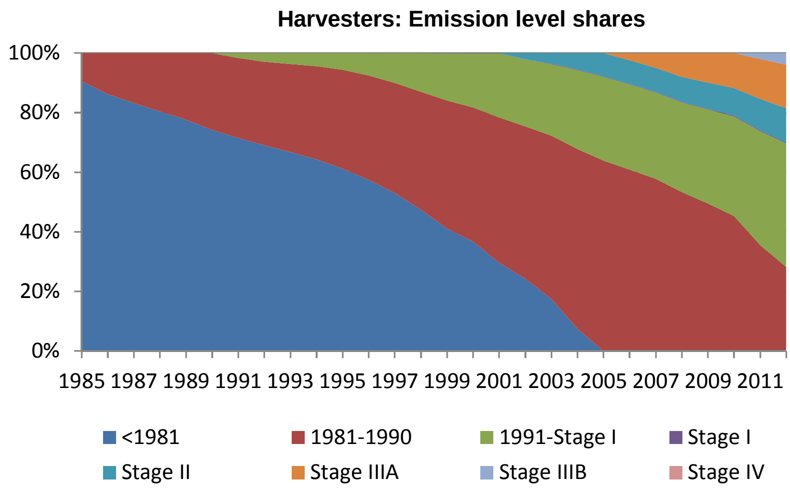


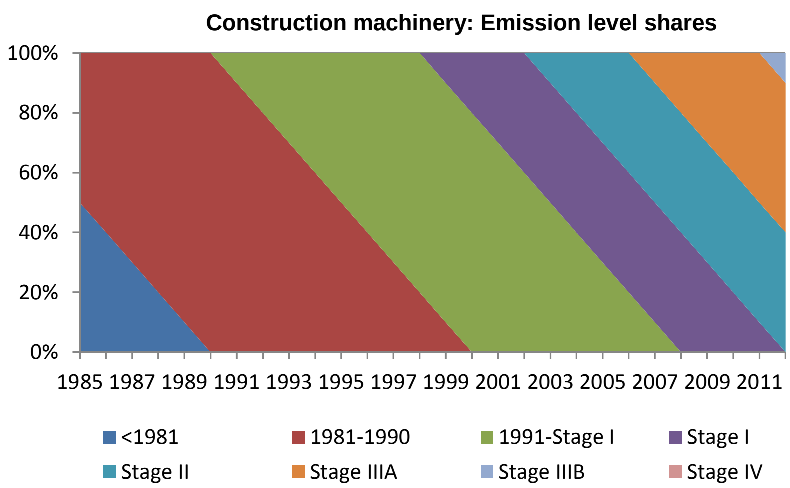
Figure 3.3.46 Total numbers of diesel fork lifts in kW classes from 1985 to 2012.

The emission level shares for tractors, harvesters, construction machinery and diesel fork lifts are shown in Figure 3.3.47, and present an overview of the penetration of the different pre-Euro engine classes, and engine stages complying with the gradually stricter EU stage I and II emission limits. The average lifetimes of 30, 25, 20 and 10 years for tractors, harvesters, fork lifts and construction machinery, respectively, influence the individual engine technology turn-over speeds.

The EU emission directive Stage I and II implementation years relate to engine size, and for all four machinery groups the emission level shares for the specific size segments will differ slightly from the picture shown in Figure 3.3.47. Due to scarce data for construction machinery, the emission level penetration rates are assumed to be linear and the general technology turnover pattern is as shown in Figure 3.3.47.







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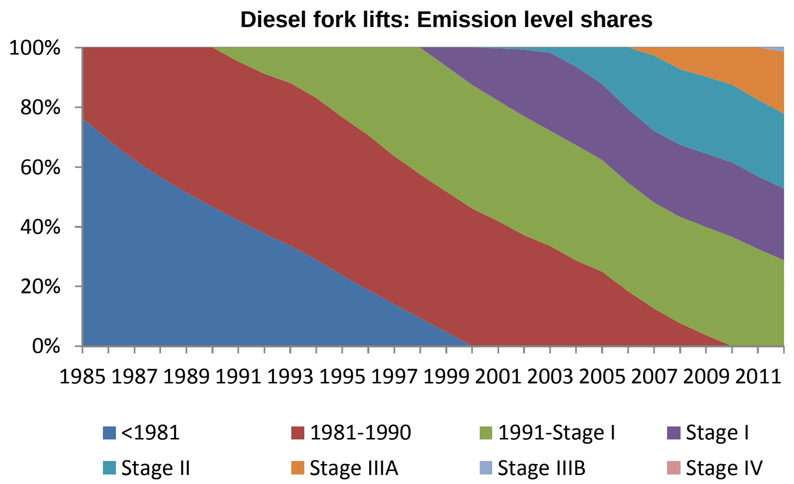

Figure 3.3.47 Emission level shares for tractors, harvesters, construction machinery and diesel fork lifts (1985 to 2012).

The 1985-2012 stock development for the most important household and gardening machinery types is shown in Figure 3.3.48.

For lawn movers and cultivators, the machinery stock remains approximately the same for all years, whereas the stock figures for riders, chain saws, shrub clearers, trimmers and hedge cutters increase from 1990 onwards. The yearly stock increases, in most cases, become larger after 2000. The lifetimes for gasoline machinery are short and, therefore, there new emission levels (not shown) penetrate rapidly.

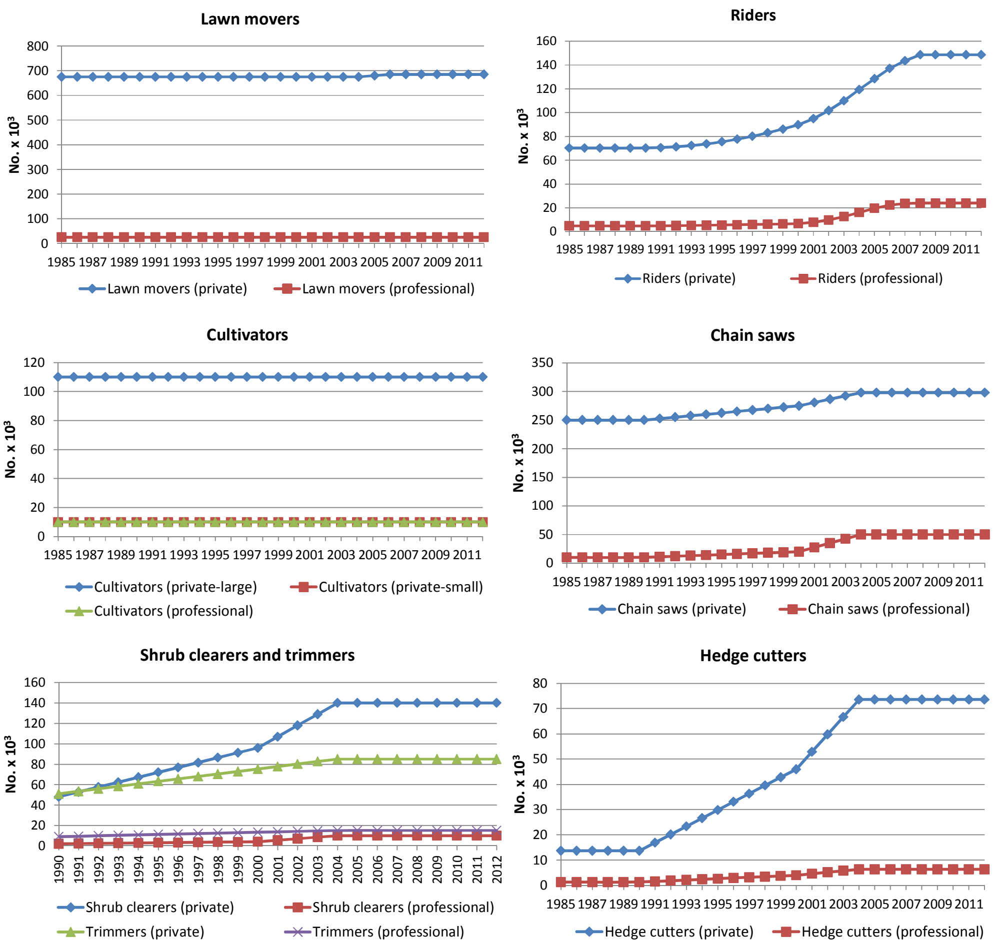

Figure 3.3.48 Stock developments 1985-2012 for the most important household and gardening machinery types.

Figure 3.3.49 shows the development in numbers of different recreational craft from 1985-2012. The 2004 stock data for recreational craft are repeated for 2005+, since no new fleet information has been obtained.

For diesel boats, increases in stock and engine size are expected during the whole period, except for the number of motor boats (< 27 ft.) and the engine sizes for sailing boats (<26 ft.), where the figures remain unchanged. A decrease in the total stock of sailing boats (<26 ft.) by 21 % and increases in the total stock of yawls/cabin boats and other boats (<20 ft.) by around 25 % are expected. Due to a lack of information specific to Denmark, the shifting rate from 2-stroke to 4-stroke gasoline engines is based on a German non-road study (IFEU, 2004).

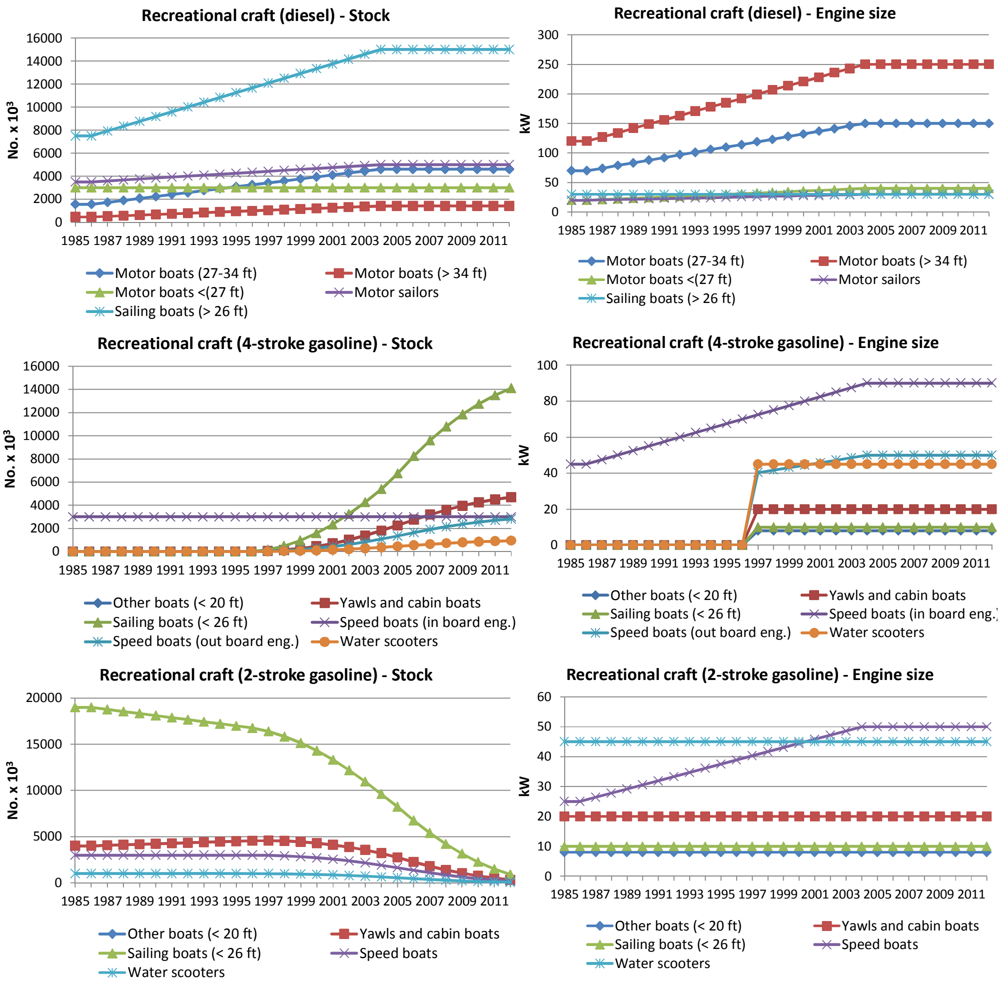

Figure 3.3.49 1985-2012 Stock and engine size development for recreational craft.

National sea transport

The methodology used to estimate the fuel consumption figures for national sea transport, based on fleet activity estimates for regional ferries, local ferries and other national sea transport is described by Winther (2008).

Table 3.3.11 lists the most important domestic ferry routes in Denmark in the period 1990-2012. For these ferry routes and the years 1990-2005, the following detailed traffic and technical data have been gathered by Winther (2008): Ferry name, year of service, engine size (MCR), engine type, fuel type, average load factor, auxiliary engine size and sailing time (single trip).

For 2006-2012, the above mentioned traffic and technical data for specific ferries have been provided by Kristensen (2013) in the case of Mols-Linien (Sjællands Odde-Ebeltoft, Sjællands Odde-Århus, Kalundborg-Århus), by Jørgensen (2013) for Færgen A/S (Køge-Rønne, Tårs-Spodsbjerg). For Esbjerg/Hanst-holm/Hirtshals-Torshavn traffic and technical data have been provided by Dávastovu (2011).

Table 3.3.11 Domestic ferry routes comprised in the Danish inventory.

Ferry service	Service period
Esbjerg-Torshavn	1990-1995, 2009+
Halsskov-Knudshoved	1990-1999
Hanstholm-Torshavn	1991-1992, 1999+
Hirtshals-Torshavn	2010
Hundested-Grenaa	1990-1996
Kalundborg-Juelsminde	1990-1996
Kalundborg-Samsø	1990+
Kalundborg-Århus	1990+
Korsør-Nyborg, DSB	1990-1997
Korsør-Nyborg, Vognmandsruten	1990-1999
København-Rønne	1990-2004
Køge-Rønne	2004+
Sjællands Odde-Ebeltoft	1990+
Sjællands Odde-Århus	1999+
Tårs-Spodsbjerg	1990+

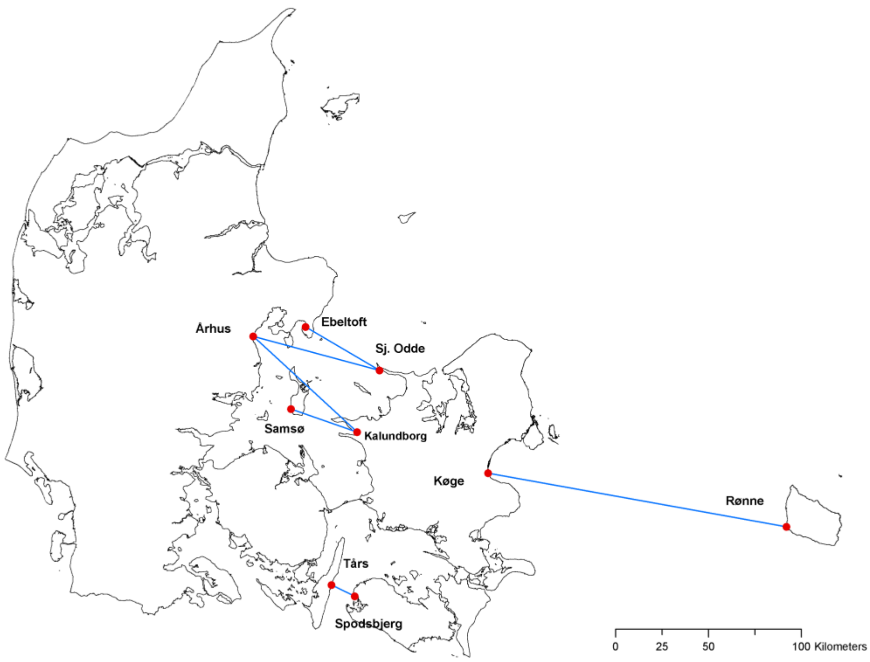

Figure 3.3.50 Domestic regional ferry routes in Denmark (2011).

The number of round trips pr ferry route from 1990 to 2012 is provided by Statistics Denmark (2012), see Figure 3.3.51 (Esbjerg/Hanstholm/Hirtshals-Torshavn not shown). The traffic data are also listed in Annex 3.B.12, together with different ferry specific technical and operational data.

For each ferry, Annex 3.B.12 lists the relevant information as regards ferry route, name, year of service, engine size (MCR), engine type, fuel type, average load factor, auxiliary engine size and sailing time (single trip). There is a lack of historical traffic data for 1985-1989, and hence, data for 1990 is used for these years, to support the fuel consumption and emission calculations.

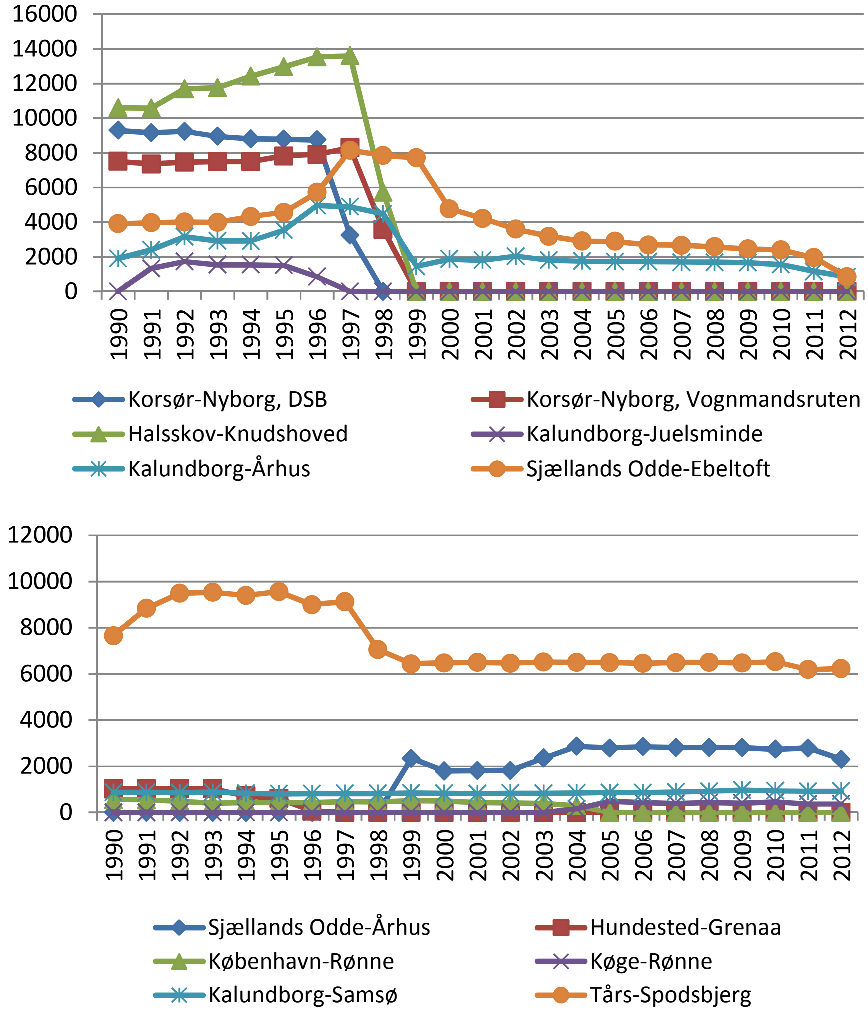

Figure 3.3.51 No. of round trips for the most important ferry routes in Denmark 1990-2012.

It is seen from Table 3.3.11 (and Figure 3.3.51) that several ferry routes were closed in the time period from 1996-1998, mainly due to the opening of the Great Belt Bridge (connecting Zealand and Funen) in 1997. Hundested-Grenaa and Kalundborg-Juelsminde was closed in 1996, Korsør-Nyborg (DSB) closed in 1997, and Halsskov-Knuds-hoved and Korsør-Nyborg (Vognmandsruten) was closed in 1998. The ferry line København-Rønne was replaced by Køge-Rønne in 2004 and from 1999 a new ferry connection was opened between Sjællands Odde and Århus.

For the local ferries, a bottom-up estimate of fuel consumption for 1996 has been taken from the Danish work in Wismann (2001). The latter project calculated fuel consumption and emissions for all sea transport in Danish waters in 1995/1996 and 1999/2000. In order to cover the entire 1990-2012 inventory period, the fuel figure for 1996 has been adjusted according to the developments in local ferry route traffic shown in Annex 3.B.12.

Fuel sold for freight transport by Royal Arctic Line between Aalborg (Denmark) and Greenland and by Eim Skip - East route between Aarhus (Denmark) and Torshavn (Faroe Islands) are included under other national sea transport in the Danish inventories. In both cases all fuel is being bought in Denmark (Rasmussen, 2013 and Thorarensen, 2013).

For the remaining part of the traffic between two Danish ports, other national sea transport, bottom-up estimates for fuel consumption have been calculated for the years 1995 and 1999 by Wismann (2007). These fuel consumption estimates are used as activity data for the inventory years until 1995 and 1999 onwards. Interpolated figures are used for the inventory years 1996-1998.

The calculations use the database set up for Denmark in the Wismann (2001) study, with actual traffic data from the Lloyd's LMIS database (not including ferries). The database was split into three vessel types: bulk carriers, container ships, and general cargo ships; and five size classes: 0-1000, 1000-3000, 3000-10000, 10000-20000 and >20000 DTW. The calculations assume that bulk carriers and container ships use heavy fuel oil, and that general cargo ships use gas oil. For further information regarding activity data for local ferries and other national sea transport, please refer to Winther (2008).

The fleet activity data for regional ferries, and the fleet activity based fuel consumption estimates for local ferries and other national sea transport replace the fuel based activity data which originated directly from the DEA statistics.

Other sectors

The activity data for military, railways, international sea transport and fishery consists of fuel consumption information from DEA (2013). For international sea transport, the basis is in principle fuel sold in Danish ports for vessels with a foreign destination, as prescribed by the IPCC guidelines.

However, it must be noted that fuel sold for sailing activities between Denmark and Greenland/Faroe Islands are reported as international in the DEA energy statistics. Hence, for inventory purposes in order to follow the IPCC guidelines the bottom-up fuel estimates for the ferry routes Esbjerg/Hanstholm/Hirshals-Torshavn, and fuel reports from Royal Arctic Line and Eim Skip is being subtracted from the fuel sales figures for international sea transport prior to inventory fuel input.

For fisheries, the calculation methodology described by Winther (2008) remains fuel based. However, the input fuel data differ from the fuel sales figures previously used. The changes are the result of further data processing of the DEA reported gas oil sales for national sea transport and fisheries, prior to inventory input. For years when the fleet activity estimates of fuel consumption for national sea transport are smaller than reported fuel sold, fuel is added to fisheries in the inventory. Conversely, lower fuel sales in relation to bottom-up estimates for national sea transport means that fuel is being subtracted from the original fisheries fuel sales figure in order to make up the final fuel consumption input for fisheries.

The updated fuel consumption time series for national sea transport lead, in turn, to changes in the energy statistics for fisheries (gas oil), industry (heavy fuel oil), and international sea transport, so the national energy balance can remain unchanged.

For all sectors, fuel-use figures are given in Annex 2.B.14 for 2012 in CollectER format.

Emission legislation

For non-road working machinery and equipment, and recreational craft and railway locomotives/motor cars, the emission directives list specific emission limit values (g pr kWh) for CO, VOC, NO_x (or VOC + NO_x) and TSP, depending on engine size (kW for diesel, ccm for gasoline) and date of implementation (referring to engine market date).

For diesel, the directives 97/68 and 2004/26 relate to non-road machinery other than agricultural and forestry tractors and the directives have different implementation dates for machinery operating under transient and constant loads. The latter directive also comprises emission limits for railway machinery. For tractors the relevant directives are 2000/25 and 2005/13. For gasoline, the directive 2002/88 distinguishes between hand-held (SH) and not hand-held (NS) types of machinery.

For engine type approval, the emissions (and fuel consumption) are measured using various test cycles (ISO 8178). Each test cycle consists of a number of measurement points for specific engine loads during constant operation. The specific test cycle used depends on the machinery type in question and the test cycles are described in more details in the directives.

Table 3.3.12 Overview of EU emission directives relevant for diesel fuelled non-road machinery.

Stage/Engine	CO	VOC	NO_x	VOC+NO_x	PM	Diesel machinery			Tractors	
size [kW]							Implement. date		EU	Implement.
			[g pr kWh]			EU Directive	Transient	Constant	Directive	date
Stage I										
37<=P<75	6.5	1.3	9.2	-	0.85	97/68	1/4 1999	-	2000/25	1/7 2001
Stage II										
130<=P<560	3.5	1	6	-	0.2	97/68	1/1 2002	1/1 2007	2000/25	1/7 2002
75<=P<130	5	1	6	-	0.3		1/1 2003	1/1 2007		1/7 2003
37<=P<75	5	1.3	7	-	0.4		1/1 2004	1/1 2007		1/1 2004
18<=P<37	5.5	1.5	8	-	0.8		1/1 2001	1/1 2007		1/1 2002
Stage IIIA										
130<=P<560	3.5	-	-	4	0.2	2004/26	1/1 2006	1/1 2011	2005/13	1/1 2006
75<=P<130	5	-	-	4	0.3		1/1 2007	1/1 2011		1/1 2007
37<=P<75	5	-	-	4.7	0.4		1/1 2008	1/1 2012		1/1 2008
19<=P<37	5.5	-	-	7.5	0.6		1/1 2007	1/1 2011		1/1 2007
Stage IIIB										
130<=P<560	3.5	0.19	2	-	0.025	2004/26	1/1 2011	-	2005/13	1/1 2011
75<=P<130	5	0.19	3.3	-	0.025		1/1 2012	-		1/1 2012
56<=P<75	5	0.19	3.3	-	0.025		1/1 2012	-		1/1 2012
37<=P<56	5	-	-	4.7	0.025		1/1 2013	-		1/1 2013
Stage IV										
130<=P<560	3.5	0.19	0.4	-	0.025	2004/26	1/1 2014		2005/13	1/1 2014
56<=P<130	5	0.19	0.4	-	0.025		1/10 2014			1/10 2014

Table 3.3.13 Overview of the EU Emission Directive 2002/88 for gasoline fuelled non-road machinery.

	Category	Engine size [ccm]	CO [g pr kWh]	HC [g pr kWh]	NO_x [g pr kWh]	HC+NO_x [g pr kWh]	Implement. date
	Stage I						
Hand held	SH1	S<20	805	295	5.36	-	1/2 2005
	SH2	20=<S<50	805	241	5.36	-	1/2 2005
	SH3	50=<S	603	161	5.36	-	1/2 2005
Not hand held	SN3	100=<S<225	519	-	-	16.1	1/2 2005
	SN4	225=<S	519	-	-	13.4	1/2 2005
	Stage II						
Hand held	SH1	S<20	805	-	-	50	1/2 2008
	SH2	20=<S<50	805	-	-	50	1/2 2008
	SH3	50=<S	603	-	-	72	1/2 2009
Not hand held	SN1	S<66	610	-	-	50	1/2 2005
	SN2	66=<S<100	610	-	-	40	1/2 2005
	SN3	100=<S<225	610	-	-	16.1	1/2 2008
	SN4	225=<S	610	-	-	12.1	1/2 2007

For recreational craft, Directive 2003/44 comprises the emission legislation limits for diesel engines, and for 2-stroke and 4-stroke gasoline engines, respectively. The CO and VOC emission limits depend on engine size (kW) and the inserted parameters presented in the calculation formulas in Table 3.3.14a. For NO_x, a constant limit value is given for each of the three engine types. For TSP, the constant emission limit regards diesel engines only.

In Table 3.3.14b the Stage II emission limits are shown for recreational craft. CO and HC+NOx limits are provided for gasoline engines depending on the rated engine power and the engine type (stern-drive vs. outboard) while CO, HC+NOx, and particulate emission limits are defined for Compression Ignition (CI) engines depending on the rated engine power and the swept volume.

Table 3.3.14a Overview of the EU Emission Directive 2003/44 for recreational craft.

Engine type	Impl. date	CO=A+B/P^n			HC=A+B/P^n			NO_x	TSP
		A	B	n	A	B	n		
2-stroke gasoline	1/1 2007	150.0	600.0	1.0	30.0	100.0	0.75	10.0	-
4-stroke gasoline	1/1 2006	150.0	600.0	1.0	6.0	50.0	0.75	15.0	-
Diesel	1/1 2006	5.0	0.0	0	1.5	2.0	0.5	9.8	1.0

Table 3.3.14b Overview of the EU Emission Directive 2013/53 for recreational craft.

Diesel engines					
Swept Volume, SV	Rated Engine Power, P_N	Impl. Date	CO	HC + NO_x	PM
l/cyl.	kW		g/kWh	g/kWh	g/kWh
SV < 0.9	P_N < 37				
	37 <= P_N < 75 (*)	18/1 2017	5	4.7	0.30
	75 <= P_N < 3 700	18/1 2017	5	5.8	0.15
0.9 <= SV < 1.2	P_N < 3 700	18/1 2017	5	5.8	0.14
1.2 <= SV < 2.5		18/1 2017	5	5.8	0.12
2.5 <= SV < 3.5		18/1 2017	5	5.8	0.12
3.5 <= SV < 7.0		18/1 2017	5	5.8	0.11
Gasoline engines					
Engine type	Rated Engine Power, P_N		CO	HC + NO_x	PM
	kW		g/kWh	g/kWh	g/kWh
Stern-drive and inboard engines	P_N <= 373	18/1 2017	75	5	-
	373 <= P_N <= 485	18/1 2017	350	16	-
	P_N > 485	18/1 2017	350	22	-
Outboard engines and PWC engines (**)	P_N <= 4.3	18/1 2017	500 – (5.0 x P_N)	15.7 + ($50/PN^{0.9}$)	-
	4.3 <= P_N <= 40	18/1 2017	500 – (5.0 x P_N)	15.7 + ($50/PN^{0.9}$)	-
	P_N > 40	18/1 2017	300		-

(*) Alternatively, this engine segment shall not exceed a PM limit of 0.2 g/kWh and a combined HC + NO_x limit of 5.8 g/kWh.
(**) Small and medium size manufacturers making outboard engines <= 15 kW have until 18/1 2020 to comply.

Table 3.3.15 Overview of the EU Emission Directive 2004/26 for railway locomotives and motorcars.

	Engine size [kW]		CO [g pr kWh]	HC [g pr kWh]	NOx [g pr kWh]	HC+NOX [g pr kWh]	PM [g pr kWh]	Implement. date
Locomotives	Stage IIIA							
	130<=P<560	RL A	3.5	-	-	4	0.2	1/1 2007
	560<P	RH A	3.5	0.5	6	-	0.2	1/1 2009
	2000<=P and piston displacement >= 5 l/cyl.	RH A	3.5	0.4	7.4	-	0.2	1/1 2009
	Stage IIIB	RB	3.5	-	-	4	0.025	1/1 2012
Motor cars	Stage IIIA							
	130<P	RC A	3.5	-	-	4	0.2	1/1 2006
	Stage IIIB							
	130<P	RC B	3.5	0.19	2	-	0.025	1/1 2012

Aircraft engine emissions of NO_x, CO, VOC and smoke are regulated by ICAO (International Civil Aviation Organization). The engine emission certification standards are contained in Annex 16 — Environmental Protection, Volume II — Aircraft Engine Emissions to the Convention on International Civil Aviation (ICAO Annex 16, 1993). The emission standards relate to the total emissions (in grams) from the so-called LTO (Landing and Take Off) cycle divided by the rated engine thrust (kN). The ICAO LTO cycle contains the idealised aircraft movements below 3000 ft (915 m) during approach, landing, airport taxiing, take off and climb out.

For smoke all aircraft engines manufactured from 1 January 1983 have to meet the emission limits agreed by ICAO. For NO_x, CO, VOC The emission legislation is relevant for aircraft engines with a rated engine thrust larger than 26.7 kN. In the case of CO and VOC, the ICAO regulations apply for engines manufactured from 1 January 1983.

For NO_x, the emission regulations fall in four categories

a) For engines of a type or model for which the date of manufacture of the first individual production model is on or before 31 December 1995, and for which the production date of the individual engine is on or before 31 December 1999.
b) For engines of a type or model for which the date of manufacture of the first individual production model is after 31 December 1995, or for individual engines with a production date after 31 December 1999.
c) For engines of a type or model for which the date of manufacture of the first individual production model is after 31 December 2003.
d) For engines of a type or model for which the date of manufacture of the first individual production model is after 31 December 2007.

The regulations published by ICAO are given in the form of the total quantity of pollutants (D_p) emitted in the LTO cycle divided by the maximum sea level thrust (F_{oo}) and plotted against engine pressure ratio at maximum sea level thrust.

The limit values for NO_x are given by the formulae in Table 3.3.16.

Table 3.3.16 Current certification limits for NO_x for turbo jet and turbo fan engines.

	Engines first produced before 31.12.1995 & for engines manufactured up to 31.12.1999	Engines first produced after 31.12.1995 & for engines manufactured after 31.12.1999	Engines for which the date of manufacture of the first individual production model was after 31 December 2003	Engines for which the date of manufacture of the first individual production model was after 31 December 2007
Applies to engines >26.7 kN	$Dp/F_{oo} = 40 + 2\pi_{oo}$	$Dp/F_{oo} = 32 + 1.6\pi_{oo}$		
Engines of pressure ratio less than 30				
Thrust more than 89 kN			$Dp/F_{oo} = 19 + 1.6\pi_{oo}$	$Dp/F_{oo} = 16.72 + 1.4080\pi_{oo}$
Thrust between 26.7 kN and not more than 89 kN			$Dp/F_{oo} = 37.572 + 1.6\pi_{oo} - 0.208F_{oo}$	$Dp/F_{oo} = 38.54862 + (1.6823\pi_{oo}) - (0.2453F_{oo}) - (0.00308\pi_{oo}F_{oo})$
Engines of pressure ratio more than 30 and less than 62.5				
Thrust more than 89 kN			$Dp/F_{oo} = 7+2.0\pi_{oo}$	$Dp/F_{oo} = -1.04+ (2.0*\pi_{oo})$
Thrust between 26.7 kN and not more than 89 kN			$Dp/F_{oo} = 42.71 +1.4286\pi_{oo} - 0.4013F_{oo} +0.00642\pi_{oo}F_{oo}$	$Dp/F_{oo} = 46.1600 + (1.4286\pi_{oo}) - (0.5303F_{oo}) - (0.00642\pi_{oo}F_{oo})$
Engines with pressure ratio 82.6 or more			$Dp/F_{oo} = 32+1.6\pi_{oo}$	$Dp/F_{oo} = 32+1.6\pi_{oo}$

Source: International Standards and Recommended Practices, Environmental Protection, ICAO Annex 16 Volume II Part III Paragraph 2.3.2, 2nd edition July 1993, plus amendments: Amendment 3 (20 March 1997),Amendment 4 (4 November 1999),Amendment 5 (24 November 2005).

where:

D_p = the sum of emissions in the LTO cycle in g.

F_{oo} = thrust at sea level take-off (100 %).

π_{oo} = pressure ratio at sea level take-off thrust point (100 %).

The equivalent limits for HC and CO are D_p/F_{oo} = 19.6 for HC and D_p/F_{oo} = 118 for CO (ICAO Annex 16 Vol. II paragraph 2.2.2). Smoke is limited to a regulatory smoke number = 83 $(F_{oo})^{-0.274}$ or a value of 50, whichever is the lower.

A further description of the technical definitions in relation to engine certification as well as actual engine exhaust emission measurement data can be found in the ICAO Engine Exhaust Emission Database. The latter database is accessible from http://www.caa.co.uk, hosted by the UK Civil Aviation Authority.

For seagoing vessels, NO_x emissions are regulated as explained in Marpol 73/78 Annex VI, formulated by IMO (International Maritime Organisation). The legislation is relevant for diesel engines with a power output higher than 130 kW, which are installed on a ship constructed on or after 1 January 2000 and diesel engines with a power output higher than 130 kW which undergo major conversion on or after 1 January 2000.

The NO_x emission limits for ship engines in relation to their rated engine speed (n) given in RPM (Revolutions Pr Minute) are the following:

- 17 g pr kWh, n < 130 RPM
- 45 x n-0.2 g pr kWh, 130 ≤ n < 2000 RPM
- 9.8 g pr kWh, n ≥ 2000 RPM

Further, the Marine Environment Protection Committee (MEPC) of IMO has agreed amendments to MARPOL Annex VI in October 2008 in order to strengthen the emission standards for NO_x and the sulphur contents of heavy fuel oil used by ship engines.

For NO_x emission regulations, a three tiered approach is considered, which comprises the following:

- Tier I: Diesel engines (> 130 kW) installed on a ship constructed on or after 1 January 2000 and prior to 1 January 2011.
- Tier II: Diesel engines (> 130 kW) installed on a ship constructed on or after 1 January 2011.
- Tier III[8]: Diesel engines (> 130 kW) installed on a ship constructed on or after 1 January 2016.

As for the existing NO_x emission limits, the new Tier I-III NO_x legislation values rely on the rated engine speeds. The emission limit equations are shown in Table 3.3.17.

[8] For ships operating in a designated Emission Control Area. Outside a designated Emission Control Area, Tier II limits apply.

Table 3.3.17 Tier I-III NOx emission limits for ship engines (amendments to MARPOL Annex VI).

	NO_x limit	RPM (n)
Tier I	17 g pr kWh	n < 130
	45 · n-0.2 g pr kWh	130 ≤ n < 2000
	9,8 g pr kWh	n ≥ 2000
Tier II	14.4 g pr kWh	n < 130
	44 · n-0.23 g pr kWh	130 ≤ n < 2000
	7.7 g pr kWh	n ≥ 2000
Tier III	3.4 g pr kWh	n < 130
	9 · n-0.2 g pr kWh	130 ≤ n < 2000
	2 g pr kWh	n ≥ 2000

The Tier I emission limits are identical with the existing emission limits from MARPOL Annex VI.

Also agreed by IMO in October 2008, the NO_x Tier I limits are to be applied for existing engines with a power output higher than 5000 kW and a displacement per cylinder at or above 90 litres, installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000.

In relation to the sulphur content in heavy fuel and marine gas oil used by ship engines, Table 3.3.18 shows the current legislation in force, and the amendment of MARPOL Annex VI agreed by IMO in October 2008.

Table 3.3.18 Current legislation in relation to marine fuel quality.

Legislation		Heavy fuel oil		Gas oil	
		S- %	Implement. date (day/month/year)	S- %	Implement. date (day/month/year)
EU-directive 93/12		None		0.2[1]	01.10.1994
EU-directive 1999/32		None		0.2	01.01.2000
EU-directive 2005/33[2]	SECA - Baltic sea	1.5	11.08.2006	0.1	01.01.2008
	SECA - North sea	1.5	11.08.2007	0.1	01.01.2008
	Outside SECA's	None		0.1	01.01.2008
MARPOL Annex VI	SECA – Baltic sea	1.5	19.05.2006		
	SECA – North sea	1.5	21.11.2007		
	Outside SECA	4.5	19.05.2006		
MARPOL Annex VI amendments	SECA's	1	01.03.2010		
	SECA's	0.1	01.01.2015		
	Outside SECA's	3.5	01.01.2012		
	Outside SECA's	0.5	01.01.2020[3]		

[1] Sulphur content limit for fuel sold inside EU.

[2] From 1.1.2010 fuel with a sulphur content higher than 0.1 % must not be used in EU ports for ships at berth exceeding two hours.

[3] Subject to a feasibility review to be completed no later than 2018. If the conclusion of such a review becomes negative the effective date would default 1 January 2025.

For non-road machinery, the EU directive 2003/17/EC gives a limit value of 10 ppm sulphur in diesel (from 2011).

Emission factors

The SO_2 emission factors are fuel related, and rely on the sulphur contents given in the relevant EU fuel directives or in the Danish legal announcements. However, for jet fuel the default factor from IPCC (1996) is used.

Road transport diesel is assumed to be used by engines in military and railways, and road transport gasoline is assumed to be used by non-road working machinery and recreational craft. Hence, these types of machinery have the same SO_2 emission factors, as for road transport.

For all mobile sources, the emission factor source for NH_3, heavy metals and PAH is the EMEP/EEA guidebook (EMEP/EEA, 2013). The heavy metal emission factors for road transport and other mobile sources except national sea transport and fisheries originate from Winther and Slentø (2010). For civil aviation jet fuel, no heavy metal emission factors are proposed due to lack of data.

In the case of military ground equipment, aggregated emission factors for gasoline and diesel are derived from road traffic emission simulations. For piston engine aircraft using aviation gasoline, aggregated emission factors for conventional cars are used.

For railways, specific Danish measurements from the Danish State Railways (DSB) (Delvig, 2013) are used to calculate the emission factors of NO_x, VOC, CO and TSP, and a NMVOC/CH_4 split is made based on expert judgment.

For agriculture, forestry, industry, household gardening and inland waterways, the NO_x, VOC, CO and TSP emission factors are derived from various European measurement programmes; see IFEU (2004) and Winther et al. (2006). The NMVOC/CH_4 split is taken from USEPA (2004).

For national sea transport and fisheries, the NO_x emission factors predominantly come from the engine manufacturer MAN Diesel, as a function of engine production year. The CO, VOC and TSP emission factors come from the Danish TEMA2000 emission model (Trafikministeriet, 2000), whereas the PM_{10} and $PM_{2.5}$ size fractions are obtained from MAN Diesel.

Specifically for the ferries used by Mols Linjen new NO_x, VOC and CO emission factors are provided by Kristensen (2008), originating from measurement results by Hansen et al. (2004), Wismann (1999) and PHP (1996). Kristensen (2013) has provided complimentary emission factor data for new ferries.

For ship engines VOC/CH_4 splits are taken from EMEP/EEA (2013), and all emission factors are shown in Annex 2.B.13.

The source for aviation (jet fuel) emission factors is the EMEP/EEA guidebook (EMEP/EEA, 2013). For a number of different representative aircraft types, the EMEP/EEA guidebook comprises fuel flow and NO_x, CO and VOC emission indices for the four LTO modes and distance based emission factors for cruise.

For all sectors, emission factors are given in CollectER format in Annex 2.B.15 for 2012. Table 3.3.19 shows the emission factors for SO_2, NO_X, NMVOC, CO, NH_3 and TSP in CollectER format used to calculate the emissions from other mobile sources in Denmark.

Factors for deterioration, transient loads and gasoline evaporation for non-road machinery

The emission effects of engine wear are taken into account for diesel and gasoline engines by using the so-called deterioration factors. For diesel engines alone, transient factors are used in the calculations, to account for the emission changes caused by varying engine loads. The evaporative emissions of NMVOC are estimated for gasoline fuelling and tank evaporation. The factors for deterioration, transient loads and gasoline evaporation are taken from IFEU(2004), and are shown in Annex 2.B.10. For more details regarding the use of these factors, please refer to paragraph 3.1.4 or Winther et al. (2006).

Table 3.3.19 Fuel based emission factors for SO_2, NO_X, NMVOC, CO, NH_3 and TSP for other mobile sources in Denmark (2012).

			Emission factors[1] [g pr GJ]					
SNAP ID	Category	Fuel type	SO_2	NO_X	NMVOC	CO	NH_3	TSP
080100	Military	AvGas	22.99	859,00	1 242,60	6 972,00	1,60	10,00
080100	Military	Diesel	0.44	356,14	12,51	92,27	0,38	11,76
080100	Military	Gasoline	0.44	127,06	160,98	1 522,54	24,95	1,51
080100	Military	Jet fuel	22.99	250,57	24,94	229,89	0,00	1,16
080200	Railways	Diesel	0.47	751,17	56,43	125,99	0,20	24,24
080300	Inland waterways	Diesel	46.84	817,03	156,52	439,34	0,17	95,54
080300	Inland waterways	Gasoline	0.46	567,23	877,36	11 258,30	0,10	17,43
080402	National sea traffic	Diesel	46.84	1 081,18	50,38	111,43	0,00	21,55
080402	National sea traffic	LPG	0.00	1 249,00	384,94	443,00	0,00	0,20
080402	National sea traffic	Residual oil	489.00	1 925,97	63,12	208,23	0,00	43,98
080403	Fishing	Diesel	46.84	1 340,90	57,72	190,43	0,00	21,55
080403	Fishing	LPG	0.00	1 249,00	384,94	443,00	0,00	0,20
080404	International sea traffic	Diesel	46.84	1 585,62	57,71	190,37	0,00	21,55
080404	International sea traffic	Residual oil	489.00	2 119,92	63,46	209,36	0,00	43,98
080501	Air traffic, Dom. < 3000 ft.	AvGas	22.83	859,00	1 242,60	6 972,00	1,60	10,00
080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22.99	309,39	16,41	147,19	0,00	1,16
080502	Air traffic, Int. < 3000 ft.	AvGas	22.83	859,00	1 242,60	6 972,00	1,60	10,00
080502	Air traffic, Int. < 3000 ft.	Jet fuel	22.99	298,57	38,17	184,54	0,00	1,16
080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22.99	278,02	6,83	95,20	0,00	1,16
080504	Air traffic, Int. > 3000 ft.	Jet fuel	22.99	238,74	6,01	48,19	0,00	1,16
080600	Agriculture	Diesel	0.47	530,77	48,98	308,69	0,18	39,27
080600	Agriculture	Gasoline	0.46	110,77	1 184,09	21 731,05	1,51	31,03
080700	Forestry	Diesel	0.47	347,95	25,87	226,21	0,18	23,40
080700	Forestry	Gasoline	0.46	54,79	3 964,24	17 915,98	0,09	82,19
080800	Industry	Diesel	0.47	489,22	54,19	306,75	0,18	47,52
080800	Industry	Gasoline	0.46	212,00	1 528,15	14 105,02	0,10	20,45
080800	Industry	LPG	0.00	1 328,11	146,09	104,85	0,21	4,89
080900	Household and gardening	Gasoline	0.46	107,75	2 283,84	30 678,27	0,09	17,21
081100	Commercial and institutional	Gasoline	0.46	93,28	1 548,54	30 913,57	0,09	28,53
080501	Air traffic, Dom. < 3000 ft.	AvGas	22.83	859,00	1 242,60	6 972,00	1,60	10,00
080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22.99	302,09	18,59	191,64	0,00	1,16
080502	Air traffic, Int. < 3000 ft.	AvGas	22.83	859,00	1 242,60	6 972,00	1,60	10,00
080502	Air traffic, Int. < 3000 ft.	Jet fuel	22.99	339,36	33,80	237,36	0,00	1,16
080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22.99	299,41	9,63	50,21	0,00	1,16
080504	Air traffic, Int. > 3000 ft.	Jet fuel	22.99	309,94	8,90	31,29	0,00	1,16

[1] References. SO_2: Country-specific; Military: Aggregated emission factors for road transport; Railways (NO_x, NMVOC and TSP): Danish State Railways; Agriculture, forestry, industry, household gardening and inland waterways (NO_x, VOC and TSP): IFEU (2004); National sea transport and fishing: MAN B&W (NO_x) and TEMA2000 (NMVOC, TSP); Aviation - jet fuel (NO_X, NMVOC and TSP): EMEP/EEA; Aviation - av.gasoline: Aggregated emission factors for conventional gasoline cars.

3.3.4 Calculation method

Air traffic

For aviation, the domestic and international estimates are made separately for landing and take-off (LTOs < 3000 ft), and cruising (> 3000 ft).

By using the LTO mode specific fuel flow and emission indices from EMEP/EEA (2013), the fuel consumption and emission factors for the full LTO cycle can be estimated for each of the representative aircraft types used in the Danish inventory.

The fuel consumption for one LTO cycle is calculated according to the following sum formula:

$$FC_{LTO}^{a} = \sum_{m=1}^{4} t_{m} \cdot ff_{a,m} \tag{13}$$

Where FC = fuel consumption (kg), m = LTO mode (approach/landing, taxiing, take off, climb out), t = times in mode (s), ff = fuel flow (kg pr s), a = representative aircraft type.

The emissions for one LTO cycle are estimated as follows:

$$E_{LTO}^{a} = \sum_{m=1}^{4} FC_{a,m} \cdot EI_{a,m} \tag{14}$$

Due to lack of specific airport data, for approach/descent, take off and climb out, standardised times-in-modes of 4, 0.7 and 2.2 mins are used as defined by ICAO (ICAO, 1995), whereas for taxiing the appropriate time interval is 13 mins in Copenhagen Airport and 5 mins in other airports present in the Danish inventory.

For each representative aircraft type, the calculated fuel consumption and emission factors per LTO are shown in Annex 2.B.10 for Copenhagen Airport and other airports.

The calculations for cruise use the distance specific fuel consumption and emissions given by EMEP/EEA (2013) per representative aircraft type. Data interpolations or extrapolations are made – in each case determined by the great circle distance between the origin and the destination airports.

If the great circle distance, y, is smaller than the maximum distance for which fuel consumption and emission data are given in the EMEP/EEA data bank the fuel consumption or emission E (y) becomes:

$$E(y) = E_{x_i} + \frac{(y - x_i)}{x_{i+1} - x_i} \cdot (E_{x_{i+1}} - E_{x_i}) \quad y<x_{max},\ i = 0,1,2\ldots max-1 \tag{15}$$

In (15) x_i and x_{max} denominate the separate distances and the maximum distance, respectively, with known fuel consumption and emissions. If the flight distance y exceeds x_{max} the maximum figures for fuel consumption and emissions must be extrapolated and the equation then becomes:

$$E(y) = E_{x_{max}} + \frac{(y - x_{max})}{x_{max} - x_{max-1}} \cdot (E_{x_{max}} - E_{x_{max-1}}) \quad y>x_{max} \tag{16}$$

Total results are summed up and categorised according to each flight's destination airport code in order to distinguish between domestic and international flights.

Annex 2.B.10 shows the average fuel consumption and emission factors per representative aircraft type for cruise flying, as well as total distance flown, for 2011[9]. The factors are split between Copenhagen Airport and other airports and distinguish between domestic and international flights.

Specifically for flights between Denmark and Greenland or the Faroe Islands, for each representative aircraft type, the flight distances are directly shown in Annex 2.B.10, which go into the cruise calculation expressions 15 and 16.

The overall fuel precision in the model is around 0.8, derived as the fuel ratio between model estimates and statistical sales. The fuel difference is accounted for by adjusting cruising fuel consumption and emissions in the model according to domestic and international cruising fuel shares.

Prior to 2001, the calculation procedure was first to estimate each year's fuel consumption and emissions for LTO. Secondly, total cruising fuel consumption was found year by year as the statistical fuel consumption total minus the calculated fuel consumption for LTO. Lastly, the cruising fuel consumption was split into a domestic and international part by using the results from a Danish city-pair emission inventory in 1998 (Winther, 2001a). For more details of this latter fuel allocation procedure, see Winther (2001b).

Non-road working machinery and recreational craft

Prior to adjustments for deterioration effects and transient engine operations, the fuel consumption and emissions in year X, for a given machinery type, engine size and engine age, are calculated as:

$$E_{Basis}(X)_{i,j,k} = N_{i,j,k} \cdot HRS_{i,j,k} \cdot P \cdot LF_i \cdot EF_{y,z} \tag{17}$$

where E_{Basis} = fuel consumption/emissions in the basic situation, N = number of engines, HRS = annual working hours, P = average rated engine size in kW, LF = load factor, EF = fuel consumption/emission factor in g pr kWh, i = machinery type, j = engine size, k = engine age, y = engine-size class and z = emission level. The basic fuel consumption and emission factors are shown in Annex 2.B.11.

The deterioration factor for a given machinery type, engine size and engine age in year X depends on the engine-size class (only for gasoline), y, and the emission level, z. The deterioration factors for diesel and gasoline 2-stroke engines are found from:

$$DF_{i,j,k}(X) = \frac{K_{i,j,k}}{LT_i} \cdot DF_{y,z} \tag{18}$$

where DF = deterioration factor, K = engine age, LT = lifetime, i = machinery type, j = engine size, k = engine age, y = engine-size class and z = emission level.

For gasoline 4-stroke engines the deterioration factors are calculated as:

$$DF_{i,j,k}(X) = \sqrt{\frac{K_{i,j,k}}{LT_i}} \cdot DF_{y,z} \tag{19}$$

[9] Excluding flights for Greenland and the Faroe Islands.

The deterioration factors inserted in (18) and (19) are shown in Annex 2.B.11. No deterioration is assumed for fuel consumption (all fuel types) or for LPG engine emissions and, hence, DF = 1 in these situations.

The transient factor for a given machinery type, engine size and engine age in year X, relies only on emission level and load factor, and is denominated as:

$$TF_{i,j,k}(X) = TF_z \tag{20}$$

Where i = machinery type, j = engine size, k = engine age and z = emission level.

The transient factors inserted in (20) are shown in Annex 2.B.11. No transient corrections are made for gasoline and LPG engines and, hence, TF_z = 1 for these fuel types.

The final calculation of fuel consumption and emissions in year X for a given machinery type, engine size and engine age, is the product of the expressions 17-20:

$$E(X)_{i,j,k} = E_{Basis}(X)_{i,j,k} \cdot TF(X)_{i,j,k} \cdot (1 + DF(X)_{i,j,k}) \tag{21}$$

The evaporative hydrocarbon emissions from fuelling are calculated as:

$$E_{Evap,fueling,i} = FC_i \cdot EF_{Evap,fueling} \tag{22}$$

Where $E_{Evap,fueling}$, = hydrocarbon emissions from fuelling, i = machinery type, FC = fuel consumption in kg, $EF_{Evap,fueling}$ = emission factor in g NMVOC pr kg fuel.

For tank evaporation, the hydrocarbon emissions are found from:

$$E_{Evap,\tan k,i} = N_i \cdot EF_{Evap,\tan k,i} \tag{23}$$

Where $E_{Evap,tank,i}$ = hydrocarbon emissions from tank evaporation, N = number of engines, i = machinery type and $EF_{Evap,fueling}$ = emission factor in g NMVOC pr year.

Ferries, other national sea transport and fisheries

The fuel consumption and emissions in year X, for regional ferries are calculated as:

$$E(X) = \sum_i N_i \cdot T_i \cdot S_{i,j} \cdot P_i \cdot LF_j \cdot EF_{k,l,y} \tag{24}$$

Where E = fuel consumption/emissions, N = number of round trips, T = sailing time pr round trip in hours, S = ferry share of ferry service round trips, P = engine size in kW, LF = engine load factor, EF = fuel consumption/emission factor in g pr kWh, i = ferry service, j = ferry, k = fuel type, l = engine type, y = engine year.

For the remaining navigation categories, the emissions are calculated using a simplified approach:

$$E(X) = \sum_i EC_{i,k} EF_{k,l,y} \tag{25}$$

Where E = fuel consumption/emissions, EC = energy consumption, EF = fuel consumption/emission factor in g pr kg fuel, i = category (local ferries, other national sea, fishery, international sea), k = fuel type, l = engine type, y = average engine year.

The emission factor inserted in (25) is found as an average of the emission factors representing the engine ages which are comprised by the average lifetime in a given calculation year, X:

$$EF_{k,l,y} = \frac{\sum_{year=X}^{year=X-LT} EF_{k,l}}{LT_{k,l}} \tag{26}$$

Other sectors

For military and railways, the emissions are estimated with the simple method using fuel-related emission factors and fuel consumption from the DEA:

$$E = FC \cdot EF \tag{27}$$

where E = emission, FC = fuel consumption and EF = emission factor. The calculated emissions for other mobile sources are shown in CollectER format in Annex 2.B.15 for the years 2012 and as time series 1985-2012 in Annex 2.B.16 (NFR format).

Energy balance between DEA statistics and inventory estimates

Following convention rules, the DEA statistical fuel sales figures are the basis for the full Danish inventory. However, in some cases for mobile sources the DEA statistical sectors do not fully match the inventory sectors. This is the case for non-road machinery, where relevant DEA statistical sectors also include fuel consumed by stationary sources.

In other situations, fuel consumption figures estimated by DCE from specific bottom-up calculations are regarded as more reliable than DEA reported sales. This is the case for national sea transport.

In the following the transferral of fuel consumption data from DEA statistics into inventory relevant categories is explained for national sea transport and fisheries, non-road machinery and recreational craft, and road transport. A full list of all fuel consumption data, DEA figures as well as intermediate fuel consumption data, and final inventory input figures is shown in Annex 2.B.14.

National sea transport and fisheries

For national sea transport in Denmark, the fuel consumption estimates obtained by DCE (see 3.3.3 Activity data – national sea transport) are regarded as much more accurate than the DEA fuel sales data, since the large fluctuations in reported fuel sales cannot be explained by the actual development in the traffic between different national ports. As a consequence, the DCE bottom-up estimates are used in the Danish inventory for national sea transport.

There are different potential reasons for the differences between estimated fuel consumption and reported sales for national sea transport in Denmark. According to the DEA, the latter fuel differences are most likely explained by inaccurate costumer specifications made by the oil suppliers. This inaccuracy can be caused by a sector misallocation in the sales statistics between national sea transport and fisheries for gas oil, and between national sea transport and industry for heavy fuel oil (Peter Dal, DEA, personal communication, 2007). Further, fuel sold for vessels sailing between Denmark and Greenland/Faroe Islands are reported as international in the DEA statistics, and this fuel categorisation is different from the IPCC guideline definitions (see following paragraph “Bunkers”).

Following this, for fisheries and industry the updated fuel consumption time series for national sea transport lead, in turn, to changes in the fuel activity data for fisheries (gas oil), industry (heavy fuel oil) and international sea transport, so the national energy balance can remain unchanged.

For fisheries, fuel investigations made prior to the initiation of the work made by Winther (2008) have actually pointed out a certain area of inaccuracy in the DEA statistics. No engines installed in fishing vessels use heavy fuel oil, even though a certain amount of heavy fuel oil is listed in the DEA numbers for some statistical years (H. Amdissen, Danish Fishermen's Association, personal communication, 2006). Hence, for fisheries small amounts of fuel oil are transferred to national sea transport, and in addition small amounts of gasoline and diesel are transferred to recreational craft.

Non-road machinery and recreational craft

For diesel and LPG, the non-road fuel consumption estimated by DCE is partly covered by the fuel-use amounts in the following DEA sectors: agriculture and forestry, market gardening, and building and construction. The remaining quantity of non-road diesel and LPG is taken from the DEA industry sector.

For gasoline, the DEA residential sector, together with the DEA sectors mentioned for diesel and LPG, contribute to the non-road fuel consumption total. In addition, a certain amount of fuel from road transport is needed to reach the fuel-use goal.

The amount of diesel and LPG in DEA industry not being used by non-road machinery is included in the sectors, “Combustion in manufacturing industry” (0301) and “Non-industrial combustion plants” (0203) in the Danish emission inventory.

For recreational craft, the calculated fuel-use totals for diesel and gasoline are subsequently subtracted from the DEA fishery sector. For gasoline, the DEA reported fuel consumption for fisheries is far too small to fill the fuel gap, and hence the missing fuel amount is taken from the DEA road transport sector.

Bunkers

The distinction between domestic and international emissions from aviation and navigation should be in accordance with the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. For the national emission inventory this, in principle, means that fuel sold (and associated emissions) for flights/sea transportation starting from a seaport/airport in the Kingdom of Denmark, with destinations inside or outside the Kingdom of Denmark, are regarded as domestic or international, respectively.

Aviation

As prescribed by the IPCC guidelines, for aviation, the fuel consumption and emissions associated with flights inside the Kingdom of Denmark are counted as domestic.

This report includes flights from airports in Denmark and associated jet fuel sales. Hence, the flights between airports in Denmark and flights from Denmark to Greenland and the Faroe Islands are classified as domestic and flights from Danish airports with destinations outside the Kingdom of Denmark are classified as international flights.

In Greenland and in the Faroe Islands, the jet fuel sold is treated as domestic. This decision becomes reasonable when considering that almost no fuel is bunkered in Greenland/the Faroe Islands by flights other than those going to Denmark.

Navigation

In DEA statistics, the domestic fuel total consists of fuel sold to Danish ferries and other ships sailing between two Danish ports. The DEA international fuel total consists of the fuel sold in Denmark to international ferries, international warships, other ships with foreign destinations, transport to Greenland and the Faroe Islands, tank vessels and foreign fishing boats.

In order to follow the IPCC guidelines the bottom-up fuel estimates for the ferry routes between Denmark and the Faroe Islands, and freight transport between Denmark and Greenland/Faroe Islands are being subtracted from the fuel sales figures for international sea transport prior to inventory fuel input.

In Greenland, all marine fuel sales are treated as domestic. In the Faroe Islands, fuel sold in Faroese ports for Faroese fishing vessels and other Faroese ships is treated as domestic. The fuel sold to Faroese ships bunkering outside Faroese waters and the fuel sold to foreign ships in Faroese ports or outside Faroese waters is classified as international (Lastein and Winther, 2003).

Conclusively, the domestic/international fuel split (and associated emissions) for navigation is not determined with the same precision as for aviation. It is considered, however, that the potential of incorrectly allocated fuel quantities is only a small part of the total fuel sold for navigational purposes in the Kingdom of Denmark.

3.3.5 Uncertainties and time series consistency

Emission uncertainty estimates are made for road transport and other mobile sources using the guidelines formulated in the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000). However, for TSP the latter source indicates no uncertainty factor and, instead, this factor is based on expert judgement.

The activity data uncertainty factor is assumed to be 2 and 10 % for road transport and other mobile sources, respectively, based on expert judgement.

The uncertainty estimates should be regarded as preliminary only and may be subject to changes in future inventory documentation. The calculations are shown in Annex 2.B.17 for all emission components.

Table 3.3.20 Uncertainties for activity data, emission factors and total emissions in 2012 and as a trend.

	Emission factor uncertainties [%]		Emission uncertainties [%]	
Pollutant	Road	Other	Overall 2012	Trend
SO_2	50	50	49	3
NO_x	50	100	54	9
NMVOC	50	100	55	8
CO	50	100	62	17
NH_3	1 000	1 000	994	1 954
TSP	50	100	47	4
PM_{10}	50	100	50	4
$PM_{2.5}$	50	100	54	4
Arsenic	1 000	1 000	873	62
Cadmium	1 000	1 000	819	151
Chromium	1 000	1 000	822	192
Copper	1 000	1 000	999	5
Mercury	1 000	1 000	714	117
Nickel	1 000	1 000	930	34
Lead	1 000	1 000	863	12
Selenium	1 000	1 000	763	142
Zinc	1 000	1 000	939	33
Dioxins	1 000	1 000	731	150
Flouranthene	1 000	1 000	812	24
Benzo(b) flouranthene	1 000	1 000	791	52
Benzo(k) flouranthene	1 000	1 000	826	66
Benzo(a) pyrene	1 000	1 000	871	66
Benzo(g,h,i) perylene	1 000	1 000	819	82
indeno(1,2,3-c,d) pyrene	1 000	1 000	799	188
HCB	1 000	1 000	774	212
PCB	1 000	1 000	710	146

As regards time series consistency, background flight data cannot be made available on a city-pair level from 2000 or earlier. However, aided by LTO/aircraft statistics for these years and the use of proper assumptions, a good level of consistency is still obtained in this part of the transport inventory.

The time series of emissions for mobile machinery in the agriculture, forestry, industry, household and gardening (residential), and inland waterways (part of navigation) sectors are less certain than time series for other sectors, since DEA statistical figures do not explicitly provide fuel consumption information for working equipment and machinery.

3.3.6 Quality assurance/quality control (QA/QC)

It is the intention to publish every second year a sector report for road transport and other mobile sources. The last sector report concerned the 2010 inventory (Winther, 2012).

The QA/QC descriptions of the Danish emission inventories for transport are given in Nielsen et al. (2013).

3.3.7 Recalculations

The following recalculations and improvements of the emission inventories have been made since the emission reporting in 2012.

Road transport

Based on the updated version of COPERT IV launched in 2013, new vehicle sub categories have been introduced in the emission inventories for mopeds and passenger cars. For mopeds a division is now made between 2-stroke and 4-stroke engine technologies and for passenger cars small engine sizes below 0.8 l. for gasoline and below 1.4 l. for diesel have been included. Also NO_x emission factors for euro 5 diesel passenger cars have been updated in the model based on the new COPERT IV version.

Small errors in input gasoline fuel consumption for the years 2009-2011 and for input diesel fuel consumption in the years 2010-2011 have been corrected.

The percentage emission change interval and year of largest percentage differences (low %; high %, year) for the different emission components are: SO_2 (-0.5 %; 0.0 %, 2008), NO_x (0.0 %; 4.3 %, 2011), NMVOC (-4.1 %; -1.1 %, 2011), NH_3 (-1.3 %; 0.1 %, 2008) and TSP (-2.1 %; 0.0 %, 2011).

Navigation

Minor changes in ferry input data has been made for the years 2008-2011 causing minor emission changes for domestic navigation. The following largest percentage differences (in brackets) for domestic navigation are noted for: SO_2 (-0.2 %), NO_x (-0.3 %), NMVOC (-0.5 %), NH_3 (0.0 %) and TSP (-0.5 %).

Agriculture**/forestry/fisheries**

The number and engine size of machine pool tractors has been updated for the years 2007-2011. The number of ATV's has been changed for the years 2009-2011.

Errors in the fuel consumption for fisheries in 2000, 2010 and 2011 have been corrected.

In 2000 the following percentage differences (in brackets) for agriculture/forestry/fisheries are noted for: SO_2 (18.2 %), NO_x (11.1 %), NMVOC (3.1 %), NH_3 (0.0 %) and TSP (3.1 %). due to fuel consumption changes in fisheries.

For other years than 2000, the following largest percentage differences (in brackets) are noted for: SO_2 (-12.1 %), NO_x (-6.4 %), NMVOC (-0.8 %), NH_3 (1.7 %) and TSP (-2.2 %).

Industry

The number of mini loaders has been updated for the years 2004-2011.

The following largest percentage differences (in brackets) for industrial non road machinery are noted for: SO_2 (1.7 %), NO_x (1.6 %), NMVOC (1.9 %), NH_3 (1.6 %) and TSP (3.4 %).

Civil aviation

A small error in the NMVOC emission factor has been corrected for the years 1985-2011, due to CH_4 emission factor updates from 1985-2000 and corrections in the general NMVOC-CH_4 split of VOC. The emission factors are now in line with the factors proposed by the EMEP/EEA emission inventory guidebook. The NMVOC emission percentage differences are between -3.1 % and 1.8 %.

Military

Emission factors derived from the new road transport simulations have caused some emission changes from 1985-2011. The following largest percentage differences (in brackets) for military are noted for: SO_2 (0.0 %), NO_x (2.5 %), NMVOC (-1.1 %), NH_3 (0.2 %) and TSP (-1.7 %).

3.3.8 Improvements

Fuel consumption and emission factors for road transport vehicles will be updated by the time when new data becomes available from COPERT model updates.

3.3.9 References for transport and other mobile sources

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3.4 Fugitive emissions (NFR sector 1B)

This chapter includes fugitive emissions in the NFR sector 1B.

3.4.1 Source category description

According to the categorisation in the reporting format (NFR) for the UNECE CLRTAP fugitive emissions is a sub-category under the main-category Energy (Sector 1). Fugitive emissions (Sector 1B) is segmented into sub-categories covering emissions from solid fuels (1B1), oil (1B2a), natural gas (1B2b) and from venting and flaring (1B2c). The sub-sectors relevant for the Danish emission inventory are shortly described below according to Danish conditions:

- 1B1c Fugitive emission from solid fuels: Coal mining is not occurring in Denmark. However, a large part of the electricity supply is based on coal fired power plants, and emissions from storage and handling of coal do occur. Emissions from solid fuels are therefore only relevant for the Danish national emission inventories in the case of particulate emissions. Emissions of other pollutants (e.g. CO) are not reported, as these emissions should be included in the inventory for the countries where the coal mining occurs.
- 1B2a Fugitive emissions from oil include emissions from extraction, storage, and transmission of crude oil, distribution of oil products and emissions from refineries. Emission data for offshore extraction of oil and gas are not available separately, and consequently emissions from gas extraction are included in 1B2a.
- 1B2b Fugitive emissions from natural gas include emissions from transmission and distribution of natural gas. Emissions from gas extraction are included in 1B2a.
- 1B2c Venting and flaring include activities onshore and offshore. Flaring occur both offshore and onshore in gas treatment and storage plants and in refineries. Venting occur in gas storage plants. Venting of gas is not occurring in extraction and in refineries as controlled venting enters the gas flare system.

Activity data, emission factors and emissions are stored in the Danish emission database on SNAP sector categories (Selected Nomenclature for Air Pollution). In Table 3.4.1 the corresponding SNAP codes and NFR sectors relevant to fugitive emissions are shown. Further, the table holds the SNAP names for the SNAP codes and the overall activity (e.g. oil and natural gas).

Table 3.4.1 List of NFR sectors relevant for fugitive emissions, and the corresponding SNAP codes and emission sources.

NFR sector	SNAP ID	SNAP name	Source
1 B 1 a	050103	Storage of solid fuel	Coal mining and handling
1 B 2 a	040101	Petroleum products processing	Oil
1 B 2 a	040103	Sulphur Recovery Plants	Oil
1 B 2 a	040104	Storage and handling of petroleum products in refinery	Oil
1 B 2 a	050201	Land-based activities	Oil
1 B 2 a	050202 *	Off-shore activities	Oil
1 B 2 a	050503	Service stations (including refuelling of cars)	Oil
1 B 2 b	050601	Pipelines	Natural gas / transmission
1 B 2 b	050602	Distribution networks	Natural gas / distribution
1 B 2 c	050699	Venting in gas treatment facilities	Venting and flaring
1 B 2 c	090203	Flaring in oil refinery	Venting and flaring
1 B 2 c	090206	Flaring in oil and gas extraction	Venting and flaring

In the Danish emission inventory emissions from extraction of gas are included in "Extraction, 1st treatment and loading of liquid fossil fuels / Off-shore activities" (NFR 1B2a / SNAP 050202).

Table 3.4.2 summarizes the Danish fugitive emissions in 2012. The methodologies, activity data and emission factors used for calculation are described in the following chapters.

Table 3.4.2 Summary of the Danish fugitive emission in 2012. P refers to point source and A to area source.

IPCC code	SNAP code	Source	Pollutant	Emission	Unit
1B2a iv	40101	P	SO_2	0*	Mg
1B2a iv	40101	P	NMVOC	3932	Mg
1B2a iv	40103	P	SO_2	889	Mg
1B2a iv	40104	A	NMVOC	**	Mg
1B1a	50103	A	TSP	597	Mg
1B1a	50103	A	PM_{10}	239	Mg
1B1a	50103	A	$PM_{2.5}$	24	Mg
1B2a i	50201	A	NMVOC	1948	Mg
1B2a i	50202	A	NMVOC	1891	Mg
1B2a v	50503	A	NMVOC	977	Mg
1B2b	50601	A	NMVOC	4	Mg
1B2b	50603	A	NMVOC	57	Mg
1B2c	50699	P	NMVOC	20	Mg
1B2c	90203	P	SO_2	167	Mg
1B2c	90203	P	NO_x	23	Mg
1B2c	90203	P	NMVOC	32	Mg
1B2c	90203	P	CO	74	Mg
1B2c	90203	P	TSP	0.4	Mg
1B2c	90203	P	PM_{10}	0.4	Mg
1B2c	90203	P	$PM_{2.5}$	0.4	Mg
1B2c	90203	P	As	< 0.1	kg
1B2c	90203	P	Cd	0.2	kg
1B2c	90203	P	Cr	0.3	kg
1B2c	90203	P	Cu	0.2	kg
1B2c	90203	P	Hg	< 0.1	kg
1B2c	90203	P	Ni	0.4	kg

IPCC code	SNAP code	Source	Pollutant	Emission	Unit
Continued					
1B2c	90203	P	Pb	0.1	kg
1B2c	90203	P	Se	< 0.1	kg
1B2c	90203	P	Zn	5.9	kg
1B2c	90203	P	Dioxin	< 0.01	g
1B2c	90203	P	Benzo(b)flouranthene	< 0.01	kg
1B2c	90203	P	Benzo(k)flouranthene	< 0.01	kg
1B2c	90203	P	Benzo(a)pyrene	< 0.01	kg
1B2c	90203	P	Indeno(1,2,3-c,d)pyrene	< 0.01	kg
1B2c	90206	A	SO_2	1.0	Mg
1B2c	90206	A	NO_x	87	Mg
1B2c	90206	A	NMVOC	8	Mg
1B2c	90206	A	CO	75	Mg
1B2c	90206	A	TSP	3	Mg
1B2c	90206	A	PM_{10}	3	Mg
1B2c	90206	A	$PM_{2.5}$	3	Mg
1B2c	90206	A	As	0.3	kg
1B2c	90206	A	Cd	1.6	kg
1B2c	90206	A	Cr	2.3	kg
1B2c	90206	A	Cu	1.3	kg
1B2c	90206	A	Hg	0.4	kg
1B2c	90206	A	Ni	3.3	kg
1B2c	90206	A	Pb	0.6	kg
1B2c	90206	A	Se	< 0.1	kg
1B2c	90206	A	Zn	46	kg
1B2c	90206	A	Dioxin	< 0.01	g
1B2c	90206	A	Benzo(b)flouranthene	< 0.01	kg
1B2c	90206	A	Benzo(k)flouranthene	< 0.01	kg
1B2c	90206	A	Benzo(a)pyrene	< 0.01	kg
1B2c	90206	A	Indeno(1,2,3-c,d)pyrene	< 0.01	kg
1B2c	90206	P	SO_2	< 0.1	Mg
1B2c	90206	P	NO_x	9	Mg
1B2c	90206	P	NMVOC	0.3	Mg
1B2c	90206	P	CO	1.0	Mg
1B2c	90206	P	TSP	< 0.1	Mg
1B2c	90206	P	PM_{10}	< 0.1	Mg
1B2c	90206	P	$PM_{2.5}$	< 0.1	Mg
1B2c	90206	P	As	< 0.1	kg
1B2c	90206	P	Cd	< 0.1	kg
1B2c	90206	P	Cr	< 0.1	kg
1B2c	90206	P	Cu	< 0.1	kg
1B2c	90206	P	Hg	< 0.1	kg
1B2c	90206	P	Ni	< 0.1	kg
1B2c	90206	P	Pb	< 0.1	kg
1B2c	90206	P	Se	< 0.1	kg
1B2c	90206	P	Zn	0.6	kg
1B2c	90206	P	Dioxin	< 0.01	g
1B2c	90206	P	Benzo(b)flouranthene	< 0.01	kg
1B2c	90206	P	Benzo(k)flouranthene	< 0.01	kg
1B2c	90206	P	Benzo(a)pyrene	< 0.01	kg
1B2c	90206	P	Indeno(1,2,3-c,d)pyrene	< 0.01	kg

* SO_2 from SNAP 040101 is included in SNAP 010306.

** Not occurring in 2012.

3.4.2 Methodological issues

The following chapters give descriptions on the methods of calculation used in the Danish emission inventory. Further, the activity data and emission factors that form the basis for the calculations are described according to data source and values.

Fugitive emissions from solid fuels

The emissions of particulate matter from storage of coal are estimated on basis of the imported amount of coal (equation 3.4.1).

$$E_{coal\_storage} = EMF_{coal\_storage} \cdot I_{coal} \qquad \text{(Eq. 3.4.1)}$$

where $EMF_{coal\_storage}$ is the emission factor for storage of coal in coal piles and I_{coal} is the amount of coal imported in the actual year.

Fugitive emissions from oil

The emissions from oil derive from offshore activities, service stations and refineries. Emissions from offshore activities include emissions from extraction, onshore oil tanks and onshore and offshore loading of ships. In the case of service stations emissions from reloading of tankers and refuelling of vehicles are included. The emissions from refineries derive from petroleum products processing (oil refining). Emissions from flaring in refineries are included in the chapters concerning flaring.

Offshore activities

Fugitive emissions from oil include emissions from offshore extraction, from onshore oil tanks and from onshore and offshore loading of ships.

The total emission can be expressed as:

$$E_{total} = E_{extraction} + E_{ship} + E_{oil\ tanks} \qquad \text{(Eq. 3.4.2)}$$

Fugitive emissions from extraction

According to the EMEP/EEA Guidebook (EMEP/EEA, 2013) the total fugitive emissions of volatile organic compounds (VOC) from extraction of oil and gas can be estimated by means of equation 3.4.3.

$$E_{extraction,VOC} = 40.2 \cdot N_P + 1.1 \cdot 10^{-2} P_{gas} + 8.5 \cdot 10^{-6} \cdot P_{oil} \qquad \text{(Eq. 3.4.3)}$$

where $E_{extraction,VOC}$ is the emission of VOC in Mg/year, N_P is the number of platforms, P_{gas} is the production of gas, 10^6 Nm^3 and P_{oil} is the production of oil, 10^6 tonnes.

It is assumed that the VOC contains 75 % CH_4 and 25 % NMVOC and consequently the total emission of NMVOC for extraction of oil and gas can be calculated as:

$$E_{extraction,NMVOC} = 0.25 \cdot E_{extraction,VOC} \qquad \text{(Eq. 3.4.4)}$$

Loading of ships

Fugitive emissions of NMVOC from loading of ships include the transfer of oil from storage tanks or directly from the well into ships. The activity also includes losses during transport. When oil is loaded hydrocarbon vapour will be displaced by oil and new vapour will be formed, both leading to emissions. The emissions from ships are calculated by equation 3.4.5.

$$E_{ships} = EMF_{ships,onshore} \cdot L_{oil,onshore} + EMF_{ships,offshore} \cdot L_{oil,ofshore} \quad \text{(Eq. 3.4.5)}$$

where EMF_{ships} is the emission factor for loading of ships and L_{oil} is the amount of oil loaded.

Oil tanks

The NMVOC emissions for storage of crude oil are given in the environmental reports from DONG Oil Pipe for 2012 (DONG Oil Pipe A/S, 2013). An implied emission factor is calculated on the basis of the amount of oil transported in pipelines according to equation 3.4.6.

$$IEF_{tanks} = E_{tanks} / T_{oil} \quad \text{(Eq. 3.4.6)}$$

where IEF_{tanks} is the implied emission factor for storage of raw oil in tanks, E_{tanks} is the emission and T_{oil} is the amount of oil transported in pipelines.

Service stations

NMVOC emissions from service stations are estimated as outlined in equation 3.4.7.

$$E_{service\ stations} = \left(EMF_{reloading} \cdot T_{fuel}\right) + \left(EMF_{refuelling} \cdot T_{fuel}\right) \quad \text{(Eq. 3.4.7)}$$

where $EMF_{reloading}$ is the emission factor for reloading of tankers to underground storage tanks at the service stations, $EMF_{refuelling}$ is the emission factor for refuelling of vehicles and T_{fuel} is the amount of gasoline used for road transport.

Oil refining

When oil is processed in the refineries, part of the volatile organic compounds (VOC) is emitted to the atmosphere. The VOC emissions from the oil refinery process include non-combustion emissions from handling and storage of feedstock (raw oil), from the petroleum product processing and from handling and storage of products.

Emissions from flaring in refineries are described under “Flaring”.

Emissions related to process furnaces in refineries are included in stationary combustion with the relevant emission factors. In cases where only the total VOC emission is given by the refinery the emission of NMVOC is estimated based on the assumption that 10 % of VOC is CH_4 and the remaining 90 % is NMVOC.

Both the non-combustion processes, product processing and sulphur recovery plants emit SO_2. The SO_2 emissions are calculated by the refineries and implemented in the emission inventory without further calculation.

Transmission and distribution of gas

The fugitive emission from transmission, storage and distribution of natural gas is based on information from the gas companies. The transmission and distribution companies give data on the transported amount and length and material of the pipeline systems.

The fugitive losses from pipelines are only given for some companies, here among the transmission company. The available distribution data are used for the remaining companies too. The emissions of NMVOC are calculated from the fugitive losses from transmission and distribution pipelines due to the gas quality measured by Energinet.dk.

Calculations of emissions from distribution of town gas are based on data from the distribution companies on distribution losses. At present, there are two areas with town gas distribution and correspondingly distribution companies. Two others companies in other areas were closed in 2004 and 2006, and it have not been possible to collect data for all years in the time series. The emissions have been calculated for the years with available data and the distribution loss for the first year with data has been applied for the previous years in the time series. Data is missing for the later years (1996-2003) for one of the distribution companies. The distribution amount is assumed to decrease linearly to cero over these years, and the share ("distribution loss"/"distribution amount") are assumed equal to the value for 1995.

Flaring

Emissions from flaring are estimated from the amount of gas flared offshore, in gas treatment/storage plants and in refineries and from the corresponding emission factors. From 2006 offshore flaring is given in the reports for the European Union Greenhouse Gas Emission Trading System (EU ETS) and thereby flaring can be split to the individual production units. Before 2006 only the summarised flared amount is available.

3.4.3 Activity data

Coal storage

The activity data are the imported amount of coal converted using the calorific values of coal (Danish Energy Agency, 2013b). The coal import fluctuates between years in the time series with and overall decreasing trend. In 2012 the imported amount was 3 978 Gg (Figure 3.4.1) which is a decrease since 2011.

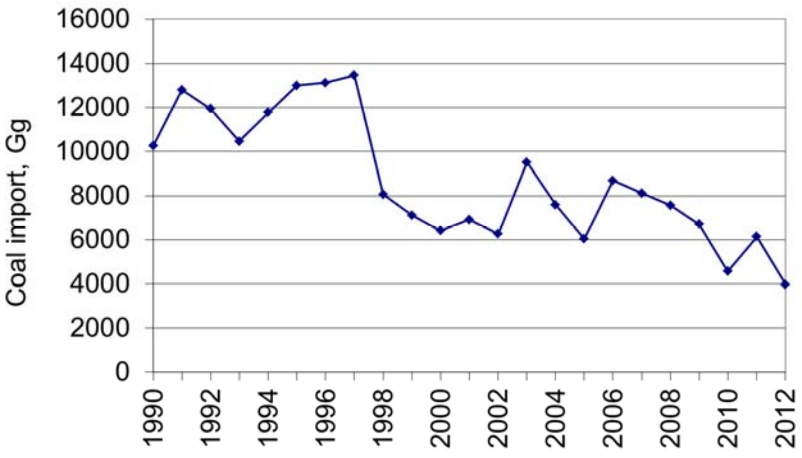

Figure 3.4.1 Amount of imported coal.

Extraction of oil and gas and loading of ships

Activity data used in the calculations of the emissions from oil and gas production and loading of ships are shown in Table 3.4.3. Data are based on information from the Danish Energy Agency (2013a) and from the environmental reports from DONG Oil Pipe (2013).

Table 3.4.3 Activity data for 2012

Activity	Symbols	Value	Data source
Number of platforms	N_p	54	Danish Energy Agency, 2013a
Produced gas, 10^6 Nm^3	P_{gas}	5 617	Danish Energy Agency, 2013a
Produced oil, 10^3 m^3	$P_{oil,vol}$	11 728	Danish Energy Agency, 2013a
Produced oil, 10^3 tonnes	P_{oil}	10 086	Danish Energy Agency, 2013a
Oil loaded, 10^3 m^3	$L_{oil\ off\text{-}shore}$	1 549	Danish Energy Agency, 2013a
Oil loaded, 10^3 tonnes	$L_{oil\ off\text{-}shore}$	1 332	Danish Energy Agency, 2013a
Oil loaded, 10^3 m^3	$L_{oil\ on\text{-}shore}$	10 500	DONG Oil Pipe A/S, 2013
Oil loaded, 10^3 tonnes	$L_{oil\ on\text{-}shore}$	9 030	DONG Oil Pipe A/S, 2013

Mass weight raw oil = 0.86 tonnes per m^3

As seen in Figure 3.4.2 the production of oil and gas in the North Sea has generally increased in the years 1990-2004. Since 2004 the production has decreased. The number of platforms is, however, still increasing (Figure 3.4.3). Five major platforms were completed in 1997-1999, which is the main reason for the great increase in the oil production in the years 1998-2000.

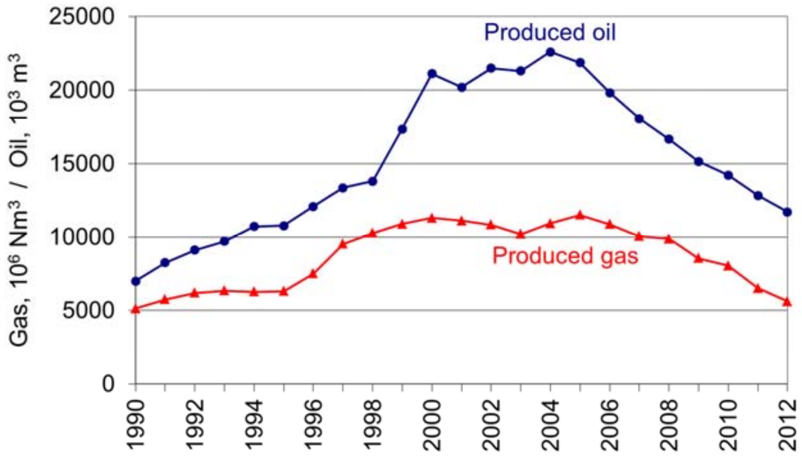

Figure 3.4.2. Production of oil and gas in the Danish part of the North Sea.

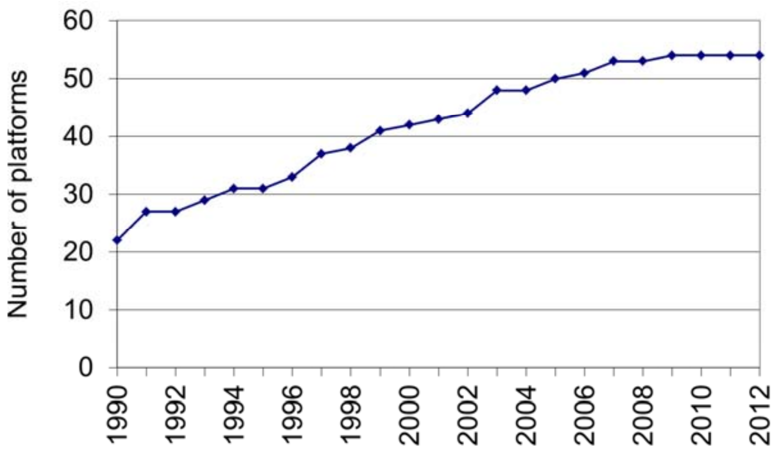

Figure 3.4.3. The number of platforms in the Danish part of the North Sea.

The amount of oil loaded offshore on ships roughly follows the trend of the oil and gas production (Figure 3.4.4). In case of onshore loading of ships the trend is more smoothed.

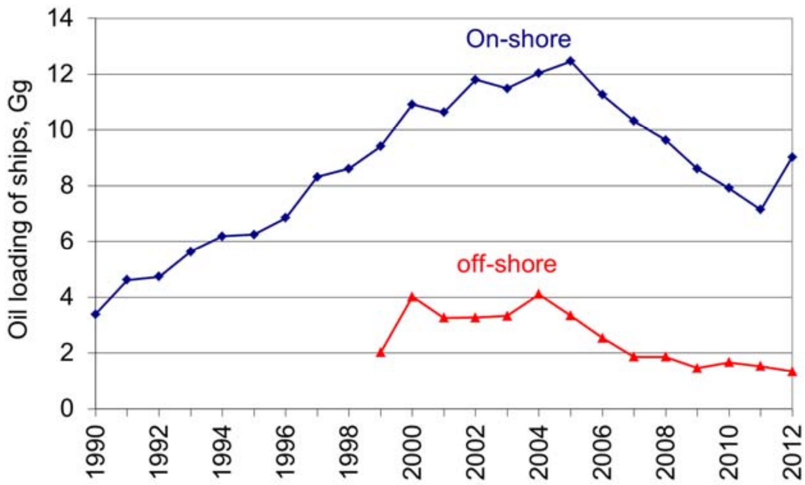

Figure 3.4.4 Onshore and offshore loading of ships.

Oil refining

Data on the amount of crude oil processed in the two Danish refineries are given by the refineries in their annual environmental report (A/S Dansk Shell, 2013 and Statoil A/S, 2013). Until 1996 a third refinery was in operation, leading to a decrease in the crude oil amount from 1996 to 1997. Data are shown in Figure 3.4.5. In 2012 the amount of crude oil being processed was 7 894 Gg.

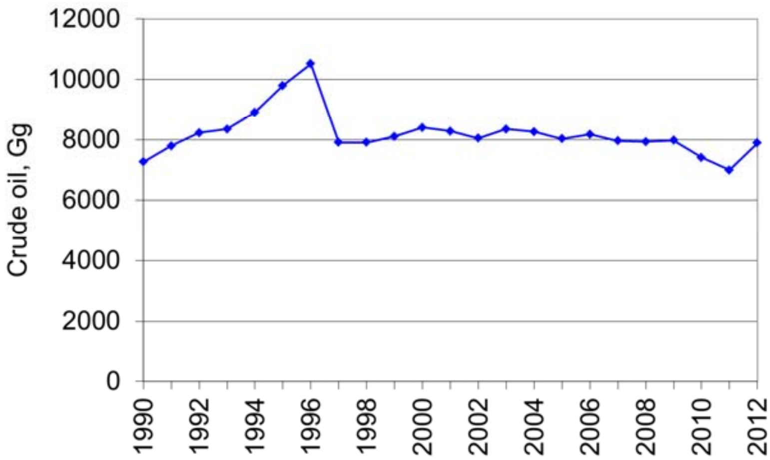

Figure 3.4.5 Oil refineries. Processed crude oil in Danish refineries.

Service stations

The Danish Energy statistics holds data on the sale of gasoline that is the basis for estimating emissions of NMVOC from service stations. The gasoline sales show an increase from 1990-1998 and a decreasing trend from 1999-2012 as shown in Figure 3.4.6. In 2012 the gasoline sale was 1 389 Gg.

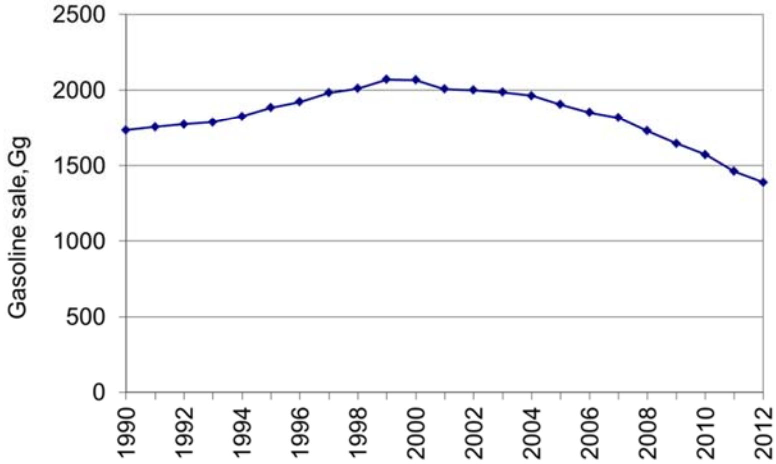

Figure 3.4.6 Gasoline sales in Denmark.

Transmission, storage and distribution of gas

The activity data used in the calculation of the emissions from natural gas are shown in Table 3.4.4. Transmission rates for 1990-1998 refer to annual environmental reports of DONG Energy. In 1999-2006 transmission rates refer to the Danish Gas Technology Centre (Karll 2003, Karll 2005, Oertenblad 2006, Oertenblad 2007). From 2008 onwards transmission rates refer to Energinet.dk. Transmission losses for 1991-1999 are based on annual environmental report of DONG Energy. The average for 1991-1995 is applied for 1990. From 2005 onwards transmission losses are given by Energinet.dk. The average for 2005-2010 is applied for the years 2000-2004.

Distribution rates for 1990-1998 are estimated from the Danish energy statistics. Distribution rates are assumed to equal total Danish consumption rate minus the consumption rates of sectors that receive the gas at high pressure. The following consumers are assumed to receive high pressure gas: town gas production companies, production platforms and power plants. In 1999-2006 distribution rates refer to DONG Energy/Danish Gas Technology Centre/Danish gas distribution companies (Karll 2003, Karll 2005, Oertenblad 2006, Oertenblad 2007). Since 2007 the distribution rates are given by the companies. Distribution rates for town gas is based on the available data from the Danish town gas distribution companies of which more are closed down today. Distribution losses for 1990-2000 are based on annual environmental report of DONG Energy. For 2000-2006 the average losses-% for the gas distribution companies are used. From 2007 data on distribution losses available from the companies are used.

Table 3.4.4 Activity data on transmission and distribution of gas for selected years of the time series. Town gas is included in distribution.

	1990	1995	2000	2005	2010	2011	2012
Transmission, Mm3 *	2739	4689	7079	7600	7462	6181	5365
Distribution of natural gas, Mm3 **	1714	3054	3181	3265	3416	2933	2728
Distribution of town gas, Mm3 ***	35	35	34	32	22	21	24

* Transmission rates for 1990-1998 refer to the annual environmental report of DONG Energy. In 1999-2006 transmission rates refer to the Danish Gas Technology Centre (Karll 2003, Karll 2005, Oertenblad 2006, Oertenblad 2007). From 2008 onwards transmission rates refer to Energinet.dk.

**) In 1990-98 distribution rates are estimated from the Danish energy statistics. Distribution rates are assumed to equal total Danish consumption rate minus the consumption rates of sectors that receive the gas at high pressure. The following consumers are assumed to receive high pressure gas: town gas production companies, production platforms and power plants. In 1999-2006 distribution rates refer to DONG Energy / Danish Gas Technology Centre / Danish gas distribution companies (Karll 2003, Karll 2005, Oertenblad 2006, Oertenblad 2007). Since 2007 the distribution rates are given by the companies.

***) The distribution of town gas is based on the available data from the Danish town gas distribution companies of which more are closed down today.

In 2012 the gas transmission rate was 5 365 Mm^3 and the distribution rate was 2 752 Mm_n^3, hereof 24 Mm_n^3 town gas (Figure 3.4.7). The variation over the time series owes mainly to variations in the winter temperature and to the variation of import/export of electricity from Norway and Sweden.

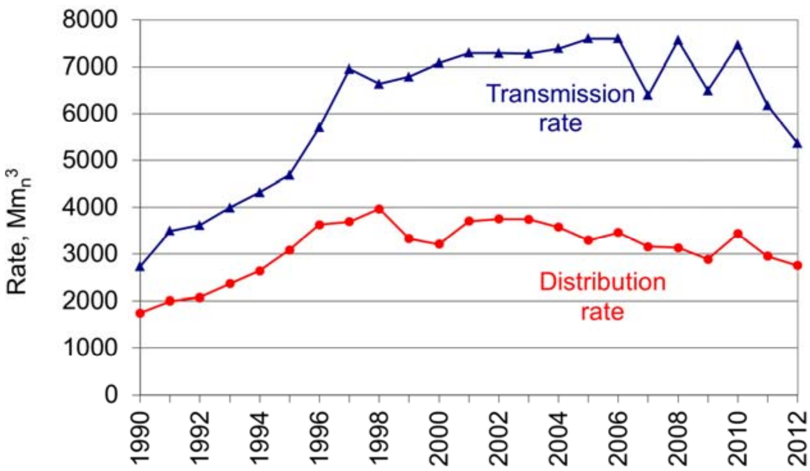

Figure 3.4.7 Rates for transmission and distribution of gas. Distribution covers both natural gas and town gas.

Data on the transmission pipelines excluding offshore pipelines and on the distribution network are given by Energinet.dk, DGC and the distribution companies concerning length and material. The length of the transmission pipelines is approximately 900 km. Because the distribution system in Denmark is relatively new most of the distribution network is made of plastic (PE). In 2012 the length of the distribution network was around 20 000 km. The major part is made of plastic (approximately 90 %) and the remaining part is made of steel. For this reason the fugitive emission is negligible under normal operating conditions as the distribution system is basically tight with no fugitive losses. However, the plastic pipes are vulnerable and therefore most of the fugitive emissions from the pipes are caused by losses due to excavation damages and construction and maintenance activities performed by the gas companies. These losses are either measured or estimated by calculation in each case by the gas companies. About 5 % of the distribution network is used for town gas. This part of the network is older and the fugitive losses are greater. The fugitive losses from this network are associated with more uncertainty as it is estimated as a percentage (15 %) of the meter differential. This assumption is based on expert judgement from one of the town gas companies. It must be noted that two town gas distribution companies have been closed in recent years (one in 2004 and another in 2006). There are only two town gas distribution companies left, and therefore the data availability is scarce.

Venting and Flaring

In Denmark there are two natural gas storage facilities. Both are obligated to make an environmental report on annual basis. Data on gas input and withdrawal are included and were 445 Mm^3 and 634 Mm^3 in 2012, respectively. Venting and flaring at the gas storage plants are included in the inventory. Venting of gas is assumed to be not occurring in extraction and in refineries as controlled venting enters the gas flare system. Venting rates in gas storage facilities are shown in Figure 3.4.8. As venting rates are not available for the years 1990-1994, the average for 1995-1998 is used.

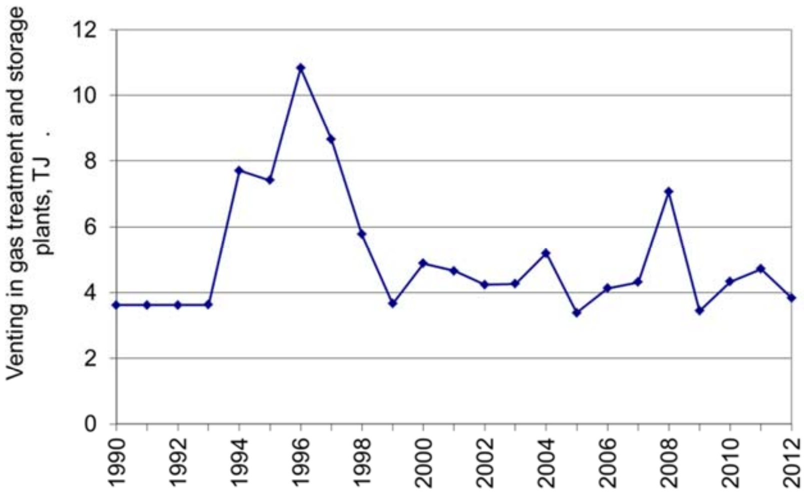

Figure 3.4.8 Amount vented in gas treatment and storage plants.

Offshore flaring amounts are given in Denmark's oil and gas production (Danish Energy Agency, 2013a) while flaring in treatment/storage plants are given in DONG Energy's environmental reports (Dong Energy, 2013; Energinet.dk, 2013a). Flaring rates for the two Danish refineries are given in their environmental reports and in additional data provided by the refineries directly to DCE. From 2006 flaring amounts are given in the EU ETS reporting.

Flaring rates are shown in Figure 3.4.9 and 3.4.10. Flaring rates in gas treatment and gas storage plants are not available before 1994. The mean value for 1994-1998 has been adopted as basis for the emission calculation for the years 1990-1993. The large amount of flared gas in 2007 owe to a larger maintenance work at the gas treatment plant.

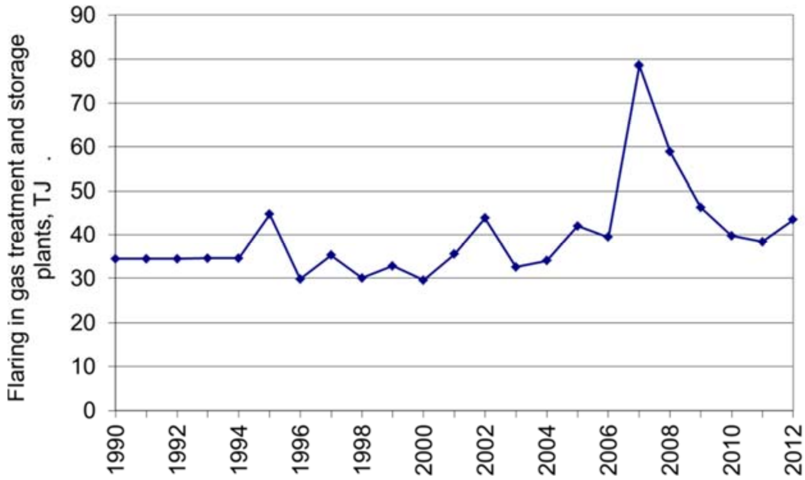

Figure 3.4.9 Amount flared in gas treatment and storage plants.

Offshore flaring amounts have been decreasing over the last 10 years period in accordance with the decrease in production as seen in Figure 3.4.2. Further, there is focus on reduction of the amount being flared for environmental reasons.

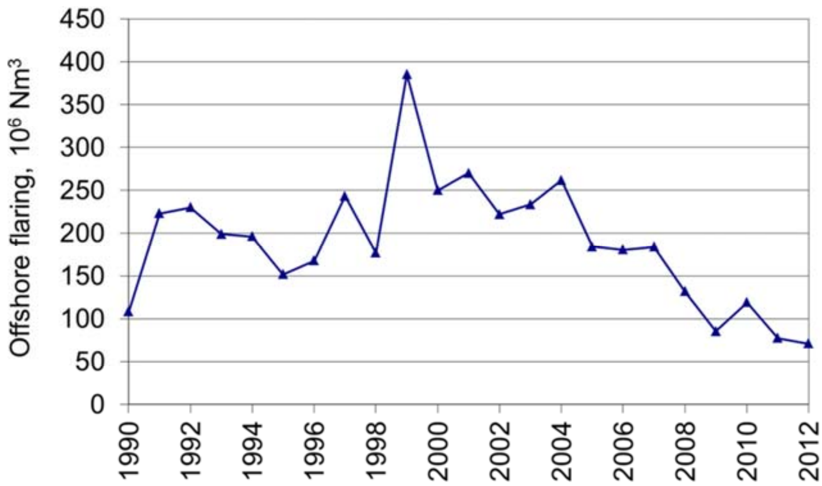

Figure 3.4.10 Amounts of gas flared in offshore exploration.

3.4.4 Emission factors

Coal storage

Emissions of particulate matter (PM) from coal storage are estimated using emission factors from the Coordinated European Particulate Matter Emission Inventory Program, CEPMEIP (Visschedijk et al., 2004). The emission factors are listed in Table 3.4.5.

Table 3.4.5 Emission factors used to estimate particulate emissions from coal storage.

Emission factor	TSP	PM_{10}	$PM_{2.5}$
Emission factor, g per Mg	150	60	6

Loading of ships

In the EMEP/EEA Guidebook standard emission factors for different countries are given (EMEP/EEA, 2013). In the Danish emission inventory the Norwegian emission factors are used for estimation of fugitive emissions from loading of ships onshore and offshore for the years 1990-2009. During 2009 new emission reducing technologies (degassing unit) were installed at the crude oil terminal. Measurements were carried out at the terminal before and after installation show a decrease of 25 % of the NMVOC emission from loading of ships. The reduced emission factors are used for 2010 onwards. The emission factors are listed in Table 3.4.6.

Table 3.4.6 Emission factors for loading of ships onshore and offshore.

	NMVOC, fraction of loaded	Reference
Ships off-shore	0.001	EMEP/EEA, 2013
Ships on-shore, 1990-2009	0.0002	EMEP/EEA, 2013
Ships on-shore, 2010 onwards	0.00015	EMEP/EEA, 2009; Miljøcenter Odense, 2010

Oil refining

The refineries provide information on consumption of fuel gas and fuel oil. The calorific values are given by the refineries in the reporting for EU ETS since 2006. Before 2006 the calorific values given by the refineries were used when available. When not available standard calorific values from the Danish Energy Agency combined with the conversion factor between fuel gas and fuel oil given by the refinery were used for calculation.

Emissions of SO_2, NO_x and VOC are given by the refineries. Only one of the two refineries has made a split between NMVOC and CH_4. For the other refinery it is assumed that 10 % of the VOC emission is CH_4 and the remaining 90 % is NMVOC.

Service stations

The NMVOC emission from service stations is calculated by use of different emission factors for the time series as shown in Table 3.4.7. In 1994 the emission factors for NMVOC from service stations were investigated by Fenhann and Kilde (1994) for the years 1990, 1991 and 1992, individually. The emission factors reported for reloading and refuelling for 1990 were used for the years 1985-1990, while the emission factors for 1991 was used for that year only. For the years 1992-1995 only emission factor for refuelling reported by Fenhann and Kilde (1994) was used in the Danish emission inventory. For reloading of tankers the British emission factor - as given in the UK Emission Factor Database - was adopted for the years 1992-2000. From 2008 the emission factors from the EMEP/EEA guidebook 2013 are used for reloading and refuelling. For the years 2001-2007 and 1996-2007 the emission factors for reloading and refuelling, respectively, are estimated by using interpolation.

Table 3.4.7 Emission factors used for estimating NMVOC from service stations.

Year	Reloading of tankers, kg NMVOC pr tonnes gasoline	Refuelling of vehicles, kg NMVOC pr tonnes gasoline	Sum of reloading and refuelling, kg NMVOC pr tonnes gasoline	Source
1985-1990	1.28	1.52	2.80	Fenhann & Kilde,1994
1991	0.64	1.52	2.16	Fenhann & Kilde,1994
1992-1995	0.08	1.52	1.60	UK emf. database / Fenhann & Kilde,1994
1996	0.08	1.45	1.53	UK emf. database / interpolation 1995-2008
1997	0.08	1.39	1.47	UK emf. database / interpolation 1995-2008
1998	0.08	1.32	1.40	UK emf. database / interpolation 1995-2008
1999	0.08	1.25	1.33	UK emf. database / interpolation 1995-2008
2000	0.08	1.19	1.27	UK emf. database / interpolation 1995-2008
2001	0.077	1.12	1.20	Interpolation 2000-2008 / 1995-2008
2002	0.073	1.05	1.13	Interpolation 2000-2008 / 1995-2008
2003	0.070	0.99	1.05	Interpolation 2000-2008 / 1995-2008
2004	0.067	0.92	0.98	Interpolation 2000-2008 / 1995-2008
2005	0.063	0.85	0.91	Interpolation 2000-2008 / 1995-2008
2006	0.060	0.78	0.84	Interpolation 2000-2008 / 1995-2008
2007	0.056	0.72	0.77	Interpolation 2000-2008 / 1995-2008
2008 onwards	0.053	0.65	0.70	EMEP/EEA 2013

Transmission, storage and distribution of gas

The fugitive emissions from transmission, storage and distribution of natural gas are based on data on gas losses from the companies and on the average annual natural gas composition given by Energinet.dk.

Table 3.4.8 Annual gas composition, lower heating value and density for Danish natural gas (Energinet.dk)

		Unit	1990	2000	2005	2010	2011	2012
Methane	CH_4	molar-%	90.92	86.97	88.97	89.95	89.10	88.84
Ethane	C_2H_6	molar-%	5.08	6.88	6.14	5.71	5.98	6.11
Propane	C_3H_8	molar-%	1.89	3.17	2.50	2.19	2.36	2.44
i-Butane	i-C_4H_{10}	molar-%	0.36	0.43	0.40	0.37	0.37	0.37
n-Butane	n-C_4H_{10}	molar-%	0.50	0.61	0.55	0.54	0.55	0.54
i-Petane	i-C_5H_{12}	molar-%	0.14	0.11	0.11	0.13	0.13	0.13
n-Petane	n-C_5H_{12}	molar-%	0.10	0.08	0.08	0.08	0.09	0.08
n-Hexane and heavier hydrocarbons	C^{6+}	molar-%	0.09	0.06	0.05	0.06	0.06	0.06
Nitrogen	N_2	molar-%	0.31	0.34	0.29	0.31	0.37	0.36
Carbon dioxide	CO_2	molar-%	0.60	1.35	0.90	0.66	0.98	1.06
Lower heating value	H_n	MJ/m^3_n	39.176	40.154	39.671	39.461	39.507	39.548
Density	ρρ	kg/m^3_n	0.808	0.846	0.825	0.816	0.824	0.827

Venting and flaring

Venting

Emissions of NMVOC from venting are given in the environmental reports for the gas storage plants (DONG Energy, 2012; Energinet.dk, 2012a).

Flaring in refineries

The composition of fuel gas is given for 2008 by one of the two refineries. As the composition for fuel gas is marked different than the composition of natural gas, which has been used in earlier year's calculations, the same fuel gas composition is used in calculations for the other Danish refinery.

The emission factor for NMVOC has been applied in the inventory for all years from 1990 and onwards. For NO_x and CO the emission factors from the EMEP/EEA guidebook 2013 are used. For trace metals, dioxin and PAHs the emission factors given in the guidebook (EMEP/EEA, 2009) for stationary combustion Tier 1 are adopted for flaring in refineries. The refinery emission factors are listed in Table 3.4.9.

Table 3.4.9 Emission factors for flaring in refineries.

Pollutant	Emission factor	Unit
NO_x *	32.2	g per GJ
NMVOC	76.4	g per GJ
CO	177	g per GJ
TSP	0.90	g per GJ
PM_{10}	0.90	g per GJ
$PM_{2.5}$	0.90	g per GJ
As	0.09	mg per GJ
Cd	0.50	mg per GJ
Cr	0.70	mg per GJ
Cu	0.40	mg per GJ
Hg	0.10	mg per GJ
Ni	1.00	mg per GJ
Pb	0.20	mg per GJ
Se	0.01	mg per GJ
Zn	14.0	mg per GJ
Dioxin	0.03	ng I-TEQ per GJ
Benzo(b)fluoranthene	0.08	µg per GJ
Benzo(k)fluoranthene	0.08	µg per GJ
Benzo(a)pyrene	0.06	µg per GJ
Indeno(1,2,3-c,d)pyrene	0.08	µg per GJ

* Direct measured emission of NO_x is available for one refinery and the emission factor is used for the remaining refinery only.

Flaring offshore

The emission factors for offshore flaring are shown in Table 3.4.10. The dioxin emission factor originates from a Danish study by Henriksen et al. (2006) and is, like emission factors for PM and SO_2, the same as the emission factors used for combustion of natural gas in Danish public power plants.

The NO_x emission factor is based on the conclusion in a Danish study of NO_x emissions from offshore flaring carried out by the Danish Environmental Protection Agency (2008). The recommended NO_x emission factor (31 008 g per GJ or 0.0015 tonnes NO_x per tonnes gas) corresponds well with the emission factors used to estimate NO_x emission in other countries with oil production in the North Sea (Netherlands: approximately 0.0014 tonnes NO_x per tonnes gas and United Kingdom: approximately 0.0013 tonnes NO_x per tonnes gas). Emission factors for NMVOC and CO are based on the EMEP/EEA Guidebook.

For trace metals, dioxin and PAH's the emission factors given in the guidebook (EMEP/EEA, 2009) for stationary combustion Tier 1 are adopted for flaring in refineries. Emissions from flaring in gas treatment and storage plants are calculated from the same emission factors, which are used for offshore flaring.

Table 3.4.10 Emission factors for offshore flaring.

Pollutant	Emission factor	Unit
SO_2	0.014	g per Nm^3
NO_x	1.227	g per Nm^3
NMVOC	0.105	g per Nm^3
CO	1.055	g per Nm^3
TSP	0.042	g per Nm^3
PM_{10}	0.042	g per Nm^3
$PM_{2.5}$	0.042	g per Nm^3
As	0.004	mg per Nm^3
Cd	0.023	mg per Nm^3
Cr	0.033	mg per Nm^3
Cu	0.019	mg per Nm^3
Hg	0.005	mg per Nm^3
Ni	0.047	mg per Nm^3
Pb	0.009	mg per Nm^3
Se	0.0005	mg per Nm^3
Zn	0.652	mg per Nm^3
Dioxin	0.001	ng I-TEQ per Nm^3
Benzo(b)fluoranthene	0.037	µg per Nm^3
Benzo(k)fluoranthene	0.037	µg per Nm^3
Benzo(a)pyrene	0.028	µg per Nm^3
Indeno(1,2,3-c,d)pyrene	0.037	µg per Nm^3

3.4.5 Emissions

Coal storage

The emission from storage of coal is 597 Mg TSP in 2012 (239 Mg PM_{10} and 24 Mg $PM_{2.5}$). The coal consumption and the related emissions vary from year to year mainly due to the extent of electricity import/export and temperature variations (Table 3.4.11). Note that PM was only included in the inventory from 2000.

Table 3.4.11 PM_{10} from storage of solid fuels for selected years of the time series.

	2000	2005	2006	2007	2008	2009	2010	2011	2012
TSP, Mg	962	905	1303	1218	1135	1007	686	920	597
PM_{10}, Mg	385	362	521	487	454	403	274	368	239
$PM_{2.5}$, Mg	38	3652	52	49	45	40	27	37	24

Extraction of oil and gas and loading of ships

From the activity data in Table 3.4.3 and equation 3.4.3 the fugitive emissions of NMVOC from extraction of oil and gas are calculated. Corresponding emissions from loading of ships can be estimated by combining the information in Table 3.4.3, Table 3.4.7 and equation 3.4.5. The emissions are listed in Table 3.4.12 (onshore activities) and Table 3.4.13 (offshore activities) along with the emissions from storage of oil given in the environmental reports from DONG Oil Pipe (2013). A degassing system has been established at the crude oil terminal leading to reduced VOC emissions from storage and handling. The degassing system has been in operation since the summer of 2009 and measurements of VOC emissions were carried out in September 2009 after a period with constant operation. The measurements show a decrease of around 80 % for the VOC emission. The emission factor for NMVOC from oil tanks has decreased by 39 % from 2008 to 2009 and further by 50 % from 2009 to 2010.

Table 3.4.12 NMVOC (Mg) from onshore activities related to extraction of oil.

NMVOC, Mg	1990	1995	2000	2005	2008	2009	2010	2011	2012
Onshore loading of ships	678	1249	2183	2494	1926	1720	1187	1071	1355
Oil tanks	1726	2664	4000	4500	3625	2098	763	638	594

Table 3.4.13 NMVOC from offshore activities related to extraction of oil and natural gas.

NMVOC emission, Mg	1990	1995	2000	2005	2008	2009	2010	2011	2012
Fugitive emissions from extraction	236	330	455	536	561	568	566	562	559
Offshore loading of ships *	0	0	4021	3337	1856	1451	1658	1525	1332

* Offshore loading were not occurring until 1999.

Oil refining

NMVOC emissions from oil refining at the Danish refineries are listed for selected years of the time series in Table 3.4.14. Further, the emissions of SO_2 from oil refining and sulphur recovery in refineries are shown. The emission of SO_2 has shown a pronounced decrease since 1990 because of technical improvements at the refineries. Note that SO_2 from refining and recovery prior to 1994 was summarised and reported as an area source in category 1B2a vi, and that SO_2 from oil refining from 2001 are included in stationary combustion.

Table 3.4.14 Oil Refineries. Emissions of NMVOC and SO_2 from oil refining and SO_2 from sulphur recovery.

	1990[1]	1995	2000	2005[2]	2008[2]	2009[2]	2010[2]	2011[2]	2012[2]
NMVOC, Mg	3335	2437	803	390	987	481	1019	1179	889
SO_2, oil refining, Mg		585	178						
SO_2, sulphur recovery, Mg	3667	5815	4845	3442	3588	3877	3867	3868	3932

1) Prior to 1994 SO_2 emissions from oil refining and sulphur recovery are reported as area sources in category 1B2a vi.

2) From 2001 SO_2 emissions from oil refining are included in stationary combustion.

Service stations

Emissions from service stations are calculated using the emission factors in Table 3.4.7 and the sales of gasoline given by the Danish Energy statistics. The NMVOC emissions are listed in Table 3.4.15.

Table 3.4.15 Emissions of NMVOC from service stations for selected years of the time series.

	1990	1995	2000	2005	2008	2009	2010	2011	2012
NMVOC, Mg	4 856	3 016	2 616	1 742	1 216	1 158	1 060	1 027	977

Transmission and distribution of gas

The gas transmission company reports emissions of CH_4. Calculations of the CH_4 emissions for transmission are based on registered loss in the transmission grid and the emission from the natural gas consumption in the pressure regulating stations. The distribution companies give data on fugitive losses, and the CH_4 emissions are estimated due to the gas quality given by Energinet.dk. Calculations of the NMVOC emissions are based on the CH_4 emission according to the gas quality measured by Energinet.dk (Table 3.4.7) according to equation 3.4.8.

$$E_{NMVOC} = E_{CH_4} \times \left(w_{NMVOC} \ / \ w_{CH_4} \right) \qquad \text{(eq. 3.4.8)}$$

where w_{NMVOC} is the weight-% NMVOC and w_{CH4} is the weight-% CH_4 according to the gas quality of the current year.

As the pipelines in Denmark are relatively new, most emissions are due to construction and maintenance. The decrease in NMVOC emission from transmission in 2007 (Table 3.4.16) is caused by the completion of a greater construction work and rerouting of a major pipeline. In preparation for construction work on a new compressor station, there has been laid a number of new line valve stations in 2011. Before this work could be done, larger amounts of natural gas were vented to drain the pipes. Therefore emissions from transmission of natural gas are significantly high in 2011.

Emissions from distribution of gas mainly owe to excavations and maintenance of the pipelines, but also difference between the calendar year and the meter reading year might influence the annual variations. As the town gas distribution network is significant older the gas losses and thus the emissions are larger than for the natural gas distribution network, even though the distribution rates for natural gas far exceeds the rates for town gas (Table 3.4.4).

Table 3.4.16 NMVOC emission from transmission, storage of natural gas and distribution of natural gas and town gas for selected years of the time series.

NMVOC emission, Mg	1990	1995	2000	2005	2008	2009	2010	2011	2012
Transmission	41	135	26	36	37	2	4	2	6
Distribution, natural gas	12	22	15	17	24	33	12	12	9
Distribution, town gas	683	700	680	587	73	67	52	48	53

Venting and flaring

Venting

Emissions of NMVOC from venting are given in the environmental reports for the gas storage plants (DONG Energy, 2013; Energinet.dk, 2013a). The time series are shown in Figure 3.4.11.

Flaring

The time series for the emission of NMVOC from offshore flaring fluctuates due to the fluctuations in the fuel rate. As shown in Figure 3.4.11 there were marked peaks in the amount of offshore flaring in 1997 and, especially, in 1999. The increase in 1997 was due to the new Dan field and the completion of the Harald field. The increase in 1999 was due to the opening of three new fields; Halfdan, Siri and Syd Arne.

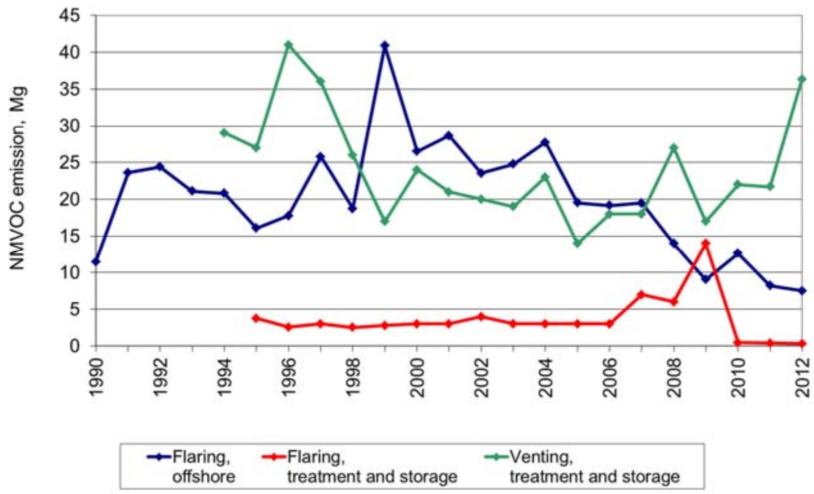

Figure 3.4.11 NMVOC emissions from venting and flaring of gas.

The emissions from offshore flaring are estimated from the same set of emission factors for all years in the time series and the variations reflect only the variations in the flared amounts. Emissions of selected components from flaring in oil and gas extraction including offshore flaring and flaring in gas treatment and storage facilities are shown in Table 3.4.17. The decrease in the NMVOC emission from 2009 to 2010 owes to change from continuous to regulating power operation of the power producing gas turbine at the gas storage plant.

Table 3.4.17 Emissions from flaring in oil and gas extraction.

Year	1990	1995	2000	2005	2008	2009	2010	2011	2012
	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
SO_2	2	2	4	3	2	1	2	1	1
NO_x	134	188	310	231	168	111	155	103	96
NMVOC	15	20	30	23	20	23	13	9	8
CO	115	161	265	195	141	91	127	83	76

Flaring also occur in refineries. Flaring in refineries is a significant fugitive emission source to emissions of SO_2. In 1990-1993 emissions from petroleum product processing were included in emissions from flaring in refineries (NFR category 1B2c). From 1994 the data delivery format was changed, which made it possible to split the emissions into contributions from flaring and processing, respectively. Emissions from processing are from 1994 included in NFR category 1B2a iv.

Emissions for selected years and components are shown in Table 3.4.18. Until 1996 a third refinery was in operation in Denmark leading to larger emissions in 1990-1996. The decreasing emissions of SO_2 from 1996 to 1998 are due to technical improvements of the sulphur recovery system at one of the two Danish refineries. The large emissions from 2005 and onwards owe to shut-downs due to maintenance and accidents. Further, construction and initialisation of new facilities and problems related to the ammonium thiosulphate (ATS) plant at the one refinery has led to increased emissions. In 2007 the capacity of the ATS plant was increased followed by commissioning difficulties.

Table 3.4.18 Emissions from flaring in refineries.

Year	1990*	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012
	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
SO_2 *	943	203	51	296	257	526	380	453	288	242	167
NO_x	13	13	11	26	22	24	26	17	19	18	23
NMVOC	31	31	26	32	31	33	38	23	27	25	32
CO	73	73	60	73	73	77	88	53	62	59	74

*In 1990-1993 emissions from petroleum product processing were included in flaring in refineries due to the data delivery form. From 1994 emissions from petroleum product processing were given in 1B2a iv.

3.4.6 Uncertainties and time series consistency

Methodology

The applied methodology for uncertainty estimates refers to Pulles & Aardenne (2004). The Danish uncertainty estimates are based on the simple Tier 1 approach described in IPCC Good Practice Guidance (IPCC, 2000).

The uncertainty estimates are based on the calculated emissions for the base year and for the latest inventory year and on the uncertainty rates for both activity data and emission factors. Data is aggregated for the NFR category 1 B - Fugitive Emissions from Fuels. Base year refers to 2000 for particulate matter and to 1990 for the remaining pollutants.

The uncertainty rates are based on the EMEP/EEA emission inventory guidebook (2009), on uncertainty estimates from companies and on estimates and assumptions by DCE. The applied uncertainty levels for activity data and emission factors are given in Table 3.4.19.

Table 3.4.19 Uncertainty levels for activity data and emission factors.

Pollutant	Activity Data Uncertainty level, %	Emission Factor Uncertainty level, %
SO_2	10	25
NO_x	8	15
NMVOC	15	40
CO	8	125
TSP	2	50
PM_{10}	2	50
$PM_{2.5}$	2	50
As	8	225
Cd	8	225
Cr	8	225
Cu	8	125
Hg	8	75
Ni	8	125
Pb	8	225
Se	8	200
Zn	8	200
Benzo(b)	8	200
Benzo(k)	8	200
Benzo(a)	8	200
Indeno	8	200

Results

The uncertainty model estimates uncertainties for both the emission level and the trend. The uncertainty on the emission level for SO_2, NO_x, NMVOC and CO is 27 %, 17 %, 43 % and 125 %, respectively.

For PM the uncertainty is 50 % and for most heavy metals and PAHs the uncertainty is around 200 %. The individual uncertainty estimates for the fugitive emission inventory are shown in Table 3.4.20.

Table 3.4.20 Estimated emission uncertainty and trend uncertainty for fugitive emissions. The trend refers to the years 1990-2012 for all pollutants except PM where the trend refers to 2000-2012.

Pollutant	Emission uncertainty %	Trend uncertainty %
SO_2	27	3
NO_x	17	9
NMVOC	43	16
CO	125	8
TSP	50	2
PM_{10}	50	2
$PM_{2.5}$	50	2
As	225	7
Cd	225	7
Cr	225	7
Cu	125	7
Hg	75	7
Ni	125	7
Pb	225	7
Se	200	7
Zn	200	7
Benzo(b)	200	7
Benzo(k)	200	7
Benzo(a)	200	7
Indeno	200	7

3.4.7 Source specific QA/QC and verification

A list of QA/QC tasks are performed directly in relation to the fugitive emission part of the Danish emission inventories. The following procedures are carried out to ensure the data quality:

- The emission from the large point sources (refineries, gas treatment and gas storage plants) is compared with the emission reported the previous year.
- Annual environmental reports are kept for subsequent control of plant-specific emission data.
- Checks of data transfer are incorporated in the fugitive emission models, e.g. sum checks.
- Verification of activity data from external data when data are available through more data sources (offshore fuel and flaring rates).
- Data sources are incorporated in the fugitive emission models
- A manual log table in the emission databases is applied to collect information about recalculations.

- Comparison with the inventory of the previous year. Any major changes are verified.
- Total emission, when aggregated to reporting tables, is compared with totals based on SNAP source categories (control of data transfer).
- Checking of time series in the NFR and SNAP source categories. Significant dips and jumps are controlled and explained.

The QC work will continue in future years.

Data deliveries

Table 3.4.21 lists the external data deliveries used for the inventory of fugitive emissions. Further the table holds information on the contacts at the data delivery companies.

Table 3.4.21 List of external data sources.

Category	Data description	Activity data, emission factors or emissions	Reference	Contact(s)	Data agreement/ Comment
Offshore activities	Gas and oil production. Dataset for production of oil, gas and number of platforms. Amounts of offshore loading of ships	Activity data	The Danish Energy Agency	Jan H. Andersen	Not necessary due to obligation by law
Offshore flaring	Flaring offshore in oil and gas extraction (ETS data)	Activity data	The Danish Energy Agency	Dorte Maimann	Data agreement
Service stations	Data on gasoline sales from the Danish energy statistics.	Activity data	The Danish Energy Agency	Jane Rusberg	Data agreement
Gas transmission	Natural gas from the transmission company, sales and losses (meter differences)	Activity data	Energinet.dk	Christian Friberg B. Nielsen	Not necessary due to obligation by law
Onshore activities	Amounts of oil transport in pipeline and onshore loading to ships. Emissions from storage of raw oil in the terminal.	Activity data and emission data	DONG Olierør A/S	Stine B. Bergmann	No formal data agreement.
Gas distribution	Natural gas from the distribution company, sales and losses (meter differences)	Activity data	Naturgas Fyn, DONG Energy, HNG and MN	Gert Nielsen, Ida Pernille Schou	No formal data agreement.
Air emissions from refinery	Fuel consumption and emission data.	Activity data and emission data	Statoil A/S, A/S Danish Shell	Anette Holst, Lis Rønnow Rasmussen	No formal data agreement.
Storage and treatment of gas	Environmental reports from plants defined as large point sources (Lille Torup, Stenlille, Nybro)	Activity data	Various plants		Not necessary due to obligation by law
Emission factors	Emission factors origin from a large number of sources	Emission factors	See chapter regarding emission factors		

3.4.8 Source specific recalculations

The following recalculations regarding fugitive emissions from fuels have been applied for the time series.

Service stations

The activity data has been updated for 2009-2011 according to the latest energy statistics published by the Danish Energy Agency. The largest recalculation for 2010 has changed the NMVOC emission by 0.02 ktonnes, corresponding 0.2 % of the total fugitive NMVOC emission in 2010.

Natural gas transmission and distribution

Activity data and IEF for the time series 1990-2011 has been updated for transmission and distribution according to annual environmental reports and the latest national energy statistics, respectively. The largest recalculation for 2002 has changed the NMVOC emission by 0.75 ktonnes, corresponding 4 % of the total fugitive NMVOC emission in 2002.

Venting

EFs for NMVOC have been added for the years 1990-1993 for one gas storage plant. In these years the plant is treated as an area source in the national system, while it is treated separately as a LPS in the following years. EFs are based on data from annual reports for 1995-1999, as no data are available for the years 1990-1994.

Further, a minor error has been corrected for venting in 2011, according to the annual report from one of the natural gas storage facilities.

The recalculation has changed the NMVOC emission by 0.02 ktonnes and the CO emission by 0.07 ktonnes for each of the years 1990-1993, corresponding 17% and 25 % of the total fugitive NMVOC and CO emission in 1993, respectively.

3.4.9 Source specific planned improvements

The following future improvements are suggested.

Emissions from storage of fuels in tank facilities: The recent edition of the Danish emission inventory holds emissions from extraction of fuels, combustion of fuels and from service stations. To make the inventory complete emissions from storage of fuels in tank facilities should be included in the future if data is available. Work is going on to locate greater tank facilities in Denmark and collect the available data. In cases where no emission estimates or measurements are available a set of emission factors have to be set up.

3.4.10 References

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4 Industrial processes (NFR sector 2)

4.1 Overview of the sector

The chapter on *Industrial processes* (NFR sector 2) is outlined as follows:

- Mineral products (NFR 2A)
- Chemical industry (NFR 2B)
- Metal production (NFR 2C)
- Other production i.e. food and drink (NFR 2D)
- Other production, consumption, storage, transportation or handling of bulk products (NFR 2G)

The industrial processes included in the Danish inventory are those in large companies, e.g. cement factories, as well as a number of smaller companies e.g. iron foundries.

Table 4.1 presents an overview of sources and groups of pollutants included in the present reporting. Explanations to the abbreviations are given below the table. In addition to the indicated groups of pollutants some groups do not include all relevant pollutants or the time series are not complete. Detailed information on this subject can be found in the following table.

Table 4.1 Survey of industrial sector with SNAP-code and NFR-code included in the Danish inventory.

Industrial sector	SNAP	NFR	$SO_X/NO_X/NH_3$	NMVOC/ CO	TSP/ $PM_{10/2.5}$	HM	POP
Cement	030311	2A1	IE	IE	x	x	IE
Lime (incl. iron, steel and paper pulp industry)	030312	2A2	IE	IE	x	+	x
Limestone and dolomite use	040618	2A3	IE	IE	x	IE	-
Roof covering with asphalt materials	040610	2A5	-	x	-	-	+/?
Road paving with asphalt	040611	2A6	-	x	-	-	+/?
Quarrying and mining of minerals other than coal		2A7a	-	-	x/+	-	-
Construction and demolition		2A7b	-	-	+	-	-
Storage, handling and transport of mineral products		2A7c	-	-	x/+	-	-
Asphalt concrete plants	030313	2A7d	IE	IE	+	-	+/?
Container glass	030315	2A7d	x	x	x	x	-
Glass / Glass wool	030316	2A7d	x/+	-	x	+	-
Mineral wool	030318	2A7d	x/+	x	x	+	-
Production of bricks	040691	2A7d	x	-	+/?	-	-
Production of expanded clay products	040692	2A7d	x	-	+/?	-	-
Nitric acid	040402	2B2	x	-	x	-	-
Chemical ingredients	040500	2B5a	-	x	-	-	-
NPK-fertiliser	040407	2B5a	x	IE	x	IE	-
Other (catalysts)	040416	2B5a	x	-	x	-/?	-
Pesticide production	040525	2B5a	+	x	+	-	+/?
Sulphuric acid	040401	2B5a	x	-	-	-	-
Production of tar products	040527	2B5a	x	x	-	x	+
Electric arc furnace	040207	2C1	IE	IE	x	x	x
Grey iron foundries	030303	2C1	IE	IE	x	x	x
Rolling mils	040208	2C1	IE	IE	x	x	+/?
Secondary aluminium production	030310	2C3	IE	IE	x	x	x
Allied metal manufacturing	040306	2C5	IE	IE	x	x	-
Secondary lead production	030307	2C5b	IE	IE	x	x	x
Secondary zinc production	030308	2C5d	IE	IE	x	x	-
Storage, handling and transport of metal products		2C5f	-	-	x/+	-	-
Paper mill industry	030321	2D1	-	+	x	-	-
Beer	040607	2D2	-	x	-	-	-
Biscuits, cakes and other bakery products	040605	2D2	-	x	-	-	-
Bread (rye and wheat)	040605	2D2	-	x	-	-	-
Coffee roasting	040699	2D2	-	x	-	-	-
Ethanol, technical	040608	2D2	-	x	-	-	-
Margarine and solid cooking fats	040698	2D2	-	x	-	-	-
Meat curing, fish and shellfish	040627	2D2	-	x	-	-	-
Meat curing, meat	040627	2D2	-	x	-	-	-
Meat curing, poultry	040627	2D2	-	x	-	-	-
Spirits, other	040608	2D2	-	x	-	-	-
Sugar production	040625	2D2	-	x	-	-	-
Other (slaughterhouse waste)	040617	2G	x/+	-	+/?	-	+/?

x Included in the present inventory.

\+ Will be included.

\- Not included/not relevant.

IE Included elsewhere.

y Included in the present inventory.

4.2 Mineral products (2A)

4.2.1 Source category description

The sub-sector *Mineral products* (NFR 2A) cover the following processes:

- 2A1 Production of cement (SNAP 030311/040612).
- 2A2 Production of lime (quicklime) (SNAP 030312/040614).
- 2A5 Roof covering with asphalt (SNAP 040610).
- 2A6 Road paving with asphalt (SNAP 040611).
- 2A7d Production of container glass/glass wool (SNAP 030315/ 030316/ 040613).
- 2A7d Production of stone wool (SNAP 030318 / 040618).
- 2A7d Production of bricks (SNAP 040691)
- 2A7d Production of expanded clay products (SNAP 040692)

The time series for emission of acidifying substances, heavy metals, NMVOC, particulate matter, and HCB/PCB from *Mineral products* (NFR 2A) are presented in Table 4.2.

The emission of CO is decreasing in the period 1990-2012. In the same period of time, the activity is nearly constant. Emissions of both substances are related to combustion/process conditions and will be investigated further. Emissions of the heavy metals lead, selenium and zinc are related to the raw materials used. Recycled glass constitutes a considerable part of raw materials and, therefore, the quality/purity of the glass is a determining factor. Emission of lead shows a decreasing trend that is in accordance with the attempts to avoid lead in glass as well as in wine bottle seals.

Production of glass wool is expected to result in emission of approximately the same pollutants as production of container glass. Emission of NH_3 from production of glass wool and mineral wool shows a decreasing trend from 1990-2012 as can be verified by the decreasing emission per amount produced.

Table 4.2 Time series for pollutants from *Mineral products 2A* (process emissions; PCDD/F: grammes, metals and PAHs: kg and other pollutants: tonnes).

Pollutants	1980	1985	1990	1995	2000	2005
SO_2	+	+	1 407	1 531	1 516	1 494
NMVOC	+	567	567	568	567	573
NH_3	+	489	489	489	497	335
CO	+	10 993	10 993	10 996	11 506	8 791
TSP					238	233
PM_{10}					202	200
$PM_{2.5}$					152	149
As			19.7	20.6	3.98	3.13
Cd			24.6	22.7	1.70	1.33
Cr			394	349	12.7	9.98
Cu			98.4	100	16.5	12.9
Hg			8.20	14.5	7.63	5.98
Ni			312	278	12.3	9.60
Pb			1164	882	456	247
Se			328	226	342	108
Zn			164	271	246	173
PCDD/F			0.014	0.010	0.025	0.071
PCB			0.023	0.023	0.020	0.017
HCB			0.001	0.007	0.007	0.006
Continued	2007	2008	2009	2010	2011	2012
SO_2	2 019	1 361	731	764	823	716
NMVOC	589	581	551	591	612	601
NH_3	353	374	309	311	295	300
CO	9 675	8 697	6 815	239	307	276
TSP	204	193	135	124	135	149
PM_{10}	173	164	118	104	114	125
$PM_{2.5}$	125	120	88.0	76.0	86.1	93.4
As	4.00	3.63	15.4	2.90	2.80	2.31
Cd	1.74	1.57	1.18	1.25	1.20	0.98
Cr	13.0	11.8	8.88	9.37	9.02	7.35
Cu	16.9	15.3	11.5	12.1	11.7	9.53
Hg	7.74	7.02	5.29	5.59	5.39	4.41
Ni	12.5	11.4	8.55	9.02	8.68	7.08
Pb	145	135	106	117	115	189
Se	54.7	47.6	27.9	21.3	21.5	63.7
Zn	218	200	148	149	138	117
PCDD/F	0.074	0.070	0.053	0.053	0.053	0.052
PCB	0.019	0.018	0.013	0.013	0.011	0.012
HCB	0.007	0.007	0.005	0.005	0.005	0.004

+ To be included.

4.2.2 Methodological issues

2A1 Production of cement

The emissions TSP from the production of cement are measured yearly from 2000 to 2012 (Aalborg Portland, 2012). PM_{10} and $PM_{2.5}$ are estimated from the distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.9/0.4) from CEPMEIP (2003). The implied EF for TSP varies between 0.02 and 0.12 kg/tonne TCE.

For the years 1990-1996, the emission has been estimated from the production of cement, expressed as TCE (total cement equivalents[1]) and emission factors from the company Aalborg Portland (Aalborg Portland, 2013). The activity has increased from 1.6 million tonne TCE in 1990 to 2.9 million tonne TCE in 2007 and thereafter decreased to 1.8 million tonne TCE in 2012 due to the financial crisis; see Table 4.3.

Table 4.3 Production of cement (tonne) (Aalborg Portland, 2013).

	1980	1985	1990	1995	2000	2005
TCE	+	+	1 619 976	2 273 775	2 612 721	2 706 371
Continued	2007	2008	2009	2010	2011	2012
TCE	2 946 294	2 551 346	1 663 126	1 454 043	1 766 561	1 818 293

+ To be included.

The emissions of heavy metals are measured in 1997 (Illerup et al., 1999) – see Table 4.4 – and estimated for the other years from emission factors (based on the measurements) and TCE.

Table 4.4 EF for heavy metals (Illerup et al., 1999).

As	g/tonne	0.02
Cd	g/tonne	0.007
Cr	g/tonne	0.01
Cu	g/tonne	0.01
Hg	g/tonne	0.06
Ni	g/tonne	0.02
Pb	g/tonne	0.01

2A2Production of lime

The activity data regarding production of lime is obtained from Statistics Denmark (2013) – See Table 4.5 – and the EF from CEPMEIP (2003) and Nielsen et al. (2014) – see Table 4.6.

Table 4.5 Production of lime (tonne) (Statistics Denmark, 2013).

	1980	1985	1990	1995	2000	2005
Burnt lime			127 978	100 789	92 002	71 239
Hydralic lime			27 686	15 804	8 159	13 839
Total			155 664	116 593	100 161	85 078
Continued	2007	2008	2009	2010	2011	2012
Burnt lime	75 504	74 981	46 202	50 397	35 824	48 999
Hydralic lime	14 028	12 326	12 842	11 173	13 264	13 388
Total	89 532	87 307	59 044	61 570	49 088	62 387

[1] TCE (total cement equivalent) express the total amount of cement produced for sale and the theoretical amount of cement from the produced amount of clinker for sale.

Table 4.6 EF for TSP, HCB, and PCB from production of lime (CEPMEIP, 2003; Nielsen et al., 2014).

TSP	g/tonne	300
PM_{10}	g/tonne	150
$PM_{2.5}$	g/tonne	30
HCB	mg/tonne	0.008
PCB	mg/tonne	0.15

2A5 and 2A6 Roof covering and road paving with asphalt

The emissions from asphalt roofing and road paving have been estimated from production statistics compiled by Statistics Denmark – see Table 4.7 – and default emission factors presented by IPCC (2007)/EMEP/EEA (2009). The applied emission factors are presented in Table 4.8.

Table 4.7 Consumption of asphalt products (tonne) (Statistics Denmark, 2013).

	1980	1985	1990	1995	2000	2005
Cut back asphalt	+	7 700	7 700	7 700	7 700	7 700
Asphalt for road covering	+	3 200 000	3 200 000	3 250 000	2 950 000	3 649 200
Asphalt roofing material	+	75 468	75 468	81 829	128 028	95 794
Continued	2007	2008	2009	2010	2011	2012
Cut back asphalt	7 700	7 700	7 700	7 700	7 700	7 700
Asphalt for road covering	4 640 756	4 135 232	2 500 645	3 005 146	3 883 436	3 222 505
Asphalt roofing material	98 814	100 509	62 127	65 753	85 942	75 510

+ To be included.

Table 4.8 Emission factors for application of asphalt products.

		Road paving with asphalt	Use of cutback asphalt	Asphalt roofing
CH_4	g per tonne	5	0	0
CO	g per tonne	75	0	10
NMVOC	g per tonne	15	64 935	80
Carbon content fraction of NMVOC	%	0.667	0.667	0.8

2A7d Other mineral products

The emission of TSP, lead, selenium, and zinc from production of container glass is measured yearly from 1997 to 2012 (TSP from 2000 to 2012) (Ardagh Glass Holmegaard, 2013). PM_{10} and $PM_{2.5}$ are estimated from the distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.9/0.8) from CEPMEIP (2003). For 1990 to 1996, emissions of arsenic, cadmium, chromium, copper, mercury and nickel are estimated from standard emission factors and activity data; see Table 4.9. Emission factors for lead, selenium, and zinc from 1990 to 1996 are estimated by interpolation from the 1990 and 1997 figures (Illerup et al., 1999); see Table 4.10.

The emission of NH_3 and TSP from the production of glass wool has been measured yearly from 1996 to 2012 (TSP from 2000 to 2012) (Saint-Gobain Isover, 2013). PM_{10} and $PM_{2.5}$ are estimated from the distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.9/0.7) from CEPMEIP (2003). The activity has varied between 33 600 and 41 318 tonnes glass wool from 1996 to 2008 and, with a significant decrease in 2011 to 29 817 tonnes due to the financial crises. During the same period, the emission decreased from approximately 300 to 108 tonne NH_3.

For production of bricks and expanded clay products the EFs for SO_2 are determined from the individual companies reporting of SO_2 emission (environmental report) for the years 2008-2010 (2009-2010 for expanded clay products) and actual activity for the corresponding years. These years were selected as the most complete data were available for these years. However, the EF will continuously be improved as a more comprehensive dataset are made available.

The SO_2 emissions has been adjusted fuel related emissions as far as possible. However, this issue will be studied further as not all the environmental reports distinguish clearly between the different emission sources.

Table 4.9 Production of other mineral products (tonne) (Statistics Denmark, 2013; Ardagh Glass Holmegaard, 2013; Saint-Gobain Isover, 2013).

	1980	1985	1990	1995	2000	2005
Glass[1]	+	+	164 000	140 000	150 000	150 000
Glass wool[2]	+	+	33 630	33 630	39 666	37 295
Stone wool[3]			ni	ni	ni	ni
Yellow bricks	+	+	291 348	362 711	414 791	407 940
Expanded clay products	+	+	331 760	340 881	316 174	310 901
Continued	2007	2008	2009	2010	2011	2012
Glass	150 000	150 000	100 000	110 000	110 000	110 000
Glass wool	40 995	41 318	33 066	24 899	29 817	26 752
Stone wool	ni	ni	ni	ni	ni	ni
Yellow bricks	348 928	322 137	226 363	212 051	222 144	185 398
Expanded clay products	504 925	303 948	140 915	157 378	172 263	153 305

\+ To be included.

ni No information.

1. Production estimated from environmental reports.
2. Production in 1990 and 1995 are estimated.
3. Production confidential.

Table 4.10 Implied emission factors for *Other mineral products 2A7d*.

Process	Substance	g/tonne	EMEP/EEA (2009) g/tonne
Glass	Pb	0.1-7.1	2.9
	Se	0.3-2.3	1.5
	Zn	0.2-1.0	-
Glass wool	NH_3	2 700-7 900	1 400
Bricks	SO_2	1 300	-
Expanded clay products	SO_2	3 100	-

4.2.3 Uncertainties and time series consistency

The time series are presented in Table 4.2. The methodologies applied for the different sources within *Mineral products* are considered to be consistent either as measurements or emission factors based on the measurements. However, not all the sources are considered to be complete regarding pollutants and these are expected to be completed in the next inventory, either by use of company-specific information or by application of general emission factors.

The time series for emissions from production of cement are based on measurements combined with emissions factors based on the measurements.

4.2.4 Source specific QA/QC and verification

The emission factors have been verified and the order of magnitude confirmed by comparison with standard emission factors (EMEP/EEA, 2009; CEPMEIP, 2003). Detailed discussion of QA/QC can be found in Nielsen et al. (2012).

4.2.5 Source specific recalculations

Emissions of HCB and PCBs from lime production have been included.

4.2.6 Source specific planned improvements

The inventory is planned to include the sectors 2A7a-c when the necessary resources are available. The time series for production of yellow bricks and expanded clay products will be extended to include 1980-1989.

The EF for consumption of asphalt products will be reviewed and updated if found necessary.

4.3 Chemical industry (NFR 2B)

4.3.1 Source category description

The sub-sector *Chemical industry* (NFR 2B) covers the following processes:

- Production of sulphuric acid (SNAP 040401)
- Production of nitric acid/fertiliser (SNAP 040402/040407)
- Production of catalysts/fertilisers (SNAP 040416/040407)
- Production of chemical ingredients (SNAP 040500)
- Production of pesticides (SNAP 040525)
- Production of tar products (SNAP 040527)

The time series for emission of acidifying substances, NMVOC and particulate matter from *Chemical industry* (NFR 2B) are presented in Table 4.11.

Table 4.11 Time series for pollutants from *Chemical industry 2B* (tonnes).

Pollutant	1980	1985	1990	1995	2000	2005
SO_2	414	624	846	616	631	614
NO_x	+	666	842	648	447	30.2
NH_3	+	23.5	25.0	75.0	27.0	79.0
NMVOC	+	391	491	158	69.9	40.7
TSP					381	23.0
PM_{10}					305	18.0
$PM_{2.5}$					228	14.0
Continued	2007	2008	2009	2010	2011	2012
SO_2	91.0	149	108	116	193	230
NO_x	18.0	19.0	18.0	17.0	21.0	19.0
NH_3	107	111	165	123	20.3	17.8
NMVOC	42.0	39.4	32.0	28.2	28.0	28.1
TSP	25.0	26.0	16.0	26.0	6.80	6.00
PM_{10}	20.0	21.0	13.0	21.0	5.40	4.80
$PM_{2.5}$	15.0	16.0	10.0	16.0	4.10	3.60

Sulphuric acid production ceased in 1997.

Nitric acid production ceased in 2004.

+ To be included.

The time series for SO_2 follows the amount of sulphuric acid produced, i.e. the fluctuation follows the activity until the activity ceased in 1997. The same is the case for NO_X from production of nitric acid; see Figure 4.1.The production of sulphuric acid and nitric acid/fertiliser ceased in 1996/7 and in the middle of 2004, respectively.

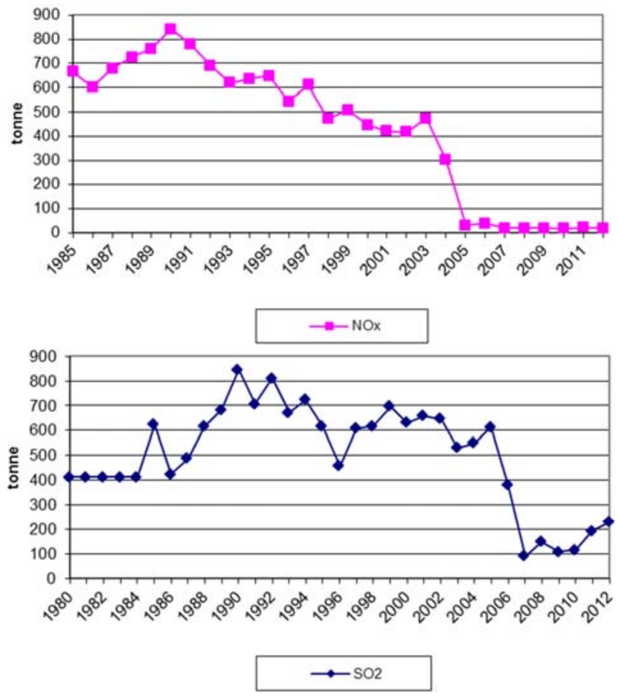

Figure 4.1 Emission of NO_x and SO_2 from Chemical industry (2B).

The emission of NO_X from production of catalysts/fertilisers decreases from 1996 to 2012, whereas the emission of NH_3 increases. Fluctuations in production, product composition and the increase in the emission factor can explain the increase in NH_3 emission.

The emission of NMVOC from production of pesticides is reduced significantly from 1990 to 2012 (Cheminova, 2013). The decrease can be explained by introduction of flue gas cleaning equipment rather than any decrease in activity. The emission of SO_2 is from the sulphur regeneration plant (Claus plant).

The time series will be explained further in the following section.

4.3.2 Methodological issues

The emission of SO_2, NO_X, NH_3 and TSP from production of sulphuric acid, nitric acid and fertiliser is measured yearly or estimated, from 1990 to 2004 (TSP from 2000 to 2004) (Kemira GrowHow, 2005). PM_{10} and $PM_{2.5}$ are estimated from the distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.8/0.6) from CEPMEIP (2003). The emission for SO_2 and NO_X for 1991 to 1993 was estimated by using interpolated emission factors and activity data. Production of sulphuric acid was stopped in 1997 and production of nitric acid was stopped in 2004. The emission factor for SO_2 fluctuated and the emission factor for NO_X decreased from 1990 to 2004. Production of sulphuric acid decreased from approximately 150 000 to 60 000 tonnes from 1990 to 1996, and production of nitric acid decreased from approximately 450 000 to 229 000 tonnes from 1990 to 2004. Overall, production of fertiliser decreased from approximately 800 000 to approximately 395 000 tonnes from 1990 to 2004.

The emission of NH_3, NO_X and TSP from production of catalysts and fertilisers is measured yearly from 1996 to 2012 (TSP from 2000 to 2012) (Haldor Topsøe, 2013). The emissions from 1990-1995 were extrapolated. PM_{10} and $PM_{2.5}$ are estimated from the distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.8/0.6) from CEPMEIP (2003). The process-related NO_X emission has been estimated as 80 % of the total NO_X emission; Haldor Topsøe reports this assumption in their environmental report. The emission of NH_3 shows an increasing trend and varies between 13 and 20 tonne from 1990 to 2012 with maximum at 165 tonne in 2009. In the same period, the production of catalysts and fertilisers increased from approximately 33 000 to 45 000 tonnes; see Table 4.12.

The emission of NMVOC from production of pesticides is measured yearly from 1990 to 2000 (Cheminova, 2013) and estimated for 2001 to 2012. An emission factor based on 2000 data – see Table 4.13 – is used for estimation of 2001 to 2012 emissions.

The emission of NMVOC from production of chemical ingredients has been measured from 1996 to 2012 (Danisco Grindsted, 2013). The emission has decreased from 100 to 12 tonnes NMVOC in this period. However, no explanation can be given on these conditions, as information on activity is not available.

The applied emission factors for the different processes in chemical industry are presented in Table 4.13.

Table 4.12 Production in chemical industry (tonne) (Statistics Denmark, 2013; Haldor Topsøe, 2013, Cheminova, 2013).

	1980	1985	1990	1995	2000	2005
Sulphuric acid	+	188 000	148 000	102 000	0	0
Nitric acid	+	350 000	450 000	390 000	433 000	0
Pesticides	+	55 800	55 800	55 800	60 284	53 504
Catalysts		ni	ni	ni	17 197	23 185
Potassium nitrate		ni	ni	ni	19 193	23 271
Catalysts+KNO_3[1]	+	32 296	32 296	32 296	36 390	46 456
Chemical ingredients[2]	ni	ni	ni	ni	ni	ni
Continued	2007	2008	2009	2010	2011	2012
Sulphuric acid	0	0	0	0	0	0
Nitric acid	0	0	0	0	0	0
Pesticides	49 796	49 747	37 484	30 977	31 000[3]	31 000[3]
Catalysts	20 712	28 125	22 504	20 480i	22 250	22 917
Potassium nitrate	27 006	31 356	22 059	25 920i	25 289	32 899
Catalysts+KNO_3[1]	47 718	59 481	44 563	46 400	47 539	55 816
Chemical ingredients[2]	ni	ni	ni	ni	ni	ni

+ To be included.

ni No information.

1. 1985-1995.
2. Production confidential.
3. Production assumed.

Table 4.13 Implied emission factors for *Chemical Industry 2B*.

Process	Substance	kg/tonne	EMEP/EEA (2009) kg/tonne
Sulphuric acid	SO_2	2.2-2.7	3.0-17
Nitric acid	NO_x	1.0-1.8	0.4-12
Pesticides, Claus process[1]	SO_2	7.0	-
	NMVOC	0.5-2.0	-
Catalysts, potassium nitrate	NO_x	0.6-1.5	-
	NH_3	0.4-1.7	-
Chemical ingredients[2]	NMVOC	no information	-

1. Average 1997-2005.
2. No activity data available.

4.3.3 Uncertainties and time series consistency

The time series are either based on specific measurements or by using company-specific emission factors and activity data. Therefore, the time series are considered to be consistent.

4.3.4 Source specific QA/QC and verification

The emission factors for production of nitric acid and sulphuric acid have been verified by comparison with standard emission factors (EMEP/EEA, 2009). Detailed discussion of QA/QC can be found in Nielsen et al. (2012).

4.3.5 Source specific recalculations

Emissions of SO_2, NMVOC, and mercury have been included from production of tar products.

4.3.6 Source specific planned improvements

Time series for SO_2, NO_x, NH_3 and NMVOC will be completed to 1980. Potential production of formaldehyde and unsaturated polyester will be investigated.

4.4 Metal production (NFR 2C)

4.4.1 Source category description

The sub-sector *Metal production* (NFR 2C) covers the following processes:

- Electric furnace steel plant (SNAP 040207)
- Rolling mills (SNAP 040208)
- Iron foundries (SNAP 030303)
- Secondary lead production (SNAP 030307)
- Secondary zinc production (SNAP 030308)
- Secondary aluminium production (SNAP 030310)
- Allied metal manufacturing (SNAP 040306)

The time series for emission of heavy metals, particulate matter, and HCB/PCB from *Metal production* (NFR 2C) are presented in Table 4.14.

The emission inventory for metal production is based on measured emissions from steelworks and secondary aluminium manufacturing as well as average emission factors for iron foundries, secondary lead and zinc manufacturing, and allied metal manufacturing. Regarding the steelworks that use iron and steel scrap as raw material, the emissions to a large degree depend on the quality of the scrap. This fact may result in large annual variations for one or more of the heavy metals. This may also be the case for iron foundries, as they also use scrap as raw material, but they have not been subject to the same requirements to analyse emissions of heavy metals to air.

Table 4.14 Time series for pollutants from *Metal production 2C* (process emissions; PCDD/F: grammes, metals: kg and other pollutants: tonnes).

Pollutant	1980	1985	1990	1995	2000	2005
TSP					279	233
PM_{10}					131	90.0
$PM_{2.5}$					48.3	23.4
As			30.9	27.1	30.5	30.0
Cd			57.1	62.2	38.9	21.1
Cr			120	107	112	110
Cu			40.1	44.6	46.4	46.4
Hg			136	158	90.0	74.0
Ni			406	435	192	210
Pb			1 482	1 509	1 249	1 135
Se			515	451	508	500
Zn			6 406	7 303	2 533	2 263
PCDD/F			13.7	9.24	2.26	0.21
PCB			1.62	1.87	1.77	0.81
HCB			1.97	2.30	2.67	1.36
Continued	2007	2008	2009	2010	2011	2012
TSP	188	176	86.9	151	172	157
PM_{10}	81.8	72.9	28.5	48.4	54.9	49.9
$PM_{2.5}$	24.7	20.9	6.02	9.51	10.5	9.42
As	21.8	21.4	12.4	21.9	25.1	22.9
Cd	17.8	17.4	11.6	17.0	18.6	16.9
Cr	80.1	78.5	45.5	80.2	91.9	84.1
Cu	46.4	46.4	46.4	46.4	46.4	46.4
Hg	12.1	11.2	4.90	8.84	9.04	6.37
Ni	140	135	72.2	128	142	123
Pb	646	633	393	634	712	651
Se	364	357	207	364	418	382
Zn	1 195	1 174	921	1 143	1 199	1 120
PCDD/F	0.036	0.027	0.00	0.00	0.00	0.00
PCB	0.20	0.17	0.057	0.073	0.078	0.074
HCB	0.73	0.55	0.003	0.004	0.005	0.005

[1)] The electro steelwork was closed 2002-2004 and from 2006.

The steelwork was closed in the beginning of 2002 and re-opened at the end of 2004. The electro steelwork has been closed again from 2006; whereas manufacturing of steel sheets at the rolling mill has continued separated from the electro steelwork. Melting of secondary aluminium was stopped in the end of 2008.

4.4.2 Methodological issues

The activity data applied in the sector *Metal production* are presented in Table xx based on Statistic Denmark (2013), Stålvalseværket (2002), and assumptions.

Table xx Production in metal industry (tonne) (Statistics Denmark, 2013; Stålvalseværket (2002), and assumptions.

	1980	1985	1990	1995	2000	2005
Steelwork, EAF			614 000	717 000	631 000	250 000
Steelwork, rolling mill			+	+	+	433 286
Iron foundry			103 000	90 200	101 698	99 910
Allied metal			4 532	4 532	4 532	4 532
Secondary lead			5 000	5 000	5 000	5 000
Secondary zinc			2 430	2 430	2 430	2 430
Secondary aluminium			ni	ni	32147	27760
Continued	2007	2008	2009	2010	2011	2012
Steelwork, EAF	-	-	-	-	-	-
Steelwork, rolling mill	520 295	483 908	211 127	381 234	389 504	274 518
Iron foundry	72 778	71 389	41 388	72 864	83 565	76 426
Allied metal	4 532	4 532	4 532	4 532	4 532	4 532
Secondary lead	5 000	5 000	5 000	5 000	5 000	5 000
Secondary zinc	2 430	2 430	2 430	2 430	2 430	2 430
Secondary aluminium	36 190	27 495	0	-	-	-

\+ The rolling mill process the output from the EAF.

ni No information.

The emission of heavy metals and TSP from the production of steel bars and sheets from steel scrap are based on measurements from the company Stålvalseværket (Stålvalseværket, 2002). PM_{10} and $PM_{2.5}$ are estimated from the distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.95/0.6) from CEPMEIP (2003). The distribution of metals for 1995/96 (Illerup et al., 1999) is used in estimation of the different metals for the following years. EF for HCB and PCB are obtained from Nielsen et al. (2014). The activity has varied between approximately 600 000 and 800 000 tonnes from 1990 to 2001. The production ceased in the beginning of 2002 and restarted at the end of 2004 with regard to melting of steel scrap in the electric arc furnace (EAF). The production of steel bars at the steelwork is assumed to be 1/3 of the production in 2001; the steelwork has been closed from end of 2005/beginning of 2006.

The emission of heavy metals from iron foundries is based on standard emission factors and yearly production statistics from The Association of Danish Foundries/Statistics Denmark (2013). The emission of TSP and distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.3/0.045) is obtained from CEPMEIP (2003). EF for HCB and PCB are obtained from Nielsen et al. (2014).

The emission of heavy metals from production of secondary lead and allied metal manufacturing is based on average emission factors for Danish producers (Illerup et al., 1999) and activity data from Statistics Denmark. The emission of TSP and distribution between TSP, PM_{10} and $PM_{2.5}$ (1/0.95/0.5) is obtained from CEPMEIP (2003). EF for HCB and PCB are obtained from Nielsen et al. (2014).

4.4.3 Uncertainties and time series consistency

The time series are either based on specific measurements, company-specific emission factors combined with activity data or on standard emission factors combined with public statistics. The same methodology has been applied for the entire time series and, therefore, the time series are considered to be consistent.

4.4.4 Source specific recalculations

Emissions of HCB and PCBs have been included for steelwork, iron foundries, secondary aluminium production and secondary lead production.

4.4.5 Source specific QA/QC and verification

Detailed discussion of QA/QC can be found in Nielsen et al. (2012).

4.4.6 Source specific planned improvements

The time series will be completed and new emission factors for the latest years will be established, when possible. Especially for secondary aluminium and zinc production, potential emissions of heavy metals will be investigated.

Potential emissions from galvanisation and electroplating will be investigated.

4.5 Other production (NFR 2D)

4.5.1 Source category description

The sub-sector *Other production* (NFR 2D) covers the following process:

- Bread (SNAP 040605).
- Beer (SNAP 040607).
- Spirits (SNAP 040608).
- Sugar production (SNAP 040625).
- Meat (fish etc. frying/curing) (SNAP 040627).
- Margarine and solid cooking fats (SNAP 040698).
- Coffee roasting (SNAP 040699).

Table 4.15, 4.16 and 4.17 presents the emission of NMVOC from production of food, beverage and sugar. The emissions are presented for relevant sub-sectors.

Table 4.15 Emission of NMVOC from production of beer and spirits (tonne NMVOC).

	1980	1985	1990	1995	2000	2005
Beer	+	326	326	347	261	304
Spirits	+	32.1	32.1	31.3	23.6	22.1
Ethanol, technical	+	51.9	51.9	77.4	72.2	83.1
Sum		410	410	455	357	409
Continued	2007	2008	2009	2010	2011	2012
Beer	268	227	211	222	231	213
Spirits	16.6	11.9	10.9	12.7	24.3	23.1
Ethanol, technical	62.7	76.8	63.6	55.3	59.4	41.9
Sum	347	315	286	290	314	278

+ To be included.

Table 4.16 Emission of NMVOC from production of bread and cookies, meat curing (meat, poultry, fish, and shellfish), production of margarine and solid cooking fats, roasting of coffee (tonne NMVOC).

	1980	1985	1990	1995	2000	2005
Biscuits, cookies and other bakery products	+	100	98.6	148	138	157
Bread (rye and wheat)	+	855	853	1 038	1 098	1 158
Meat	+	414	443	528	559	603
Poultry	+	34.4	39.4	51.9	60.5	56.3
Fish and shellfish	+	495	493	708	578	405
Solid fats and oils	+	2 300	2 307	1 983	1 957	2 002
Coffee, not roasted, not decaffeinated, supply	+	27.5	28.6	26.9	30.6	20.1
Total emission		4 226	4 263	4 484	4 422	4 401
Continued	2007	2008	2009	2010	2011	2012
Biscuits, cookies and other bakery products	136	124	115	118	114	109
Bread (rye and wheat)	1 153	1 145	1 201	1 101	933	1 047
Meat	605	574	536	563	580	542
Poultry	51.7	52.9	50.6	56.0	56.1	42.5
Fish and shellfish	314	295	316	320	273	184
Solid fats and oils	1 914	1 911	1 752	1 802	1 915	1 862
Coffee, not roasted, not decaffeinated, supply	18.2	18.5	18.7	18.8	12.2	9.72
Total emission	4 192	4 120	3 990	3 979	3 884	3 798

+ To be included.

Table 4.17 Emission of NMVOC from production of sugar (tonne NMVOC).

	1980	1985	1990	1995	2000	2005
Sugar	+	+	101	88.8	88.6	101
Continued	2007	2008	2009	2010	2011	2012
Sugar	66.0	80.1	85.7	52.4	43.6	52.4

+ To be included.

The emission of NMVOC from production of food and beverage follows the activity as the same emission factors have been used for the entire period. The emission factors are presented in Table 4.9.

4.5.2 Methodological issues

The emission of NMVOC from production of food and beverage is estimated from production statistics (Statistics Denmark) and standard emission factors from the IPCC guidelines (IPCC (1997) Vol. 3, Table 2-24/2-25) combined with the EMEP/EEA Guidebook (EMEP/EEA, 2009); see Table 4.18. Regarding refining of sugar, the default EF has been revised based on company specific measurements obtained from Nielsen (2011). TOC has been measured in order to solve odour issues. The emission of TOC has been used as indicator for NMVOC assuming a conversion factor at: 0.6 kg C/kg NMVOC.

Table 4.18 Emission factors for NMVOC applied within production of food and beverage; activity is given as 1 000 l or tonne of product.

Beverage	kg NMVOC/1 000 l	Reference
Beer	0.35	EMEP/EEA (2009)
Spirits	4	EMEP/EEA (2009)
Ethanol, technical	4	EMEP/EEA (2009)
Food	kg NMVOC/tonne	
Meat, fish and poultry	0.3	EMEP/EEA (2009)
Sugar	0.2	Nielsen (2011)
Margarine and solid cooking fats	10	EMEP/EEA (2009)
Cakes, biscuits and breakfast cereals	1	EMEP/EEA (2009)
Bread	4.5	EMEP/EEA (2009)
Coffee roasting	0.55	EMEP/EEA (2009)

The activity data used for the emission estimates are presented in Table 4.19, 4.20 and 4.21.

Table 4.19 Production statistics for production of beer and spirits (tonne) (Statistics Denmark, 2012).

	1980	1985	1990	1995	2000	2005
Beer	+	930 405	930 405	990 321	745 492	868 041
Spirits	+	8 026	8 026	7 823	5 893	5 518
Ethanol, technical	+	12 977	12 977	19 338	18 059	20 780
Continued	2007	2008	2009	2010	2011	2012
Beer	765 789	647 402	603 797	633 535	658 995	608 021
Spirits	4 140	2 976	2 721	3 173	6 067	5 784
Ethanol, technical	15 663	19 195	15 896	13 827	14 846	10 486

+ To be included.

Table 4.20 Production statistics for production (or supply of) of bread and cookies, meat curing (meat, poultry, fish, and shellfish), production of margarine and solid cooking fats, roasting of coffee (tonne) (Statistics Denmark, 2013; Danish AgriFish Agency, 2013).

	1980	1985	1990	1995	2000	2005
Biscuits, cookies and other bakery products	+	100 000	98 574	148 247	138 488	157 214
Bread (rye and wheat)	+	190 000	189 562	230 762	244 060	257 444
Meat	+	1 381 400	1 477 700	1 758 800	1 864 000	2 009 400
Poultry	+	114 700	131 400	173 000	201 700	187 500
Fish and shellfish	+	1 650 000	1 643 648	2 360 076	1 926 516	1 348 424
Solid fats and oils	+	230 000	230 705	198 274	195 679	200 170
Coffee, not roasted, not decaffeinated, supply	+	50 000	52 086	48 870	55 617	36 555
Continued	2007	2008	2009	2010	2011	2012
Biscuits, cookies and other bakery products	136 397	124 170	115 496	117 500	114 486	109 310
Bread (rye and wheat)	256 265	254 373	266 886	244 753	207 316	232 768
Meat	2 016 100	1 912 800	1 785 300	1 877 000	1 934 400	1 807 000
Poultry	172 400	176 200	168 800	186 500	187 000	141 800
Fish and shellfish	1 046 152	984 407	1 054 914	1 066 548	911 624	614 576
Solid fats and oils	191 405	191 082	175 192	180 214	191 455	186 235
Coffee, not roasted, not decaffeinated, supply	33 121	33 643	33 933	34 190	22 847	17 676

+ To be included.

Table 4.21 Production of sugar (Statistics Denmark, 2013; Nordic Sugar, 2013).

	1980	1985	1990	1995	2000	2005
Sugar	+	+	505 709	444 143	443 189	506 471
Continued	2007	2008	2009	2010	2011	2012
Sugar	356 740	465 995	394 779	262 072	218 065	262 026

+ To be included.

4.5.3 Uncertainties and time series consistency

The time series is based on the same methodology throughout, using public statistics and standard emission factors. Therefore, the time series is considered to be consistent.

4.5.4 Source specific recalculations

No source specific QA/QC and verification has been performed for the sector *Other production*.

4.5.5 Source specific planned improvements

The relevance of the following sources will be investigated:

- Wood processing
- Wine
- Smokehouses
- Yeast production
- Other processes

4.6 Other production, consumption, storage, transportation or handling of bulk products (NFR 2G)

4.6.1 Source category description

The sub-sector *Other production, consumption, storage, transportation or handling of bulk products* (NFR 2G) covers the following process:

- Other (SNAP 040617; Slaughterhouse waste).

Table 4.22 presents the emission of NH_3 from treatment of slaughterhouse waste.

Table 4.22 Emission of NH_3 from treatment of slaughterhouse waste (tonne).

Year	1980	1985	1990	1995	2000	2005
NH_3	+	+	24.2	31.5	34.0	132
Continued	2007	2008	2009	2010	2011	2012
NH_3	112	112	92.5	89.0	86.2	75.5

+ To be included.

4.6.2 Methodological issues

The emission of NH_3 from treatment of slaughterhouse waste has been calculated from an average emission factor based on measurements from Danish plants (daka, 2012). Measurements of NH_3 during the years 2002/3 from three locations (Lunderskov, Løsning and Randers) with different product mix have been included in the determination of an EF:

EF_{NH3} = 0.475 kg NH_3/tonne product

Activity data are obtained from production statistics (Statistics Denmark, 2012); see Table 4.23.

Table 4.23 Products from treatment of slaughterhouse waste (tonne) (Statistics Denmark, 2013).

Year	1980	1985	1990	1995	2000	2005
Meat/bone meal[1]	+	+	128 789	197 034	198 568	177 388
Animal fat[1]	+	+	62 178	54 178	73 436	90 234
Blood meal[2]	+	+	11 000	11 000	11 400	10 230
Total			201 967	262 212	283 404	277 852
Continued	2007	2008	2009	2010	2011	2012
Meat/bone meal[1]	142 577	140 502	116 412	104 622	96 251	73 717
Animal fat[1]	82 648	84 700	70 889	75 285	77 740	77 740[3]
Blood meal[2]	10 621	10 045	7 482	7 482	7 482	7 482
Total	235 846	235 247	194 783	187 389	181 473	158 939

\+ To be included.

1. Statistics Denmark (2013).
2. daka (2013). 1990-97 and 2010-12: Produced amount of blood meal is estimated.
3. Assumed to be the same as 2011 as the value is missing in Statistics Denmark (2013).

4.6.3 Uncertainties and time series consistency

The time series is based on the same methodology throughout, using public statistics and standard emission factors. Therefore, the time series is considered to be consistent.

4.6.4 Source specific recalculations

No source specific recalculation has been performed for the sector *Other production, consumption, storage, transportation or handling of bulk products*.

4.6.5 Source specific QA/QC and verification

No source specific QA/QC and verification has been performed for the sector *Other production, consumption, storage, transportation or handling of bulk products*.

4.6.6 Source specific planned improvements

Time series will be completed to 1980.

4.7 Uncertainty estimates

Uncertainty estimates for industrial processes (SNAP 04) are presented in Table 4.24. The uncertainty estimates are based on standard uncertainty factors (EMEP/EEA, 2009).

Table 4.24 Uncertainty estimates for industrial processes (%).

	Activity data uncertainty	Emission factor uncertainty	Overall 2012	Trend
SO_2	2	20	20.100	1.187
NO_x	2	50	50.040	0.064
NMVOC	50	50	70.711	57.686
CO	50	100	50.040	0.071
NH_3	2	1 000	1000.002	2.07
Cadmium	2	1 000	1000.002	0.619
Copper	2	1 000	1000.002	1.143
Lead	2	1 000	1000.002	0.898
Zinc	2	1 000	1000.002	0.533

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5 Solvents and Other Product Use (NFR sector 3)

5.1 Introduction

This section presents the Danish methodology used for calculating emissions from use of solvents and other products in industry and households that are related to the source categories Paint application (NFR sector 3A), Degreasing and dry cleaning (NFR sector 3B), Chemical products, manufacture and processing (NFR sector 3C) and Other (NFR sector 3D). Covered pollutants are; NMVOCs, SO_2, NOx, CO, NH_3, particles, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, dioxins/furans and PAHs.

Solvents are chemical compounds that are used on a global scale in industrial processes and as constituents in final products to dissolve e.g. paint, cosmetics, adhesives, ink, rubber, plastic, pesticides, aerosols or are used for cleaning purposes, i.e. degreasing. NMVOCs are main components in solvents - and solvent use in industries and households is typically the dominant source of anthropogenic NMVOC emissions (UNFCCC, 2008; Pärt, 2005; Karjalainen, 2005). In industrial processes where solvents are produced or used, NMVOC emissions to air and as liquid can be recaptured and either used or destroyed. Solvent containing products are used indoor and outdoor and the majority of solvent sooner or later evaporate. A small fraction of the solvent ends up in waste or as emissions to water and may finally also contribute to air pollution by evaporation from these compartments. Emission inventories for solvents are based on model estimates, as direct and continuous emissions are only measured from a limited number of sources. In addition to NMVOCs there are a number of other organic compounds and heavy metals, as listed above, that are emitted from use of fireworks, tobacco, charcoal for barbeques and candles. These are included in the source category Other (NFR 3D).

In this section the methodology for the Danish emission inventory for Solvent and Other Product Use is presented and the results for the period 1985 – 2012 are summarised. The method is mainly based on the detailed approach and methodology described in EMEP/EEA (2009) and IPCC (1997 & 2000), and emissions are calculated for industrial sectors, households for the stated NFR sectors, as well as for individual pollutants.

5.2 Methodology

Until 2002 the Danish solvent emission inventory was based on questionnaires, which were sent to selected industries and sectors requiring information on solvent use. In 2003 it was decided to implement a method that is more complete, accurate and transparent with respect to including the total amount of used solvent, attributing emissions to industrial sectors and households and establishing a reliable model that is readily updated on a yearly basis.

Emission modelling of solvents can basically be done in two ways: 1) By estimating the amount of (pure) solvents consumed, or 2) By estimating the amount of solvent containing products consumed, taking account of their solvent content (EMEP/EEA, 2009).

In 1) all relevant solvents must be estimated, or at least those together representing more than 90 % of the total pollutant emission, and in 2) all relevant source categories must be inventoried or at least those together contributing more than 90 % of the total pollutant emission. A simple approach is to use a per capita emission for each category, whereas a detailed approach is to get all relevant consumption data (EMEP/EEA, 2009; IPCC, 1997 & 2000).

The detailed method 1) is used in the Danish emission inventory for solvent use, thus representing a chemicals approach, where each pollutant is estimated separately. The sum of emissions of all estimated pollutants used as solvents equals the pollutant emission from solvent use.

Method 2) is used for determining emissions from fireworks, tobacco, charcoal for barbeques and candles, which are included in 3D Other Use.

5.2.1 Pollutant list

NMVOC is the most abundant chemical group in relation to Solvent and Other Product Use. Additionally there is also some use and/or emissions of SO_2, NO_x, CO, NH_3, particles, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, dioxins/furans and PAHs that are included in activities in sector 3D Other Product Use.

The definitions of solvents and VOC that are used in the Danish inventory (Nielsen et al., 2010) are as defined in the solvent directive (Directive 1999/13/EC) of the EU legislation: "Organic solvent shall mean any VOC which is used alone or in combination with other agents, and without undergoing a chemical change, to dissolve raw materials, products or waste materials, or is used as a cleaning agent to dissolve contaminants, or as a dissolver, or as a dispersion medium, or as a viscosity adjuster, or as a surface tension adjuster, or a plasticiser, or as a preservative". VOCs are defined as follows: "Volatile organic compound shall mean any organic compound having at 293.15 K a vapour pressure of 0.01 kPa or more, or having a corresponding volatility under the particular condition of use".

This implies that some NMVOCs, e.g. ethylene glycol, that have vapour pressures just around 0.01 kPa at 20 °C, may only be defined as VOCs at use conditions with higher temperature. However, use conditions under elevated temperature are typically found in industrial processes. Here the capture of solvent fumes is often efficient, thus resulting in small emissions (communication with industries).

The Danish list of NMVOCs comprises approx. 30 pollutants or pollutant groups representing more than 95 % of the total emission from solvent use, cf. Table 5.3.

5.2.2 Activity data

For each pollutant or product a mass balance is formulated:

Consumption = (production + import) – (export + destruction/disposal + hold-up) (Eq. 1)

Data concerning production, import and export amounts of solvents and solvent containing products are collected from Statistics Denmark (StatBank DK, 2013), which contains detailed statistical information on the Danish society. Manufacturing and trading industries are committed to reporting production and trade figures to the Danish Customs & Tax Authorities in accordance with the Combined Nomenclature. Import and export figures are available on a monthly basis from 1990 to present and contain trade information from 272 countries world-wide. Production figures are reported quarterly as "industrial commodity statistics by commodity group and unit" from 1990 to present. Prior to 1990 the figures are assumed constant on a 1990 level.

Destruction and disposal of solvents lower the pollutant emissions. In principle this amount must be estimated for each pollutant in all industrial activities and for all uses of pollutant containing products. At present the solvent inventory only considers destruction and disposal for a limited number of pollutants. For some pollutants it is inherent in the emission factor, and for others the reduction is specifically calculated from information obtained from the industry or literature.

Hold-up is the difference in the amount in stock in the beginning and at the end of the year of the inventory. No information on solvents in stock has been obtained from industries. Furthermore, the inventory spans over several years so there will be an offset in the use and production, import and export balance over time.

In some industries the solvents are consumed in the process, e.g. in the graphics and plastic industry, whereas in the production of paints and lacquers the solvents are still present in the final product. These products can either be exported or used in the country. In order not to double count consumption amounts of pollutants it is important to keep track of total solvent use, solvents not used in products and use of solvent containing products. Furthermore some pollutants may be represented as individual pollutants and also in chemical groups, e.g. "o-xylene", "mixture of xylenes" and "xylene". Some pollutants are better inventoried as a group rather than individual pollutants, due to missing information on use or emission for the individual pollutants. The Danish inventory considers single pollutants, with a few exceptions.

Activity data for pollutants are thus primarily calculated from Equation 1 with input from Statistics Denmark (StatBank DK, 2013). When Statistics Denmark holds no information on production, import and export or when more reliable information is available from industries, scientific reports or expert judgements the data can be adjusted or even replaced.

5.2.3 Emission factors

For each pollutant the emission is calculated by multiplying the consumption with the fraction emitted (emission factor), according to:

Emission = consumption * emission factor

The present Danish method uses emission factors that represent specific industrial activities, such as processing of polystyrene, dry cleaning etc. or that represent use categories, such as paints and detergents. Some pollutants have been assigned emission factors according to their water solubility. Higher hydrophobicity yields higher emission factors, since a lower amount ends in waste water, e.g. ethanol (hydrophilic) and turpentine (hydrophobic).

Emission factors for solvents are categorised in four groups in ascending order: (1) Lowest emission factors in the chemical industry, e.g. lacquer and paint manufacturing, due to emission reducing abatement techniques and destruction of solvent containing waste, (2) Other processes in industry, e.g. graphic industry, have higher emission factors, (3) Non-industrial use, e.g. auto repair and construction, have even higher emission factors, (4) Diffuse use of solvent containing products, e.g. painting, where practically all the pollutant present in the products will be released during or after use.

For a given pollutant the consumed amount can thus be attributed with two or more emission factors; one emission factor representing the emissions occurring at a production or processing plant and one emission factor representing the emissions during use of a solvent containing product. If the chemical is used in more processes and/or is present in several products more emission factors are assigned to the respective chemical amounts.

Emission factors can be defined from surveys of specific industrial activities or as aggregated factors from industrial branches or sectors. Furthermore, emission factors may be characteristic for the use pattern of certain products. The emission factors used in the Danish inventory also rely on the work done in a joint Nordic project (Fauser et al., 2009).

5.2.4 Source allocation

The Danish Working Environment Authority (WEA) is administrating the registrations of chemicals and products to the Danish product register. All manufacturers and importers of products for occupational and commercial use are obliged to register. The following products are comprised in the registration agreement:

- Chemicals and materials that are classified as dangerous according to the regulations set up by the Danish Environmental Protection Agency (EPA).
- Chemicals and materials that are listed with a limit value on the WEA "limit value list".
- Materials, containing 1 % or more of a chemical, which is listed on the WEA "limit value list".
- Materials, containing 1 % or more of a chemical, which are classified as hazardous to humans or the environment according to the EPA rules on classification.

There are the following important exceptions for products, which does not need to be registered:

- Products exclusively for private use.
- Pharmaceuticals ready for use.
- Cosmetic products.

The Danish product register does therefore not comprise a complete account of used pollutants. Source allocations of exceptions from the duty of declaration are done based on information from trade organisations, industries, scientific reports and information from the internet.

Outputs from the inventory are

- a list where the most predominant pollutants are ranked according to emissions to air,
- specification of emissions from industrial sectors and from households,
- contribution from each pollutant to emissions from industrial sectors and households,
- yearly trend in emissions, expressed as total pollutant and single pollutant, and specified in industrial sectors and households.

5.3 Emissions, activity data and emission factors

5.3.1 NMVOC

Table 5.1 and Figure 5.1 show the emissions of NMVOC from 1985 to 2012, where the used amounts of single pollutants have been assigned to specific products and NFR sectors. From 1985 to 1990 the emission level is set constantly equal to the 1990 emission level, due to missing reliable data. A general increase is seen for all sectors from 1990 to 1996 followed by a decrease from 1997 to 2006 and stagnation in the period 2007 to 2012. Table 5.1 is derived from used amounts of pollutants by applying emission factors relevant to individual pollutants and production or use activities. Table 5.2 showing the used amount of products (activity data) is derived from used amounts of pollutants by assessing the amount of pollutants that is comprised within products belonging to each of the four source categories.

In Table 5.3 the emission for 2012 is split into individual pollutants. The most abundantly used solvents are ethanol, turpentine, or white spirit defined as a mixture of stoddard solvent and solvent naphtha and propylalcohol. Ethanol is used as solvent in the chemical industry and as windscreen washing agent. Turpentine is used as thinner for paints, lacquers and adhesives. Propylalcohol is used in cleaning agents in the manufacture of electrical equipment, flux agents for soldering, as solvent and thinner and as windscreen washing agent. Household emissions are dominated by propane and butane, which are used as aerosols in spray cans, primarily in cosmetics. For some pollutants the emission factors are precise but for others they are rough estimates. The division of emission factors into four categories implies that high emission factors are applicable for use of solvent containing products and lower emission factors are applicable for use in industrial processes.

Table 5.1 Emission of NMVOC in Gg per year.

	1985	1990	1995	2000	2001	2002	2003	2004	2005
Paint application (3A)	5,11	5,11	5,90	6,40	5,25	5,18	4,99	4,66	4,32
Degreasing and dry cleaning (3B)	7,1E-05	7,1E-05	7,7E-05	2,9E-05	1,3E-05	3,0E-05	2,9E-05	2,4E-05	1,8E-05
Chemical products, manufacturing and processing (3C)	8,14	8,14	9,32	6,96	6,28	6,58	4,96	6,06	6,25
Other (3D)	24,7	24,7	30,0	27,8	24,8	24,4	22,4	21,4	20,8
Other (3D3)*	0,080	0,083	0,079	0,095	0,085	0,10	0,11	0,10	0,095
Total NMVOC	38,0	38,0	45,3	41,2	36,4	36,2	32,5	32,3	31,5

Continued

	2006	2007	2008	2009	2010	2011	2012
Paint application (3A)	3,73	3,23	3,38	2,85	2,75	2,87	2,86
Degreasing and dry cleaning (3B)	1,5E-05	2,2E-05	1,5E-05	1,3E-05	1,2E-05	1,1E-05	2,7E-06
Chemical products, manufacturing and processing (3C)	6,02	6,12	5,91	4,99	5,05	4,81	4,87
Other (3D)	20,8	18,0	18,4	19,7	19,4	19,2	19,1
Other (3D3)*	0,11	0,084	0,078	0,080	0,068	0,060	0,082
Total NMVOC	30,7	27,5	27,8	27,6	27,3	27,0	27,0

*Fireworks, tobacco, barbequing, candles

Table 5.2 Used amounts of products (activity data) in Gg per year.

	1985	1990	1995	2000	2001	2002	2003	2004	2005
Paint application (3A)	83,2	83,2	92,1	105	86,4	86,7	79,8	77,6	75,2
Degreasing and dry cleaning (3B)	1,41	1,41	1,53	0,585	0,250	0,596	0,578	0,480	0,365
Chemical products, manufacturing and processing (3C)	406	406	504	567	551	540	513	633	740
Other (3D)	197	197	247	230	206	218	185	182	204
Other (3D3)*	28,0	28,0	31,4	46,5	42,0	56,3	61,8	61,4	63,4
Total products	716	716	785	844	800	815	761	878	1008

Continued

	2006	2007	2008	2009	2010	2011	2012
Paint application (3A)	64,7	57,3	58,1	48,7	45,8	43,8	43,3
Degreasing and dry cleaning (3B)	0,291	0,433	0,299	0,262	0,24	0,224	0,054
Chemical products, manufacturing and processing (3C)	749	814	771	683	641	640	516
Other (3D)	180	162	169	179	170	169	169
Other (3D3)*	63,6	58,5	51,2	52,2	57,7	50,0	53,69
Total products	993	1035	991	914	869	859	738,7

*Fireworks, tobacco, barbequing, candles

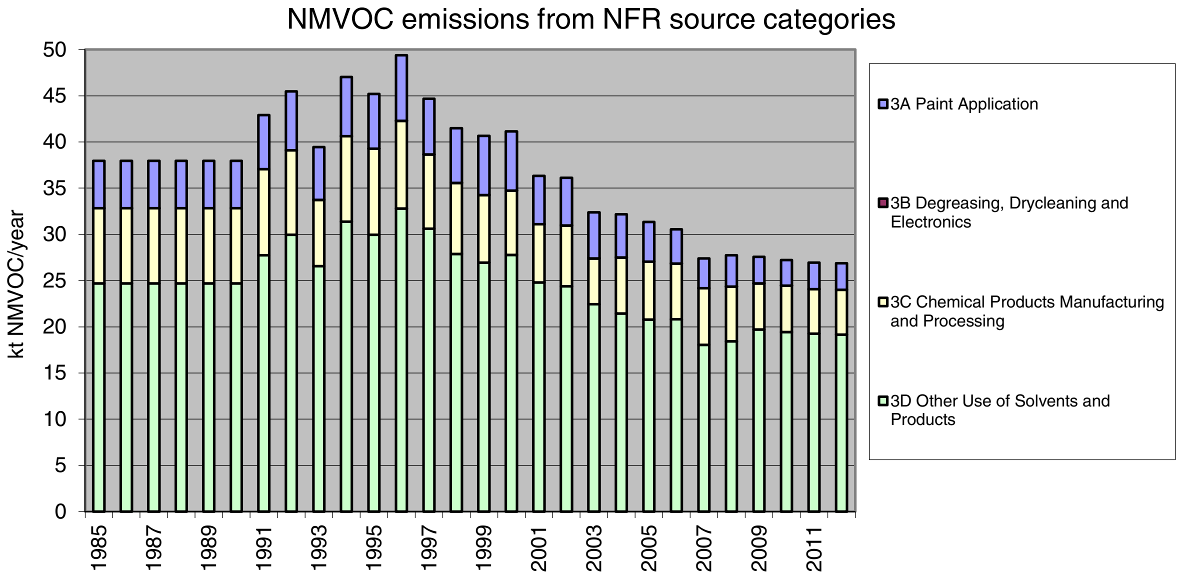

Figure 5.1 Emissions of NMVOC in Gg NMVOC per year. The methodological approach for finding emissions in the period 1985 – 2012 is described in the text. Figures can be seen in Table 5.1.

Table 5.3 NMVOCs with highest emissions 2012.

Pollutant	CAS no	Emissions 2012 (t)
ethanol	64-17-5	7982
turpentine (white spirit: stoddard	64742-88-7	6239
solvent and solvent naphtha)	8052-41-3	
propyl alcohol	67-63-0	2847
cyanates	79-10-7	2260
pentane	109-66-0	1650
methanol	67-56-1	1069
acetone	67-64-1	861
propylen glycol	57-55-6	851
propane	74-98-6	654
butane	106-97-8	654
butanone	78-93-3	348
xylene	1330-20-7	270
	95-47-6	
	108-38-3	
	106-42-3	
glycol ethers	110-80-5	251
	107-98-2	
	108-65-6	
	34590-94-8	
	112-34-5	
	and others	
ethylen glycol	107-21-1	180
toluene	108-88-3	141
cyclohexanones	108-94-1	135
phenol	108-95-2	130
styrene	100-42-5	100
butanoles	78-92-2	87.5
	2517-43-3	
	and others	

Continued		
formaldehyde	50-00-0	72.3
acyclic aldehydes	78-84-2	29.4
	111-30-8	
	and others	
ethyl acetate	141-78-6	29.3
1-butanol	71-36-3	14.7
butyl acetate	123-86-4	14.0
tetrachloroethylene	127-18-4	0.45
acrylic acid	79-10-7	0.043
Total 2011		26,950

5.3.2 Other pollutants

This section covers emissions, activity data and emission factors for other pollutants than NMVOC from the use of fireworks, tobacco, candles and charcoal for barbeques. These are included in 3D Other Use. NMVOC emissions from the use of charcoal and tobacco are included in Table 5.1.

Regarding the national emissions from fireworks the emission factor for Pb was changed in 2000 and Hg and Pb, along with any compounds derived here from, were forbidden in 2003 and 2007, respectively. Emissions are therefore noted as not occurring for these years and forward. Full time series for emissions and activity data can be found in Annex 2E-3 – 2E-7.

Table 5.4 Emissions from use of fireworks.

	Unit	1985	1990	1995	2000	2001	2002	2003	2004	2005
SO_2	Mg	1.9	2.5	5.8	9.4	7.4	9.2	11.7	16.7	7.1
CO	Mg	6.9	8.8	20.7	33.5	26.4	32.7	41.8	59.6	25.4
TSP	Mg	39.7	50.7	118.9	192.5	151.9	187.9	240.0	342.7	146.1
PM_{10}	Mg	19.8	25.4	59.4	96.3	76.0	93.9	120.0	171.4	73.0
$PM_{2.5}$	Mg	13.9	17.8	41.6	67.4	53.2	65.8	84.0	119.9	51.1
As	kg	1.3	1.7	4.0	6.5	5.1	6.3	8.1	11.5	4.9
Cd	kg	0.7	0.9	2.0	3.2	2.6	3.2	4.0	5.8	2.5
Cr	kg	15.6	19.9	46.6	75.5	59.6	73.7	94.2	134.5	57.3
Cu	kg	444	568	1332	2157	1703	2106	2690	3840	1637
Hg	kg	0.1	0.1	0.2	0.3	0.2	0.3	NO	NO	NO
Ni	kg	30.0	38.4	89.9	145.6	114.9	142.1	181.6	259.3	110.5
Pb	kg	2200	2814	6595	3237	2554	3159	4035	5762	2456
Zn	kg	260	333	779	1262	996	1232	1574	2247	958

Continued

	Unit	2006	2007	2008	2009	2010	2011	2012
SO_2	Mg	8.1	8.7	8.5	10.4	10.5	9.2	6.7
CO	Mg	29.0	30.9	30.1	37.1	37.4	32.7	24.0
TSP	Mg	166.9	177.4	173.2	213.4	214.9	187.7	138.1
PM_{10}	Mg	83.5	88.7	86.6	106.7	107.4	93.8	69.1
$PM_{2.5}$	Mg	58.4	62.1	60.6	74.7	75.2	65.7	48.3
As	kg	5.6	6.0	5.8	7.2	7.2	6.3	4.6
Cd	kg	2.8	3.0	2.9	3.6	3.6	3.2	2.3
Cr	kg	65.5	69.6	68.0	83.7	84.3	73.6	54.2
Cu	kg	1871	1988	1941	2392	2408	2103	1548
Hg	kg	NO	NO	NO	NO	NO	NO	NO
Ni	kg	126.3	134.2	131.1	161.5	162.6	142.0	104.5
Pb	kg	2807	NO	NO	NO	NO	NO	NO
Zn	kg	1095	1163	1136	1399	1409	1230	905.5

Table 5.5 Emissions from use of cigarettes and other tobacco products.

	Unit	1985	1990	1995	2000	2001	2002	2003	2004	2005
SO_2	Mg	5.54	5.13	4.60	4.58	4.40	4.38	4.55	4.46	4.18
NO_X	Mg	24.78	22.94	20.55	20.47	19.66	19.57	20.34	19.94	18.69
CO	Mg	758.02	701.93	628.81	626.22	601.43	598.62	622.15	610.13	571.84
NH_3	Mg	57.06	52.84	47.34	47.14	45.28	45.06	46.84	45.93	43.05
TSP	Mg	188.11	174.19	156.05	155.41	149.25	148.55	154.39	151.41	141.91
PM_{10}	Mg	188.11	174.19	156.05	155.41	149.25	148.55	154.39	151.41	141.91
$PM_{2.5}$	Mg	188.11	174.19	156.05	155.41	149.25	148.55	154.39	151.41	141.91
As	kg	2.19	2.03	1.81	1.81	1.74	1.73	1.80	1.76	1.65
Cd	kg	0.22	0.20	0.18	0.18	0.17	0.17	0.18	0.18	0.17
Cr	kg	4.87	4.51	4.04	4.02	3.86	3.85	4.00	3.92	3.67
Cu	kg	2.09	1.94	1.73	1.73	1.66	1.65	1.72	1.68	1.58
Hg	kg	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.06
Ni	kg	0.44	0.41	0.37	0.36	0.35	0.35	0.36	0.35	0.33
Pb	kg	8.86	8.20	7.35	7.32	7.03	7.00	7.27	7.13	6.68
Se	kg	0.11	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.08
Zn	kg	22.15	20.51	18.37	18.30	17.57	17.49	18.18	17.83	16.71
PCDD/Fs	mg	1.38	1.27	1.14	1.14	1.09	1.09	1.13	1.11	1.04
Benzo[b]fluoranthene	kg	0.62	0.57	0.51	0.51	0.49	0.49	0.51	0.50	0.47
Benzo[k]fluoranthene	kg	0.62	0.57	0.51	0.51	0.49	0.49	0.51	0.50	0.47
Benzo[a]pyrene	kg	1.53	1.41	1.27	1.26	1.21	1.21	1.25	1.23	1.15
Indeno[1,2,3-cd]pyrene	kg	0.62	0.57	0.51	0.51	0.49	0.49	0.51	0.50	0.47

Continued

	Unit	2006	2007	2008	2009	2010	2011	2012
SO_2	Mg	4.17	3.94	3.86	3.79	3.69	3.33	3.29
NO_X	Mg	18.63	17.62	17.27	16.93	16.48	14.87	14.72
CO	Mg	569.91	539.22	528.25	518.06	504.28	454.80	450.29
NH_3	Mg	42.90	40.59	39.77	39.00	37.96	34.24	33.90
TSP	Mg	141.43	133.81	131.09	128.56	125.14	112.87	111.74
PM_{10}	Mg	141.43	133.81	131.09	128.56	125.14	112.87	111.74
$PM_{2.5}$	Mg	141.43	133.81	131.09	128.56	125.14	112.87	111.74
As	kg	1.64	1.56	1.52	1.49	1.46	1.31	1.30
Cd	kg	0.17	0.16	0.15	0.15	0.15	0.13	0.13
Cr	kg	3.66	3.46	3.39	3.33	3.24	2.92	2.89
Cu	kg	1.57	1.49	1.46	1.43	1.39	1.25	1.24
Hg	kg	0.06	0.06	0.06	0.06	0.05	0.05	0.05
Ni	kg	0.33	0.31	0.31	0.30	0.29	0.26	0.26
Pb	kg	6.66	6.30	6.17	6.05	5.89	5.32	5.26
Se	kg	0.08	0.08	0.08	0.08	0.07	0.07	0.07
Zn	kg	16.65	15.76	15.44	15.14	14.73	13.29	13.16
PCDD/Fs	mg	1.03	0.98	0.96	0.94	0.92	0.83	0.82
Benzo[b]fluoranthene	kg	0.47	0.44	0.43	0.42	0.41	0.37	0.37
Benzo[k]fluoranthene	kg	0.47	0.44	0.43	0.42	0.41	0.37	0.37
Benzo[a]pyrene	kg	1.15	1.09	1.06	1.04	1.02	0.92	0.91
Indeno[1,2,3-cd]pyrene	kg	0.47	0.44	0.43	0.42	0.41	0.37	0.37

Table 5.6 Emissions from use of charcoal in barbeques.

	Unit	1985	1990	1995	2000	2001	2002	2003	2004	2005
SO_2	Mg	13.73	22.23	24.47	41.41	33.78	50.83	62.12	50.25	46.27
NO_X	Mg	13.29	21.52	23.69	40.07	32.69	49.19	60.11	48.63	44.77
CO	Gg	0.93	1.51	1.66	2.81	2.29	3.44	4.21	3.40	3.13
NH_3	Mg	0.42	0.68	0.75	1.27	1.04	1.56	1.90	1.54	1.42
TSP	Mg	13.73	22.23	24.47	41.41	33.78	50.83	62.12	50.25	46.27
PM_{10}	Mg	13.73	22.23	24.47	41.41	33.78	50.83	62.12	50.25	46.27
$PM_{2.5}$	Mg	13.73	22.23	24.47	41.41	33.78	50.83	62.12	50.25	46.27
As	kg	0.42	0.68	0.75	1.27	1.04	1.56	1.90	1.54	1.42
Cd	kg	0.16	0.25	0.28	0.47	0.39	0.58	0.71	0.58	0.53
Cr	kg	0.17	0.27	0.30	0.51	0.41	0.62	0.76	0.62	0.57
Cu	Kg	0.67	1.09	1.20	2.03	1.66	2.49	3.05	2.46	2.27
Hg	Kg	0.29	0.47	0.51	0.87	0.71	1.07	1.30	1.05	0.97
Ni	Kg	0.58	0.93	1.03	1.74	1.42	2.13	2.60	2.11	1.94
Pb	Kg	19.71	31.92	35.13	59.44	48.49	72.97	89.17	72.14	66.42
Se	Kg	2.88	4.66	5.13	8.68	7.08	10.66	13.02	10.54	9.70
Zn	kg	8.42	13.63	15.00	25.38	20.70	31.15	38.07	30.80	28.36
HCB	g	0.42	0.68	0.75	1.27	1.04	1.56	1.90	1.54	1.42
PCDD/Fs	g	0.05	0.08	0.08	0.14	0.11	0.17	0.21	0.17	0.16
Benzo[b]fluoranthene	kg	9.48	15.35	16.90	28.59	23.32	35.09	42.88	34.69	31.94
Benzo[k]fluoranthene	kg	5.54	8.97	9.87	16.70	13.62	20.50	25.05	20.26	18.66
Benzo[a]pyrene	kg	9.57	15.49	17.05	28.85	23.54	35.42	43.28	35.02	32.24
Indeno[1.2.3-cd]pyrene	kg	6.47	10.47	11.53	19.50	15.91	23.94	29.25	23.67	21.79
PCBs	g	0.59	0.96	1.06	1.79	1.46	2.20	2.68	2.17	2.00

Continued

	Unit	2006	2007	2008	2009	2010	2011	2012
SO_2	Mg	61.28	37.67	32.19	36.10	24.29	20.83	43.53
NO_X	Mg	59.30	36.45	31.15	34.93	23.50	20.16	42.12
CO	Gg	4.15	2.55	2.18	2.45	1.65	1.41	2.95
NH_3	Mg	1.88	1.15	0.99	1.11	0.74	0.64	1.33
TSP	Mg	61.28	37.67	32.19	36.10	24.29	20.83	43.53
PM_{10}	Mg	61.28	37.67	32.19	36.10	24.29	20.83	43.53
$PM_{2.5}$	Mg	61.28	37.67	32.19	36.10	24.29	20.83	43.53
As	kg	1.88	1.15	0.99	1.11	0.74	0.64	1.33
Cd	kg	0.70	0.43	0.37	0.41	0.28	0.24	0.50
Cr	kg	0.75	0.46	0.39	0.44	0.30	0.26	0.53
Cu	Kg	3.00	1.85	1.58	1.77	1.19	1.02	2.13
Hg	Kg	1.28	0.79	0.67	0.76	0.51	0.44	0.91
Ni	Kg	2.57	1.58	1.35	1.51	1.02	0.87	1.83
Pb	Kg	87.96	54.07	46.21	51.82	34.86	29.90	62.48
Se	Kg	12.85	7.90	6.75	7.57	5.09	4.37	9.13
Zn	kg	37.56	23.09	19.73	22.12	14.89	12.77	26.68
HCB	g	1.88	1.15	0.99	1.11	0.74	0.64	1.33
PCDD/Fs	g	0.21	0.13	0.11	0.12	0.08	0.07	0.15
Benzo[b]fluoranthene	kg	42.30	26.00	22.22	24.92	16.77	14.38	30.05
Benzo[k]fluoranthene	kg	24.71	15.19	12.98	14.56	9.79	8.40	17.55
Benzo[a]pyrene	kg	42.70	26.25	22.43	25.15	16.92	14.51	30.33
Indeno[1.2.3-cd]pyrene	kg	28.86	17.74	15.16	17.00	11.44	9.81	20.50
PCBs	g	2.65	1.63	1.39	1.56	1.05	0.90	1.88

Table 5.7 Emissions from use of candles.

	Unit	1985	1990	1995	2000	2001	2002	2003	2004	2005
CO	Mg	88.32	74.44	90.94	169.27	163.38	243.32	244.41	254.96	344.33
TSP	Mg	11.84	9.98	12.19	22.68	21.89	32.61	32.75	34.16	46.14
PM_{10}	Mg	11.84	9.98	12.19	22.68	21.89	32.61	32.75	34.16	46.14
$PM_{2.5}$	Mg	11.84	9.98	12.19	22.68	21.89	32.61	32.75	34.16	46.14
PCDD/Fs	mg	0.24	0.20	0.25	0.46	0.44	0.66	0.66	0.69	0.93
Benzo[k]fluoranthene	g	40.98	34.54	42.20	78.54	75.81	112.90	113.40	118.30	159.77
Benzo[a]pyrene	g	32.77	27.62	33.74	62.80	60.61	90.27	90.67	94.59	127.75
Indeno[1.2.3-cd]pyrene	g	8.21	6.92	8.46	15.74	15.19	22.63	22.73	23.71	32.02

Continued

		2006	2007	2008	2009	2010	2011	2012
CO	Mg	292.41	321.12	268.48	257.80	352.94	301.71	278.69
TSP	Mg	39.18	43.03	35.98	34.55	47.29	40.43	37.34
PM_{10}	Mg	39.18	43.03	35.98	34.55	47.29	40.43	37.34
$PM_{2.5}$	Mg	39.18	43.03	35.98	34.55	47.29	40.43	37.34
PCDD/Fs	mg	0.79	0.87	0.72	0.70	0.95	0.81	0.75
Benzo[k]fluoranthene	g	135.68	149.00	124.58	119.62	163.76	139.99	129.31
Benzo[a]pyrene	g	108.48	119.13	99.61	95.64	130.94	111.93	103.39
Indeno[1.2.3-cd]pyrene	g	27.19	29.86	24.97	23.98	32.82	28.06	25.92

Table 5.8 Activity data for the product use of fireworks, tobacco, charcoal for barbeques (BBQ) and use of candles.

	Unit	1985	1990	1995	2000	2001	2002	2003	2004	2005
Fireworks	Gg	1.0	1.3	3.0	4.9	3.8	4.7	6.1	8.6	3.7
Tobacco	Gg	13.8	12.7	11.4	11.4	10.9	10.9	11.3	11.1	10.4
BBQ	Gg	4.4	7.2	7.9	13.4	10.9	16.4	20.0	16.2	14.9
Candles	Gg	8.8	7.4	9.1	16.9	16.3	24.3	24.4	25.5	34.4

Continued

	Unit	2006	2007	2008	2009	2010	2011	2012
Fireworks	Gg	4.2	4.5	4.4	5.4	5.4	4.7	3.5
Tobacco	Gg	10.3	9.8	9.6	9.4	9.2	8.3	8.2
BBQ	Gg	19.8	12.2	10.4	11.6	7.8	6.7	14.0
Candles	Gg	29.2	32.1	26.8	25.8	35.3	30.2	27.9

Emission factors for use of fireworks, tobacco, charcoal for barbeques (BBQ) and use of candles are found from literature studies and are shown in Table 5.9.

Table 5.9 Emission factors for other product use, per Gg.

Compound	Unit	Fireworks	Tobacco	BBQ	Candles
SO_2	Mg	1.935 (a)	0.40(e)	3.1 (k)	NAV
NO_X	Mg	NAV	1.80(f)	3.0 (l)	NAV
NMVOC	Mg	NAV	4.84 (g)	3.0 (l)	NAV
CO	Mg	6.9 (a)	55.10(f)	210 (l)	10.0 (n)
NH_3	Mg	NAV	4.15(f)	0.1 (e)	NAV
TSP	Mg	39.66 (b)	13.67(f)	3.1 (k)	1.34 (o)
PM_{10}	Mg	19.83 (b)	13.67(f)	3.1 (k)	1.34 (o)
$PM_{2.5}$	Mg	13.88 (b)	13.67(f)	3.1 (k)	1.34 (o)
As	kg	1.333 (c)	0.159 (h)	0.10 (k)	NAV
Cd	kg	0.667 (c)	0.016(e)	0.04 (k)	NAV
Cr	kg	15.56 (c)	0.354 (h)	0.04 (e)	NAV
Cu	kg	444.4 (c)	0.152 (h)	0.15 (e)	NAV
Hg	kg	0.064 (d)*	0.006(e)	0.065 (k)	NAV
Ni	kg	30 (d)	0.032(e)	0.13 (k)	NAV
Pb, 1980-1999	kg	2200 (d)	0.644(e)	4.45 (k)	NAV
Pb, 2000-2006	kg	666.7 (c)*			
Se	kg	NAV	0.008(e)	0.65 (k)	NAV
Zn	kg	260 (d)	1.61(e)	13.90 (k)	NAV
HCB	g	NAV	NAV	0.10 (e)	NAV
PCDD/Fs	mg	NAV	0.1(i)	10.50 (m)	0.04 (p)
Benzo[b]fluoranthene	kg	NAV	0.045 (j)	2.14 (e)	NAV
Benzo[k]fluoranthene	kg	NAV	0.045 (j)	1.25 (e)	0.005 (o)
Benzo[a]pyrene	kg	NAV	0.111 (j)	2.16 (e)	0.004 (o)
Indeno[1,2,3-cd]pyrene	kg	NAV	0.045 (j)	1.46 (e)	0.001 (o)
PCBs	g	NAV	NAV	0.13 (e)	NAV

*Following the implementation of new legislation; the emission of Hg and Pb from fireworks are assumed not to be occurring from the years 2003 and 2007 respectively. (a) Netherlands National Water Board (2008), (b) Klimont, Z. et al. (2002), (c) Passant, N. et al. (2003), (d) Fyrverkeriers miljöpåverkan (1999), (e) EFs for wood (111A) in residential plants (1A4b i), SNAP 020200, the energy content used in the calculation is the average of wood pills and wood waste (16.1 GJ/Mg), (f) Martin et al. 1997, (g) Sandmo, T. 2011, (h) Finstad & Rypdal 2003, (i) Toolkit 2005, (j) Daher 2010, (k) Environment Australia (1999), (l) IPCC (1997 & 2000), (m) Hansen (2000), (n) Hamins et al. (2005), (o) Fine et al. (1999), (p) Lau et al. (1997)

5.4 Uncertainties and time series consistency

5.4.1 NMVOC

For NMVOCs an overall Tier 1 uncertainty of 23% is found for 2012. This represents a 95%-confidence interval limit relative to the calculated mean 2012 emission. The Tier 1 trend uncertainty for 1985 to 2012 is 11%.

Important uncertainty issues related to the mass-balance approach are

(i) Identification of pollutants that qualify as NMVOCs. Although a tentative list of 650 pollutants from NAEI (2000) has been used, it is possible that relevant pollutants are not included, e.g. pollutants that are not listed with their name in Statistics Denmark (StatBank DK, 2013) but as a product.

(ii) Collection of data for quantifying production, import and export of single pollutants and products where the pollutants are comprised. For some pollutants no data are available in StatBank DK (2013). This can be due to confidentiality or that the amount of pollutants must be derived from products wherein they are comprised. For other pollutants the amount is the sum of the single pollutants *and* product(s) where they are included. The data available in StatBank DK (2013) is obtained from Danish Customs & Tax Authorities and they have not been verified in this assessment.

(iii) Distribution of pollutants on products, activities, sectors and households. The present approach is based on amounts of single pollutants. To differentiate the amounts into industrial sectors it is necessary to identify and quantify the associated products and activities and assign these to the industrial sectors and households. No direct link is available between the amounts of pollutants and products or activities. From the Nordic SPIN database it is possible to make a relative quantification of products and activities used in industry, and combined with estimates and expert judgement these products and activities are differentiated into sectors. The contribution from households is also based on estimates. If the household contribution is set too low, the emission from industrial sectors will be too high and vice versa. This is due to the fact that the total amount of pollutant is constant. A change in distribution of pollutants between industrial sectors and households will, however, affect the total emissions, as different emission factors are applied in industry and households, respectively.

A number of activities are assigned as “other”, i.e. activities that cannot be related to the comprised source categories. This assignment is based on expert judgement but it is possible that the assigned amount of pollutants may more correctly be included in other sectors. More detailed information from the industrial sectors is continuously being implemented.

(iv) Rough estimates and assumed emission factors are used for some pollutants. For some pollutants more reliable information has been obtained from the literature and from communication with industrial sectors. In some cases it is more appropriate to define emission factors for sector specific activities rather than for the individual pollutants.

A quantitative measure of the uncertainty has not been assessed. Single values have been used for emission factors and activity distribution ratios etc.

5.4.2 Other pollutants

The tier 1 uncertainties for other product use are shown in Table 5.10.

Table 5.10 Tier 1 uncertainties for other product use.

Pollutant	Total emission uncertainty, %	Trend 1990-2012*, %	Uncertainty trend %-age points
SO_2	±82.7	79.5	±26.1
NO_x	±74.7	27.8	±36.6
CO	±80.5	61.5	±30.2
NH_3	±19.8	-34.2	±18.0
TSP	±133.5	-19.7	±19.0
PM_{10}	±98.3	-17.1	±20.7
$PM_{2.5}$	±87.3	-16.0	±21.3
As	±192.5	64.9	±125.6
Cd	±236.7	125.1	±94.4
Cr	±282.3	133.4	±96.9
Cu	±299.5	171.4	±30.7
Hg	±95.4	54.0	±88.9
Ni	±392.2	168.4	±33.4
Pb	±92.7	-97.6	±9.5
Se	±99.8	93.0	±27.2
Zn	±383.2	157.8	±59.3
HCB	±100.5	95.8	±27.7
PCDD/F	±99.6	94.0	±27.6
benzo[b]flouranthene	±99.3	91.0	±27.1
benzo[k]flouranthene	±98.0	88.5	±27.8
benzo[a]pyrene	±97.3	85.1	±27.5
indeno[1,2,3-c,d]pyrene	±98.6	89.1	±27.2
PCBs	±100.5	95.8	±27.7

* Trend for particles is calculated for 2000-2012.

The main issues leading to uncertainties are:

(i) Collection of data for quantifying production, import and export of products. Some data, like private import (cross-border shopping) of fireworks, are not available in StatBank DK (2013). Other lacking data like the composition of mineral containing charcoal for barbequing are unobtainable due to confidentiality.

(ii) Reliable emission factors are not easy to obtain for other product use categories. Some chosen emission factors apply to countries that are not directly comparable to Denmark, and hereby is introduced an increased uncertainty. This is the case with e.g. some heavy metals from barbequing.

5.5 QA/QC and verification

Please refer to the Danish National Inventory Report reported to the UNFCCC (Nielsen et al., 2010).

5.6 Recalculations

Improvements and additions are continuously being implemented due to the comprehensiveness and complexity of the use and application of solvents and solvent containing products in industries and households. The main recalculations and their implications on the emissions in the 2014 reporting include the following:

- Updated statistical data for the activities of tobacco, fireworks, candles and charcoal for barbequing (StatBank, 2013)

- Emission factors for NH_3, PCB, HCB, Cu, benzo[b]flouranthene, benzo[k]flouranthene, benzo[a]pyrene and PCBs have been added for barbequing and PM_{10} and $PM_{2.5}$ have been added for the burning of candles. Furthermore, emission factors for Cr, TSP, PM_{10} and $PM_{2.5}$ have been updated for barbequing.

5.7 Planned improvements

No planned improvements.

5.8 References

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6 Agriculture (NFR sector 4)

6.1 Overview of the sector

The emission from agricultural activities covers ammonia (NH_3) emission from animal husbandry, manure management and agricultural soils, particulate matter (PM) emission from animal production and emissions from field burning of straw of NH_3, PM, nitrogen oxides (NO_x), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC), sulphur dioxide (SO_2), heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Se and Zn), dioxins and furanes (PCDD/F) and polycyclic aromatic hydrocarbons (PAH – benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene).

6.1.1 Ammonia

The majority of the Danish NH_3 emission, corresponding to 96 %, originates from the agricultural sector. The remaining 4 % originates from stationary combustion, traffic and industrial processes. Figure 6.1 shows the distribution of sources of NH_3 emission from the agricultural sector 2012. The main part of the agricultural emission is directly related to the livestock production by 80 % from manure management and 3% from grazing animals. Emissions from use of synthetic fertiliser and crops contribute with 10 % and 7 %, respectively. Emissions from NH_3-treated straw, field burning of agricultural wastes and sewage sludge used as fertiliser amount to less than 1 %.

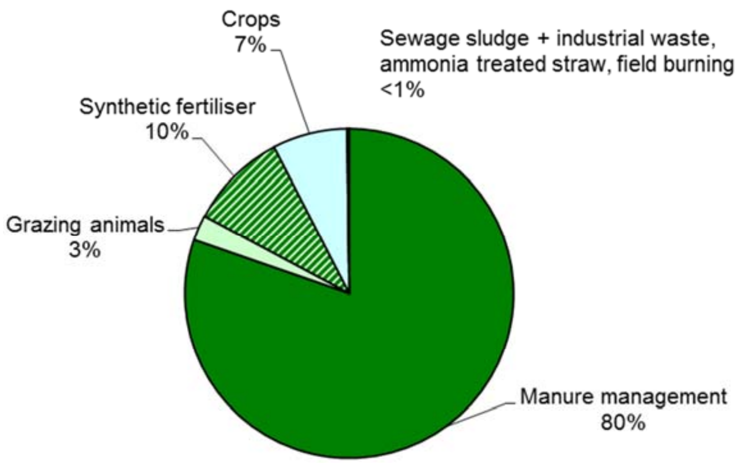

Figure 6.1 NH_3 emissions from the agricultural sector, 2012.

The NH_3 emission from the agricultural sector has decreased between 1985 and 2012 from 125.98 Gg NH_3 to 73.43 Gg NH_3, corresponding to a 42 % reduction (Table 6.1). This significant drop in NH_3 emissions should be read in a conjunction of a very active national environmental policy designed to reduce the loss of nitrogen to the aquatic environment. A string of measures have been introduced by action plans, for example the NPO (Nitrogen, phosphor, organic matter) Action Plan (1986), Action Plans for the Aquatic Environment (1987, 1998, 2004), the Action Plan for Sustainable Agriculture (1991), the Ammonia Action Plan (2001) and latest the action plan the Agreement on Green Growth (2009 and 2010). Based on these action plans have legislative changes and actions led to an optimization of manure as a resource. Requirements to capacity of slurry storage and requirements to handling of manure during spreading has led to a decrease in animal nitrogen excretion, improvement in use of nitrogen in manure and a fall in the use of synthetic fertiliser. A Danish environmental approval act for livestock holdings was acted in January 2007 and according to the act, farmers are required to apply for an environmental approval if the farmer wants to change or expand the livestock production facilities. In order to get environmental approval farmers has to fulfil requirements concerning Best Available Technique (BAT) and specific environmental requirements as for example emission of ammonia. All of these action plans have helped to reduce the overall NH_3 emission significantly and the new Danish environmental approval act for livestock will contribute to a further reduction in emissions in future.

Table 6.1 Total NH_3 emissions from the agricultural sector 1985 to 2011, Gg NH_3.

		1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
NFR						Gg NH_3					
4B	Manure management, total	93.09	87.68	76.45	72.46	68.05	62.68	60.38	60.72	59.72	58.97
	Cattle	*40.00*	*35.60*	*29.53*	*25.79*	*19.31*	*20.67*	*20.35*	*20.55*	*20.23*	*20.65*
	Swine	*43.88*	*41.25*	*36.45*	*35.28*	*35.15*	*28.91*	*26.93*	*26.72*	*26.48*	*25.15*
	Other animals	*9.21*	*10.84*	*10.46*	*11.39*	*13.58*	*13.10*	*13.10*	*13.45*	*13.01*	*13.17*
4D1	Synthetic N-fertiliser	15.66	16.87	15.27	9.90	7.81	8.16	7.13	7.14	7.36	7.06
4D2c	Grazing animals	3.13	2.92	3.03	2.92	2.21	1.99	1.91	1.87	1.81	1.84
4F	Field burning of agricultural Waste	1.53	0.08	0.09	0.11	0.13	0.10	0.12	0.09	0.09	0.10
4G	Crops	5.97	5.92	5.28	5.21	5.34	5.41	5.41	5.41	5.42	5.40
4G	NH_3 treated straw	6.54	10.19	6.63	2.47	0.26	0.00	0.00	0.24	0.24	0.00
4G	Sewage sludge used as fertiliser	0.05	0.07	0.11	0.08	0.05	0.05	0.07	0.06	0.06	0.06
4.	Agricultural sector - total	125.98	123.74	106.85	93.16	83.85	78.41	75.01	75.53	74.70	73.43

The management of manure has to be considered as the most important emission source. Most of the emission originates from the production of swine and cattle, which contributed, respectively with 43 % and 35 %.

It is noteworthy that the overall emission from swine has decreased by 43 % from 1985 to 2012 despite a considerable increase in swine production from 14.7 million produced fattening pigs in 1985 to 20.4 million in 2012. The most important reason for this is the improvement in feed efficiency. In 1985, the nitrogen excretion for a fattening pig was estimated to 5.09 kg N (Poulsen & Kristensen, 1998). In 2012, that figures were considerably lower at 2.84 kg N per fattening pig produced (Poulsen, 2013). Due to the large contribution from the swine production, the lower level of N-excretion has a significant influence on total agricultural emissions.

Since 1985, changes in practice of manure application to the fields have taken place, which has reduced the emission from all animal types. From the beginning of the 1990s slurry has increasingly been spread using trailing hoses. From the late 1990s the practice of slurry injection or mechanical incorporation into the soil has increased. This development is a consequence of a ban on broad spreading but it is also a consequence of the general requirement to improve the utilisation of nitrogen in the manure - e.g. requirements that a larger part of the nitrogen in manure has to be included in the farmer's nitrogen accounting. This has forced farmers to consider the manure as a fertiliser resource instead of a waste product.

Particulate matter

In the NFR, the emission of particulate matter (PM) is reported for the years 2000 to 2012. The emission from the agricultural sector includes the emission of dust from animal housing systems, which include emissions from cattle, swine, poultry, horses, sheep, goats and fur animals. Furthermore, the emission from field burning of agricultural wastes is calculated.

The Danish inventory does not yet include emission from plant production, which means activities related to field operations such as harvesting and cultivation of the soil.

TSP (total suspended particulate) emission from the agricultural sector contributes with 29 % to the national TSP emission in 2012 and the emission shares for PM_{10} and $PM_{2.5}$ are only 20 % and 7 % respectively. The majority of the emission originates from the animal production. The emission from field burning of agricultural residues, contributes with less than 1 % to the agricultural emission.

The same emission factor is used for all years. This means that changes in the PM emissions for each livestock category mainly reflects the changes in number of animals, but also reflects the changes due to the allocation of subcategories and changes in the housing type.

The PM emission from agricultural activities, given in TSP, is almost unaltered during the period from 2000 to 2012 (Figure 6.2). The emission of TSP is increased in 2010 compared to 2009 and decreased again in 2012 this is mainly due to change in the number of swine.

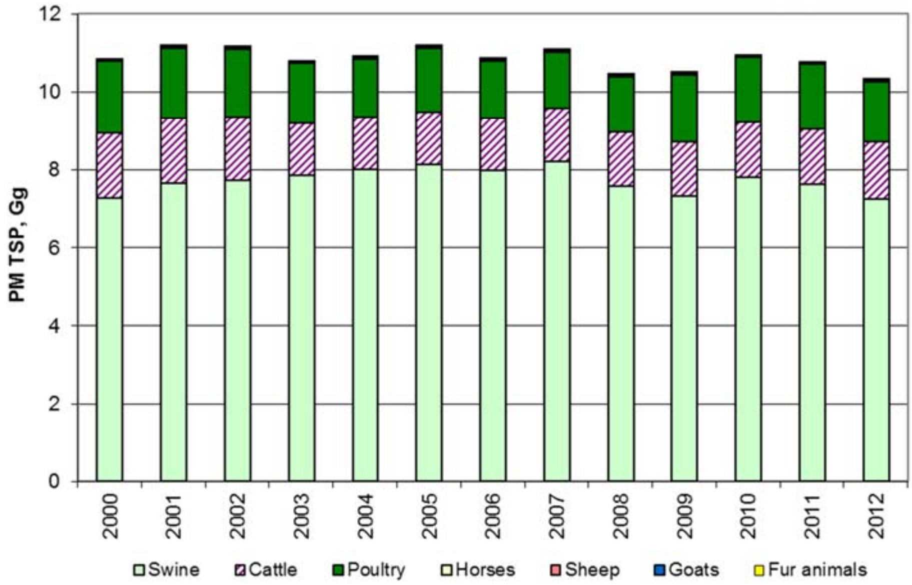

Figure 6.2 Emission of particulate matter (TSP) from the agricultural sector 2000 to 2012.

6.1.2 References – sources of information

Activity data, emissions factors (EF) and additional values are collected, evaluated and discussed in cooperation with Statistics Denmark, DCA - Danish Centre for Food and Agriculture, Aarhus University, the Danish Agricultural Advisory Service, Danish Environmental Protection Agency and the Danish AgriFish Agency. It means that both the data and the methods used are evaluated continuously according to latest knowledge and information. Table 6.2 shows the source of data input from the different institutes.

Table 6.2 List of institutes involved in the emission inventory.

References	Abbreviation	Data / information
Statistics Denmark - Agricultural Statistics (http://www.dst.dk/en.aspx)	DSt	-livestock production -milk yield -slaughtering data -land use -crop production -crop yield
Danish Centre for Food and Agriculture, Aarhus University	DCA	-N-excretion -feeding situation -NH_3 emissions factor -PM emissions factor
The Danish Agricultural Advisory Service (http://www.vfl.dk)	DAAS	-housing type (until 2004) -grazing situation -manure application time and methods -field burning of agricultural residue
Danish Environmental Protection Agency (http://www.mst.dk)	EPA	-sewage sludge used as fertiliser (until 2004)
The Danish AgriFish Agency (http://naturerhverv.fvm.dk)	DAFA	-synthetic fertiliser -number of animals from CHR -housing type (from 2005) -sewage sludge used as fertiliser (from 2005)

Methods

The emission calculation is based on the methodologies provided in the EMEP/EEA air pollutant emission inventory guidebook (EMEP/EEA, 2013).

The emissions from agricultural activities include Animal Husbandry and Manure Management, Crop Production and Agricultural Soils, Field Burning of Agricultural Wastes and Agriculture Other. In general the field burning of agricultural wastes has been prohibited since 1989. However, burning of straw may take place in connection with fields continuously cultivating seed grass or in cases where weather conditions result in surplus of straw in form of wet or broken bales.

The emissions from the agricultural sector are calculated in a comprehensive agricultural model complex called IDA (Integrated Database model for Agricultural emissions). The model complex is designed in a relational database system (MS Access). Input data are stored in tables in one database called IDA_Backend and the calculations are carried out as queries in another linked database called IDA. The model, as shown in Figure 6.3, is implemented and it is used to calculate emissions of NH_3, PM, NO_x, CO, NMVOC, SO_2, heavy metals, dioxin, PAH, HCB, PCB and greenhouse gases (N_2O and CH_4). Thus, there is direct link between the NH_3 emission and the emission estimation of N_2O.

DCE – the Danish Centre for Environment and Energy, Aarhus University, which is responsible for the emission inventory, has established data agreements with the institutes and organisations to assure that the necessary data are available for timely completion of the emission inventory. The main part of the emission is related to livestock production and most of the data are

based on Danish standards. DCA, Danish Centre for Food and Agriculture, Aarhus University delivers Danish standards relating to feeding consumption, manure type in different housing types, nitrogen content in manure, etc. Previously, the standards were updated and published every third or fourth year – the last one is Poulsen et al. from 2001. From year 2001, DCE receives updated data annually directly from DCA in the form of spread sheets. These standards have been described and published in English in Poulsen & Kristensen (1998). From 2004 the standards are uploaded every year at
http://anis.au.dk/forskning/sektioner/husdyrernaering-og-miljoe/normtal/.

IDA - Integrated Database model for Agricultural emissions

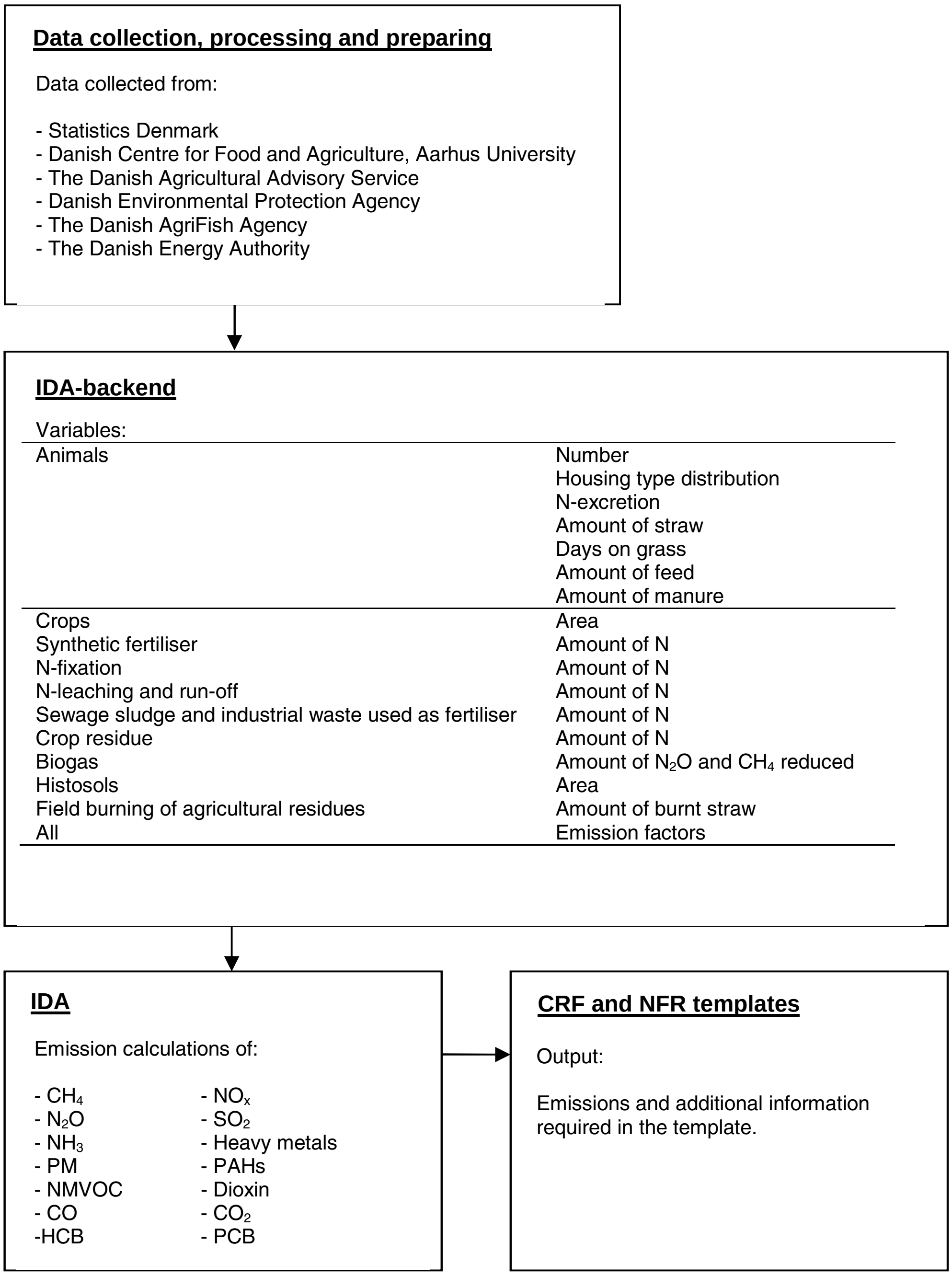

Figure 6.3 Overview of the data process for calculation of agricultural emissions.

IDA includes 38 different livestock categories, divided on weight class and age. Each of these subcategories is subdivided according to housing system and manure type, which results in 252 different combinations of subcategories and housing type (Table 6.3). The emissions are calculated from each of these subcategories and then aggregated in accordance with the livestock categories given in the NFR. It is important to point out that changes in the emission and the implied emission factor over the years are not only a result of changes in the number of animals, but also depend on changes in the allocation of subcategories, changes in feed consumption, changes in housing type and changed practices with regard to the handling of livestock manure in relation to storage and application.

Table 6.3 Livestock categories and subcategories.

NFR 4B	Animal categories	Includes	No. of subcategories in IDA, animal type/housing system/manure type
4B 1a	Dairy Cattle[1]	Dairy Cattle	34
4B 1b	Non-dairy Cattle[1]	Calves (<½ year), heifers, bulls, suckling cattle	120
4B 3	Sheep	including lambs	1
4B 4	Goats	Including kids (meet, dairy and mohair)	3
4B 6	Horses	<300 kg, 300 - 499 kg, 500 - 700 kg, >700 kg	4
4B 8	Swine	Sows, weaners, fattening pigs	36
4B 9	Poultry	Hens, pullet, broilers, turkey, geese, ducks, ostrich, pheasant	46
4B 13	Other	Fur farming, deer	8

[1)] For all cattle categories, large breed and jersey cattle are distinguished from each other.

6.2 NH_3 emission from Manure Management – NFR 4.B

6.2.1 Description

The main part of the NH_3 emission (80%) is related to manure management. Figure 6.4 shows the emission from manure management (NFR category 4.B) distributed according to the different livestock categories. The main part of the emission is related to cattle and swine production, corresponding to 78 %. The fall in the emission from swine and cattle during 1985 to 2012 is mainly due to an active environmental policy in combination with improvements within the genetic development. The emission has increased slightly from “other”, which is mainly due to an increase in number of produced mink.

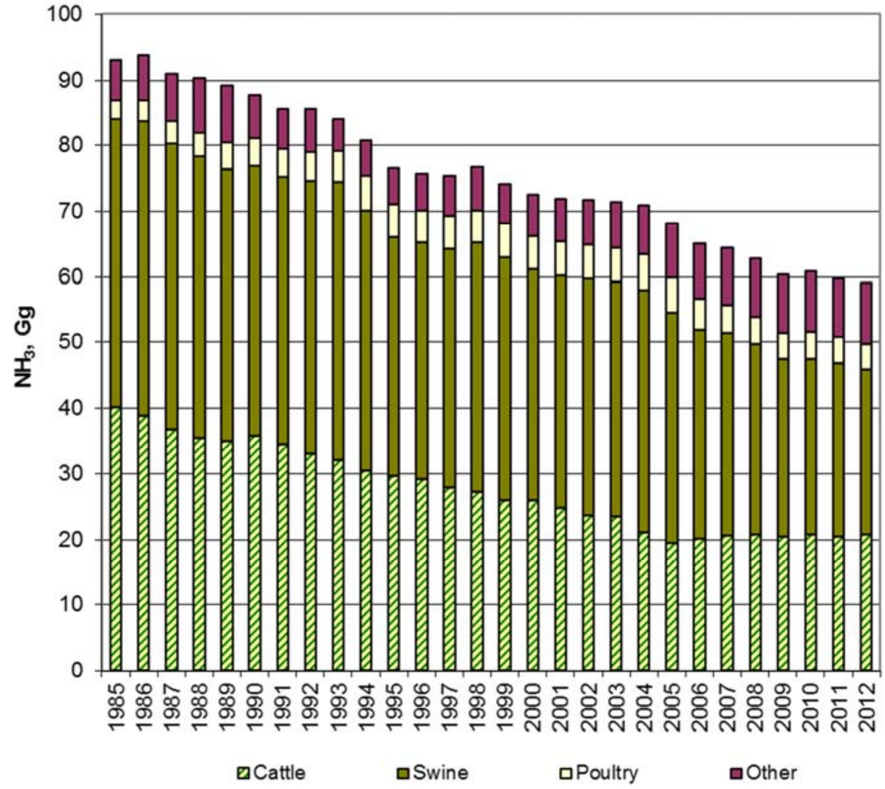

Figure 6.4 NH_3 emission from manure management 1985 to 2012.

6.2.2 Methodological issues

Activity data – livestock production

Table 6.4 shows the development in livestock production from 1985 to 2012 based on the Agricultural Statistics (Statistics Denmark). The number of animal corresponds to average annual production (AAP), which means the number of animals that are present on average within the year (EMEP/EEA, 2013). For many animal categories the number given in the annual Agricultural Statistics can be used directly. However, for weaners, fattening pigs, bulls and poultry the number is based on slaughter data also collected from the Agricultural Statistics. This is because the production cycle for these animals is under one year and the normative figures are based on produced animals.

Only farms larger than five hectares are included in the annual census. Especially horses, goats and sheep are placed on small farms, which mean that the number of animals given in the Agricultural Statistics is not representative. Therefore, the number of sheep and goats is based on the Central Husbandry Register (CHR) which is the central register of farms and animals managed by the Ministry of Food, Agriculture and Fisheries. The number of deer and ostriches is also based on CHR because these are not included in the Agricultural Statistics published by Statistics Denmark. The number of horses is based on data from The Danish Agricultural Advisory Service. The number of pheasants is based on expert judgement from Department of Bioscience, Aarhus University and the Danish pheasant breeding association.

Since 1985, the production of swine, poultry and fur has increased significantly. This is contrary to the production of cattle, which has decreased as a result of increasing milk yields. Buffalos, camels, lamas, mules and donkeys are not farmed in Denmark.

Table 6.4 Livestock production 1985 to 2012 given in AAP, 1000 head - NFR category 4B.

NFR	Animal category	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
4B 1a	Dairy Cattle	896	753	702	636	564	558	563	568	565	587
4B 1b	Non-dairy cattle	1 721	1 486	1 388	1 232	1 006	1 006	977	1 003	1 003	1 020
4B 3	Sheep*	40	92	81	112	126	117	116	111	94	90
4B 4	Goats*	8	7	7	8	11	14	16	16	13	13
4B 6	Horses*	140	135	143	150	175	190	178	165	155	155
4B 8	Swine	9 089	9 497	11 084	11 922	13 534	12 738	12 369	13 173	12 932	12 331
4B 9a	Laying hens	5 577	5 696	6 088	4 935	5 168	4 973	4 437	5 248	5 679	5 597
4B 9b	Broilers	8 490	9 802	12 585	16 047	11 905	9 737	14 787	12 836	12 528	12 576
4B 9c	Turkeys	308	238	456	456	516	446	490	494	400	460
4B 9d	Other poultry	1 822	1 600	1 563	1 374	1 509	1 590	1 350	1 510	1 963	1 444
4B 13	Other;										
4B 13	Fur farming	1 906	2 264	1 850	2 199	2 552	2 810	2 721	2 699	2 757	2 648
4B 13	Deer	9	10	10	10	10	10	9	10	8	7

*Includes animals on small farms (less than 5 ha), which are not included in the Agricultural Statistics published by Statistics Denmark.

N-excretion

The normative figures for both total nitrogen excretion and the content of TAN are provided by DCA, Aarhus University.

The emission of NH_3 from manure management is calculated on the basis on nitrogen excreted from livestock. Most of the N excreted that is readily degradable and broken down to NH_4-N is found in the urine. The relationship between NH_4-N and total N will not remain constant over time due to changes in feed composition and feed use efficiency. In order to be able to implement the effect of NH_3 reducing measures as improvements in feed intake and composition in the emission inventory, it is necessary to calculate the emission based on the Total Ammoniacal Nitrogen (TAN) content. Since 2007, DCA has established Danish standards based on TAN for liquid manure, which is incorporated in the inventory. The emission for solid manure and deep litter is based on the total N excreted because DCA's estimate of TAN follows urine-N.

In Annex 2C Table 2C.1 is given the average N-excretion based on Total-N for each NFR livestock category from 1985 to 2006 (Table 2C.1a) and N-excretion based on TAN for 2007-2011 (Table 2C.1b). These values include N excretion from grazing animals. Notice that each livestock category is an aggregated average of different subcategories (see Table 6.3).

Housing system

A systematic registration of the housing of husbandry for all farms does not exist from 1985 to 2004 and the housing type distribution is therefore based on estimates from the Danish Agricultural Advisory Services (Rasmussen, 2006) and Lundgaard (2006). From 2005 the distribution of housing system is based on information from the Danish AgriFish Agency, which is based on information from the farmers.

The structural development in the agricultural sector has an influence on the changes in housing type distribution. The trend in housing system for dairy cattle goes from older tied-up housings, which is replaced by bigger housings with loose-holding. In 1985 85 % of the dairy cattle were kept in tied-up housings and in 2012 the share is reduced to 9 %. In loose-holding systems the cattle have more space and more straw bedding and this will in general increase the NH_3 emission per animal compared to the tied-up housings. In

Annex 2C Table 2C.2 the distribution of housing type for dairy cattle and fattening pigs for 1985-2012 is listed.

Emission factors - Housing

The emission from housings is thus determined by a number of different conditions that depends on housing type and the different kinds of manure disposal systems placed in these housings. Danish Centre for Food and Agriculture, Aarhus University has carried out a number of emission surveys and estimated emission coefficients for each type of housings (Poulsen et al., 2001 and Poulsen, 2013). In Table 6.5 is shown the emission factors for the most important animal categories; dairy cattle and fattening pigs in different housing systems. For the slurry and liquid manure is given TAN emission factors (TAN ex animal) and for solid and deep litter manure is given N ex animal.

Table 6.5 NH_3 emission factors in different housing systems 2012 – dairy cattle and fattening pigs.

Manure system	Manure type	NH_3 emission	NH_3 emission
		Pct. NH_3-N of N ex Animal	Pct. NH_3-N of TAN ex Animal
Dairy cattle			
Tied-up	Solid manure	6.0	
	+ Liquid		10.0
Tied-up	Slurry		6.0
Loose-holding with beds, slatted floor	Slurry		16.0
Loose-holding with beds, slatted floor, scrapes	Slurry		12.0
Loose-holding with beds, solid floor	Slurry		20.0
Loose-holding with beds, drained floor	Slurry		8.0
Deep litter (all)	Deep litter	6.0	
Deep litter, slatted floor	Deep litter	6.0	
	+ Slurry		16.0
Deep litter, slatted floor, scrapes	Deep litter	6.0	
	+ Slurry		12.0
Deep litter, solid floor, scrapes	Deep litter	6.0	
	+ Slurry		20.0
Fattening pigs			
Full slatted floor	Slurry		24.0
Partly slatted floor (50-75% solid floor)	Slurry		13.0
Partly slatted floor (25-49% solid floor)	Slurry		17.0
Solid floor	Solid manure	25.0	
	+ Liquid		27.0
Deep litter	Deep litter	25.0	
Partly slatted floor and partly deep litter	Deep litter	25.0	
	+ Slurry		18.0

Emission factors - Storage

Livestock manure is collected either as solid manure or as slurry depending on housing type. In Table 6.6 are shown the emission factors used for storage. It is assumed that the part of solid manure taken directly from the housing into the field is 65% from cattle, 25% from pigs, 50% from sows, 15% from poultry and 5% from hens (Poulsen, 2013). The remaining part of the solid manure is deposited in stock piles in the field before field application.

By law all slurry tanks have to be covered by a fixed cover or a full floating cover in order to reduce NH_3 emission. However, it can be difficult to establish a natural full floating cover every day all year especially for tank with pig slurry. In 2012 it is assumed that 5% of the tanks with swine slurry and 2% of tanks with cattle slurry are incompletely covered (Annex 2C Table 2C.3).

Table 6.6 NH_3 emission factors for storage 2012.

		Liquid manure	Slurry	Solid manure	Deep litter
		Loss of NH_3-N in %			
Animal category		of TAN ex housing	of TAN ex housing	of N ex housing	of N ex housing
Cattle		2.2	3.5	4.0	1.05
Swine	Fattening pigs	2.2	2.9	19.0	9.75
	Sows		2.9	19.0	6.50
Poultry	Hens and pullet		2.0[a]	7.5	4.75
	Broilers, geese and ducks			7.5	6.80
	Turkeys			7.5	8.00
Fur farming			3.1	11.5	
Sheep/goats					3.0
Horses					3.0

[a] Loss of NH_3-N in % of N ex housing.

Application in fields

To calculate the emissions from application of manure on the fields distinguish between solid manure and liquid manure and also between manure from cattle and swine. For all other animals same emission factor as for cattle is used. In 2012 the emission factor for cattle is for solid manure estimated to 7 % of N ex storage and for liquid manure estimated to 13 % TAN ex storage, for swine the emission factors are 6 % and 11 % respectively.

The emission factors will vary from year to year depending on changes in the practice of application. The emission factor is based on background estimates of time of application, application methods, application in growing crops or on bare soil and the time from application to ploughing in soil. In Table 6.7 background information for 2012 are given. This estimate is based on information from the Danish Agricultural Advisory Service.

Table 6.7 Estimate for application method, time of application and time before the manure is incorporated in the soil for 2012.

Liquid manure				Length of time before incorporation into soil, hours							
Application methods	Application time	Percentage distribution of manure		0		4, and then harrowed		4, and then Ploughed		Not incorporated	
		Cattle	Pigs	Cattle	Pigs	Cattle	Pigs	Cattle	Pigs	Cattle	Pigs
Incorporated	winter-spring	61	24	61	24	-	-	-	-	-	-
Incorporated	summer-autumn	18	4	18	4	-	-	-	-	-	-
Trailing horses	winter-spring	17	64	-	-	-	3	-	2	17	59
Trailing horses	spring-summer	2	2	-	-	-	-	-	-	2	2
Trailing horses	late summer-autumn	2	6	-	-	-	2	-	1	2	3
Total		100	100	79	28	-	5	-	3	21	64

Solid manure				Length of time before incorporation into soil, hours							
Application methods	Application time	Percentage distribution of manure		0		4		6		Not incorporated	
		Cattle	Pigs	Cattle	Pigs	Cattle	Pigs	Cattle	Pigs	Cattle	Pigs
Broad spreading	winter-spring	90	76	-	-	70	60	20	16	-	-
Broad spreading	spring-summer	5	5	5	5	-	-	-	-	-	-
Broad spreading	late summer-autumn	5	19	-	-	5	19		-	-	-
Total		100	100	5	5	75	79	20	16	-	-

Implied emission factor

Table 6.8 shows the implied emission factors for each NFR livestock category from 1985 to 2012. The implied emission factors express the average emission of NH_3 per AAP (annual average population) per year. The implied emission factors are changing from year to year depending on a combination of several factors, such as:

- change in number of animals or change in the share of different subcategories,
- change in feed intake and N-excretion,
- change in housing type,
- change in handling of manure in relation to storage and application.

It should be mentioned that the emission from manure deposited by grazing animals is included in the emission from agricultural soils (NFR – 4.D2c).

For most of the animal categories are the implied emission factor decreased from 1985 to 2012, which is mainly the result of measures in relation to the environmental Action Plans. Strict requirements to obtain improvements in utilisation of nitrogen in manure have resulted in reduction of N-excretion and especially for fattening pigs. Changes in the way manure is handled during application are another important factor, which has reduced the emission. Based on the action plans various initiatives has been implemented and include for example requirement for a minimum 9-month manure storage capacity, requirement that manure applied to soil be ploughed down within six hours, a ban on the application of manure in winter and broad spreading is no longer allowed.

Table 6.8 Implied emission factor, manure management 1985 to 2012, kg NH_3 per AAP per year.

NFR	Animal category	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
4B1a	Dairy cattle	30.94	33.36	29.87	28.46	24.98	25.55	24.77	25.54	24.88	24.71
4B1b	Non-dairy cattle	7.13	7.05	6.16	6.25	5.19	6.37	6.55	6.02	6.16	6.03
4B3	Sheep	1.93	1.85	1.88	1.45	1.44	1.32	1.32	1.32	1.34	1.34
4B4	Goats	1.93	1.85	1.88	1.45	1.35	1.28	1.28	1.28	1.30	1.31
4B6	Horses	7.62	7.10	6.32	6.27	6.23	5.71	5.71	5.71	5.77	5.77
4B8	Swine	4.83	4.34	3.29	2.96	2.60	2.27	2.18	2.03	2.05	2.04
4B9a	Laying hens	0.21	0.26	0.30	0.32	0.39	0.35	0.36	0.31	0.31	0.28
4B9b	Broilers	0.18	0.24	0.21	0.19	0.24	0.23	0.15	0.17	0.16	0.16
4B9c	Turkeys	0.57	0.59	0.74	0.72	0.71	0.61	0.61	0.61	0.61	0.61
4B9d	Other poultry	0.12	0.11	0.16	0.12	0.09	0.04	0.04	0.03	0.02	0.03
4B13	Other	2.62	2.44	2.32	2.34	2.69	2.67	2.87	3.00	2.87	2.79

Emissions

The NH_3 emission from manure management is estimated to 58.97 Gg NH_3 in 2012 (Table 6.9). From 1985 to 2012, the emission is reduced by 37 %. As mentioned in Chapter 6.1.1 this development is mainly due to implementation of a number of action plans to reduce nitrogen losses from the agricultural production.

In 2012, cattle production contributes with 35 % of the total emission from manure management. The swine production contributes in 2012 with 43 % of the total emission from manure management. The number of cattle has decreased as a result of a growth in milk yield and the milk quota which limits the production. The production of fattening pigs has increased by more than 50 % compared with 1985. However, despite this development the emission from swine is still decreasing. This is due to a breeding of pigs with focus on a biological development and improvement in fodder efficiency. Thus the N-excretion for fattening pigs has decreased from 5.09 kg per pig per year in 1985 to 2.84 in 2012.

Table 6.9 Emission of NH_3 from manure management 1985 to 2012, Gg NH_3.

NFR	Animal category	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
4B1a	Dairy cattle	27.73	25.13	20.98	18.09	14.10	14.26	13.95	14.51	14.06	14.51
4B1b	Non-dairy cattle	12.27	10.47	8.55	7.70	5.22	6.41	6.40	6.04	6.17	6.14
4B3	Sheep	0.08	0.17	0.15	0.16	0.18	0.16	0.15	0.15	0.12	0.12
4B4	Goats	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
4B6	Horses	1.07	0.96	0.90	0.94	1.09	1.08	1.01	0.94	0.89	0.89
4B8	Swine	43.88	41.25	36.45	35.28	35.15	28.91	26.93	26.72	26.48	25.15
4B9a	Laying hens	1.15	1.49	1.82	1.56	2.02	1.75	1.59	1.65	1.74	1.58
4B9b	Broilers	1.49	2.32	2.67	3.07	2.87	2.22	2.15	2.21	2.01	1.97
4B9c	Turkeys	0.18	0.14	0.34	0.33	0.37	0.27	0.30	0.30	0.24	0.28
4B9d	Other poultry	0.22	0.18	0.25	0.16	0.14	0.06	0.05	0.05	0.05	0.05
4B13	Other	5.02	5.56	4.32	5.17	6.90	7.53	7.83	8.13	7.93	8.26
4B	Total	93.09	87.68	76.45	72.46	68.05	62.68	60.38	60.72	59.72	58.97

Figure 6.5 shows the percentage distribution of the NH_3 emission from housing, storage and application of manure. The main part of the reduction in NH_3 emission has taken place in connection with the application of manure in fields, due to changes in manure application practice. There has been a reduction in emissions associated with storage of manure, which is a result of improvement in coverage of slurry tanks. As a consequence of this development, the percentage of emission from housing is increased from 38 % in 1985 to 57 % in 2012. In future, the possibilities for NH_3 reduction will likely

be focused on measures in housings by implementation various technological solutions. Furthermore, sulphuric acid treatment of the slurry within application of manure is also one of the environmental technologies which are currently being implemented.

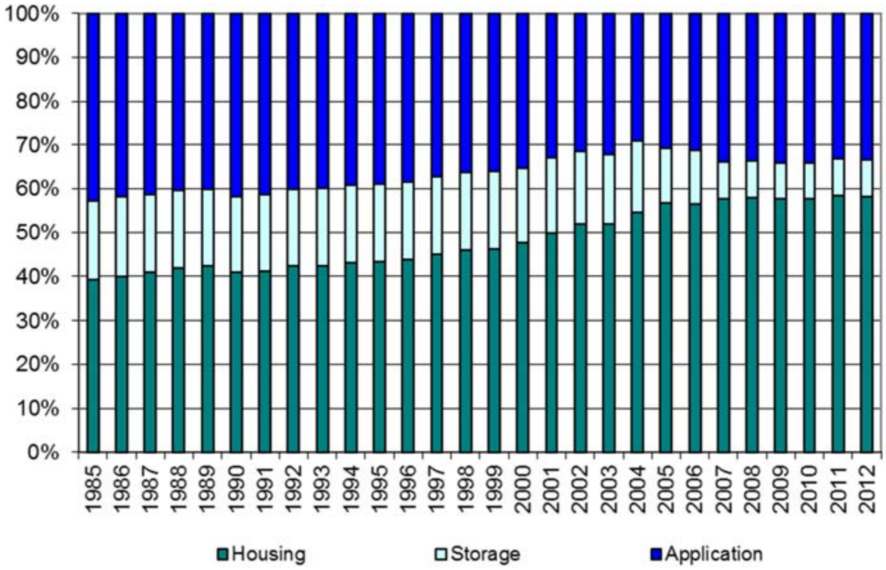

Figure 6.5 The percentage distribution of the NH_3 emission in manure management 1985-2012.

6.3 NH_3 emission from agricultural soils – NFR 4.D

6.3.1 Description

NH_3 emission from agricultural soils contributes with 12 % of the total emission from the agricultural sector and includes the emission from use of synthetic fertiliser and the emission from nitrogen deposited by grazing animals. In 2012 approximately 79 % of the emission from agricultural soils originates from synthetic fertiliser.

6.3.2 Methodological issues

Synthetic fertiliser

Since 1985 there has been a significant decrease in use of synthetic fertiliser. This is due to requirements to utilising of nitrogen in manure as outlined in various environmental action plans. Another explanation for a reduction of emission is a decrease in use of urea as currently accounting for less than 1 % of the total nitrogen (Table 6.10). Based on the Danish use and composition of synthetic fertiliser in 2012, the emission in average is estimated to 3.1 % NH_3 of the total nitrogen.

Data on the use of synthetic fertiliser is based on the annual sale estimations collected by the Danish AgriFish Agency (2012). Emission factors are based on the values given in EMEP/EEA guidebook (EMEP/EEA, 2013).

The use of synthetic fertiliser includes fertiliser used in parks, golf courses and private gardens. Approximately 1 % of the synthetic fertiliser can be related to use outside the agricultural area.

Table 6.10 Synthetic fertiliser consumption 2012 and emission factors.

	NH_3 Emission factor[1], Kg NH_3-N pr kg N	Consumption[2], t N
Fertiliser type		
Calcium and boron calcium nitrate	0.11	0.1
Ammonium sulphate	0.01	5.9
Calcium ammonium nitrate and other nitrate types	0.02	90.8
Ammonium nitrate	0.04	8.1
Liquid ammonia	0.01	7.8
Urea	0.24	0.8
Other nitrogen fertiliser	0.04	22.8
Magnesium fertiliser	0.11	0.0
NPK-fertiliser	0.04	43.0
Diammonphosphate	0.11	0.9
Other NP fertiliser types	0.11	4.7
NK fertiliser	0.04	2.1
Total consumption of N in synthetic fertiliser		187.0
Total emission of NH_3-N, Gg	5.75	
Average NH_3-N emission	0.03	

[1] EMEP/EEA (2013), see Annex 2C Table 2C.4 for assumptions for fertiliser type.
[2] The Danish AgriFish Agency.

Grazing

It is assumed that 5% of the manure from dairy cattle is deposited in the field, which corresponding to 18 days per year (Aaes, 2008). For heifers 36% of the nitrogen in the manure is estimated deposited during grazing (Aaes, 2008), 61% for suckling cows (Poulsen et al, 2001), 50% for horses (Clausen, 2008) and 73% for sheep and goats (Poulsen et al, 2001).

Study of grazing cattle indicates that 7 % of the total nitrogen content is assumed to evaporate as NH_3 (Jarvis *et al*. 1998a, Jarvis *et al*. 1989b and Bussink 1994). This emission factor is used for all animal categories.

Activity data

At present, farmed area covers about 60 % of the total land area in Denmark. In recent decades, farmed area has decreased, being replaced by built-up areas, roads, forest and nature habitats. Table 6.11 shows the activity data used in calculation of the NH_3 emission from agricultural soils. The use of fertiliser has decreased considerably. The consumption in 2012 is almost half than in 1985, which reflect the development of improvement of nitrogen in animal manure.

Table 6.11 Activity data used to estimate the NH_3 emission from agricultural soils 1985 to 2012.

NFR 4.D											
Activity data	Unit	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
N in synthetic fertiliser	M kg N	398	400	316	251	206	220	200	190	197	187
N deposited on grass	M kg N	37	34	36	34	26	23	22	22	21	22

Implied emission factor

Table 6.12 shows the implied emission factors, 1985-2012 for use of synthetic fertiliser and grazing animals.

The IEF for synthetic fertiliser depend on consumption and type of fertiliser. The IEF is almost unaltered through the years and the small changes are due to variation in the type of fertiliser used.

Table 6.12 Implied emission factors for NH_3 emission from agricultural soils.

NFR 4.D											
Source	Unit	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
Fertiliser	% of total N	3.2	3.5	4.0	3.2	3.1	3.0	2.9	3.1	3.1	3.1
N grass	% of total N	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0

6.3.3 Emissions

From 1985 to 2012 the NH_3 emission from agricultural soils decreased from 18.79 Gg NH_3 to 8.90 Gg NH_3, which corresponds to a 53 % reduction (Table 6.13). A considerable decrease in the use of synthetic fertiliser has, in particular, been important for this development. The lower emissions from grazing animals reflect the trend towards larger farms where the animals are kept in housings throughout the year.

Table 6.13 Emission of NH_3 from Agricultural Soils from 1985 to 2012, Gg NH_3.

NFR 4.D										
Agricultural Soils	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
Synthetic fertiliser	15.66	16.87	15.27	9.90	7.81	8.16	7.13	7.14	7.36	7.06
N excretion on pasture	3.13	2.92	3.03	2.92	2.21	1.99	1.91	1.87	1.81	1.84
Emission - total	18.79	19.79	18.29	12.82	10.03	10.16	9.03	9.01	9.18	8.90

6.4 NH_3 emission from agriculture other – NFR 4.G

6.4.1 Description

Emissions reported under NFR category 4G include three emissions sources; emissions from growing crops, sewage sludge used as fertilizer and NH_3 treated straw. NH_3 emission from these sources contributes in 2012 with 7 % of the total emission from the agricultural sector. The most important contributor is the emission from growing crops.

6.4.2 Methodological issues

Crops

The Danish emission inventory includes NH_3 emission from crops, despite the uncertainties related to this emission source. Literature research shows that the volatilisation from crop types differs considerably. EF´s for crops are estimated to 2 % for crops and 0.5 % for grass based on a literary survey (Gyldenkærne and Albrektsen, 2009). However, as for the emission ceiling given in the Gothenburg-Protocol and the EU NEC Directive the emission from crops is not taken into account.

Table 6.14 EF used to estimate the emission of NH_3 from crops.

Crops	kg NH_3-N per ha
Cash crops, beets and silage maize	2
Grass/clover in rotation	0.5
Permanent grass	0.5
Set-a side	0

NH_3 treated straw

NH_3 is used for conservation of straw for feeding. Investigations show that up to 80-90% of the supplied NH_3 (given in NH_3-N) can emit (Andersen *et al.* 1999). However, the emissions can be reduced particularly if the right dose is used. It is assumed that the emission factor is 65 % of the applied NH_3-N. Information on NH_3 used for treatment of straw is collected from the suppliers. NH_3 treated straw has been prohibited from 2006, but in 2010 and 2011 an exemption were given due to wet weather.

As for the emission ceiling given in the Gothenburg-Protocol and the EU NEC Directive the emission from NH_3 treated straw is not taken into account.

Activity data

Information on farmed area and cultivation of different crop types is collected by Statistics Denmark. Information on amount of sewage sludge, N-content and NH_3 emission factor is obtained from reports prepared by the Danish Environmental Protection Agency and based on data from the fertiliser accounts controlled by The Danish AgriFish Agency. Farmers with more than 10 animal units have to be registered and keep accounts of the use of N content in manure, received manure or other organic fertiliser.

The activity data are given in Table 6.15. The amount of sewage sludge has increased from 1985 until 1995. In the following years to 2012 the trend is a fall, which probably is a result of increasing demand from the industrial sector. The sludge is used in industrial processes, e.g. in the cement production and production of sandblasting material.

Table 6.15 Activity data used to estimate the NH_3 emission from agriculture other 1985 to 2012.

NFR 4.G											
Activity data	Unit	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
Cultivated area	1000 ha	2 834	2 788	2 726	2 647	2 707	2 668	2 607	2 627	2 623	2 624
Amount of sludge applied on soil	Tonnes of dry matter	50 000	77 883	112 235	83 727	45 738	50 401	62 709	56 665	54 564	52 002
N-content	%	4.00	4.00	4.13	4.33	4.75	4.75	4.75	4.75	4.75	4.75
N applied on soil	Tonnes N	2 000	3 115	4 635	3 625	2 173	2 394	2 979	2 692	2 592	2 470
NH_3 treated straw	Tonnes NH_3-N	8 285	12 912	8 406	3 125	329	0	0	300	300	0

Implied emission factor

The implied emission factor for crops is expressed as total emission divided by total area under cultivation. The IEF for all emission sources; crops, sewage sludge and NH_3 used for straw has remained unchanged for all years.

Table 6.16 Implied emission factors used to estimate the NH_3 emission from 4.G Agriculture Other.

NFR 4.G											
Source	Unit	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
Crops	kg NH_3-N per hectare	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7
Sewage sludge[1]	kg NH_3-N per kg N	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019
NH_3 treated straw	% of total NH_3-N	65	65	65	65	65	65	65	65	65	65

[1] Emission factor is based on information from the Danish Environmental Protection Agency

6.4.3 Emissions

From 1985 to 2012 the NH_3 emission from Agriculture Other decreases from 12.56 Gg NH_3 to 5.46 Gg NH_3, which corresponds to a 57 % reduction (Table 6.17). The decrease is mainly due to a decrease in NH_3 used for treatment of straw. NH_3 treatment was prohibited by law in 2006 but a small emission is seen for 2010 and 2011 caused by an exemption due to wet weather.

Table 6.17 Emission of NH_3 from 4.G Agriculture Other 1985 to 2012, Gg NH_3.

NFR 4.G	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
Crops	5.97	5.92	5.28	5.21	5.34	5.41	5.41	5.41	5.42	5.40
Sewage sludge	0.05	0.07	0.11	0.08	0.05	0.05	0.07	0.06	0.06	0.06
NH_3 treated straw	6.54	10.19	6.63	2.47	0.26	0.00	0.00	0.24	0.24	0.00
Emission - total	12.56	16.18	12.02	7.76	5.65	5.47	5.48	5.71	5.71	5.46

6.5 PM emission from housings – NFR 4.B

This chapter describes the PM emission related to the animal production. The calculation of PM emission in connection to field burning of agricultural wastes is included in Chapter 6.6.

6.5.1 Description

Investigations have shown that farmers, as well as livestock, are subject to an increased risk of developing lung and respiratory related diseases due to the particulate emissions (Hartung and Seedorf, 1999). This is because the particles are able to carry bacteria, viruses and other organic compounds.

In 2012 the PM emission from housings, given as TSP, is estimated to 10.33 Gg. Of this, 70 % relates to swine production. The emission from cattle and poultry contributes with 14 % and 15 %, respectively and the remainder animals contribute with 1 %.

6.5.2 Methodological issues

The estimation of PM emission is based on the EMEP/EEA guidebook (2013) where the scientific data mainly are based on an investigation of PM emission in North European housings (Takai et al., 1998).

The PM emission includes primary particles in the form of dust from housings. The inventory includes PM emission from cattle, swine, poultry, horses, sheep, goats and fur animals (Table 6.18). The number of grazing days is taken into account. Some animal categories are divided into subcategories and for some categories (if applicable) distinction is made between solid and slurry based housing systems.

The PM emission is related to the annual average population (AAP) and to the time the animal is housed. The PM emission from grazing animals is considered as negligible.

Table 6.18 Livestock categories used in the PM emission inventory.

Livestock categories as given in NFR	Subcategories as given in the EMEP/EEA guidebook	Danish inventory	Grazing days
Cattle			
Dairy Cattle	Dairy cattle	Dairy cattle	18
Non-Dairy Cattle	Calves	Calves < ½ yr	0
	Beef cattle	Bulls	0
		Heifers	132
		Suckling cattle	224
Swine	Sows	Sows (incl. weaners until 7 kg)	0
	Weaners	Weaners (7-32 kg)	0
	Fattening pigs	Fattening pigs (32-107 kg)	0
Poultry	Laying hens	Laying hens	0
	Broilers	Broilers	0
	Turkeys	Turkeys	0
	Other poultry	Ducks	0
		Geese	365
Horses	Horses	Horses	183
Sheep	Sheep	Sheep	265
Goats	Goats	Goats	265

Activity data

Livestock production data are based on Statistics Denmark, Agricultural Statistics (http://www.dst.dk/en.aspx) – Table 6.4.

Emission factor

Emission factors for TSP, PM_{10} and $PM_{2.5}$ are based on the EMEP/EEA guidebook (EMEP/EEA, 2013). The same emissions factors are used for all years.

In Takai et al. (1998), dust emissions from housings are estimated as ”inhalable dust”. This is defined as particles that can be transported into the body via the respiratory system. Approximately, “inhalable dust” equates to TSP (Hinz, 2002). Estimation of TSP is based on the transformation factors between TSP and PM_{10} as given in the EMEP/EEA emission inventory guidebook (2013).

Table 6.19 Emission factors for particle emission from animal housing system.

Livestock category	Housing system	Emission factor PM10	PM2.5	TSP	Transformation factor PM10 to TSP
		kg per AAP per year			
Cattle:					
Dairy cattle	Slurry	0.83	0.54	1.81	0.46
	Solid	0.43	0.28	0.94	0.46
Calves < ½ yr	Slurry	0.15	0.10	0.34	0.46
	Solid	0.16	0.10	0.35	0.46
Beef cattle	Slurry	0.32	0.21	0.69	0.46
	Solid	0.24	0.16	0.52	0.46
Heifer[1)]	Slurry	0.49	0.32	1.07	0.46
	Solid	0.30	0.19	0.64	0.46
Suckling cattle[2)]	Slurry	0.32	0.21	0.69	0.46
	Solid	0.24	0.16	0.52	0.46
Swine:					
Sows	Slurry	0.61	0.11	1.36	0.45
	Solid	0.80	0.14	1.77	0.45
Weaners	Slurry	0.16	0.03	0.36	0.45
	Solid	0.16	0.03	0.36	0.45
Fattening pigs	Slurry	0.31	0.06	0.70	0.45
	Solid	0.37	0.07	0.83	0.45
Poultry:					
Laying hens, cages	Solid	0.025	0.003	0.02	1.00
Laying hens, perchery	Solid	0.119	0.023	0.12	1.00
Broilers	Solid	0.069	0.009	0.07	1.00
Ducks	Solid	0.139	0.018	0.14	1.00
Geese	Solid	0.243	0.032	0.24	1.00
Turkeys	Solid	0.521	0.068	0.52	1.00
Horses	Solid	0.22	0.14	0.48	0.46
Sheep	Solid	0.06	0.02	0.12	0.46
Goats	Solid	0.06	0.02	0.12	0.46
Fur animals	Solid	0.008	0.004	0.01	1.00

1) Average of “calves” and “dairy cattle”.

2) Assumed the same value as for “Beef cattle”.

3) Same as slurry based systems.

6.5.3 Emissions

Table 6.20 shows the PM emission, given in TSP, PM_{10} and $PM_{2.5}$ for each animal category in the period 2000 to 2012. It is seen that the main part of the emission originates from swine housings. In the period 2000 to 2012, the total agricultural emission of TSP from housings is almost unaltered, but from 2009 to 2010 the emission is increased 5 %, mainly due to an increase in the number of swine, which also explain the fall in 2011 and 2012.

Table 6.20 PM emission from housings 2000 – 2012, Gg PM_{10}, $PM_{2.5}$ and TSP.

	Gg TSP	2000	2005	2006	2007	2008	2009	2010	2011	2012
NFR	Animal Category									
4B 1a	Dairy	0.86	0.87	0.87	0.88	0.90	0.92	0.92	0.93	0.96
4B 1b	Non-dairy	0.81	0.46	0.46	0.49	0.49	0.48	0.48	0.49	0.50
4B 3	Sheep	<0.005	0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4B 4	Goats	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4B 6	Horses	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04
4B 8	Swine	7.27	8.14	8.00	8.21	7.57	7.32	7.80	7.63	7.24
4B 9a	Laying hens	0.47	0.53	0.37	0.40	0.49	0.42	0.51	0.57	0.44
4B 9b	Broilers	1.11	0.82	0.89	0.81	0.67	1.02	0.89	0.86	0.87
4B 9c	Turkeys	0.24	0.27	0.17	0.22	0.23	0.26	0.26	0.21	0.24
4B 9d	Other poultry	0.033	0.035	0.038	0.021	0.023	0.019	0.018	0.017	0.017
4B 13	Other[1]	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	TSP total	10.84	11.20	10.86	11.10	10.45	10.50	10.94	10.77	10.33
	Gg PM_{10}	2000	2005	2006	2007	2008	2009	2010	2011	2012
NFR	Animal Category									
4B 1a	Dairy	0.40	0.40	0.40	0.40	0.42	0.42	0.43	0.43	0.44
4B 1b	Non-dairy	0.37	0.21	0.21	0.23	0.23	0.22	0.22	0.23	0.23
4B 3	Sheep	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4B 4	Goats	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4B 6	Horses	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
4B 8	Swine	3.27	3.66	3.60	3.69	3.41	3.29	3.51	3.43	3.26
4B 9a	Laying hens	0.47	0.53	0.37	0.40	0.49	0.42	0.51	0.57	0.44
4B 9b	Broilers	1.11	0.82	0.89	0.81	0.67	1.02	0.89	0.86	0.87
4B 9c	Turkeys	0.24	0.27	0.17	0.22	0.23	0.26	0.26	0.21	0.24
4B 9d	Other poultry	0.033	0.035	0.038	0.021	0.023	0.019	0.018	0.017	0.017
4B 13	Other[1]	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	PM_{10} total	5.92	5.98	5.72	5.82	5.51	5.69	5.87	5.79	5.53
	Gg $PM_{2.5}$	2000	2005	2006	2007	2008	2009	2010	2011	2012
NFR	Animal Category									
4B 1a	Dairy	0.26	0.26	0.26	0.26	0.27	0.27	0.28	0.28	0.29
4B 1b	Non-dairy	0.24	0.14	0.14	0.15	0.15	0.14	0.14	0.15	0.15
4B 3	Sheep	0.001	0.001	0.001	0.001	0.001	0.001	0.001	<0.001	<0.001
4B 4	Goats	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4B 6	Horses	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
4B 8	Swine	0.62	0.69	0.68	0.70	0.64	0.62	0.66	0.65	0.62
4B 9a	Laying hens	0.09	0.10	0.07	0.07	0.09	0.08	0.10	0.11	0.08
4B 9b	Broilers	0.15	0.11	0.12	0.11	0.09	0.13	0.12	0.11	0.11
4B 9c	Turkeys	0.03	0.04	0.02	0.03	0.03	0.03	0.03	0.03	0.03
4B 9d	Other poultry	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4B 13	Other[1]	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	$PM_{2.5}$ total	1.40	1.36	1.32	1.35	1.30	1.31	1.36	1.35	1.31

[1] Only emissions from fur animals.

6.6 Field burning of agricultural wastes – NFR 4F

Field burning of agricultural wastes has been prohibited in Denmark since 1990 and may only take place in connection with production of grass seeds on fields with repeated production and in cases of wet or broken bales of straw. The amount of burnt straw from the grass seed production is estimated as 15-20 % of the total amount produced. The amount of burnt bales of wet straw is estimated as 0.1 % of total amount of straw. Both estimates are based on expert judgement by the Danish Agricultural Advisory Service. The total amounts are based on data from Statistics Denmark. EMEP/EEA guidebook (EMEP/EEA, 2013) default values for the emission factors for field burning of agricultural wastes are used (Table 6.21).

Emissions of NH_3, NO_x, CO, NMVOC, SO_2, PM, heavy metals, dioxin, PAHs, HCB and PCB are included under the NFR category 4F. The emission of NH_3 from field burning contributes in 2012 with less than 1 % of the agricultural emission. Emissions of PM and NMVOC from field burning contributes with 2 % TSP, 4 % PM_{10}, 15 % $PM_{2.5}$ and 12 % NMVOC of the agricultural emission. The emission of NO_x, CO, SO_2, heavy metals, dioxin and PCB from field burning contribute with less than or around 1 % of the total national emission, while the emission of PAHs and HCB contribute with around 4 % of the national emission. From 1989 to 1990 all emissions decrease significantly due to the ban on field burning, see Annex 2C Table 2C.5 and 2C.6 for emissions and activity data.

Table 6.21 EF for field burning of agricultural waste.

Pollutant	EF	Unit
NO_x[1]	2.4	g/kg DM
CO[1]	58.9	g/kg DM
NMVOC[1]	6.3	g/kg DM
SO_x[1]	0.3	g/kg DM
NH_3[1]	2.4	g/kg DM
TSP[1]	5.8	g/kg DM
PM_{10}[1]	5.8	g/kg DM
$PM_{2.5}$[1]	5.5	g/kg DM
PCDD/F[1]	500	ng TEQ/t
Pb[1]	0.865	mg/kg DM
Cd[1]	0.049	mg/kg DM
Hg[1]	0.008	mg/kg DM
As[1]	0.058	mg/kg DM
Cr[1]	0.22	mg/kg DM
Ni[1]	0.177	mg/kg DM
Se[1]	0.036	mg/kg DM
Zn[1]	0.028	mg/kg DM
Cu[2]	0.0003	mg/kg DM
Benzo(a)pyrene[2]	2 787	mg/kg DM
benzo(b)fluoranthene[2]	2 735	mg/kg DM
benzo(k)fluoranthene[2]	1 073	mg/kg DM
Indeno(1,2,3-cd)pyrene[2]	1 017	mg/kg DM
HCB (broken bales)[3]	0.003	g/tonnes
HCB (seed production)[3]	0.002	g/tonnes
PCB (broken bales)[4]	3	ng TEQ/t
PCB (seed production)[4]	0.05	ng TEQ/t

[1] EMEP/EEA, 2013.

[2] Jenkins, 1996.

[3] Yang (2006).

[4] Black et al. (2012).

6.7 NMVOC emissions from agriculture other – NFR 4G

Around 3 % of the NMVOC emission originates from the agricultural sector, which, in the Danish emission inventory, includes emission from arable land crops and grassland, and field burning of agricultural wastes (refer to Chapter 6.6.) Activity data are obtained from Statistics Denmark. The emission factors for crops and grassland are for land with arable crops estimated to

393 g NMVOC per ha and for grassland 2 120 g NMVOC per ha (Fenhann & Kilde, 1994; Priemé & Christensen, 1991).

The Danish inventory does not yet include NMVOC emission from livestock production. It is expected to be a relatively important contributor and this emission source is planned to be implemented for next submission.

Table 6.22 Areas and NMVOC emission from agricultural soils 1985 – 2012.

	1985	1990	1995	2000	2005	2008	2009	2010	2011	2012
Arable crops, 1000 ha	2 336	2 322	2 064	2 043	2 086	2 107	2 103	2 096	2 102	2 092
Grassland, 1000 ha	498	466	446	413	446	490	498	521	516	527
NMVOC emission, Gg	1.97	1.90	1.76	1.68	1.77	1.87	1.88	1.93	1.92	1.94

6.8 Uncertainties

Table 6.23 shows the estimated uncertainties for the pollutants.

The total uncertainty regarding emission from manure management depends on uncertainty values for activity data and emission factor.

6.8.1 NH_3

4B Manure management

Apart from the number of animals, the activity data also include the N-excretion, type of housing and thus type of manure.

The number of animals for the most important animal categories is estimated by Statistic Denmark and in 2012 the uncertainties for swine is estimated to 1.2 % and 0.7 % for cattle. The uncertainty is higher for less important animal groups, e.g. poultry, horses, sheep and goats is. The uncertainty for number of animals overall is estimated to 2 %.

The uncertainties are higher when it comes to N-excretion, type of housing and thus type of manure. The Danish Normative System for animal excretions is based on data from the Danish Agricultural Advisory Services (DAAS), which is the central office for all Danish agricultural advisory services. DAAS engages in a great deal of research as well as the collection of efficacy reports from Danish farmers for dairy production, meat production, pig production, etc., to optimise productivity in Danish agriculture. Feeding plans from 15-18 % of the Danish dairy productions, 25-30 % of swine productions, 80-90 % of poultry productions and approximately 100 % of fur productions are collected annually. These basic feeding plans are used to develop the standard values of the "Danish Normative System". However, due to the large number of farms included in the norm figures, the arithmetic mean can be assumed as a very good estimate with a low uncertainty.

The uncertainties for the activity data is thus a combination of low uncertainty in animal numbers, a relatively low uncertainty for feed consumption and excretion rates, which assumed to result in an overall uncertainty by 10 %.

Regarding the uncertainties for the emission factor, it has to be included that the emission comes from three different places in the livestock production; from manure in housing, from stored manure and from application of manure. The uncertainties for emission measurements in housing, which are the basement for the normative standards varies from 15 -25 % (Poulsen et al., 2011). But there is no specified uncertainty estimates for emission factors for storage and application of manure. The overall uncertainty value for NH_3 emission factor for manure management is assumed to be around 25 %.

4D1a Synthetic N-fertilizers

The activity data for the emission from synthetic fertiliser depends on the amount of sold fertiliser and the N-content for each fertiliser type, which is based on information given by the Danish AgriFish Agency. Uncertainty is considered to be low; 3 % based on expert judgement.

No uncertainty values for the emission factor are given in the EEA/EMEP guidebook. The Danish inventory assume an uncertainty value at 25 %, which indicated a uncertainty in the translation of the Danish fertiliser types to types specified in the guidebook but also indicate an uncertainty of the emission factors specified in the guidebook.

4D2c N-excretion on pasture range and paddock

The overall uncertainty for the activity is estimated to 5 %. Besides the number of animals, the uncertainty depends on number of grassing days and the assumption of the amount of N excreted on grass, which is estimated by DAAS and DCA, Aarhus University.

Regarding the uncertainty for the emissions factor, this depends on the animal type, the temperature and other climatic conditions. The uncertainty value is estimated to 25 %.

4F Field burning of agricultural waste

An uncertainty of 25 % for the activity for field burning of agricultural wastes is used. The uncertainty is a combination of the uncertainty for area of grass for seed production, which has a low uncertainty, amount of burnt straw and yield, which have a high uncertainty. The uncertainties are based on the EMEP/EEA Guidebook (EMEP, 2013) and Jenkins et al. (1996).

4G Other

Under Table 4G emissions from three sources are reported, crops, sewage sludge and NH_3 treated straw. The uncertainty of activity data for crops is very low, while it for sewage sludge and NH_3 treated straw is higher. The total uncertainty value is assumed to be 20 %.The uncertainty level for the emission factor for crops and NH_3 treated straw is high, while it for sewage sludge is lower. The uncertainty value for the emission factor in overall is assumed to be 50 %.

6.8.2 PM

Previously the uncertainties for the PM emission factors have been considered to be very high and especially for animal husbandry and manure management. The uncertainty estimates regarding the PM emission factors are based on the EMEP/EEA guidebook.

6.8.3 Other pollutants

For the NMVOC emission from 4G Other the activity data is hectares of arable crops and grassland. Data for hectares under cultivation is estimated by Statistic Denmark and the uncertainties are based on the calculations and they are very low; 2 %. The uncertainty for the emission factor is based on expert judgment and is considered to be very high; 500 %. For the NMVOC emission from field burning the uncertainty of the emission factor is based on EMEP/EEA guidebook.

Emission of NO_x, CO, SO_2, heavy metals, dioxin, PAHs, HCB and PCB from the agricultural sector originates from field burning of agricultural wastes. The uncertainty for activity data for these emissions is a combination of the uncertainty for crop production which is low and the uncertainty of the amount of burned straw which is high. The uncertainties for the emission factors are based on EMEP/EEA guidebook. All uncertainties for field burning are relatively high. The uncertainty for activity data for the emission of HCB from pesticides are estimated to 5 % and the uncertainty for the emission factor are relatively high.

Table 6.23 Estimated uncertainty associated with activities and emission factors for the agricultural sector.

	Sector	Emission	Activity data, %	Emission factor, %	Combined Uncertainty, %	Total Uncertainty, %
NH_3, Gg	4.B Manure management	58.97	10	25	27	22
	4 D 1 a Synthetic N-fertilizers	7.06	3	25	25	
	4 D 2 c N-excretion on pasture	1.84	5	25	25	
	4.F Field burning	0.10	25	50	56	
	4 G Agriculture other	5.46	20	50	54	
NMVOC, Gg	4.F Field burning	0.27	25	100	103	439
	4 G Agriculture other	1.94	2	500	500	
TSP, Gg	4.B Manure management	10.33	2	300	300	293
	4.F Field burning	0.25	25	50	56	
PM_{10}, Gg	4.B Manure management	5.53	2	300	300	287
	4.F Field burning	0.25	25	50	56	
$PM_{2.5}$, Gg	4.B Manure management	1.31	2	300	300	254
	4.F Field burning	0.24	25	50	56	
HCB, kg	4.F Field burning	0.11	25	500	501	501
HCB, kg	4 G Agriculture other	0.02	5	500	500	
PCB, kg	4.F Field burning	<0.01	25	500	501	501
NO_x, Gg	4.F Field burning	0.10	25	25	35	35
CO, Gg	4.F Field burning	2.52	25	100	103	103
SO_2, Gg	4.F Field burning	0.01	25	100	103	103
Pb, Mg	4.F Field burning	0.04	25	50	56	56
Cd, Mg	4.F Field burning	<0.01	25	100	103	103
Hg, Mg	4.F Field burning	<0.01	25	200	202	202
As, Mg	4.F Field burning	<0.01	25	100	103	103
Cr, Mg	4.F Field burning	0.01	25	200	202	202
Cu, Mg	4.F Field burning	<0.01	25	200	202	202
Ni, Mg	4.F Field burning	0.01	25	200	202	202
Se, Mg	4.F Field burning	<0.01	25	100	103	103
Zn, Mg	4.F Field burning	<0.01	25	200	202	202
Dioxin, g I-Teq	4.F Field burning	0.03	25	500	501	501
Benzo(a)pyrene, Mg	4.F Field burning	0.12	25	500	501	501
Benzo(b)fluoranthen, Mg	4.F Field burning	0.12	25	500	501	501
Benzo(k)fluoranthen, Mg	4.F Field burning	0.05	25	500	501	501
Indeno(1,2,3 cd)pyrene, Mg	4.F Field burning	0.04	25	500	501	501

6.9 Quality assurance and quality control (QA/QC)

A general QA/QC and verification plan for the agricultural sector is continuously under development and will be improved and developed in line with the deficiencies are identified and corrected. The objectives for the quality planning, as given in the CLRTAP Emission Inventory Guidebook, which is closely related to the IPCC Good Practice Guidance, are to improve the transparency, consistency, comparability, completeness and confidence.

To ensure consistency a procedure for internal quality check are provided. Input of external data is checked and certain time series have been prepared for both the activity data, the emission factors and implied emission factors, 1985 - 2012. The annual change for each emission source on activity will be checked for significant differences and if necessary explained. Considerable variation between years can reveal miscalculations or changes in methods. All checks of all activity data, emission factor, implied emission factor and other important key parameters are provided and achieved in excel spread sheet.

Activity data and emission factors are collected and discussed in cooperation with specialists and researchers at different institutes and research departments. As a consequence, both data and methods are evaluated continuously according to latest knowledge and information. A more detailed description of quality assurance and quality control is given in the Denmark´s National Inventory Report 2013 - submitted under the United Nations Framework Convention on Climate Change (http://www2.dmu.dk/pub/sr56.pdf).

6.10 Recalculations

Compared with the previous NH_3 and PM emissions inventory (submission 2013), some changes and updates have been made, see Table 6.24. These changes cause a relatively high increase in the NH_3 emission for all years (1985–2011) between 5-10 % and a decrease in the PM emission 2000-2011 by 3-5 %.

Table 6.24 Changes in NH_3 and PM emission in the agricultural sector compared to NFR reported last year.

NH_3 emission, Gg NH_3	1985	1990	1995	2000	2005	2008	2009	2010	2011
2012 submission	116.78	113.45	97.14	87.11	79.16	73.90	71.56	71.85	71.30
2013 submission	125.98	123.74	106.85	93.16	83.85	78.41	75.01	75.53	74.70
Difference, %	7.88	9.06	10.00	6.94	5.92	6.10	4.83	5.11	4.77

PM emission, Gg TSP	2000	2005	2008	2009	2010	2011
2012 submission	11.45	12.05	11.26	11.15	11.65	11.50
2013 submission	11.11	11.50	10.70	10.79	11.16	10.98
Difference, %	-2.97	-4.56	-4.93	-3.24	-4.21	-4.49

There have been no changes in the methodology.

The emission of NH_3 has increased all years due to change in the emission factor for synthetic fertiliser as a consequence of updating of the EMEP/EEA Guidebook (2013). Some other changes have been made which slightly increases the emission of NH_3 from manure management; number of geese all years, number of weaners and fattening pigs in 2011 and change of distribution of housings for hens also in 2011.

Emission of PM TSP decreased all years due to changes of emission factor in the revised EMEP/EEA Guidebook (2013). The overall decrease is mainly due to decrease in emission factor for fattening pigs and weaners.

6.11 Planned improvements

In recent years, there has been focus on reduction of the NH_3 emission and especially the possibilities for emission reduction in housings. A number of investigations to estimate the effects from technical measures on the emission have been initiated. Until now, still relatively few housings have implemented NH_3 reduction technologies, but there is no doubt, that the ammonia reducing technology will play an important role in the future. When data are available, it is planned to implement the effect of the reducing technology in the emission inventory.

For the next submission it is planned to include the dust emission from arable farming – i.e. harvesting and field preparation by machines and NMVOC emission from the livestock production (NFR 4B).

The QA/QC plan for the agricultural sector is continually under development. Until now, the main focus has been on the internal procedure check as described in Section 6.9. There is still a need to provide the procedure for control of the inventory data calculations. This means to identify the possibility to compare the calculations made by other institutions or organisations e.g. calculation of total N-excretion made by the DCA-Danish Centre for Food and Agriculture, Aarhus University. Furthermore, it is a need to consider how to ensure a quality assurance procedure for the entire inventory. To implement these activities there is a need for more resources than are currently allocated to the emission inventory.

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7 Waste (NFR sector 6)

The waste sector consists of the four main NFR categories 6A Solid waste disposal on land, 6B Waste-Water handling, 6C Waste incineration and 6D Other waste. Table 7.1 below shows the relevant SNAP codes for the waste sector.

Table 7.1 Link between SNAP codes and NFR sectors.

SNAP code	SNAP name	NFR code
090401	Managed Waste Disposal on Land	6A
090402	Unmanaged Waste Disposal Sites	6A
090403	Other	6A
091001	Waste water treatment in industry	6B
091007	Latrines	6B
091002	Waste water treatment in residential/commercial sect.	6B
090201	Incineration of domestic or municipal wastes	6C
090202	Incineration of industrial wastes (except flaring)	6C
090204	Flaring in chemical industries	6C
090205	Incineration of sludge from waste water treatment	6C
090207	Incineration of hospital wastes	6C
090208	Incineration of waste oil	6C
090901	Incineration of corpses	6C
090902	Incineration of carcasses	6C
090700	Open burning of agricultural wastes	6C
091003	Sludge spreading	6D
091005	Compost production	6D
091006	Biogas production	6D
091008	Other production of fuel (refuse derived fuel)	6D
091009	Accidental fires	6D

Incineration of waste (municipal, industrial, clinical and hazardous) in Denmark is done with energy recovery and therefore the emissions are included under the relevant sectors under NFR sector 1A. The documentation for waste incineration is included in Chapter 3.2.

7.1 Solid waste disposal on land

Major emissions from landfilling are emissions of greenhouse gases, i.e. CH_4. It is assumed that landfilling also leads to emission of small quantities of NMVOC, CO, NH_3 and NO_x. PM emissions are emitted from waste handling as well, but these have not been included in the current submission.

For the 2014 submission Denmark has not estimated emissions of air pollutants from solid waste disposal. The EMEP/EEA Guidebook contains default NMVOC and particle emission factor, however due to limited resources it has not been possible to estimate the emissions.

7.2 Wastewater handling

According to the EMEP/EEA Guidebook wastewater handling can be a source for emissions of POPs, NMVOC, NH_3 and CO. Of these pollutants only NMVOC is thought to be significant.

For the current submission Denmark has not estimated emissions of air pollutants from wastewater handling. The EMEP/EEA Guidebook contains a default NMVOC emission factor for latrines and wastewater handling, however due to limited resources it has not been possible to estimate the emissions.

7.3 Waste incineration

Incineration of municipal, industrial, clinical and hazardous waste takes place with energy recovery, therefore the emissions are included in the relevant subsectors under NFR sector 1A. For documentation please refer to Chapter 3.2. Flaring off-shore and in refineries are included under NFR sector 1B2c, for documentation please refer to Chapter 3.4. No flaring in chemical industry occurs in Denmark.

7.3.1 Human cremation

The incineration of human corpses is a common practice that is performed on an increasing part of the deceased. All Danish crematoria use optimised and controlled cremation facilities, with temperatures reaching 800-850 °C, secondary combustion chambers, controlled combustion air flow and regulations for coffin materials.

However, the emissions of especially Hg caused by cremations can still contribute to a considerable part of the total national emissions. In addition to the most frequently discussed emissions of Hg and PCDD/Fs (dioxins and furans), are the emissions of compounds like SO_2, NO_x, NMVOC, CO, other heavy metals (As, Cd, Cr, Cu, Ni, Pb, Se, Zn), particulate matter, HCB, PAHs and PCBs.

Crematoria are usually located within cities, close to residential areas and normally, their stacks are relatively low. Therefore environmental and human exposure is likely to occur as a result of emissions from cremation facilities.

Methodology

During the 1990es all Danish crematoria were rebuilt to meet new standards. This included installation of secondary combustion chambers and in most cases, replacement of old primary combustion chambers (Schleicher et al., 2001). All Danish crematoria are therefore performing controlled incinerations with a good burn-out of the gases, and a low emission of pollutants.

Following the development of new technology, the emission limit values for crematoria were lowered again in January 2011. These new standards were originally expected from January 2009 but were postponed two years for existing crematoria.

Table 7.2 shows a comparison of the emission limit values from February 1993 and the new standard limits.

Table 7.2 Emission limit values mg per Nm^3 at 11 % O_2 (Schleicher & Gram, 2008).

Component	Report 2/1993	Standard terms (1/2011)
	Emission limit value mg/normal m^3 at 11 % O_2	
Total dust	80	10
CO	50	50
Hg	No demands	0.1
Other demands:		
Stack height	3 m above rooftop	3 m above rooftop
Temperature in stack	Minimum 150 °C	Minimum 110 °C
Flue gas flow in stack	8 – 20 m/s	No demands
Temperature in after burner	850 °C	800 °C
Residence time in after burner	2 seconds	2 seconds
Odour	The crematory must not cause noticeable odour in the surroundings	The crematory must not cause odour nuisance outside the crematory perimeter, that is significant according to the supervisory authority

To meet the new standards, some crematoria have been rebuilt to larger capacity while others are closed (MILIKI, 2006). In 2011, there were 26 operating crematoria in Denmark, some with multiple furnaces (DKL, 2013).

Crematoria that are not closed are equipped with flue gas cleaning (bag filters with activated carbon). The use of air pollution control devices, and activated carbon, for the removal of Hg will also reduce the flue gas concentration of dioxins, PAHs and odour. Existing knowledge on the reduction efficiencies justifies that no emission limits are necessary (Schleicher & Gram, 2008).

Around half of the Danish crematoria are currently connected to the district heating system and in addition, a few crematoria produce heat for use in their own buildings. The bag filter cleaning system requires that the flue gas is cooled down to 125-150 °C, and the cheapest way to do so is to use the surplus heat in the district heating system (DKL, 2009). The heat contribution from crematoria is negligible compared to the total district heat production and is not part of the Danish energy statistics.

Activity data

Table 7.3 shows the time series of total number of deceased persons (Statistics Denmark, 2013), number of cremations and the fraction of cremations in relation to the total number of deceased (DKL, 2013). Annex 2D Table 2D-1 presents data for the entire time series.

Table 7.3 Data human cremations (DKL 2013, Statistics Denmark 2013).

	1980	1985	1990	1995	2000	2005	2010	2011	2012
Nationally deceased	55939	58378	60926	63127	57998	54962	54368	52516	52325
Cremations	33986	36705	40991	43847	41651	40758	42050	41248	40909
Cremation fraction, %	60.8	62.8	67.3	69.5	71.8	74.2	77.3	78.6	79.6

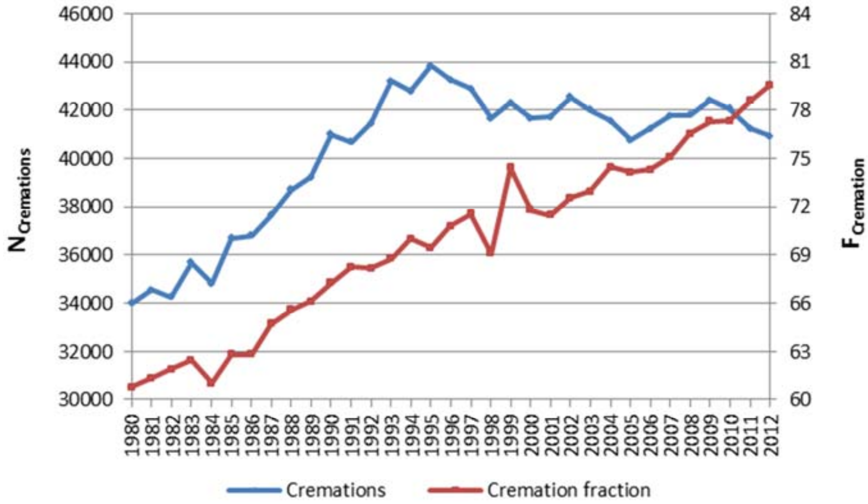

Figure 7.1 Illustration of the development in cremations (DKL 2013), where the number of cremations, $N_{cremations}$, is shown at the left Y-axis. The cremation percentage, $F_{cremations}$, shows the percentage of cremated deceased of the total number of deceased for the years 1984 to 2012. Data for 1980-1983 are estimated values, for details on the estimation, see Annex 2D-1.

Even though the total number of annual cremations is fluctuating, the cremation percentage has been steadily increasing since 1984, and is likely to continue to increase.

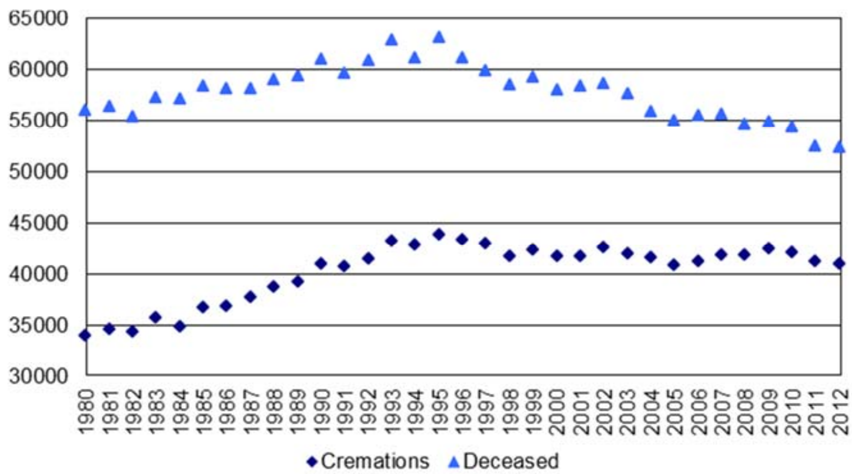

Figure 7.2 Trends of the activity data for cremation of human corpses and the number of deceased persons.

Figure 7.2 presents the trend of the number of deceased persons together with the activity data for human cremation. The figure shows a direct connection between the number of deceased and the activity of human cremation as the two trends are quite similar. Figure 7.2 also shows the effect of the increasing fraction of cremations per deceased, as the number of cremations is not decreasing along with the number of deceased. The cremation fraction has increased from 67 % in 1990 to 80 % in 2012; the trend of this fraction is shown in Figure 7.1, Table 7.3 and Annex 2D Table 2D-1.

Emission factors

For crematoria, emissions are calculated by multiplying the total number of cremations by the emission factors. The emission factors are gathered from literature and are based on the measurements performed in countries that are comparable with Denmark. By comparable is meant countries that use similar incineration processes, similar cremation techniques including support fuel and have a similar composition of sources to lifetime exposure, lifetimes and coffins.

Table 7.4 lists the emission factors for valid for 1980-2010 and their respective references. As mentioned earlier, 2011 is year one after installation of bag filters with activated carbon at all Danish crematoria, causing the emission factors for particles, heavy metals, PAhs and PCDD/Fs to decrease quite drastically.

Table 7.4 Emission factors for human cremation with references.

Pollutant name	Unit	Emission factor*	Reference
SO_2	kg/body	0.113	Santarsiero et al., 2005
NO_X	kg/body	0.825	Santarsiero et al., 2005
NMVOC	kg/body	0.013	EEA, 1996
CO	kg/body	0.010	Schleicher et al., 2001
NH_3		NA	
TSP	kg/body	0.039	Webfire, 2012
PM_{10}	kg/body	0.035	Webfire, 2012
$PM_{2.5}$	kg/body	0.031	Webfire, 2012
As	g/body	0.014	Webfire, 2012
Cd	g/body	0.005	Webfire, 2012
Cr	g/body	0.014	Webfire, 2012
Cu	g/body	0.012	Webfire, 2012
Hg	g/body	1.12	Kriegbaum et al., 2005
Ni	g/body	0.017	Webfire, 2012
Pb	g/body	0.030	Webfire, 2012
Se	g/body	0.020	Webfire, 2012
Zn	g/body	0.160	Webfire, 2012
HCB	mg/body	0.152	Toda, 2006
PCDD/F	µg I-TEQ/body**	0.350	Schleicher et al., 2001
Benzo(b)flouranthene	µg/body	7.21	Webfire, 2012
Benzo(k)flouranthene	µg/body	6.44	Webfire, 2012
Benzo(a)pyrene	µg/body	13.20	Webfire, 2012
Indeno(1,2,3-c-d)pyrene	µg/body	6.99	Webfire, 2012
PCBs	mg/body	0.414	Toda, 2006

*NA = not applicable. ** I-TEQ: International Toxicity Equivalents.

The average body weight of cremated corpses is assumed to be 65 kg.

Fluegas cleaning efficiencies are based on measurements performed at Danish crematoria and expert judgements, and are 99 % for PCDD/Fs, particles, PAHs and heavy metals. These abatement efficiencies are implemented from 2011.

It has not been possible to find data for ammonia. Ammonia might appear in lesser amounts, but will most likely be converted to NO_X at the high incineration temperatures.

There might for some emission factors be included a small part of the support fuel (natural gas) if the measurements were taken early in the burning process. This would then be a double counting since fuel for cremation is reported under NFR code 1A4a, commercial and institutional. However, this double counting is considered miniscule.

Emissions

Table 7.5 shows the total emissions from selected years. To view the entire time series 1980-2012, see Annex 2D Table 2D-3a-d. The dioxin emission is given in I-TEQ; i.e. International Toxicity Equivalents which is a weighted addition of congener toxicity with reference to 2,3,7,8-TCDD (Seveso-dioxin).

Emissions from human cremations have been steady over the last two decades but have decreased strongly for the pollutants TSP, PM_{10}, $PM_{2.5}$, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, PCDD/Fs and PAHs from 2010 to 2011 because of the installation of bag filters with activated carbon.

Table 7.5 Total national emissions from incineration of corpses.

	Unit	1980	1985	1990	1995	2000	2005	2010	2011	2012
SO_2	Mg	3.83	4.14	4.62	4.94	4.70	4.60	4.74	4.65	4.61
NO_X	Mg	28.04	30.28	33.82	36.17	34.36	33.63	34.69	34.03	33.75
NMVOC	Mg	0.442	0.477	0.533	0.570	0.541	0.530	0.547	0.536	0.532
CO	Mg	0.340	0.367	0.410	0.438	0.417	0.408	0.421	0.412	0.409
TSP	Mg	1.31	1.42	1.58	1.69	1.61	1.57	1.62	0.02	0.02
PM_{10}	Mg	1.18	1.27	1.42	1.52	1.45	1.41	1.46	0.01	0.01
$PM_{2.5}$	Mg	1.18	1.27	1.42	1.52	1.45	1.41	1.46	0.01	0.01
As	kg	0.46	0.50	0.56	0.60	0.57	0.55	0.57	0.01	0.01
Cd	kg	0.17	0.18	0.21	0.22	0.21	0.21	0.21	0.002	0.002
Cr	kg	0.46	0.50	0.56	0.59	0.56	0.55	0.57	0.01	0.01
Cu	kg	0.42	0.46	0.51	0.55	0.52	0.51	0.52	0.01	0.01
Hg	kg	38.03	41.07	45.87	49.06	46.61	45.61	47.05	0.46	0.46
Ni	kg	0.59	0.64	0.71	0.76	0.72	0.71	0.73	0.01	0.01
Pb	kg	1.02	1.10	1.23	1.32	1.25	1.22	1.26	0.01	0.01
Se	kg	0.67	0.73	0.81	0.87	0.82	0.81	0.83	0.01	0.01
Zn	kg	5.44	5.88	6.56	7.02	6.67	6.53	6.73	0.07	0.07
HCB	g	5.15	5.56	6.21	6.65	6.31	6.18	6.37	6.25	6.20
PCDD/F	mg	11.90	12.85	14.35	15.35	14.58	14.27	14.72	0.14	0.14
benzo(b)flouranthene	g	0.25	0.26	0.30	0.32	0.30	0.29	0.30	0.003	0.003
benzo(k)flouranthene	g	0.22	0.24	0.26	0.28	0.27	0.26	0.27	0.003	0.003
benzo(a)pyrene	g	0.45	0.48	0.54	0.58	0.55	0.54	0.56	0.005	0.005
indeno(1,2,3-c-d)pyrene	g	0.24	0.26	0.29	0.31	0.29	0.28	0.29	0.003	0.003
PCB	g	14.05	15.18	16.95	18.13	17.22	16.86	17.39	17.06	16.92

7.3.2 Animal cremation

The incineration of animal carcasses in animal crematoria follows much the same procedure as human cremation. Animal crematoria use similar two chambered furnaces and controlled incineration. However, animal carcasses are burned in special designed plastic (PE) bags rather than coffins. Emissions from animal cremation are similar to those from human cremation, with the exception of Hg which mainly stems from amalgam tooth fillings.

Animal cremations are performed in two ways, individually where the owner often pays for receiving the ashes in an urn or collectively which is most often the case with animal carcasses that are left at the veterinarian.

Methodology

Open burning of animal carcasses is illegal in Denmark and is not occurring and small-scale incinerators are not known to be used at Danish farms. Livestock that is diseased or in other ways unfit for consumption is disposed of through rendering plants, incineration of livestock carcasses is illegal and these carcasses are therefore commonly used in the production of fat and soap at Daka Bio-industries.

The only animal carcasses that are approved for cremation in Denmark are deceased pets and animals used for experimental purposes, where the incineration must take place at a specialised animal crematorium. There are four animal crematoria in Denmark but one of these is situated at a waste incineration company in northern Jutland called AVV. The specially designed cremation furnaces are at this location connected to the flue gas cleaning equipment of the municipal waste incineration plant with energy recovery and the emission from the cremations are therefore included in the annual inventory from AVV. Consequently, this crematorium is included in Chapter 3.1 Energy. Therefore only three animal crematoria are included in this sector report.

Animal by-products are regulated under the EU commission regulation no. 142/2011. This states that animal crematoria must be approved by the authority and comply either with the EU directive (2000/76/EC) on waste incineration or with Regulation (EC) No. 1069/2009. (EC, 2011)

The incineration of animal carcasses is, as the incineration of human corpses, performed in special incineration chambers. All Danish animal crematoria have primary combustion chambers with temperatures around 850 ºC and secondary combustion chambers with temperatures around 1100 ºC. The support fuel used at the Danish facilities is natural gas.

Emissions from pet cremations are calculated for SO_2, NO_x, NMVOC, CO, NH_3, particles, heavy metals (As, Cd, Cr, Cu, Ni, Pb, Se, Zn), HCB, dioxins/furans, PAHs and PCBs. For the pollutants SO_2, NO_x, CO, As, Se, HCB, PAHs and PCBs, emissions are estimated by using the same emission factors as for human cremation.

Activity data

Activity data for animal cremation are gathered directly from the animal crematoria. There is no national statistics available on the activity from these facilities. The precision of activity data therefore depends on the information provided by the crematoria.

The following Table 7.6 lists the four Danish pet crematoria, their foundation year and provides each crematorium with an id letter.

Table 7.6 Animal crematoria I Denmark.

Id	Name of crematorium	Founded in
A	Dansk Dyrekremering ApS	May 2006
B	Ada's Kæledyrskrematorium ApS	Unknown, existed in more than 30 years, assumed 1980
C	Kæledyrskrematoriet	2006
D	Kæledyrskrematoriet v. Modtagestation Vendsyssel I/S	-

Crematoria D is situated at the AVV municipal waste incineration site and the emissions from this site are, as previously mentioned, included in the annual emission reporting from AVV and consequently included in the energy sector as waste incineration with energy recovery. Therefore, only crematoria A-C are considered in this chapter.

Table 7.7 lists the activity data for crematoria A-C. The entire dataset for 1980-2012 is available in Annex 2D Table 2D-2.

Table 7.7 Activity data. Source: direct contact with all Danish crematoria.

	1980	1985	1990	1995	2000	2005	2010	2011	2012
Total, Mg	50	100	150	200	443	762	1449	1219	1238

Crematorium B delivered exact annual activity data for the years 1998-2011. They were not certain about the founding year but believe to have existed since the early 1980es. It is assumed that crematorium B was founded at January 1st 1980 and activity data for 1980-1997 must therefore be estimated.

Statistical data describing the national consumption for pets including food and equipment for pets were evaluated as surrogate data. These statistical data show an increase of consumption of 6 % from 1998 to 2000, in the same period the amount of cremated animal carcasses increased with 89 % and no correlation seems to be present. Since there are no other available data on the subject of pets, it is concluded that there are no surrogate data available.

It is not possible to extrapolate data linearly back to 1980 because the activity, due to the steep increase, in this case would become negative from 1993 and back in time.

The activity data for animal cremation for the period of 1980-1997 are estimated by expert judgement. The estimated data are shown in Table 7.7, Figure 7.3 and Annex 2D Table 2D-2.

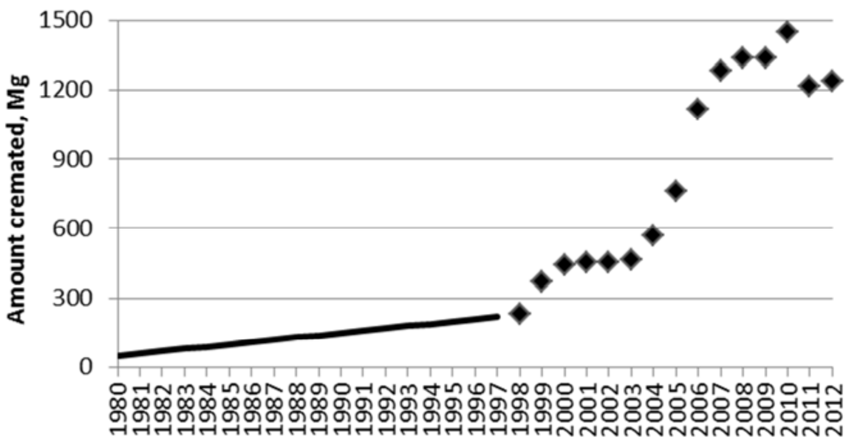

Figure 7.3 The amount of animal carcasses cremated, in Mg. Data from 1998-2011 are delivered by the crematoria and is considered to be exact; these data are marked as points. Data from 1980-1997 are estimated and are shown as the thick line in the figure.

Emission factors

Concerning the incineration of animal carcasses in animal crematoria there is not much literature to be found. The EMEP/EEA Guidebook (EEA, 2009) is the only available source to emission factors for NMVOC, NH_3, TSP, PM_{10}, $PM_{2.5}$ and PCDD/F.

Chen et al. (2004) is the only available source to emission factors for the heavy metals Cd, Cr, Cu, Ni, Pb and Zn.

There is a good agreement between the emission factors for animal and human cremation for PCDD/F and a relatively good agreement for NMVOC, TSP, PM_{10}, $PM_{2.5}$ and heavy metals.

The emission factors of the remaining pollutants SO_2, NO_x, CO, As, Se, HCB, PAHs and PCBs are collected from the literature search on human cremation, and it is assumed that humans and animals are similar in composition for this purpose. Emission factors from human cremation are recalculated to match the activity data for animal cremation, emission per Mg.

No data were available for the emission of Hg in animal cremations. The emission factor accepted for human cremation is not accepted in the case of Hg, because the Hg emission from human cremations primarily stems from tooth fillings.

Table 7.8 lists the emission factors and their respective references.

Table 7.8 Emission factors for animal cremation with references, per Mg.

Pollutant	Unit	Emission factor	Source
SO_2	kg	1.73*	Santarsiero et al, 2005
NO_X	kg	12.69*	Santarsiero et al, 2005
NMVOC	kg	2 00	EEA, 2009
CO	kg	0.15*	Schleicher et al., 2001
NH_3	kg	1.90	EEA, 2009
TSP	kg	2.18	EEA, 2009
PM_{10}	kg	1.53	EEA, 2009
$PM_{2.5}$	kg	1.31	EEA, 2009
As	g	0.21*	Webfire, 2012
Cd	g	0.01	Chen et al., 2004
Cr	g	0.07	Chen et al., 2004
Cu	g	0.02	Chen et al., 2004
Hg	-	NAV	-
Ni	g	0.06	Chen et al., 2004
Pb	g	0.18	Chen et al., 2004
Se	g	0.30*	Webfire, 2012
Zn	g	0.19	Chen et al., 2004
HCB	mg	2.33*	Toda, 2006
PCDD/F	µg I-TEQ	10.00	EEA, 2009
Benzo(b)flouranthene	mg	0.11*	Webfire, 2012
Benzo(k)flouranthene	mg	0.10*	Webfire, 2012
Benzo(a)pyrene	mg	0.20*	Webfire, 2012
Indeno(1,2,3-c-d)pyrene	mg	0.11*	Webfire, 2012
PCB	mg	6.36*	Toda, 2006

* Emission factors from human cremations.

Emissions

For the incineration of animal carcasses, emissions are calculated by multiplying the amount of incinerated animals by the emission factors.

Emissions are shown in the following Table 7.9. Emissions for the full time series are shown in Annex 2D Table 2D-4a-d.

Table 7.9 Emissions from animal cremation.

	unit	1980	1985	1990	1995	2000	2005	2010	2011	2012
SO_2	Mg	0.09	0.17	0.26	0.35	0.77	1.32	2.51	2.11	2.15
NO_X	Mg	0.63	1.27	1.90	2.54	5.63	9.68	18.39	15.47	15.71
NMVOC	Mg	0.10	0.20	0.30	0.40	0.89	1.52	2.90	2.44	2.48
CO	Mg	0.01	0.02	0.02	0.03	0.07	0.12	0.22	0.19	0.19
NH_3	Mg	0.10	0.19	0.29	0.38	0.84	1.45	2.75	2.32	2.35
TSP	Mg	0.11	0.22	0.33	0.44	0.97	1.66	3.16	2.66	2.70
PM_{10}	Mg	0.08	0.15	0.23	0.31	0.68	1.17	2.22	1.86	1.89
$PM_{2.5}$	Mg	0.07	0.13	0.20	0.26	0.58	1.00	1.90	1.60	1.62
As	kg	0.01	0.02	0.03	0.04	0.09	0.16	0.30	0.25	0.26
Cd	kg	0.001	0.001	0.002	0.002	0.004	0.01	0.01	0.01	0.01
Cr	kg	0.004	0.01	0.01	0.01	0.03	0.05	0.10	0.09	0.09
Cu	kg	0.001	0.002	0.003	0.004	0.01	0.02	0.03	0.02	0.02
Ni	kg	0.003	0.01	0.01	0.01	0.03	0.05	0.09	0.07	0.07
Pb	kg	0.01	0.02	0.03	0.04	0.08	0.14	0.26	0.22	0.22
Se	kg	0.02	0.03	0.05	0.06	0.13	0.23	0.44	0.37	0.38
Zn	kg	0.01	0.02	0.03	0.04	0.08	0.14	0.28	0.23	0.24
HCB	g	0.12	0.23	0.35	0.47	1.03	1.78	3.38	2.84	2.89
PCDD/F	mg	0.50	1.00	1.50	2.00	4.43	7.62	14.49	12.19	12.38
benzo(b)flouranthene	g	0.01	0.01	0.02	0.02	0.05	0.08	0.16	0.14	0.14
benzo(k)flouranthene	g	0.005	0.01	0.01	0.02	0.04	0.08	0.14	0.12	0.12
benzo(a)pyrene	g	0.01	0.02	0.03	0.04	0.09	0.15	0.29	0.25	0.25
indeno(1,2,3-c-d)pyrene	g	0.01	0.01	0.02	0.02	0.05	0.08	0.16	0.13	0.13
PCB	g	0.32	0.64	0.95	1.27	2.82	4.85	9.22	7.75	7.87

7.4 Other waste

This category is a catch all for the waste sector. Emissions in this category could stem from sludge spreading, compost production, accidental fires, biogas production and other combustion without energy recovery.

7.4.1 Sludge spreading

Sludge from wastewater treatment plants is only spread out in the open with the purpose of fertilising crop fields. Emissions that derive from this activity are covered in Chapter 6.

7.4.2 Compost production

This section covers the biological treatment of solid waste called composting. Pollutants that are emitted from this process are CO and NH_3.

Methodology

Emissions from composting have been calculated according to a country specific Tier 1 method. However, a Tier 1 default methodological guidance is available in the 2006 IPCC Guidelines (IPCC, 2006).

In Denmark, composting of solid biological waste includes composting of:

- garden and park waste (GPW),
- organic waste from households and other sources,
- sludge,
- home composting of garden and vegetable food waste.

In 2001, 123 composting facilities treated only garden and park waste (type 2 facilities), nine facilities treated organic waste mixed with GPW or other organic waste (type 1 facilities) and 10 facilities treated GPW mixed with sludge and/or "other organic waste" (type 3 facilities). 92 % of these facilities consisted entirely of windrow composting, which is a simple technology composting method with access to only natural air. It is assumed that all facilities can be considered as using windrow composting. (Petersen & Hansen, 2003)

Composting is performed with simple technology in Denmark; this implies that temperature, moisture and aeration are not consistently controlled or regulated. Temperature is measured but not controlled, moisture is regulated by watering the windrows in respect to weather conditions and aeration is assisted by turning the windrows. (Petersen & Hansen, 2003)

During composting a fraction of the degradable organic carbon (DOC) in the waste material is converted into CO. Even though the windrows are occasionally turned to support aeration, anaerobic sections are inevitable and will cause a small emission of CH_4. In the same manner, aerobic biological digestion of N leads to an emission of NO_X, while the anaerobic decomposition leads to the emission of NH_3 (IPCC, 2006).

Activity data

All Danish waste treatment plants are obligated to statutory registration and reporting of all waste entering and leaving the plants. All waste streams are weighed, categorised with a waste type and a type of treatment and registered to the ISAG waste information system, which contain data for 1995-2009 (ISAG, 2010). The new waste data system that was supposed to replace ISAG in 2010 is not yet available; activity data for 2010-2012 has therefore been estimated by extrapolation.

Figure 7.4 illustrates the composted amount of waste divided in the four categories mentioned earlier.

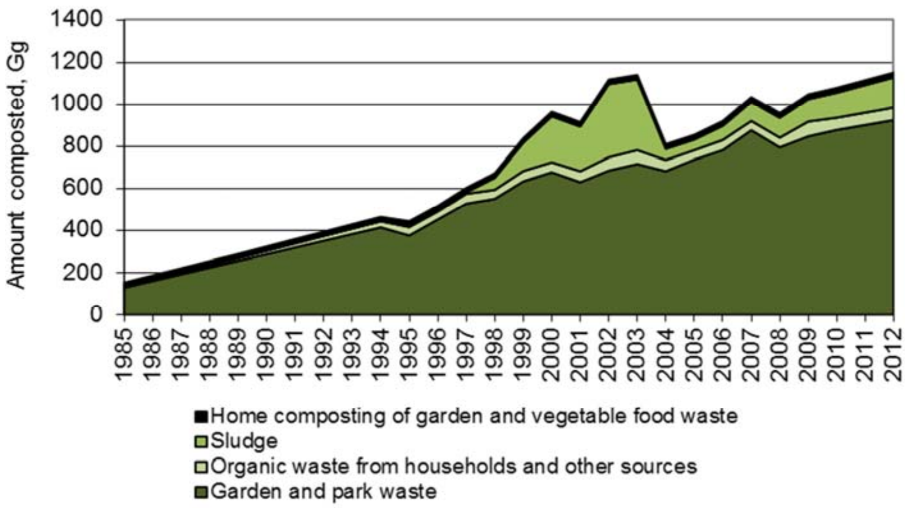

Figure 7.4 Amount of composted waste divided in garden and park waste (GPW), organic municipal solid waste (MSW), sludge and home composting of garden and food waste, these data are also shown in Table 7.11.

Activity data for the years 1995-2009 are collected from the ISAG database for the categories: "sludge", "organic waste from households and other sources" and "garden and park waste". Activities for 2010-2012 are calculated by using the trend from earlier years.

The Danish legislation on sludge (DEPA, 2006) was implemented in the summer of 2003. This stated that composted sludge may only be used as a fertilizer on areas not intended for growing foods of any kind for at least 2-3 years. This restriction caused the amount of composted sludge to drop drastically from 2003 to 2004.

The trend in composting of sludge does not demonstrate a convincing trend that can be used for estimation of activity data for previous years. Since this activity is insignificant for 1995-1997 (1-2 %) it is assumed to be "not occurring" for 1985-1994.

The amount of organic waste from households composted in the years 1985-1994 is estimated by multiplying the number of facilities treating this type of waste with the average amount composted per facility in the years 1995-2001 (2.6-3.8 Gg per facility per year). The following Table 7.10 shows the number of composting sites divided in the three types described under "Methodology" (Petersen, 2001 and Petersen & Hansen, 2003).

Table 7.10 Number of composting facilities in the years 1985-2001.

Facility type	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Type 1	2	2	3	3	4	5	6	7	8	9
Type 2	6	10	14	18	22	38	54	70	86	102
Type 3	0	0	0	0	0	1	2	2	3	4
Total	8	12	17	21	26	44	62	79	97	115

Continued

Facility type	1995	1996	1997	1998	1999	2000	2001
Type 1	13	14	13	14	13	11	9
Type 2	113	108	99	102	111	115	123
Type 3	9	9	11	10	10	7	10
Total	136	133	126	130	139	138	149

Type 1 waste treatment sites normally includes biogas producing facilities, but these are not included in this table.

The ISAG activity data for composting of garden and park waste (GPW) include wood chipping. Compost data for GPW provided by Petersen (2001) and Petersen & Hansen (2003) show that for 1997-2001, wood chipping accounts for about 3 % of the total chosen ISAG activity data for GPW. Activity data for GPW for the years 1985-1994 and 2010-2012 are estimated by extrapolating the trend.

The last waste category involved in composting is home composting of garden waste and vegetable waste. The activity data for this category are known from Petersen & Kielland (2003) to be 21.4 Gg in 2001. It is assumed that the following estimates made by Petersen & Kielland (2003) are valid for all years 1985-2012.

- 28 % of all residential buildings with private gardens (including summer cottages) are actively contributing to home composting.
- 14 % of all multi-dwelling houses are actively contributing to home composting.
- 50 kg waste per year will on average be composted at every contributing residential building.

- 10 kg waste per year will on average be composted at every contributing multi-dwelling house.

Multi-dwelling houses include apartment buildings, it is very un-common for people in these types of buildings to compost their bio waste and the average amount of composted waste is therefore lower in spite of the higher number of residents. The total number of occupied residential buildings, summer cottages and multi-dwelling houses are found at the Statistics Denmark's website.

The calculated activity data for home composting of garden and vegetable waste are shown in Table 7.11 and Annex 2D Table 2D-5.

Table 7.11 Activity data composting, Gg.

	1985	1990	1995	2000	2005	2010	2011	2012
Composting of garden and park waste	130	288	376	677	737	877	901	924
Composting of organic waste from households and other sources	5	16	40	47	45	58	59	59
Composting of sludge	NO	NO	7	218	50	120	132	145
Home composting of garden and vegetable food waste	19	20	21	21	22	23	23	23
Total	154	324	444	963	854	1078	1115	1151

NO = Not occurring.

Emission factors

The emissions from composting strongly depend on both the composition of the treated waste and on process conditions such as aeration, mechanical agitation, moisture control and temperature pattern. (Amlinger et al., 2008)

The emission factors stated in Table 7.12 are considered the best available for the calculation of Danish national emissions from composting.

Table 7.12 Composting emission factors, per Mg.

	Composting of garden and park waste (GPW)	Composting of organic waste	Composting of sludge	Home composting of garden and vegetable food waste
Unit	kg	kg	kg	kg
NO_x	NAV	NAV	NAV	NAV
CO	0.56	NAV	NAV	0.08
NH_3	0.66	0.24	0.31	0.63
Source	Boldrin et al., 2009	EEA, 2009	MST, 2013	Boldrin et al., 2009

Emissions from Boldrin et al. (2009) are given in percentage of total degraded carbon or nitrogen respectively. The factors shown in Table 7.12 are calculated by assuming 37.5 % DOC in dry matter, 2 % N in dry matter and 50 % moisture in the waste (Boldrin et al., 2009).

Boldrin et al. (2009) and MST (2013) do not directly provide any emission factors, the following assumptions were made to derive the factors shown in Table 7.12;

- 0.5 % N per dry matter waste water sludge
- 25 % moisture in waste water sludge.
- 2 % N per dry matter garden waste (incl. home composting)
- DOC is 25-50 % in garden waste (incl. home composting)
- 50 % moisture in garden waste (incl. home composting)

Emissions

Table 7.13 show the total national emissions from composting. The full time series is shown in Annex 2D Table 2D-6.

Table 7.13 National emissions from composting, Mg.

	1980	1985	1990	1995	2000	2005	2010	2011	2012
CO	NE	74.6	163.5	213.1	382.4	416.2	495.0	508.5	521.5
NH_3	NE	99.0	206.5	273.2	538.8	526.5	644.4	664.1	683.3

7.4.3 Biogas production

Emissions from biogas production are divided and reported in different sectors according to waste type and method.

Methodology

Emissions from the combustion of biogas regardless of the origin are included in the energy sector and are allocated to the appropriate subsector in the Danish energy statistics. See this IIR Chapter 3, Energy.

The reduced emissions from gasification of manure should be included in the agricultural sector in Chapter 6.

Fugitive emissions of NMVOC and NH_3 from anaerobic digestion of sludge from wastewater treatment are covered by the NFR source category 6B Wastewater Handling, these are not presently included in the submission but should be investigated and possibly added to the IIR Chapter 7.2.

Emissions that are included in this section includes fugitive emissions from anaerobic conditions in waste handling and combustion of biogas in biogas production plants.

Fugitive emissions from the handling of biological waste, sludge and manure includes activities like storage, pre- and post-treatment during which anaerobic conditions may occur, and fugitive emissions from the anaerobic digestion that is the actual production. However, emissions from these activities are not currently included in the inventory.

Emissions from combustion of biogas in biogas production plants are included for the years 1994-2004 where these emissions existed. This activity is not occurring in 2006 - 2012. Pollutants from this activity are SO_2, NO_x, NMVOC, CO, particulate matter, heavy metals, HCB, PCDD/F and PCBs.

Activity data

Activity data for this source category are collected from the energy statistics (DEA, 2013). Combustion of biogas in biogas production plants occurred for the years 1994-2004, the full time-series is available in Annex 2D Table 2D-7.

Table 7.14 Combusted biogas at biogas production plants

	1995	2000	2004
GJ	4711	40990	28744

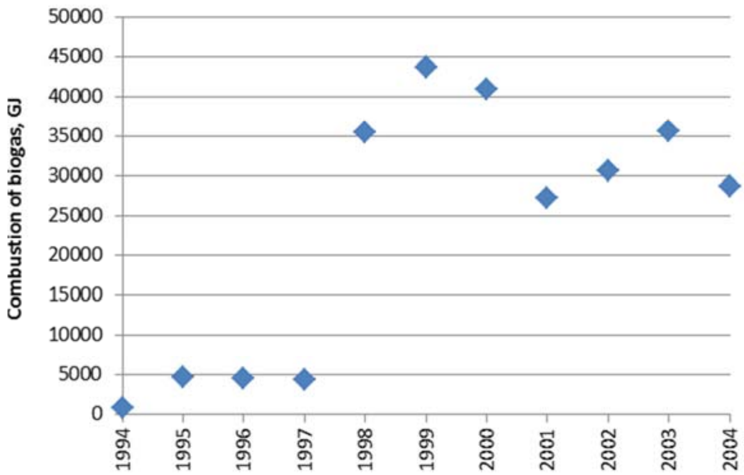

Figure 7.5 Combusted biogas at biogas production plants.

Emission factors
Emission factors for combustion of biogas in biogas production plants are presented in Table 7.15.

Table 7.15 Emission factors for combustion of biogas, per GJ.

Pollutant	Unit	Emission factor
SO_2	g	25
NO_x	g	28
NMVOC	g	2
CO	g	36
TSP	g	1.5
PM_{10}	g	1.5
$PM_{2.5}$	g	1.5
As	mg	0.04
Cd	mg	0.002
Cr	mg	0.18
Cu	mg	0.31
Hg	mg	0.12
Ni	mg	0.23
Pb	mg	0.005
Se	mg	0.21
Zn	mg	3.95
HCB	ng	190
PCDD/F	ng	0.025
PCBs	ng	90

Emissions
Table 7.16 shows the total national emissions from combustion of biogas at biogas production plants. This activity only occurs from 1994 to 2004, the full time-series is available in Annex 2D Table 2D-8.

Table 7.16 Emissions from the combustion of biogas.

		1995	2000	2004
SO_2	Mg	0.1	1.0	0.7
NO_x	Mg	0.1	1.1	0.8
NMVOC	Mg	0.01	0.1	0.1
CO	Mg	0.2	1.5	1.0
TSP	kg	7.1	61.5	43.1
PM_{10}	kg	7.1	61.5	43.1
$PM_{2.5}$	kg	7.1	61.5	43.1
As	g	0.2	1.6	1.1
Cd	g	0.01	0.1	0.1
Cr	g	0.8	7.4	5.2
Cu	g	1.5	12.7	8.9
Hg	g	0.6	4.9	3.4
Ni	g	1.1	9.4	6.6
Pb	g	0.02	0.2	0.1
Se	g	1.0	8.6	6.0
Zn	g	18.6	161.9	113.5
HCB	mg	0.9	7.8	5.5
PCDD/F	µg	0.1	1.0	0.7
PCBs	mg	0.4	3.7	2.6

7.4.4 Accidental building fires

Emissions from accidental fires are categorised under the NFR category 6D Other Waste. Pollutants that are emitted from building fires include SO_2, NO_x, NMVOC, CO, heavy metals (As, Cd, Cr, Cu, Hg, Pb), particulate matter, PCDD/F and PAHs.

Methodology

Emissions from building fires are calculated by multiplying the number of building fires with selected emission factors. Six types of buildings are distinguished with different emission factors: detached houses, undetached houses, apartment buildings, industrial buildings, additional buildings and containers.

Activity data

In January 2005 it became mandatory for the local authorities to register every rescue assignment in the *online data registration- and reporting system called ODIN, ODIN is developed and run by* the Danish Emergency Management Agency (DEMA, 2007).

Activity data for accidental building fires are given by ODIN (DEMA, 2012). Fires are classified in four categories: full, large, medium and small. The emission factors comply for full scale fires and the activity data are therefore recalculated as a full scale equivalent where it is assumed that a full, large, medium and a small scale fire leads to 100 %, 75 %, 30 % and 5 % of a full scale fire respectively.

In practice, a full scale fire is defined as a fire where more than three fire hoses were needed for extinguishing the fire, a full scale fire is considered as a complete burnout. A large fire is in this context defined as a fire that involves the use of two or three fire hoses for fire extinguishing and is assumed to typically involve the majority of a house, an apartment, or at least part of an industrial complex. A medium size fire is in this context defined as a fire involving the use of only one fire hose for fire-fighting and will typically involve a part of a single room in an apartment or house. And a small size fire is in this context defined as a fire that was extinguished before the arrival of the fire service, extinguished by small tools or a chimney fire.

The total number of registered fires is known for the years 1989-2012. For the years 2007-2012 the total number of registered building fires is known with a very high degree of detail.

Table 7.17 shows the occurrence of all types of fires (registered for 1989-2012) and the occurrence of building fires (2007-2012) registered at DEMA. The 1980-1988 data for all fires are estimated to be the average of 1989-2010 data. In 2007-2010 the average per cent of building fires, in relation to all fires, was 60 %. The total numbers of building fires 1980-2006 are calculated using this percentage. The full time series is presented in Annex 2D Table 2D-9.

Table 7.17 Occurrence of all fires and building fires.

	1980	1985	1990	1995	2000	2005	2010	2011	2012
All fires	17 751	17 751	17 025	19 543	17 174	16 551	16 728	16 157	14 084
Building fires	10 621	10 621	10 187	11 694	10 276	9 903	9 325	11 447	9 932

The building fires that occurred in the years 2007-2012 are subcategorised into six building types; detached houses, undetached houses, apartment buildings, industrial buildings, additional buildings and container fires.

Table 7.18 states the average registered activity data for building fires for the years 2007-2010, divided in both damage size and building type. This describes the average share of building fires from 2007-2010 of a certain type and size, in relation to all building fires in the same four years period.

Table 7.18 Registered occurrence of building fires, average of 2007-2010 fires, %. (DEMA)

Size	Detached	Undetached	Apartment	Industry	Additional	Container	All building fires
full	2.46	0.50	0.31	0.73	0.44	0.17	4.61
large	4.01	1.14	1.09	1.69	3.08	1.92	12.93
medium	5.24	2.33	6.15	2.92	4.30	18.46	39.40
small	11.77	4.24	12.64	5.36	4.79	4.27	43.06
all	23.47	8.21	20.19	10.70	12.61	24.82	100.00

It is assumed that the average percentages provided by the years 2007-2010 shown in Table 7.18 are compliable for the years 1980-2006. Hereby, similar activity data for building fires can be estimated back to 1980.

By applying the damage rates of 100 %, 75 %, 30 % and 5 % corresponding to the damage sizes full, large, medium and small, a full scale equivalent can be determined. Table 7.19 shows the calculated full scale equivalents (FSE). The full time series is shown in Annex 2D-10.

Table 7.19 Accidental building fires full scale equivalent activity data.

	1980	1985	1990	1995	2000	2005	2010	2011	2012
Container fires	782	782	750	861	756	729	594	729	584
Detached house fires	810	810	777	892	784	755	833	818	742
Undetached house fires	240	240	231	265	233	224	194	206	181
Apartment building fires	383	383	367	421	370	357	348	362	327
Industry building fire	334	334	320	368	323	311	281	334	298
Additional building fires	455	455	437	501	440	424	429	740	610

Emission factors

For building fires, emissions are calculated by multiplying the number of full scale equivalent fires with the emission factors. The emission factors are produced from different measurements and assumptions from literature and expert judgements. When possible, emission factors are chosen that represent conditions that are comparable to Denmark. By comparable is meant countries that have similar building traditions, with respect to the materials used in building structure and interior.

In the process of selecting the best available emission factors for the calculation of the emissions from Danish accidental building fires, a range of different sources has been studied. Unfortunately it is difficult to do an interrelated comparison of the different sources because they all establish emission factors on different assumptions and many of these assumptions are not fully accounted for.

Table 7.20 lists the emission factors that were chosen for 2012 as the best available and their respective references.

Table 7.20 Emission factors building fires, 2012.

Compound	Unit /fire	Detached house	Undetached house	Apartment building	Industrial building	Additional building	Container	Source
SO_2	kg	265.3	214.4	124.6	802.9	32.1	2.4	Blomqvist et.al. 2002
NO_x	kg	19.8	16.0	9.3	24.0	1.0	3.0	NAEI, 2009
NMVOC*	kg	99.1	80.1	46.6	120.0	4.8	0.7	NAEI, 2009
CO	kg	277.6	224.3	130.4	336.0	13.4	42.0	NAEI, 2009
TSP	kg	143.8	61.6	43.8	27.2	1.1	23.2	Aasestad, 2008**
PM_{10}	kg	143.8	61.6	43.8	27.2	1.1	23.2	Aasestad, 2008**
$PM_{2.5}$	kg	143.8	61.6	43.8	27.2	1.1	23.2	Aasestad, 2008**
As	g	1.35	0.58	0.41	0.25	0.01	0.22	Aasestad, 2008**
Cd	g	0.85	0.36	0.26	0.16	0.01	0.14	Aasestad, 2008**
Cr	g	1.29	0.55	0.39	0.24	0.01	0.21	Aasestad, 2008**
Cu	g	2.99	1.28	0.91	0.57	0.02	0.48	Aasestad, 2008**
Hg	g	0.85	0.36	0.26	0.16	0.01	0.14	Aasestad, 2008**
Pb	g	0.42	0.18	0.13	0.08	0.003	0.07	Aasestad, 2008**
PCDD/F*	mg	3.5	2.8	1.6	4.2	0.2	1.1	Hansen, 2000
Benzo[b]fluoranthene	g	12.6	10.1	5.9	15.2	0.6	1.9	NAEI, 2009
Benzo[k]fluoranthene	g	4.4	3.6	2.1	5.4	0.2	0.7	NAEI, 2009
Benzo[a]pyrene	g	7.9	6.4	3.7	9.6	0.4	1.2	NAEI, 2009
Indeno[1,2,3-cd]pyrene	g	8.6	6.9	4.0	10.4	0.4	1.3	NAEI, 2009

*Container fires have a different source than the other five categories; Blomqvist et.al. 2002, ** Personal contact with Kristin Aasestad has provided a correction of the units which are inaccurate in the text of Aasestad (2008)

Emission factors for detached, undetached and apartment fires depend on the annual average floor space; see Table 7.21. Industrial, additional and container fires on the other hand are assumed to have a constant size/volume throughout the time series. Emission factors for detached, undetached and apartment fires for 1980-2011 are shown in Annex 2D Table 2D-11a-d, 2D-12a-d and 2D-13a-d.

Emission factors from Aasestad (2008) are already specified for four of the six building types; detached houses, undetached houses, apartment buildings and industrial buildings. Aasestad (2008) and all other sources considered were altered to match the six building types. This alternation was performed simply by adjusting the average floor space for each of the building types respectively, whereas factors like loss rate and mass of combustible contents per area are not altered.

The average floor space in Danish buildings is stated in Table 7.21. The data are collected from Statistics Denmark and takes into account possible multiple building floors but not attics and basements. For the full time series see Annex 2D Table 2D-14. The average floor space in industrial buildings, schools etc. is estimated to 500 square meters for all years and the average floor space for additional buildings, sheds etc. is estimated to 20 square meters for all years.

Table 7.21 Average floor space in building types (Statistics Denmark, 2013).

	1980	1985	1990	1995	2000	2005	2010	2011	2012
Detached houses	154	154	156	155	156	162	163	164	165
Undetached houses	130	130	129	129	131	131	134	132	134
Apartment buildings	74	75	75	75	75	76	77	78	78

Emission factors from literature are given in mass emission per mass burned. For the calculation of these emission factors to a unit that matches the activity data, the building masses are estimated using the same methodology as Hansen (2000).

The total building masses are calculated using an average weight loss rate of 12.4 % (Persson et al., 1998) and data for the amount of combustible material in the building structure itself (Blomqvist et al., 2002) and the amount of combustible interior (Persson et al., 1998).

Emission factors for container fires cannot be calculated based on an average floor space but on an average mass. The average mass of a container is set to 1 Mg and covers all types of containers, from small residential garbage containers to large shipping containers and waste/goods in storage piles.

Building masses for 2012 are presented in Table 7.22.

Table 7.22 Building mass per building type.

	Unit	Detached house	Undetached house	Apartment building	Industry building	Additional building	Container
Average floor area*	m^2	165	134	78	500	20	-
Building mass per floor area	kg/m^2	40	40	35	30	30	-
Total building mass*	Mg/fire	6.6	5.3	2.7	15.0	0.6	1

* 2012 numbers

For further detail on the emission factors and calculations, please refer to Hjelgaard (2013).

Emissions

Table 7.23 shows the total emissions from building fires. The entire time series 1980-2012 is shown in Annex 2D Table 2D-15a-d.

Table 7.23 Emissions from building fires.

	unit	1980	1985	1990	1995	2000	2005	2010	2011	2012
SO_2	Mg	580.4	581.3	559.3	640.2	565.2	552.4	543.0	598.2	536.3
NO_x	Mg	32.9	33.0	31.8	36.3	32.1	31.5	31.5	33.7	30.1
NMVOC	Mg	153.3	153.7	148.0	169.3	149.7	147.2	149.1	158.0	142.3
CO	Mg	460.7	461.6	444.5	508.4	449.5	441.2	441.3	471.6	421.9
TSP	Mg	175.8	175.8	168.6	193.5	170.1	163.9	168.8	173.0	154.5
PM_{10}	Mg	175.8	175.8	168.6	193.5	170.1	163.9	168.8	173.0	154.5
$PM_{2.5}$	Mg	175.8	175.8	168.6	193.5	170.1	163.9	168.8	173.0	154.5
As	kg	1.6	1.6	1.6	1.8	1.6	1.5	1.6	1.6	1.4
Cd	kg	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	0.9
Cr	kg	1.6	1.6	1.5	1.7	1.5	1.5	1.5	1.5	1.4
Cu	kg	3.7	3.7	3.5	4.0	3.5	3.4	3.5	3.6	3.2
Hg	kg	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	0.9
Pb	kg	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5
PCDD/F	g I-TEQ	6.2	6.2	6.0	6.9	6.1	5.9	5.9	6.3	5.6
Benzo(b)fluoranthene	kg	20.8	20.9	20.1	23.0	20.3	20.0	20.0	21.3	19.1
Benzo(k)fluoranthene	kg	7.3	7.4	7.1	8.1	7.2	7.0	7.0	7.5	6.7
Benzo(a)pyrene	kg	13.2	13.2	12.7	14.5	12.8	12.6	12.6	13.5	12.1
Indeno(1,2,3-cd)pyrene	kg	14.3	14.3	13.8	15.7	13.9	13.7	13.7	14.6	13.1

7.4.5 Accidental vehicle fires

Pollutants that are emitted from accidental vehicle fires include SO_2, NO_x, NMVOC, CO, particulate matter, heavy metals (As, Cd, Cr, Cu, Ni, Pb, Zn), PCDD/F and PAHs.

Methodology

Emissions from vehicle fires are calculated by multiplying the mass of vehicle fires with selected emission factors. Emission factors are not available for different vehicle types, whereas it is assumed that all the different vehicle types leads to similar emissions. The activity data are calculated as an annual combusted mass by multiplying the number of different full scale vehicle fires with the Danish registered average weight of the given vehicle type.

Activity data

As with accidental building fires, data for accidental vehicle fires are available through the Danish Emergency Management Agency (DEMA). DEMA provides very detailed data for 2007-2012; the remaining years back to 1980 are estimated by using surrogate data.

Table 7.24 shows the occurrence of fires in general and vehicle fires registered at DEMA. In 2007-2010 the average per cent of vehicle fires, in relation to all fires, was 20 %. The total numbers of vehicle fires in 1980-2006 are calculated using this percentage. The full time series is presented in Annex 2D, Table 2D-9.

Table 7.24 Occurrence of all fires and vehicle fires

Year	1980	1985	1990	1995	2000	2005	2010	2011	2012
All fires	17 751	17 751	17 025	19 543	17 174	16 551	16 728	16 157	14 084
Vehicle fires	3 497	3 497	3 354	3 850	3 383	3260	3 459	3 255	2 889

There are fourteen different vehicle categories. The activity data are categorised in passenger cars (lighter than 3500 kg), buses, light duty vehicles (vans and motor homes), heavy duty vehicles (trucks and tankers), motorcycles/mopeds, other transport, caravans, trains, boats, airplanes, bicycles, tractors, combine harvesters and machines.

In the same manner as accidental building fires, the 2007-2012 data from DEMA can be divided in four categories according to damage size. It is assumed that a full scale fire is a complete burnout of the given vehicle, and that a large, medium and small scale fire corresponds to 75 %, 30 % and 5 % of a full scale fire respectively. The total number of full scale equivalent (FSE) fires can be calculated for each of the fourteen vehicle categories for 2007-2012.

The total number of registered vehicles is known from Jensen et al. (2012) and Statistics Denmark (2013). By assuming that the share of vehicle fires in relation to the total number of registered vehicles, of every category respectively, can be counted as constant, the number of vehicle fires is estimated for the years 1980-2006. The numbers of registered vehicles from 1980 to 1984 are extrapolated based on the years 1985 to 1989, where a clear trend has been visible this trend has been extrapolated (e.g. passenger cars), otherwise the average value of 1985 to 1989 has been used (e.g. buses).

Table 7.25 states the total number of national registered vehicles and the number of full scale equivalent vehicle fires. The full time series 1980-2012 is shown in Annex 2D Table 2D-16a-c.

Table 7.25 Number of nationally registered vehicles and full scale equivalent vehicle fires.

	Passenger Cars		Buses		Light Duty Vehicles		Heavy Duty Vehicles	
	Registered	FSE fires	Registered	FSE fires	Registered	FSE fires	Registered	FSE fires
1980	1475109	429	8070	12	99168	10	47428	60
1985	1564319	455	8010	11	147874	14	46962	60
1990	1645454	479	8109	12	192317	19	45664	58
1995	1733242	504	14371	21	228074	22	48077	61
2000	1916364	557	15051	22	272386	27	50227	64
2005	2012216	585	15131	22	372674	36	49311	63
2010	2246675	646	14577	23	362385	38	44813	60
2011	2281539	584	13915	13	343355	43	43640	54
2012	2326778	514	13177	11	318668	32	42326	53

Continued

	Motorcycles/Mopeds		Caravans		Train		Boat	
	Registered	FSE fires	Registered	FSE fires	Registered	FSE fires	Registered	FSE fires
1980	220273	78			7284	9	2222	25
1985	191478	68			7284	9	2222	25
1990	163133	58	86257	24	7156	9	2324	26
1995	165272	58	95831	26	6854	8	1911	21
2000	233309	82	106935	29	4907	6	1759	19
2005	273904	97	121350	33	3195	4	1792	20
2010	301562	83	142354	37	2740	2	1773	16
2011	295488	91	142764	34	2943	3	1768	21
2012	295798	82	142654	33	3055	2	1772	14

Continued

	Airplane		Tractor		Combined Harvester		Bicycle	Other Transport	Machine
	Registered	FSE	Registered	FSE fires	Registered	FSE fires	FSE fires	FSE fires	FSE fires
1980	1060	1	139600	87	38781	64			
1985	1060	1	128700	80	35708	59			
1990	1055	1	131880	82	33594	56			
1995	1058	1	130028	81	27986	46			
2000	1070	1	111736	69	23272	39			
2005	1073	1	104551	65	20965	35			
2010	1152	1	102619	77	18889	32	4	58	94
2011	1132	0	102619	59	18889	21	3	50	111
2012	1111	0	102619	68	18889	18	2	50	115

The average weights of a passenger car, bus, light- and heavy commercial vehicle and motorcycle/moped are known for every year back to 1993 (Statistics Denmark, 2013), the weight of combined harvesters is based on an expert judgement. The corresponding weights from 1980 to 1992 and the average weight of the units from the remaining categories are estimated by an expert judgment; see Table 7.26 and Annex 2D Table 2D-17a-b.

Table 7.26 Average weight of different vehicle categories, kg.

	Cars	Buses	Light Duty Vehicles	Heavy Duty Vehicles	Motorcycles/ Mopeds	Combined Harvester
1980	850	10000	2000	15000	75	8000
1985	850	10000	2000	15000	75	8750
1990	850	10000	2000	15000	86	9500
1995	923	10807	2492	14801	97	10250
2000	999	11195	3103	15214	103	11000
2005	1068	11560	3793	13258	116	11750
2010	1144	11804	4498	11883	133	12500
2011	1154	11907	4296	11291	135	12650
2012	1160	11625	4150	10844	136	12800

It is assumed that the average weight of a boat equals that of a bus. That tractors and vans weigh the same and that trains and airplanes have the same average weight as trucks.

Bicycles, machines and other transport can only be calculated for the years 2007-2012 due to the lack of surrogate data (number of nationally registered vehicles). The average weight of a bicycle, caravan, machine and other transport is estimated as 12 kg, 90 % of a car, 50 % of a car and 40 % of a car respectively.

By multiplying the number of full scale fires with the average weight of the vehicles respectively, the total amount of combusted vehicle mass can be calculated. The result is shown in Table 7.27 and in Annex 2D, Table 2D-18a-d.

Table 7.27 Burnt mass of different vehicle categories, Mg.

	1980	1985	1990	1995	2000	2005	2010	2011	2012
Passenger cars	365	387	407	466	557	625	739	674	592
Buses	116	115	116	223	242	251	266	160	130
Light duty vehicles	19	29	37	55	82	138	171	185	133
Heavy duty vehicles	902	893	869	902	969	829	715	606	579
Motorcycle, moped	6	5	5	6	8	11	11	12	11
Other transport	-	-	-	-	-	-	33	29	29
Caravan	-	-	30	36	44	53	63	59	57
Train	130	130	128	121	89	51	24	28	23
Boat	246	246	257	228	218	229	189	249	160
Airplane	12	12	12	11	12	10	7	3	5
Bicycle	-	-	-	-	-	-	0	0	0
Tractor	174	160	164	202	216	247	347	254	283
Combine harvester	515	518	530	476	425	409	398	271	236
Machine	-	-	-	-	-	-	43	51	53
Total	2484	2495	2555	2727	2863	2858	3025	2624	2319

Emission factors

In the process of selecting the most reliable emission factors for the calculation of the emissions from Danish vehicle fires, a range of different sources have been studied. Unfortunately it is difficult to make an interrelated comparison of the different sources because they all establish emission factors on different assumptions and many of these assumptions are not fully accounted for. Table 7.28 lists the accepted emission factors and their respective references.

Table 7.28 Emission factors vehicle fires.

	Unit, per Mg	Emission factor	Source
SO_2	kg	5	Lönnermark et al., 2004
NO_x	kg	2	Lemieux et al., 2004
NMVOC	kg	8.5	Lönnermark et al., 2004
CO	kg	63	Lönnermark et al., 2004
TSP	kg	38	Lönnermark et al., 2004
PM_{10}	kg	38	Lönnermark et al., 2004
$PM_{2.5}$	kg	38	Lönnermark et al., 2004
As	g	0.26	Lönnermark et al., 2004
Cd	g	1.70	Lönnermark et al., 2004
Cr	g	3.80	Lönnermark et al., 2004
Cu	g	27.0	Lönnermark et al., 2004
Ni	g	2.80	Lönnermark et al., 2004
Pb	g	820	Lönnermark et al., 2004
Zn	g	3200	Lönnermark et al., 2004
PCDD/F	mg	0.04	Hansen, 2000
Benzo(b)fluoranthene	g	32.3	Lemieux et al., 2004
Benzo(k)fluoranthene	g		Lemieux et al., 2004
Benzo(a)pyrene	g	14.7	Lemieux et al., 2004
Indeno(1,2,3-cd)pyrene	g	23.3	Lemieux et al., 2004

No data was available for Hg, Se, HCB and PCBs. NH_3 is assumed not to be emitted.

Emissions

Table 7.29 shows the total national emissions from vehicle. The entire time series is shown in Annex 2D Table 2D-19a-d.

Table 7.29 National emissions from vehicle fires.

	unit	1980	1985	1990	1995	2000	2005	2010	2011	2012
SO_2	Mg	12.42	12.47	12.77	13.64	14.32	14.29	15.12	13.12	11.59
NO_X	Mg	4.97	4.99	5.11	5.45	5.73	5.72	6.05	5.25	4.64
NMVOC	Mg	21.11	21.21	21.72	23.18	24.34	24.29	25.71	22.30	19.71
CO	Mg	156.48	157.18	160.95	171.80	180.40	180.04	190.57	165.31	146.07
TSP	Mg	94.39	94.81	97.08	103.63	108.81	108.60	114.95	99.71	88.11
PM_{10}	Mg	94.39	94.81	97.08	103.63	108.81	108.60	114.95	99.71	88.11
$PM_{2.5}$	Mg	94.39	94.81	97.08	103.63	108.81	108.60	114.95	99.71	88.11
As	kg	0.65	0.65	0.66	0.71	0.74	0.74	0.79	0.68	0.60
Cd	kg	4.22	4.24	4.34	4.64	4.87	4.86	5.14	4.46	3.94
Cr	kg	9.44	9.48	9.71	10.36	10.88	10.86	11.49	9.97	8.81
Cu	kg	67.06	67.36	68.98	73.63	77.31	77.16	81.67	70.85	62.60
Ni	kg	6.95	6.99	7.15	7.64	8.02	8.00	8.47	7.35	6.49
Pb	Mg	2.04	2.05	2.09	2.24	2.35	2.34	2.48	2.15	1.90
Zn	Mg	7.95	7.98	8.18	8.73	9.16	9.14	9.68	8.40	7.42
PCDD/F	g I-TEQ	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.10	0.09
Benzo(b)fluoranthene	kg	40.11	40.29	41.26	44.04	46.25	46.15	48.85	42.38	37.44
Benzo(k)fluoranthene	kg	40.11	40.29	41.26	44.04	46.25	46.15	48.85	42.38	37.44
Benzo(a)pyrene	kg	36.51	36.68	37.56	40.09	42.09	42.01	44.47	38.57	34.08
Indeno(1,2,3-cd)pyrene	kg	57.87	58.13	59.53	63.54	66.72	66.59	70.48	61.14	54.02

7.4.6 Other

Other combustion sources include open burning of yard waste and bonfires.

Due to the cold and wet climatic conditions in Denmark wild fires very seldom occur. Controlled field burnings and the occasional wild fires are categorised under the sectors Agriculture and Land Use, Land Use Change and Forestry (LULUCF) respectively.

In Denmark, the open burning of private yard waste is under different restrictions according to the respective municipality. These restrictions involve what can be burned but also the quantity, and how, when and where, or in some cases a complete ban is imposed. The burning of yard waste is not allowed within urban areas (DEPA, 2011). There is no registration of private waste burning and the activity data on this subject are very difficult to estimate. Citizens are generally encouraged to compost their yard waste or to dispose of it through one of the many waste disposal/recycling sites.

The occurrence of bonfires at midsummer night and in general are likewise not registered, therefore it has not been possible to obtain activity data and consequently, bonfires are not included in this inventory.

7.5 Uncertainties and time series consistency

This section covers the uncertainty estimates

7.5.1 Input data

The uncertainty of the number of human cremations is miniscule, however for the purpose of the calculation it has been set to 1 %.

The uncertainty of the activity data from animal cremations is also minimal for the most recent years (1998-2012) but is increasing back in time (to 200 % in 1980). The uncertainty is set to 40 % for all years.

Activity data for composting are estimated for the years 1990-1994 and 2010-2012 resulting in a higher level of uncertainty these years; this is set at 40 %.

The uncertainty of the total number of accidental fires is very small, but the division into building and transportation types and also the calculation of full scale equivalents will lead to some uncertainty, partly caused by the category "other". The uncertainty for both building and vehicle activity data is therefore set to 10 % for all years. The uncertainty is however lowest for the most recent years (2007-2011).

Activity data for combustion of biogas at biogas production facilities are available from the national energy statistics; the uncertainty for this activity is set to 5 %.

The following Tables 7.30 lists the uncertainties for activity data in the waste sector.

Table 7.30 Estimated uncertainty rates for activity data.

	Human cremation	Animal cremation	Composting	Building fires	Vehicle fires	Biogas production
Activity data uncertainty, %	1	80	50	10	10	5*

*This category only exists from 1994-2004 and is therefore (with the exception of particles) not included in the uncertainty calculations included in this report. Uncertainties for all pollutants are calculated for 1990 and 2012, except for those for particles which are calculated for 2000 and 2012.

The uncertainties for emission factors in the waste sector, and at the present level of available information, are listed in Table 7.31. The uncertainties are assumed valid for all years 1990-2012.

Table 7.31 Estimated uncertainty rates for emission factors, %.

Pollutant	Human cremation	Animal cremation	Compos-ting	Building fires	Vehicle fires	Biogas production
SO_2	100	100		300	500	100
NO_x	150	150		500	500	100
NMVOC	100	300		500	500	100
CO	150	150	100	500	500	100
NH_3		300	100			
TSP	500	300		500	700	500
PM_{10}	500	300		500	700	500
$PM_{2.5}$	500	300		500	700	500
As	700	700		500	500	400
Cd	700	500		500	500	150
Cr	700	500		500	500	100
Cu	700	500		500	500	100
Hg	150			500		100
Ni	700	500			500	100
Pb	600	500		500	500	100
Se	700	700				100
Zn	700	500			500	150
HCB	500	500				1000
PCDD/F	300	300		100	100	1000
Benzo(b)flouranthene	1000	1000		500	500	
Benzo(k)flouranthene	1000	1000		500	500	
Benzo(a)pyrene	1000	1000		500	500	
Indeno(1,2,3-c,d)pyrene	1000	1000		500	500	
PCB	1000	1 000				1000

7.5.2 Uncertainty results

The Tier 1 uncertainty estimates for the waste sector are calculated from 95 % confidence interval uncertainties, results are shown in Table 7.32.

Table 7.32 National tier 1 uncertainty results for waste.

Pollutant	National emission 2012, Mg	Total emission uncertainty, %	Trend 1990-2012, %	Trend Uncertainty, %-age points
SO_2	554.6	±290.4	-3.9	±13.2
NO_x	84.2	±192.9	16.0	±57.4
NMVOC	165.0	±435.4	-3.2	±13.4
CO	1090.0	±211.2	41.7	±154.3
NH_3	685.7	±107.3	231.6	±186.9
TSP	245.3	±403.0	-12.9*	±22.2
PM_{10}	244.5	±404.3	-13.0*	±22.0
$PM_{2.5}$	244.2	±404.8	-13.0*	±22.0
As	0.002	±347.8	-18.3	±128.8
Cd	0.005	±415.6	-12.2	±27.6
Cr	0.010	±433.6	-12.7	±33.8
Cu	0.066	±476.1	-9.8	±13.2
Hg	0.001	±336.8	-97.1	±9.8
Ni	0.007	±493.9	-16.5	±62.7
Pb	1.902	±499.9	-9.3	±12.8
Se	0.0004	±686.5	-55.1	±410.0
Zn	7.420	±500.1	-9.3	±12.8
HCB	9.09E-06	±376.6	38.5	±258.7
PCDD/F	5.71E-06	±98.7	-6.4	±13.0
Benzo(b)flouranthene	0.057	±371.8	-7.9	±11.6
Benzo(k)flouranthene	0.044	±430.7	-8.6	±11.7
Benzo(a)pyrene	0.046	±391.9	-8.2	±11.6
Indeno(1,2,3-c,d)pyrene	0.067	±414.3	-8.5	±11.6
PCB	2.48E-05	±752.8	38.5	±515.6

*Trend 2000-2012, %

7.6 QA/QC and verification

A list of QA/QC tasks are performed directly in relation to the emissions from the waste sector part of the Danish emission inventories. The following procedures are carried out to ensure the data quality:

- Checking of time series in the NFR and SNAP source categories. Considerable changes are controlled and explained.
- Comparison with the inventory of the previous year. Any major changes are verified.
- A manual log table is applied to collect information about recalculations.
- Some automated checks have been prepared for the emission databases:
- Check of units for fuel rate and emission factors
- Additional checks on database consistency

The QC work will continue in future years.

7.6.1 Data deliveries

Table 7.33 lists the external data deliveries used for the waste emission inventory. Further the table holds information on the contacts at the data delivery companies.

Table 7.33 List of external data sources.

Category	Data description	Activity data, emission factors or emissions	Reference	Contact(s)	Data agreement/ Comment	http, file or folder name
Human cremation	Annual number of cremated persons	Activity data	Association of Danish Crematories	Hanne Ring	Public access	http://www.dkl.dk
Human cremation	Population statistics	Activity data	Statistics Denmark		Public access	http://www.statistikbanken.dk/BEF5
Animal cremation	Annual number of cremated carcasses	Activity data	Dansk Dyre-kremering ApS	Knud Ribergaard	Personal contact	
Animal cremation	Annual number of cremated carcasses	Activity data	Ada's Kæle-dyrskrematorium ApS	Frederik Møller	Personal contact	
Animal cremation	Annual number of cremated carcasses	Activity data	Kæledyrs-krematoriet	Annette Laursen	Personal contact	
Accidental building fires	Average floor space in buildings	Activity data	Statistics Denmark		Public access	http://www.statistikbanken.dk/BOL511
Accidental fires	Categorised fires	Activity data	The Danish Emergency Management Agency	Steen Hjere Nonnemann	Public access	https://statistikbank.brs.dk
Accidental building fires	Building type statistics	Activity data	Statistics Denmark		Public access	http://www.statistikbanken.dk/ BOL11, BOL3, BOL33 and BYGB11
Accidental vehicle fires	Weight categorisation of vehicles (passenger cars, busses, vans and trucks)	Activity data	Statistics Denmark		Public access	http://www.statistikbanken.dk BIL10, BIL12, BIL15 and BIL18
Composting	Waste categories for composting	Activity data	Waste Statistics (Affaldsstatistik)		Public access	http://www2.mst.dk/udgiv/publikationer/2010/978-87-92668-21-9/pdf/978-87-92668-22-6.pdf

7.7 Source-specific recalculations and improvements

For sector 6.C. Waste Incineration; changes were made to the human cremation with fluegas cleaning emission factors for heavy metals (HMs), PAHs and PCDD/Fs, the abatement of these pollutants by the newly installed fluegas cleaning equipment have not previously been included in this report, this change reduces the listed pollutants for 2011. Furthermore an error has been corrected for the $PM_{2.5}$ emission factor for human cremation, as correctly described in the text the $PM_{2.5}$ emission is estimated as 80 % for the TSP and not 90 % as reported in last submission, this correction reduces the $PM_{2.5}$ emission for 2000-2010.

For sector 6.D. Waste Other several recalculations were made. NH_3 emission factors for composting of sludge and organic municipal waste have been updated. These new emission factors causes a decrease in NH_3 emissions for 1985-1997 (0.3-0.7 %) and an increase for 1998-2011 (2.1-19.3 %)

For accidental vehicle fires, an update in vehicle population data from Jensen et al. (2013) has given a small decrease in the FSE activity data for accidental tractor and combined harvester fires. In addition to this the average weight of caravans, motorhomes, combined harvesters and motorcycles/mopeds have been updated to more well founded expert judgments. And finally the emission factors for particles and heavy metals have been updated. While the changes in activity data leads to a general decrease in emissions for 1980-1999 (-16 % to -5 %) and only subtle changes for 2000-2011 (-5 % to 4 %), the new emission factors results in a strong increase in particle and heavy metal emissions for all years 1980-2011 (1413-1874 %).

There are no recalculations for accidental building fires.

7.8 Source-specific planned improvements

There are currently no planned improvements for this sector.

7.9 References

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8 Other and natural emissions

Denmark does not report emissions in the NFR category “Other” (NFR 7). Regarding natural emissions volcanoes do not occur in Denmark and hence the category is reported as NO (Not Occurring).

Emissions from forest fires are for most years negligible but have not been estimated. Any other natural emissions to be reported under NFR category 11C have also not been estimated.

9 Reporting spatially distributed emissions on grid

This chapter include descriptions on input data, methodology and results of the Danish gridded emissions for the years 2005 and 2010. A detailed methodological description is given in Plejdrup & Gyldenkærne (2011).

9.1 Background for reporting

According to the UNECE Convention on Long-Range Transboundary Air Pollution parties are obligated to report gridded emissions every fifth year. In the 2012 reporting Denmark reported gridded emissions for the years 2005 and 2010. The mandatory reporting of gridded emissions includes the following 13 pollutants: SO_x, NO_x, NH_3, NMVOC, CO, PM_{10}, $PM_{2.5}$, Pb, Cd, Hg, benzo(b)flouranthene, benzo(k)flouranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, HCB, and dioxins and furans. The reporting includes GNFR sectoral emissions as well as national total emissions disaggregated to the standard EMEP grid with a resolution of 50 km x 50 km. Table 9.1 lists the categories (sectors) used for reporting gridded emission data based on the Danish inventories.

Table 9.1 GNFR categories and corresponding NFR categories and SNAP IDs in the Danish gridded emission inventory.

GNFR ID	GNFR (long name)	NFR	SNAP	Note
A_PublicPower	PublicPower	1A1a	0101, 0102	
B_IndustrialComb	IndustrialCombustion	1A1c, 1A2a, 1A2b, 1A2c, 1A2d, 1A2e, 1A2f i	0103, 0105, 0301, 0302, 0304, 0305, 0306, 0307, 0308, 0309, 0310 , 0311, 0312, 0313, 0314, 0315, 0316, 0320	
C_SmallComb	SmallCombustion	1A4a i, 1A4b i, 1A4c i	0201, 0202, 0203	
D_IndProcess	IndustrialProcesses	2	0303, 0402, 0404, 0405, 0406	
E_Fugitive	Fugitive emissions from fuels	1B1, 1B2	0401, 0501, 0502, 0505, 0506, 0902	
F_Solvents	Solvent and other product use	3	06	
G_RoadRail	RoadRailway	1A3b, 1A3c	07, 0802	
H_Shipping	Shipping	1A3d ii, 1A4c iii	0803, 080402, 080403	
I_OffRoadMob	OffRoadMobile	1A2f ii, 1A4a ii1A4b ii, 1A4c ii, 1A5b	0801, 0806, 0807, 0808, 0809, 0811	
J_AviationLTO	AviationLTO	1A3 a i (i), 1A3 a ii (i)	080501, 080502	
L_OtherWasteDisp	OtherWasteDisposal	6D	0910	
M_WasteWater	WasteWater			NE
N_WasteIncin	WasteIncineration	6C	0909	
O_AgriLivestock	AgricultureLivestock	4B	*	
P_AgriOther	AgricultureOther	4D, 4G	*	
Q_AgriWaste	AgricultureWaste	4F	*	
R_Other	Other			NO
S_Natural	Natural			NO
K_CivilAviCruise	CivilAviationCruise	1A3a ii (ii)	080503	
T_IntAviCruise	IntAviationCruise	1A3a i (ii)	080504	
Z_memo	memo	1A3d i (i)	080404	

* The Danish national emission inventory system for agriculture builds on NFR categories and not SNAP categories as is the case for the remaining sectors in the Danish emission inventory system.

Guidelines for reporting emissions of air pollutants on grid are included in UNECE (2009). The methodology in the Danish emission gridding model SPREAD follows the EMEP/EEA Guidebook (2009). The gridded emission data in the 2012 reporting are available at the EIONET Central Data Repository homepage:

http://cdr.eionet.europa.eu/dk/Air_Emission_Inventories/Submission_EMEP_UNECE

Further, a detailed methodological description is given in Plejdrup & Gyldenkærne (2011).

9.2 Methods and data for disaggregation of emission data

A national model for high resolution spatial distribution of emissions to air, the SPREAD model, has been developed at Department of Environmental Science, Aarhus University. SPREAD includes all sources and pollutants in the Danish emission inventory system, and generates emissions on a resolution of 1 km x 1 km.

SPREAD covers the area defined by the Exclusive Economic Zone (EEZ) and the national boarder. Denmark is geographically the peninsula of Jutland and 443 named islands and islets, of which approximately 72 are inhabited. The country is located in Scandinavia neighbouring the sea (the Baltic Sea, Skagerrak, Kattegat and the North Sea) as well as Germany, which Jutland are adjacent to the south (Figure 9.1).

The spatial emission distribution is carried out on the most disaggregated level possible and therefore SPREAD includes a large number of distribution keys related to single sources, sub categories and in a single case to a whole sector. Gridded emissions reported to UNECE LRTAP are based on the results from SPREAD, aggregated on the 50 km x 50 km EMEP grid.

The spatial distribution in SPREAD is based on a number of national geographical data sets. As the model is very complex and include many spatial data, only the most important input data and methodology descriptions are included in the IIR report. For a more detailed description, please refer to Plejdrup & Gyldenkærne (2011).

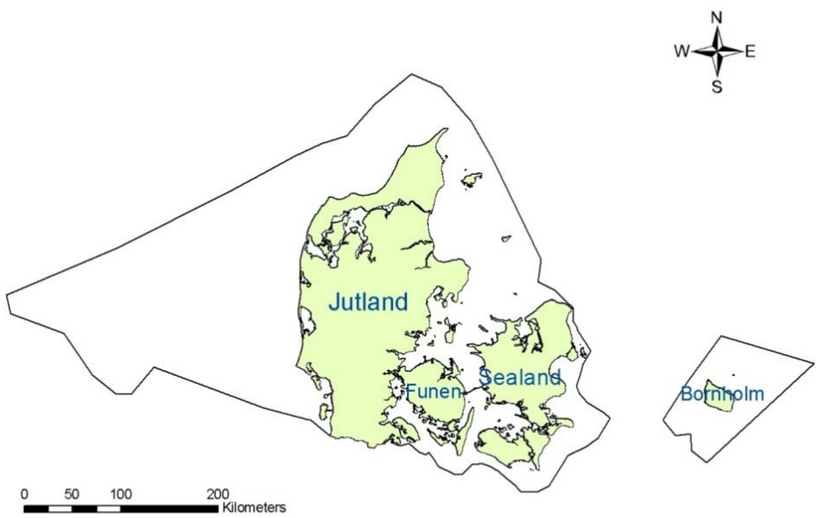

Figure 9.1 Map of Denmark including names of regions and the Exclusive Economic Zone.

9.2.1 The SPREAD model

The distribution in SPREAD is made on SNAP category level to assure the most accurate distribution of the emissions. It has been aimed to use the most disaggregated SNAP level (SNAP 3 level) but for some categories and sectors SNAP 2 or SNAP 1 level has been applied in the distribution model, due to a lack of detailed geographical information. An exception is the agricultural sector, as this sector is not treated on SNAP level in the Danish inventory system. Instead the agricultural data processing is carried out for the relevant NFR categories, and the same approach is applied in SPREAD. The SPREAD model is prepared in order to be applicable for the mandatory reporting of gridded emissions under CLRTAP.

SPREAD includes a number of sub-models covering separate sources or groups of sources in the emission inventory; Large Point Sources, Stationary combustion for point sources, Stationary combustion for area sources, Mobile sources, Aviation, Fugitive emissions from fuels, Industrial Processes, F-gases, Solvent and other product use, Waste, and a number of sub-models for the agricultural sector. All sub-models correspond to the methodology and groupings in the Danish inventory system. A number of sub-models include a higher disaggregation level compared to the NFR tables. Both SNAP and NFR categories are included in all SPREAD sub-models to enable a distribution in agreement with the international guidelines.

Emissions from all Large Point Sources (LPS) are treated in the LPS sub-model in SPREAD. LPSs represent emissions at all SNAP 1 categories except solvents (SNAP 06) and road traffic (SNAP 07). Further, LPSs in agriculture are included in a separate part of the emission database system covering agriculture and are not included in the LPS sub-model in SPREAD. The Point Sources sub-model covers emissions from stationary combustion from point sources, which refer to the large number of plants, for which the fuel consumption is known at plant level but emissions are calculated using standard emission factors.

General methodology

The distribution of emissions in the Danish emission inventory is carried out in databases and in a geographical information system, GIS.

The methodology applied in the part of the distribution carried out in GIS is shortly described in this chapter. The description is made for the Industrial Processes sector as a case, as this distribution is rather simple.

The emission inventory for Industrial Processes covers both point sources and area sources. Emissions from point sources are allocated to the coordinates for the individual plants included in the Danish inventory system and are not relevant in relation to the GIS procedure. Emissions from area sources are calculated from production statistics and the resulting emissions are national totals as allocation of the sources (industrial plants) is not possible with the available data. Instead a proxy for the distribution is applied, in this case the location of industrial areas as given in the national topographic map KORT10 by the National Survey and Cadastre (Figure 9.2). The map of industrial areas is not reflecting differences in the location for different industries, but only holds industrial buildings (referred to as the industrial area as the buildings are treated as areas rather than units). The map is a shape file and the industrial areas are polygons.

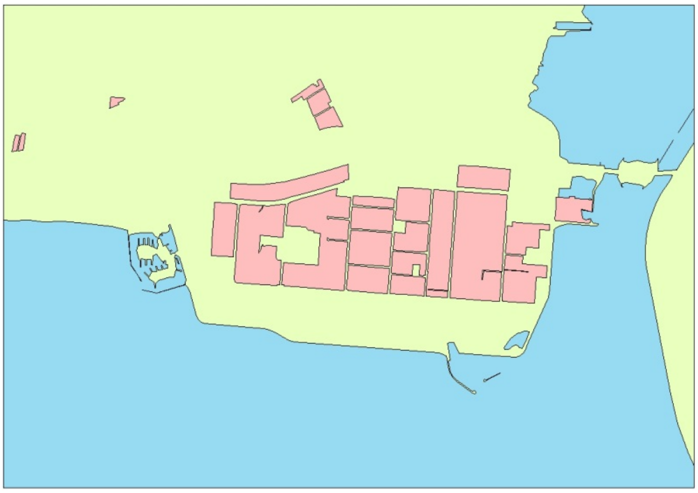

Figure 9.2 Segment around Avedøre close to Copenhagen of the map of industrial areas (KORT10).

As SPREAD gives emissions on 1 km x 1 km, the map of industrial areas must be combined with the Danish 1 km x 1 km Grid Net. The grid is an orthogonal coordinate system and the cells are defined and named by their lower left corner coordinates. The grid net map is a shape file and the grid cells are polygons (Figure 9.3).

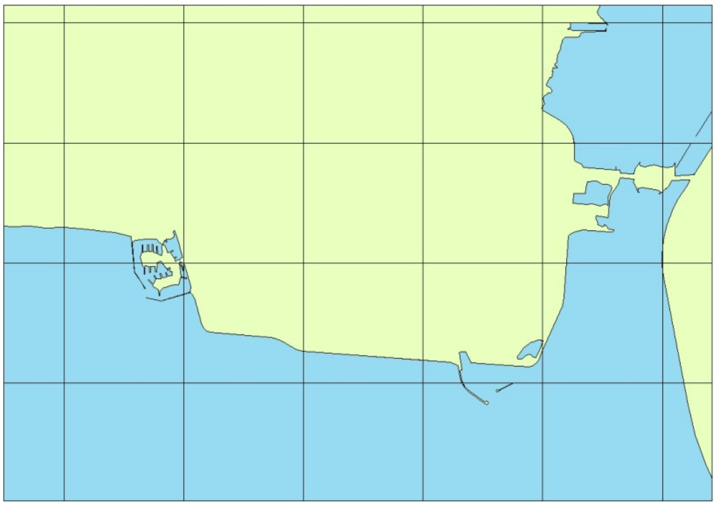

Figure 9.3 Segment around Avedøre in Copenhagen of the map of the Danish 1 km x 1 km grid net (KORT10).

To be able to distribute the emissions on 1 km x 1 km it is necessary to split the industrial polygons between the grid cells and thereby be able to calculate the industrial area in each grid cell (Figure 9.4). These functionalities are available in GIS, in this case ArcMAP. The split is made using the intersect tool, and afterwards the areas are applied to each cell using the Calculate Area function.

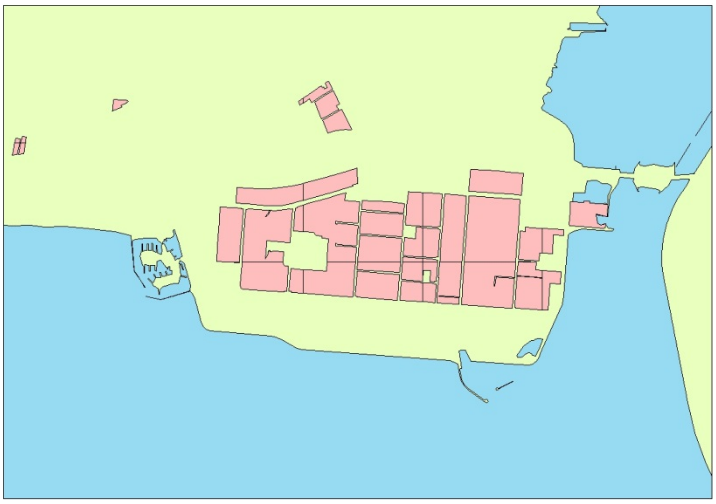

Figure 9.4 Segment around Avedøre in Copenhagen of the map of industrial areas and the Danish 1 km x 1 km grid net (KORT10).

The remaining part of the emission distribution for industrial processes is carried out in a database. The share of the national emissions that should be allocated to each grid cell is calculated as the industrial area of the cell divided by the total industrial area. The same distribution key is applied for all pollutants.

In the case of the Industrial Processes sector only one map is combined with the grid, but more maps or layers could be combined to make a distribution key. This is the case for some sources in the agricultural sector, e.g. emissions from organic soils where the distribution key is based on a map of organic soils, a map of the agricultural fields and the Danish Grid Net. A number of area sources are distributed on line features, e.g. emissions from railways and road traffic. In these cases the lines are split into segments by intersection with the 1 km x 1 km grid net. The emission in each grid cell is calculated as the national emission multiplied by the length of the line segment(s) in the cell and divided by the total length of the line feature.

For some sources the same distribution key can be applied for more or all years, while other sources demands a separate distribution key for every year. For Industrial Processes the distribution key can be applied for more years, as the dataset is not available on annual basis. Further, the industrial area does not change much from year to year. In other cases the distribution keys must be set up on annual basis as large changes occur from year to year. This is the case for e.g. agricultural soils and point sources (PS) in the energy sector.

National geographical data

A large number of national geographical data sets are implemented in the SPREAD model in preparation of the various distribution keys. The data sets are listed in Table 9.2 with specification of data owner and a short description of the content of each data set.

Table 9.2 List of geographic data applied in the emission gridding.

Data owner	Data set	Contents
The National Survey and Cadastre	Topographic map	Geo-referenced basic map layers on administrative units, Land cover, territorial borders, coastline and infrastructure.
National Agency for Enterprise and Construction	Central Dwelling and Building Register (Danish abbreviation BBR)	Geo-referenced information on dwellings and buildings
Danish Ministry of the Environment	The Area Information System (AIS)	National maps of spatial data related to nature and environment (e.g. railways, industrial areas and one-storey settlements)
The Directorate for Food, Fisheries and Agri Business	The Central Husbandry Register (CHR)	Information on stock of livestock at farm level
	The General Agricultural Register (GLR)	Information on agricultural farms and crops on field level
Ministry of food, agriculture and fisheries	The fertilizer and husbandry register (Danish abbreviation GHI)	Information on manure and fertiliser amounts on farm level
	The Land Parcel Identification System (LPIS)	Geo-referenced data on agricultural land parcels, including field IDs for fields located in the parcels
The Central Business Register	Central Business Register (Danish abbreviation CVR)	Geo-referenced information on businesses with a CVR number, e.g. farms
The Central Office of the Civil Registration	The Civil Registration System (Danish abbreviation CPR)	Geo-referenced information on population on address level
The Department of Environmental Science, Aarhus University	National road and traffic database	Geo-referenced traffic load on the Danish road network
The Danish Energy Agency	Energy producer accountings	Geo-referenced information on fuel consumption for district heating and/or power producing plants
	The regional inventory	Regional inventory of energy consumption for heating for oil boilers, natural gas boilers and solid fuel installations on municipality level
DCE - Danish Centre for Environment and Energy	Large Point Sources (LPS)	Geo-referenced information on power plants, large industrial plants and offshore installations
Danish Petroleum association	Service stations	Geo-referenced information on addresses for all Danish service stations
Energinet.dk	Measurement and regulator stations	Geo-referenced information on location of measurement and regulator stations in the Danish natural gas transmission network
Danish Forest and Nature Agency	Military training terrain	Geo-referenced information on military training terrains
The Danish Environmental Protection Agency	Information system for waste and recycling (Danish abbreviation ISAG)	Data on waste treatment companies on address level
Miljøportalen.dk	Waste water treatment plants	Data on waste water treatment on facility level, including flow rates and organic matter content

9.3 Gridded emission data

In this section selected maps of gridded emissions are presented, all referring to the year 2010. The selected maps in Figure 9.5 illustrate the emissions included in the national total in the NFR table (all emissions excluding Civil Aviation - Domestic and International Cruise, and international Maritime Navigation). All figures illustrate the sum of all included GNFR sectors. The Danish high resolution gridded emissions are aggregated on the 50 km x 50 km EMEP grid for reporting to CLRTAP. The share of each 1 km x 1 km grid cell located in the relevant EMEP grid cells are calculated and the aggregated emissions are calculated as the weighted sum of emissions in the 1 km grid cells intersecting each EMEP grid cell being partial or fully part of the Danish Exclusive Economic Zone, EEZ.

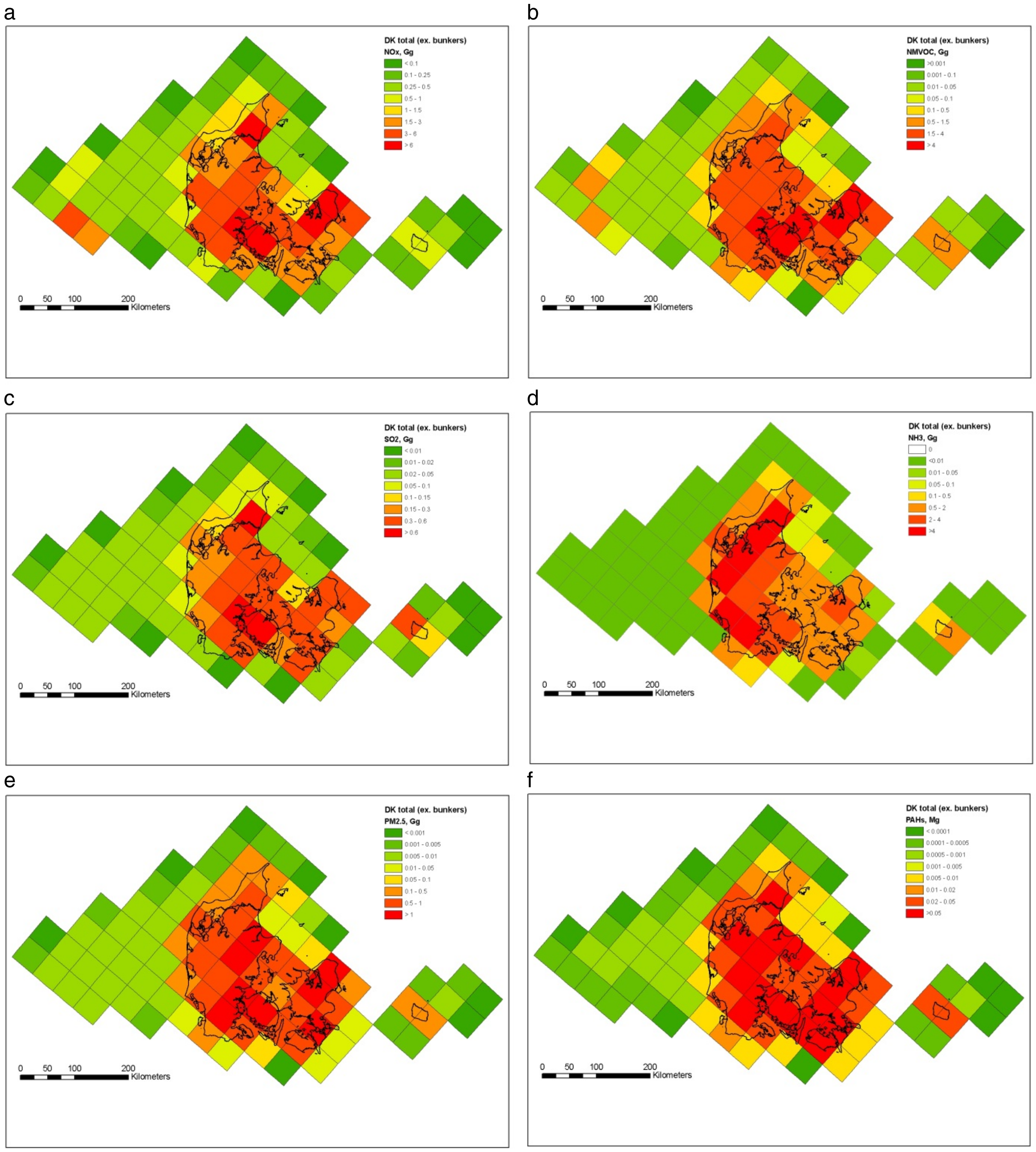

Figure 9.5 National total gridded emissions excluding civil aviation and international navigation of a) NO_x, b) NMVOC, c) SO_2, d) NH_3, e) $PM_{2.5}$ and f) PAHs (the sum of benzo(b)flouranthene, benzo(k)flouranthene, benzo(a)pyrene and indeno(1,2,3-c,d)pyrene) for the year 2010.

Even on the 50 km x 50 km aggregated level spatial patterns from the major sectors are recognisable for different pollutants.

9.3.1 NO_X

The major GNFR source to NO_x emissions is RoadRail followed by Shipping, OffRoadMob, PublicPower and IndustrialComb contributing 36 %, 16 %, 15 %, 15 % and 11 %, respectively. The pattern of the gridded NO_x emissions reflect the major road and rail network located in the eastern part of Jutland and across Funen and Zealand to Copenhagen (figure 9.5). Further, large emissions from PublicPower and IndustrialComb are seen around the major cities. Part of the fugitive emissions is located offshore due to extraction of oil and gas on the North Sea.

9.3.2 NMVOC

The major source of NMVOC is Solvents followed by SmallComb, RoadRail, OffRoadMob and Fugitive contributing 31 %, 18 %, 15 %, 11 % and 11 %, respectively. Both emissions from Solvents, SmallComb and OffRoadMob are to a large degree allocated according to population density and location of one-storey settlements. Part of the fugitive emissions is located offshore due to extraction of oil and gas on the North Sea.

9.3.3 SO_2

The major sources of SO_2 are PublicPower and IndustrialComb followed by SmallComb and Shipping contributing 27 %, 26 %, 19 %, and 13 %, respectively. Even though the SO_2 emission has decreased over the years due to implementation of techniques for reduction of sulphur in the flue gas, it still produces a distinct pattern reflecting the localisation of large power plants in Denmark. The allocation of emissions from IndustrialComb reflect the location of a large number of CHP plants not reported as LPS due to no plant specific emission factors. The allocation of emissions from SmallComb reflects the areas with high population density and mainly one-storey settlements.

For the ferries operating between Copenhagen and Bornholm part of the route is outside the Danish EEZ. The emissions from all these ferries are included in Shipping and distributed on the part of the straight line between Copenhagen and Bornholm inside the Danish EEZ. This leads to an aggregation of the emissions in few EMEP cells, and thereby artificial high emissions at the part of the route inside the EEZ.

9.3.4 NH_3

The agricultural sector is by far the major contributor to the NH_3 emission. 81 % of the national emissions excluding civil aviation and international navigation derive from AgriLivestock and another 15 % from AgriOther. Emission of NH_3 is mainly related to livestock farming and especially to manure management. Emissions are distributed according to very detailed data on animals and fields, and the geographical pattern is in good agreement with the localisation of the major Danish livestock farming in Jutland.

9.3.5 $PM_{2.5}$

The major source of $PM_{2.5}$ emissions is SmallComb contributing 73 %. RoadRail is the second largest source contributing 10 % of the $PM_{2.5}$ emission. Emissions from SmallComb are allocated rather evenly on the land area as a major source is residential wood combustion. Emissions from the residential sector are distributed on municipality level leading to equal emissions for larger areas. Further emissions from CHP plants are located in all parts of the country, also leading to a rather even distribution.

9.3.6 PAHs

Emissions of PAHs are the sum of benzo(b)flouranthene, benzo(k)flouranthene, benzo(a)pyrene and indeno(1,2,3-c,d)pyrene. The major source to emissions of PAHs in Denmark is SmallComb and hereof the all-important source is residential wood combustion. As described for $PM_{2.5}$ the distribution are made on municipality level leading to a rather even distribution on the land area.

9.4 References

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10 Recalculations and Improvements

In general, considerable work is being carried out to improve the inventories. Investigations and research carried out in Denmark and abroad produce new results and findings which are given consideration and, to the extent which is possible, are included as the basis for emission estimates and as data in the inventory databases. Furthermore, the updates of the EMEP/EEA Guidebook, and the work of the Task Force on Emission Inventories and its expert panels are followed closely in order to be able to incorporate the best scientific information as the basis for the inventories.

The implementation of new results in inventories is made in a way so that improvements, as far as possible, better reflect Danish conditions and circumstances. This is in accordance with good practice. Furthermore, efforts are made to involve as many experts as possible in the reasoning, justification and feasibility of implementation of improvements.

In improving the inventories, care is taken to consider implementation of improvements for the whole time series of inventories to make it consistent. Such efforts lead to recalculation of previously submitted inventories. This submission includes recalculated inventories for the whole time series. The reasoning for the recalculations performed is to be found in the sectoral chapters of this report. The text below focuses on recalculations, in general, and further serves as an overview and summary of the relevant text in the sectoral chapters. For sector specific planned improvements please also refer to the relevant sectoral chapters.

10.1 Energy

Improvements and updates of the Danish energy statistics are made regularly by the producer of the statistics, the Danish Energy Agency. In close cooperation with the DEA, these improvements and updates are reflected in the emission inventory for the energy sector. The Danish energy statistics have, for the most part, been aggregated to the SNAP categorisation.

The inventories are still being improved through work to increase the number of large point sources, e.g. power plants, included in the databases as individual point sources. Such an inclusion makes it possible to use plant-specific data for emissions, etc., available e.g. in annual environmental reports from the plants in question.

10.1.1 Stationary Combustion

For stationary combustion plants, the emission estimates for the years 1990-2011 have been updated according to the latest energy statistics published by the Danish Energy Agency. The update included both end use and transformation sectors as well as a source category update. The changes in the energy statistics are largest for the years 2009, 2010 and 2011.

The emission factors for residential wood combustion have been revised according to the EEA Guidebook update (EEA, 2013). This has caused large recalculations for residential plants.

The HCB emission inventory has been improved and an emission inventory for dioxin-like PCB has been elaborated.

10.1.2 Mobile sources

The following recalculations and improvements of the emission inventories have been made since the emission reporting in 2013.

Road transport

Based on the updated version of COPERT IV launched in 2013, new vehicle sub categories have been introduced in the emission inventories for mopeds and passenger cars. For mopeds a division is now made between 2-stroke and 4-stroke engine technologies and for passenger cars small engine sizes below 0.8 l. for gasoline and below 1.4 l. for diesel have been included. Also NO_x emission factors for euro 5 diesel passenger cars have been updated in the model based on the new COPERT IV version.

Small errors in input gasoline fuel consumption for the years 2009-2011 and for input diesel fuel consumption in the years 2010-2011 have been corrected.

The percentage emission change interval and year of largest percentage differences (low %; high %, year) for the different emission components are: SO_2 (-0.5 %; 0.0 %, 2008), NO_x (0.0 %; 4.3 %, 2011), NMVOC (-4.1 %; -1.1 %, 2011), NH_3 (-1.3 %; 0.1 %, 2008) and TSP (-2.1 %; 0.0 %, 2011).

Navigation

Minor changes in ferry input data has been made for the years 2008-2011 causing minor emission changes for domestic navigation. The following largest percentage differences (in brackets) for domestic navigation are noted for: SO_2 (-0.2 %), NO_x (-0.3 %), NMVOC (-0.5 %), NH_3 (0.0 %) and TSP (-0.5 %).

Agriculture/forestry/fisheries

The number and engine size of machine pool tractors has been updated for the years 2007-2011. The number of ATV's has been changed for the years 2009-2011.

Errors in the fuel consumption for fisheries in 2000, 2010 and 2011 have been corrected.

In 2000 the following percentage differences (in brackets) for agriculture/forestry/fisheries are noted for: SO_2 (18.2 %), NO_x (11.1 %), NMVOC (3.1 %), NH_3 (0.0 %) and TSP (3.1 %). due to fuel consumption changes in fisheries.

For other years than 2000, the following largest percentage differences (in brackets) are noted for: SO_2 (-12.1 %), NO_x (-6.4 %), NMVOC (-0.8 %), NH_3 (1.7 %) and TSP (-2.2 %).

Industry

The number of mini loaders has been updated for the years 2004-2011.

The following largest percentage differences (in brackets) for industrial non road machinery are noted for: SO_2 (1.7 %), NO_x (1.6 %), NMVOC (1.9 %), NH_3 (1.6 %) and TSP (3.4 %).

Civil aviation

A small error in the NMVOC emission factor has been corrected for the years 1985-2011, due to CH_4 emission factor updates from 1985-2000 and corrections in the general NMVOC-CH_4 split of VOC. The emission factors are now in line with the factors proposed by the EMEP/EEA emission inventory guidebook. The NMVOC emission percentage differences are between -3.1 % and 1.8 %.

Military

Emission factors derived from the new road transport simulations have caused some emission changes from 1985-2011. The following largest percentage differences (in brackets) for military are noted for: SO_2 (0.0 %), NO_x (2.5 %), NMVOC (-1.1 %), NH_3 (0.2 %) and TSP (-1.7 %).

10.1.3 Fugitive emissions

Service stations

The activity data has been updated for 2009-2011 according to the latest energy statistics published by the Danish Energy Agency. The largest recalculation for 2010 has changed the NMVOC emission by 0.02 ktonnes, corresponding 0.2 % of the total fugitive NMVOC emission in 2010.

Natural gas transmission and distribution

Activity data and IEF for the time series 1990-2011 has been updated for transmission and distribution according to annual environmental reports and the latest national energy statistics, respectively. The largest recalculation for 2002 has changed the NMVOC emission by 0.75 ktonnes, corresponding 4 % of the total fugitive NMVOC emission in 2002.

Venting

EFs for NMVOC have been added for the years 1990-1993 for one gas storage plant. In these years the plant is treated as an area source in the national system, while it is treated separately as a LPS in the following years. EFs are based on data from annual reports for 1995-1999, as no data are available for the years 1990-1994.

Further, a minor error has been corrected for venting in 2011, according to the annual report from one of the natural gas storage facilities.

The recalculation has changed the NMVOC emission by 0.02 ktonnes and the CO emission by 0.07 ktonnes for each of the years 1990-1993, corresponding 17 % and 25 % of the total fugitive NMVOC and CO emission in 1993, respectively.

10.2 Industrial processes

Emissions of HCB and PCBs have been included in the emission inventory. Also, emissions from production of tar products have been included.

10.3 Solvent and other product use

Improvements and additions are continuously being implemented due to the comprehensiveness and complexity of the use and application of solvents and solvent containing products in industries and households. The main recalculations and their implications on the emissions in the 2014 reporting include the following:

- Updated statistical data for the activities of tobacco, fireworks, candles and charcoal for barbequing
- Emission factors for NH_3, PCB, HCB, Cu, benzo(b)flouranthene, benzo(k)flouranthene, benzo(a)pyrene and PCBs have been added for barbequing and PM_{10} and $PM_{2.5}$ have been added for the burning of candles. Furthermore, emission factors for Cr, TSP, PM_{10} and $PM_{2.5}$ have been updated for barbequing.

10.4 Agriculture

Compared with the previous NH_3 and PM emissions inventory (submission 2013), some changes and updates have been made. These changes cause a relatively high increase in the NH_3 emission for all years (1985–2011) between 5-10 % and a decrease in the PM emission 2000-2011 by 3-5 %.

The emission of NH_3 has increased all years due to change in the emission factor for synthetic fertiliser as a consequence of updating of the EMEP/EEA Guidebook (2013). Some other changes have been made which slightly increases the emission of NH_3 from manure management; number of geese all years, number of weaners and fattening pigs in 2011 and change of distribution of housings for hens also in 2011.

The emission of PM decreased for all years due to changes in emission factors in the revised EMEP/EEA Guidebook (2013). The overall decrease is mainly due to a decrease in the emission factors for fattening pigs and weaners.

10.5 Waste

For sector 6.C. Waste Incineration; changes were made to the human cremation with flue gas cleaning emission factors for heavy metals (HMs), PAHs and PCDD/Fs, the abatement of these pollutants by the newly installed flue gas cleaning equipment have not previously been included in this report, this change reduces the listed pollutants for 2011. Furthermore, an error has been corrected for the $PM_{2.5}$ emission factor for human cremation, as correctly described in the text the $PM_{2.5}$ emission is estimated as 80 % for the TSP and not 90 % as reported in last submission, this correction reduces the $PM_{2.5}$ emission for 2000-2010.

For sector 6.D. Waste Other several recalculations were made. NH_3 emission factors for composting of sludge and organic municipal waste have been updated. These new emission factors causes a decrease in NH_3 emissions for 1985-1997 (0.3-0.7 %) and an increase for 1998-2011 (2.1-19.3 %)

For accidental vehicle fires, an update in vehicle population data has given a small decrease in the FSE activity data for accidental tractor and combined harvester fires. In addition to this the average weight of caravans, motorhomes, combined harvesters and motorcycles/mopeds have been updated to more well-founded expert judgments. Finally the emission factors for particles and heavy metals have been updated. While the changes in activity data leads to a general decrease in emissions for 1980-1999 (-16 % to -5 %) and only subtle changes for 2000-2011 (-5 % to 4 %), the new emission factors results in a strong increase in particle and heavy metal emissions for all years 1980-2011 (1413-1874 %).

There are no recalculations for accidental building fires.

11 Projections

Projections of emissions are carried out by DCE at irregular time intervals. The most recent projection was made in 2013, projecting the emissions of NO_x, SO_2, NMVOC, NH_3, TSP, PM_{10} and $PM_{2.5}$ to 2035.

The total projected emissions for these pollutants for 2015, 2020, 2025, 2030 and 2035 are shown in the table below. For further documentation, please refer to Nielsen et al. (2013).

Table 11.1 Projected emissions for 2015, 2020, 2025, 2030 and 2035, tonnes.

Pollutant	2015	2020	2025	2030	2035
SO_2	13 656	12 270	12 207	12 435	14 061
NO_x	105 246	82 999	73 265	69 248	67 095
NMVOC	73 384	68 386	65 817	65 283	64 894
NH_3	71 442	70 236	67 294	64 696	63 617
TSP	34 576	31 526	30 658	30 296	29 264
PM_{10}	26 296	23 029	21 912	21 173	20 171
$PM_{2.5}$	20 218	16 734	15 411	14 371	13 342

11.1 References

Nielsen, O.-K., Plejdrup, M., Hjelgaard, K., Nielsen, M., Winther, M., Mikkelsen, M.H., Albrektsen, R., Fauser, P., Hoffmann, L. & Gyldenkærne, S., 2013: Projection of SO_2, NOx, NMVOC, NH_3 and particle emissions - 2012-2035. Aarhus University, DCE – Danish Centre for Environment and Energy, 151 pp. Technical Report from DCE – Danish Centre for Environment and Energy No. 81. Available at: http://www.dce2.au.dk/pub/SR81.pdf

Annex 1 – Key category analysis

Due to a lack of resources a key category analysis has not been performed for this submission.

Annex 2A - Stationary combustion

Annex 2A-1 Correspondence list for SNAP/CRF

Table 2A-1.1 Correspondence list for stationary combustion SNAP/CRF.

SNAP_id	SNAP	CRF_id	CRF_name
010100	Public power	1A1a	Electricity and heat production
010101	Combustion plants >= 300 MW (boilers)	1A1a	Electricity and heat production
010102	Combustion plants >= 50 and < 300 MW (boilers)	1A1a	Electricity and heat production
010103	Combustion plants < 50 MW (boilers)	1A1a	Electricity and heat production
010104	Gas turbines	1A1a	Electricity and heat production
010105	Stationary engines	1A1a	Electricity and heat production
010200	District heating plants	1A1a	Electricity and heat production
010201	Combustion plants >= 300 MW (boilers)	1A1a	Electricity and heat production
010202	Combustion plants >= 50 and < 300 MW (boilers)	1A1a	Electricity and heat production
010203	Combustion plants < 50 MW (boilers)	1A1a	Electricity and heat production
010204	Gas turbines	1A1a	Electricity and heat production
010205	Stationary engines	1A1a	Electricity and heat production
010300	Petroleum refining plants	1A1b	Petroleum refining
010301	Combustion plants >= 300 MW (boilers)	1A1b	Petroleum refining
010302	Combustion plants >= 50 and < 300 MW (boilers)	1A1b	Petroleum refining
010303	Combustion plants < 50 MW (boilers)	1A1b	Petroleum refining
010304	Gas turbines	1A1b	Petroleum refining
010305	Stationary engines	1A1b	Petroleum refining
010306	Process furnaces	1A1b	Petroleum refining
010400	Solid fuel transformation plants	1A1c	Manufacture of solid fuels and other energy industries
010401	Combustion plants >= 300 MW (boilers)	1A1c	Manufacture of solid fuels and other energy industries
010402	Combustion plants >= 50 and < 300 MW (boilers)	1A1c	Manufacture of solid fuels and other energy industries
010403	Combustion plants < 50 MW (boilers)	1A1c	Manufacture of solid fuels and other energy industries
010404	Gas turbines	1A1c	Manufacture of solid fuels and other energy industries
010405	Stationary engines	1A1c	Manufacture of solid fuels and other energy industries
010406	Coke oven furnaces	1A1c	Manufacture of solid fuels and other energy industries
010407	Other (coal gasification, liquefaction, ...)	1A1c	Manufacture of solid fuels and other energy industries
010500	Coal mining, oil/gas extraction, pipeline compressors	1A1c	Manufacture of solid fuels and other energy industries
010501	Combustion plants >= 300 MW (boilers)	1A1c	Manufacture of solid fuels and other energy industries
010502	Combustion plants >= 50 and < 300 MW (boilers)	1A1c	Manufacture of solid fuels and other energy industries
010503	Combustion plants < 50 MW (boilers)	1A1c	Manufacture of solid fuels and other energy industries
010504	Gas turbines	1A1c	Manufacture of solid fuels and other energy industries
010505	Stationary engines	1A1c	Manufacture of solid fuels and other energy industries
020100	Commercial and institutional plants (t)	1A4a i	Commercial/Institutional plants
020101	Combustion plants >= 300 MW (boilers)	1A4a i	Commercial/Institutional plants
020102	Combustion plants >= 50 and < 300 MW (boilers)	1A4a i	Commercial/Institutional plants
020103	Combustion plants < 50 MW (boilers)	1A4a i	Commercial/Institutional plants
020104	Stationary gas turbines	1A4a i	Commercial/Institutional plants
020105	Stationary engines	1A4a i	Commercial/Institutional plants
020106	Other stationary equipments (n)	1A4a i	Commercial/Institutional plants
020200	Residential plants	1A4b i	Residential plants
020201	Combustion plants >= 50 MW (boilers)	1A4b i	Residential plants
020202	Combustion plants < 50 MW (boilers)	1A4b i	Residential plants
020203	Gas turbines	1A4b i	Residential plants
020204	Stationary engines	1A4b i	Residential plants
020205	Other equipments (stoves, fireplaces, cooking,...) [1)]	1A4b i	Residential plants
020300	Plants in agriculture, forestry and aquaculture	1A4c i	Agriculture/Forestry/Fishing, Stationary
020301	Combustion plants >= 50 MW (boilers)	1A4c i	Agriculture/Forestry/Fishing, Stationary
020302	Combustion plants < 50 MW (boilers)	1A4c i	Agriculture/Forestry/Fishing, Stationary
020303	Stationary gas turbines	1A4c i	Agriculture/Forestry/Fishing, Stationary
020304	Stationary engines	1A4c i	Agriculture/Forestry/Fishing, Stationary
020305	Other stationary equipments (n)	1A4c i	Agriculture/Forestry/Fishing, Stationary
030100	Comb. in boilers, gas turbines and stationary	1A2f i	Industry-Other
030101	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
030102	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
030103	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
030104	Gas turbines	1A2f i	Industry-Other
030105	Stationary engines	1A2f i	Industry-Other
030106	Other stationary equipments (n)	1A2f i	Industry-Other
030200	Process furnaces without contact	1A2f i	Industry-Other
030203	Blast furnace cowpers	1A2a	Industry-Iron and steel
030204	Plaster furnaces	1A2f i	Industry-Other
030205	Other furnaces	1A2f i	Industry-Other
030400	Iron and steel	1A2a	Iron and steel
030401	Combustion plants >= 300 MW (boilers)	1A2a	Iron and steel
030402	Combustion plants >= 50 and < 300 MW (boilers)	1A2a	Iron and steel
030403	Combustion plants < 50 MW (boilers)	1A2a	Iron and steel
030404	Gas turbines	1A2a	Iron and steel
030405	Stationary engines	1A2a	Iron and steel
030406	Other stationary equipments (n)	1A2a	Iron and steel
030500	Non-ferrous metals	1A2b	Non-ferrous metals
030501	Combustion plants >= 300 MW (boilers)	1A2b	Non-ferrous metals
030502	Combustion plants >= 50 and < 300 MW (boilers)	1A2b	Non-ferrous metals
030503	Combustion plants < 50 MW (boilers)	1A2b	Non-ferrous metals

SNAP_id	SNAP	CRF_id	CRF_name
030504	Gas turbines	1A2b	Non-ferrous metals
030505	Stationary engines	1A2b	Non-ferrous metals
030506	Other stationary equipments (n)	1A2b	Non-ferrous metals
030600	Chemical and petrochemical	1A2c	Chemicals
030601	Combustion plants >= 300 MW (boilers)	1A2c	Chemicals
030602	Combustion plants >= 50 and < 300 MW (boilers)	1A2c	Chemicals
030603	Combustion plants < 50 MW (boilers)	1A2c	Chemicals
030604	Gas turbines	1A2c	Chemicals
030605	Stationary engines	1A2c	Chemicals
030606	Other stationary equipments (n)	1A2c	Chemicals
030700	Non-metallic minerals	1A2f i	Industry-Other
030701	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
030702	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
030703	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
030704	Gas turbines	1A2f i	Industry-Other
030705	Stationary engines	1A2f i	Industry-Other
030706	Other stationary equipments (n)	1A2f i	Industry-Other
030800	Mining and Quarrying	1A2f i	Industry-Other
030801	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
030802	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
030803	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
030804	Gas turbines	1A2f i	Industry-Other
030805	Stationary engines	1A2f i	Industry-Other
030806	Other stationary equipments (n)	1A2f i	Industry-Other
030900	Food and tobacco	1A2e	Food processing, beverages and tobacco
030901	Combustion plants >= 300 MW (boilers)	1A2e	Food processing, beverages and tobacco
030902	Combustion plants >= 50 and < 300 MW (boilers)	1A2e	Food processing, beverages and tobacco
030903	Combustion plants < 50 MW (boilers)	1A2e	Food processing, beverages and tobacco
030904	Gas turbines	1A2e	Food processing, beverages and tobacco
030905	Stationary engines	1A2e	Food processing, beverages and tobacco
030906	Other stationary equipments (n)	1A2e	Food processing, beverages and tobacco
031000	Textile and leather	1A2f i	Industry-Other
031001	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
031002	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
031003	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
031004	Gas turbines	1A2f i	Industry-Other
031005	Stationary engines	1A2f i	Industry-Other
031006	Other stationary equipments (n)	1A2f i	Industry-Other
031100	Paper, pulp and print	1A2d	Pulp, Paper and Print
031101	Combustion plants >= 300 MW (boilers)	1A2d	Pulp, Paper and Print
031102	Combustion plants >= 50 and < 300 MW (boilers)	1A2d	Pulp, Paper and Print
031103	Combustion plants < 50 MW (boilers)	1A2d	Pulp, Paper and Print
031104	Gas turbines	1A2d	Pulp, Paper and Print
031105	Stationary engines	1A2d	Pulp, Paper and Print
031106	Other stationary equipments (n)	1A2d	Pulp, Paper and Print
031200	Transport equipment	1A2f i	Industry-Other
031201	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
031202	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
031203	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
031204	Gas turbines	1A2f i	Industry-Other
031205	Stationary engines	1A2f i	Industry-Other
031206	Other stationary equipments (n)	1A2f i	Industry-Other
031300	Machinery	1A2f i	Industry-Other
031301	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
031302	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
031303	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
031304	Gas turbines	1A2f i	Industry-Other
031305	Stationary engines	1A2f i	Industry-Other
031306	Other stationary equipments (n)	1A2f i	Industry-Other
031400	Wood and wood products	1A2f i	Industry-Other
031401	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
031402	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
031403	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
031404	Gas turbines	1A2f i	Industry-Other
031405	Stationary engines	1A2f i	Industry-Other
031406	Other stationary equipments (n)	1A2f i	Industry-Other
031500	Construction	1A2f i	Industry-Other
031501	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
031502	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
031503	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
031504	Gas turbines	1A2f i	Industry-Other
031505	Stationary engines	1A2f i	Industry-Other
031506	Other stationary equipments (n)	1A2f i	Industry-Other
031600	Cement production	1A2f i	Industry-Other
031601	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
031602	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
031603	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
031604	Gas turbines	1A2f i	Industry-Other

SNAP_id	SNAP	CRF_id	CRF_name
031605	Stationary engines	1A2f i	Industry-Other
031606	Other stationary equipments (n)	1A2f i	Industry-Other
032000	Non-specified (industry)	1A2f i	Industry-Other
032001	Combustion plants >= 300 MW (boilers)	1A2f i	Industry-Other
032002	Combustion plants >= 50 and < 300 MW (boilers)	1A2f i	Industry-Other
032003	Combustion plants < 50 MW (boilers)	1A2f i	Industry-Other
032004	Gas turbines	1A2f i	Industry-Other
032005	Stationary engines	1A2f i	Industry-Other
032006	Other stationary equipments (n)	1A2f i	Industry-Other

1) Stoves, fireplaces and cooking is included in the sector 0202 or 020202 in the Danish inventory.

Annex 2A-2 Fuel rate

Table 2A-2.1 Fuel consumption rate of stationary combustion plants 1990-2012, PJ.

Sum of Fuel_rate_PJ			Year									
fuel_type	fuel_id	fuel_gr_abbr	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SOLID	102A	COAL	253.4	344.3	286.8	300.8	323.4	270.3	371.9	276.3	234.3	196.5
	106A	BROWN COAL BRI.	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
	107A	COKE OVEN COKE	1.3	1.4	1.2	1.2	1.2	1.3	1.2	1.3	1.3	1.4
LIQUID	110A	PETROLEUM COKE	4.5	4.4	4.3	5.7	7.5	5.3	5.9	6.0	5.3	6.8
	203A	RESIDUAL OIL	32.1	38.3	38.5	32.8	46.2	33.0	37.8	26.6	30.0	23.7
	204A	GAS OIL	61.4	65.0	56.1	62.0	53.9	53.7	58.0	51.1	48.4	47.5
	206A	KEROSENE	5.1	0.9	0.8	0.8	0.6	0.6	0.5	0.4	0.4	0.3
	225A	ORIMULSION						19.9	36.8	40.5	32.6	34.2
	303A	LPG	2.9	2.7	2.4	2.5	2.5	2.7	3.0	2.6	2.8	2.5
	308A	REFINERY GAS	14.2	14.5	14.9	15.4	16.4	20.8	21.4	16.9	15.2	15.7
GAS	301A	NATURAL GAS	76.1	86.1	90.5	102.5	114.6	132.7	156.3	164.5	178.7	187.9
WASTE	114A	WASTE	15.5	16.7	17.8	19.4	20.3	22.9	25.0	26.8	26.6	29.1
BIOMASS	111A	WOOD	18.2	20.0	21.0	22.2	21.9	21.8	23.4	23.4	22.9	24.4
	117A	STRAW	12.5	13.3	13.9	13.4	12.7	13.1	13.5	13.9	13.9	13.7
	215A	BIO OIL	0.7	0.7	0.7	0.8	0.2	0.3	0.1	0.0	0.0	0.0
	309A	BIOGAS	0.8	0.9	0.9	1.1	1.3	1.8	2.0	2.4	2.6	2.6
	310A	BIO PROD GAS					0.1	0.0	0.0	0.0	0.0	0.0
Grand Total			498.8	609.6	549.9	580.6	623.0	600.2	756.8	652.7	615.2	586.4

Sum of Fuel_rate_PJ			Year									
fuel_type	fuel_id	fuel_gr_abbr	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SOLID	101A	ANODE CARBON										0.0
	102A	COAL	164.7	174.3	174.7	239.0	182.5	154.0	232.0	194.1	170.5	167.7
	106A	BROWN COAL BRI.	0.0	0.0	0.0	0.0					0.0	0.0
	107A	COKE OVEN COKE	1.2	1.1	1.1	1.0	1.1	1.0	1.0	1.1	1.0	0.8
LIQUID	110A	PETROLEUM COKE	6.8	7.8	7.8	8.0	8.4	8.1	8.5	9.2	6.9	5.9
	203A	RESIDUAL OIL	18.8	21.1	26.2	28.6	24.5	21.9	26.1	19.8	15.8	14.7
	204A	GAS OIL	41.3	43.6	38.6	38.9	35.8	31.6	26.5	21.3	20.4	23.3
	206A	KEROSENE	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.1	0.1	0.1
	225A	ORIMULSION	34.1	30.2	23.8	1.9	0.0					
	303A	LPG	2.4	2.1	2.0	2.1	2.1	2.2	2.2	1.9	1.7	1.5
	308A	REFINERY GAS	15.6	15.8	15.2	16.6	15.9	15.3	16.1	15.9	14.8	15.4
GAS	301A	NATURAL GAS	186.1	193.8	193.6	195.9	195.1	187.4	191.1	171.0	171.9	164.9
WASTE	114A	WASTE	29.8	31.3	33.3	35.1	35.3	35.8	36.9	38.1	39.6	37.6
	115A	INDUSTR. WASTES	0.5	1.4	1.9	1.5	2.0	2.0	1.5	1.6	2.0	1.7
BIOMASS	111A	WOOD	27.5	30.8	31.6	38.9	43.9	49.7	52.1	60.3	63.6	66.0
	117A	STRAW	12.2	13.7	15.7	16.9	17.9	18.5	18.5	18.8	15.9	17.4
	215A	BIO OIL	0.0	0.2	0.1	0.4	0.6	0.8	1.1	1.2	1.8	1.7
	309A	BIOGAS	2.9	3.0	3.3	3.5	3.7	3.8	3.9	3.9	3.9	4.2
	310A	BIO PROD GAS	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
Grand Total			544.3	570.7	569.1	628.6	569.2	532.5	618.0	558.4	530.1	523.2

Sum of Fuel_rate_PJ			Year		
fuel_type	fuel_id	fuel_gr_abbr	2010	2011	2012
SOLID	101A	ANODE CARBON	0.0	0.0	0.0
	102A	COAL	163.0	135.5	106.2
	103A	SUB-BITUMINOUS		0.0	0.1
	106A	BROWN COAL BRI.	0.0	0.0	0.0
	107A	COKE OVEN COKE	0.7	0.7	0.6
LIQUID	110A	PETROLEUM COKE	5.1	6.5	6.7
	203A	RESIDUAL OIL	13.0	8.0	7.3
	204A	GAS OIL	21.5	14.6	10.0
	206A	KEROSENE	0.1	0.0	0.0
	303A	LPG	1.4	1.3	1.4
	308A	REFINERY GAS	14.3	15.0	15.6
GAS	301A	NATURAL GAS	184.9	157.7	145.2
WASTE	114A	WASTE	36.4	36.9	36.0
	115A	INDUSTR. WASTES	1.4	1.7	1.5
BIOMASS	111A	WOOD	81.3	79.3	84.7
	117A	STRAW	23.3	19.4	17.5
	215A	BIO OIL	2.0	0.8	1.1
	309A	BIOGAS	4.4	4.2	4.4
	310A	BIO PROD GAS	0.2	0.3	0.4
Grand Total			553.0	481.9	438.8

Table 2A-2.2 Detailed fuel consumption data for stationary combustion plants, PJ. 1990 – 2012.

Sum of Fuel_rate _PJ					Year									
fuel_type	**fuel_gr_abbr**	**nfr_id**	**nfr_name**	**snap_id**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
SOLID	COAL	1A1a	Electricity and heat production	010100	8.5	12.9	10.2	8.2						
				010101	207.9	294.7	241.8	256.3	284.7	233.2	333.6	244.3	206.2	172.0
				010102	14.0	11.0	13.2	15.4	18.9	19.4	22.6	17.1	14.2	12.8
				010103					0.5	0.4	0.1			
				010104					0.3	0.3	0.3	0.1		
				010105					0.0					
				010200	6.0	6.6	5.2	3.6						
				010202					1.1	0.7				
				010203					1.4	1.0	0.7	0.2	0.1	0.0
		1A2c	Chemicals	030600	0.1	0.1	0.1	0.7	0.7	0.6	0.6	0.5	0.5	0.5
		1A2d	Pulp, Paper and Print	031100	1.3	1.7	1.1	0.7	0.7	0.0				
				031102						0.1	0.0			
		1A2e	Food processing, beverages and tobacco	030900	4.0	4.0	3.1	3.4	2.5	2.3	1.6	1.4	1.8	1.0
				030902					0.5	1.0	1.4	1.5	1.4	1.4
				030903					0.3	0.4	0.4	0.5	0.3	0.2
		1A2f i	Industry-Other	030700	0.2			0.2	0.3	0.3	0.8	0.6	0.7	1.1
				030800	1.6	1.9	1.7	1.9	1.6	1.3	1.3	1.5	1.4	0.9
				031200	0.0	0.0	0.0	0.0						
				031300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
				031600	5.0	6.0	6.6	6.6	6.9	7.2	7.1	7.2	6.6	5.6
				032000	1.6	1.2	0.7	0.8						
		1A4a i	Commercial/Institutional plants	020100	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	
		1A4b i	Residential plants	020200	0.6	1.1	0.9	0.8	0.6	0.4	0.1	0.1	0.1	0.1
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	2.5	2.9	2.2	2.1	2.3	1.8	1.4	1.2	0.9	0.7
	BROWN COAL BRI.	1A2f i	Industry-Other	030800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		1A4a i	Commercial/Institutional plants	020100	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
		1A4b i	Residential plants	020200	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
	COKE OVEN COKE	1A2a	Iron and steel	030400	0.0	0.0								0.0
		1A2e	Food processing, beverages and tobacco	030900	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2
		1A2f i	Industry-Other	030700	0.8	1.0	0.9	0.8	0.9	0.1	0.1	0.1	0.1	0.1
				030800	0.0								0.0	0.0
				031200	0.0	0.0				0.0	0.0	0.0	0.0	
				031300	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
				031400	0.0	0.0	0.0	0.0	0.0	0.0				
				032000	0.0	0.0	0.0	0.0		0.9	0.9	0.9	1.0	1.0
		1A4b i	Residential plants	020200	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
LIQUID	PETROLEUM COKE	1A1a	Electricity and heat production	010100				1.2						
				010102					3.7	0.9				
		1A2a	Iron and steel	030400										0.0
		1A2c	Chemicals	030600				0.0						

Sum of Fuel_rate _PJ					Year									
fuel_type	**fuel_gr_abbr**	**nfr_id**	**nfr_name**	**snap_id**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0							
		1A2e	Food processing, beverages and tobacco	030900				0.1						
		1A2f i	Industry-Other	030700	0.2						0.1	0.0	0.0	0.0
				030800	0.1	0.1	0.1	0.0		0.2				0.0
				031000	0.0	0.0	0.0			0.0				
				031300	0.0	0.0	0.0			0.0	0.0		0.0	0.0
				031400	0.0	0.0	0.0	0.0		0.0				
				031600	2.5	3.0	3.2	3.2	3.5	3.7	5.0	5.2	4.8	6.4
				032000						0.0				
		1A4a i	Commercial/Institutional plants	020100	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		1A4b i	Residential plants	020200	0.8	0.7	0.5	0.5	0.2	0.2	0.4	0.3	0.2	0.2
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.8	0.5	0.4	0.4		0.1	0.3	0.3	0.2	0.1
	RESIDUAL OIL	1A1a	Electricity and heat production	010100	0.8	0.4	1.8	0.8						
				010101	6.5	9.6	8.3	7.8	21.5	8.5	11.6	5.2	8.9	6.0
				010102	0.7	0.4	0.5	0.7	0.7	2.5	4.5	2.7	2.8	1.6
				010103					0.3	0.3	0.0	0.2	0.2	0.0
				010104					0.0	0.0	0.0	0.0	0.0	0.0
				010105					0.0	0.0	0.0	0.0	0.0	0.0
				010200	2.0	2.2	1.1	0.9						
				010202					0.1	0.5	0.5	0.4	0.2	0.1
				010203					1.1	1.1	1.6	1.3	1.5	1.6
		1A1b	Petroleum refining	010306	1.3	2.0	3.6	3.5	3.3	2.3	2.2	1.6	1.1	1.1
		1A2a	Iron and steel	030400	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2b	Non-ferrous metals	030500	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
		1A2c	Chemicals	030600	2.4	2.6	2.7	2.0	1.9	1.7	1.7	1.6	1.5	0.8
		1A2d	Pulp, Paper and Print	031100	1.0	1.0	0.7	0.8	0.7	0.6	0.2	0.2	0.2	0.1
				031102						0.0	0.1			
		1A2e	Food processing, beverages and tobacco	030900	7.4	7.7	7.6	7.0	7.1	5.7	5.8	5.0	5.5	5.5
				030902					0.8	0.8	0.7	0.7	0.6	0.6
				030903					0.1	0.2	0.1	0.1	0.1	0.2
				030904								0.1		
		1A2f i	Industry-Other	030700	1.0	2.8	2.4	0.8	0.9	0.4	0.8	0.5		0.9
				030800	0.4	0.4	0.4	0.4	0.5	0.7	0.6	0.7	0.7	0.6
				031000	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.0
				031200	0.2	0.2	0.2	0.2	0.1	0.1	0.0		0.0	0.0
				031300	0.8	0.6	0.7	0.6	0.4	0.2	0.2	0.1	0.2	0.1
				031400	0.4	0.4	0.3	0.4	0.4	0.4	0.5	0.6	0.5	0.5
				031403					0.0	0.0				
				031500	1.0	1.5	1.6	0.5	0.2	0.2	0.4	0.2	0.2	0.1
				031503						0.0				
				031600	1.8	2.2	2.4	2.4	2.6	2.8	1.8	1.9	2.5	0.9
				032000	1.5	1.5	1.5	1.5	0.2	0.2	0.1	0.1	0.1	0.1
		1A4a i	Commercial/Institutional plants	020100	1.1	0.9	0.6	0.5	0.7	0.7	0.7	0.7	0.4	0.5
				020103					0.1	0.1				
		1A4b i	Residential plants	020200	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.1

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	1.2	1.3	1.6	1.7	1.9	2.6	3.1	2.5	2.6	2.4
				020304									0.0	0.0
	GAS OIL	1A1a	Electricity and heat production	010100	0.3	0.5	0.7	0.3						
				010101					0.0	0.1	0.0	0.1	0.1	0.3
				010102					0.0	0.0	0.0	0.0	0.0	0.1
				010103						0.0	0.0	0.0	0.0	0.0
				010104		0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0
				010105					0.1	0.1	0.1	0.1	0.1	0.1
				010200	1.9	0.8	0.7	0.9						
				010202					0.1	0.2	0.8	0.5	0.4	0.3
				010203					1.0	0.7	0.8	0.7	0.8	0.4
		1A1b	Petroleum refining	010306		0.0	0.0	0.0	0.0	0.0	0.0	0.1		
		1A2a	Iron and steel	030400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2c	Chemicals	030600	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
				031103							0.0	0.0	0.0	
		1A2e	Food processing, beverages and tobacco	030900	0.1	0.4	0.4	0.3	0.2	0.4	0.5	0.4	0.3	0.6
				030902					0.0	0.0	0.0	0.0	0.0	0.0
				030903					0.0	0.0				0.0
				030904								0.0	0.0	0.0
		1A2f i	Industry-Other	030700	0.1	0.2	0.2	0.1	0.1	0.2	0.4	0.5	0.5	0.2
				030800	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
				031000	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
				031200	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1
				031300	0.1	0.3	0.3	0.2	0.2	0.4	0.5	0.4	0.4	0.6
				031305									0.0	0.0
				031400	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1
				031403					0.0	0.0		0.0	0.0	0.0
				031505					0.0					
				032000	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3
				032005					0.0					
		1A4a i	Commercial/Institutional plants	020100	11.8	10.6	9.1	9.0	7.2	6.6	6.6	6.1	5.4	5.8
				020103					0.2		0.1	0.1	0.1	0.0
				020105					0.0	0.0	0.0	0.0	0.0	0.0
		1A4b i	Residential plants	020200	46.5	50.6	42.9	50.0	43.7	43.3	45.3	39.6	37.8	35.7
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.4	1.0	1.2	0.8	0.7	1.2	1.9	1.8	1.7	2.3
				020302								0.0		
				020304							0.0	0.0		
	KEROSENE	1A2f i	Industry-Other	031500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				032000	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.6	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
		1A4b i	Residential plants	020200	4.4	0.7	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.1
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	ORIMULSION	1A1a	Electricity and heat production	010101						19.9	36.8	40.5	32.6	34.2

Sum of Fuel_rate _PJ					Year									
fuel_type	**fuel_gr_abbr**	**nfr_id**	**nfr_name**	**snap_id**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
	LPG	1A1a	Electricity and heat production	010100		0.0	0.0	0.0						
				010200	0.0	0.0	0.0							
				010203					0.0	0.0				0.0
		1A1b	Petroleum refining	010306			0.0		0.0	0.0	0.0	0.0		
		1A2a	Iron and steel	030400	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2c	Chemicals	030600	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0
				030602							0.0	0.0	0.0	0.0
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
		1A2f i	Industry-Other	030700	0.2	0.2	0.2	0.2	0.3	0.4	0.6	0.4	0.4	0.4
				030800	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
				031000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031300	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2
				031400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031500	0.5	0.6	0.7	0.6	0.5	0.5	0.5	0.5	0.6	0.4
				032000	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
		1A4a i	Commercial/Institutional plants	020100	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
				020105										0.0
		1A4b i	Residential plants	020200	1.0	0.7	0.5	0.8	0.7	0.7	0.8	0.7	0.9	1.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	REFINERY GAS	1A1a	Electricity and heat production	010203							0.0	0.0		
		1A1b	Petroleum refining	010300	0.5	0.9	1.5	0.0						
				010304				2.1	2.4	2.3	2.7	2.3	2.5	2.7
				010306	13.5	13.5	13.2	13.2	14.0	18.5	18.7	14.5	12.7	13.1
		1A2f i	Industry-Other	032000	0.2	0.1	0.1	0.1			0.0	0.1	0.0	
GAS	NATURAL GAS	1A1a	Electricity and heat production	010101	4.0	4.4	3.3	4.4	6.4	7.8	9.5	8.4	17.5	17.3
				010102					2.0	2.8	4.1	8.1	9.3	6.5
				010103					0.0	0.1	0.1	0.1	0.1	0.1
				010104	2.5	3.9	5.7	7.5	7.6	8.2	15.1	17.7	12.6	23.6
				010105	0.7	1.3	2.2	4.2	8.6	16.9	22.2	23.6	26.5	26.8
				010200	10.0	11.8	11.1	10.9						
				010202					0.3	0.4	0.4	0.5	0.5	0.2
				010203					9.3	7.9	5.0	2.0	3.1	0.4
		1A1c	Manufacture of solid fuels and other energy industries	010504	9.5	9.7	11.1	11.2	12.3	13.0	15.3	20.0	22.1	24.1
		1A2a	Iron and steel	030400	1.7	1.5	1.5	1.5	1.6	0.1	0.1			
				030402						1.6	1.6	1.9	1.9	2.1
		1A2b	Non-ferrous metals	030500	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
		1A2c	Chemicals	030600	1.0	1.3	1.5	1.2	1.4	1.2	1.1	1.4	2.8	3.3
				030602	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
				030603					0.2	0.3	0.5	0.6	0.5	0.3
				030604	0.5	0.6	0.7	0.7	0.8	0.9	1.3	1.3	1.2	1.3
				030605								0.0	0.1	0.1

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
		1A2d	Pulp, Paper and Print	031100	2.3	1.8	1.6	1.2	1.3	1.3	1.5	1.4	1.6	1.8
				031102					0.7	1.1	0.9	1.1	1.1	1.0
				031103					0.0	0.1	0.1	0.1	0.1	0.1
				031104						0.1	0.9	1.0	1.0	1.0
		1A2e	Food processing, beverages and tobacco	030900	8.1	9.2	9.5	11.2	12.7	14.0	12.2	13.4	12.2	11.8
				030902						0.0	0.0	0.0	0.0	0.0
				030903					0.4	0.5	0.4	0.3	0.5	0.4
				030904					0.1	0.3	0.9	1.5	2.3	3.5
				030905					0.0	0.1	0.6	0.6	0.6	0.5
		1A2f i	Industry-Other	030106	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
				030700	4.2	4.2	4.1	4.5	5.0	5.9	5.2	5.6	5.7	6.4
				030705						0.0	0.0	0.0	0.0	0.0
				030800	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.7
				031000	1.2	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.0	1.3
				031005							0.0	0.0	0.0	0.0
				031200	0.2	0.2	0.3	0.4	0.5	0.7	0.7	0.7	0.7	0.6
				031300	1.4	2.0	2.2	2.5	2.8	2.9	3.5	3.2	3.2	3.8
				031305							0.0	0.0	0.1	0.1
				031400	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.2
				031405						0.0	0.1	0.1	0.1	0.1
				031500	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
				031503						0.0				
				032000	1.9	1.9	2.3	2.4	1.6	1.7	1.9	1.8	2.0	2.1
				032003					0.1		0.0	0.0	0.0	0.0
				032004							0.1	0.2	0.2	0.2
				032005	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
		1A4a i	Commercial/Institutional plants	020100	6.3	6.8	7.1	8.6	7.3	8.4	11.2	9.1	8.7	7.5
				020103					0.0	0.0	0.0	0.0	0.2	0.0
				020104						0.0		0.0		
				020105	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.0	1.1
		1A4b i	Residential plants	020200	17.4	20.4	20.9	24.1	24.7	26.9	30.4	28.4	29.1	29.0
				020202					0.0	0.0	0.1	0.0	0.0	0.0
				020204		0.0	0.5	0.8	1.0	1.0	1.4	1.5	1.5	1.5
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	2.1	2.6	2.2	2.3	2.5	2.6	2.7	2.6	2.5	2.2
				020304	0.1	0.1	0.1	0.2	0.3	1.2	2.2	3.0	3.7	3.7
WASTE	WASTE	1A1a	Electricity and heat production	010100	1.0	3.6	5.6	8.4						
				010101									1.3	1.3
				010102					5.1	4.4	6.3	7.7	8.1	14.5
				010103					4.1	5.3	6.0	5.6	4.7	1.1
				010104					0.6	0.9	1.9	1.9	1.6	1.5
				010200	13.6	12.1	11.1	9.8						
				010202						3.3	4.6	4.6	4.6	
				010203					9.3	7.8	4.8	5.7	5.6	9.2
		1A2a	Iron and steel	030400					0.0	0.0				
		1A2c	Chemicals	030600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
		1A2f i	Industry-Other	030700	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
				031000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031200	0.0	0.0			0.0	0.0				
				031300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
				031400			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				032000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.9	1.0	1.1	1.1	1.2	1.3	1.2	1.2	0.7	1.5
				020103					0.0	0.0	0.0	0.0	0.0	0.0
BIOMASS	WOOD	1A1a	Electricity and heat production	010100			0.2	0.5						
				010101					0.0				0.3	
				010102					1.7	1.6	1.6	1.7	2.0	2.9
				010103					0.0	0.0	0.0	0.1	0.1	0.3
				010104						0.0				
				010200	3.2	3.6	4.1	3.8						
				010203					3.3	3.5	3.9	3.9	4.1	4.0
		1A2a	Iron and steel	030400	0.0	0.0	0.0	0.0	0.0					
		1A2b	Non-ferrous metals	030500	0.0									
		1A2c	Chemicals	030600	0.0									
		1A2d	Pulp, Paper and Print	031100	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
				030902									0.0	0.0
		1A2f i	Industry-Other	030700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031000					0.0	0.0				0.0
				031200	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
				031300	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
				031400	3.2	3.0	3.0	3.0	3.0	3.0	2.7	2.8	2.9	2.9
				031403					0.4	0.3	0.5	0.4	0.3	0.4
				032000	2.4	2.5	2.5	2.6	1.3	1.1	1.2	1.2	1.2	0.9
				032003					0.0	0.0	0.0	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.6
				020103					0.0	0.0	0.0	0.0		
		1A4b i	Residential plants	020200	9.0	10.4	10.7	11.9	11.6	11.8	12.7	12.6	11.1	11.6
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
				020304								0.0	0.0	0.0
	STRAW	1A1a	Electricity and heat production	010100	0.5	1.0	1.5	1.6						
				010101					0.1	0.1	0.4	0.7	1.0	1.3
				010102					0.6	1.1	1.5	1.3	1.3	1.3
				010103					0.7	1.0	1.4	1.5	1.5	1.3
				010200	3.5	3.8	3.9	3.8						
				010203					3.9	4.0	4.2	3.9	3.9	3.9
		1A2f i	Industry-Other	031305									0.0	0.0
				032003						0.0				
		1A4b i	Residential plants	020200	5.1	5.1	5.1	4.8	4.4	4.1	3.6	3.9	3.8	3.4

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	3.4	3.4	3.4	3.2	2.9	2.7	2.4	2.6	2.5	2.3
				020302					0.0	0.0	0.0	0.0	0.0	0.0
	BIO OIL	1A1a	Electricity and heat production	010200	0.7	0.7	0.7	0.8						
				010203					0.2	0.3	0.1	0.0	0.0	0.0
	BIOGAS	1A1a	Electricity and heat production	010100	0.1	0.2	0.0	0.0						
				010101					0.0	0.0	0.0	0.0		
				010102					0.0		0.1	0.0	0.1	0.0
				010104					0.0	0.0	0.0			
				010105	0.1	0.2	0.3	0.5	0.5	0.6	0.6	0.8	1.0	1.0
				010200	0.0	0.0	0.1	0.1						
				010203					0.2	0.2	0.2	0.2	0.2	0.2
		1A2a	Iron and steel	030400	0.0									
		1A2e	Food processing, beverages and tobacco	030900	0.0				0.0	0.1	0.1	0.1	0.1	0.0
				030903					0.0	0.0	0.0	0.0	0.0	0.0
		1A2f i	Industry-Other	032000	0.3	0.3	0.4	0.4						
		1A4a i	Commercial/Institutional plants	020100					0.1	0.2	0.2	0.3	0.2	0.3
				020103						0.0	0.0	0.0	0.1	0.1
				020105	0.2	0.2	0.1	0.1	0.4	0.6	0.5	0.8	0.9	0.8
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300					0.0	0.0	0.1	0.0	0.0	0.0
				020304					0.0	0.0	0.0	0.0	0.0	0.0
	BIO PROD GAS	1A1a	Electricity and heat production	010105					0.1	0.0	0.0	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020105									0.0	0.0
Grand Total					498.8	609.6	549.9	580.6	623.0	600.2	756.8	652.7	615.2	586.4

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SOLID	ANODE CARBON	1A2f i	Industry-Other	032000										0.0
	COAL	1A1a	Electricity and heat production	010101	143.8	156.2	158.3	223.5	167.9	140.0	218.4	180.9	159.4	161.9
				010102	9.3	7.7	8.0	6.4	4.5	4.0	3.3	3.1	2.8	2.0
				010104										0.0
				010203	0.0	0.0	0.0	0.0	0.0	0.0		0.1	0.1	
		1A2a	Iron and steel	030400									0.0	0.0
		1A2b	Non-ferrous metals	030500									0.0	0.0
		1A2c	Chemicals	030600	0.5	0.5	0.4	0.6	0.6	0.5	0.2			
		1A2e	Food processing, beverages and tobacco	030900	1.5	1.8	1.4	0.4	0.7	0.4	0.6	0.6	1.1	0.1
				030902	1.1	1.0	1.0	1.6	1.5	1.5	1.2	1.2	1.2	1.2
				030903	0.4	0.4	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3
		1A2f i	Industry-Other	030700	0.3	0.3		1.6	1.8	1.6	1.8	1.9	0.0	0.4
				030800	0.8	0.6	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.1
				031300	0.0	0.0	0.0	0.0	0.0				0.0	0.0
				031400	0.1			0.0	0.0					
				031600	5.7	4.5	4.3	3.4	3.8	3.9	4.3	4.0	3.5	1.1
				032000										0.1
		1A4a i	Commercial/Institutional plants	020100					0.0					
		1A4b i	Residential plants	020200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	1.1	1.2	0.9	1.2	1.4	1.8	2.0	2.1	1.8	0.5
				020304					0.0	0.0				0.0
	BROWN COAL BRI.	1A4b i	Residential plants	020200	0.0	0.0	0.0	0.0					0.0	0.0
	COKE OVEN COKE	1A2a	Iron and steel	030400	0.0	0.0	0.0							
		1A2e	Food processing, beverages and tobacco	030900	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	
				030902									0.1	0.1
				030903								0.0	0.0	0.1
		1A2f i	Industry-Other	030700	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
				030800	0.0									
				031200									0.0	0.0
				031300				0.0	0.0			0.0	0.0	0.0
				032000	0.9	0.9	0.8	0.7	0.8	0.7	0.8	1.0	0.9	0.6
		1A4b i	Residential plants	020200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LIQUID	PETROLEUM COKE	1A1a	Electricity and heat production	010102					0.0	0.0				0.0
		1A2e	Food processing, beverages and tobacco	030900									0.0	
		1A2f i	Industry-Other	030700	0.2	0.1	0.1	0.1	0.1	0.1				
				030800	0.0	0.1	0.1	0.1	0.1	0.1				
				031300									0.0	
				031600	6.5	7.7	7.5	7.7	8.2	7.8	8.5	9.1	6.8	5.9
		1A4a i	Commercial/Institutional plants	020100	0.0	0.0	0.0	0.0		0.1	0.0	0.0	0.0	
		1A4b i	Residential plants	020200	0.0	0.0	0.0	0.0		0.1		0.0	0.1	
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.0	0.0	0.0	0.0						
	RESIDUAL OIL	1A1a	Electricity and heat production	010101	3.4	3.5	3.7	5.8	4.6	4.3	3.3	5.4	2.8	3.6

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
				010102	0.7	2.3	1.2	1.7	1.3	1.5	1.8	0.3	0.9	1.9
				010103	0.3	0.1	0.1	0.1	0.2	0.2	0.1	0.6	0.2	0.1
				010104		1.7	6.6	9.3	7.4	6.3	8.4	4.5	4.5	2.9
				010105	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
				010202							0.1			
				010203	1.1	1.0	1.0	0.6	0.3	0.5	0.3		0.1	0.1
		1A1b	Petroleum refining	010306	1.3	1.4	1.4	0.9	1.1	0.7	0.6	0.8	0.9	0.7
		1A2a	Iron and steel	030400	0.0	0.0	0.0					0.0	0.0	0.0
				030403						0.0	0.0			
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2c	Chemicals	030600	0.9	1.0	1.1	0.8	0.9	0.4	0.6	0.5	0.3	0.2
		1A2d	Pulp, Paper and Print	031100	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0
		1A2e	Food processing, beverages and tobacco	030900	5.4	5.1	5.6	4.9	4.5	3.4	5.2	3.3	1.9	1.2
				030902	0.6	0.6	0.5	0.9	0.9	1.1	0.8	0.6	1.9	2.0
				030903	0.2	0.3	0.3	0.7	0.8	0.8	0.8	0.8	1.0	1.1
		1A2f i	Industry-Other	030700	0.6	0.6	0.7	0.3	0.1		0.2	0.0		
				030800	0.5	0.4	0.4	0.3	0.3	0.2	0.3	0.2	0.1	0.1
				031000	0.0	0.0	0.0					0.0	0.0	0.0
				031200	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0
				031300	0.1	0.1	0.2	0.1	0.1	0.4	0.6	0.2	0.2	0.1
				031305		0.0	0.0							
				031400	0.4	0.3	0.3	0.2	0.2	0.4	0.5	0.2	0.2	0.1
				031500	0.0	0.0	0.0							
				031600	0.9	0.5	0.6	0.6	0.8	0.7	1.0	1.1	0.5	0.2
				032000	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0
				032003		0.0								
				032005				0.0	0.0	0.0	0.0		0.0	
		1A4a i	Commercial/Institutional plants	020100	0.3	0.2	0.5	0.2	0.1	0.1	0.3	0.2	0.1	0.0
		1A4b i	Residential plants	020200	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	1.8	1.6	1.4	0.9	0.7	0.8	0.9	0.6		0.1
				020302				0.0	0.0	0.0	0.0	0.0	0.0	0.0
				020304	0.0	0.0	0.0	0.0						
	GAS OIL	1A1a	Electricity and heat production	010101	0.1	0.1	0.1	1.0	0.2	0.2	0.5	0.5	0.9	2.3
				010102	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1
				010103	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
				010104	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
				010105	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
				010202	0.5	0.9	0.2	0.4	0.5	0.2	0.2	0.2	0.3	0.4
				010203	0.6	0.5	0.4	1.0	0.6	0.5	0.4	0.4	0.8	1.0
		1A1b	Petroleum refining	010306				0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2a	Iron and steel	030400	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
				030403						0.0				
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		1A2c	Chemicals	030600	0.1	0.2	0.1	0.1	0.1	0.1	0.0			
				030602							0.0	0.0	0.0	0.0

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
				030604	0.0					0.0	0.0	0.0	0.0	0.0
		1A2d	Pulp, Paper and Print	031100	0.1	0.1	0.1	0.1	0.1	0.0	0.0			
				031102							0.0	0.0		
				031103			0.0	0.0	0.0	0.0	0.0	0.0		
		1A2e	Food processing, beverages and tobacco	030900	0.5	0.7	0.6	0.5	0.5	0.4	0.1			
				030902				0.0	0.0	0.0	0.0	0.0	0.0	0.0
				030903	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				030904			0.0							
		1A2f i	Industry-Other	030700	0.2	0.3	0.2	0.3	0.2	0.2	0.1			
				030800	0.3	0.5	0.4	0.5	0.4	0.3	0.1			
				031000	0.0	0.1	0.0	0.1	0.1	0.0	0.0			
				031200	0.1	0.1	0.1	0.1	0.1	0.1	0.0			
				031205									0.0	0.0
				031300	0.6	0.7	0.5	0.6	0.6	0.3	0.1			
				031305	0.0	0.0								
				031400	0.1	0.1	0.1	0.1	0.1	0.0	0.0			
				031403	0.1	0.0	0.0							
				031600							0.0	0.0	0.0	0.0
				032000	0.2	0.3	0.2	0.3	0.3	0.1	0.0	0.0	0.0	0.0
				032003			0.0							
		1A4a i	Commercial/Institutional plants	020100	5.0	4.7	4.0	4.3	4.4	3.8	3.0	2.6	2.8	2.8
				020103	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
				020105	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A4b i	Residential plants	020200	30.3	31.5	29.0	27.0	25.3	23.9	21.2	17.2	15.2	16.4
				020204									0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	2.2	2.6	2.2	2.3	2.0	1.2	0.5			
				020302								0.0	0.0	0.0
				020304	0.0	0.0	0.0	0.0		0.0	0.0			0.0
	KEROSENE	1A2f i	Industry-Other	031500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				032000	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
		1A4b i	Residential plants	020200	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	ORIMULSION	1A1a	Electricity and heat production	010101	34.1	30.2	23.8	1.9	0.0					
	LPG	1A1a	Electricity and heat production	010101							0.0		0.0	0.0
				010102									0.0	0.0
				010202						0.0	0.0	0.0		
				010203	0.0					0.0		0.0	0.0	0.0
		1A2a	Iron and steel	030400	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2c	Chemicals	030600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				030602	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
		1A2f i	Industry-Other	030700	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.0	0.0

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
				030800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031300	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
				031400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031500	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
				032000	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3
				020105						0.0	0.0	0.0	0.0	0.0
		1A4b i	Residential plants	020200	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	0.8
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	REFINERY GAS	1A1b	Petroleum refining	010304	2.4	2.4	2.5	2.7	2.4	2.0	2.2	2.3	1.8	1.9
				010306	13.2	13.3	12.7	13.9	13.4	13.4	13.9	13.6	12.9	13.5
GAS	NATURAL GAS	1A1a	Electricity and heat production	010101	18.4	18.2	16.5	17.9	17.3	17.2	19.0	13.9	10.9	13.4
				010102	6.5	6.4	5.5	3.9	3.3	3.0	2.6	0.9	3.8	2.7
				010103	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
				010104	22.8	24.9	30.0	29.7	32.0	27.3	33.5	26.2	27.8	24.6
				010105	25.7	28.0	27.8	26.9	27.1	24.2	21.6	17.3	18.4	15.4
				010202	0.1	0.1	0.2	0.2	0.3			0.2	0.3	0.5
				010203	2.3	2.9	2.3	3.1	1.2	2.8	3.1	6.1	6.0	8.1
		1A1c	Manufacture of solid fuels and other energy industries	010504	25.4	24.9	26.6	26.6	27.5	28.2	28.8	28.6	28.2	26.7
		1A2a	Iron and steel	030400	0.1	0.0	1.7	0.3	0.1	0.0			0.1	0.0
				030402	1.6	1.8		1.2	1.2	1.2	1.3	1.4	1.4	0.7
		1A2b	Non-ferrous metals	030500	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		1A2c	Chemicals	030600	3.0	3.2	2.7	3.1	2.3	2.7	2.5	1.9	2.3	2.7
				030602	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5
				030603	0.5									
				030604	1.4	1.7	1.8	1.7	1.6	1.3	1.2	1.1	1.1	1.1
				030605	0.1	0.1	0.1	0.1	0.1	0.0				
		1A2d	Pulp, Paper and Print	031100	1.3	1.8	1.2	1.9	1.5	2.0	2.5	1.9	1.5	1.4
				031102	1.1	1.1	1.2	1.0	1.0	1.0	1.0	0.2	0.1	0.1
				031103	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0		
				031104	1.0	0.7	1.0	0.9	0.9	1.0	0.9	0.9	0.9	0.7
		1A2e	Food processing, beverages and tobacco	030900	11.1	11.7	10.2	9.0	9.9	11.6	11.3	12.3	13.0	12.1
				030902	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				030903	0.1	0.1	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6
				030904	3.8	3.5	3.8	3.8	4.2	3.6	2.6	2.4	1.4	1.2
				030905	0.9	1.1	1.0	1.0	1.1	1.0	0.6	0.1	0.3	0.3
		1A2f i	Industry-Other	030106	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
				030700	5.8	5.8	5.4	5.5	5.0	3.9	4.1	4.8	4.0	3.7
				030705	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				030800	0.6	0.9	0.6	0.7	0.8	1.4	1.3	1.1	0.6	0.5
				031000	1.2	1.2	1.2	1.0	0.9	0.5	0.5	0.3	0.4	0.4
				031005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
				031200	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.6	0.6	0.6
				031300	3.6	4.1	3.7	4.1	3.8	2.8	2.9	3.0	3.9	3.4
				031305	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
				031400	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2
				031405	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
				031500	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.3	0.4
				031503			0.0							
				032000	2.1	2.3	2.2	2.3	2.1	1.5	1.4	1.5	1.2	1.0
				032003	0.0	0.0	0.0	0.0						
				032004	0.2	0.2	0.2	0.1	0.1	0.1		0.0	0.0	0.0
				032005	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	7.2	7.3	7.6	9.2	9.2	9.7	10.8	10.1	10.0	10.1
				020103	0.2	0.2	0.2	0.0	0.1	0.0	0.1	0.0	0.1	0.0
				020104	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
				020105	1.1	1.1	1.2	1.1	1.1	1.0	1.0	0.9	0.8	0.8
		1A4b i	Residential plants	020200	27.6	29.3	28.1	30.0	29.9	29.5	28.6	26.6	26.5	26.7
				020202	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1
				020204	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.2	1.1
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	2.4	2.7	2.5	2.3	2.3	2.2	2.2	1.9	1.7	1.7
				020304	3.3	3.1	3.4	3.2	3.3	2.9	2.0	1.4	1.1	0.9
WASTE	WASTE	1A1a	Electricity and heat production	010101		0.2	0.9	0.1					0.0	0.0
				010102	12.1	13.0	13.9	14.1	16.6	19.3	20.1	20.3	21.1	21.1
				010103	9.0	9.0	9.2	9.1	9.1	8.8	9.6	9.4	9.6	8.8
				010104	2.2	2.5	2.6	3.0	2.9	2.6	3.1	3.3	3.3	3.2
				010203	6.4	6.6	6.6	7.4	6.5	4.3	3.8	4.7	5.0	4.0
		1A2c	Chemicals	030600	0.0					0.0		0.0		
		1A2d	Pulp, Paper and Print	031100	0.0					0.0		0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.0					0.0		0.1	0.1	0.1
				030902						0.0		0.0	0.0	
		1A2f i	Industry-Other	030800						0.1		0.0	0.1	0.1
				031000	0.0							0.0		
				031300	0.0					0.0		0.0	0.0	0.0
				031400	0.0					0.0		0.0		
				032000	0.0					0.1		0.1		
		1A4a i	Commercial/Institutional plants	020100				1.3	0.1	0.4	0.2		0.1	
				020103	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.1	0.1
	INDUSTR. WA-STES	1A2f i	Industry-Other	031600	0.5	1.4	1.9	1.5	2.0	2.0	1.5	1.6	2.0	1.7
BIOMASS	WOOD	1A1a	Electricity and heat production	010101		0.0	0.1	0.3	0.2	0.2	0.3	0.2	0.3	0.5
				010102	2.7	2.5	3.2	5.3	5.4	6.5	6.5	6.3	5.8	7.1
				010103	0.4	0.5	0.6	0.7	0.7	0.6	0.5	0.6	0.6	0.7
				010104			0.1	1.6	4.5	4.5	2.6	3.8	6.0	6.3
				010203	3.9	4.5	5.0	5.6	6.2	6.6	7.0	7.1	7.9	8.6
		1A2a	Iron and steel	030400				0.0	0.0					
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0	0.0	0.0	0.0			0.7	1.4

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
				031102							0.0	1.1	1.2	1.2
		1A2e	Food processing, beverages and tobacco	030900	0.1	0.1	0.1	0.0	0.1	0.3	0.3	0.3	0.2	0.0
				030902	0.0	0.0								0.0
				030903					0.0	0.1	0.1	0.1	0.1	0.0
		1A2f i	Industry-Other	030700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				030800								0.1	0.9	0.8
				031000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				031300	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.2
				031305								0.0	0.0	0.0
				031400	3.0	3.1	2.5	1.8	1.7	2.3	2.6	2.7	2.9	2.4
				031403	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.5
				032000	1.2	1.3	0.7	1.6	1.6	0.9	1.1	0.8	0.8	0.8
				032003	0.0	0.0	0.0							
		1A4a i	Commercial/Institutional plants	020100	0.8	0.7	0.7	0.7	0.7	0.8	1.0	1.0	1.1	1.0
		1A4b i	Residential plants	020200	14.6	17.5	18.1	20.9	22.3	26.4	29.4	35.5	34.5	34.3
				020202						0.0	0.0	0.0	0.0	0.0
				020204									0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
				020304	0.0	0.0								
	STRAW	1A1a	Electricity and heat production	010101	1.1	1.6	2.6	3.2	3.7	3.3	3.7	3.6	2.4	2.8
				010102	1.3	1.3	1.2	1.3	2.1	2.0	1.7	1.9	1.7	1.9
				010103	0.7	2.1	1.9	2.1	2.1	2.1	2.1	2.1	2.1	2.2
				010104		0.1	1.2	1.7	1.9	2.4	2.5	2.5	0.8	1.5
				010203	3.8	3.8	3.8	3.8	3.4	3.7	3.7	3.8	3.9	4.1
		1A2f i	Industry-Other	031305	0.0	0.0								
		1A4b i	Residential plants	020200	3.1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	2.1	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
				020302	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	BIO OIL	1A1a	Electricity and heat production	010101				0.1				0.0	0.0	
				010105					0.0			0.0	0.0	0.0
				010202				0.0	0.0	0.0	0.0	0.0	0.4	0.2
				010203	0.0	0.2	0.1	0.3	0.6	0.7	1.1	1.1	1.4	1.4
		1A2e	Food processing, beverages and tobacco	030903			0.1							
		1A2f i	Industry-Other	031305			0.0	0.0	0.0	0.0	0.0			
				032005					0.0	0.0	0.0	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020105								0.0		
		1A4b i	Residential plants	020200								0.0	0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020304	0.0	0.0	0.0							
	BIOGAS	1A1a	Electricity and heat production	010102	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				010105	1.1	1.1	1.3	1.3	1.4	1.6	1.6	1.7	1.6	1.9
				010203	0.3	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.2	0.1
		1A2e	Food processing, beverages and tobacco	030900	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1
				030902	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1
				030903	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1

Sum of Fuel_rate _PJ					Year									
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
		1A2f i	Industry-Other	031300									0.0	0.0
				032005		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.3	0.4	0.4	0.3	0.4	0.4	0.5	0.4	0.4	0.3
				020103	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
				020105	0.9	0.8	0.8	0.8	0.8	0.8	0.6	0.6	0.5	0.6
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.3	0.4	0.2
				020304	0.1	0.1	0.2	0.4	0.5	0.6	0.5	0.6	0.5	0.6
	BIO PROD GAS	1A1a	Electricity and heat production	010105	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
		1A4a i	Commercial/Institutional plants	020105		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Grand Total					544.3	570.7	569.1	628.6	569.2	532.5	618.0	558.4	530.1	523.2

Sum of Fuel_rate _PJ					Year		
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2010	2011	2012
SOLID	ANODE CARBON	1A2f i	Industry-Other	032000	0.0	0.0	0.0
	COAL	1A1a	Electricity and heat production	010101	155.9	128.1	100.7
				010102	1.7	1.1	1.0
				010104	0.0	0.7	
				010203	0.1	0.1	0.1
		1A2a	Iron and steel	030400	0.0	0.0	0.0
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.5	0.5	0.0
				030902	1.0	1.2	1.2
				030903	0.2	0.2	0.3
		1A2f i	Industry-Other	030700		0.6	0.3
				030703		0.2	0.3
				030800	0.0	0.1	0.1
				031300	0.0	0.0	0.0
				031600	2.0	1.4	0.9
				032000	0.1	0.1	0.1
		1A4b i	Residential plants	020200	0.0	0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	1.3	1.2	1.2
	SUB-BITUMINOUS	1A1a	Electricity and heat production	010104		0.0	0.1
	BROWN COAL BRI.	1A4b i	Residential plants	020200	0.0	0.0	0.0
	COKE OVEN COKE	1A2e	Food processing, beverages and tobacco	030900	0.0	0.0	0.0
				030902	0.0	0.0	0.0
				030903	0.1	0.1	0.1
		1A2f i	Industry-Other	030700	0.0	0.0	0.1
				031200	0.0	0.0	0.0
				031300	0.0	0.0	0.0
				032000	0.6	0.5	0.4
		1A4b i	Residential plants	020200	0.0	0.0	0.0
LIQUID	PETROLEUM COKE	1A1a	Electricity and heat production	010102	0.0	0.0	
		1A2e	Food processing, beverages and tobacco	030900	0.0	0.0	0.0
		1A2f i	Industry-Other	030700	0.0	0.1	0.1
				031300	0.0	0.0	0.0
				031600	5.1	6.4	6.6
		1A4a i	Commercial/Institutional plants	020100	0.0	0.0	
		1A4b i	Residential plants	020200	0.0	0.0	
	RESIDUAL OIL	1A1a	Electricity and heat production	010101	4.9	1.8	1.5
				010102	0.2	0.2	0.1
				010103	0.1	0.1	0.1
				010104	0.2	0.1	0.0
				010105	0.0	0.0	
				010202	0.0	0.0	
				010203	0.4	0.1	0.1

Sum of Fuel_rate _PJ fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	Year 2010	2011	2012
		1A1b	Petroleum refining	010306	0.5	0.5	0.8
		1A2a	Iron and steel	030400	0.0	0.0	0.0
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0
		1A2c	Chemicals	030600	0.3	0.2	
				030603			0.2
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	2.0	0.9	0.2
				030902	1.9	1.9	1.9
				030903	1.0	1.0	1.2
		1A2f i	Industry-Other	030800	0.1	0.1	0.1
				031000	0.0	0.0	0.0
				031200	0.0	0.0	0.0
				031300	0.1	0.1	0.1
				031400	0.2	0.1	0.1
				031600	0.3	0.3	0.2
				032000	0.0	0.0	0.0
				032005		0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.0	0.0	0.2
		1A4b i	Residential plants	020200	0.0	0.0	0.1
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.6	0.4	0.2
				020302	0.0	0.0	0.0
				020304	0.0	0.0	
	GAS OIL	1A1a	Electricity and heat production	010101	1.3	1.3	1.2
				010102	0.2	0.1	0.1
				010103	0.0	0.1	0.0
				010104	0.1	0.0	0.1
				010105	0.1	0.1	0.1
				010202	1.2	0.3	0.2
				010203	1.4	0.9	0.9
		1A1b	Petroleum refining	010306	0.0	0.0	0.0
		1A1c	Manufacture of solid fuels and other energy industries	010504		0.0	0.0
		1A2a	Iron and steel	030402		0.0	0.0
		1A2c	Chemicals	030602	0.0	0.0	0.0
				030604	0.0	0.0	0.0
		1A2d	Pulp, Paper and Print	031102		0.0	0.0
		1A2e	Food processing, beverages and tobacco	030902	0.0	0.0	0.0
				030903	0.0		
		1A2f i	Industry-Other	030703		0.0	0.0
				031205	0.0	0.0	0.0
				031600	0.0	0.0	0.0
				032000	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	2.7	2.1	2.4
				020103	0.1	0.1	0.0
				020105	0.0	0.0	0.0

Sum of Fuel_rate _PJ					Year		
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2010	2011	2012
		1A4b i	Residential plants	020200	14.5	9.6	5.0
				020204	0.0		
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020302	0.0	0.0	0.0
	KEROSENE	1A2f i	Industry-Other	031500	0.0	0.0	0.0
				032000	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.0	0.0	0.0
		1A4b i	Residential plants	020200	0.0	0.0	0.0
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.0	0.0	0.0
	LPG	1A1a	Electricity and heat production	010101	0.0	0.0	0.0
				010102	0.1	0.0	0.0
				010103	0.0	0.0	0.0
				010104			0.0
				010203	0.0	0.0	0.0
		1A1b	Petroleum refining	010306		0.4	0.2
		1A2a	Iron and steel	030400	0.0		0.0
				030402		0.0	0.0
		1A2b	Non-ferrous metals	030500	0.0	0.0	0.0
		1A2c	Chemicals	030600	0.0	0.0	0.0
				030602	0.0	0.0	0.0
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.0	0.0	0.0
		1A2f i	Industry-Other	030700	0.0	0.0	0.0
				030800	0.0	0.0	0.0
				031000	0.0	0.0	0.0
				031200	0.0	0.0	0.0
				031300	0.1	0.1	0.1
				031400	0.0	0.0	0.0
				031500	0.1	0.1	0.1
				032000	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.3		0.1
				020105	0.0	0.0	0.0
		1A4b i	Residential plants	020200	0.8	0.7	0.7
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.0	0.0	0.0
	REFINERY GAS	1A1b	Petroleum refining	010304	1.5	1.5	1.7
				010306	12.7	13.4	13.9
GAS	NATURAL GAS	1A1a	Electricity and heat production	010101	14.4	9.1	8.8
				010102	4.6	3.1	3.4
				010103	0.0	0.0	0.0
				010104	28.6	21.8	15.5
				010105	19.7	16.2	10.1
				010202	1.2	0.9	1.0
				010203	8.9	7.7	11.4
		1A1c	Manufacture of solid fuels and other energy industries	010503		0.2	0.2
				010504	26.0	24.5	24.8

Sum of Fuel_rate _PJ					Year		
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2010	2011	2012
		1A2a	Iron and steel	030402	1.2	1.3	1.0
		1A2b	Non-ferrous metals	030500	0.1	0.1	0.1
		1A2c	Chemicals	030600	2.9	3.0	2.7
				030602	0.6	0.5	0.6
				030603			0.0
				030604	1.0	0.8	0.8
		1A2d	Pulp, Paper and Print	031100	1.5	1.5	1.4
				031102	0.1	0.1	0.0
				031104	0.7	0.6	0.5
		1A2e	Food processing, beverages and tobacco	030900	12.5	12.3	11.8
				030902	0.1	0.0	0.0
				030903	0.6	0.6	0.4
				030904	2.4	1.2	1.3
				030905	0.4	0.3	0.2
		1A2f i	Industry-Other	030106	0.1	0.0	0.0
				030700	4.0	4.0	3.7
				030703		0.0	0.0
				030705	0.0	0.0	0.0
				030800	0.6	0.5	0.5
				031000	0.4	0.4	0.4
				031005	0.0	0.0	0.0
				031200	0.6	0.6	0.6
				031300	3.7	3.6	3.4
				031305	0.1	0.1	0.0
				031400	0.2	0.2	0.2
				031405	0.1	0.0	0.0
				031500	0.4	0.6	0.6
				032000	1.2	1.2	1.2
				032004	0.0	0.0	0.0
				032005	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	10.0	9.4	7.4
				020103	0.1	0.1	0.0
				020105	0.8	0.6	0.4
		1A4b i	Residential plants	020200	31.5	27.1	27.7
				020202	0.1	0.1	0.2
				020204	1.1	0.9	0.7
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	1.8	1.7	1.5
				020304	1.0	0.8	0.5
WASTE	WASTE	1A1a	Electricity and heat production	010102	20.0	20.2	19.6
				010103	8.5	8.6	8.3
				010104	3.3	3.2	3.2
				010203	4.2	4.3	4.4
		1A2d	Pulp, Paper and Print	031100	0.0	0.0	0.0
		1A2e	Food processing, beverages and tobacco	030900	0.1	0.1	0.1
		1A2f i	Industry-Other	030800	0.1	0.1	0.1

Sum of Fuel_rate _PJ					Year		
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2010	2011	2012
				031300	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.1	0.1	0.2
				020103	0.1	0.1	0.0
	INDUSTR. WASTES	1A2f i	Industry-Other	031600	1.4	1.7	1.5
BIOMASS	WOOD	1A1a	Electricity and heat production	010101	3.3	4.7	5.6
				010102	9.3	8.8	10.3
				010103	1.3	1.3	1.3
				010104	11.3	11.8	13.9
				010203	10.3	10.4	11.8
		1A2d	Pulp, Paper and Print	031100	1.5	1.9	2.0
				031102	1.2	1.3	1.3
		1A2e	Food processing, beverages and tobacco	030900	0.0		
				030902	0.0	0.1	0.1
				030903	0.0	0.0	0.0
		1A2f i	Industry-Other	030700	0.0	0.0	0.0
				030800	0.8	0.9	0.9
				031000	0.0	0.0	0.0
				031200	0.0	0.0	0.0
				031300	0.2	0.2	0.2
				031305	0.0		
				031400	2.5	2.6	2.6
				031403	0.4	0.4	0.3
				032000	0.8	0.8	0.8
		1A4a i	Commercial/Institutional plants	020100	1.0	1.0	0.9
		1A4b i	Residential plants	020200	36.9	33.0	32.6
				020202	0.0	0.0	0.0
				020204	0.0		
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.2	0.2	0.2
				020302	0.0	0.0	0.0
	STRAW	1A1a	Electricity and heat production	010101	5.5	4.0	2.5
				010102	3.9	3.2	2.9
				010103	2.2	1.6	1.5
				010104	2.0	1.3	1.2
				010203	4.9	4.6	4.5
		1A4b i	Residential plants	020200	2.9	2.9	2.9
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	1.9	1.9	1.9
				020302		0.0	0.0
	BIO OIL	1A1a	Electricity and heat production	010102	0.1	0.0	0.1
				010105	0.0	0.0	0.0
				010202	0.0	0.0	0.1
				010203	1.9	0.7	0.8
		1A2f i	Industry-Other	031600		0.0	0.0
				032005	0.0		
		1A4b i	Residential plants	020200	0.0	0.0	0.1

Sum of Fuel_rate _PJ					Year		
fuel_type	fuel_gr_abbr	nfr_id	nfr_name	snap_id	2010	2011	2012
	BIOGAS	1A1a	Electricity and heat production	010101	0.0	0.0	0.0
				010102	0.0	0.0	0.0
				010105	2.0	2.0	2.3
				010203	0.1	0.1	0.1
		1A2e	Food processing, beverages and tobacco	030900	0.2	0.1	0.1
				030902	0.0	0.0	0.0
				030903	0.1	0.1	0.1
		1A2f i	Industry-Other	031300	0.0	0.0	0.0
				032005	0.0	0.0	0.0
		1A4a i	Commercial/Institutional plants	020100	0.3	0.4	0.3
				020103	0.1	0.1	0.1
				020105	0.6	0.6	0.6
		1A4c i	Agriculture/Forestry/Fishing, Stationary	020300	0.2	0.2	0.1
				020304	0.7	0.7	0.6
	BIO PROD GAS	1A1a	Electricity and heat production	010105	0.2	0.3	0.4
		1A4a i	Commercial/Institutional plants	020105	0.0	0.0	0.0
Grand Total					553.0	481.9	438.8

Annex 2A-3 Default Lower Calorific Value (LCV) of fuels and fuel correspondance list

Table 2A-3.1 Time-series for calorific values of fuels (DEA 2013a).

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Crude Oil, Average	GJ pr tonne	42.40	42.40	42.40	42.70	42.70	42.70	42.70	43.00	43.00	43.00
Crude Oil, Golf	GJ pr tonne	41.80	41.80	41.80	41.80	41.80	41.80	41.80	41.80	41.80	41.80
Crude Oil, North Sea	GJ pr tonne	42.70	42.70	42.70	42.70	42.70	42.70	42.70	43.00	43.00	43.00
Refinery Feedstocks	GJ pr tonne	41.60	41.60	41.60	41.60	41.60	41.60	41.60	42.70	42.70	42.70
Refinery Gas	GJ pr tonne	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
LPG	GJ pr tonne	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00
Naphtha (LVN)	GJ pr tonne	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50
Motor Gasoline	GJ pr tonne	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
Aviation Gasoline	GJ pr tonne	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
JP4	GJ pr tonne	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
Other Kerosene	GJ pr tonne	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
JP1	GJ pr tonne	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
Gas/Diesel Oil	GJ pr tonne	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70
Fuel Oil	GJ pr tonne	40.40	40.40	40.40	40.40	40.40	40.40	40.70	40.65	40.65	40.65
Orimulsion	GJ pr tonne	27.60	27.60	27.60	27.60	27.60	28.13	28.02	27.72	27.84	27.58
Petroleum Coke	GJ pr tonne	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40
Waste Oil	GJ pr tonne	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90
White Spirit	GJ pr tonne	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
Bitumen	GJ pr tonne	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80
Lubricants	GJ pr tonne	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90
Natural Gas	GJ pr 1000 Nm^3	39.00	39.00	39.00	39.30	39.30	39.30	39.30	39.60	39.90	40.00
Town Gas	GJ pr 1000 m^3							17.00	17.00	17.00	17.00
Electricity Plant Coal	GJ pr tonne	25.30	25.40	25.80	25.20	24.50	24.50	24.70	24.96	25.00	25.00
Other Hard Coal	GJ pr tonne	26.10	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50
Coke	GJ pr tonne	31.80	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30
Brown Coal Briquettes	GJ pr tonne	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30
Straw	GJ pr tonne	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50
Wood Chips	GJ pr Cubic metre	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Wood Chips	GJ pr m^3	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30
Firewood, Hardwood	GJ pr m^3	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40
Firewood, Conifer	GJ pr tonne	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60
Wood Pellets	GJ pr tonne	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50
Wood Waste	GJ pr Cubic metre	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70
Wood Waste	GJ pr 1000 m^3	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Biogas	GJ pr tonne								23.00	23.00	23.00
Wastes	GJ pr tonne	8.20	8.20	9.00	9.40	9.40	10.00	10.50	10.50	10.50	10.50
Bioethanol	GJ pr tonne	26.70	26.70	26.70	26.70	26.70	26.70	26.70	26.70	26.70	26.70
Liquid Biofuels	GJ pr tonne	37.60	37.60	37.60	37.60	37.60	37.60	37.60	37.60	37.60	37.60
Bio Oil	GJ pr tonne	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20

Continued		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Crude Oil, Average	GJ pr tonne	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Crude Oil, Golf	GJ pr tonne	41.80	41.80	41.80	41.80	41.80	41.80	41.80	41.80	41.80	41.80
Crude Oil, North Sea	GJ pr tonne	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Refinery Feedstocks	GJ pr tonne	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70
Refinery Gas	GJ pr tonne	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
LPG	GJ pr tonne	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00
Naphtha (LVN)	GJ pr tonne	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50
Motor Gasoline	GJ pr tonne	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
Aviation Gasoline	GJ pr tonne	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
JP4	GJ pr tonne	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
Other Kerosene	GJ pr tonne	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
JP1	GJ pr tonne	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
Gas/Diesel Oil	GJ pr tonne	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70
Fuel Oil	GJ pr tonne	40.65	40.65	40.65	40.65	40.65	40.65	40.65	40.65	40.65	40.65
Orimulsion	GJ pr tonne	27.62	27.64	27.71	27.65	27.65	27.65	27.65	27.65	27.65	27.65
Petroleum Coke	GJ pr tonne	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40
Waste Oil	GJ pr tonne	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90
White Spirit	GJ pr tonne	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
Bitumen	GJ pr tonne	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80
Lubricants	GJ pr tonne	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90
Natural Gas	GJ pr 1000 Nm^3	40.15	39.99	40.06	39.94	39.77	39.67	39.54	39.59	39.48	39.46
Town Gas	GJ pr 1000 m^3	17.01	16.88	17.39	16.88	17.58	17.51	17.20	17.14	15.50	21.29
Electricity Plant Coal	GJ pr tonne	24.80	24.90	25.15	24.73	24.60	24.40	24.80	24.40	24.30	24.60
Other Hard Coal	GJ pr tonne	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	25.81	25.13
Coke	GJ pr tonne	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30
Brown Coal Briquettes	GJ pr tonne	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30
Straw	GJ pr tonne	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50
Wood Chips	GJ pr Cubic metre	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Wood Chips	GJ pr m^3	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30	9.30
Firewood, Hardwood	GJ pr m^3	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40
Firewood, Conifer	GJ pr tonne	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60
Wood Pellets	GJ pr tonne	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50
Wood Waste	GJ pr Cubic metre	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70
Wood Waste	GJ pr 1000 m^3	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Biogas	GJ pr tonne	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Wastes	GJ pr tonne	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50
Bioethanol	GJ pr tonne	26.70	26.70	26.70	26.70	26.70	26.70	26.70	26.70	26.70	26.70
Liquid Biofuels	GJ pr tonne	37.60	37.60	37.60	37.60	37.60	37.60	37.60	37.60	37.50	37.50
Bio Oil	GJ pr tonne	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20

Continued		2010	2011	2012
Crude Oil, Average	GJ pr tonne	43.00	43.00	43.00
Crude Oil, Golf	GJ pr tonne	41.80	41.80	41.80
Crude Oil, North Sea	GJ pr tonne	43.00	43.00	43.00
Refinery Feedstocks	GJ pr tonne	42.70	42.70	42.70
Refinery Gas	GJ pr tonne	52.00	52.00	52.00
LPG	GJ pr tonne	46.00	46.00	46.00
Naphtha (LVN)	GJ pr tonne	44.50	44.50	44.50
Motor Gasoline	GJ pr tonne	43.80	43.80	43.80
Aviation Gasoline	GJ pr tonne	43.80	43.80	43.80
JP4	GJ pr tonne	43.80	43.80	43.80
Other Kerosene	GJ pr tonne	43.50	43.50	43.50
JP1	GJ pr tonne	43.50	43.50	43.50
Gas/Diesel Oil	GJ pr tonne	42.70	42.70	42.70
Fuel Oil	GJ pr tonne	40.65	40.65	40.65
Orimulsion	GJ pr tonne	27.65	27.65	27.65
Petroleum Coke	GJ pr tonne	31.40	31.40	31.40
Waste Oil	GJ pr tonne	41.90	41.90	41.90
White Spirit	GJ pr tonne	43.50	43.50	43.50
Bitumen	GJ pr tonne	39.80	39.80	39.80
Lubricants	GJ pr tonne	41.90	41.90	41.90
Natural Gas	GJ pr 1000 Nm3	39.46	39.51	39.55
Town Gas	GJ pr 1000 m3	21.35	21.37	21.37
Electricity Plant Coal	GJ pr tonne	24.44	24.38	24.23
Other Hard Coal	GJ pr tonne	24.44	24.38	24.23
Coke	GJ pr tonne	29.30	29.30	29.30
Brown Coal Bri-quettes	GJ pr tonne	18.30	18.30	18.30
Straw	GJ pr tonne	14.50	14.50	14.50
Wood Chips	GJ pr Cubic metre	2.80	2.80	2.80
Wood Chips	GJ pr m3	9.30	9.30	9.30
Firewood, Hardwood	GJ pr m3	10.40	10.40	10.40
Firewood, Conifer	GJ pr tonne	7.60	7.60	7.60
Wood Pellets	GJ pr tonne	17.50	17.50	17.50
Wood Waste	GJ pr Cubic metre	14.70	14.70	14.70
Wood Waste	GJ pr 1000 m3	3.20	3.20	3.20
Biogas	GJ pr tonne	23.00	23.00	23.00
Wastes	GJ pr tonne	10.50	10.50	10.50
Bioethanol	GJ pr tonne	26.70	26.70	26.70
Liquid Biofuels	GJ pr tonne	37.50	37.50	37.50
Bio Oil	GJ pr tonne	37.20	37.20	37.20

Table 2A-3.2 Fuel category correspondence list, DEA, DCE and Climate Convention reportings (IPCC).

Danish Energy Agency	DCE Emission database	IPCC fuel category
Other Hard Coal	Coal	Solid
Coke	Coke oven coke	Solid
Electricity Plant Coal	Coal	Solid
Brown Coal Briquettes	Brown coal briq.	Solid
-	Anode carbon	Solid
-	Fly ash	Solid
Orimulsion	Orimulsion	Liquid
Petroleum Coke	Petroleum coke	Liquid
Fuel Oil	Residual oil	Liquid
Waste Oil	Residual oil	Liquid
Gas/Diesel Oil	Gas oil	Liquid
Other Kerosene	Kerosene	Liquid
LPG	LPG	Liquid
Refinery Gas	Refinery gas	Liquid
Town Gas	Natural gas	Gas
Natural Gas	Natural gas	Gas
Straw	Straw	Biomass
Wood Waste	Wood and simil.	Biomass
Wood Pellets	Wood and simil.	Biomass
Wood Chips	Wood and simil.	Biomass
Firewood, Hardwood & Conifer	Wood and simil.	Biomass
Waste Combustion (biomass)	Municip. wastes	Biomass
Bio Oil	Bio oil	Biomass
Biogas	Biogas	Biomass
Biogas, other	Biogas	Biomass
Biogas, landfill	Biogas	Biomass
Biogas, sewage sludge	Biogas	Biomass
(Wood applied in gas engines)	Biomass producer gas	Biomass
Waste Combustion (fossil)	Fossil waste	Other fuel

Annex 2A-4 Emission factors

Table 2A-4.1 SO_2 emission factors and references, 2012.

Fuel type	Fuel	NFR	NFR_name	SNAP	SO_2 emission factor, g/GJ	Reference
SOLID	ANODE CARBON	1A2f	Industry - other	032000	574	Assumed equal to coal. DCE assumption.
	COAL	1A1a	Public electricity and heat production	0101	11	DCE estimate based on data reported by plant owners to the electricity transmission company, Energinet.dk (Energinet.dk, 2013)
				0102	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
		1A2a-f	Industry	03	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
		1A4b i	Residential	020200	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
		1A4c i	Agriculture/ Forestry	0203	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
	FLY ASH FOSSIL	1A1a	Public electricity and heat production	010104	10	Assumed equal to the emission factor for coal in 2010. DCE assumption.
	BROWN COAL BRI.	1A4b	Residential	0202	574	Assumed equal to coal. DCE assumption.
	COKE OVEN COKE	1A2a-f	Industry	03	574	Assumed equal to coal. DCE assumption.
		1A4b i	Residential	020200	574	Assumed equal to coal. DCE assumption.
LIQUID	PETROLEUM COKE	1A2a-f	Industry	03	605	DCE calculation based on DEPA (2001b), DEA (2012a) and EMEP (2006).
	RESIDUAL OIL	1A1a	Electricity and heat production	0101	100	DCE estimate based on plant specific data for 2008 and 2009.
				0102	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A1b	Petroleum refining	010306	537	DCE calculation based on plant specific data for year 2003.
		1A2a-f	Industry	03	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A4a	Commercial/ Institutional	0201	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A4b	Residential	0202	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A4c i	Agriculture/ Forestry	0203	344	DCE estimate based on EOF (2013) and DEA (2012a)
	GAS OIL	1A1a	Public electricity and heat production	0101 0102	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A1b	Petroleum refining	010306	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A1c	Other energy industries	0105	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A2a-f	Industry	03	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A4a	Commercial/ Institutional	0201	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A4b i	Residential	0202	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).

Fuel type	Fuel	NFR	NFR_name	SNAP	SO_2 emission factor, g/GJ	Reference
		1A4c	Agriculture/Forestry	0203	23	DCE estimate based on DEPA (1998), Miljø- og planlægn-ingsudvalget (1998) and DEA (2012a).
	KEROSENE	1A2f	Industry - other	03	5	DCE estimate based on Tønder (2004) and Shell (2013).
		1A4a	Commercial/ Institutional	0201	5	DCE estimate based on Tønder (2004) and Shell (2013).
		1A4b i	Residential	0202	5	DCE estimate based on Tønder (2004) and Shell (2013).
		1A4c i	Agriculture/ Forestry	0203	5	DCE estimate based on Tønder (2004) and Shell (2013).
	LPG	1A1a	Public electricity and heat production	All	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
		1A2a-f	Industry	03	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
		1A4a	Commercial/ Institutional	0201	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
		1A4b i	Residential	0202	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
		1A4c i	Agriculture/ Forestry	0203	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
	REFINERY GAS	1A1b	Petroleum refining	0103	1	DCE estimate based on plant specific data for one plant, average value for 1995-2002.
GAS	NATURAL GAS	1A1a	Public electricity and heat production	0101, 0102, except engines	0.43	DCE estimate based on data from Energinet.dk (2013b)
				010105, engines	0.5	Kristensen (2003)
		1A1c	Other energy industries	0105	0.43	DCE estimate based on data from Energinet.dk (2013b)
		1A2a-f	Industry	03 except engines	0.43	DCE estimate based on data from Energinet.dk (2013b)
				Engines	0.5	Kristensen (2003)
		1A4a	Commercial/ Institutional	0201 except engines	0.43	DCE estimate based on data from Energinet.dk (2013b)
				Engines	0.5	Kristensen (2003)
		1A4b i	Residential	0202 except engines	0.43	DCE estimate based on data from Energinet.dk (2013b)
				Engines	0.5	Kristensen (2003)
		1A4c i	Agriculture/ Forestry	0203 except engines	0.43	DCE estimate based on data from Energinet.dk (2013b)
				Engines	0.5	Kristensen (2003)
WASTE	WASTE	1A1a	Public electricity and heat production	0101	8.3	Nielsen et al. (2010a)
				0102	14	DCE estimate based on plant specific data for four plants, 2009 data.

Fuel type	Fuel	NFR	NFR_name	SNAP	SO_2 emission factor, g/GJ	Reference
		1A2a-f	Industry	03	14	Assumed equal to district heating plants (DCE assumption).
		1A4a	Commercial/ Institutional	0201	14	Assumed equal to district heating plants (DCE assumption).
	INDU-STRIAL WASTE	1A2f	Industry - Other	031600	14	Assumed equal to waste. DCE assumption.
BIO-MASS	WOOD	1A1a	Public electricity and heat production	0101	1.9	Nielsen et al. (2010a)
				0102	11	EEA (2013)
		1A2a-f	Industry	03	11	EEA (2013)
		1A4a	Commercial/ Institutional	0201	11	EEA (2013)
		1A4b i	Residential	0202	11	EEA (2013)
		1A4c i	Agriculture/ Forestry	0203	11	EEA (2013)
	STRAW	1A1a	Public electricity and heat production	0101	49	Nielsen et al. (2010a)
				0102	130	Nikolaisen et al. (1998)
		1A4b i	Residential	0202	130	Assumed equal to district heating plants. DCE assumption.
		1A4c i	Agriculture/ Forestry	0203	130	Assumed equal to district heating plants. DCE assumption.
	BIO OIL	1A1a	Public electricity and heat production	0101	0.1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
		1A2a-f	Industry	03	0.1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
		1A4b i	Residential	0202	0.1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
	BIOGAS	1A1a	Public electricity and heat production	0101, except engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
				Engines	19.2	Nielsen & Illerup (2003)
				0102	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
		1A2a-f	Industry	03, except engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
				03, engines	19.2	Nielsen & Illerup (2003)
		1A4a	Commercial/ Institutional	0201, except engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
				020105	19.2	Nielsen & Illerup (2003)
		1A4c i	Agriculture/ Forestry	0203, except engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).

Fuel type	Fuel	NFR	NFR_name	SNAP	SO_2 emission factor, g/GJ	Reference
				020304	19.2	Nielsen & Illerup (2003)
	BIO PROD GAS	1A1a	Public electricity and heat production	010105	1.9	Assumed equal to wood. DCE assumption.

Table 2A-4.2 NO_x emission factors and references, 2012.

Fuel type	Fuel	NFR	NFR_name	SNAP	NOx emission factor, g/GJ	Reference
SOLID	ANODE CARBON	1A2f	Industry - other	032000	132	Assumed equal to coal. DCE assumption.
	COAL	1A1a	Public electricity and heat production	0101	32	DCE estimate based on Energinet.dk (2013) and EU ETS (2013)
				0102	95	DEPA (2001a)
		1A2a-f	Industry	03 except cement production	132	DCE estimate based on plant specific data for 2011.
		1A2f	Industry, cement production	0316	176	DCE estimate based on plant specific data for 2012.
		1A4b i	Residential	020200	95	DEPA (2001a)
		1A4c i	Agriculture/ Forestry	0203	95	DEPA (2001a)
	FLY ASH FOSSIL	1A1a	Public electricity and heat production	0101	30	Assumed equal to the emission factor for coal in 2010.
	BROWN COAL BRI.	1A4b	Residential	0202	95	Assumed equal to coal. DCE assumption.
	COKE OVEN COKE	1A2a-f	Industry	03	132	Assumed equal to coal. DCE assumption.
		1A4b i	Residential	020200	95	Assumed equal to coal. DCE assumption.
LIQUID	PETROLEUM COKE	1A2a-f	Industry	03	132	Assumed equal to coal. DCE assumption.
	RESIDUAL OIL	1A1a	Public electricity and heat production	0101	138	DCE estimate based on Energinet.dk (2009); Energinet.dk (2010); Energinet.dk (2011): EU ETS (2009-2011)
				0102	142	DEPA (2001a)
		1A1b	Petroleum refining	010306	200	IPCC (1997)
		1A2a-f	Industry	03	129	DCE estimate based on plant specific data from two plants, 2011,
		1A4a	Commercial/ Institutional	0201	142	DEPA (2001a)
		1A4b	Residential	0202	142	DEPA (2001a)
		1A4c i	Agriculture/ Forestry	0203	142	DEPA (2001a)
	GAS OIL	1A1a	Public electricity and heat production	010101, 010102	114	DCE estimate based on plant specific data for 2011. Data from Energinet.dk (2011) and EU ETS (2011).
				010103 0102	130	DEPA (2012b), DEPA (2003b) and DEPA (1990)
				010104	350	DCE estimate based on Eltra & Elkraft System, (2001) and DEA (2012b)
				010105	942	Nielsen et al. (2010a)
		1A1b	Petroleum refining	010306	65	DEPA (1990)
		1A1c	Other energy industries	010504	350	(?)
		1A2a-f	Industry	03 except engines	130	DEPA (2012b), DEPA (2003b) and DEPA (1990)
		1A2a-f	Industry	Engines	942	Nielsen et al. (2010a)
		1A4a	Commercial/ Institutional	0201	52	DEPA (2001a)
				020105	942	Nielsen et al. (2010a)
		1A4b i	Residential	0202	52	DEPA (2001a)
				Engines	942	Nielsen et al. (2010a)

Fuel type	Fuel	NFR	NFR_name	SNAP	NOx emission factor, g/GJ	Reference
		1A4c	Agriculture/Forestry	0203	52	DEPA (2001a)
				Engines	942	Nielsen et al. (2010a)
	KEROSENE	1A2f	Industry - other	03	50	EEA (2009)
		1A4a	Commercial/ Institutional	0201	50	EEA (2009)
		1A4b i	Residential	0202	50	EEA (2009)
		1A4c i	Agriculture/ Forestry	0203	50	EEA (2009)
	LPG	1A1a	Public electricity and heat production	All	96	IPCC (1997)
		1A1b	Petroleum refining	0103	96	IPCC (1997)
		1A2a-f	Industry	03	96	IPCC (1997)
		1A4a	Commercial/ Institutional	0201	71	IPCC (1997)
		1A4b i	Residential	0202	47	IPCC (1997)
		1A4c i	Agriculture/ Forestry	0203	71	IPCC (1997)
	REFINERY GAS	1A1b	Petroleum refining	010304	170	DCE estimate based on plant specific data for a gas turbine in year 2000.
				010306	84	DCE estimate based on plant specific data for years 2011.
GAS	NATURAL GAS	1A1a	Public electricity and heat production	010101, 010102	55	DEPA (2003b)
				010103	42	Larsen (2009)
				010104	48	Nielsen et al. (2010a)
				010105	135	Nielsen et al. (2010a)
				0102	42	Larsen (2009)
		1A1c	Other energy industries	010504	250	Kristensen (2004)
		1A2a-f	Industry	03	42	Larsen (2009)
				Engines	135	Nielsen et al. (2010a)
				Turbines	48	Nielsen et al. (2010a)
				030700	87	DCE estimate based on plant specific data for 11 clay production plants, EU ETS (2011-2012); DEPA (2012)
		1A4a	Commercial/ Institutional	0201	30	Larsen (2009); DEPA (2001a)
				Engines	135	Nielsen et al. (2010a)
		1A4b i	Residential	0202	30	Larsen (2009); DEPA (2001a)
				Engines	135	Nielsen et al. (2010a)
		1A4c i	Agriculture/ Forestry	0203	30	Larsen (2009); DEPA (2001a)
				Engines	135	Nielsen et al. (2010a)
WASTE	WASTE	1A1a	Public electricity and heat production	0101	102	Nielsen et al. (2010a)
				0102	164	DCE estimate based on plant specific data for year 2000.
		1A2a-f	Industry	03	164	DCE estimate based on plant specific data for district heating plants in year 2000.
		1A4a	Commercial/ Institutional	0201	164	DCE estimate based on plant specific data for district heating plants in year 2000.
	INDUSTRIAL WASTE	1A2f	Industry - Other	031600	164	Assumed equal to waste. DCE assumption.
BIOMASS	WOOD	1A1a	Public electricity and heat production	0101	81	Nielsen et al. (2010a)
				0102	90	Serup et al. (1999)

Fuel type	Fuel	NFR	NFR_name	SNAP	NOx emission factor, g/GJ	Reference
		1A2a-f	Industry	All	90	Serup et al. (1999)
		1A4a	Commercial/ Institutional	0201	90	Serup et al. (1999)
		1A4b i	Residential	0202	73.9	DCE estimate based on DEA (2013a), DEPA (2013) and EEA (2013),
		1A4c i	Agriculture/ Forestry	0203	90	Serup et al. (1999)
	STRAW	1A1a	Public electricity and heat production	0101	125	Nielsen et al. (2010a)
				0102	90	Nikolaisen et al. (1998)
		1A4b i	Residential	0202	90	Assumed equal to district heating plants. DCE assumption.
		1A4c i	Agriculture/ Forestry	0203	90	Assumed equal to district heating plants. DCE assumption.
	BIO OIL	1A1a	Public electricity and heat production	0101	249	Assumed equal to gas oil. DCE assumption. The emission factor for gas oil have been changed and the emission factor for biooil will also be changed in future inventories.
				010105	700	Assumed equal to gas oil. DCE assumption.
				0102	65	Assumed equal to gas oil. DCE assumption.
		1A2a-f	Industry	03	65	Assumed equal to gas oil. DCE assumption.
				Engines	700	Assumed equal to gas oil. DCE assumption.
		1A4b i	Residential	0202	65	Assumed equal to gas oil. DCE assumption.
	BIOGAS	1A1a	Public electricity and heat production	0101, not engines	28	DEPA (2001a)
				Engines	202	Nielsen et al. (2010a)
				0102	28	DEPA (2001a)
		1A2a-f	Industry	03, not engines	28	DEPA (2001a)
				03, engines	202	Nielsen et al. (2010a)
				030902	59	DEPA (1990); DEPA (1995)
		1A4a	Commercial/ Institutional	0201, not engines	28	DEPA (2001a)
				020105	202	Nielsen et al. (2010a)
		1A4c i	Agriculture/ Forestry	0203, not engines	28	DEPA (2001a)
				020304	202	Nielsen et al. (2010a)
	BIO PROD GAS	1A1a	Public electricity and heat production	010105	173	Nielsen et al. (2010a)
		1A4a	Commercial/ Institutional	020105	173	Nielsen et al. (2010a)

Table 2A-4.3 NMVOC emission factors and references, 2012.

Fuel type	Fuel	NFR	NFR_name	SNAP	NMVOC, g/GJ	Reference
SOLID	ANODE CARBON	1A2f	Industry - other	032000	10	Assumed equal to coal. DCE assumption.
	COAL	1A1a	Electricity and heat production	0101 0102	1.2	EEA (2009)
		1A2a-f	Industry	(all)	10	EEA (2009)
		1A4b i	Residential	020200	484	EEA (2009)
		1A4c i	Agriculture/ Forestry	020300	88.8	EEA (2009)
	BROWN COAL BRI.	1A4b i	Residential	020200	484	EEA (2009)
	COKE OVEN COKE	1A2a-f	Industry	03	10	EEA (2009)
		1A4b i	Residential	020200	484	EEA (2009)
LIQUID	PETROLEUM COKE	1A2a-f	Industry	03	10	Assumed equal to coal. DCE assumption.
	RESIDUAL OIL	1A1a	Public electricity and heat production	010101 010102 010103	0.8	Nielsen et al. (2010)
				010104	2.3	EEA (2009)
				010203	2.3	EEA (2009)
		1A1b	Petroleum refining	010306	2.3	EEA (2009)
		1A2a-f	Industry	03 except engines	0.8	Nielsen et al. (2010)
				Engines	10	EEA (2009)
		1A4a	Commercial/ Institutional	0201	5	EEA (2009)
		1A4b	Residential	0202	15	EEA (2009)
		1A4c i	Agriculture/ Forestry	0203	5	EEA (2009)
	GAS OIL	1A1a	Public electricity and heat production	010101 010102 010103	0.8	EEA (2009)
				010104	0.2	EEA (2009)
				010105	37	EEA (2009)
				0102	0.8	EEA (2009)
		1A1b	Petroleum refining	010306	0.8	EEA (2009)
		1A1c	Other energy industries	010504	0.2	EEA (2009)
		1A2a-f	Industry	03 boilers > 50 MW	5	EEA (2009)
				03 boilers < 50 MW	10	EEA (2009)
				Gas turbines	0.2	EEA (2009)
				Engines	37	EEA (2009)
		1A4a	Commercial/ Institutional	0201 except engines	5	EEA (2009)
				Engines	37	EEA (2009)
		1A4b i	Residential	0202	15	EEA (2009)
		1A4c	Agriculture/Forestry	0203	5	EEA (2009)
	KEROSENE	1A2a-f	Industry	03	10	EEA (2009)
		1A4a	Commercial/ Institutional	0201	5	EEA (2009)
		1A4b i	Residential	0202	15	EEA (2009)
		1A4c i	Agriculture/ Forestry	0203	5	EEA (2009)
	LPG	1A1a	Public electricity and heat production	0101 0102	0.8	EEA (2009)

Fuel type	Fuel	NFR	NFR_name	SNAP	NMVOC, g/GJ	Reference
		1A1b	Petroleum refining	0103	0.8	EEA (2009)
		1A2a-f	Iron and steel	03	5	EEA (2009)
		1A4a	Commercial/ Institutional	0201	5	EEA (2009)
		1A4b i	Residential	0202	10	EEA (2009)
		1A4c i	Agriculture/ Forestry	0203	5	EEA (2009)
	REFINERY GAS	1A1b	Petroleum refining	0103	1.4	Assumed equal to natural gas fuelled gas turbines. DCE assumption.
GAS	NATURAL GAS	1A1a	Public electricity and heat production	010101 010102 010103	2	Danish Gas Technology Centre (2001).
				010104	1.6	Nielsen et al. (2010)
				010105	92	Nielsen et al. (2010)
				0102	2	Danish Gas Technology Centre (2001).
		1A1c	Other energy industries	010504	1.6	Nielsen et al. (2010)
		1A2a-f	Industry	03 except engines and turbines	2	Danish Gas Technology Centre (2001).
				Turbines	1.6	Nielsen et al. (2010)
				Engines	92	Nielsen et al. (2010)
		1A4a	Commercial/ Institutional	0201 except engines	2	Danish Gas Technology Centre (2001).
				Engines	92	Nielsen et al. (2010)
		1A4b i	Residential	0202 except engines	4	Gruijthuijsen & Jensen (2000)
				Engines	92	Nielsen et al. (2010)
		1A4c i	Agriculture/ Forestry	0203 except engines	2	Danish Gas Technology Centre (2001).
				Engines	92	Nielsen et al. (2010)
WASTE	WASTE	1A1a	Public electricity and heat production	0101	0.56	Nielsen et al. (2010)
				0102	2	EEA (2009)
		1A2a-f	Industry	03	2	EEA (2009)
		1A4a	Commercial/ Institutional	0201	2	EEA (2009)
	INDISTRIAL WASTE	1A2f	Industry - Other	0316	2	EEA (2009)
BIO-MASS	WOOD	1A1a	Public electricity and heat production	0101	5.1	Nielsen et al. (2010)
				0102	7.3	EEA (2009)
		1A2a-f	Industry	03	10	EEA (2009)
		1A4a	Commercial/ Institutional	0201	146	EEA (2009)
		1A4b i	Residential	0202	363.4	DCE estimate based on DEA (2013a), DEPA (2013) and EEA (2013),
		1A4c i	Agriculture/ Forestry	0203	146	EEA (2009)
	STRAW	1A1a	Public electricity and heat production	0101	0.78	Nielsen et al. (2010)
				0102	7.3	EEA (2009)
		1A4b i	Residential	0202	400	EEA (2009)
		1A4c i	Agriculture/ Forestry	0203	146	EEA (2009)
				020302	10	EEA (2009)
	BIO OIL	1A1a	Public electricity and heat production	010102	0.8	EEA (2009)
				010105	37	EEA (2009)
				0102	0.8	EEA (2009)

Fuel type	Fuel	NFR	NFR_name	SNAP	NMVOC, g/GJ	Reference
		1A2a-f	Industry	03	0.8	EEA (2009)
		1A4b i	Residential	0202	15	EEA (2009)
	BIOGAS	1A1a	Public electricity and heat production	0101	2	Assumed equal to natural gas. DCE assumption.
				010105	10	Nielsen et al. (2010)
				0102	2	Assumed equal to natural gas. DCE assumption.
		1A2a-f	Industry	03 except engines	2	Assumed equal to natural gas. DCE assumption.
				Engines	10	Nielsen et al. (2010)
		1A4a	Commercial/ Institutional	0201 except engines	2	Assumed equal to natural gas. DCE assumption.
				Engines	10	Nielsen et al. (2010)
		1A4c i	Agriculture/ Forestry	0203 except engines	2	Assumed equal to natural gas. DCE assumption.
				Engines	10	Nielsen et al. (2010)
	BIO PROD GAS	1A1a	Public electricity and heat production	010105	2	Nielsen et al. (2010)
		1A4a	Commercial/ Institutional	020105	2	Nielsen et al. (2010)

Table 2A-4.4 CO emission factors and references, 2012.

Fuel type	Fuel	NFR	NFR_name	SNAP	CO emission factor g/GJ	Reference
SOLID	ANODE CARBON	1A2a-f	Industry	03	10	Assumed the same emission factor as for coal. DCE assumption.
	COAL	1A1a	Public electricity and heat production	0101 and 0102	10	Sander (2002)
		1A2a-f	Industry	03	10	Assumed equal to boilers in public electricity and heat production. DCE assumption.
		1A4b i	Residential	0202	2000	IPCC (1997)
		1A4c i	Agriculture/ Forestry	020300	931	EEA (2009)
	FLY ASH FOSSIL	1A1a	Public electricity and heat production	0101	10	Assumed equal to coal. DCE assumption.
	BROWN COAL BRI.	1A4b i	Residential	020200	2000	Assumed the same emission factor as for coal. DCE assumption.
	COKE OVEN COKE	1A2a-f	Industry	03	10	Assumed the same emission factor as for coal. DCE assumption.
		1A4b i	Residential	0202	2000	Assumed the same emission factor as for coal. DCE assumption.
LIQUID	PETROLEUM COKE	1A2a-f	Industry	03	61	Unknown – the emission factor will be updated according to EEA (2013)
	RESIDUAL OIL	1A1a	Electricity and heat production	0101	15	Sander (2002)
				010203	30	EEA (2007)
		1A1b	Petroleum refining	010306	30	EEA (2007)
		1A2a-f	Industry	03 except engines	2.8	Nielsen et al. (2010)
				Engines	100	EEA (2009)
		1A4a	Commercial/Institutional	0201	30	EEA (2007)
		1A4b	Residential	0202	30	EEA (2007)
		1A4c i	Agriculture/ Forestry	0203	30	EEA (2007)
	GAS OIL	1A1a	Public electricity and heat production	0101 except engines	15	Sander (2002)
				Engines	130	Nielsen et al. (2010)
				0102	30	EEA (2007)
		1A1b	Petroleum refining	010306	30	EEA (2007)
		1A2a-f	Industry	03 except gas turbines and engines	30	EEA (2007)
				Gas turbines	15	Sander (2002)
				Engines	130	Nielsen et al. (2010)
		1A4a	Commercial/ Institutional	0201 except engines	30	EEA (2007)
				Engines	130	Nielsen et al. (2010)
		1A4b i	Residential	0202	43	EEA (2007)
		1A4c	Agriculture/Forestry	0203	30	EEA (2007)
	KEROSENE	1A2a-f	Industry	03	20	EEA (2007)
		1A4a	Commercial/ Institutional	0201	20	EEA (2007)
		1A4b i	Residential	0202	20	EEA (2007)
		1A4c i	Agriculture/ Forestry	0203	20	EEA (2007)
	LPG	1A1a	Public electricity and heat production	0101 and 0102	25	EEA (2007)
		1A2a-f	Industry	03	25	EEA (2007)
		1A4a	Commercial/ Institutional	0201	25	EEA (2007)

Fuel type	Fuel	NFR	NFR_name	SNAP	CO emission factor g/GJ	Reference
		1A4b i	Residential	0202	25	EEA (2007)
		1A4c i	Agriculture/ Forestry	0203	25	EEA (2007)
	REFINERY GAS	1A1b	Petroleum refining	0103	6.2	Assumed same emission factor as for natural gas fuelled gas turbines. DCE assumption.
GAS	NATURAL GAS	1A1a	Public electricity and heat production	010101 and 010102	15	Sander (2002)
				010103	28	DEPA (2001)
				010104	4.8	Nielsen et al. (2010)
				010105	58	Nielsen et al. (2010)
				0102	28	DEPA (2001)
		1A1c	Other energy industries	010504	4.8	Nielsen et al. (2010)
		1A2a-f	Industry	03 except gas turbines and engines	28	DEPA (2001)
				Gas turbines	4.8	Nielsen et al. (2010)
				Engines	58	Nielsen et al. (2010)
		1A4a	Commercial/ Institutional	0201 except engines	28	DEPA (2001)
				Engines	58	Nielsen et al. (2010)
		1A4b i	Residential	0202 except engines	20	Gruijthuijsen & Jensen (2000)
				Engines	58	Nielsen et al. (2010)
		1A4c i	Agriculture/ Forestry	0203 except engines	28	DEPA (2001)
				Engines	58	Nielsen et al. (2010)
WASTE	WASTE	1A1a	Public electricity and heat production	0101	3.9	Nielsen et al. (2010)
				0102	10	DCE calculation based on annual environmental reports for Danish plants year 2000.
		1A2a-f	Industry	03	10	Assumed equal to district heating plants. DCE assumption.
		1A4a	Commercial/ Institutional	0201	10	Assumed equal to district heating plants. DCE assumption.
	INDISTRIAL WASTE	1A2f	Industry - Other	0316	10	Assumed equal to waste, district heating plants. DCE assumption.
BIOMASS	WOOD	1A1a	Public electricity and heat production	0101	90	Nielsen et al. (2010)
				010203	240	DEPA (2001)
		1A2a-f	Industry	03	240	DEPA (2001)
		1A4a	Commercial/ Institutional	020100	240	DEPA (2001)
		1A4b i	Residential	0202	2676	DCE estimate based on DEA (2013a), DEPA (2013) and EEA (2013),
		1A4c i	Agriculture/ Forestry	020300	240	DEPA (2001)
	STRAW	1A1a	Public electricity and heat production	0101	67	Nielsen et al. (2010)
				0102	325	DEPA (2001); Nikolaisen et al (1998)
		1A4b i	Residential	0202	4000	EEA (2007); Jensen & NIelsen (1990) and Bjerrum (2002)
		1A4c i	Agriculture/ Forestry	0203	4000	EEA (2007); Jensen & NIelsen (1990) and Bjerrum (2002)
				020302	325	DEPA (2001); Nikolaisen et al (1998)

Fuel type	Fuel	NFR	NFR_name	SNAP	CO emission factor g/GJ	Reference
	BIO OIL	1A1a	Public electricity and heat production	0101 and 0102	15	Assumed same emission factor as for gas oil. DCE assumption.
		1A2a-f			15	Assumed same emission factor as for gas oil. DCE assumption.
		1A4b i	Residential	0202	100	Assumed same emission factor as for gas oil. DCE assumption.
	BIOGAS	1A1a	Public electricity and heat production	0101 except engines	36	DEPA (2001)
				Engines	310	Nielsen et al. (2010)
				0102	36	DEPA (2001)
		1A2a-f	Industry	03 except engines	36	DEPA (2001)
				Engines	310	Nielsen et al. (2010)
		1A4a	Commercial/ Institutional	0201 except engines	36	DEPA (2001)
				Engines	310	Nielsen et al. (2010)
		1A4c i	Agriculture/ Forestry	0203 except engines	36	DEPA (2001)
				Engines	310	Nielsen et al. (2010)
	BIO PROD GAS	1A1a	Public electricity and heat production	010105	586	Nielsen et al. (2010)
		1A4a	Commercial/ Institutional	020105	586	Nielsen et al. (2010)

Table 2A-5 SO_2 emission factors time-series, g per GJ for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	506	571	454	386																			
SOLID	102A	COAL	1A1a	010101	506	571	454	386	343	312	420	215	263	193	64	47	45	61	42	41	37	40	26	14	10	9	11
SOLID	102A	COAL	1A1a	010102	506	571	454	386	343	312	420	215	263	193	64	47	45	61	42	41	37	40	26	14	10	9	11
SOLID	102A	COAL	1A1a	010103					343	312	420																
SOLID	102A	COAL	1A1a	010104					343	312	420	215													10	9	
LIQUID	110A	PETROLEUM COKE	1A1a	010102					787	787															605	605	
LIQUID	110A	PETROLEUM COKE	1A2e	030900				787															605		605	605	605
LIQUID	110A	PETROLEUM COKE	1A2f i	030700	787						787	787	787	787	787	605	605	605	605	605					605	605	605
LIQUID	110A	PETROLEUM COKE	1A2f i	030800	787	787	787	787		787				787	787	605	605	605	605	605							
LIQUID	110A	PETROLEUM COKE	1A2f i	031300	787	787	787			787	787		787	787									605		605	605	605
LIQUID	110A	PETROLEUM COKE	1A2f i	031600	787	787	787	787	787	787	787	787	787	787	787	605	605	605	605	605	605	605	605	605	605	605	605
LIQUID	110A	PETROLEUM COKE	1A4a i	020100	787	787	787	787	787	787	787	787	787	787	787	605	605	605		605	605	605	605		605	605	
LIQUID	110A	PETROLEUM COKE	1A4b i	020200	787	787	787	787	787	787	787	787	787	787	787	605	605	605		605		605	605		605	605	
LIQUID	110A	PETROLEUM COKE	1A4c i	020300	787	787	787	787		787	787	787	787	787	787	605	605	605									
LIQUID	203A	RESIDUAL OIL	1A1a	010100	446	470	490	475																			
LIQUID	203A	RESIDUAL OIL	1A1a	010101	446	470	490	475	543	351	408	344	369	369	403	315	290	334	349	283	308	206	100	100	100	100	100
LIQUID	203A	RESIDUAL OIL	1A1a	010102	446	470	490	475	543	351	408	344	369	369	403	315	290	334	349	283	308	206	100	100	100	100	100
LIQUID	203A	RESIDUAL OIL	1A1a	010103					543	351	408	344	369	369	403	315	290	334	349				100	100	100	100	100
LIQUID	203A	RESIDUAL OIL	1A1a	010104					543	351	408	344	369	369		315	290	334	349	283	308	206	100	100	100	100	100
LIQUID	203A	RESIDUAL OIL	1A1a	010105					543	351	408	344	369	369	403	315	290	334	349	283	308				100	100	
LIQUID	203A	RESIDUAL OIL	1A1a	010202					495	495	495	344	344	344							344				344	344	
LIQUID	203A	RESIDUAL OIL	1A1a	010203					495	495	495	344	344	344	344	344	344	344	344	344	344		344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A1b	010306	798	798	798	798	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537	537
LIQUID	203A	RESIDUAL OIL	1A2a	030400	495	495	495	495	495	495	495	344	344	344	344	344	344					344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2b	030500	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2c	030600	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	
LIQUID	203A	RESIDUAL OIL	1A2d	031100	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2e	030900	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2e	030902					495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2e	030903					495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2f i	030700	495	495	495	495	495	495	495	344		344	344	344	344	344	344		344	344					
LIQUID	203A	RESIDUAL OIL	1A2f i	030800	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2f i	031000	495	495	495	495	495	495	495	344	344	344	344	344	344					344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2f i	031200	495	495	495	495	495	495	495		344	344	344	344	344			344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2f i	031300	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2f i	031400	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A2f i	031500	495	495	495	495	495	495	495	344	344	344	344	344	344										
LIQUID	203A	RESIDUAL OIL	1A2f i	031600	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
LIQUID	203A	RESIDUAL OIL	1A2f i	032000	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A4a i	020100	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A4b i	020200	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
LIQUID	203A	RESIDUAL OIL	1A4c i	020300	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344	344	344		344	344	344	344
LIQUID	204A	GAS OIL	1A1a	010101					94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A1a	010102					94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A1a	010104		94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A1a	010105					94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A1a	010202					94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A1a	010203					94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A1b	010306		94	94	94	94	23	23	23						23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A2a	030400	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2b	030500	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2c	030600	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2d	031100	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2e	030900	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2e	030902					94	23	23	23	23	23				23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A2e	030903					94	23				23	23	23	23	23	23	23	23	23	23	23	23		
LIQUID	204A	GAS OIL	1A2f i	030700	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2f i	030800	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2f i	031000	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2f i	031200	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2f i	031300	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2f i	031400	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	204A	GAS OIL	1A2f i	031403					94	23		23	23	23	23	23	23										
LIQUID	204A	GAS OIL	1A2f i	032000	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A4a i	020100	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A4a i	020103					94		23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A4a i	020105					94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A4b i	020200	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LIQUID	204A	GAS OIL	1A4c i	020300	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23	23						
LIQUID	225A	ORIMULSION	1A1a	010101						149	149	149	149	149		12	12	12	12								
WASTE	114A	WASTE	1A1a	010100	138	116	95	73																			
WASTE	114A	WASTE	1A1a	010102					52	30	29	28	26	25	24	24	24	24	19	14	8.3	8.3	8.3	8.3	8.3	8.3	8.3
WASTE	114A	WASTE	1A1a	010103					52	30	29	28	26	25	24	24	24	24	19	14	8.3	8.3	8.3	8.3	8.3	8.3	8.3
WASTE	114A	WASTE	1A1a	010104					52	30	29	28	26	25	24			24			8.3				8.3	8.3	8.3
WASTE	114A	WASTE	1A1a	010200	138	131	124	117																			
WASTE	114A	WASTE	1A1a	010202						103	95																
WASTE	114A	WASTE	1A1a	010203					110	103	95	88	81	74	67	60	52	45	37	30	22	14	14	14	14	14	14
WASTE	114A	WASTE	1A2a	030400					110	103																	
WASTE	114A	WASTE	1A2c	030600	138	131	124	117	110	103	95	88	81		67					30		14					
WASTE	114A	WASTE	1A2d	031100	138	131	124	117	110	103	95	88	81	74	67					30		14	14	14	14	14	14
WASTE	114A	WASTE	1A2e	030900	138	131	124	117	110	103	95		81	74	67					30		14	14	14	14	14	14
WASTE	114A	WASTE	1A2e	030902																30		14	14				
WASTE	114A	WASTE	1A2f i	030700	138	131	124	117	110	103			81														
WASTE	114A	WASTE	1A2f i	030800																30		14	14	14	14	14	14
WASTE	114A	WASTE	1A2f i	031000	138	131	124	117	110	103	95	88	81	74	67							14					
WASTE	114A	WASTE	1A2f i	031200	138	131			110	103																	

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
WASTE	114A	WASTE	1A2f i	031300	138	131	124	117	110	103	95	88	81		67					30		14	14	14	14	14	14
WASTE	114A	WASTE	1A2f i	031400			124	117	110	103	95	88	81	74	67					30		14					
WASTE	114A	WASTE	1A2f i	032000	138	131	124	117	110	103	95	88	81	74	67					30		14					
WASTE	114A	WASTE	1A4a i	020100	138	131	124	117	110	103	95	88	81	74				45	37	30	22		14		14	14	14
WASTE	114A	WASTE	1A4a i	020103					110	103	95	88	81	74	67	60	52	45	37	30	22	14	14	14	14	14	14
WASTE	115A	INDUSTR. WA-STES	1A2f i	031600											67	60	52	45	37	30	22	14	14	14	14	14	14

Table 2A-4.6 NOx emission factors time-series, g per GJ for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	342	384	294	289																			
SOLID	102A	COAL	1A1a	010101	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127	109	98	59	39	30	30	32
SOLID	102A	COAL	1A1a	010102	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127	109	98	59	39	30	30	32
SOLID	102A	COAL	1A1a	010103					267	239	250																
SOLID	102A	COAL	1A1a	010104					267	239	250	200													30	30	
SOLID	102A	COAL	1A1a	010203					200	200	200	200	200	200	95	95	95	95	95	95		95	95		95	95	95
SOLID	102A	COAL	1A2f i	031600	715	715	715	715	715	715	715	715	715	715	715	688	661	634	607	580	516.5	453	389.5	326	262.5	199	176
SOLID	102A	COAL	1A4a i	020100	200	200	200	200	200	200	200	200	200						95								
SOLID	102A	COAL	1A4b i	020200	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95	95	95	95	95	95	95	95
SOLID	102A	COAL	1A4c i	020300	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95	95	95	95	95	95	95	95
SOLID	106A	BROWN COAL BRI.	1A4b i	020200	200	200	200	200	200	200	200	200	200	200	95	95	95	95					95	95	95	95	95
SOLID	107A	COKE OVEN COKE	1A4b i	020200	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95	95	95	95	95	95	95	95
LIQUID	110A	PETROLEUM COKE	1A1a	010102					267	239															138	138	
LIQUID	203A	RESIDUAL OIL	1A1a	010100	342	384	294	289																			
LIQUID	203A	RESIDUAL OIL	1A1a	010101	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127	109	98	138	138	138	138	138
LIQUID	203A	RESIDUAL OIL	1A1a	010102	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127	109	98	138	138	138	138	138
LIQUID	203A	RESIDUAL OIL	1A1a	010103					267	239	250	200	177	152	129	122	130	144	131	127	109	98	138	138	138	138	138
LIQUID	203A	RESIDUAL OIL	1A1a	010104					267	239	250	200	177	152		122	130	144	131	127	109	98	138	138	138	138	138
LIQUID	203A	RESIDUAL OIL	1A1a	010105					267	239	250	200	177	152	129	122	130	144	131	127	109				138	138	
LIQUID	203A	RESIDUAL OIL	1A4c i	020304									142	142	142	142	142	142							130	130	
LIQUID	204A	GAS OIL	1A1a	010101					249	249	249	249	249	249	249	249	249	249	232	215	198	182	165	148	131	114	114
LIQUID	204A	GAS OIL	1A1a	010102					249	249	249	249	249	249	249	249	249	249	232	215	198	182	165	148	131	114	114
LIQUID	204A	GAS OIL	1A1a	010105					1247	1196	1145	1094	1044	993	942	942	942	942	942	942	942	942	942	942	942	942	942
LIQUID	204A	GAS OIL	1A1b	010306		95	90	85	80	75	70	65						65	65	65	65	65	65	65	65	65	65
LIQUID	204A	GAS OIL	1A4a i	020105					1247	1196	1145	1094	1044	993	942	942	942	942	942	942	942	942	942	942	942	942	942
LIQUID	204A	GAS OIL	1A4c i	020304							1145	1094			942	942	942	942		942	942			942			
LIQUID	225A	ORIMULSION	1A1a	010101						138	139	138	138	138		88	86	86	86								
LIQUID	308A	REFINERY GAS	1A1b	010306	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	94	94	94	94
GAS	301A	NATURAL GAS	1A1a	010101					115	115		115			115	115	115	115	97	97	97	97	55	55	55	55	55
GAS	301A	NATURAL GAS	1A1a	010102					115	115	115		115	115	115	115	115	115	97	97	97	97	55	55	55	55	55
GAS	301A	NATURAL GAS	1A1a	010104	161	157	153	149	145	141	138	134	131	127	124	119	113	108	103	98	73	48	48	48	48	48	48
GAS	301A	NATURAL GAS	1A1a	010105	276	241	235	214	199	194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A2c	030604	161	157	153	149	145	141	138	134	131	127	124	119	113	108	103	98	73	48	48	48	48	48	48
GAS	301A	NATURAL GAS	1A2c	030605								170	167	167	168	163	158	153	148	143							
GAS	301A	NATURAL GAS	1A2d	031104						141	138	134	131	127	124	119	113	108	103	98	73	48	48	48	48	48	48
GAS	301A	NATURAL GAS	1A2e	030904					145	141	138	134	131	127	124	119	113	108	103	98	73	48	48	48	48	48	48
GAS	301A	NATURAL GAS	1A2e	030905					199	194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A2f i	030705						194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A2f i	031005							193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A2f i	031305							193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A2f i	031405						194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A2f i	032004							138	134	131	127	124	119	113	108	103	98		48	48	48	48	48	48
GAS	301A	NATURAL GAS	1A2f i	032005	276	241	235	214	199	194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GAS	301A	NATURAL GAS	1A4a i	020104						141		134			124	119	113	108	103	98	73	48					
GAS	301A	NATURAL GAS	1A4a i	020105	276	241	235	214	199	194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A4b i	020204		241	235	214	199	194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
GAS	301A	NATURAL GAS	1A4c i	020304	276	241	235	214	199	194	193	170	167	167	168	163	158	153	148	143	139	135	135	135	135	135	135
WASTE	114A	WASTE	1A1a	010102					134	134	134	134	134	129	124	124	124	124	117	110	102	102	102	102	102	102	102
WASTE	114A	WASTE	1A1a	010103					134	134	134	134	134	129	124	124	124	124	117	110	102	102	102	102	102	102	102
WASTE	114A	WASTE	1A1a	010104					134	134	134	134	134	129	124			124			102				102	102	102
BIO-MASS	111A	WOOD	1A4b i	020200	63.4	63.4	63.4	63.4	63.4	63.4	63.4	63.4	63.4	63.4	63.4	65.4	66.2	66.5	66.8	67.6	68.5	68.8	70.1	71.5	72.3	73.2	73.9
BIO-MASS	111A	WOOD	1A4b i	020202																67.6	68.5	68.8	70.1	71.5	72.3	73.2	73.9
BIO-MASS	111A	WOOD	1A4b i	020204																			70.1	71.5	72.3		
BIO-MASS	215A	BIO OIL	1A1a	010200	100	95	90	85																			
BIO-MASS	215A	BIO OIL	1A1a	010203					80	75	70	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
BIO-MASS	309A	BIOGAS	1A1a	010105	711	696	681	665	650	635	616	597	578	559	540	484	427	371	315	259	202	202	202	202	202	202	202
BIO-MASS	309A	BIOGAS	1A2f i	032005												484	427	371	315	259	202	202	202	202	202	202	202
BIO-MASS	309A	BIOGAS	1A4a i	020105	711	696	681	665	650	635	616	597	578	559	540	484	427	371	315	259	202	202	202	202	202	202	202
BIO-MASS	309A	BIOGAS	1A4c i	020304					650	635	616	597	578	559	540	484	427	371	315	259	202	202	202	202	202	202	202

Table 2A-4.7 NMVOC emission factors time-series, g per GJ for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GAS	301A	NATURAL GAS	1A1a	010104	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
GAS	301A	NATURAL GAS	1A1a	010105	60	69	81	127	140	142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A1c	010504	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
GAS	301A	NATURAL GAS	1A2c	030604	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
GAS	301A	NATURAL GAS	1A2c	030605								124	122	122	121	114	108	101	95	88							
GAS	301A	NATURAL GAS	1A2d	031104						1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
GAS	301A	NATURAL GAS	1A2e	030904					1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
GAS	301A	NATURAL GAS	1A2e	030905					140	142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A2f i	030705						142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A2f i	031005							138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A2f i	031305							138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A2f i	031405						142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A2f i	032004							1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6		1.6	1.6	1.6	1.6	1.6	1.6
GAS	301A	NATURAL GAS	1A2f i	032005	60	69	81	127	140	142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A4a i	020104						1.4		1.4			1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6					
GAS	301A	NATURAL GAS	1A4a i	020105	60	69	81	127	140	142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A4b i	020204		69	81	127	140	142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
GAS	301A	NATURAL GAS	1A4c i	020304	60	69	81	127	140	142	138	124	122	122	121	114	108	101	95	88	90	92	92	92	92	92	92
WASTE	114A	WASTE	1A1a	010101									0.98	0.98		0.98	0.98	0.98					0.56	0.56			
WASTE	114A	WASTE	1A1a	010102					0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.84	0.7	0.56	0.56	0.56	0.56	0.56	0.56	0.56
WASTE	114A	WASTE	1A1a	010103					0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.84	0.7	0.56	0.56	0.56	0.56	0.56	0.56	0.56
WASTE	114A	WASTE	1A1a	010104					0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.84	0.7	0.56	0.56	0.56	0.56	0.56	0.56	0.56
BIO-MASS	111A	WOOD	1A2a	030400	146	132	119	105	92									10	10								
BIO-MASS	111A	WOOD	1A2d	031100	146	132	119	105	92	78	64	51	37	24	10	10	10	10	10	10			10	10	10	10	10
BIO-MASS	111A	WOOD	1A2e	030900	146	132	119	105	92	78	64	51	37	24	10	10	10	10	10	10	10	10	10	10	10		
BIO-MASS	111A	WOOD	1A2e	030902									37	24	10	10								10	10	10	10

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BIO-MASS	111A	WOOD	1A2f i	030700	146	132	119	105	92	78	64	51	37	24	10	10	10	10	10	10	10	10	10	10	10	10	10
BIO-MASS	111A	WOOD	1A2f i	031000					92	78				24	10	10	10	10	10	10	10	10	10	10	10	10	10
BIO-MASS	111A	WOOD	1A2f i	031200	146	132	119		92	78	64	51	37	24	10	10	10	10	10	10	10	10	10	10	10	10	10
BIO-MASS	111A	WOOD	1A2f i	031300	146	132	119	105	92	78	64	51	37	24	10	10	10	10	10	10	10	10	10	10	10	10	10
BIO-MASS	111A	WOOD	1A2f i	031400	146	132	119	105	92	78	64	51	37	24	10	10	10	10	10	10	10	10	10	10	10	10	10
BIO-MASS	111A	WOOD	1A2f i	031403					92	78	64	51	37	24	10	10	10	10	10	10	10	10	10	10	10	10	10
BIO-MASS	111A	WOOD	1A2f i	032000	146	132	119	105	92	78	64	51	37	24	10	10	10	10	10	10	10	10	10	10	10	10	10
BIO-MASS	111A	WOOD	1A2f i	032003					92	78	64	51	37	24	10	10	10										
BIO-MASS	111A	WOOD	1A4b i	020200	584.9	584.9	584.9	584.9	584.9	584.9	584.9	584.9	584.9	584.9	584.9	522.2	498.0	493.2	487.3	464.8	438.7	448.3	428.7	400.6	386.7	372.7	363.4
BIO-MASS	111A	WOOD	1A4b i	020202																464.8	438.7	448.3	428.7	400.6	386.7	372.7	363.4
BIO-MASS	111A	WOOD	1A4b i	020204																			428.7	400.6	386.7		
BIO-MASS	117A	STRAW	1A4b i	020200	925	872.5	820	767	715	663	610	558	505	453	400	400	400	400	400	400	400	400	400	400	400	400	400
BIO-MASS	309A	BIOGAS	1A1a	010105	14	14	14	14	14	14	14	14	14	14	14	13	13	12	11	10	10	10	10	10	10	10	10
BIO-MASS	309A	BIOGAS	1A2f i	032005												13	13	12	11	10	10	10	10	10	10	10	10
BIO-MASS	309A	BIOGAS	1A4a i	020105	14	14	14	14	14	14	14	14	14	14	14	13	13	12	11	10	10	10	10	10	10	10	10
BIO-MASS	309A	BIOGAS	1A4c i	020304					14	14	14	14	14	14	14	13	13	12	11	10	10	10	10	10	10	10	10

Table 2A-4.8 CO emission factors time-series, g per GJ for the years 1990 to 2012.

fuel_type	fuel	fuel_gr_abbr	nfr_id	snap	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GAS	301A	NATURAL GAS	1A1a	010104	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	5.5	4.8	4.8	4.8	4.8	4.8	4.8
GAS	301A	NATURAL GAS	1A1a	010105	189	211	212	227	226	222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A1c	010504	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	5.5	4.8	4.8	4.8	4.8	4.8	4.8
GAS	301A	NATURAL GAS	1A2c	030604	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	5.5	4.8	4.8	4.8	4.8	4.8	4.8
GAS	301A	NATURAL GAS	1A2c	030605								182	182	182	183	163	142	122	101	81							
GAS	301A	NATURAL GAS	1A2d	031104						6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	5.5	4.8	4.8	4.8	4.8	4.8	4.8
GAS	301A	NATURAL GAS	1A2e	030904					6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	5.5	4.8	4.8	4.8	4.8	4.8	4.8
GAS	301A	NATURAL GAS	1A2e	030905					226	222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A2f i	030705						222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A2f i	031005							221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A2f i	031305							221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A2f i	031405						222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A2f i	032004							6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2		4.8	4.8	4.8	4.8	4.8	4.8
GAS	301A	NATURAL GAS	1A2f i	032005	189	211	212	227	226	222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A4a i	020104						6.2		6.2			6.2	6.2	6.2	6.2	6.2	6.2	5.5	4.8					
GAS	301A	NATURAL GAS	1A4a i	020105	189	211	212	227	226	222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A4b i	020204		211	212	227	226	222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
GAS	301A	NATURAL GAS	1A4c i	020304	189	211	212	227	226	222	221	182	182	182	183	163	142	122	101	81	70	58	58	58	58	58	58
WASTE	114A	WASTE	1A1a	010101									7.4	7.4		8	8	8						3.9			
WASTE	114A	WASTE	1A1a	010102					7.4	7.4	7.4	7.4	7.4	7.4	8	8	8	8	6.6	5.3	3.9	3.9	3.9	3.9	3.9	3.9	3.9
WASTE	114A	WASTE	1A1a	010103					7.4	7.4	7.4	7.4	7.4	7.4	8	8	8	8	6.6	5.3	3.9	3.9	3.9	3.9	3.9	3.9	3.9
WASTE	114A	WASTE	1A1a	010104					7.4	7.4	7.4	7.4	7.4	7.4	8		8	8			3.9			3.9	3.9	3.9	3.9
WASTE	114A	WASTE	1A1a	010200	100	85	70	55																			
WASTE	114A	WASTE	1A1a	010202						25	10	10	10														
WASTE	114A	WASTE	1A1a	010203					40	25	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
WASTE	114A	WASTE	1A2a	030400					40	25																	
WASTE	114A	WASTE	1A2c	030600	100	85	70	55	40	25	10	10	10		10					10		10					
WASTE	114A	WASTE	1A2d	031100	100	85	70	55	40	25	10	10	10	10	10					10		10	10	10	10	10	10
WASTE	114A	WASTE	1A2e	030900	100	85	70	55	40	25	10		10	10	10					10		10	10	10	10	10	10
WASTE	114A	WASTE	1A2f i	030700	100	85	70	55	40	25			10														
WASTE	114A	WASTE	1A2f i	031000	100	85	70	55	40	25	10	10	10	10	10							10					
WASTE	114A	WASTE	1A2f i	031200	100	85			40	25																	
WASTE	114A	WASTE	1A2f i	031300	100	85	70	55	40	25	10	10	10		10					10		10	10	10	10	10	10
WASTE	114A	WASTE	1A2f i	031400			70	55	40	25	10	10	10	10	10					10		10					
WASTE	114A	WASTE	1A2f i	032000	100	85	70	55	40	25	10	10	10	10	10					10		10					
WASTE	114A	WASTE	1A4a i	020100	100	85	70	55	40	25	10	10	10	10				10	10	10	10		10		10	10	10
WASTE	114A	WASTE	1A4a i	020103					40	25	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
BIOMASS	111A	WOOD	1A1a	010200	400	373	347	320																			
BIOMASS	111A	WOOD	1A1a	010203					293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A2a	030400	400	373	347	320	293									240	240								
BIOMASS	111A	WOOD	1A2d	031100	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240			240	240	240	240	240
BIOMASS	111A	WOOD	1A2e	030900	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240		
BIOMASS	111A	WOOD	1A2f i	030700	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A2f i	031000					293	267				240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A2f i	031200	400	373	347		293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A2f i	031300	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A2f i	031400	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240

fuel_type	fuel	fuel_gr_abbr	nfr_id	snap	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BIOMASS	111A	WOOD	1A2f i	031403					293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A2f i	032000	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A2f i	032003					293	267	240	240	240	240	240	240	240										
BIOMASS	111A	WOOD	1A4a i	020100	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	111A	WOOD	1A4a i	020103					293	267	240	240															
BIOMASS	111A	WOOD	1A4b i	020200	4227.8	4227.8	4227.8	4227.8	4227.8	4227.8	4227.8	4227.8	4227.8	4227.8	4227.8	3810.0	3654.9	3633.0	3604.7	3461.1	3296.7	3349.5	3194.1	2982.1	2868.0	2755.7	2675.8
BIOMASS	111A	WOOD	1A4b i	020202																3461.1	3296.7	3349.5	3194.1	2982.1	2868.0	2755.7	2675.8
BIOMASS	111A	WOOD	1A4b i	020204																			3194.1	2982.1	2868.0		
BIOMASS	111A	WOOD	1A4c i	020300	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
BIOMASS	117A	STRAW	1A1a	010200	600	554	508	463																			
BIOMASS	117A	STRAW	1A1a	010203					417	371	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325
BIOMASS	117A	STRAW	1A4b i	020200	8500	8500	8500	8500	8500	7500	6500	5500	4500	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
BIOMASS	117A	STRAW	1A4c i	020300	8500	8500	8500	8500	8500	7500	6500	5500	4500	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
BIOMASS	309A	BIOGAS	1A1a	010105	230	234	239	243	248	252	256	260	265	269	273	279	285	292	298	304	310	310	310	310	310	310	310
BIOMASS	309A	BIOGAS	1A2f i	032005												279	285	292	298	304	310	310	310	310	310	310	310
BIOMASS	309A	BIOGAS	1A4a i	020105	230	234	239	243	248	252	256	260	265	269	273	279	285	292	298	304	310	310	310	310	310	310	310
BIOMASS	309A	BIOGAS	1A4c i	020304					248	252	256	260	265	269	273	279	285	292	298	304	310	310	310	310	310	310	310

Table 2A-4.9 PM emission factors (in g per GJ) and references, 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	TSP	Ref	PM_{10}	Ref	$PM_{2.5}$	Ref
BIOMASS	111A	WOOD	1A1a	0101	10	18	7.45	8	4.82	8
				0102	19	1	13	2	10	1
			1A2 a-f	(all)	19	1	13	2	10	1
			1A4a i	0201	143	1	143	9	135	9
			1A4b i	0202	477	17	453	17	442	17
			1A4c i	0203	143	1	143	9	135	9
	117A	STRAW	1A1a	0101	2.3	18	1.71	3	1.11	3
				0102	21	1	15	2	12	2
			1A4b i	0202	234	4	222	5	211	5
			1A4c i	020300	234	4	222	5	211	5
				020302	21	1	15	2	12	2
	215A	BIO OIL	1A1a	0101	5	15	5	15	5	15
				0102	5	15	5	15	5	15
				0102	5	15	5	15	5	15
			1A2a-f	03	5	15	5	15	5	15
			1A4b i	0202	5	15	5	15	5	15
	309A	BIOGAS	1A1a	010101	1.5	6	1.5	7	1.5	7
				010102	1.5	6	1.5	7	1.5	7
				010105	2.63	3	0.451	3	0.206	3
				0102	1.5	6	1.5	7	1.5	7
			1A2a-f	Engines	2.63	3	0.451	3	0.206	3
				Other	1.5	6	1.5	7	1.5	7
			1A4a i	0201	1.5	6	1.5	7	1.5	7
				Engines	2.63	3	0.451	3	0.206	3
			1A4c i	0203	1.5	6	1.5	7	1.5	7
				Engines	2.63	3	0.451	3	0.206	3
	310A	BIO PROD GAS	1A1a	010105	2.63	19	0.451	19	0.206	19
			1A4a	020105	2.63	19	0.451	19	0.206	19
WASTE	114A	WASTE	1A1a	0101	0.29	18	0.29	3	0.29	3
				0102	4.2	20	0.29	10	0.29	10
			1A2 a-f	03	4.2	20	3.2	20	2.1	20
			1A4a i	0201	4.2	20	3.2	20	2.1	20
	115A	INDUSTRIAL WASTE	1A2f i	0316	4.2	20	3.2	20	2.1	20
GAS	301A	NATURAL GAS	1A1a	0101	0.1	9	0.1	9	0.1	9
				Gas turbines	0.1	3	0.061	3	0.051	3
				Engines	0.76	3	0.189	3	0.161	3
				0102	0.1	9	0.1	9	0.1	9
			1A1c	010504	0.1	3	0.061	3	0.051	3
			1A2a-f	Engines	0.76	3	0.189	3	0.161	3
				Turbines	0.1	3	0.061	3	0.051	3
				Other	0.1	9	0.1	9	0.1	9
			1A4a i	0201	0.1	9	0.1	9	0.1	9
				Engines	0.76	3	0.189	3	0.161	3
			1A4b i	0202	0.1	9	0.1	9	0.1	9
				Engines	0.76	3	0.189	3	0.161	3
			1A4c i	0203	0.1	9	0.1	9	0.1	9
				Engines	0.76	3	0.189	3	0.161	3
LIQUID	110A	PETROLEUM COKE	1A2a-f	03	10	9	7	9	3	9
	203A	RESIDUAL OIL	1A1a	010101	3	3	3	3	2.5	3
				010102	9.5	18	9.5	13	7.9	13
				010103	9.5	18	9.5	13	7.9	13
				010104	3	9	3	9	2.5	9
				0102	3	9	3	9	2.5	9
			1A1b	010306	50	9	40	9	35	9
			1A2 a-f	03	9.5	18	7.1	13	4.8	13
			1A4a	0201	14	6	10.5	13	7	13
			1A4b	0202	14	6	10.5	13	7	13
			1A4c i	0203	14	6	10.5	13	7	13
	204A	GAS OIL	1A1a	0101	5	9	5	9	5	9
				0102	5	9	5	9	5	9
			1A1b	010306	5	9	5	9	5	9
			1A2a-f	all	5	9	5	9	5	9
			1A4a i	0201	5	9	5	9	5	9
			1A4b i	0202	5	9	5	9	5	9
			1A4c i	0203	5	9	5	9	5	9
	206A	KEROSENE	1A2 a-f	all	5	9	5	9	5	9
			1A4a i	0201	5	9	5	9	5	9
			1A4b i	0202	5	9	5	9	5	9
			1A4c i	0203	5	9	5	9	5	9
	303A	LPG	1A1a	0101, 0102	0.2	9	0.2	9	0.2	9
			1A1b	010306	0.2	9	0.2	9	0.2	9

			1A2 a-f	03	0.2	9	0.2	9	0.2	9
			1A4a	0201	0.2	9	0.2	9	0.2	9
			1A4b i	0202	0.2	9	0.2	9	0.2	9
			1A4c i	0203	0.2	9	0.2	9	0.2	9
	308A	REFINERY GAS	1A1b	0103	5	9	5	9	5	9
SOLID	101A	ANODE CARBON	1A2f i	0320	17	6	12	14	7	14
	102A	COAL	1A1a	0101	3	12	2.6	12	2.1	12
			1A2 a-f	03	17	6	12	14	7	14
			1A4b i	0202	17	6	12	14	7	14
			1A4c i	0203	17	6	12	14	7	14
	103A	FLY ASH FOSSIL	1A1a	0101	3	12	2.6	12	2.1	12
	106A	BROWN COAL BRI.	1A4b i	0202	17	16	12	16	7	16
	107A	COKE OVEN COKE	1A2 a-f	03	17	16	12	16	7	16
			1A4b i	0202	17	16	12	16	7	16

1. Danish legislation, Miljøstyrelsen 2001. Luftvejledningen, Begrænsning af luftforurening fra virksomheder, Vejledning fra Miljøstyrelsen nr 2 2001.
2. Particulate size distribution for wood and straw combustion in power plants refers to the TNO CEPMEIP emission factor database 2001 (wood). Available at: http://www.air.sk/tno/cepmeip/ (05-02-2011).
3. Nielsen, M. & Illerup, J.B: 2003. Emissionsfaktorer og emissionsopgørelse for decentral kraftvarme. Eltra PSO projekt 3141. Kortlægning af emissioner fra decentrale kraftvarmeværker. Delrapport 6. Danmarks Miljøundersøgelser. 116 s. –Faglig rapport fra DMU nr. 442.(In Danish, with an English summary). Available at: http://www.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/FR442.pdf (05-02-2011).
4. German, L., 2003. The Danish Technological Institute, Personal communication, rough estimate.
5. Particulate size distribution for wood and straw combustion in residential plants refers to the TNO CEPMEIP emission factor database 2001 (wood). Available at: http://www.air.sk/tno/cepmeip/ (05-02-2011).
6. Danish legislation. Miljøstyrelsen 1990, Bekendtgørelse 689, 15/10/1990, Bekendtgørelse om begrænsning af emissioner af svovldioxid, kvælstofoxider og støv fra store fyringsanlæg. (and Bekendtgørelse 518/1995).
7. All TSP emission is assumed to be <2,5µm (NERI assumption).
8. Estimated based on the TSP emission factor.
9. The TNO CEPMEIP emission factor database 2001. Available on the internet at: http://www.air.sk/tno/cepmeip/ (05-02-2011).
10. Error. Will be corrected in the next inventory.
11. Particulate size distribution is unknown. The PM10 fraction is assumed to equal 85 % of TSP and the PM2.5 fraction is assumed to equal 70 % of TSP (NERI assumption).
12. Livbjerg, H. Thellefsen, M. Sander, B. Simonsen, P., Lund, C., Poulsen, K. & Fogh, C.L., 2001. Feltstudier af Forbrændings-aerosoler, EFP -98 Projekt, Aerosollaboratoriet DTU, FLS Miljø, Forskningscenter Risø, Elsam, Energi E2 (in Danish).
13. Particulate size distribution for residual oil combustion refers to the TNO CEPMEIP emission factor database 2001. Available at: http://www.air.sk/tno/cepmeip/ (05-02-2011).
14. Particulate size distribution for coal combustion refers to the TNO CEPMEIP emission factor database 2001. Available at: http://www.air.sk/tno/cepmeip/ (05-02-2011).
15. Assuming same emission factors as for gas oil (NERI assumption).
16. Same emission factor as for coal is assumed (NERI assumption).
17. DCE estimate based on DEA (2013a), DEPA (2013), Glasius et al. (2005), EEA (2013), Illerup et al. (2007). Nordic Swan label (2012), ,
18. Nielsen, M., Nielsen, O.K. & Thomsen, M. 2010c: Emissionskortlægning for decentral kraftvarme, Energinet.dk miljøprojekt nr. 07/1882. Delrapport 5. Emissionsfaktorer og emissionsopgørelse for decentral kraftvarme, 2006. National Environmental Research Institute, Aarhus University.
19. Same emission factor as for biogas assumed (NERI assumption).
20. The emission factor have been estimated by NERI based on plant specific data from MSW incineration plants, district heating, 2008.

Table 2A-4.10 TSP emission factors, time-series for the years 2000 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
LIQUID	203A	RESIDUAL OIL	1A2f i	032005				14	14	14	14		14			9.5	9.5
WASTE	114A	WASTE	1A1a	010102	2.02	2.02	2.02	2.02	1.44	0.87	0.29	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	010103	2.02	2.02	2.02	2.02	1.44	0.87	0.29	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	010104	2.02		2.02	2.02			0.29				0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	010203	6	5.7	5.5	5.2	5	4.7	4.5	4.2	4.2	4.2	4.2	4.2	4.2
WASTE	114A	WASTE	1A2c	030600	6					4.7		4.2					
WASTE	114A	WASTE	1A2d	031100	6					4.7		4.2	4.2	4.2	4.2	4.2	4.2
WASTE	114A	WASTE	1A2e	030900	6					4.7		4.2	4.2	4.2	4.2	4.2	4.2
WASTE	114A	WASTE	1A2e	030902						4.7		4.2	4.2				
WASTE	114A	WASTE	1A2f i	030800						4.7		4.2	4.2	4.2	4.2	4.2	4.2
WASTE	114A	WASTE	1A2f i	031000	6							4.2					
WASTE	114A	WASTE	1A2f i	031300	6					4.7		4.2	4.2	4.2	4.2	4.2	4.2
WASTE	114A	WASTE	1A2f i	031400	6					4.7		4.2					
WASTE	114A	WASTE	1A2f i	032000	6					4.7		4.2					
WASTE	114A	WASTE	1A4a i	020100				5.2	5	4.7	4.5		4.2		4.2	4.2	4.2
WASTE	114A	WASTE	1A4a i	020103	6	5.7	5.5	5.2	5	4.7	4.5	4.2	4.2	4.2	4.2	4.2	4.2
WASTE	115A	INDUSTR. WASTES	1A2f i	031600	6	5.7	5.5	5.2	5	4.7	4.5	4.2	4.2	4.2	4.2	4.2	4.2
BIOMASS	111A	WOOD	1A4b i	020200	791	710	679	674	669	641	610	620	587	543	517	494	477
BIOMASS	111A	WOOD	1A4b i	020202						641	610	620	587	543	517	494	477
BIOMASS	111A	WOOD	1A4b i	020204									587	543	517		

Table 2A-4.11 PM_{10} emission factors, time-series for the years 2000 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A4c i	Agriculture/Forestry/Fishing, Stationary	020304					0	12				12			
LIQUID	203A	RESIDUAL OIL	1A2f i	Industry-Other	032005				10.5	10.5	10.5	10.5		10.5			7.1	7.1
LIQUID	203A	RESIDUAL OIL	1A4c i	Agriculture/Forestry/Fishing, Stationary	020304	50	50	50	50							10.5	10.5	
WASTE	114A	WASTE	1A1a	Electricity and heat production	010102	1.126	1.126	1.126	1.126	1.126	0.87	0.29	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	Electricity and heat production	010103	1.126	1.126	1.126	1.126	1.126	0.87	0.29	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	Electricity and heat production	010104	1.126		4.2	1.126			0.29				0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	Electricity and heat production	010203	4.6	4.4	4.2	4	3.8	3.6	3.4	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A2c	Chemicals	030600	4.6					3.6		3.2					
WASTE	114A	WASTE	1A2d	Pulp, Paper and Print	031100	4.6					3.6		3.2	3.2	3.2	3.2	3.2	3.2
WASTE	114A	WASTE	1A2e	Food processing, beverages and tobacco	030900	4.6					3.6		3.2	3.2	3.2	3.2	3.2	3.2
WASTE	114A	WASTE	1A2e	Food processing, beverages and tobacco	030902						3.6		3.2	3.2				
WASTE	114A	WASTE	1A2f i	Industry-Other	030800						3.6		3.2	3.2	3.2	3.2	3.2	3.2
WASTE	114A	WASTE	1A2f i	Industry-Other	031000	4.6							3.2					
WASTE	114A	WASTE	1A2f i	Industry-Other	031300	4.6					3.6		3.2	3.2	3.2	3.2	3.2	3.2
WASTE	114A	WASTE	1A2f i	Industry-Other	031400	4.6					3.6		3.2					
WASTE	114A	WASTE	1A2f i	Industry-Other	032000	4.6					3.6		3.2					
WASTE	114A	WASTE	1A4a i	Commercial/Institutional plants	020100				4	3.8	3.6	3.4		3.2		3.2	3.2	3.2
WASTE	114A	WASTE	1A4a i	Commercial/Institutional plants	020103	4.6	4.4	4.2	4	3.8	3.6	3.4	3.2	3.2	3.2	3.2	3.2	3.2
WASTE	115A	INDUSTR. WASTES	1A2f i	Industry-Other	031600	4.6	4.4	4.2	4	3.8	3.6	3.4	3.2	3.2	3.2	3.2	3.2	3.2
BIOMASS	111A	WOOD	1A4b i	Residential plants	020200	752	674	645	641	635	609	579	589	558	516	491	469	453
BIOMASS	111A	WOOD	1A4b i	Residential plants	020202						609	579	589	558	516	491	469	453
BIOMASS	111A	WOOD	1A4b i	Residential plants	020204									558	516	491		

Table 2A-4.12 $PM_{2.5}$ emission factors, time-series for the years 2000 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	nfr_name	snap_id	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A4c i	Agriculture/Forestry/Fishing, Stationary	020304					0	7				7			
LIQUID	203A	RESIDUAL OIL	1A2f i	Industry-Other	032005				7	7	7	7		7			4.8	4.8
LIQUID	203A	RESIDUAL OIL	1A4c i	Agriculture/Forestry/Fishing, Stationary	020304	40	40	40	40							7	7	
WASTE	114A	WASTE	1A1a	Electricity and heat production	010102	1.084	1.084	1.084	1.084	1.084	0.87	0.29	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	Electricity and heat production	010103	1.084	1.084	1.084	1.084	1.084	0.87	0.29	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	Electricity and heat production	010104	1.084		2.7	1.084			0.29				0.29	0.29	0.29
WASTE	114A	WASTE	1A1a	Electricity and heat production	010203	3	2.9	2.7	2.6	2.5	2.4	2.2	0.29	0.29	0.29	0.29	0.29	0.29
WASTE	114A	WASTE	1A2c	Chemicals	030600	3					2.4		2.1					
WASTE	114A	WASTE	1A2d	Pulp, Paper and Print	031100	3					2.4		2.1	2.1	2.1	2.1	2.1	2.1
WASTE	114A	WASTE	1A2e	Food processing, beverages and tobacco	030900	3					2.4		2.1	2.1	2.1	2.1	2.1	2.1
WASTE	114A	WASTE	1A2e	Food processing, beverages and tobacco	030902						2.4		2.1	2.1				
WASTE	114A	WASTE	1A2f i	Industry-Other	030800						2.4		2.1	2.1	2.1	2.1	2.1	2.1
WASTE	114A	WASTE	1A2f i	Industry-Other	031000	3							2.1					
WASTE	114A	WASTE	1A2f i	Industry-Other	031300	3					2.4		2.1	2.1	2.1	2.1	2.1	2.1
WASTE	114A	WASTE	1A2f i	Industry-Other	031400	3					2.4		2.1					
WASTE	114A	WASTE	1A2f i	Industry-Other	032000	3					2.4		2.1					
WASTE	114A	WASTE	1A4a i	Commercial/Institutional plants	020100				2.6	2.5	2.4	2.2		2.1		2.1	2.1	2.1
WASTE	114A	WASTE	1A4a i	Commercial/Institutional plants	020103	3	2.9	2.7	2.6	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1
WASTE	115A	INDUSTR. WASTES	1A2f i	Industry-Other	031600	3	2.9	2.7	2.6	2.5	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1
BIOMASS	111A	WOOD	1A4b i	Residential plants	020200	728	653	626	622	617	591	563	573	543	502	479	458	442
BIOMASS	111A	WOOD	1A4b i	Residential plants	020202						591	563	573	543	502	479	458	442
BIOMASS	111A	WOOD	1A4b i	Residential plants	020204									543	502	479		

Table 2A-4.13 HM emission factors (mg per GJ) and references 2012.

fuel_type	fuel_gr_abbr	nfr	nfr_name	snap	As mg/GJ	Cd mg/GJ	Cr mg/GJ	Cu mg/GJ	Hg mg/GJ	Ni mg/GJ	Pb mg/GJ	Se mg/GJ	Zn mg/GJ	Reference
BIOMASS	WOOD	-	All non-residential	all	1.4	0.27	2.34	2.6	0.4	2.34	3.62	0.5	2.3	**2 and 4**
		1A4b i	Residential	all	0.5	1	2	8	0.4	2	40	0.5	100	**2**
	STRAW	1A1a	Electricity and heat production	all	1.4	0.32	1.6	1.7	0.31	1.7	6.2	0.5	0.41	**2 and 4**
		1A4b i	Residential	0202	1	1.4	2.9	8.6	0.5	4.4	40	0.5	130	**2**
		1A4c i	Agriculture/ Forestry	0203	1	1.4	2.9	8.6	0.5	4.4	40	0.5	130	**2**
	BIO OIL	-	All non-residential	engines	0.055	0.011	0.2	0.3	0.11	0.013	0.15	0.22	58	**5**
		-	All non-residential	boilers	0.002	0.001	0.2	0.13	0.12	0.005	0.012	0.002	0.42	**5**
		1A4b i	Residential	020200	0.002	0.001	0.2	0.13	0.12	0.005	0.012	0.002	0.42	**5**
	BIOGAS	-	All	all	0.04	0.002	0.18	0.31	0.12	0.23	0.005	0.21	3.95	**4**
	BIO PROD GAS	-	All	all	0.12	0.009	0.029	0.045	0.54	0.014	0.022	0.18	0.058	**4**
WASTE	WASTE	-	All	all	0.59	0.44	1.56	1.3	1.79	2.06	5.52	1.11	2.33	**4**
	INDUSTRIAL WASTE	1A2f	Industry - Other	all	0.59	0.44	1.56	1.3	1.79	2.06	5.52	1.11	2.33	**4**
GAS	NATURAL GAS	-	Engines (reciprocating)	all	0.05	0.003	0.05	0.01	0.1	0.05	0.04	0.01	2.9	**4**
		-	All other	all	0.119	0.00025	0.00076	0.000076	0.1	0.00051	0.0015	0.01	0.0015	**7 and 2**
LIQUID	PETROLEUM COKE	all	All	all	4.3	1.3	2.7	5.7	0.4	362	4.9	2.2	94	**2**
	RESIDUAL OIL	1A1a	Electricity and heat production	all	2.1	0.53	2.6	2.4	0.21	362	2.6	1.2	7.4	**1**
		All other	All other	all	4.3	1.3	2.7	5.7	0.4	362	4.9	2.2	94	**2**
	GAS OIL	-	Engines (reciprocating)	all	0.055	0.011	0.2	0.3	0.11	0.013	0.15	0.22	58	**4**
		-	All other	all	0.002	0.001	0.2	0.13	0.12	0.005	0.012	0.002	0.42	**3**
	KEROSENE	All	All	all	0.002	0.001	0.2	0.13	0.12	0.005	0.012	0.002	0.42	**5**
	LPG	-	Engines (reciprocating)	all	0.055	0.011	0.2	0.3	0.11	0.013	0.15	0.22	58	**6**
		-	All other	all	0.002	0.001	0.2	0.13	0.12	0.005	0.012	0.002	0.42	**2**
	REFINERY GAS	1A1b	Petroleum refining	all	1.8	1.4	1.4	2.7	1.4	1.4	4.1	6.8	1.8	**2**
SOLID	ANODE CARBON	1A2f	Industry - Other	all	4	1.8	13.5	17.5	7.9	13	134	25	200	**2**
	COAL	1A1a	Electricity and heat production	all	0.51	0.07	0.86	0.48	1.3	0.97	0.62	5.9	1.9	**1**
		All other	All other	All	4	1.8	13.5	17.5	7.9	13	134	25	200	**2**
	FLY ASH FOSSIL	1A1a	Electricity and heat production		0.51	0.07	0.86	0.48	1.3	0.97	0.62	5.9	1.9	**1**
	BROWN COAL BRI.	1A4b i	Residential	0202	2.5	1.5	11.2	22.3	5.1	12.7	130	1	220	**2**
	COKE OVEN COKE	1A2 a-f	Industry - Other	all	4	1.8	13.5	17.5	7.9	13	134	25	200	**2**
		1A4b i	Residential	020200	2.5	1.5	11.2	22.3	5.1	12.7	130	1	220	**2**

Reference: 1. Implied emission factor 2008 estimated by DCE based on plant specific emission data for power plants. 2. EMEP/EEA Emission inventory Guidebook, 2009 update (EEA 2009). 3. CONCAWE (Denier van der Gon & Kuenen, 2009). 4. Nielsen et al. 2010. 5. Assumed equal to gas oil. DCE assumption. 6. Assumed equal to natural gas fuelled engines. 7. Gruijthuijsen (2001).

Table 2A-4.14 As emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	3.3	2.8	2.4	1.9																			
SOLID	102A	COAL	1A1a	010101	3.3	2.8	2.4	1.9	1.4	0.93	0.9	0.87	0.83	0.8	0.77	0.72	0.67	0.63	0.58	0.53	0.523	0.517	0.51	0.51	0.51	0.51	0.51
SOLID	102A	COAL	1A1a	010102	3.3	2.8	2.4	1.9	1.4	0.93	0.9	0.87	0.83	0.8	0.77	0.72	0.67	0.63	0.58	0.53	0.523	0.517	0.51	0.51	0.51	0.51	0.51
SOLID	102A	COAL	1A1a	010103					1.4	0.93	0.9																
SOLID	102A	COAL	1A1a	010104					1.4	0.93	0.9	0.87													0.51	0.51	
SOLID	102A	COAL	1A1a	010200	3.3	2.8	2.4	1.9																			
SOLID	102A	COAL	1A1a	010202					1.4	0.93																	
SOLID	102A	COAL	1A1a	010203					1.4	0.93	0.9	0.87	0.83	0.8	0.77	0.72	0.67	0.63	0.58	0.53		0.517	0.51		0.51	0.51	0.51
SOLID	107A	COKE OVEN COKE	1A2e	030903																		3.2	4	4	4	4	4
LIQUID	110A	PETROLEUM COKE	1A1a	010102					2.1	2.1									2.1	2.1				2.1	4.3	4.3	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.002	0.002	0.002	0.055	0.055
WASTE	114A	WASTE	1A1a	010101									7.2	7										0.59			
WASTE	114A	WASTE	1A1a	010102					7.8	7.8	7.6	7.4	7.2	7	6.8	6.8	6.8	6.8	4.7	2.7	0.59	0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A1a	010103					7.8	7.8	7.6	7.4	7.2	7	6.8	6.8	6.8	6.8	4.7	2.7	0.59	0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A1a	010104					7.8	7.8	7.6	7.4	7.2	7	6.8	6.8	6.8	6.8	4.7	2.7	0.59	0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A1a	010202						7.8	7.7	7.6	7.4														
WASTE	114A	WASTE	1A1a	010203					7.8	7.8	7.7	7.6	7.4	7.3	7.2	7.1	6.9	6.8	4.7	2.7	0.59	0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A2c	030600	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.6	7.4		7.2					2.7		0.59					
WASTE	114A	WASTE	1A2d	031100	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.6	7.4	7.3	7.2					2.7		0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A2e	030900	7.8	7.8	7.8	7.8	7.8	7.8	7.7		7.4	7.3	7.2					2.7		0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A2e	030902																2.7		0.59	0.59				
WASTE	114A	WASTE	1A2f i	030700	7.8	7.8	7.8	7.8	7.8	7.8			7.4														
WASTE	114A	WASTE	1A2f i	030800																2.7		0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A2f i	031000	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.6	7.4	7.3	7.2							0.59					
WASTE	114A	WASTE	1A2f i	031300	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.6	7.4		7.2					2.7		0.59	0.59	0.59	0.59	0.59	0.59
WASTE	114A	WASTE	1A2f i	031400			7.8	7.8	7.8	7.8	7.7	7.6	7.4	7.3	7.2					2.7		0.59					
WASTE	114A	WASTE	1A2f i	032000	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.6	7.4	7.3	7.2					2.7		0.59					
WASTE	114A	WASTE	1A4a i	020100	7.8	7.8	7.8	7.8	7.8	7.8	7.7	7.6	7.4	7.3				6.8	4.7	2.7	0.59		0.59		0.59	0.59	0.59
WASTE	114A	WASTE	1A4a i	020103					7.8	7.8	7.7	7.6	7.4	7.3	7.2	7.1	6.9	6.8	4.7	2.7	0.59	0.59	0.59	0.59	0.59	0.59	0.59
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											7.2	7.1	6.9	6.8	4.7	2.7	0.59	0.59	0.59	0.59	0.59	0.59	0.59
BIOMASS	117A	STRAW	1A4c i	020302					1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1	1.4	1	1		1	1
BIOMASS	215A	BIO OIL	1A2f i	031305													0.055	0.055	0.055	0.002	0.002						

Table 2A-4.15 Cd emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	1.1	0.9	0.71	0.51																			
SOLID	102A	COAL	1A1a	010101	1.1	0.9	0.71	0.51	0.32	0.12	0.11	0.1	0.09	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
SOLID	102A	COAL	1A1a	010102	1.1	0.9	0.71	0.51	0.32	0.12	0.11	0.1	0.09	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
SOLID	102A	COAL	1A1a	010103					0.32	0.12	0.11																
SOLID	102A	COAL	1A1a	010104					0.32	0.12	0.11	0.1													0.07	0.07	
SOLID	102A	COAL	1A1a	010200	1.1	0.9	0.71	0.51																			
SOLID	102A	COAL	1A1a	010202					0.32	0.12																	
SOLID	102A	COAL	1A1a	010203					0.32	0.12	0.11	0.1	0.09	0.08	0.07	0.07	0.07	0.07	0.07	0.07		0.07	0.07		0.07	0.07	0.07
LIQUID	110A	PETROLEUM COKE	1A1a	010102					0.53	0.53									0.53	0.53				0.53	1.3	1.3	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.001	0.001	0.001	0.011	0.011
WASTE	114A	WASTE	1A1a	010100	31	27	22	18																			
WASTE	114A	WASTE	1A1a	010101									6.6	5.7										0.44			
WASTE	114A	WASTE	1A1a	010102					14	9.2	8.3	7.4	6.6	5.7	4.8	4.8	4.8	4.8	3.3	1.9	0.44	0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A1a	010103					14	9.2	8.3	7.4	6.6	5.7	4.8	4.8	4.8	4.8	3.3	1.9	0.44	0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A1a	010104					14	9.2	8.3	7.4	6.6	5.7	4.8	4.8	4.8	4.8	3.3	1.9	0.44	0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A1a	010200	31	27	22	18																			
WASTE	114A	WASTE	1A1a	010202						9.2	8.7	8.1	7.6														
WASTE	114A	WASTE	1A1a	010203					14	9.2	8.7	8.1	7.6	7	6.5	5.9	5.4	4.8	3.3	1.9	0.44	0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A2a	030400					14	9.2																	
WASTE	114A	WASTE	1A2c	030600	31	27	22	18	14	9.2	8.7	8.1	7.6		6.5					1.9		0.44					
WASTE	114A	WASTE	1A2d	031100	31	27	22	18	14	9.2	8.7	8.1	7.6	7	6.5					1.9		0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A2e	030900	31	27	22	18	14	9.2	8.7		7.6	7	6.5					1.9		0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A2e	030902																1.9		0.44	0.44				
WASTE	114A	WASTE	1A2f i	030700	31	27	22	18	14	9.2			7.6														
WASTE	114A	WASTE	1A2f i	030800																1.9		0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A2f i	031000	31	27	22	18	14	9.2	8.7	8.1	7.6	7	6.5							0.44					
WASTE	114A	WASTE	1A2f i	031200	31	27			14	9.2																	
WASTE	114A	WASTE	1A2f i	031300	31	27	22	18	14	9.2	8.7	8.1	7.6		6.5					1.9		0.44	0.44	0.44	0.44	0.44	0.44
WASTE	114A	WASTE	1A2f i	031400			22	18	14	9.2	8.7	8.1	7.6	7	6.5					1.9		0.44					
WASTE	114A	WASTE	1A2f i	032000	31	27	22	18	14	9.2	8.7	8.1	7.6	7	6.5					1.9		0.44					
WASTE	114A	WASTE	1A4a i	020100	31	27	22	18	14	9.2	8.7	8.1	7.6	7				4.8	3.3	1.9	0.44		0.44		0.44	0.44	0.44
WASTE	114A	WASTE	1A4a i	020103					14	9.2	8.7	8.1	7.6	7	6.5	5.9	5.4	4.8	3.3	1.9	0.44	0.44	0.44	0.44	0.44	0.44	0.44
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											6.5	5.9	5.4	4.8	3.3	1.9	0.44	0.44	0.44	0.44	0.44	0.44	0.44
BIOMASS	117A	STRAW	1A4c i	020302					0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	1.4	0.32	1.4	1.4		1.4	1.4
BIOMASS	215A	BIO OIL	1A2f i	031305													0.011	0.011	0.011	0.001	0.001						

Table 2A-4.16 Cr emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	8	7.3	6.7	6																			
SOLID	102A	COAL	1A1a	010101	8	7.3	6.7	6	5.4	4.7	4.1	3.5	2.9	2.3	1.7	1.6	1.4	1.3	1.1	1	0.95	0.91	0.86	0.86	0.86	0.86	0.86
SOLID	102A	COAL	1A1a	010102	8	7.3	6.7	6	5.4	4.7	4.1	3.5	2.9	2.3	1.7	1.6	1.4	1.3	1.1	1	0.95	0.91	0.86	0.86	0.86	0.86	0.86
SOLID	102A	COAL	1A1a	010103					5.4	4.7	4.1																
SOLID	102A	COAL	1A1a	010104					5.4	4.7	4.1	3.5													0.86	0.86	
SOLID	102A	COAL	1A1a	010200	8	7.3	6.7	6																			
SOLID	102A	COAL	1A1a	010202					5.4	4.7																	
SOLID	102A	COAL	1A1a	010203					5.4	4.7	4.1	3.5	2.9	2.3	1.7	1.6	1.4	1.3	1.1	1		0.91	0.86		0.86	0.86	0.86
LIQUID	110A	PETROLEUM COKE	1A1a	010102					2.6	2.6									2.6	2.6				2.6	2.7	2.7	
WASTE	114A	WASTE	1A1a	010100	186	155	125	94																			
WASTE	114A	WASTE	1A1a	010101									15	8.6										1.56			
WASTE	114A	WASTE	1A1a	010102					64	33	27	21	15	8.6	2.5	2.5	2.5	2.5	2.2	1.9	1.56	1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A1a	010103					64	33	27	21	15	8.6	2.5	2.5	2.5	2.5	2.2	1.9	1.56	1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A1a	010104					64	33	27	21	15	8.6	2.5	2.5	2.5	2.5	2.2	1.9	1.56	1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A1a	010200	186	155	125	94																			
WASTE	114A	WASTE	1A1a	010202						33	29	25	22														
WASTE	114A	WASTE	1A1a	010203					64	33	29	25	22	18	14	10	6.3	2.5	2.2	1.9	1.56	1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A2a	030400					64	33																	
WASTE	114A	WASTE	1A2c	030600	186	155	125	94	64	33	29	25	22		14					1.9		1.56					
WASTE	114A	WASTE	1A2d	031100	186	155	125	94	64	33	29	25	22	18	14					1.9		1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A2e	030900	186	155	125	94	64	33	29		22	18	14					1.9		1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A2e	030902																1.9		1.56	1.56				
WASTE	114A	WASTE	1A2f i	030700	186	155	125	94	64	33			22														
WASTE	114A	WASTE	1A2f i	030800																1.9		1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A2f i	031000	186	155	125	94	64	33	29	25	22	18	14							1.56					
WASTE	114A	WASTE	1A2f i	031200	186	155			64	33																	
WASTE	114A	WASTE	1A2f i	031300	186	155	125	94	64	33	29	25	22		14					1.9		1.56	1.56	1.56	1.56	1.56	1.56
WASTE	114A	WASTE	1A2f i	031400			125	94	64	33	29	25	22	18	14					1.9		1.56					
WASTE	114A	WASTE	1A2f i	032000	186	155	125	94	64	33	29	25	22	18	14					1.9		1.56					
WASTE	114A	WASTE	1A4a i	020100	186	155	125	94	64	33	29	25	22	18				2.5	2.2	1.9	1.56		1.56		1.56	1.56	1.56
WASTE	114A	WASTE	1A4a i	020103					64	33	29	25	22	18	14	10	6.3	2.5	2.2	1.9	1.56	1.56	1.56	1.56	1.56	1.56	1.56
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											14	10	6.3	2.5	2.2	1.9	1.56	1.56	1.56	1.56	1.56	1.56	1.56
BIOMASS	117A	STRAW	1A4c i	020302					1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	2.9	1.6	2.9	2.9		2.9	2.9

Table 2A-4.17 Cu emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	4.4	4.2	4	3.7																			
SOLID	102A	COAL	1A1a	010101	4.4	4.2	4	3.7	3.5	3.3	2.8	2.4	1.9	1.5	1	0.92	0.84	0.76	0.68	0.6	0.56	0.52	0.48	0.48	0.48	0.48	0.48
SOLID	102A	COAL	1A1a	010102	4.4	4.2	4	3.7	3.5	3.3	2.8	2.4	1.9	1.5	1	0.92	0.84	0.76	0.68	0.6	0.56	0.52	0.48	0.48	0.48	0.48	0.48
SOLID	102A	COAL	1A1a	010103					3.5	3.3	2.8																
SOLID	102A	COAL	1A1a	010104					3.5	3.3	2.8	2.4													0.48	0.48	
SOLID	102A	COAL	1A1a	010200	4.4	4.2	4	3.7																			
SOLID	102A	COAL	1A1a	010202					3.5	3.3																	
SOLID	102A	COAL	1A1a	010203					3.5	3.3	2.8	2.4	1.9	1.5	1	0.92	0.84	0.76	0.68	0.6		0.52	0.48		0.48	0.48	0.48
LIQUID	110A	PETROLEUM COKE	1A1a	010102					2.4	2.4									2.4	2.4				2.4	5.7	5.7	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.13	0.13	0.13	0.3	0.3
WASTE	114A	WASTE	1A1a	010100	123	105	87	68																			
WASTE	114A	WASTE	1A1a	010101									19	14										1.3			
WASTE	114A	WASTE	1A1a	010102					50	32	28	23	19	14	10.1	10.1	10.1	10.1	7.2	4.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A1a	010103					50	32	28	23	19	14	10.1	10.1	10.1	10.1	7.2	4.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A1a	010104					50	32	28	23	19	14	10.1	10.1	10.1	10.1	7.2	4.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A1a	010200	123	105	87	68																			
WASTE	114A	WASTE	1A1a	010202						32	29	27	24														
WASTE	114A	WASTE	1A1a	010203					50	32	29	27	24	21	18	16	13	10.1	7.2	4.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A2a	030400					50	32																	
WASTE	114A	WASTE	1A2c	030600	123	105	87	68	50	32	29	27	24		18					4.2		1.3					
WASTE	114A	WASTE	1A2d	031100	123	105	87	68	50	32	29	27	24	21	18					4.2		1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A2e	030900	123	105	87	68	50	32	29		24	21	18					4.2		1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A2e	030902																4.2		1.3	1.3				
WASTE	114A	WASTE	1A2f i	030700	123	105	87	68	50	32			24														
WASTE	114A	WASTE	1A2f i	030800																4.2		1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A2f i	031000	123	105	87	68	50	32	29	27	24	21	18							1.3					
WASTE	114A	WASTE	1A2f i	031200	123	105			50	32																	
WASTE	114A	WASTE	1A2f i	031300	123	105	87	68	50	32	29	27	24		18					4.2		1.3	1.3	1.3	1.3	1.3	1.3
WASTE	114A	WASTE	1A2f i	031400			87	68	50	32	29	27	24	21	18					4.2		1.3					
WASTE	114A	WASTE	1A2f i	032000	123	105	87	68	50	32	29	27	24	21	18					4.2		1.3					
WASTE	114A	WASTE	1A4a i	020100	123	105	87	68	50	32	29	27	24	21				10.1	7.2	4.2	1.3		1.3		1.3	1.3	1.3
WASTE	114A	WASTE	1A4a i	020103					50	32	29	27	24	21	18	16	13	10.1	7.2	4.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											18	16	13	10.1	7.2	4.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
BIOMASS	117A	STRAW	1A4c i	020302					1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	8.6	1.7	8.6	8.6		8.6	8.6
BIOMASS	215A	BIO OIL	1A2f i	031305													0.3	0.3	0.3	0.13	0.13						

Table 2A-4.18 Hg emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	2.2	2.1	2	2																			
SOLID	102A	COAL	1A1a	010101	2.2	2.1	2	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
SOLID	102A	COAL	1A1a	010102	2.2	2.1	2	2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
SOLID	102A	COAL	1A1a	010103					1.9	1.8	1.7																
SOLID	102A	COAL	1A1a	010104					1.9	1.8	1.7	1.6													1.3	1.3	
SOLID	102A	COAL	1A1a	010200	2.2	2.1	2	2																			
SOLID	102A	COAL	1A1a	010202					1.9	1.8																	
SOLID	102A	COAL	1A1a	010203					1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.3		1.3	1.3		1.3	1.3	1.3
LIQUID	110A	PETROLEUM COKE	1A1a	010102					0.21	0.21									0.21	0.21				0.21	0.4	0.4	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.12	0.12	0.12	0.11	0.11
WASTE	114A	WASTE	1A1a	010100	132	117	103	88																			
WASTE	114A	WASTE	1A1a	010101									28	18										1.79			
WASTE	114A	WASTE	1A1a	010102					74	59	49	38	28	18	7.4	7.4	7.4	7.4	5.5	3.7	1.79	1.79	1.79	1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A1a	010103					74	59	49	38	28	18	7.4	7.4	7.4	7.4	5.5	3.7	1.79	1.79	1.79	1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A1a	010104					74	59	49	38	28	18	7.4	7.4	7.4	7.4	5.5	3.7	1.79			1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A1a	010200	132	117	103	88																			
WASTE	114A	WASTE	1A1a	010202						59	53	46	40														
WASTE	114A	WASTE	1A1a	010203					74	59	53	46	40	33	27	20	14	7.4	5.5	3.7	1.79	1.79	1.79	1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A2a	030400					74	59																	
WASTE	114A	WASTE	1A2c	030600	132	117	103	88	74	59	53	46	40		27					3.7		1.79					
WASTE	114A	WASTE	1A2d	031100	132	117	103	88	74	59	53	46	40	33	27					3.7		1.79	1.79	1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A2e	030900	132	117	103	88	74	59	53		40	33	27					3.7		1.79	1.79	1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A2e	030902																3.7		1.79	1.79				
WASTE	114A	WASTE	1A2f i	030700	132	117	103	88	74	59			40														
WASTE	114A	WASTE	1A2f i	030800																3.7		1.79	1.79	1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A2f i	031000	132	117	103	88	74	59	53	46	40	33	27							1.79					
WASTE	114A	WASTE	1A2f i	031200	132	117			74	59																	
WASTE	114A	WASTE	1A2f i	031300	132	117	103	88	74	59	53	46	40		27					3.7		1.79	1.79	1.79	1.79	1.79	1.79
WASTE	114A	WASTE	1A2f i	031400			103	88	74	59	53	46	40	33	27					3.7		1.79					
WASTE	114A	WASTE	1A2f i	032000	132	117	103	88	74	59	53	46	40	33	27					3.7		1.79					
WASTE	114A	WASTE	1A4a i	020100	132	117	103	88	74	59	53	46	40	33				7.4	5.5	3.7	1.79		1.79		1.79	1.79	1.79
WASTE	114A	WASTE	1A4a i	020103					74	59	53	46	40	33	27	20	14	7.4	5.5	3.7	1.79	1.79	1.79	1.79	1.79	1.79	1.79
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											27	20	14	7.4	5.5	3.7	1.79	1.79	1.79	1.79	1.79	1.79	1.79
BIOMASS	117A	STRAW	1A4c i	020302					0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.5	0.31	0.5	0.5		0.5	0.5
BIOMASS	215A	BIO OIL	1A2f i	031305													0.11	0.11	0.11	0.12	0.12						

Table 2A-4.19 Ni emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010101	6.8	6.8	6.8	6.8	6.8	6.8	6.3	5.8	5.4	4.9	4.4	3.8	3.2	2.5	1.9	1.3	1.2	1.1	0.97	0.97	0.97	0.97	0.97
SOLID	102A	COAL	1A1a	010102	6.8	6.8	6.8	6.8	6.8	6.8	6.3	5.8	5.4	4.9	4.4	3.8	3.2	2.5	1.9	1.3	1.2	1.1	0.97	0.97	0.97	0.97	0.97
SOLID	102A	COAL	1A1a	010103					6.8	6.8	6.3																
SOLID	102A	COAL	1A1a	010104					6.8	6.8	6.3	5.8													0.97	0.97	
SOLID	102A	COAL	1A1a	010203					6.8	6.8	6.3	5.8	5.4	4.9	4.4	3.8	3.2	2.5	1.9	1.3		1.1	0.97		0.97	0.97	0.97
LIQUID	204A	GAS OIL	1A2f i	031205																			0.005	0.005	0.005	0.013	0.013
WASTE	114A	WASTE	1A1a	010100	192	165	137	110																			
WASTE	114A	WASTE	1A1a	010101									25	15										2.06			
WASTE	114A	WASTE	1A1a	010102					82	55	45	35	25	15	4.8	4.8	4.8	4.8	3.9	3	2.06	2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A1a	010103					82	55	45	35	25	15	4.8	4.8	4.8	4.8	3.9	3	2.06	2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A1a	010104					82	55	45	35	25	15	4.8	4.8	4.8	4.8	3.9	3	2.06	2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A1a	010200	192	165	137	110																			
WASTE	114A	WASTE	1A1a	010202						55	49	42	36														
WASTE	114A	WASTE	1A1a	010203					82	55	49	42	36	30	24	17	11	4.8	3.9	3	2.06	2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A2a	030400					82	55																	
WASTE	114A	WASTE	1A2c	030600	192	165	137	110	82	55	49	42	36		24					3		2.06					
WASTE	114A	WASTE	1A2d	031100	192	165	137	110	82	55	49	42	36	30	24					3		2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A2e	030900	192	165	137	110	82	55	49		36	30	24					3		2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A2e	030902																3		2.06	2.06				
WASTE	114A	WASTE	1A2f i	030700	192	165	137	110	82	55			36														
WASTE	114A	WASTE	1A2f i	030800																3		2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A2f i	031000	192	165	137	110	82	55	49	42	36	30	24							2.06					
WASTE	114A	WASTE	1A2f i	031200	192	165			82	55																	
WASTE	114A	WASTE	1A2f i	031300	192	165	137	110	82	55	49	42	36		24					3		2.06	2.06	2.06	2.06	2.06	2.06
WASTE	114A	WASTE	1A2f i	031400			137	110	82	55	49	42	36	30	24					3		2.06					
WASTE	114A	WASTE	1A2f i	032000	192	165	137	110	82	55	49	42	36	30	24					3		2.06					
WASTE	114A	WASTE	1A4a i	020100	192	165	137	110	82	55	49	42	36	30				4.8	3.9	3	2.06		2.06		2.06	2.06	2.06
WASTE	114A	WASTE	1A4a i	020103					82	55	49	42	36	30	24	17	11	4.8	3.9	3	2.06	2.06	2.06	2.06	2.06	2.06	2.06
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											24	17	11	4.8	3.9	3	2.06	2.06	2.06	2.06	2.06	2.06	2.06
BIOMASS	117A	STRAW	1A4c i	020302					1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	4.4	1.7	4.4	4.4		4.4	4.4
BIOMASS	215A	BIO OIL	1A2f i	031305													0.013	0.013	0.013	0.005	0.005						

Table 2A-4.20 Pb emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010101	6	6	6	6	6	6	5.1	4.2	3.4	2.5	1.6	1.5	1.4	1.2	1.1	1	0.87	0.75	0.62	0.62	0.62	0.62	0.62
SOLID	102A	COAL	1A1a	010102	6	6	6	6	6	6	5.1	4.2	3.4	2.5	1.6	1.5	1.4	1.2	1.1	1	0.87	0.75	0.62	0.62	0.62	0.62	0.62
SOLID	102A	COAL	1A1a	010103					6	6	5.1																
SOLID	102A	COAL	1A1a	010104					6	6	5.1	4.2													0.62	0.62	
SOLID	102A	COAL	1A1a	010203					6	6	5.1	4.2	3.4	2.5	1.6	1.5	1.4	1.2	1.1	1		0.75	0.62		0.62	0.62	0.62
LIQUID	110A	PETROLEUM COKE	1A1a	010102					2.6	2.6									2.6	2.6				2.6	4.9	4.9	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.012	0.012	0.012	0.15	0.15
WASTE	114A	WASTE	1A1a	010100	723	606	489	372																			
WASTE	114A	WASTE	1A1a	010101									129	126										5.52			
WASTE	114A	WASTE	1A1a	010102					255	138	135	132	129	126	123	123	123	123	84	45	5.52	5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A1a	010103					255	138	135	132	129	126	123	123	123	123	84	45	5.52	5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A1a	010104					255	138	135	132	129	126	123		123	123			5.52	5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A1a	010200	723	606	489	372																			
WASTE	114A	WASTE	1A1a	010202						138	136																
WASTE	114A	WASTE	1A1a	010203					255	138	136	134	132	131	129	127	125	123	84	45	5.52	5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A2a	030400					255	138																	
WASTE	114A	WASTE	1A2c	030600	723	606	489	372	255	138	136	134	132		129					45		5.52					
WASTE	114A	WASTE	1A2d	031100	723	606	489	372	255	138	136	134	132	131	129					45		5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A2e	030900	723	606	489	372	255	138	136		132	131	129					45		5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A2e	030902																45		5.52	5.52				
WASTE	114A	WASTE	1A2f i	030700	723	606	489	372	255	138			132														
WASTE	114A	WASTE	1A2f i	030800																45		5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A2f i	031000	723	606	489	372	255	138	136	134	132	131	129							5.52					
WASTE	114A	WASTE	1A2f i	031200	723	606			255	138																	
WASTE	114A	WASTE	1A2f i	031300	723	606	489	372	255	138	136	134	132		129					45		5.52	5.52	5.52	5.52	5.52	5.52
WASTE	114A	WASTE	1A2f i	031400			489	372	255	138	136	134	132	131	129					45		5.52					
WASTE	114A	WASTE	1A2f i	032000	723	606	489	372	255	138	136	134	132	131	129					45		5.52					
WASTE	114A	WASTE	1A4a i	020100	723	606	489	372	255	138	136	134	132	131				123	84	45	5.52		5.52		5.52	5.52	5.52
WASTE	114A	WASTE	1A4a i	020103					255	138	136	134	132	131	129	127	125	123	84	45	5.52	5.52	5.52	5.52	5.52	5.52	5.52
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											129	127	125	123	84	45	5.52	5.52	5.52	5.52	5.52	5.52	5.52
BIOMASS	117A	STRAW	1A4c i	020302					6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	40	6.2	40	40		40	40
BIOMASS	215A	BIO OIL	1A2f i	031305													0.15	0.15	0.15	0.012	0.012						

Table 2A-4.21 Se emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	13	12.6	12.2	11.8																			
SOLID	102A	COAL	1A1a	010101	13	12.6	12.2	11.8	11.4	11	10	9	7.9	6.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
SOLID	102A	COAL	1A1a	010102	13	12.6	12.2	11.8	11.4	11	10	9	7.9	6.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
SOLID	102A	COAL	1A1a	010103					11.4	11	10																
SOLID	102A	COAL	1A1a	010104					11.4	11	10	9													5.9	5.9	
SOLID	102A	COAL	1A1a	010200	13	12.6	12.2	11.8																			
SOLID	102A	COAL	1A1a	010202					11.4	11																	
SOLID	102A	COAL	1A1a	010203					11.4	11	10	9	7.9	6.9	5.9	5.9	5.9	5.9	5.9	5.9		5.9	5.9		5.9	5.9	5.9
LIQUID	110A	PETROLEUM COKE	1A1a	010102					1.2	1.2									1.2	1.2				1.2	2.2	2.2	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.002	0.002	0.002	0.22	0.22
LIQUID	225A	ORIMULSION	1A1a	010101						1.1	1.1	1.1	1.1	1		1.1	1.1	1.1	1.1								
WASTE	114A	WASTE	1A1a	010101									25	25										1.11			
WASTE	114A	WASTE	1A1a	010102					25	25	25	25	25	25	25	25	25	25	17	9.1	1.11	1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A1a	010103					25	25	25	25	25	25	25	25	25	25	17	9.1	1.11	1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A1a	010104					25	25	25	25	25	25	25	25	25	25	17	9.1	1.11	1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A1a	010203					25	25	25	25	25	25	25	25	25	25	17	9.1	1.11	1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A2c	030600	25	25	25	25	25	25	25	25	25		25					9.1		1.11					
WASTE	114A	WASTE	1A2d	031100	25	25	25	25	25	25	25	25	25	25	25					9.1		1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A2e	030900	25	25	25	25	25	25	25		25	25	25					9.1		1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A2e	030902																9.1		1.11	1.11				
WASTE	114A	WASTE	1A2f i	030800																9.1		1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A2f i	031000	25	25	25	25	25	25	25	25	25	25	25							1.11					
WASTE	114A	WASTE	1A2f i	031300	25	25	25	25	25	25	25	25	25		25					9.1		1.11	1.11	1.11	1.11	1.11	1.11
WASTE	114A	WASTE	1A2f i	031400			25	25	25	25	25	25	25	25	25					9.1		1.11					
WASTE	114A	WASTE	1A2f i	032000	25	25	25	25	25	25	25	25	25	25	25					9.1		1.11					
WASTE	114A	WASTE	1A4a i	020100	25	25	25	25	25	25	25	25	25	25				25	17	9.1	1.11		1.11		1.11	1.11	1.11
WASTE	114A	WASTE	1A4a i	020103					25	25	25	25	25	25	25	25	25	25	17	9.1	1.11	1.11	1.11	1.11	1.11	1.11	1.11
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											25	25	25	25	17	9.1	1.11	1.11	1.11	1.11	1.11	1.11	1.11
BIOMASS	215A	BIO OIL	1A2f i	031305													0.22	0.22	0.22	0.002	0.002						

Table 2A-4.22 Zn emission factors time series, mg per GJ, for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOLID	102A	COAL	1A1a	010100	19	18	17	16																			
SOLID	102A	COAL	1A1a	010101	19	18	17	16	14	13	12	11	10	8.9	7.7	6.6	5.5	4.4	3.2	2.1	2.03	1.97	1.9	1.9	1.9	1.9	1.9
SOLID	102A	COAL	1A1a	010102	19	18	17	16	14	13	12	11	10	8.9	7.7	6.6	5.5	4.4	3.2	2.1	2.03	1.97	1.9	1.9	1.9	1.9	1.9
SOLID	102A	COAL	1A1a	010103					14	13	12																
SOLID	102A	COAL	1A1a	010104					14	13	12	11													1.9	1.9	
SOLID	102A	COAL	1A1a	010200	19	18	17	16																			
SOLID	102A	COAL	1A1a	010202					14	13																	
SOLID	102A	COAL	1A1a	010203					14	13	12	11	10	8.9	7.7	6.6	5.5	4.4	3.2	2.1		1.97	1.9		1.9	1.9	1.9
LIQUID	110A	PETROLEUM COKE	1A1a	010102					7.4	7.4									7.4	7.4				7.4	94	94	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.42	0.42	0.42	58	58
WASTE	114A	WASTE	1A1a	010100	805	716	627	538																			
WASTE	114A	WASTE	1A1a	010101									175	114		52	52							2.33			
WASTE	114A	WASTE	1A1a	010102					449	360	298	237	175	114	52	52	52	52	35	19	2.33	2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A1a	010103					449	360	298	237	175	114	52	52	52	52	35	19	2.33	2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A1a	010104					449	360	298	237	175	114	52	52	52	52	35	19	2.33	2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A1a	010200	805	716	627	538																			
WASTE	114A	WASTE	1A1a	010202						360	322	283	245														
WASTE	114A	WASTE	1A1a	010203					449	360	322	283	245	206	168	129	91	52	35	19	2.33	2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A2a	030400					449	360																	
WASTE	114A	WASTE	1A2c	030600	805	716	627	538	449	360	322	283	245		168					19		2.33					
WASTE	114A	WASTE	1A2d	031100	805	716	627	538	449	360	322	283	245	206	168					19		2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A2e	030900	805	716	627	538	449	360	322		245	206	168					19		2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A2e	030902																19		2.33	2.33				
WASTE	114A	WASTE	1A2f i	030700	805	716	627	538	449	360			245														
WASTE	114A	WASTE	1A2f i	030800																19		2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A2f i	031000	805	716	627	538	449	360	322	283	245	206	168							2.33					
WASTE	114A	WASTE	1A2f i	031200	805	716			449	360																	
WASTE	114A	WASTE	1A2f i	031300	805	716	627	538	449	360	322	283	245		168					19		2.33	2.33	2.33	2.33	2.33	2.33
WASTE	114A	WASTE	1A2f i	031400			627	538	449	360	322	283	245	206	168					19		2.33					
WASTE	114A	WASTE	1A2f i	032000	805	716	627	538	449	360	322	283	245	206	168					19		2.33					
WASTE	114A	WASTE	1A4a i	020100	805	716	627	538	449	360	322	283	245	206				52	35	19	2.33		2.33		2.33	2.33	2.33
WASTE	114A	WASTE	1A4a i	020103					449	360	322	283	245	206	168	129	91	52	35	19	2.33	2.33	2.33	2.33	2.33	2.33	2.33
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											168	129	91	52	35	19	2.33	2.33	2.33	2.33	2.33	2.33	2.33
BIOMASS	117A	STRAW	1A4c i	020302					0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	130	0.41	130	130		130	130
BIOMASS	215A	BIO OIL	1A2f i	031305													58	58	58	0.42	0.42						

Table 2A-4.23 PAH emission factors 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id	snap_id	Benzo(a)-pyrene µg per GJ	Ref.	Benzo(b)-flouran-thene µg per GJ	Ref.	Benzo(k)-flouran-thene µg per GJ	Ref.	Indeno-(1,2,3-c,d)-pyrene µg per GJ	Ref.
BIOMASS	111A	WOOD	1A1a	0101	11	7	15	7	5	7	0.8	7
				0102	6.46	4	1292.52	4	1292.52	4	11.56	4
			1A2 a-f	all	6.46	4	1292.52	4	1292.52	4	11.56	4
			1A4a i	0201	168707	4	221769	4	73469	4	119728	4
			1A4b i	All	56464	9	55827	9	20502	9	32028	9
			1A4c i	all	168707	4	221769	4	73469	4	119728	4
	117A	STRAW	1A1a	0101	0.5	7	0.5	7	0.5	7	0.5	7
				0102	1529	2	3452	2	1400	2	1029	2
			1A4b i	0202	12956	2	12828	2	6912	2	4222	2
			1A4c i	0203	12956	2	12828	2	6912	2	4222	2
	215A	BIO OIL	1A1a	all	109.6	3	475.41	3	93.21	3	177.28	3
			1A2a-f	all	109.6	3	475.41	3	93.21	3	177.28	3
			1A4b i	0202	80	3	42	3	66	3	160	3
	309A	BIOGAS	Engines	All	1.3	7	1.2	7	1.2	7	0.6	7
	310A	BIO PROD GAS	Engines	010105	2	7	2	7	2	7	2	7
WASTE	114A	WASTE	1A1a	all	0.8	7	1.7	7	0.9	7	1.1	7
			1A2 a-f	all	0.8	7	1.7	7	0.9	7	1.1	7
			1A4a i	0201	0.8	7	1.7	7	0.9	7	1.1	7
	115A	INDUSTRIAL WASTE	1A2f	031600	0.8	7	1.7	7	0.9	7	1.1	7
GAS	301A	NATURAL GAS	1A1a	010104	1	8	1	8	2	8	3	8
				010105	1.2	7	9	7	1.7	7	1.8	7
			1A1c	010504	1	8	1	8	2	8	3	8
			1A2 a-f	Turbines	1	8	1	8	2	8	3	8
				Engines	1.2	7	9	7	1.7	7	1.8	7
			1A4a i	020105	1.2	7	9	7	1.7	7	1.8	7
			1A4b i	020202	0.133	6	0.663	6	0.265	6	2.653	6
				020204	1.2	6	9	6	1.7	6	1.8	6
			1A4c i	020304	1.2	6	9	6	1.7	6	1.8	6
LIQUID	110A	PETROLEUM COKE	1A2 a-f	all	3184	5	9554	5	-	-	-	-
	203A	RESIDUAL OIL	1A1a	All	109.6	4	475.41	4	93.21	4	177.28	4
			1A1b	010306	109.6	4	475.41	4	93.21	4	177.28	4
			1A2 a-f	all	80	4	42	4	66	4	160	4
			1A4a	all	80	4	42	4	66	4	160	4
			1A4b	all	80	4	42	4	66	4	160	4
			1A4c i	all	80	4	42	4	66	4	160	4
	204A	GAS OIL	1A1a	Not engines	109.6	4	475.41	4	93.21	4	177.28	4
				Engines	1.9	7	15	7	1.7	7	1.5	7
			1A1b	010306	109.6	4	475.41	4	93.21	4	177.28	4
			1A1c	010504	109.6	4	475.41	4	93.21	4	177.28	4
			1A2 a-f	Not engines	80	4	42	4	66	4	160	4
				Engines	1.9	7	15	7	1.7	7	1.5	7
			1A4a i	Not engines	80	4	42	4	66	4	160	4
				Engines	1.9	7	15	7	1.7	7	1.5	7
			1A4b i	0202	80	4	42	4	66	4	160	4
			1A4c i	0203	80	4	42	4	66	4	160	4

fuel_type	fuel_id	fuel_gr_abbr	nfr_id	snap_id	Benzo(a)-pyrene		Benzo(b)-flouran-thene		Benzo(k)-flouran-thene		Indeno-(1,2,3-c,d)-pyrene	
SOLID	102A	ANODE CARBON	1A2f	0320	23	4	929	4	929	4	698	4
		COAL	1A1a	All	0.14	4	0.29	4	0.29	4	0.28	4
			1A2 a-f	All	23	4	929	4	929	4	698	4
			1A4b i	0202	59524	4	63492	4	1984	4	119048	4
			1A4c i	0203	59524	4	63492	4	1984	4	119048	4
	103A	FLY ASH FOSSIL	1A1a	0101	0.14	4	0.29	4	0.29	4	0.28	4
	106A	BROWN COAL BRI.	1A4b i	020200	59524	4 (8)	63492	4 (8)	1984	4 (8)	119048	4 (8)
	107A	COKE OVEN COKE	1A2 a-f	all	23	4	929	4	929	4	698	4
			1A4b i	0202	59524	4 (8)	63492	4 (8)	1984	4 (8)	119048	4 (8)

1. -
2. Same emission factors as for gas oil is assumed (DCE assumption).
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8. Same emission factor as for coal is assumed (DCE assumption).
9. Aggregated emission factor based on the technology distribution in the sector and guidebook (EEA 2009) emission factors. Technology distribution based on: DEPA (2013)

Table 2A-4.24 PAH emission factors time-series, µg pr GJ for the years 1990 to 2012.

pol_id	fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
P14	LIQUID	204A	GAS OIL	1A2f i	031205																			80	80	80	1.9	1.9
P14	GAS	301A	NATURAL GAS	1A1a	010104	1	1	0	1	0	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
P14	GAS	301A	NATURAL GAS	1A1a	010105	3	3	3	3	3	3	3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A2c	030604	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
P14	GAS	301A	NATURAL GAS	1A2c	030605								3	3	3	3	2.7	2.5	2.2	2	1.7							
P14	GAS	301A	NATURAL GAS	1A2d	031104						0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
P14	GAS	301A	NATURAL GAS	1A2e	030903					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	0
P14	GAS	301A	NATURAL GAS	1A2e	030904					1	1	0	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1
P14	GAS	301A	NATURAL GAS	1A2e	030905					3	3	3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A2f i	030705						3	3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A2f i	031005							3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A2f i	031305							3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A2f i	031405						3	3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A2f i	032004							0	0	1	0	0	0	1	1	1	1		1	1	1	1	1	1
P14	GAS	301A	NATURAL GAS	1A2f i	032005	3	0	3	3	3	3	3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A4a i	020104						0		0			0	0	1	1	1	1	1	1					
P14	GAS	301A	NATURAL GAS	1A4a i	020105	3	3	3	3	3	3	3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A4b i	020200	0.133	0	0	0	0.133	0.133	0	0	0.133	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P14	GAS	301A	NATURAL GAS	1A4b i	020204		3	3	3	3	3	0	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	GAS	301A	NATURAL GAS	1A4c i	020304	3	3	3	3	3	3	3	3	3	3	3	2.7	2.5	2.2	2	1.7	1.5	1.2	1.2	1.2	1.2	1.2	1.2
P14	BIOMASS	111A	WOOD	1A4b i	020200	95142	95142	95142	95142	95142	95142	95142	95142	95142	95142	95142	85868	82318	81660	80875	77634	73988	74595	70268	64894	61651	58738	56464
P14	BIOMASS	111A	WOOD	1A4b i	020202																77634	73988	74595	70268	64894	61651	58738	56464
P14	BIOMASS	111A	WOOD	1A4b i	020204																			70268	64894	61651		
P14	BIOMASS	215A	BIO OIL	1A2f i	032005															109.6	80	80	80	80	80	80		
P14	BIOMASS	215A	BIO OIL	1A4b i	020200																		109.6	80	80	80	80	80
P14	BIOMASS	309A	BIOGAS	1A1a	010105	1	1	1	1	1	1	1	1	1	1	1	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
P14	BIOMASS	309A	BIOGAS	1A1a	010200	1	0	0	0																			
P14	BIOMASS	309A	BIOGAS	1A2e	030900	0				0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
P14	BIOMASS	309A	BIOGAS	1A2e	030902																				1			0
P14	BIOMASS	309A	BIOGAS	1A2e	030903					0	0	0	0	1	0	0	0	0			0	0	0		1			
P14	BIOMASS	309A	BIOGAS	1A2f i	032005												1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
P14	BIOMASS	309A	BIOGAS	1A4a i	020105	1	1	1	1	1	1	1	1	1	1	1	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
P14	BIOMASS	309A	BIOGAS	1A4c i	020300					0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P14	BIOMASS	309A	BIOGAS	1A4c i	020304					1	1	1	1	1	1	1	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
P14	BIOMASS	310A	BIO PROD GAS	1A4a i	020105									0	2		2	2		2	2	2	2	2	2	2	2	2
P12	LIQUID	204A	GAS OIL	1A2f i	031205																			42	42	42	15	15
P12	GAS	301A	NATURAL GAS	1A1a	010104	1	1	0	1	0	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
P12	GAS	301A	NATURAL GAS	1A1a	010105	42	42	42	42	42	42	42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A2c	030604	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
P12	GAS	301A	NATURAL GAS	1A2c	030605								42	42	42	42	37	33	28	23	18							
P12	GAS	301A	NATURAL GAS	1A2d	031104						0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
P12	GAS	301A	NATURAL GAS	1A2e	030903					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	155	0
P12	GAS	301A	NATURAL GAS	1A2e	030904					1	1	0	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1
P12	GAS	301A	NATURAL GAS	1A2e	030905					42	42	42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A2f i	030705						42	42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A2f i	031005							42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A2f i	031305							42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A2f i	031405						42	42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A2f i	032004							0	0	1	0	0	0	1	1	1	1		1	1	1	1	1	1
P12	GAS	301A	NATURAL GAS	1A2f i	032005	42	0	42	42	42	42	42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A4a i	020104						0		0			0	0	1	1	1	1	1	1					
P12	GAS	301A	NATURAL GAS	1A4a i	020105	42	42	42	42	42	42	42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A4b i	020200	0.663	0	0	0	0.663	0.663	0	0	0.663	0	0	0	0	0	0	0	0	0	0	0	0	0	0

pol_id	fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
P12	GAS	301A	NATURAL GAS	1A4b i	020204		42	42	42	42	42	0	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	GAS	301A	NATURAL GAS	1A4c i	020304	42	42	42	42	42	42	42	42	42	42	42	37	33	28	23	18	14	9	9	9	9	9	9
P12	BIOMASS	111A	WOOD	1A4b i	020200	89148	89148	89148	89148	89148	89148	89148	89148	89148	89148	89148	81137	78046	77437	76718	73897	70724	71256	67574	62996	60238	57759	55827
P12	BIOMASS	111A	WOOD	1A4b i	020202																73897	70724	71256	67574	62996	60238	57759	55827
P12	BIOMASS	111A	WOOD	1A4b i	020204																			67574	62996	60238		
P12	BIOMASS	215A	BIO OIL	1A2f i	032005															475.41	42	42	42	42	42	42		
P12	BIOMASS	215A	BIO OIL	1A4b i	020200																		475.41	42	42	42	42	42
P12	BIOMASS	309A	BIOGAS	1A1a	010105	1	1	1	1	1	1	1	1	1	1	1	1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P12	BIOMASS	309A	BIOGAS	1A1a	010200	1	0	0	0																			
P12	BIOMASS	309A	BIOGAS	1A2e	030900	0				0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
P12	BIOMASS	309A	BIOGAS	1A2e	030902																				1			0
P12	BIOMASS	309A	BIOGAS	1A2e	030903					0	0	0	0	1	0	0	0	0			0	0	0		1			
P12	BIOMASS	309A	BIOGAS	1A2f i	032005												1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P12	BIOMASS	309A	BIOGAS	1A4a i	020105	1	1	1	1	1	1	1	1	1	1	1	1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P12	BIOMASS	309A	BIOGAS	1A4c i	020300					0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P12	BIOMASS	309A	BIOGAS	1A4c i	020304					1	1	1	1	1	1	1	1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P12	BIOMASS	310A	BIO PROD GAS	1A4a i	020105									0	2		2	2		2	2	2	2	2	2	2	2	2
P13	LIQUID	204A	GAS OIL	1A2f i	031205																			66	66	66	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A1a	010104	2	2	0	2	0	0	2	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2
P13	GAS	301A	NATURAL GAS	1A1a	010105	24	24	24	24	24	24	24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A2c	030604	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2
P13	GAS	301A	NATURAL GAS	1A2c	030605								24	24	24	24	21	18	14	11	8							
P13	GAS	301A	NATURAL GAS	1A2d	031104						0	0	0	2	0	0	0	2	2	2	2	2	2	2	2	2	2	2
P13	GAS	301A	NATURAL GAS	1A2e	030903					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.7	0
P13	GAS	301A	NATURAL GAS	1A2e	030904					2	2	0	0	2	0	0	0	0	0	0	2	2	2	2	2	2	2	2
P13	GAS	301A	NATURAL GAS	1A2e	030905					24	24	24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A2f i	030705						24	24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A2f i	031005							24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A2f i	031305							24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A2f i	031405						24	24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A2f i	032004							0	0	2	0	0	0	2	2	2	2		2	2	2	2	2	2
P13	GAS	301A	NATURAL GAS	1A2f i	032005	24	0	24	24	24	24	24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A4a i	020104						0		0			0	0	2	2	2	2	2	2					
P13	GAS	301A	NATURAL GAS	1A4a i	020105	24	24	24	24	24	24	24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A4b i	020200	0.265	0	0	0	0.265	0.265	0	0	0.265	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P13	GAS	301A	NATURAL GAS	1A4b i	020204		24	24	24	24	24	0	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	GAS	301A	NATURAL GAS	1A4c i	020304	24	24	24	24	24	24	24	24	24	24	24	21	18	14	11	8	5	1.7	1.7	1.7	1.7	1.7	1.7
P13	BIOMASS	111A	WOOD	1A4b i	020200	33443	33443	33443	33443	33443	33443	33443	33443	33443	33443	33443	30335	29140	28910	28638	27547	26320	26525	25088	23301	22224	21256	20502
P13	BIOMASS	111A	WOOD	1A4b i	020202																27547	26320	26525	25088	23301	22224	21256	20502
P13	BIOMASS	111A	WOOD	1A4b i	020204																			25088	23301	22224		
P13	BIOMASS	215A	BIO OIL	1A2f i	032005															93.21	66	66	66	66	66	66		
P13	BIOMASS	215A	BIO OIL	1A4b i	020200																		93.21	66	66	66	66	66
P13	BIOMASS	309A	BIOGAS	1A1a	010105	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.7	0.8	0.9	1	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P13	BIOMASS	309A	BIOGAS	1A1a	010200	0.4	0	0	0																			
P13	BIOMASS	309A	BIOGAS	1A2e	030900	0				0	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	
P13	BIOMASS	309A	BIOGAS	1A2e	030902																				0.4			0
P13	BIOMASS	309A	BIOGAS	1A2e	030903					0	0	0	0	0.4	0	0	0	0			0	0	0		0.4			
P13	BIOMASS	309A	BIOGAS	1A2f i	032005												0.5	0.7	0.8	0.9	1	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P13	BIOMASS	309A	BIOGAS	1A4a i	020105	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.7	0.8	0.9	1	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P13	BIOMASS	309A	BIOGAS	1A4c i	020300					0	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P13	BIOMASS	309A	BIOGAS	1A4c i	020304					0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.7	0.8	0.9	1	1.2	1.2	1.2	1.2	1.2	1.2	1.2
P13	BIOMASS	310A	BIO PROD GAS	1A4a i	020105									0	2		2	2		2	2	2	2	2	2	2	2	2
P16	LIQUID	204A	GAS OIL	1A2f i	031205																			160	160	160	1.5	1.5
P16	GAS	301A	NATURAL GAS	1A1a	010104	3	3	0	3	0	0	3	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3
P16	GAS	301A	NATURAL GAS	1A1a	010105	6	6	6	6	6	6	6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8

pol_id	fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
P16	GAS	301A	NATURAL GAS	1A2c	030604	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0	3	3	3	3
P16	GAS	301A	NATURAL GAS	1A2c	030605								6	6	6	6	5.4	4.8	4.2	3.6	3							
P16	GAS	301A	NATURAL GAS	1A2d	031104						0	0	0	3	0	0	0	3	3	3	3	3	3	3	3	3	3	3
P16	GAS	301A	NATURAL GAS	1A2e	030903					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
P16	GAS	301A	NATURAL GAS	1A2e	030904					3	3	0	0	3	0	0	0	0	0	0	3	3	3	3	3	3	3	3
P16	GAS	301A	NATURAL GAS	1A2e	030905					6	6	6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A2f i	030705						6	6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A2f i	031005							6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A2f i	031305							6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A2f i	031405						6	6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A2f i	032004							0	0	3	0	0	0	3	3	3	3		3	3	3	3	3	3
P16	GAS	301A	NATURAL GAS	1A2f i	032005	6	0	6	6	6	6	6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A4a i	020104						0		0			0	0	3	3	3	3	3	3					
P16	GAS	301A	NATURAL GAS	1A4a i	020105	6	6	6	6	6	6	6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A4b i	020200	2.653	0	0	0	2.653	2.653	0	0	2.653	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P16	GAS	301A	NATURAL GAS	1A4b i	020204		6	6	6	6	6	0	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	GAS	301A	NATURAL GAS	1A4c i	020304	6	6	6	6	6	6	6	6	6	6	6	5.4	4.8	4.2	3.6	3	2.4	1.8	1.8	1.8	1.8	1.8	1.8
P16	BIOMASS	111A	WOOD	1A4b i	020200	55316	55316	55316	55316	55316	55316	55316	55316	55316	55316	55316	49738	47610	47225	46764	44821	42635	42998	40380	37131	35168	33405	32029
P16	BIOMASS	111A	WOOD	1A4b i	020202																44821	42635	42998	40380	37131	35168	33405	32029
P16	BIOMASS	111A	WOOD	1A4b i	020204																			40380	37131	35168		
P16	BIOMASS	215A	BIO OIL	1A2f i	032005															177.28	160	160	160	160	160	160		
P16	BIOMASS	215A	BIO OIL	1A4b i	020200																		177.28	160	160	160	160	160
P16	BIOMASS	309A	BIOGAS	1A1a	010105	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	0.9	0.9	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
P16	BIOMASS	309A	BIOGAS	1A1a	010200	1.1	0	0	0																			
P16	BIOMASS	309A	BIOGAS	1A2e	030900	0				0	0	0	0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	
P16	BIOMASS	309A	BIOGAS	1A2e	030902																				1.1			0
P16	BIOMASS	309A	BIOGAS	1A2e	030903					0	0	0	0	1.1	0	0	0	0			0	0	0		1.1			
P16	BIOMASS	309A	BIOGAS	1A2f i	032005												1	0.9	0.9	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
P16	BIOMASS	309A	BIOGAS	1A4a i	020105	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	0.9	0.9	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
P16	BIOMASS	309A	BIOGAS	1A4c i	020300					0	0	0	0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P16	BIOMASS	309A	BIOGAS	1A4c i	020304					1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	0.9	0.9	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
P16	BIOMASS	310A	BIO PROD GAS	1A4a i	020105									0	2		2	2		2	2	2	2	2	2	2	2	2

Annex 2A-5 Implied emission factors for waste incineration plants and power plants combustion coal

Table 74 Implied emission factors for municipal waste incineration plants 2012.

Pollutant	Implied Emission factor	Unit
SO_2	6.3	g pr GJ
NO_x	96	g pr GJ
TSP	0.47	g pr GJ
PM_{10}	0.39	g pr GJ
$PM_{2.5}$	0.33	g pr GJ
As	0.64	Mg pr GJ
Cd	0.43	mg pr GJ
Cr	1.63	mg pr GJ
Cu	1.47	mg pr GJ
Hg	1.27	mg pr GJ
Ni	2.77	mg pr GJ
Pb	5.47	mg pr GJ
Se	1.15	mg pr GJ
Zn	2.53	mg pr GJ

Table 75 Implied emission factors for power plants combusting coal, 2012.

Pollutant	Implied Emission factor	Unit
SO_2	10	g pr GJ
NO_x	32	g pr GJ
TSP	3.1	g pr GJ
PM_{10}	2.0	g pr GJ
$PM_{2.5}$	1.6	g pr GJ
As	0.19	mg pr GJ
Cd	0.03	mg pr GJ
Cr	0.39	mg pr GJ
Cu	0.21	mg pr GJ
Hg	0.78	mg pr GJ
Ni	0.45	mg pr GJ
Pb	0.25	mg pr GJ
Se	3.4	mg pr GJ
Zn	0.98	mg pr GJ

Annex 2A-6 Large point sources

Table 2A-6.1 Large point sources, fuel consumption in 2012 (1A1, 1A2 and 1A4).

nfr_id_EA	lps_id	lps_name	fuel_id	fuel_gr_abbr	Fuel_rate_TJ
1A1a	001	Amagervaerket	111A	WOOD AND SIMIL.	5332
1A1a	001	Amagervaerket	117A	STRAW	622
1A1a	001	Amagervaerket	203A	RESIDUAL OIL	85
1A1a	001	Amagervaerket	102A	COAL	9951
1A1a	001	Amagervaerket	203A	RESIDUAL OIL	335
1A1a	002	Svanemoellevaerket	301A	NATURAL GAS	2573
1A1a	002	Svanemoellevaerket	204A	GAS OIL	6
1A1a	003	H.C.Oerstedsvaerket	203A	RESIDUAL OIL	1
1A1a	003	H.C.Oerstedsvaerket	301A	NATURAL GAS	2898
1A1a	003	H.C.Oerstedsvaerket	301A	NATURAL GAS	1082
1A1a	003	H.C.Oerstedsvaerket	204A	GAS OIL	232
1A1a	004	Kyndbyvaerket	204A	GAS OIL	937
1A1a	005	Masnedoevaerket	204A	GAS OIL	40
1A1a	007	Stigsnaesvaerket	203A	RESIDUAL OIL	99
1A1a	007	Stigsnaesvaerket	203A	RESIDUAL OIL	61
1A1a	007	Stigsnaesvaerket	204A	GAS OIL	5
1A1a	008	Asnaesvaerket	102A	COAL	7300
1A1a	008	Asnaesvaerket	117A	STRAW	7
1A1a	008	Asnaesvaerket	111A	WOOD AND SIMIL.	5
1A1a	008	Asnaesvaerket	204A	GAS OIL	0
1A1a	008	Asnaesvaerket	303A	LPG	1
1A1a	008	Asnaesvaerket	203A	RESIDUAL OIL	28
1A1a	008	Asnaesvaerket	102A	COAL	257
1A1a	008	Asnaesvaerket	203A	RESIDUAL OIL	24
1A1a	008	Asnaesvaerket	204A	GAS OIL	31
1A1a	010	Avedoerevaerket	203A	RESIDUAL OIL	46
1A1a	010	Avedoerevaerket	117A	STRAW	1230
1A1a	010	Avedoerevaerket	111A	WOOD AND SIMIL.	13735
1A1a	010	Avedoerevaerket	103A	FLY ASH	61
1A1a	010	Avedoerevaerket	204A	GAS OIL	14
1A1a	010	Avedoerevaerket	203A	RESIDUAL OIL	286
1A1a	010	Avedoerevaerket	102A	COAL	8364
1A1a	010	Avedoerevaerket	301A	NATURAL GAS	3162
1A1a	011	Fynsvaerket	111A	WOOD AND SIMIL.	308
1A1a	011	Fynsvaerket	309A	BIOGAS	46
1A1a	011	Fynsvaerket	117A	STRAW	1959
1A1a	011	Fynsvaerket	102A	COAL	17425
1A1a	011	Fynsvaerket	203A	RESIDUAL OIL	147
1A1a	011	Fynsvaerket	204A	GAS OIL	0
1A1a	012	Studstrupvaerket	204A	GAS OIL	6
1A1a	012	Studstrupvaerket	111A	WOOD AND SIMIL.	27
1A1a	012	Studstrupvaerket	117A	STRAW	62
1A1a	012	Studstrupvaerket	203A	RESIDUAL OIL	150
1A1a	012	Studstrupvaerket	102A	COAL	16363
1A1a	012	Studstrupvaerket	117A	STRAW	777
1A1a	012	Studstrupvaerket	203A	RESIDUAL OIL	141
1A1a	012	Studstrupvaerket	102A	COAL	6675
1A1a	014	Nordjyllandsvaerket	303A	LPG	0
1A1a	014	Nordjyllandsvaerket	204A	GAS OIL	11
1A1a	014	Nordjyllandsvaerket	204A	GAS OIL	8
1A1a	014	Nordjyllandsvaerket	203A	RESIDUAL OIL	127
1A1a	014	Nordjyllandsvaerket	204A	GAS OIL	4
1A1a	014	Nordjyllandsvaerket	102A	COAL	14945
1A1a	018	Skaerbaekvaerket	204A	GAS OIL	12
1A1a	018	Skaerbaekvaerket	301A	NATURAL GAS	8783
1A1a	019	Enstedvaerket	102A	COAL	2358
1A1a	019	Enstedvaerket	203A	RESIDUAL OIL	24
1A1a	019	Enstedvaerket	111A	WOOD AND SIMIL.	169
1A1a	019	Enstedvaerket	117A	STRAW	1016
1A1a	019	Enstedvaerket	204A	GAS OIL	7
1A1a	019	Enstedvaerket	303A	LPG	0
1A1a	020	Esbjergvaerket	102A	COAL	17081
1A1a	020	Esbjergvaerket	203A	RESIDUAL OIL	122
1A1a	020	Esbjergvaerket	303A	LPG	0
1A1a	022	Oestkraft	102A	COAL	457
1A1a	022	Oestkraft	111A	WOOD AND SIMIL.	213
1A1a	022	Oestkraft	203A	RESIDUAL OIL	81
1A1a	022	Oestkraft	204A	GAS OIL	14
1A1a	022	Oestkraft	303A	LPG	0
1A1a	025	Horsens Kraftvarmevaerk	114A	MUNICIP. WASTES	1013

nfr_id_EA	lps_id	lps_name	fuel_id	fuel_gr_abbr	Fuel_rate_TJ
1A1a	025	Horsens Kraftvarmevaerk	111A	WOOD AND SIMIL.	13
1A1a	025	Horsens Kraftvarmevaerk	301A	NATURAL GAS	567
1A1a	025	Horsens Kraftvarmevaerk	303A	LPG	1
1A1a	026	Herningvaerket	111A	WOOD AND SIMIL.	4168
1A1a	026	Herningvaerket	203A	RESIDUAL OIL	0
1A1a	026	Herningvaerket	204A	GAS OIL	0
1A1a	026	Herningvaerket	215A	BIO OIL	5
1A1a	026	Herningvaerket	301A	NATURAL GAS	454
1A1a	026	Herningvaerket	303A	LPG	0
1A1a	027	I/S Vestforbraending	114A	MUNICIP. WASTES	5349
1A1a	027	I/S Vestforbraending	303A	LPG	0
1A1a	027	I/S Vestforbraending	204A	GAS OIL	1
1A1a	027	I/S Vestforbraending	301A	NATURAL GAS	17
1A1a	028	Amagerforbraending	111A	WOOD AND SIMIL.	541
1A1a	028	Amagerforbraending	114A	MUNICIP. WASTES	3901
1A1a	028	Amagerforbraending	303A	LPG	31
1A1a	029	Energi Randers Produktion	309A	BIOGAS	10
1A1a	029	Energi Randers Produktion	215A	BIO OIL	49
1A1a	029	Energi Randers Produktion	204A	GAS OIL	4
1A1a	029	Energi Randers Produktion	102A	COAL	2
1A1a	029	Energi Randers Produktion	111A	WOOD AND SIMIL.	2775
1A1a	030	Grenaa Kraftvarmevaerk	117A	STRAW	497
1A1a	030	Grenaa Kraftvarmevaerk	102A	COAL	528
1A1a	030	Grenaa Kraftvarmevaerk	111A	WOOD AND SIMIL.	261
1A1a	030	Grenaa Kraftvarmevaerk	203A	RESIDUAL OIL	30
1A1a	030	Grenaa Kraftvarmevaerk	204A	GAS OIL	3
1A1a	030	Grenaa Kraftvarmevaerk	303A	LPG	0
1A1a	031	Hilleroed Kraftvarmevaerk	301A	NATURAL GAS	1502
1A1a	032	Helsingoer Kraftvarmevaerk	301A	NATURAL GAS	1533
1A1a	032	Helsingoer Kraftvarmevaerk	301A	NATURAL GAS	1533
1A1a	036	Kolding Forbraendingsanlaeg TAS	203A	RESIDUAL OIL	0
1A1a	036	Kolding Forbraendingsanlaeg TAS	114A	MUNICIP. WASTES	530
1A1a	036	Kolding Forbraendingsanlaeg TAS	111A	WOOD AND SIMIL.	331
1A1a	036	Kolding Forbraendingsanlaeg TAS	111A	WOOD AND SIMIL.	348
1A1a	036	Kolding Forbraendingsanlaeg TAS	117A	STRAW	2
1A1a	036	Kolding Forbraendingsanlaeg TAS	117A	STRAW	1
1A1a	036	Kolding Forbraendingsanlaeg TAS	114A	MUNICIP. WASTES	504
1A1a	037	Maabjergvaerket	114A	MUNICIP. WASTES	1757
1A1a	037	Maabjergvaerket	301A	NATURAL GAS	55
1A1a	037	Maabjergvaerket	117A	STRAW	458
1A1a	037	Maabjergvaerket	111A	WOOD AND SIMIL.	419
1A1a	037	Maabjergvaerket	309A	BIOGAS	15
1A1a	038	Soenderborg Kraftvarmevaerk	301A	NATURAL GAS	86
1A1a	038	Soenderborg Kraftvarmevaerk	111A	WOOD AND SIMIL.	77
1A1a	038	Soenderborg Kraftvarmevaerk	114A	MUNICIP. WASTES	676
1A1a	038	Soenderborg Kraftvarmevaerk	117A	STRAW	0
1A1a	038	Soenderborg Kraftvarmevaerk	204A	GAS OIL	0
1A1a	039	I/S Kara Affaldsforbraendingsanlaeg	301A	NATURAL GAS	10
1A1a	039	I/S Kara Affaldsforbraendingsanlaeg	111A	WOOD AND SIMIL.	48
1A1a	039	I/S Kara Affaldsforbraendingsanlaeg	114A	MUNICIP. WASTES	2156
1A1a	040	Viborg Kraftvarme	204A	GAS OIL	1
1A1a	040	Viborg Kraftvarme	301A	NATURAL GAS	1921
1A1a	042	I/S Nordforbraending	111A	WOOD AND SIMIL.	446
1A1a	042	I/S Nordforbraending	301A	NATURAL GAS	9
1A1a	042	I/S Nordforbraending	114A	MUNICIP. WASTES	1068
1A1a	046	Affaldscenter aarhus - Forbraendsanlaegget	114A	MUNICIP. WASTES	2705
1A1a	047	I/S Reno Nord	114A	MUNICIP. WASTES	1860
1A1a	047	I/S Reno Nord	204A	GAS OIL	2
1A1a	047	I/S Reno Nord	111A	WOOD AND SIMIL.	30
1A1a	048	Silkeborg Kraftvarmevaerk	204A	GAS OIL	0
1A1a	048	Silkeborg Kraftvarmevaerk	301A	NATURAL GAS	1818
1A1a	050	AffaldPlus+, Naestved Forbraendingsanlaeg	114A	MUNICIP. WASTES	1169
1A1a	051	AVV Forbraendingsanlaeg	204A	GAS OIL	2
1A1a	051	AVV Forbraendingsanlaeg	111A	WOOD AND SIMIL.	23
1A1a	051	AVV Forbraendingsanlaeg	114A	MUNICIP. WASTES	737
1A1a	051	AVV Forbraendingsanlaeg	117A	STRAW	0
1A1a	051	AVV Forbraendingsanlaeg	203A	RESIDUAL OIL	7
1A1a	052	Affaldsforbraendingsanlaeg I/S REFA	114A	MUNICIP. WASTES	1233
1A1a	053	Svendborg Kraftvarmevaerk	114A	MUNICIP. WASTES	516
1A1a	053	Svendborg Kraftvarmevaerk	111A	WOOD AND SIMIL.	10
1A1a	053	Svendborg Kraftvarmevaerk	301A	NATURAL GAS	6
1A1a	053	Svendborg Kraftvarmevaerk	204A	GAS OIL	0
1A1a	053	Svendborg Kraftvarmevaerk	117A	STRAW	0
1A1a	054	Kommunekemi	204A	GAS OIL	22

nfr_id_EA	lps_id	lps_name	fuel_id	fuel_gr_abbr	Fuel_rate_TJ
1A1a	054	Kommunekemi	203A	RESIDUAL OIL	57
1A1a	054	Kommunekemi	114A	MUNICIP. WASTES	1906
1A1a	055	I/S Faelles Forbraending	114A	MUNICIP. WASTES	257
1A1a	058	I/S Reno Syd	204A	GAS OIL	2
1A1a	058	I/S Reno Syd	117A	STRAW	0
1A1a	058	I/S Reno Syd	114A	MUNICIP. WASTES	620
1A1a	058	I/S Reno Syd	111A	WOOD AND SIMIL.	91
1A1a	059	I/S Kraftvarmevaerk Thisted	117A	STRAW	1
1A1a	059	I/S Kraftvarmevaerk Thisted	114A	MUNICIP. WASTES	516
1A1a	059	I/S Kraftvarmevaerk Thisted	111A	WOOD AND SIMIL.	49
1A1a	061	Affaldplus+, Slagelse Forbr. and DONG Slagelse KVV	114A	MUNICIP. WASTES	566
1A1a	061	Affaldplus+, Slagelse Forbr. and DONG Slagelse KVV	117A	STRAW	474
1A1a	065	Haderslev Kraftvarmevaerk	301A	NATURAL GAS	11
1A1a	065	Haderslev Kraftvarmevaerk	111A	WOOD AND SIMIL.	27
1A1a	065	Haderslev Kraftvarmevaerk	114A	MUNICIP. WASTES	595
1A1a	065	Haderslev Kraftvarmevaerk	117A	STRAW	1
1A1a	066	Frederikshavn Affaldskraftvarmevaerk	204A	GAS OIL	1
1A1a	066	Frederikshavn Affaldskraftvarmevaerk	111A	WOOD AND SIMIL.	41
1A1a	066	Frederikshavn Affaldskraftvarmevaerk	114A	MUNICIP. WASTES	359
1A1a	068	Bofa I/S	114A	MUNICIP. WASTES	193
1A1a	069	DTU	301A	NATURAL GAS	1035
1A1a	070	AffaldPlus+, Naestved Kraftvarmevaerk	301A	NATURAL GAS	143
1A1a	072	Hjoerring Varmeforsyning	301A	NATURAL GAS	24
1A1a	072	Hjoerring Varmeforsyning	111A	WOOD AND SIMIL.	536
1A1a	085	L90 Affaldsforbraending	114A	MUNICIP. WASTES	2333
1A1a	085	L90 Affaldsforbraending	204A	GAS OIL	7
1A1a	086	Hammel Fjernvarmeselskab	114A	MUNICIP. WASTES	293
1A1a	086	Hammel Fjernvarmeselskab	215A	BIO OIL	14
1A1a	086	Hammel Fjernvarmeselskab	111A	WOOD AND SIMIL.	35
1A1a	087	Koege Kraftvarmevaerk	111A	WOOD AND SIMIL.	1098
1A1a	087	Koege Kraftvarmevaerk	203A	RESIDUAL OIL	1
1A1a	087	Koege Kraftvarmevaerk	204A	GAS OIL	0
1A1a	088	Skagen Forbraending	114A	MUNICIP. WASTES	114
1A1a	088	Skagen Forbraending	111A	WOOD AND SIMIL.	25
1A1a	090	Odense Kraftvarmevaerk	204A	GAS OIL	22
1A1a	090	Odense Kraftvarmevaerk	117A	STRAW	5
1A1a	090	Odense Kraftvarmevaerk	111A	WOOD AND SIMIL.	12
1A1a	090	Odense Kraftvarmevaerk	114A	MUNICIP. WASTES	2239
1A1a	091	Centralkommunernes Transmissionsselskab F_berg	204A	GAS OIL	170
1A1a	092	Frederikshavn Kraftvarmevaerk	301A	NATURAL GAS	61
1A1a	093	Fjernvarme Fyn, Centrum Varmecentral	301A	NATURAL GAS	28
1A1a	094	Special Waste System	114A	MUNICIP. WASTES	37
1A1a	095	Grenaa Forbraending	111A	WOOD AND SIMIL.	8
1A1a	095	Grenaa Forbraending	114A	MUNICIP. WASTES	247
1A1a	098	Vordingborg Kraftvarme	111A	WOOD AND SIMIL.	162
1A1a	098	Vordingborg Kraftvarme	117A	STRAW	472
1A1a	098	Vordingborg Kraftvarme	204A	GAS OIL	1
1A1b	009	Statoil Raffinaderi	303A	LPG	193
1A1b	009	Statoil Raffinaderi	308A	REFINERY GAS	8549
1A1b	009	Statoil Raffinaderi	204A	GAS OIL	1
1A1b	017	Shell Raffinaderi	308A	REFINERY GAS	4365
1A1b	017	Shell Raffinaderi	308A	REFINERY GAS	1734
1A1b	017	Shell Raffinaderi	203A	RESIDUAL OIL	808
1A1c	024	Nybro Gasbehandlingsanlaeg	204A	GAS OIL	0
1A1c	024	Nybro Gasbehandlingsanlaeg	301A	NATURAL GAS	0
1A1c	024	Nybro Gasbehandlingsanlaeg	301A	NATURAL GAS	175
1A4a i	049	Rensningsanlaegget Lynetten	114A	MUNICIP. WASTES	47
1A4a i	049	Rensningsanlaegget Lynetten	309A	BIOGAS	144
1A4a i	049	Rensningsanlaegget Lynetten	204A	GAS OIL	4
Total					**225087**

Table 2A-6.2 Large point sources, plant specific emissions (IPCC 1A1, 1A2 and 1A4)[1)].

nfr_id	lps_id	lps_name	SO2	NOx	NMVOC	CO	NH3	TSP	PM10	PM2.5	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn	Dioxin
1A1a	001	Amagervaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	002	Svanemoellevaerket	x	x		x														
1A1a	003	H.C.Oerstedsvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	004	Kyndbyvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	005	Masnedoevaerket	x	x																
1A1a	007	Stigsnaesvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	008	Asnaesvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	010	Avedoerevaerket	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	011	Fynsvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	012	Studstrupvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	014	Nordjyllandsvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	018	Skaerbaekvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	019	Enstedvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	020	Esbjergvaerket	x	x				x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	022	Oestkraft	x	x																
1A1a	025	Horsens Kraftvarmevaerk	x	x				x	x	x										
1A1a	026	Herningvaerket	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	027	I/S Vestforbraending	x	x											x					x
1A1a	028	Amagerforbraending	x	x		x	x	x	x	x					x					x
1A1a	029	Energi Randers Produktion	x	x				x	x	x										
1A1a	030	Grenaa Kraftvarmevaerk	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	
1A1a	031	Hilleroed Kraftvarmevaerk		x																
1A1a	032	Helsingoer Kraftvarmevaerk		x																
1A1a	036	Kolding Forbraendingsanlaeg TAS	x	x	x	x	x	x	x	x					x					x
1A1a	037	Maabjergvaerket	x	x		x		x	x	x	x	x	x	x	x	x	x			
1A1a	038	Soenderborg Kraftvarmevaerk	x	x	x	x		x	x	x	x				x					x
1A1a	039	I/S Kara Affaldsforbraendingsanlaeg	x	x		x		x	x	x					x					x
1A1a	040	Viborg Kraftvarme		x																
1A1a	042	I/S Nordforbraending	x	x		x	x	x	x	x					x					x
1A1a	046	Affaldscenter aarhus - Forbraendsanlaegget	x	x	x			x	x	x					x					x
1A1a	047	I/S Reno Nord	x	x	x	x		x	x	x										
1A1a	048	Silkeborg Kraftvarmevaerk		x																
1A1a	050	AffaldPlus+, Naestved Forbraendingsanlaeg	x	x	x	x		x	x	x					x					
1A1a	051	AVV Forbraendingsanlaeg	x	x	x	x		x	x	x										
1A1a	052	Affaldsforbraendingsanlaeg I/S REFA	x	x		x					x	x	x	x	x	x	x			
1A1a	053	Svendborg Kraftvarmevaerk	x	x	x	x		x	x	x							x			x
1A1a	054	Kommunekemi	x	x	x	x		x	x	x										
1A1a	055	I/S Faelles Forbraending	x	x		x		x	x	x					x					x
1A1a	058	I/S Reno Syd	x	x	x	x		x	x	x										x
1A1a	059	I/S Kraftvarmevaerk Thisted	x	x	x	x		x	x	x										x
1A1a	061	Affaldplus+, Slagelse Forbr. and DONG Sla-	x	x		x		x	x	x										

nfr_id	lps_id	lps_name	SO2	NOx	NMVOC	CO	NH3	TSP	PM10	PM2.5	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn	Dioxin
		gelse KVV																		
1A1a	065	Haderslev Kraftvarmevaerk	x	x		x		x	x	x										
1A1a	066	Frederikshavn Affaldskraftvarmevaerk	x	x	x	x		x	x	x	x	x	x	x	x	x	x			x
1A1a	068	Bofa I/S	x	x		x					x	x	x	x	x	x	x			x
1A1a	069	DTU		x		x														
1A1a	070	AffaldPlus+, Naestved Kraftvarmevaerk		x		x														
1A1a	072	Hjoerring Varmeforsyning		x		x														
1A1a	085	L90 Affaldsforbraending	x	x		x		x	x	x	x	x	x	x	x	x	x			x
1A1a	086	Hammel Fjernvarmeselskab	x	x	x	x		x	x	x					x					x
1A1a	087	Koege Kraftvarmevaerk	x	x				x	x	x										
1A1a	088	Skagen Forbraending	x	x	x												x			x
1A1a	090	Odense Kraftvarmevaerk	x	x		x		x	x	x	x	x	x	x	x	x	x			x
1A1a	091	Centralkommunernes Transmissionsselskab F_berg	x	x																
1A1a	092	Frederikshavn Kraftvarmevaerk	x	x				x	x	x										
1A1a	093	Fjernvarme Fyn, Centrum Varmecentral		x																
1A1a	094	Special Waste System	x	x	x	x									x					x
1A1b	009	Statoil Raffinaderi	x	x																
1A1b	017	Shell Raffinaderi	x	x																
1A1c	024	Nybro Gasbehandlingsanlaeg		x																
1A2a	033	DanSteel		x																
1A2c	081	Haldor Topsoee		x																
1A2c	084	Cheminova		x																
1A2c	097	Koppers	x	x	x															
1A2d	034	Dalum Papir		x																
1A2e	023	Danisco Grindsted		x																
1A2e	071	Maricogen		x																
1A2e	082	Nordic Sugar Nakskov	x	x																
1A2e	083	Nordic Sugar Nykoebing	x					x	x	x										
1A2e	089	AarhusKarlshamn Denmark A/S	x	x				x	x	x										
1A2f i	045	Aalborg Portland	x	x		x		x	x	x					x					
1A2f i	076	Rockwool A/S Vamdrup	x	x																
1A2f i	077	Rockwool A/S Doense	x	x																
1A2f i	078	Ardagh Glass Holmegaard A/S		x		x														
1A2f i	080	Saint-Gobain Isover A/S	x	x																
1A2f i	096	Faxe Kalk	x	x																
1A4a i	049	Rensningsanlaegget Lynetten	x	x		x		x	x	x										x
TOTAL			**4157**	**14036**	**4**	**3412**	**6**	**500**	**365**	**277**	**22**	**8**	**57**	**39**	**136**	**56**	**67**	**393**	**198**	**379**
Share of total emission from stationary combustion, %			**52%**	**43%**	**0.02%**	**3%**	**3%**	**3%**	**2%**	**2%**	**10%**	**7%**	**16%**	**6%**	**55%**	**2%**	**3%**	**57%**	**4%**	**2%**

1) Emissions of the pollutants marked with “x” are plant specific. Emission of other pollutants is estimated based on emission factors. The total shown *in this table* only includes plant specific data.

2) Based on particle size distribution.

Annex 2A-7 Uncertainty estimates 2012

Table 2A-7.1 Uncertainty estimation.

SNAP	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg SO_2	Mg SO_2	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	SO_2	127207.001	3065.615	2.000	10.000	10.198	3.878	-0.023	0.020	-0.227	0.056	0.234
Stationary combustion, SNAP 02	SO_2	11358.557	2092.062	2.000	20.000	20.100	5.217	0.010	0.013	0.194	0.038	0.197
Stationary combustion, SNAP 03	SO_2	16437.351	2903.191	2.000	10.000	10.198	3.673	0.013	0.019	0.132	0.053	0.142
Total	SO_2	155002.909	8060.868				55.745					0.114
Total uncertainties					Overall uncertainty i the year (%):		7.466			Trend uncertainty (%):		0.337

SNAP	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg NO_x	Mg NO_x	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	NO_x	94566.133	21846.170	2.000	20.000	20.100	13.574	-0.043	0.192	-0.869	0.542	1.024
Stationary combustion, SNAP 02	NO_x	6948.760	5186.256	2.000	50.000	50.040	8.023	0.028	0.046	1.409	0.129	1.415
Stationary combustion, SNAP 03	NO_x	12457.468	5316.332	2.000	20.000	20.100	3.303	0.016	0.047	0.312	0.132	0.339
Total	NO_x	113972.361	32348.758				259.527					3.167
Total uncertainties					Overall uncertainty in the year (%):		16.110			Trend uncertainty (%):		1.779

SNAP	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg NMVOC	Mg NMVOC	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	NMVOC	486.054	1509.216	2.000	50.000	50.040	4.796	0.069	0.107	3.430	0.304	3.443
Stationary combustion, SNAP 02	NMVOC	12474.535	13966.268	2.000	50.000	50.040	44.383	-0.000	0.993	-0.012	2.809	2.809
Stationary combustion, SNAP 03	NMVOC	1100.497	270.977	2.000	50.000	50.040	0.861	-0.068	0.019	-3.416	0.055	3.417
Total	NMVOC	14061.086	15746.461				1993.576					31.422
Total uncertainties					Overall uncertainty in the year (%):		44.649			Trend uncertainty (%):		5.606

SNAP	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg CO	Mg CO	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	CO	8104.775	10973.857	2.000	20.000	20.100	1.767	0.025	0.083	0.500	0.236	0.553
Stationary combustion, SNAP 02	CO	118883.954	109626.421	2.000	50.000	50.040	43.955	-0.023	0.832	-1.142	2.354	2.617
Stationary combustion, SNAP 03	CO	4706.279	4201.357	2.000	20.000	20.100	0.677	-0.002	0.032	-0.039	0.090	0.098
Total	CO	131695.008	124801.635				1935.658					7.162
Total uncertainties					Overall uncertainty in the year (%):		43.996			Trend uncertainty (%):		2.676

SNAP	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg NH_3	Mg NH_3	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	NH_3	0.287	14.279	2.000	1000.000	1000.002	75.723	0.200	0.212	200.411	0.601	200.412
Stationary combustion, SNAP 02	NH_3	66.938	174.241	2.000	1000.000	1000.002	924.051	-0.199	2.592	-199.076	7.331	199.211
Stationary combustion, SNAP 03	NH_3		0.043	2.000	1000.000	1000.002	0.227	0.001	0.001	0.638	0.002	0.638
Total	NH_3	67.225	188.563				859604.643					79850.380
Total uncertainties					Overall uncertainty in the year (%):		927.149			Trend uncertainty (%):		282.578

SNAP	Gas	Base year emission (year 2000)	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg TSP	Mg TSP	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	TSP	1167.331	856.988	2.000	50.000	50.040	2.367	-0.036	0.057	-1.794	0.160	1.801
Stationary combustion, SNAP 02	TSP	13185.989	16924.511	2.000	500.000	500.004	467.167	0.073	1.120	36.629	3.168	36.765
Stationary combustion, SNAP 03	TSP	756.322	332.623	2.000	50.000	50.040	0.919	-0.038	0.022	-1.899	0.062	1.900
Total	TSP	15109.642	18114.123				218251.615					1358.548
Total uncertainties					Overall uncertainty in the year (%):		467.174			Trend uncertainty (%):		36.858

SNAP	Gas	Base year emission (year 2000)	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg PM_{10}	Mg PM_{10}	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	PM_{10}	961.506	619.716	2.000	50.000	50.040	1.830	-0.038	0.044	-1.924	0.125	1.928
Stationary combustion, SNAP 02	PM_{10}	12531.111	16071.888	2.000	500.000	500.004	474.349	0.067	1.145	33.552	3.238	33.707
Stationary combustion, SNAP 03	PM_{10}	546.510	249.541	2.000	50.000	50.040	0.737	-0.029	0.018	-1.459	0.050	1.460
Total	PM_{10}	14039.127	16941.146				225010.461					1142.044
Total uncertainties					Overall uncertainty in the year (%):		474.353			Trend uncertainty (%):		33.794

SNAP	Gas	Base year emission (year 2000)	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg $PM_{2,5}$	Mg $PM_{2,5}$	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	$PM_{2,5}$	818.358	508.943	2.000	50.000	50.040	1.560	-0.038	0.038	-1.896	0.109	1.899
Stationary combustion, SNAP 02	$PM_{2,5}$	12098.393	15642.801	2.000	500.000	500.004	479.008	0.053	1.183	26.319	3.346	26.531
Stationary combustion, SNAP 03	$PM_{2,5}$	305.634	176.715	2.000	50.000	50.040	0.542	-0.015	0.013	-0.759	0.038	0.760
Total	$PM_{2,5}$	13222.385	16328.459				229451.421					708.075
Total uncertainties					Overall uncertainty in the year (%):		479.011			Trend uncertainty (%):		26.610

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg As	kg As	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	As	958.851	110.790	2.000	100.000	100.020	49.625	-0.061	0.095	-6.121	0.268	6.127
Stationary combustion, SNAP 02	As	54.820	34.388	2.000	1000.000	1000.002	154.003	0.020	0.029	20.440	0.083	20.440
Stationary combustion, SNAP 03	As	156.335	78.119	2.000	100.000	100.020	34.991	0.041	0.067	4.121	0.189	4.125
Total	As	1170.006	223.297				27404.124					472.357
Total uncertainties					Overall uncertainty in the year (%):		165.542			Trend uncertainty (%):		21.734

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Cd	kg Cd	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Cd	740.086	49.739	2.000	100.000	100.020	42.558	-0.060	0.058	-5.970	0.165	5.972
Stationary combustion, SNAP 02	Cd	60.719	42.669	2.000	1000.000	1000.002	365.013	0.040	0.050	40.175	0.141	40.175
Stationary combustion, SNAP 03	Cd	53.970	24.490	2.000	100.000	100.020	20.954	0.020	0.029	2.000	0.081	2.002
Total	Cd	854.776	116.897				135484.490					1653.725
Total uncertainties					Overall uncertainty in the year (%):		368.082			Trend uncertainty (%):		40.666

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Cr	kg Cr	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Cr	4662.870	178.529	2.000	100.000	100.020	49.469	-0.028	0.035	-2.833	0.098	2.835
Stationary combustion, SNAP 02	Cr	282.408	101.902	2.000	1000.000	1000.002	282.307	0.016	0.020	15.907	0.056	15.907
Stationary combustion, SNAP 03	Cr	216.490	80.532	2.000	100.000	100.020	22.315	0.013	0.016	1.266	0.044	1.267
Total	Cr	5161.768	360.963				82642.095					262.676
Total uncertainties					Overall uncertainty in the year (%):		287.475			Trend uncertainty (%):		16.207

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Cu	kg Cu	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Cu	2915.710	180.698	2.000	100.000	100.020	29.336	-0.089	0.051	-8.946	0.143	8.947
Stationary combustion, SNAP 02	Cu	349.446	331.511	2.000	1000.000	1000.002	538.096	0.076	0.093	75.859	0.262	75.860
Stationary combustion, SNAP 03	Cu	306.935	103.874	2.000	100.000	100.020	16.864	0.014	0.029	1.425	0.082	1.427
Total	Cu	3572.090	616.083				290692.708					5836.816
Total uncertainties					Overall uncertainty in the year (%):		539.159			Trend uncertainty (%):		76.399

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Hg	kg Hg	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Hg	2469.476	179.462	2.000	100.000	100.020	72.494	-0.013	0.063	-1.288	0.179	1.300
Stationary combustion, SNAP 02	Hg	166.721	30.975	2.000	1000.000	1000.002	125.100	0.006	0.011	5.788	0.031	5.788
Stationary combustion, SNAP 03	Hg	192.041	37.165	2.000	100.000	100.020	15.013	0.007	0.013	0.719	0.037	0.720
Total	Hg	2828.238	247.602				21130.958					35.709
Total uncertainties					Overall uncertainty in the year (%):		145.365			Trend uncertainty (%):		5.976

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Ni	kg Ni	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Ni	8532.141	535.667	2.000	100.000	100.020	22.779	-0.040	0.032	-4.040	0.091	4.041
Stationary combustion, SNAP 02	Ni	1785.272	293.271	2.000	1000.000	1000.002	124.685	0.002	0.018	2.420	0.050	2.420
Stationary combustion, SNAP 03	Ni	6274.997	1523.165	2.000	100.000	100.020	64.771	0.038	0.092	3.804	0.260	3.813
Total	Ni	16592.410	2352.103				20260.355					36.732
Total uncertainties					Overall uncertainty in the year (%):		142.339			Trend uncertainty (%):		6.061

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Pb	kg Pb	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Pb	12069.654	387.714	2.000	100.000	100.020	15.891	-0.098	0.025	-9.849	0.071	9.850
Stationary combustion, SNAP 02	Pb	1829.069	1667.625	2.000	1000.000	1000.002	683.382	0.089	0.108	89.440	0.307	89.441
Stationary combustion, SNAP 03	Pb	1483.940	384.917	2.000	100.000	100.020	15.777	0.010	0.025	0.971	0.071	0.974
Total	Pb	15382.663	2440.256				467512.957					8097.635
Total uncertainties					Overall uncertainty in the year (%):		683.749			Trend uncertainty (%):		89.987

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Se	kg Se	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Se	3551.520	557.878	2.000	100.000	100.020	80.870	-0.016	0.141	-1.575	0.400	1.625
Stationary combustion, SNAP 02	Se	119.949	51.085	2.000	1000.000	1000.002	74.038	0.008	0.013	7.627	0.037	7.627
Stationary combustion, SNAP 03	Se	276.929	81.021	2.000	100.000	100.020	11.745	0.008	0.021	0.826	0.058	0.828
Total	Se	3948.398	689.985				12159.575					61.501
Total uncertainties					Overall uncertainty in the year (%):		110.270			Trend uncertainty (%):		7.842

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Zn	kg Zn	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Zn	16446.353	476.272	2.000	100.000	100.020	8.457	-0.140	0.020	-14.026	0.056	14.026
Stationary combustion, SNAP 02	Zn	3828.374	4199.703	2.000	1000.000	1000.002	745.623	0.137	0.175	137.411	0.495	137.412
Stationary combustion, SNAP 03	Zn	3706.258	956.515	2.000	100.000	100.020	16.985	0.004	0.040	0.358	0.113	0.375
Total	Zn	23980.985	5632.490				556313.032					19078.990
Total uncertainties					Overall uncertainty in the year (%):		745.864			Trend uncertainty (%):		138.127

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		g Dioxin	g Dioxin	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Dioxin	30.913	1.255	2.000	500.000	500.004	37.781	-0.213	0.027	-106.716	0.077	106.716
Stationary combustion, SNAP 02	Dioxin	14.236	15.299	2.000	1000.000	1000.002	920.983	0.220	0.332	220.017	0.940	220.019
Stationary combustion, SNAP 03	Dioxin	0.904	0.057	2.000	1000.000	1000.002	3.457	-0.006	0.001	-5.832	0.004	5.832
Total	Dioxin	46.052	16.611				849649.946					59830.705
Total uncertainties					Overall uncertainty in the year (%):		921.765			Trend uncertainty (%):		244.603

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Benzo(b)	kg Benzo(b)	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Benzo(b)	23.255	34.475	2.000	100.000	100.020	1.490	-0.006	0.027	-0.605	0.076	0.610
Stationary combustion, SNAP 02	Benzo(b)	1203.020	2201.103	2.000	1000.000	1000.002	951.315	0.014	1.726	14.312	4.882	15.121
Stationary combustion, SNAP 03	Benzo(b)	48.988	78.174	2.000	100.000	100.020	3.379	-0.008	0.061	-0.839	0.173	0.857
Total	Benzo(b)	1275.263	2313.752				905013.980					229.764
Total uncertainties					Overall uncertainty in the year (%):		951.322			Trend uncertainty (%):		15.158

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Benzo(k)	kg Benzo(k)	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Benzo(k)	10.547	22.487	2.000	100.000	100.020	2.737	0.005	0.053	0.477	0.150	0.500
Stationary combustion, SNAP 02	Benzo(k)	390.190	785.155	2.000	1000.000	1000.002	955.432	0.065	1.854	65.257	5.245	65.467
Stationary combustion, SNAP 03	Benzo(k)	22.694	14.139	2.000	100.000	100.020	1.721	-0.071	0.033	-7.059	0.094	7.059
Total	Benzo(k)	423.431	821.782				912860.839					4336.029
Total uncertainties					Overall uncertainty in the year (%):		955.438			Trend uncertainty (%):		65.849

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Benzo(a)	kg Benzo(a)	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Benzo(a)	7.035	8.107	2.000	100.000	100.020	0.370	-0.003	0.007	-0.350	0.019	0.350
Stationary combustion, SNAP 02	Benzo(a)	1220.732	2160.424	2.000	1000.000	1000.002	986.329	0.001	1.744	1.279	4.934	5.097
Stationary combustion, SNAP 03	Benzo(a)	10.804	21.841	2.000	100.000	100.020	0.997	0.002	0.018	0.221	0.050	0.226
Total	Benzo(a)	1238.571	2190.372				972846.042					26.149
Total uncertainties					Overall uncertainty in the year (%):		986.330			Trend uncertainty (%):		5.114

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg Indeno	kg Indeno	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	Indeno	6.321	6.111	2.000	100.000	100.020	0.453	-0.002	0.006	-0.247	0.017	0.248
Stationary combustion, SNAP 02	Indeno	974.992	1339.601	2.000	1000.000	1000.002	993.082	0.018	1.346	17.569	3.808	17.977
Stationary combustion, SNAP 03	Indeno	13.581	3.223	2.000	100.000	100.020	0.239	-0.015	0.003	-1.527	0.009	1.527
Total	Indeno	994.895	1348.935				986212.799					325.562
Total uncertainties					Overall uncertainty in the year (%):		993.082			Trend uncertainty (%):		18.043

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg HCB	kg HCB	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	HCB	4.370	1.052	2.000	1000.000	1000.002	764.205	0.003	0.181	2.966	0.512	3.009
Stationary combustion, SNAP 02	HCB	1.304	0.252	2.000	1000.000	1000.002	182.802	-0.010	0.043	-9.817	0.122	9.818
Stationary combustion, SNAP 03	HCB	0.140	0.073	2.000	1000.000	1000.002	52.995	0.007	0.013	6.850	0.035	6.850
Total	HCB	5.814	1.376				620234.752					152.368
Total uncertainties					Overall uncertainty in the year (%):		787.550			Trend uncertainty (%):		12.344

SNAP		Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty i trend in national emissions introduced by emission factor uncer-tainty	Uncertainty in trend in national emissions introduced by activity data uncer-tainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg PCB	kg PCB	%	%	%	%	%	%	%	%	%
Stationary combustion, SNAP 01	PCB	0.894	0.250	2.000	1000.000	1000.002	585.914	-0.065	0.214	-65.457	0.606	65.460
Stationary combustion, SNAP 02	PCB	0.152	0.126	2.000	1000.000	1000.002	295.120	0.060	0.108	60.271	0.305	60.272
Stationary combustion, SNAP 03	PCB	0.121	0.051	2.000	1000.000	1000.002	118.968	0.006	0.044	5.603	0.123	5.604
Total	PCB	1.167	0.427				444544.203					7949.165
Total uncertainties					Overall uncertainty in the year (%):		666.741			Trend uncertainty (%):		89.158

Annex 2A-8 Emission inventory 2012 based on SNAP sectors

Table 104 Emission inventory 2012 based on SNAP sectors.

SNAP	SO2 [Mg]	NOX [Mg]	NMVOC [Mg]	CH4 [Mg]	CO [Mg]	CO2 [Gg]	N2O [Mg]	NH3 [Mg]	TSP [Mg]	PM10 [Mg]	PM2,5 [Mg]	As [kg]	Cd [kg]	Cr [kg]	Cu [kg]	Hg [kg]	Ni [kg]	Pb [kg]	Se [kg]	Zn [kg]	HCB [kg]	Ben-zo(b) [kg]	Benzo(k) [kg]	Benzo(a) [kg]	Indeno [kg]	PCBs [kg]
Total:	10964.09	37665.07	16017.48	14597.32	129003	41472.48	622.75	188.6	18446.74	17190.68	16505.17	301.41	141.37	441.46	719.94	284.77	3875.3	2825.12	771.01	6588.97	1.42	2391.94	835.92	2212.21	1352.12	0.46
1	3065.62	21846.17	1509.22	6609.77	10973.86	25623.37	283.32	14.28	856.99	619.72	508.94	110.79	49.74	178.53	180.7	179.46	535.67	387.71	557.88	476.27	1.05	34.48	22.49	8.11	6.11	0.25
101	1908.04	11350.17	1300.29	6052.78	6077.9	20038.57	181.79	11.91	408.74	278.72	220.31	49.14	20.12	112.33	89.53	140.2	175.72	226	435.88	331.09	0.97	2.19	0.57	0.77	0.73	0.2
10100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10101	1131.63	3897.19	171.02	112.45	1848.68	11093.11	89.59	0	319.69	215.63	173.22	19.04	4.25	45.04	24.22	79.71	48.05	28.27	345.2	141.61	0.7	1.42	0.31	0.38	0.52	0.11
10102	530.78	2984.69	74.07	41.41	1095.7	3955.57	36.69	4.78	53.21	43.29	32.61	17.33	9.75	40.37	39.75	30.62	74.28	115.4	31.47	106.04	0.14	0.29	0.09	0.15	0.07	0.04
10103	117.78	1060.02	7.82	7.68	159.14	1244.5	12.95	6.53	11.47	9.2	6.81	8.52	4.34	18.07	18.84	16.95	44.04	62.82	10.65	23.35	0.04	0.08	0.02	0.03	0.03	0.01
10104	77.61	1476.07	96.99	71.54	1455.03	2923.21	31.96	0.59	9.49	7.24	5.24	3.61	1.74	7.92	5.89	11.44	8.33	19.08	47.91	18.82	0.08	0.3	0.12	0.19	0.09	0.04
10105	50.25	1932.21	950.39	5819.7	1519.35	822.17	10.61	0	14.88	3.37	2.44	0.64	0.04	0.93	0.83	1.49	1.03	0.43	0.66	41.27	0	0.1	0.02	0.02	0.02	0
102	873.68	2644.26	144.99	494.59	4649.73	3164.48	72.78	2.37	326.98	228.85	180.79	27.04	6.67	42.07	44.31	14.52	44.35	93.6	13.66	40.65	0.08	31.87	21.79	7.22	5.16	0.05
10200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10202	4.41	56.27	2.21	0.29	34.37	74.52	0.19	0	1.22	1.22	1.22	0.12	0	0.05	0.03	0.13	0	0	0.01	0.1	0	0.11	0.02	0.02	0.04	0
10203	869.27	2587.98	142.78	494.3	4615.36	3089.97	72.59	2.37	325.76	227.63	179.57	26.92	6.67	42.02	44.28	14.39	44.34	93.6	13.65	40.56	0.08	31.76	21.77	7.2	5.12	0.05
10204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	273.13	1604.15	23.91	19.86	126.13	983.65	3.73	0	118.77	110.62	106.56	31.63	22.94	24.12	46.86	22.23	315.59	68.07	108.09	104.49	0	0.39	0.08	0.09	0.14	0
10300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10304	5.24	270	2.43	2.95	10.75	100.47	1.73	0	8.67	8.67	8.67	3.12	2.43	2.43	4.68	2.43	2.43	7.11	11.79	3.12	0	0	0	0	0	0
10305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10306	267.89	1334.15	21.48	16.92	115.38	883.18	1.99	0	110.11	101.95	97.9	28.51	20.51	21.69	42.18	19.81	313.16	60.96	96.3	101.37	0	0.39	0.08	0.09	0.14	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10401	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10402	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10403	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10404	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10407	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	10.76	6247.59	40.03	42.53	120.1	1436.67	25.02	0	2.5	1.53	1.28	2.98	0.01	0.02	0	2.5	0.01	0.04	0.25	0.04	0	0.02	0.05	0.02	0.07	0
10500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10502	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10503	0.08	36.26	0.28	0.3	0.84	9.97	0.17	0	0.02	0.01	0.01	0.02	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0
10504	10.68	6211.34	39.75	42.24	119.26	1426.7	24.85	0	2.48	1.52	1.27	2.96	0.01	0.02	0	2.48	0.01	0.04	0.25	0.04	0	0.02	0.05	0.02	0.07	0
10505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2092.06	5186.26	13966.27	7170.22	109626.4	7382.39	188.07	174.24	16924.51	16071.89	15642.8	34.39	42.67	101.9	331.51	30.98	293.27	1667.62	51.09	4199.7	0.25	2201.1	785.15	2160.42	1339.6	0.13
201	146.75	677.6	201.33	498.12	714.86	856.8	23.94	0	143.45	141.18	133.24	3.02	0.57	3.59	4.18	1.98	61.05	5.44	1.38	24.18	0.01	194.19	64.47	147.84	105.19	0
20100	133.98	495.36	156.65	45.6	509.15	762.16	22.45	0	141.39	140.62	132.83	2.94	0.54	3.36	3.88	1.86	60.77	5.16	1.17	19.96	0.01	194.18	64.46	147.84	105.18	0
20101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20103	1.47	8.87	0.66	2.21	2.57	22.63	0.32	0	0.22	0.22	0.22	0.04	0.02	0.11	0.11	0.01	0.13	0.26	0.08	0.69	0	0	0	0	0.01	0
20104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20105	11.3	173.36	44.03	450.31	203.13	72.01	1.17	0	1.84	0.34	0.19	0.04	0	0.12	0.18	0.11	0.15	0.02	0.13	3.53	0	0	0	0	0	0
20106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202	922.22	3927.72	13288.78	5560.88	99781.02	5979.45	148.94	174.24	16273.99	15455.15	15063.79	23.21	36.9	75.53	287.94	18.26	125.88	1424.88	18.59	3661.03	0.21	1860.63	689.4	1881.86	1061.08	0.11
20200	921.76	3831.03	13224.92	5236.25	99728.8	5929.87	148.51	174.22	16271.78	15453.4	15062.1	23.15	36.9	75.49	287.91	18.18	125.84	1424.71	18.58	3658.73	0.21	1860.42	689.33	1881.66	1060.97	0.11
20201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20202	0.12	5.98	2.04	1.41	13.25	11.26	0.03	0.02	1.7	1.62	1.58	0.02	0	0.01	0.03	0.02	0.01	0.14	0	0.35	0	0.2	0.07	0.2	0.11	0
20203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20204	0.34	90.72	61.82	323.22	38.97	38.32	0.39	0	0.51	0.13	0.11	0.03	0	0.03	0.01	0.07	0.03	0.03	0.01	1.95	0	0.01	0	0	0	0
20205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
203	1023.1	580.94	476.16	1111.22	9130.54	546.15	15.19	0	507.07	475.56	445.78	8.15	5.2	22.78	39.39	10.73	106.34	237.31	31.12	514.49	0.04	146.29	31.29	130.72	173.33	0.02
20300	1005.38	386.41	420.19	599.26	8908.43	462.76	13.83	0	503.65	473.88	444.41	8.03	5.15	22.54	38.95	10.59	102.68	236.34	30.95	506.89	0.04	144.65	30.68	129.4	172.5	0.02
20301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20302	6.16	3.9	1.16	0.85	8.89	3.88	0.12	0	1.47	1.31	1.16	0.07	0.04	0.1	0.26	0.02	3.5	0.94	0.03	3.74	0	1.64	0.6	1.32	0.83	0
20303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SNAP	SO2 [Mg]	NOX [Mg]	NMVOC [Mg]	CH4 [Mg]	CO [Mg]	CO2 [Gg]	N2O [Mg]	NH3 [Mg]	TSP [Mg]	PM10 [Mg]	PM2,5 [Mg]	As [kg]	Cd [kg]	Cr [kg]	Cu [kg]	Hg [kg]	Ni [kg]	Pb [kg]	Se [kg]	Zn [kg]	HCB [kg]	Ben-zo(b) [kg]	Benzo(k) [kg]	Benzo(a) [kg]	Indeno [kg]	PCBs [kg]
20304	11.56	190.63	54.8	511.1	213.22	79.51	1.25	0	1.95	0.37	0.21	0.05	0	0.13	0.19	0.12	0.16	0.02	0.13	3.87	0	0.01	0	0	0	0
20305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	5806.41	10632.64	541.99	817.33	8402.69	8466.72	151.36	0.08	665.24	499.07	353.43	156.23	48.96	161.03	207.73	74.33	3046.36	769.79	162.04	1913	0.12	156.36	28.28	43.68	6.41	0.08
301	0	0.16	0.01	0.01	0.11	0.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30106	0	0.16	0.01	0.01	0.11	0.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
304	1.39	53.54	1.94	1.35	26.78	54.83	0.11	0	0.12	0.12	0.11	0.13	0	0.01	0.02	0.1	0.97	0.03	0.02	0.28	0	0	0	0	0	0
30400	0.98	0.55	0.01	0.01	0.06	0.35	0.01	0	0.03	0.02	0.01	0.01	0	0.01	0.02	0	0.97	0.03	0.01	0.27	0	0	0	0	0	0
30401	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30402	0.41	52.99	1.92	1.34	26.72	54.48	0.1	0	0.1	0.1	0.1	0.11	0	0	0	0.1	0	0	0.01	0	0	0	0	0	0	0
30403	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30404	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
305	2.84	3.37	0.12	0.09	1.56	3.77	0.05	0	0.08	0.06	0.04	0.04	0.01	0.02	0.05	0.01	2.94	0.05	0.02	0.77	0	0	0	0	0	0
30500	2.84	3.37	0.12	0.09	1.56	3.77	0.05	0	0.08	0.06	0.04	0.04	0.01	0.02	0.05	0.01	2.94	0.05	0.02	0.77	0	0	0	0	0	0
30501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30502	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30503	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30504	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
306	12.63	270.22	8.78	6.25	97.34	249.83	2.13	0	2.26	1.75	1.28	1.36	0.26	0.55	1.15	0.49	72.99	0.99	0.48	18.96	0	0.01	0.01	0.02	0.03	0
30600	1.15	112.67	5.37	3.75	75.02	152.83	0.27	0	0.27	0.27	0.27	0.32	0	0	0	0.27	0	0	0.03	0	0	0	0	0	0	0
30601	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30602	0.28	4.75	1.26	0.88	17.66	35.99	0.06	0	0	0	0	0.07	0	0	0	0.06	0	0	0.01	0	0	0	0	0	0	0
30603	11.2	36.6	0.89	0.28	0.89	16.28	1.01	0	1.92	1.43	0.97	0.87	0.26	0.54	1.15	0.08	72.99	0.99	0.44	18.95	0	0.01	0.01	0.02	0.03	0
30604	0	116.2	1.25	1.33	3.77	44.73	0.78	0	0.08	0.05	0.04	0.09	0	0	0	0.08	0	0	0.01	0	0	0	0	0	0	0
30605	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
307	280.57	453.62	16.1	17.25	118.66	286.84	1.37	0	12.32	8.8	5.2	3.42	1.28	9	11.85	5.53	40.63	87.25	14.43	137.99	0	1.45	0.6	0.3	0.45	0
30700	280.49	392.55	12.52	9.43	115.28	262.45	1.01	0	7.96	5.72	3.4	2.4	0.82	5.55	7.38	3.51	37.31	52.98	8.03	86.8	0	1.22	0.37	0.29	0.27	0
30701	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30702	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30703	0.07	59.6	2.58	2.57	2.75	23.77	0.36	0	4.35	3.07	1.8	1.02	0.46	3.45	4.48	2.02	3.33	34.27	6.39	51.15	0	0.24	0.24	0.01	0.18	0
30704	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30705	0.01	1.47	1	5.25	0.63	0.62	0.01	0	0.01	0	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0	0	0
30706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
308	92.47	144.15	10.97	18.76	223.59	154.52	4.54	0	19.31	13.35	9.97	2.05	0.56	3.73	4.53	1.44	30.02	17.23	3.17	28.59	0.01	1.21	1.21	0.01	0.09	0
30800	92.47	144.15	10.97	18.76	223.59	154.52	4.54	0	19.31	13.35	9.97	2.05	0.56	3.73	4.53	1.44	30.02	17.23	3.17	28.59	0.01	1.21	1.21	0.01	0.09	0
30801	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30802	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30803	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30804	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30805	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30806	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
309	1365.35	1348.75	59.88	136.62	415.65	1240.61	22.49	0.04	95.29	84.38	65.37	22.64	7.33	31.23	47.69	15.73	1231.2	233.29	45.85	638.05	0.01	1.75	1.83	0.31	1.67	0.01
30900	72.08	547.45	24.5	21.22	336.42	711.37	2.6	0	3.6	3.02	2.44	2.25	0.3	0.81	1.32	1.57	61.81	2.76	0.78	18.32	0	0.02	0.02	0.01	0.03	0
30901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30902	960.1	485.09	10.09	15.95	33.18	282.7	11.69	0	42.56	34.02	23.59	13.41	4.78	22.12	32.94	10.6	721.02	175.83	34.99	431.19	0.01	1.3	1.35	0.19	1.18	0.01
30903	332.53	228.52	5.91	6.6	29	163.17	6.81	0.04	48.86	47.22	39.24	6.82	2.25	8.29	13.43	3.42	448.37	54.69	10.06	187.99	0	0.43	0.46	0.11	0.45	0
30904	0.55	62.24	2.04	2.16	6.11	72.62	1.27	0	0.13	0.08	0.06	0.15	0	0	0	0.13	0	0	0.01	0	0	0	0	0	0	0
30905	0.09	25.45	17.35	90.69	10.94	10.75	0.11	0	0.14	0.04	0.03	0.01	0	0.01	0	0.02	0.01	0.01	0	0.55	0	0	0	0	0	0
30906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
310	1.44	19.13	1.62	4.57	13.09	24.36	0.09	0	0.18	0.14	0.11	0.07	0.01	0.02	0.03	0.04	1.27	0.04	0.01	0.37	0	0.01	0.01	0	0	0
31000	1.43	18.03	0.87	0.65	12.62	23.9	0.08	0	0.18	0.14	0.11	0.07	0.01	0.02	0.03	0.04	1.27	0.04	0.01	0.34	0	0.01	0.01	0	0	0

SNAP	SO2 [Mg]	NOX [Mg]	NMVOC [Mg]	CH4 [Mg]	CO [Mg]	CO2 [Gg]	N2O [Mg]	NH3 [Mg]	TSP [Mg]	PM10 [Mg]	PM2,5 [Mg]	As [kg]	Cd [kg]	Cr [kg]	Cu [kg]	Hg [kg]	Ni [kg]	Pb [kg]	Se [kg]	Zn [kg]	HCB [kg]	Benzo(b) [kg]	Benzo(k) [kg]	Benzo(a) [kg]	Indeno [kg]	PCBs [kg]
31001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31005	0	1.1	0.75	3.92	0.47	0.46	0	0	0.01	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0
31006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
311	47.36	373.69	36.23	52	820.64	473.52	13.85	0	62.09	42.54	32.74	4.91	0.92	7.69	8.62	1.53	18.82	11.96	1.72	10.4	0.02	4.19	4.19	0.02	0.04	0.01
31100	33.03	242.51	22.51	31.88	510.25	300.04	8.2	0	37.76	25.9	19.93	3.05	0.58	4.7	5.3	0.96	15.83	7.33	1.08	7.46	0.01	2.54	2.54	0.02	0.03	0.01
31101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31102	14.1	105.7	12.87	19.22	307.84	143.2	5.11	0	24.28	16.61	12.78	1.79	0.34	2.99	3.32	0.52	2.99	4.62	0.64	2.94	0.01	1.65	1.65	0.01	0.01	0
31103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31104	0.23	25.48	0.85	0.9	2.55	30.28	0.53	0	0.05	0.03	0.03	0.06	0	0	0	0.05	0	0	0.01	0	0	0	0	0	0	0
31105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
312	3.83	26.69	1.3	1.01	19.02	34.86	0.16	0	0.38	0.29	0.23	0.13	0.02	0.06	0.09	0.07	3.39	0.15	0.03	1.01	0	0.02	0.02	0	0	0
31200	3.82	26.64	1.29	1	18.97	34.83	0.15	0	0.38	0.29	0.23	0.13	0.02	0.06	0.09	0.07	3.39	0.15	0.03	0.99	0	0.02	0.02	0	0	0
31201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31205	0.01	0.05	0.01	0.01	0.05	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0
31206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
313	39.7	195.2	10.31	11.75	156.54	240.63	1.99	0	5.97	4.27	3.29	1.19	0.21	0.91	1.25	0.56	36.61	1.61	0.42	10.12	0	0.33	0.31	0.02	0.02	0
31300	39.7	194.66	9.94	9.83	156.31	240.4	1.99	0	5.97	4.27	3.29	1.19	0.21	0.91	1.25	0.56	36.61	1.61	0.42	10.11	0	0.33	0.31	0.02	0.02	0
31301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31305	0	0.54	0.37	1.91	0.23	0.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0	0
31306	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
314	66.39	288.46	31.08	50.59	710.51	342.59	12.27	0	56.71	38.86	29.83	4.55	0.92	7.14	8.19	1.23	42.69	11.1	1.69	16.1	0.01	3.8	3.8	0.03	0.05	0.01
31400	62.86	257.91	26.7	39.62	632.91	306.63	10.98	0	50.61	34.7	26.63	4.1	0.83	6.39	7.36	1.11	41.94	9.94	1.53	15.32	0.01	3.38	3.38	0.02	0.05	0.01
31401	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31402	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31403	3.52	28.82	3.2	4.8	76.85	35.23	1.28	0	6.08	4.16	3.2	0.45	0.09	0.75	0.83	0.13	0.75	1.16	0.16	0.74	0	0.41	0.41	0	0	0
31404	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31405	0.01	1.73	1.18	6.16	0.74	0.73	0.01	0	0.01	0	0	0	0	0	0	0	0	0	0	0.04	0	0	0	0	0	0
31406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
315	0.29	34.08	1.72	1	18.59	39.33	0.12	0	0.11	0.11	0.11	0.07	0	0.02	0.01	0.07	0	0	0.01	0.05	0	0	0	0	0	0
31500	0.29	34.08	1.72	1	18.59	39.33	0.12	0	0.11	0.11	0.11	0.07	0	0.02	0.01	0.07	0	0	0.01	0.05	0	0	0	0	0	0
31501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31502	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31503	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31504	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
316	504	1621	78.43	66.72	1372	865.82	12.25	0	62	44.1	20.16	36.37	12.73	18.18	18.18	10	36.37	18.18	12.73	90.91	0.01	64.11	0.86	21.12	0.67	0.01
31600	504	1621	78.43	66.72	1372	865.82	12.25	0	62	44.1	20.16	36.37	12.73	18.18	18.18	10	36.37	18.18	12.73	90.91	0.01	64.11	0.86	21.12	0.67	0.01
31601	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31602	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31603	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31604	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31605	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
320	484.95	484.26	12.51	40.71	207.27	221.63	4.28	0	15.79	10.77	8.28	1.2	0.23	1.96	2.2	0.35	5.27	3.02	0.44	2.92	0	1.3	1.3	0.01	0.19	0
32000	484.5	476.44	10.11	19.49	198.84	218.33	4.23	0	15.71	10.76	8.27	1.2	0.23	1.95	2.19	0.35	5.26	3.02	0.43	2.76	0	1.3	1.3	0.01	0.19	0
32001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32004	0	0.04	0	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32005	0.45	7.78	2.4	21.22	8.43	3.25	0.05	0	0.08	0.01	0.01	0	0	0.01	0.01	0.01	0.01	0	0.01	0.16	0	0	0	0	0	0
32006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1)] Including CO_2 emission from biomass.

Annex 2A-9 Description of the Danish energy statistics

This description of the Danish energy statistics has been prepared by Denmark's National Environmental Research Institute, NERI (now DCE) in co-operation with the Danish Energy Agency (DEA) as background information to the Danish National Inventory Report (NIR).

The Danish energy statistics system

DEA is responsible for the Danish energy balance. Main contributors to the energy statistics outside DEA are Statistics Denmark and Danish Energy Association (before Association of Danish Energy Companies). The statistics is performed using an integrated statistical system building on an Access database and Excel spreadsheets.

The DEA follows the recommendations of the International Energy Agency as well as Eurostat.

The national energy statistics is updated annually and all revisions are immediately included in the published statistics, which can be found on the DEA homepage. It is an easy task to check for breaks in a series because the statistics is 100 % time-series oriented.

The national energy statistics does not include Greenland and Faroe Islands.

For historical reasons, DEA receive monthly information from the Danish oil companies regarding Danish deliveries of oil products to Greenland and Faroe Islands. However, the monthly (MOS) and annual (AOS) reporting of oil statistics to Eurostat and IEA exclude Greenland and Faroe Islands. For all other energy products, the Danish figures are also excluding Greenland and Faroe Islands.

Reporting to the Danish Energy Agency

The Danish Energy Agency receives monthly statistics for the following fuel groups:

- Crude oil and oil products.
    - Monthly data from 46 oil companies, the main purpose is monitoring oil stocks according to the oil preparedness system.
- Natural gas.
    - Fuel/flare from platforms in the North Sea.
    - Natural gas balance from the regulator Energinet.dk (National monopoly).
- Coal and coke.
    - Power plants (94 %).
    - Industry companies (4 %).
    - Coal and coke traders (2 %).
- Electricity.
    - Monthly reporting by e-mail from the regulator Energinet.dk (National monopoly).
    - The statistics covers:
        - Production by type of producer.
        - Own use of electricity.
        - Import and export by country.
        - Domestic supply (consumption + distribution loss).
- Town gas (quarterly) from two town gas producers.

- The large central power plants also report monthly consumption of biomass.

Annual data includes renewable energy including waste. The DEA conducts a biannual survey on wood pellets and wood fuel. Statistics Denmark conducts biannual surveys on the energy consumption in the service and industrial sectors. Statistics Denmark prepares annual surveys on forest (wood fuel) & straw.

Other annual data sources include:

- DEA:
  - Survey on production of electricity and heat and fuels used.
  - Survey on end use of oil.
  - Survey on end use of natural gas.
  - Survey on end use of coal and coke.
- DCE (former NERI), Aarhus University.
  - Energy consumption for domestic air transport.
- Danish Energy Association (Association of Danish Energy companies).
  - Survey on electricity consumption.
- Ministry of Taxation.
  - Border trade.
- Centre for Biomass Technology.
  - Annual estimates of final consumption of straw and wood chips.

Annual revisions

In general, DEA follows the same procedures as in the Danish national account. This means that normally only figures for the last two years are revised.

Aggregating the energy statistics on SNAP level

The sectors used in the official energy statistics have been mapped to SNAP categories, used in the Danish emission database. DCE aggregates the official energy statistics to SNAP level based on a source correspondence table.

In cooperation between DEA and DCE, a fuel correspondence table has been developed mapping the fuels used by the DEA in the official energy statistics with the fuel codes used in the Danish national emission database. The fuel correspondence table between fuel categories used by the DEA, DCE and IPCC is presented in Annex 2A-1.

The mapping between the energy statistics and the SNAP and fuel codes used by DCE can be seen in the table below.

Table 2A-9.1 Correspondence between the Danish national energy statistics and the SNAP nomenclature (only stationary combustion part shown).

Unit: TJ		End-use		Transformation 1980-1993	
	SNAP	Fuel *(in Danish)*	Fuel-code	SNAP	Fuel-code
Foreign Trade					
- *Border Trade*					
- - Motor Gasoline					
- - Gas-/Diesel Oil					
- - Petroleum Coke	0202	Petrokoks	110A		
Vessels in Foreign Trade					
- *International Marine Bunkers*					
- - Gas-/Diesel Oil					
- - Fuel Oil					
- - Lubricants					
Energy Sector					
Extraction and Gasification					
- *Extraction*					
- - Natural Gas	010504	Naturgas	301A		
- *Gasification*					
- - Biogas, Landfill	091006	Biogas	309A		
- - Biogas, Other	091006	Biogas	309A		
Refineries					
- Own Use					
- - Refinery Gas	010306	Raffinaderigas	308A		
- - LPG	010306	LPG	303A		
- - Gas-/Diesel Oil	010306	Gas & Dieselolie	204A		
- - Fuel Oil	010306	Fuelolie & Spildolie	203A		
Transformation Sector					
Large-scale Power Units					
- *Fuels Used for Power Production*					
- - Gas-/Diesel Oil				0101	204A
- - Fuel Oil				0101	203A
- - Electricity Plant Coal				0101	102A
- - Straw				0101	117A
Large-Scale CHP Units					
- *Fuels Used for Power Production*					
- - Refinery Gas				0103	308A
- - LPG				0101	303A
- - Naphtha (LVN)				0101	210A
- - Gas-/Diesel Oil				0101	204A
- - Fuel Oil				0101	203A
- - Petroleum Coke				0101	110A
- - Orimulsion				0101	225A
- - Natural Gas				0101	301A
- - Electricity Plant Coal				0101	102A
- - Straw				0101	117A
- - Wood Chips				0101	111A
- - Wood Pellets				0101	111A
- - Wood Waste				0101	111A
- - Biogas, Landfill				0101	309A
- - Biogas, Others				0101	309A
- - Waste, Non-renewable				0101	114A
- - Wastes, Renewable				0101	114A
- *Fuels Used for Heat Production*					
- - Refinery Gas				0103	308A
- - LPG				0101	303A
- - Naphtha (LVN)				0101	210A
- - Gas-/Diesel Oil				0101	204A
- - Fuel Oil				0101	203A
- - Petroleum Coke				0101	110A
- - Orimulsion				0101	225A
- - Natural Gas				0101	301A
- - Electricity Plant Coal				0101	102A
- - Straw				0101	117A
- - Wood Chips				0101	111A
- - Wood Pellets				0101	111A
- - Wood Waste				0101	111A
- - Biogas, Landfill				0101	309A
- - Biogas, Other				0101	309A
- - Waste, Non-renewable				0101	114A
- - Wastes, Renewable				0101	114A
Small-Scale CHP Units					

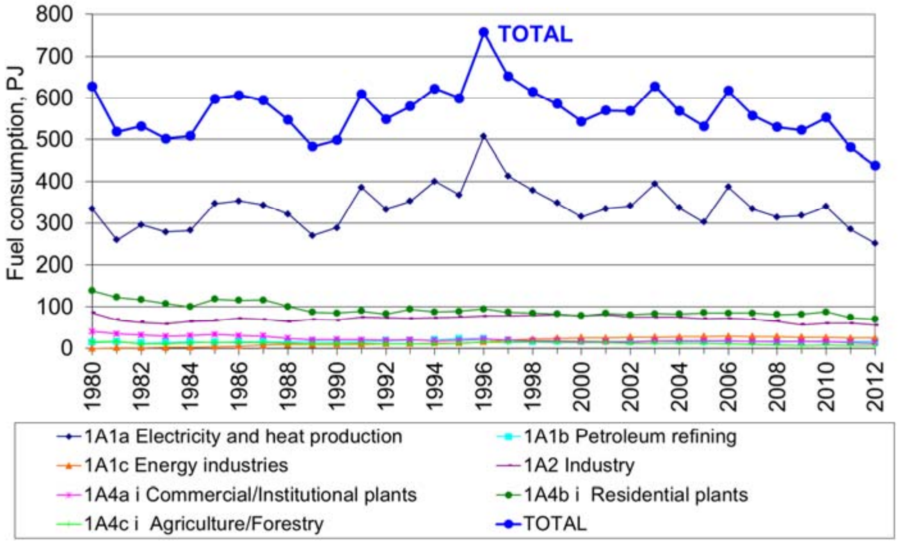
Unit: TJ		End-use		Transformation 1980-1993	
	SNAP	Fuel *(in Danish)*	Fuel-code	SNAP	Fuel-code
- *Fuels Used for Power Production*					
- - Gas-/Diesel Oil				0101	204A
- - Fuel Oil				0101	203A
- - Natural Gas				0101	301A
- - Hard Coal				0101	102A
- - Straw				0101	117A
- - Wood Chips				0101	111A
- - Wood Pellets				0101	111A
- - Wood Waste				0101	111A
- - Biogas, Landfill				0101	309A
- - Biogas, Other				0101	309A
- - Waste, Non-renewable				0101	114A
- - Wastes, Renewable				0101	114A
- *Fuels Used for Heat Production*					
- - Gas-/Diesel Oil				0101	204A
- - Fuel Oil				0101	203A
- - Natural Gas				0101	301A
- - Coal				0101	102A
- - Straw				0101	117A
- - Wood Chips				0101	111A
- - Wood Pellets				0101	111A
- - Wood Waste				0101	111A
- - Biogas, Landfill				0101	309A
- - Biogas, Other				0101	309A
- - Waste, Non-renewable				0101	114A
- - Wastes, Renewable				0101	114A
District Heating Units					
- *Fuels Used for Heat Production*					
- - Refinery Gas				0103	308A
- - LPG				0102	303A
- - Gas-/Diesel Oil				0102	204A
- - Fuel Oil				0102	203A
- - Waste Oil				0102	203A
- - Petroleum Coke				0102	110A
- - Natural Gas				0102	301A
- - Electricity Plant Coal				0102	102A
- - Coal				0102	102A
- - Straw				0102	117A
- - Wood Chips				0102	111A
- - Wood Pellets				0102	111A
- - Wood Waste				0102	111A
- - Biogas, Landfill				0102	309A
- - Biogas, Sludge				0102	309A
- - Biogas, Other				0102	309A
- - Waste, Non-renewable				0102	114A
- - Wastes, Renewable				0102	114A
- - Fish Oil				0102	215A
Autoproducers, Electricity Only					
- Fuels Used for Power Production					
- - Natural Gas				0320	301A
- - Biogas, Landfill				0320	309A
- - Biogas, Sewage Sludge				0320	309A
- - Biogas, Other				0320	309A
Autoproducers, CHP Units					
- *Fuels Used for Power Production*					
- - Refinery Gas				0103	308A
- - Gas-/Diesel Oil				0320	204A
- - Fuel Oil				0320	203A
- - Waste Oil				0320	203A
- - Natural Gas				0320	301A
- - Coal				0320	102A
- - Straw				0320	117A
- - Wood Chips				0320	111A
- - Wood Pellets				0320	111A
- - Wood Waste				0320	111A
- - Biogas, Landfill				0320	309A
- - Biogas, Sludge				0320	309A
- - Biogas, Other				0320	309A
- - Fish Oil				0320	215A
- - Waste, Non-renewable				0320	114A

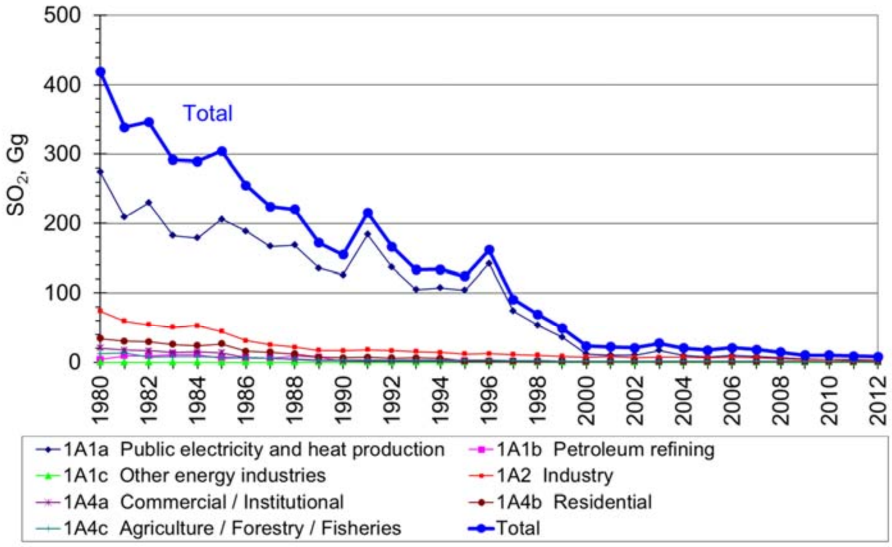
Unit: TJ	SNAP	End-use Fuel *(in Danish)*	Fuel-code	Transformation 1980-1993 SNAP	Fuel-code
- - Wastes, Renewable				0320	114A
- *Fuels Used for Heat Production*					
- - Refinery Gas				0103	308A
- - Gas-/Diesel Oil				0320	204A
- - Fuel Oil				0320	203A
- - Waste Oil				0320	203A
- - Natural Gas				0320	301A
- - Coal				0320	102A
- - Wood Chips				0320	111A
- - Wood Waste				0320	111A
- - Biogas, Landfill				0320	309A
- - Biogas, Sludge				0320	309A
- - Biogas, Other				0320	309A
- - Waste, Non-renewable				0320	114A
- - Wastes, Renewable				0320	114A
Autoproducers, Heat Only					
- *Fuels Used for Heat Production*					
- - Gas-/Diesel Oil				0320	204A
- - Fuel Oil				0320	203A
- - Waste Oil				0320	203A
- - Natural Gas				0320	301A
- - Straw				0320	117A
- - Wood Chips				0320	111A
- - Wood Chips				0320	111A
- - Wood Waste				0320	111A
- - Biogas, Landfill				0320	309A
- - Biogas, Sludge				0320	309A
- - Biogas, Other				0320	309A
- - Waste, Non-renewable				0102	114A
- - Wastes, Renewable				0102	114A
Town Gas Units	030106	Naturgas	301A		
- Fuels Used for Production of District Heating	030106	Kul (-83) / Gasolie (84-)	102A / 204A		
Transport sector					
Military Transport					
- Aviation Gasoline					
- Motor Gasoline					
- JP4					
- JP1					
- Gas-/Diesel Oil					
Road					
- LPG					
- Motor Gasoline					
- Other Kerosene	0202	Petroleum	206A		
- Gas-/Diesel Oil					
- Fuel Oil					
Rail					
- Motor Gasoline					
- Other Kerosene					
- Gas-/Diesel Oil					
- Electricity					
Domestic Sea Transport					
- LPG					
- Other Kerosene					
- Gas-/Diesel Oil					
- Fuel Oil					
Air Transport, Domestic					
- LPG					
- Aviation Gasoline					
- Motor Gasoline					
- Other Kerosene	0201	Petroleum	206A		
- JP1					
Air Transport, International					
- Aviation Gasoline					
- JP1					
Agriculture and Forestry					
- LPG					
- Motor Gasoline					
- Other Kerosene	0203	Petroleum	206A		
- Gas-/Diesel Oil					

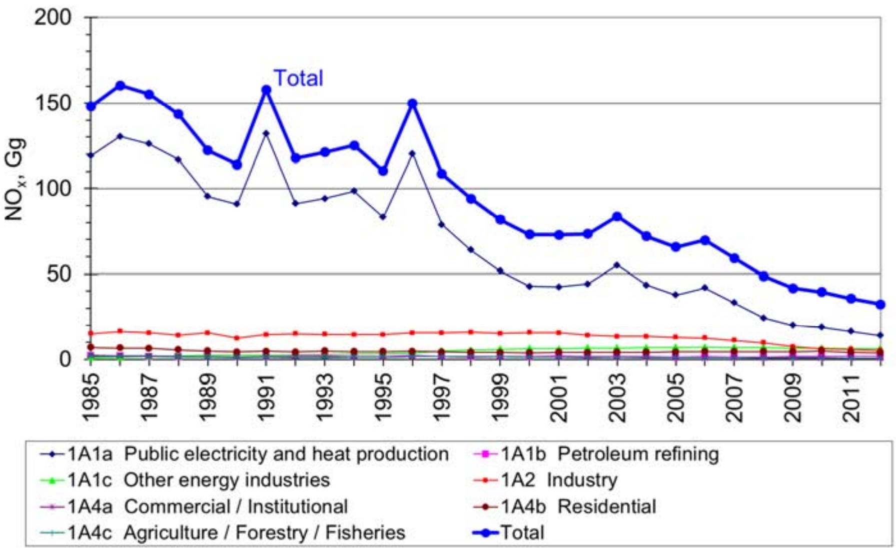
Unit: TJ		End-use		Transformation 1980-1993	
	SNAP	Fuel *(in Danish)*	Fuel-code	SNAP	Fuel-code
- Fuel Oil	0203	Fuelolie & Spildolie	203A		
- Petroleum Coke	0203	Petrokoks	110A		
- Natural Gas	0203	Naturgas	301A		
- Coal	0203	Kul	102A		
- Brown Coal Briquettes	0203	Brunkul	106A		
- Straw	0203	Halm	117A		
- Wood Chips	0203	Træ	111A		
- Wood Waste	0203	Træ	111A		
- Biogas, Other	0203	Biogas	309A		
Horticulture					
- LPG					
- Motor Gasoline					
- Gas-/Diesel Oil					
- Fuel Oil	0203	Fuelolie & Spildolie	203A		
- Petroleum Coke	0203	Petrokoks	110A		
- Natural Gas	0203	Naturgas	301A		
- Coal	0203	Kul	102A		
- Wood Waste	0203	Træ	111A		
Fishing					
- LPG					
- Motor Gasoline					
- Other Kerosene					
- Gas-/Diesel Oil					
- Fuel Oil					
Manufacturing Industry					
- Refinery Gas	0320	Raffinaderigas	308A		
- LPG					
- Naphtha (LVN)					
- Motor Gasoline					
- Other Kerosene	0320	Petroleum	206A		
- Gas-/Diesel Oil					
- Fuel Oil	0320	Fuelolie & Spildolie	203A		
- Waste Oil	0320	Fuelolie & Spildolie	203A		
- Petroleum Coke	0320	Petrokoks	110A		
- Natural Gas	0320	Naturgas	301A		
- Coal	0320	Kul	102A		
- Coke	0320	Koks	107A		
- Brown Coal Briquettes	0320	Brunkul	106A		
- Wood Pellets	0320	Træ	111A		
- Wood Waste	0320	Træ	111A		
- Biogas, Landfill	0320	Biogas	309A		
- Biogas, Other	0320	Biogas	309A		
- Wastes, Non-renewable	0320	Affald	114A		
- Wastes, Renewable	0320	Affald	114A		
- Town Gas	0320	Naturgas	301A		
Construction					
- LPG	0320	LPG	303A		
- Motor Gasoline					
- Other Kerosene	0320	Petroleum	206A		
- Gas-/Diesel Oil					
- Fuel Oil	0320	Fuelolie & Spildolie	203A		
- Natural Gas	0320	Naturgas	301A		
Wholesale					
- LPG	0201	LPG	303A		
- Motor Gasoline	0201	Petroleum	206A		
- Other Kerosene	0201	Gas & Dieselolie	204A		
- Gas-/Diesel Oil	0201	Fuelolie & Spildolie	203A		
- Petroleum Coke	0201	Petrokoks	110A		
- Natural Gas	0201	Naturgas	301A		
- Wood Waste	0201	Træ	111A		
Retail Trade					
- LPG	0201	LPG	303A		
- Other Kerosene	0201	Petroleum	206A		
- Gas-/Diesel Oil	0201	Gas & Dieselolie	204A		
- Fuel Oil	0201	Fuelolie & Spildolie	203A		
- Petroleum Coke	0201	Petrokoks	110A		
- Natural Gas	0201	Naturgas	301A		
Private Service					
- LPG	0201	LPG	303A		
- Other Kerosene	0201	Petroleum	206A		

Unit: TJ		End-use		Transformation 1980-1993	
	SNAP	Fuel *(in Danish)*	Fuel-code	SNAP	Fuel-code
- Gas-/Diesel Oil	0201	Gas & Dieselolie	204A		
- Fuel Oil	0201	Fuelolie & Spildolie	203A		
- Waste Oil	0201	Fuelolie & Spildolie	203A		
- Petroleum Coke	0201	Petrokoks	110A		
- Natural Gas	0201	Naturgas	301A		
- Wood Chips	0201	Træ	111A		
- Wood Waste	0201	Træ	111A		
- Biogas, Landfill	0201	Biogas	309A		
- Biogas, Sludge	0201	Biogas	309A		
- Biogas, Other	0201	Biogas	309A		
- Wastes, Non-renewable	0201	Affald	114A		
- Wastes, Renewable	0201	Affald	114A		
- Town Gas	0201	Naturgas	301A		
Public Service					
- LPG	0201	LPG	303A		
- Other Kerosene	0201	Petroleum	206A		
- Gas-/Diesel Oil	0201	Gas & Dieselolie	204A		
- Fuel Oil	0201	Fuelolie & Spildolie	203A		
- Petroleum Coke	0201	Petrokoks	110A		
- Natural Gas	0201	Naturgas	301A		
- Coal	0201	Kul	102A		
- Brown Coal Briquettes	0201	Brunkul	106A		
- Wood Chips	0201	Træ	111A		
- Wood Pellets	0201	Træ	111A		
- Town Gas	0201	Naturgas	301A		
Single Family Houses					
- LPG	0202	LPG	303A		
- Motor Gasoline					
- Other Kerosene	0202	Petroleum	206A		
- Gas-/Diesel Oil	0202	Gas & Dieselolie	204A		
- Fuel Oil	0202	Fuelolie & Spildolie	203A		
- Petroleum Coke	0202	Petrokoks	110A		
- Natural Gas	0202	Naturgas	301A		
- Coal	0202	Kul	102A		
- Coke	0202	koks	107A		
- Brown Coal Briquettes	0202	Brunkul	106A		
- Straw	0202	Halm	117A		
- Firewood	0202	Træ	111A		
- Wood Chips	0202	Træ	111A		
- Wood Pellets	0202	Træ	111A		
- Town Gas	0202	Naturgas	301A		
Multi-family Houses					
- LPG	0202	LPG	303A		
- Other Kerosene	0202	Petroleum	206A		
- Gas-/Diesel Oil	0202	Gas & Dieselolie	204A		
- Fuel Oil	0202	Fuelolie & Spildolie	203A		
- Petroleum Coke	0202	Petrokoks	110A		
- Natural Gas	0202	Naturgas	301A		
- Coal	0202	Kul	102A		
- Coke	0202	Koks	107A		
- Brown Coal Briquettes	0202	Brunkul	106A		
- Town Gas	0202	Naturgas	301A		

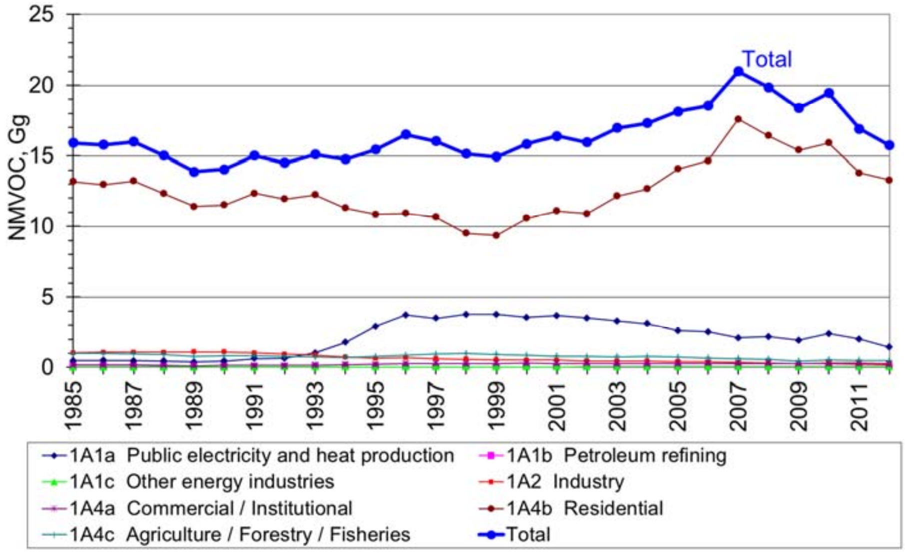
Annex 2A-10 Time-series 1980/1985-2012







Continued



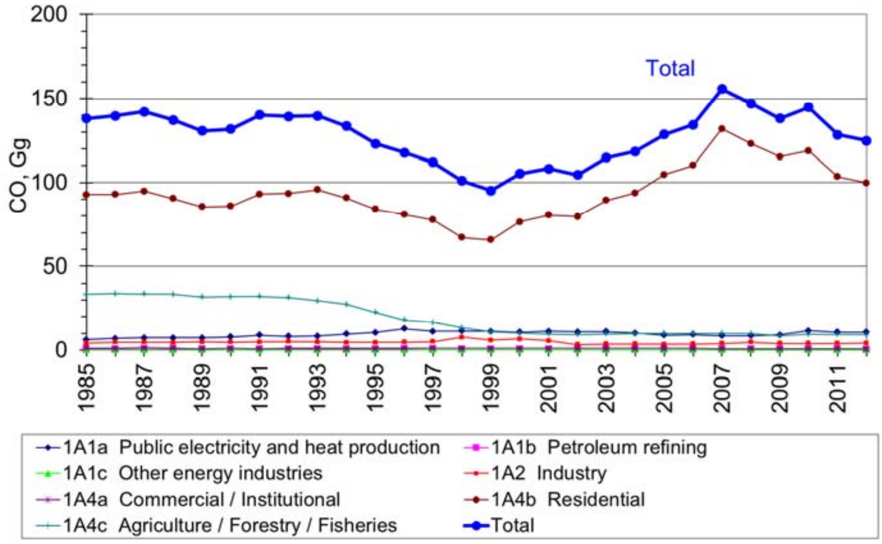


Figure 2A-10.1 Time-series for fuel consumption and emissions, 1980/1985 - 2012.

Annex 2A-11 QA/QC for stationary combustion

An updated quality manual for the Danish emission inventories has been published in 2013 (Nielsen et al. 2013). The quality manual describes the concepts of quality work and definitions of sufficient quality, critical control points and a list of Point for Measuring (PM).

Documentation concerning verification of the Danish emission inventories has been published by Fauser et al. (2013). The reference approach for the energy sector is shown in the annual National Inventory Report, Chapter 3.4.

Former editions of a sector report for stationary combustion (Nielsen et al. 2014) has been reviewed by external experts in 2004, 2006 and 2009 (Nielsen et al. 2004, Nielsen et al. 2006 and Nielsen et al. 2009). This forms a vital part of the QA activities for stationary combustion.

Source specific QA/QC and PM's are shown below.

Data storage, level 1

Table 3.2.38 lists the sectoral PM's for data storage level 1.

Table 3.2.38 List of PM, data storage level 1.

Level	CCP	Id	Description	Sectoral/general	Stationary combustion
Data Storage level 1	1. Accuracy	DS.1.1.1	General level of uncertainty for every dataset including the reasoning for the specific values.	Sectoral	Uncertainties are estimated and references given in IIR chapter 3.2.
	2. Comparability	DS1.2.1	Comparability of the emission factors/calculation parameters with data from international guidelines, and evaluation of major discrepancies.	Sectoral	In general, if national referenced emission factors differ considerably from IPCC Guideline/EEA Guidebook values this is discussed in NIR chapter 3.2.4. This documentation is improved annually based on reviews. At CRF level, a project has been carried out comparing the Danish inventories with those of other countries (Fauser et al. 2007).
	3.Completeness	DS.1.3.1	Ensuring that the best possible national data for all sources are included, by setting down the reasoning behind the selection of datasets.	Sectoral	A list of external data are shown and discussed below.
	4.Consistency	DS.1.4.1	The original external data has to be archived with proper reference.	Sectoral	It is ensured that all external data are archived at DCE. Subsequent data processing takes place in other spreadsheets or databases. The datasets are archived annually in order to ensure that the basic data for a given report are always available in their original form.
	6.Robustness	DS.1.6.1	Explicit agreements between the external institution holding the data and DCE about the conditions of delivery	Sectoral	For stationary combustion, a data delivery agreement is made with the DEA. NERI (now DCE) and DEA have renewed the data delivery agreement in 2011. Most of the other external data sources are available due to legislatory requirements. See Table 3.2.39.
	7.Transparency	DS.1.7.1	Listing of all archived datasets and external contacts.	Sectoral	A list of external datasets and external contacts is shown in Table 3.2.39 below.

Table 3.2.39 List of external data sources.

Dataset	Description	AD or Emf.	Reference	Contact(s)	Data agreement/ Comment
Energiproducenttællingen.xls	Data set for all electricity and heat producing plants.	Activity data	The Danish Energy Agency (DEA)	Kaj Stærkind	Data agreement in place
Gas consumption for gas engines and gas turbines 1990-1994	Historical data set for gas engines and gas turbines.	Activity data	The Danish Energy Agency (DEA)	Jane Rusbjerg	No data agreement. Historical data
Basic data (Grunddata.xls)	The Danish energy statistics. Data set applied for both the reference approach and the national approach.	Activity data	The Danish Energy Agency (DEA)	Jane Rusbjerg	Data agreement in place. However, the data set is also published as part of national energy statistics
Energy statistics for industrial subsectors	Disaggregation of the industrial fuel consumption. The data set have been applied for the first time in the inventory reported in 2012.	Activity data	The Danish Energy Agency (DEA)	Jane Rusbjerg	Only informal data delivery agreement. The data set will be included in the next update of the data delivery agreement with DEA.
SO_2 & NO_x data, plants>25 MW_e	Annual emission data for all power plants > 25 MW_e. Includes information on methodology: measurements or emission factor.	Emissions	Energinet.dk	Christian F.B. Nielsen	No data agreement in place
Emission factors	Emission factors stems from a large number of sources.	Emission factors	See chapter regarding emission factors		Some of the annually updated CO_2 emission factors are based on EU ETS data, see below. For the other emission factors no formal data delivery agreement.
HM and PM from public power plants	Emissions from the two large power plant operators in DK DONG Energy and Vattenfall	Emissions	Dong Energy Vattenfall	Marina Snowman Møller, Heidi Demant	No formal data agreement in place
Annual environmental reports / environmental data	Emissions from plants defined as large point sources	Emissions	Various plants		No data agreement necessary. Plants are obligated by law and data published on the Danish EPA homepage.
EU ETS data	Plant specific CO_2 emission factors	Emission factors and fuel consumption	The Danish Energy Agency (DEA)	Dorte Maimann Helen Falster	Plants are obligated by law. The availability of detailed information is part of the renewed data agreement with DEA.

Energiproducenttaellingen - statistic on fuel consumption from district heating and power plants (DEA)
The data set includes all plants producing power or district heating. The spreadsheet from DEA is listing fuel consumption of all plants included as large point sources in the emission inventory. The statistic on fuel consumption from district heating and power plants is regarded as complete and with no significant uncertainty since the plants are bound by law to report their fuel consumption and other information.

Gas consumption for gas engines and gas turbines 1990-1994 (DEA)
For the years 1990-1994, DEA has estimated consumption of natural gas and biogas in gas engines and gas turbines. DCE assesses that the estimation by the DEA are the best available data.

Basic data (DEA)
The Danish energy statistics. The spreadsheet from DEA is used for the CO_2 emission calculation in accordance with the IPCC reference approach and is also the first data set applied in the national approach. The data set is included in the data delivery agreement with DEA, but it is also published annually on DEA's homepage.

Energy statistics for industrial subsectors (DEA)
This data set has been applied for the first time in the inventory reported in 2012. The data includes disaggregation of the fuel consumption for industrial plants. The data set is estimated for the reporting to Eurostat. The data delivery agreement is informal at this time, but the dataset will be included in the next update of the agreement with DEA.

SO_2 and NO_x emission data from electricity producing plants > 25MW$_e$ (Energinet.dk)
Plants larger than 25 MW$_e$ are obligated to report emission data for SO_2 and NO_x to the DEA annually. Data are on production unit level and classified. The data on plant level are part of the plants annually environmental reports. DCE's QC of the data consists of a comparison with data from previous years and with data from the plants' annual environmental reports.

Emission factors
For specific references, see the chapter regarding emission factors. Some of the annually updated CO_2 emission factors are based on EU ETS data, se below.

Data for emission of heavy metals and particles from central power plants, DONG Energy and Vattenfall
The two major Danish power plant operators assess heavy metal emissions from their plants using model calculations based on fuel data and type of flue gas cleaning. DCE's QC of the data consists of a comparison with data from previous years and with data from the plants' annual environmental reports.

Annual environmental reports (DEPA)
A large number of plants are obligated by law to report annual environmental data including emission data. DCE compares the data with those from previous years and large discrepancies are checked.

EU ETS data (DEA)

EU ETS data are information on fuel consumption, heating values, carbon content of fuel, oxidation factor and CO_2 emissions. DCE receives the verified reports for all plants which utilises a detailed estimation methodology. DCE's QC of the received data consists of comparing to calculation using standard emission factors as well as comparing reported values with those for previous years.

Data processing, level 1

Table 3.2.40 lists the sectoral PM's for data processing level 1.

Table 3.2.40 List of PM, data processing level 1.

Level	CCP	Id	Description	Sectoral / general	Stationary combustion
Data Processing level 1	1. Accuracy	DP.1.1.1	Uncertainty assessment for every data source not part of DS.1.1.1 as input to Data Storage level 2 in relation to type and scale of variability.	Sectoral	Uncertainties are estimated and references given in NIR chapter 3.2.5.
	2.Comparability	DP.1.2.1	The methodologies have to follow the international guidelines suggested by UNFCCC and IPCC.	Sectoral	The methodological approach is consistent with international guidelines. An overview of tiers is given in NIR Chapter 3.2.5
	3.Completeness	DP.1.3.1	Identification of data gaps with regard to data sources that could improve quantitative knowledge.	Sectoral	The energy statistics is considered complete.
	4.Consistency	DP.1.4.1	Documentation and reasoning of methodological changes during the time series and the qualitative assessment of the impact on time series consistency.	Sectoral	The two main methodological changes in the time series; implementation of Energiproducenttaellingen (plant specific fuel consumption data) from 1994 onwards and implementation of EU ETS data from 2006 onwards is discussed in NIR chapter 3.2.
	5.Correctness	DP.1.5.2	Verification of calculation results using time series	Sectoral	time series for activity data on SNAP and CRF source category level are used to identify possible errors. time series for emission factors and the emission from CRF subcategories are also examined.
		DP.1.5.3	Verification of calculation results using other measures	Sectoral	The IPCC reference approach validates the fuel consumption rates and CO_2 emission. Both differ less than 2.0 % (1990-2011). The reference approach is further discussed in NIR Chapter 3.4.
	7.Transparency	DP.1.7.1	The calculation principle, the equations used and the assumptions made must be described.	Sectoral	This is included in NIR chapter 3.2.5.
		DP.1.7.2	Clear reference to dataset at Data Storage level 1	Sectoral	This is included in NIR chapter 3.2.5.
		DP.1.7.3	A manual log to collect information about recalculations.	Sectoral	-

Data storage, level 2

Table 3.2.41 lists the sectoral PM's for data storage level 2.

Table 3.2.41 List of PM, data storage level 2.

Level	CCP	Id	Description	Sectoral / general	Stationary combustion
Data Storage level 2	5.Correctness	DS.2.5.1	Check if a correct data import to level 2 has been made	Sectoral	To ensure a correct connection between data on level 2 and level 1 different controls are in place, e.g. control of sums and random tests.

Data storage level 4

Table 3.2.42 lists the sectoral PM's for data storage level 4.

Table 3.2.42 List of PM, data storage level 4.

Level	CCP	Id	Description	Sectoral / general	Stationary combustion
Data Storage level 4	4. Consistency	DS.4.4.3	The IEFs from the CRF are checked both regarding level and trend. The level is compared to relevant emission factors to ensure correctness. Large dips/jumps in the time series are explained.	Sectoral	Large dips/jumps in time series are discussed and explained in NIR chapter 3.2.

Other QC procedures

The emission from each large point source is compared with the emission reported the previous year.

Some automated checks have been prepared for the emission databases:

- Check of units for fuel rate, emission factors and plant-specific emissions.
- Check of emission factors for large point sources. Emission factors for pollutants that are not plant-specific should be the same as those defined for area sources.
- Additional checks on database consistency.
- Emission factor references are included in this report.
- Annual environmental reports are kept for subsequent control of plant-specific emission data.
- QC checks of the country-specific emission factors have not been performed, but most factors are based on input from companies that have implemented some QA/QC work. The major power plant owner/operators in Denmark, DONG Energy and Vattenfall have obtained the ISO 14001 certification for an environmental management system. The Danish Gas Technology Centre and Force Technology both run accredited laboratories for emission measurements.

National external review

The 2005, 2007 and 2011 updates of the sector report for stationary Former editions of the sector report for stationary combustion (Nielsen et al. 2011) has been reviewed by external experts in 2004, 2006 and 2009 (Nielsen et al. 2004, Nielsen et al. 2006 and Nielsen et al. 2009). This forms a vital part of the QA activities for stationary combustion.

Annex 2A-12 SO_2 and NO_x emission factors

The text below is from the 2014 update of the sector report for stationary combustion. This update of the report includes the years 1990-2011. The suggested improvements have been included in the emission inventory reported in 2014. The report have not been published yet.

SO_2 emission factors

The SO_2 emission factors and references are shown in Table 1. Below the table further details about the references, additional references, and time series are discussed.

Table 1 SO_2 emission factors and references 2011.

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
SOLID	ANODE CARBON	1A2f	Industry - other	032000	574	Assumed equal to coal. DCE assumption.
	COAL	1A1a	Electricity and heat production	0101	9	DCE estimate based on data reported by plant owners to the electricity transmission company, Energinet.dk (Energinet.dk, 2012)
				0102	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
		1A2a-f	Industry	03	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
		1A4a	Commercial/Institutional	020100	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006).
		1A4b i	Residential	020200	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
		1A4c i	Agriculture/ Forestry	0203	574	DCE calculation based on DEPA (2010c), DEA (2012a) and EMEP (2006)
	BROWN COAL BRI.	1A2f i	Industry - other	0308	574	Assumed equal to coal. DCE assumption.
		1A4a	Commercial/Institutional	0201	574	Assumed equal to coal. DCE assumption.
		1A4b	Residential	0202	574	Assumed equal to coal. DCE assumption.
		1A4c	Agriculture/ Forestry	0203	574	Assumed equal to coal. DCE assumption.
	COKE OVEN COKE	1A2a-f	Industry	03	574	Assumed equal to coal. DCE assumption.
		1A4b i	Residential	020200	574	Assumed equal to coal. DCE assumption.
LIQUID	PETRO-LEUM COKE	1A1a	Electricity and heat production	0101	605	DCE calculation based on DEPA (2001b), DEA (2012a) and EMEP (2006).
		1A2a-f	Industry	03	605	DCE calculation based on DEPA (2001b), DEA (2012a) and EMEP (2006).
		1A4a	Commercial/ Institutional	020100	605	DCE calculation based on DEPA (2001b), DEA (2012a) and EMEP (2006).
		1A4b	Residential	020200	605	DCE calculation based on DEPA (2001b), DEA (2012a) and EMEP (2006).
	RESIDUAL OIL	1A1a	Electricity and heat production	0101	218	Unknown. See chapter 0.

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
				0102	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A1b	Petroleum refining	010306	537	DCE calculation based on plant specific data for year 2003.
		1A2a-f	Industry	03	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A4a	Commercial/ Institutional	0201	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A4b	Residential	0202	344	DCE estimate based on EOF (2013) and DEA (2012a)
		1A4c i	Agriculture/ Forestry	0203	344	DCE estimate based on EOF (2013) and DEA (2012a)
	GAS OIL	1A1a	Electricity and heat production	all	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A1b	Petroleum refining	010306	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A2a-f	Industry	03	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A4a	Commercial/ Institutional	0201	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A4b i	Residential	0202	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
		1A4c	Agriculture/Forestry	0203	23	DCE estimate based on DEPA (1998), Miljø- og planlægningsudvalget (1998) and DEA (2012a).
	KERO-SENE	1A2f	Industry - other	03	5	DCE estimate based on Tønder (2004) and Shell (2013).
		1A4a	Commercial/ Institutional	0201	5	DCE estimate based on Tønder (2004) and Shell (2013).
		1A4b i	Residential	0202	5	DCE estimate based on Tønder (2004) and Shell (2013).
		1A4c i	Agriculture/ Forestry	0203	5	DCE estimate based on Tønder (2004) and Shell (2013).
	ORIMUL-SION	1A1a	Electricity and heat production	0101	12	DCE estimate based on plant specific data.
	LPG	1A1a	Electricity and heat production	All	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
		1A2a-f	Industry	03	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
		1A4a	Commercial/ Institutional	0201	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
		1A4b i	Residential	0202	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
		1A4c i	Agriculture/ Forestry	0203	0.13	DCE estimate based on Augustesen (2003) and DEA (2012a).
	REFINE-RY GAS	1A1b	Petroleum refining	0103	1	DCE estimate based on plant specific data for one plant, average value for 1995-2002.
GAS	NATURAL GAS	1A1a	Electricity and heat production	0101, 0102	0.3	Schmidt (2004)
		1A1c	Other energy industries	010504	0.3	Schmidt (2004)
		1A2a-f	Industry	03	0.3	Schmidt (2004)
		1A4a	Commercial/ Institutional	0201	0.3	Schmidt (2004)
		1A4b i	Residential	0202	0.3	Schmidt (2004)
		1A4c i	Agriculture/ Forestry	0203	0.3	Schmidt (2004)
WASTE	WASTE	1A1a	Electricity and heat production	0101	8.3	Nielsen et al. (2010a)
				0102	15	DCE estimate based on plant specific data for four plants, 2009 data.
		1A2a-f	Industry	03	15	Assumed equal to district heating plants (DCE assumption).
		1A4a	Commercial/ Institutional	0201	15	Assumed equal to district heating plants (DCE assumption).
	INDU-STRIAL WASTE	1A2f	Industry - Other	031600	15	Assumed equal to waste. DCE assumption.
BIO-MASS	WOOD	1A1a	Electricity and heat production	0101	1.9	Nielsen et al. (2010a)
				0102	25	Serup et al. (1999); Christiansen et al. (1997)
		1A2a-f	Industry	All	25	Serup et al. (1999); Christiansen et al. (1997)
		1A4a	Commercial/ Institutional	0201	25	Serup et al. (1999); Christiansen et al. (1997)
		1A4b i	Residential	0202	25	Serup et al. (1999); Christiansen et al. (1997)
		1A4c i	Agriculture/ Forestry	0203	25	Serup et al. (1999); Christiansen et al. (1997)
	STRAW	1A1a	Electricity and heat production	0101	49	Nielsen et al. (2010a)
				0102	130	Nikolaisen et al. (1998)
		1A4a	Commercial/Institutional	0201	130	Assumed equal to district heating plants. DCE assumption.
		1A4b i	Residential	0202	130	Assumed equal to district heating plants. DCE assumption.
		1A4c i	Agriculture/ Forestry	0203	130	Assumed equal to district heating plants. DCE assumption.

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
	BIO OIL	1A1a	Electricity and heat production	0101	1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
		1A2a-f	Industry	03	1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
		1A4a	Commercial/ Institutional	0201	1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
		1A4b i	Residential	0202	1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
		1A4c	Agriculture/ Forestry	0203	1	DCE estimate based on Folkecenter for Vedvarende Energi (2000) and DEA (2012a).
	BIOGAS	1A1a	Electricity and heat production	0101, not engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
				Engines	19.2	Nielsen & Illerup (2003)
				0102	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
		1A2a-f	Industry	03, not engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
				03, engines	19.2	Nielsen & Illerup (2003)
		1A4a	Commercial/ Institutional	0201, not engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
				020105	19.2	Nielsen & Illerup (2003)
		1A4c i	Agriculture/ Forestry	0203, not engines	25	DCE estimate based on Christiansen (2003), Hjort-Gregersen (1999) and DEA (2012a).
				020304	19.2	Nielsen & Illerup (2003)
	BIO PROD GAS	1A1a	Electricity and heat production	010105	1.9	Assumed equal to wood. DCE assumption.
		1A2f	Industry - other	031305	1.9	Assumed equal to wood. DCE assumption.
		1A4a	Commercial/ Institutional	020105	1.9	Assumed equal to wood. DCE assumption.
		1A4c	Agriculture/ Forestry	020304	1.9	Assumed equal to wood. DCE assumption.

Anode carbon

Anode carbon has been used in industrial plants since 2010. The SO_2 emission factor, 574 g/GJ, have been assumed equal to the SO_2 emission factor for coal combusted in industrial plants.

Coal, large power plants

Sector 1A1a, SNAP 0101

Data for SO_2 emission and fuel consumption for Danish power plants >25MW$_e$ are available for all plants for the years 1990 and onwards. In general, the plant specific data have been included in the emission inventories.

For some years, a small part of the coal consumption has, however, been included as an area source. The SO_2 emission factor for coal has been estimated as an average value based on the annual reporting from the power plant operators to the electricity transmission company in Denmark, Energinet.dk[1].

From 2010 onwards, the emission factor is estimated based on a database query including power plants for which the coal consumption makes up more than 90 % of the total fuel consumption. All SO_2 emission from these plants is assumed to originate from the coal consumption.

For 2008-2009, the emission factor is based on emission data for power plants that are primarily fuelled by coal and the emission is assumed to originate from coal, residual oil, gas oil or biomass/waste.

For 1990-2007, the emission factor is based on the total SO_2 emission from all power plants divided by the fuel consumption of coal and residual oil. This methodology results in a small overestimation of the emission factor. From 2003 onwards, the fuel consumption data were stated in TJ.

The calculated time series for the SO_2 emission factor are shown in Table 2 below.

Table 2 SO_2 emission factor for coal combusted in centralised power plants.

Year	SO_2 emission factor [g/GJ]
1990	506
1991	571
1992	454
1993	386
1994	343
1995	312
1996	420
1997	215
1998	263
1999	193
2000	64
2001	47
2002	45
2003	61
2004	42
2005	41
2006	37
2007	40
2008	26
2009	14
2010	10
2011	9

[1] Eltra and Elkraft System in the beginning of the time series.

Coal, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 0102, 03, 02
According to Danish legislation, the maximum sulphur content of coal used in plants that are not large power plants is 0.9% (DEPA, 2010c). This value has been in force since 1989 (DEPA, 1994; DEPA, 1988, DEPA, 2001b). The average sulphur content has been assumed to be a little below the maximum – 0.8%.

The lower heating value of coal used in other plants than power plants was 26.5 GJ/ton in 1991-2007 (DEA, 2012a). The LCV differed from this value in 1990 and in 2008 onwards. However, a LCV of 26.65 GJ/ton have been applied in the DCE estimate.

The sulphur retention in ash has been assumed to be 0.05 referring to the EMEP/Corinair Guidebook 2006[2] update (EMEP, 2006).

Based on these data the emission factor 574 g/GJ has been calculated (see below).

$$EMF_{SO2} = 10^6 \cdot ((2 \cdot C_s \cdot (1-\alpha_s)) \ / \ H_u)$$

$$EMF_{SO2} = 10^6 \cdot ((2 \cdot 0.8 \cdot 0.01 \cdot (1-0.05)) \ / \ 26.5) = 574 \text{ g/GJ}$$

The tier 1 emission factor in the 2009 update of the EMEP/EEA Guidebook is 820 g/GJ or 900 g/GJ depending on source category (EEA, 2009).

Plant specific emission data are available for a large part of the coal consumption in the category. However, as a result of the large emission reductions for power plants and large industrial plants the SO_2 emission estimated based on the emission factor 574 g/GJ is considerable. An improved emission factor will be considered in future inventories.

Brown coal briquettes

Sector 1A2f, 1A4a, 1A4b, 1A4c, SNAP 03, 0201, 0202, 0203
The emission factors for brown coal briquettes (BKB) have been assumed to be the same as for coal. The consumption of BKB is below 0.2 PJ all years and below 0.03 % of the Danish fuel consumption.

Coke oven coke

Sector 1A2a-f, 1A4b, SNAP 03, 0202
The emission factors for coke oven coke have been assumed to be the same as for coal. The consumption of coke oven coke is below 1.4 PJ all years and below 0.3 % of the Danish fuel consumption.

Petroleum coke

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP: All
The emission factor for petroleum coke (605 g/GJ) has been based on maximum sulphur content according to Danish legislation and on the lower heating value that is part of the Danish energy statistics.

[2] EMEP/Corinair Guidebook 2006 update, B111-22, Table 8.

The lower heating value for petroleum coke used in Denmark is 31.4 GJ/ton (DEA 2012a).

According to Danish legislation, the sulphur content of petroleum coke should be below 1% in 2001 and onwards (DEPA, 2001b). In the years 1990 – 2000, the maximum sulphur content according to Danish legislation was 1.3% (DEPA, 1994; DEPA, 1988).

The sulphur retention in ash has been assumed to be 0.05 referring to EMEP (2006). It has been assumed that sulphur flue gas cleaning is not installed in plants combusting petroleum coke.

$EMF_{SO2} = 10^6 \cdot ((2 \cdot C_s \cdot (1-\alpha_s)) / H_u)$

1990-2000: $EMF_{SO2} = 10^6 \cdot ((2 \cdot 1.3 \cdot 0.01 \cdot (1-0.05)) / 31.4) = 787$ g/GJ

2001-2011: $EMF_{SO2} = 10^6 \cdot ((2 \cdot 1.0 \cdot 0.01 \cdot (1-0.05)) / 31.4) = 605$ g/GJ

Residual oil, large power plants

Sector 1A1a, SNAP 0101

Data for SO_2 emission and fuel consumption for Danish power plants >25MW_e are available for all plants for the years 1990 and onwards. In general, the plant specific data have been included in the emission inventories. For some years, a small part of the residual oil consumption has, however, been included as an area source. The SO_2 emission factor for residual oil has been estimated as an average value based on the annual reporting from the power plant operators to the electricity transmission company in Denmark, Energinet.dk[3].

For 1990-2001, DCE has estimated the SO_2 emission factor for residual oil based on the sulphur content of the residual oil used in power plants >25MW_e. This information was part of the reporting from the power plant owners (Eltra & Elkraft System) to the Danish Energy Agency at that time. The lower heating value for residual oil refers to DEA (2012a). Sulphur retention in ash is not relevant for oil and sulphur flue gas cleaning has not been taken into account. The estimated emission factors are shown below.

The emission factors applied for 2002-2007 have been based on plant specific data for a few large power plant units combusting primarily residual oil. Data for this calculation refers to annual data from Eltra & Elkraft System.

For 2008 and onwards, the applied emission factor is 218 g/GJ. The reference of this value is unknown and in future inventories, the emission factor 100 g/GJ will be applied. This value is an average value of the plant specific data for 2008 and 2009. In general, plant specific data are available and thus the recalculation will be small.

[3] Eltra and Elkraft System in the beginning of the time series.

Table 3 Emission factors time series for residual oil used in power plants.

Year	Average sulphur content [%][1)]	Sulphur retention in ash [kg/kg]	Lower heating value [GJ/tonne][2)]	Emission factor [g/GJ]
1990	0.9	0	40.4	446
1991	0.95	0	40.4	470
1992	0.99	0	40.4	490
1993	0.96	0	40.4	475
1994	3.16	0	40.4	543
1995	0.71	0	40.4	351
1996	0.83	0	40.7	408
1997	0.7	0	40.65	344
1998	0.75	0	40.65	369
1999	0.75	0	40.65	369
2000	0.82	0	40.65	403
2001	0.641	0	40.65	315
2002				290
2003				334
2004				349
2005				283
2006				308
2007				206
2008				218
2009				218
2010				218
2011				218

1. Eltra & Elkraft System annual reporting.

2. DEA (2012a).

3. Estimated based on plant specific data reported by plant operators to Energinet.dk (Previously Eltra & Elkraft System). Annual reporting.

Residual oil, refineries

Sector 1A1b, SNAP 010306

The refineries have been included in the Danish inventory as point sources with plant specific SO_2 emission data from 1994 onwards. Thus, the emission factor has only been applied for a small amount of residual oil.

The emission factor for 1994-2011 (537 g/GJ) has been estimated based on plant specific data for 2003 from the two refineries in operation in Denmark. It has been assumed that all SO_2 originate from residual oil.

The total emission from refinery furnaces 1990-1993 have been reported by Fenhann (1996). The emission factor for residual oil (798 g/GJ) has been estimated based on these data.

Residual oil, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 0102, 03, 0201, 0202, 0203

The legislative limit for sulphur content in residual oil sold in Denmark is 1% (DEPA, 2010c; DEPA, 2001b; DEPA, 1994).

However, the sulphur content of residual oil sold in Denmark has been somewhat lower in recent years; 0.75 % or 0.5% (EOF, 2013). According to Danish Oil Industry Association, the average sulphur content has been 0.7%

from 1997 to 2005 (EOF, 2003). The same sulphur content has been assumed for the years 2006-2011.

For the years 1990-1996, the legislative maximum sulphur content of 1% has been assumed by DCE.

The lower heating value for residual oil is 40.65 GJ/ton in 1997-2011 and 40.40 GJ/ton in 1990-1995 (DEA, 2012a).

The emission factors are estimated below:

$EMF_{SO2} = 10^6 \cdot (2 \cdot C_s / H_u)$

1990-1996: 495 g/GJ

1997-2011: 344 g/GJ

Gas oil

Sector 1A1a, 1A1b, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP: all

For the years 1995-2011, the emission factor is 23 g/GJ. This emission factor is based on a sulphur content of 0.05% and a lower heating value of 42.7 GJ/ton.

The Danish legislation for gas oil requires sulphur content below 0.2% (DEPA, 1994; DEPA, 2000; DEPA, 2001b; DEPA, 2010c). The sulphur content has been lower than the 0.2% due to Danish tax laws (DEPA, 1998). According to the tax laws, the base sulphur content (no tax) for gas oil has been 0.05% since 1995.

The low average sulphur content for gas oil used in Denmark refers to a note from the parliamentary committee for environment (Miljø- og planlægningsudvalget, 1998). According to this reference, the oil sold in Denmark in 1998 had a sulphur content of 0.05% regardless of the legislative limit of 0.2% sulphur. The sulphur content of 0.05% has been confirmed by product data sheets from Q8, Shell and Statoil. The lower heating value for gas oil is 42.7 GJ/ton (DEA, 2012a).

For the years 1990-1994 the emission factor 94 g/GJ refers to Danish legislation (DEPA, 1994; DEPA, 1988) concerning sulphur content (0.2%) and the lower heating value 42.7 GJ/ton (DEA 2012a).

Kerosene

Sector 1A2f, 1A4a, 1A4b, 1A4c, SNAP: all

According to a product sheet from Shell (2013), the maximum sulphur content of kerosene is 0.05 %. However, this maximum sulphur content has been stated in the product sheets as it is the maximum sulphur content allowed to avoid sulphur taxes (DEPA, 1998). The actual sulphur content is somewhat lower. According to Tønder (2004), the sulphur content was approximately 95-107 mg S/litre. According to the product sheet from Shell (2013) the density of kerosene is 775-840 g/litre and thus the actual sulphur content is approximately 0.012 % sulphur.

The lower heating value 43.1 GJ/ton refers to the product data sheet from Shell (2013).

The emission factor 5 g/GJ has been based on a sulphur content of 0.01% (Tønder, 2004) and the LCV 43.1 GJ/ton (Shell, 2013).

Orimulsion

Sector 1A1a, SNAP 010101

Orimulsion has only been used in a single large power plant boiler in Denmark. This power plant boiler has been included in the inventories as a point source with plant specific SO_2 emission data included all years. Thus, the emission factors are only included for information.

The emission factors have been estimated based on the plant specific data from the power plant boiler combusting orimulsion. The plant specific SO_2 emission data refer to Eltra & Elkraft System (annual reporting) and the fuel consumption data refer to DEA (2012b). The emission factor is 149 g/GJ in 1995-1998 and 12 g/GJ in 2001-2004.

The use of orimulsion in Denmark ceased in 2005.

In 1996, the applied emission factor is 147 g/GJ. This will be corrected to 149 g/GJ in the next inventory.

LPG

Sector 1A1a, 1A1b, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP: all

The main part of the sulphur content in LPG originates from the added odorant (Krebs, 2003). The maximum sulphur content of LPG is 50 mg S/kg (Krebs, 2003). The added odorant is Ethylmercaptan (Augustesen, 2003). According to the Danish legislation concerning fuel gas, a minimum of 8.8 mg odorant/m^3 should be added if ethylmercaptan (C_2H_6S) is used (Gasreglementet, 2001). According to specifications from Statoil, a minimum of 12 mg odorant/m^3 is added (Augustesen, 2003). The S content in the odorant is 51.61% corresponding to a sulphur content of $12 \cdot 0.5161 = 6.19$ mg S/m^3. The weight of 1 m^3 propane is 1.96 kg/m^3, whereas the weight of butane is 2.59 kg/m^3. A 40 % propane / 60 % butane weights 2.34 kg/m^3. Thus, the sulphur content is at least 6.19/2.34=2.65 mg S/kg corresponding to 0.000265%.

The sulphur content of LPG is in the interval 0.000265% to 0.005%. DCE has assumed that the sulphur content is slightly above the specified minimum: 0.0003% S.

The lower heating value 46 GJ/ton refers to DEA (2012a) and the estimated emission factor is 0.13 g/GJ.

Refinery gas

Sector 1A1a, 1A1b, 1A2f, SNAP: all

The SO_2 emission from combustion of refinery gas in refinery furnaces has been included as a point source with plant specific SO_2 emission data in 1994 and onwards.

The emission factor (1 g/GJ) has been estimated by DCE based on plant specific emission data from a gas turbine only combusting refinery gas. The turbine is installed in a Danish refinery. Plant specific emission data for 1995-2002 have been included in the estimate. This emission factor has been applied for all technologies.

Natural gas

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP: all

The sulphur content originates from the H_2S content of natural gas and from the added odorant (THT, C_4H_8S).

The Danish gas transmission company Energinet.dk states the H_2S content 3.2 mg/m_n^3 (Energinet.dk, 2013a). This corresponds to $3.2 \cdot 32/34 = 3.0$ mg S/m_n^3.

According to Energinet.dk, the added THT corresponds to 5.5 mg S/m_n^3 (Energinet.dk, 2013b).

Thus, the total sulphur content is 8.5 mg S/m_n^3.

The lower heating value in 2012 was 39.548 MJ/m_n^3 (Energinet.dk, 2013a).

DCE has estimated the SO_2 emission factor $8.5 \cdot 2/39.548 = 0.43$ mg SO_2/MJ or 0.43 g/GJ.

The emission factor has also been estimated for 2004 based on data from the former gas transmission company Gastra. In 2004, the H_2S content was 3.16 mg H_2S/m_n^3 (Gastra, 2005) and the THT content was 15 mg THT/m_n^3 (Gastra, 2005). The sulphur content in THT is 32/88. Based on these data the emission factor 0.42 g/GJ was estimated.

In future inventories, the emission factor 0.43 g/GJ will be applied for all years.

The emission factor that has is currently applied in the Danish inventories is 0.3 g/GJ. This emission factor has been applied for all years. The emission factor 0.3 g/GJ refers to an environmental report from Danish Gas Technology Centre (Schmidt, 2004).

The SO_2 emission from gas engines is somewhat higher due to the consumption of lube oil. This has not been taken into account in the Danish inventories so far but will be included in the next inventory.

Waste, CHP plants

Sector 1A1a, SNAP 0101

The emission factor for 2006 onwards is 8.3 g/GJ referring to Nielsen et al. (2010a). The emission factor is based on 43 emission measurements from 7 waste incineration plants representing 30 % of the waste consumption in CHP plants.

New emission limit values came into force for waste incineration plants in 2006 (DEPA, 2003). The SO_2 emission limit in the current legislation (DEPA 2012) is unchanged since 2006 (DEPA, 2003). Modifications of the plants are assumed to have taken place over several years prior to 2006 and a linear reduction of emission factor has been assumed between 2003 and 2006.

The emission factor for the years 2000-2003 refers to another Danish study (Nielsen & Illerup, 2003) that included emission measurements from 16 waste incineration plants (19 units) representing more than 70% of the waste consumption in CHP plants in the year 2000.

The flue gas cleaning systems in CHP waste incineration plants have been developed considerably during the last two decades. Thus, the emission factor applied for 2000 and onwards is not valid for the previous years.

The emission factors applied for the years 1990 and 1995 also refers to Nielsen & Illerup (2003). The estimates for 1990 and 1995, included in this report, were based on knowledge of flue gas cleaning systems of the plants in 1990 and 1995 (Illerup et al., 1999). Emission factors for plants with different flue gas cleaning systems were applied (Nielsen & Illerup, 2003). For plants with no flue gas cleaning, the sulphur content was assumed to be 0.24% (Risø, 2005) and the sulphur retention in ash was assumed to be 63% (Blinksbjerg, 1994) and thus the estimated emission factor was 169 g/GJ.

The estimated emission factors were 138 g/GJ in 1990 and 30 g/GJ in 1995. The emission factor time series between 1990 and 1995 and between 1995 and 2000 have been assumed linear (DCE assumption).

The emission factor time series are shown below.

Table 4 Emission factors for CHP waste incineration plants.

Year	Emission factor [g/GJ]
1990	138
1991	116
1992	95
1993	73
1994	52
1995	30
1996	29
1997	28
1998	26
1999	25
2000	24
2001	24
2002	24
2003	24
2004	19
2005	14
2006	8.3
2007	8.3
2008	8.3
2009	8.3
2010	8.3
2011	8.3

Waste, district heating and other plants

Sector 1A1a, 1A2a-f, 1A4a, SNAP 0102, 03, 0201

The emission factor 15 g/GJ that have been applied since 2007 refer to plant specific data for 2009. The estimate was based on plant specific data for 4 units without power production. However, the accurate result of the plant specific data is 14 g/GJ and this emission factor will be applied in future inventories. The emission limit value (DEPA, 2011) corresponds to 26 g/GJ.

DCE has estimated the emission factor for the year 2000 based on plant specific fuel consumption data in year 2000 (DEA, 2012b) and on SO_2 emission data (annual environmental reports 2001) for each of the 5 non-power producing plants. The estimated emission factor is 67 g/GJ.

Table 5 Waste incineration plants without power production, 2000

Fuel consumption [GJ]	SO_2 emission [tonne]	SO_2 emission factor [g/GJ]
1440233	96.42	67

The emission factor for 1990 has been estimated by DCE based on:

- Technology applied in 1990 (Illerup et al., 1999)
- Fuel consumption for each technology (Illerup et al., 1999)
- Emission factors for each sulphur flue gas cleaning technology in the year 2000 (Nielsen & Illerup, 2003).
- An emission factor for plants with no flue gas cleaning estimated by DCE. The estimated emission factor was 169 g/GJ. The sulphur content was assumed to be 0.24 % (Risø, 2005) and the sulphur retention in ash was assumed to be 63% (Blinksbjerg, 1994).

The estimated emission factor for 1990 is 138 g/GJ[4]. The emission factor time series between 1990 and 2000 have been assumed linear (DCE assumption).

Table 6 Emission factors for waste incineration plants without power production, 1990

Flue gas cleaning [1)]	Waste combustion 1990[2)] [ton]	SO_2 emission factor[3)] [g/GJ]	Consumption x emission factor 1990 [ton g/GJ]
No sulphur cleaning	1327760	169	224391440
ESP WET	30700	50.5	1550350
SD (CYK) FB	148430	10.3	1528829
Other WET	12000	26.6	319200
Other DRY	156900	20.6	3232140
Total	1675790		231021959
			Emission factor 1990 [g/GJ]: 138

1. WET: wet flue gas cleaning. SD: semidry flue gas cleaning. DRY: dry flue gas cleaning. ESP: electrostatic precipitator. FB: fabric filter. CYK: cyclone.
2. Illerup et al. (1999).
3. Nielsen & Illerup (2003).

Time series for the emission factor is shown below.

[4] The emission factor happens to be equal to the factor for CHP plants. The reference is however not the same.

Table 7 Emission factors time series for non- power producing incineration plants.

Year	Emission factor [g/GJ]
1990	138
1991	131
1992	124
1993	117
1994	110
1995	103
1996	95
1997	88
1998	81
1999	74
2000	67
2001	60
2002	52
2003	45
2004	37
2005	30
2006	22
2007	15
2008	15
2009	15
2010	15
2011	15

The same emission factor time series have been assumed for industrial plants and commercial/institutional plants.

Industrial waste

Since the waste incinerated in the Danish cement production plant differs from waste incinerated in other plants a separate fuel category is applied. The emission factor for SO_2 has however been assumed equal to the emission factor for waste.

Wood, CHP plants

Sector 1A1a, SNAP 0101
The SO_2 emission factor for wood combusted in CHP plants, 1.9 g/GJ, refers to a Danish study (Nielsen et al., 2010a) that included 4 emission measurements from two plants. This emission factor has been applied for all years.

Wood, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 0102, 03, 0201, 0202, 0203
The emission factor refers to two reports, both in Danish: Serup et al. (1999) and Christiansen et al. (1997).

According to Serup et al. (1999), the emission factor is in the interval 5-30 g/GJ and a typical value is 15 g/GJ. According to Christiansen et al. (1997), the emission factor is in the interval 15-30 g/GJ.

Until now the emission factor 25 g/GJ has been applied all years.

The emission factor in the EMFP/EEA Guidebook (EEA, 2013) for biomass, small combustion is 11 g/GJ. This emission factor will be applied in future inventories.

Straw, CHP plants and power plants

Sector 1A1a, SNAP 0101

The SO_2 emission factor for straw combusted power plants and CHP plants (49 g/GJ) refers to a Danish study (Nielsen et al., 2010a) that included 15 emission measurements from five CHP plants combusting straw. The emission factor is also been applied for large power plants. However, plant specific SO_2 emission data are usually available for large power plants. The emission factor has been applied for all years.

Straw, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 0102, 03, 0201, 0202, 0203

The SO_2 emission factor (130 g/GJ) for straw combusted in plants that are not power producing refers to Nikolaisen et al. (1998). The reference states the typical value 130 g/GJ for district heating plants and the interval 100-170 g/GJ. The emission factor for small farmhouse boilers and other plants has been assumed to be the same (DCE assumption).

Bio oil

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP: all

The sulphur content of rape oil is below 0.001% and typically 0.0005% (Folkecenter for Vedvarende Energi, 2000). The lower heating value is 37.6 GJ/ton (DEA, 2012a). Based on these data the estimated emission factor is 0.1-0.3 g/GJ. However, DCE has applied an emission factor that is somewhat higher – 1 g/GJ.

In future inventories, the emission factor 0.1 g/GJ will be applied.

Biogas, gas engines

Sector 1A1a, 1A2a-f, 1A4a, 1A4c, SNAP 010105, 030905, 020105, 020304

The SO_2 emission factor for biogas fuelled engines, 19.2 g/GJ, refers to a Danish study (Nielsen & Illerup, 2003) that included emission measurements on 5 biogas engines. Despite the limited number of emission measurements, the fuel consumption of the plants represented 11% of the biogas consumption in gas engines in year 2000.

Biogas, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4c, SNAP: all that are not included above

The emission factor 25 g/GJ has been estimated based on a H_2S content of 200 ppm. The sulphur content refers to Christiansen (2003) and to Hjort-Gregersen (1999).

The density of H_2S is 1.521 kg/m^3.

The lower heating value of biogas is 23 MJ/m_n^3 (DEA, 2012a).

Based on these data DCE has estimated the SO_2 emission factor:

H_2S: $200 \cdot 1.521/23 = 13.2$ mg H_2S/MJ

S: $13.2 \cdot 32/34 = 12.4$ mg S/MJ

SO_2: $64/32 \cdot 12.4 = \underline{25\ mg\ SO_2/MJ}$

Biomass producer gas

Biomass producer gas is combusted in gas engines. The emission factor, 1.9 g/GJ, have been assumed equal to wood. The emission factor is probably overestimated.

NO_x emission factors

The NO_x emission factors and references are shown in Table 8. Below the table, further details about the references, additional references, and time series are discussed.

Table 8 NO_x emission factors and references 2011.

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
SOLID	ANODE CARBON	1A2f	Industry - other	032000	132	Assumed equal to coal. DCE assumption.
	COAL	1A1a	Electricity and heat production	0101	30	DCE estimate based on Energinet.dk (2012) and EU ETS (2012)
				0102	95	DEPA (2001a)
		1A2a-f	Industry	03	95	DEPA (2001a)
		1A2f	Industry, cement production	0316	95	DEPA (2001a)
		1A4a	Commercial/Institutional	020100	95	DEPA (2001a)
		1A4b i	Residential	020200	95	DEPA (2001a)
		1A4c i	Agriculture/ Forestry	0203	95	DEPA (2001a)
	BROWN COAL BRI.	1A2f i	Industry - other	0308	95	Assumed equal to coal. DCE assumption.
		1A4a	Commercial/Institutional	0201	95	Assumed equal to coal. DCE assumption.
		1A4b	Residential	0202	95	Assumed equal to coal. DCE assumption.
		1A4c	Agriculture/ Forestry	0203	95	Assumed equal to coal. DCE assumption.
	COKE OVEN COKE	1A2a-f	Industry	03	95	Assumed equal to coal. DCE assumption.
		1A4b i	Residential	020200	95	Assumed equal to coal. DCE assumption.
LIQUID	PETRO-LEUM COKE	1A1a	Electricity and heat production	0101	95	Assumed equal to coal. DCE assumption.
		1A2a-f	Industry	03	95	Assumed equal to coal. DCE assumption.
		1A4a	Commercial/ Institutional	020100	50	EMEP (2006)
		1A4b	Residential	020200	50	EMEP (2006)
		1A4c	Agriculture/ Forestry	0203	50	EMEP (2006)
	RESIDUAL OIL	1A1a	Electricity and heat production	0101	138	DCE estimate based on Energinet.dk (2009); Energinet.dk (2010); Energinet.dk (2011): EU ETS (2009-2011)
				0102	142	DEPA (2001a)
		1A1b	Petroleum refining	010306	142	DEPA (2001a)
		1A2a-f	Industry	03	130	DEPA (1990)

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
		1A2e	Food processing, beverages and tobacco	030902, 030903	136	Nielsen et al. (2010a)
		1A4a	Commercial/ Institutional	0201	142	DEPA (2001a)
		1A4b	Residential	0202	142	DEPA (2001a)
		1A4c i	Agriculture/ Forestry	0203	142	DEPA (2001a)
	GAS OIL	1A1a	Electricity and heat production	010100, 010101, 010102	249	DCE estimate based on plant specific data for 2003 (Eltra & Elkraft System, 2004; DEA, 2012b)
				010103 0102	65	DEPA (1990)
				010104	350	DCE estimate based on (Eltra & Elkraft System, 2001; DEA, 2012b)
				010105	942	Nielsen et al. (2010a)
		1A1b	Petroleum refining	010306	65	DEPA (1990)
		1A2a-f	Industry	03 (not engines)	65	DEPA (1990)
		1A2a-f	Industry	Engines	942	Nielsen et al. (2010a)
		1A4a	Commercial/ Institutional	0201	52	DEPA (2001a)
				020105	942	Nielsen et al. (2010a)
		1A4b i	Residential	0202	52	DEPA (2001a)
				020204	942	Nielsen et al. (2010a)
		1A4c	Agriculture/Forestry	0203	52	DEPA (2001a)
				020304	942	Nielsen et al. (2010a)
	KERO-SENE	1A2f	Industry - other	03	50	EEA (2009)
		1A4a	Commercial/ Institutional	0201	50	EEA (2009)
		1A4b i	Residential	0202	50	EEA (2009)
		1A4c i	Agriculture/ Forestry	0203	50	EEA (2009)
	ORIMUL-SION	1A1a	Electricity and heat production	0101	86 (in year 2004)	DCE estimate based on Eltra & Elkraft System (2005) and DEA (2012b).
	LPG	1A1a	Electricity and heat production	All	96	IPCC (1997)
		1A2a-f	Industry	03	96	IPCC (1997)
		1A4a	Commercial/ Institutional	0201	71	IPCC (1997)
		1A4b i	Residential	0202	47	IPCC (1997)
		1A4c i	Agriculture/ Forestry	0203	71	IPCC (1997)
	REFIN-ERY GAS	1A1b	Petroleum refining	010304	170	DCE estimate based on plant specific data for a gas turbine in year 2000.
				010306	80	DCE estimate based on plant specific data for the years 2007 and 2008.
GAS	NATURAL GAS	1A1a	Electricity and heat production	010101, 010102	55	DEPA (2003b)
				010103	42	Larsen (2009)
				010104	48	Nielsen et al. (2010a)

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
				010105	135	Nielsen et al. (2010a)
				0102	42	Larsen (2009)
		1A1c	Other energy industries	010504	250	Kristensen (2004)
		1A2a-f	Industry	03	42	Larsen (2009)
				Engines	135	Nielsen et al. (2010a)
				Turbines	48	Nielsen et al. (2010a)
				030700	87	DCE estimate based on plant specific data for 11 clay production plants, EU ETS (2011-2012); DEPA (2012)
		1A4a	Commercial/ Institutional	0201	30	Larsen (2009); DEPA (2001a)
				Engines	135	Nielsen et al. (2010a)
		1A4b i	Residential	0202	30	Larsen (2009); DEPA (2001a)
				Engines	135	Nielsen et al. (2010a)
		1A4c i	Agriculture/ Forestry	0203	30	Larsen (2009); DEPA (2001a)
				Engines	135	Nielsen et al. (2010a)
WASTE	WASTE	1A1a	Electricity and heat production	0101	102	Nielsen et al. (2010a)
				0102	164	DCE estimate based on plant specific data for year 2000.
		1A2a-f	Industry	03	164	DCE estimate based on plant specific data for district heating plants in year 2000.
		1A4a	Commercial/ Institutional	0201	164	DCE estimate based on plant specific data for district heating plants in year 2000.
	INDUS-TRIAL WASTE	1A2f	Industry - Other	031600	164	Assumed equal to waste. DCE assumption.
BIO-MASS	WOOD	1A1a	Electricity and heat production	0101	81	Nielsen et al. (2010a)
				0102	90	Serup et al. (1999)
		1A2a-f	Industry	All	90	Serup et al. (1999)
		1A4a	Commercial/ Institutional	0201	90	Serup et al. (1999)
		1A4b i	Residential	0202	120	IPCC (1997)
		1A4c i	Agriculture/ Forestry	0203	90	Serup et al. (1999)
	STRAW	1A1a	Electricity and heat production	0101	125	Nielsen et al. (2010a)
				0102	90	Nikolaisen et al. (1998)
		1A2a-f	Industry	03	90	Nikolaisen et al. (1998)
		1A4a	Commercial/Institutional	0201	90	Assumed equal to district heating plants. DCE assumption.
		1A4b i	Residential	0202	90	Assumed equal to district heating plants. DCE assumption.
		1A4c i	Agriculture/ Forestry	0203	90	Assumed equal to district heating plants. DCE assumption.
	BIO OIL	1A1a	Electricity and heat production	0101	249	Assumed equal to gas oil. DCE assumption.
				010105	700	Assumed equal to gas oil. DCE assumption.

Fuel type	Fuel	NFR	NFR_name	SNAP	Emission factor, g/GJ	Reference
				0102	65	Assumed equal to gas oil. DCE assumption.
		1A2a-f	Industry	03	65	Assumed equal to gas oil. DCE assumption.
				Engines	700	Assumed equal to gas oil. DCE assumption.
		1A4a	Commercial/ Institutional	020105	700	Assumed equal to gas oil. DCE assumption.
		1A4b i	Residential	0202	65	Assumed equal to gas oil. DCE assumption.
		1A4c	Agriculture/ Forestry	020304	700	Assumed equal to gas oil. DCE assumption.
	BIOGAS	1A1a	Electricity and heat production	0101, not engines	28	DEPA (2001a)
				Engines	202	Nielsen et al. (2010a)
				0102	28	DEPA (2001a)
		1A2a-f	Industry	03, not engines	28	DEPA (2001a)
				03, engines	202	Nielsen et al. (2010a)
				030902	59	DEPA (1990); DEPA (1995)
		1A4a	Commercial/ Institutional	0201, not engines	28	DEPA (2001a)
				020105	202	Nielsen et al. (2010a)
		1A4c i	Agriculture/ Forestry	0203, not engines	28	DEPA (2001a)
				020304	202	Nielsen et al. (2010a)
	BIO PROD GAS	1A1a	Electricity and heat production	010105	173	Nielsen et al. (2010a)
		1A2f	Industry - other	031305	173	Nielsen et al. (2010a)
		1A4a	Commercial/ Institutional	020105	173	Nielsen et al. (2010a)
		1A4c	Agriculture/ Forestry	020304	173	Nielsen et al. (2010a)

Anode carbon

Anode carbon has been used in industrial plants since 2010. The NO_x emission factor, 95 g/GJ, have been assumed equal to the NO_x emission factor for coal combusted in industrial plants.

The emission factor for coal combusted in industrial plants will be changed and thus the emission factor for anode carbon will also be changed to 132 g/GJ.

Coal, large power plants

Sector 1A1a, SNAP 0101

Data for NO_x emission and the fuel consumption for Danish power plants >25MW_e are available for all plants for the years 1990 and onwards. In general, the plant specific data have been included in the emission inventories.

For some years, a small part of the coal consumption has, however, been included as an area source. The NO_x emission factor for coal has been estimated as an average value based on the annual reporting from the power plant operators to the electricity transmission company in Denmark, Energinet.dk[5].

In 2010 onwards, the emission factor is estimated based on a database query including plant specific data for power plants for which the coal consumption makes up more than 90 % of the total fuel consumption. All NO_x emission from these plants is assumed to originate from the coal consumption.

For 2008-2009, the emission factor is based on plant specific emission data for power plants that are primarily fuelled by coal. The NO_x emissions from plants that are primarily fuelled by coal have been divided by the total fuel consumption of these plants.

For 1990-2007, the emission factor is based on the total NO_x emission from power plants (regardless of primary fuel category) divided by the total fuel consumption of the power plants. This emission factor has been applied for both coal and residual oil. From 2003 onwards, the fuel consumption data were stated in TJ.

The calculated time series for the NO_x emission factor is shown below.

Table 9 NO_x emission factors for coal, power plants.

Year	NO_x emission factor [g/GJ]
1990	342
1991	384
1992	294
1993	289
1994	267
1995	239
1996	250
1997	200
1998	177
1999	152
2000	129
2001	122
2002	130
2003	144
2004	131
2005	127
2006	109
2007	98
2008	59
2009	39
2010	30
2011	30

[5] Eltra and Elkraft System in the beginning of the time series.

Coal, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 0102, 03, 02
The 2000-2011 emission factors for plants that do not produce power refer to Danish legislation (DEPA, 2001a). The emission limit for 5-50 MW boilers is 95 g/GJ. The NO_x emission limit applies for plants approved in 2001 onwards, but DCE has applied the emission factor for year 2000 onwards.

For 1990-1992, the currently applied emission factor 200 g/GJ refers to Fenhann & Kilde (1994). DCE has assumed the same emission factor for 1993-1999.

The current legislation for 50-100 MW plants approved before 2013 is 104 g/GJ (DEPA, 2012b). Former legislation for large plants (DEPA, 1990) sets the emission limit 225 g/GJ for plants installed before 1992 and 69 g/GJ for plants installed after 1992. However, plants larger than 50 MW have in general been included in the inventory as point sources with plant specific NO_x emission data.

The EMEP/EEA Guidebook (EEA, 2013) states the emission factors: 209 g/GJ for public electricity and heat production and 173 g/GJ for industrial plants.

An improved emission factor time series will be applied in future inventories. The consumption is largest for agricultural plants, food, beverage and tobacco industry and cement industry.

Plant specific data are available for the cement industry and the IEF was 199 g/GJ in 2011. The IEF is 732 g/GJ in year 2000 and 698 g/GJ in 1990. The emission factor 715 g/GJ will be applied for cement industry in future inventories for 1990-2000. For 2005, the IEF 580 g/GJ will be applied and for 2011, the IEF 199 g/GJ will be applied. A linear decline rate will be assumed between 2000-2005 and 2005-2011. In spite of the large change of emission factor, the estimated emission from cement industry will not change because plant specific data are available. However, the high but declining emission factors will now be reflected in the emission factor.

For 2011, plant specific data are available for one plant in the food, beverage and tobacco industry (with considerable coal consumption). The IEF was 132 g/GJ for this plant. This emission factor will be applied for all industrial plants (except cement production). The revised emission factor will be applied for all years.

The non-industrial consumption mainly takes place in agricultural plants and in 1990 also in district heating plants. The current emission factor referring to DEPA (2001a) will also be applied in future inventories.

The two revised emission factors will also be applied for brown coal briquettes and coke oven coke.

Brown coal briquettes

Sector 1A2f, 1A4a, 1A4b, 1A4c, SNAP 03, 0201, 0202, 0203
The emission factors for brown coal briquettes (BKB) have been assumed to be the same as for coal. The consumption of BKB is below 0.2 PJ all years and below 0.03 % of the Danish fuel consumption.

The emission factor will be revised when the emission factor for coal is revised.

Coke oven coke

Sector 1A2a-f and 1A4b, SNAP 03, 0202

The emission factors for coke oven coke have been assumed to be the same as for coal. The consumption of coke oven coke is below 1.4 PJ all years and below 0.3 % of the Danish fuel consumption.

The emission factor will be revised when the emission factor for coal is revised.

Petroleum coke, power plants and industry

Sector 1A1a, 1A2a-f, SNAP 0101, 03

DCE have assumed that the emission factor for petroleum coke combusted in power plants, district heating plants and industrial plants is the same as for coal combustion in district heating/industrial plants. This has been assumed for all years.

In the next inventory, the emission factor will be assumed equal to residual oil instead.

Petroleum coke, residential plants, commercial/institutional plants and plants in agriculture/forestry

Sector 1A4a, 1A4b, 1A4c, SNAP 0201, 0202, 0203

The emission factor for petroleum coke combusted in residential plants or other plants refers to the EMEP/Corinair Guidebook (EMEP, 2006)[6]. The NO_x emission factor 50 g/GJ for petroleum coke combusted in non-industrial plants have been applied.

The emission factor has been revised in the latest update of the Guidebook. The emission factor will be changed to 51 g/GJ for residential plants in the next inventory referring to the tier 1 value for liquid fuels in the latest update of the EMEP/EEA Guidebook (EEA, 2013). The emission factor for commercial/institutional plants and plants in agriculture/forestry will be assumed equal to the emission factor for residential plants.

Residual oil, power plants

Sector 1A1a, SNAP 0101

The NO_x emission and the fuel consumption for Danish power plants >25MW$_e$ are available for all plants for the years 1990 and onwards. In general, the plant specific data have been included in the emission inventories.

For some years, a small part of the residual oil consumption has, however, been included as an area source. The NO_x emission factor for residual oil has been estimated as an average value based on the plant specific data. The NO_x emission data refer to Energinet.dk[7] and the fuel consumption data refer to EU ETS or DEA.

[6] In Chapter 112, Table 5 the NO_x emission factor 50 g/GJ is stated for petroleum coke combusted in non-industrial plants.

[7] Eltra and Elkraft System in the beginning of the time series.

From 2008 onwards, the emission factor is estimated based on an average value for 2008, 2009 and 2010. The emission factor for each year is based on a database query that include plant specific data for power plants for which the residual oil consumption is more than 90 % of the total fuel consumption. All NO_x emission from these plants is assumed to originate from the residual oil consumption. NO_x emission data refer to Energinet.dk (2009), Energinet.dk (2010), and Energinet.dk (2011). Fuel consumption data refer to EU ETS (2009-2011). The emission factor 138 g/GJ is the average for the years 2008, 2009 and 2010.

For 1990-2007, the emission factor is based on the total NO_x emission from power plants (regardless of primary fuel category) divided by the total fuel consumption of the power plants. This emission factor has been applied for both coal and residual oil. From 2003 onwards, the fuel consumption data were stated in TJ.

The calculated time series for the NO_x emission factor are shown below.

Table 10 NO_x emission factors for coal, power plants.

Year	NO_x emission factor [g/GJ]
1990	342
1991	384
1992	294
1993	289
1994	267
1995	239
1996	250
1997	200
1998	177
1999	152
2000	129
2001	122
2002	130
2003	144
2004	131
2005	127
2006	109
2007	98
2008	138
2009	138
2010	138
2011	138

Residual oil, industrial plants

Sector 1A2a-f, SNAP 03

The NO_x emission factor for residual oil combusted in industrial plants refers to Danish legislation.

Table 11 gives an overview of emission limits values and other emission factors for industrial plants combusting residual oil.

Table 11 Emission factors for industrial plants combusting residual oil.

Technology	Emission factor (/limit)	Reference
Boilers 2-50 MW	142 g/GJ	DEPA (2001a)[1)]
Boilers > 50 MW installed before 1992	130 g/GJ	DEPA (1990)[2)]
Boilers > 50 MW installed after 1992	65 g/GJ	DEPA (1990)[2)], DEPA (1995)
CHP plants, residual oil fuelled steam turbine	136 g/GJ	Nielsen et al. (2010a)
IEF for two plants in the food and tobacco industry, 2011	129 g/GJ	DCE estimate (2013)
IEF for the cement industry	199 g/GJ	DCE estimate (2013)
Heavy fuel oil for public electricity and heat production	215 g/GJ	EEA (2009)
Industry, oil	200 g/GJ	IPCC (1997)

The emission of NO_x from 2-50 MW boilers should be below 300 mg/m_n^3 (ref. 10% O_2) (DEPA, 2001a) corresponding to 142 g/GJ. Residual oil should not be combusted in boilers < 2 MW in Denmark (DEPA, 2001a).

The NO_x emission from boilers > 50 MW should be below 450 mg/m_n^3 (ref. 3% O_2) (DEPA, 1990) corresponding to 130 g/GJ. The emission from plants installed after 1992 should be below 225 mg/m_n^3 (ref. 3% O_2) (DEPA, 1990) corresponding to 65 g/GJ. A later update of the legislation (DEPA, 1995) confirms the same emission limits for residual oil.

In 2011, more than 90 % of the industrial consumption of residual oil was used in the food and tobacco industry. The consumption is also considerable in the cement industry. Plants in both sectors are included as point sources with plant specific data in the Danish emission inventory for 2011. The IEF for two plants in the food and tobacco industry 2011 is 129 g/GJ. The IEF for cement is 199 g/GJ in 2011.

The current emission factor 130 g/GJ refers to DEPA (1990), however for food and tobacco industry the emission factor 136 g/GJ refer to Nielsen et al. (2010a).

In future inventories, the same emission factor will be applied for all industrial plants. The current emission level is close to both Nielsen et al. (2010a) and to the IEF (129 g/GJ) based on plant specific data for two plants in the food and tobacco industry in 2011. The emission factor 129 g/GJ will be applied because this emission factor covers a large part of the consumption.

Residual oil, other plants

Sector 1A1a, 1A1b, 1A4a, 1A4b, 1A4c, SNAP 0102, 010306, 0201, 0202, 0203

Residual oil combusted in neither plants that are neither power plants nor industrial plants has been assumed to be boilers < 50MW. Thus, the plants have to meet Danish emission limit 142 g/GJ (DEPA, 2001a).

The EMEP/EEA Guidebook (EEA, 2009) states the emission factor 100 g/GJ for small combustion, non-residential plants. The IPCC Guidelines (IPCC, 1997) states the emission factor 100 g/GJ for other sectors and 200 g/GJ for energy industries. Thus, the legislative emission limit seems to be a reasonable choice.

Currently, the emission factor for refinery furnaces has been assumed to be the same (DCE assumption). However, in future inventories the IPCC default emission factor 200 g/GJ will be applied.

Gas oil, power plants

Sector 1A1a, SNAP 010100, 010101, 010102

The emission factor 249 g/GJ has been estimated by DCE based on plant specific emission data for 2003 (Eltra & Elkraft System, 2004) and fuel consumption data from DEA (2012b). The estimate was based on emission data from two power plant boilers that only combusted gas oil. This emission factor has been applied all years.

Based on plant specific data, DCE has estimated the emission factor for 2011 to 114 g/GJ. In the next inventory, this emission factor will be applied and a linear decrease since 2003 will be assumed.

Gas oil consumption adds up to less than 1% of the fuel consumption in power plants in 1990-2011[8].

Gas oil, gas turbines

Sector 1A1a, 1A2a-f, SNAP 010104, 030604, 030904

The emission factor for gas turbines combusting gas oil (350 g/GJ) has been estimated by DCE based on plant specific emission data from power plant gas turbines in year 2000 (Eltra & Elkraft System, 2001) and fuel consumption data from DEA (2012b). The emission factor has been applied for all years.

In 2011, the emission factor for a gas oil fuelled turbine was 146 g/GJ. A large part of the gas oil combusted in gas turbines is used in gas turbines that are primarily fuelled by natural gas. A large part of the consumption was in public power production plants.

The IPCC Reference Manual (IPCC, 1997) states the emission factor 300 g/GJ for gas oil combustion in gas turbines. The EMEP/EEA Guidebook (EEA, 2009) states the emission factor 398 g/GJ. These values verify the Danish emission factor.

The current emission limit value for gas oil fuelled gas turbines is 65 g/GJ (DEPA, 2012b). This limit is, however, not valid for turbines in plants with a thermal input above 50 MW or with less than 500 operating hours per year.

Gas oil, stationary engines

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 010105, 031205, 031305, 032005, 020105, 020204, 020304

The emission factor for gas oil combusted in stationary engines (942 g/GJ) refers to a Danish emission measurement project for CHP plants (Nielsen et al., 2010a). This emission factor has been applied for year 2000 onwards.

The EMEP/EEA Guidebook (EEA, 2009) that states the emission factor 1450 g/GJ. This emission factor has been applied for the year 1990. A linear decrease has been assumed between 1990 and 2000.

The emission limit is 178 g/GJ for existing engines (DEPA, 2012b). However, the limit value is not valid for engines with less than 500 operating hours per year.

[8] Except in 2009 (1.1 %).

Gas oil, small power plant boilers, district heating plants and industrial boilers

Sector 1A1a, 1A1b, 1A2a-f, SNAP 010103, 0102, 0301

The main part of the gas oil consumption is in district heating plants. Most of the district heating boilers are installed before 2003.

The current emission limit for existing 50-100 MW plants is 130 g/GJ (DEPA, 2012b[9]). The former legislation (DEPA, 2003b) included the same emission limit for plants installed before 2003. The legislation from 1990 (DEPA, 1990) also included this emission limit for boilers installed before 1992, but for boilers installed after 1992 the emission limit equals 65 g/GJ.

For 5- 50 MW boilers the emission limit is 52 g/GJ or 118 g/GJ depending on installation year (DEPA, 2001a).

The EMEP/EEA Guidebook (EEA, 2009) states the emission factors 180 g/GJ for other liquid fuels in energy industries or 100 g/GJ for other liquid fuels, small combustion. The IPCC Guidelines (IPCC, 1997) states the emission factor 200 g/GJ for energy industries and industry. Thus, these two references suggest higher emission factors than the current emission factor.

The emission factor applied for 1997 onwards (65 g/GJ) refers to DEPA (1990).

In future inventories, the emission factor will be revised to 130 g/GJ for all years referring to DEPA (2012b), DEPA (2003b) and DEPA (1990).

For 1990, the emission factor 100 g/GJ has been applied. This emission factor refers to Fenhann & Kilde (1994). The emission factors applied for 1991-1996 have been assumed to follow a constant decrease rate (DCE assumption).

Gas oil, residential plants, commercial/institutional plants, and plants in agriculture/forestry

Sector 1A4a, 1A4b, 1A4c, SNAP 0201, 0202, 0203

Residential plants, commercial and institutional plants and plants in agriculture/forestry are all small plants. The emission limit for 120 kW - 50 MW boilers is 52 g/GJ for plants installed after 2001 and 118 g/GJ for plants installed before 2001 (DEPA, 2001a).

The EMEP/EEA Guidebook (EEA, 2009) states the emission factors 68 g/GJ for residential plants, 100 g/GJ for commercial/institutional plants, 70 g/GJ for residential boilers. IPCC Guidelines (IPCC, 1997) states the tier 1 emission factor 100 g/GJ for residential or commercial/institutional plants and the tier 2 emission factor 65 g/GJ for distillate oil combusted in residential or commercial plants. These values confirm an emission level close to the emission limit in Denmark.

The applied emission factor 52 g/GJ refers to DEPA (2001a). DCE has assumed the same emission factor for residential plants, commercial/institutional plants and plants in agriculture/forestry. The same emission factor has been applied all years.

[9] Implements the EU Directive on Industrial Emissions.

Kerosene

Sector 1A2f, 1A4a, 1A4b, 1A4c, SNAP 0301, 0201, 0202, 0203

The emission factor for kerosene, 50 g/GJ, refers to the EMEP/EEA Guidebook (EEA, 2009). The emission factor for residential stoves has been applied.

Orimulsion

Sector 1A1a, SNAP 010101

Orimulsion has only been used in a single large power plant boiler in Denmark. This power plant boiler has been included in the inventories as a point source with plant specific NO_x emission data included all years. Thus, the emission factors that are stated in the area source emission factor time series are only included for information.

The emission factors have been estimated based on plant specific data. The plant specific NO_x emission data refer to Eltra & Elkraft System (annual reporting) and the fuel consumption data refer to DEA (2012b) and the similar DEA data reported in former years. The use of orimulsion in Denmark ceased in 2005.

LPG

Sector 1A1a, 1A1b,1A2a-f, 1A4a, 1A4b, 1A4c, SNAP: all

The emission factors applied for LPG refer to the IPCC Guidelines (IPCC, 1997). The applied tier 2 emission factors are:

- 96 g/GJ for combustion in energy and transformation industry or in industrial plants
- 71 g/GJ for combustion in commercial and institutional plants and in agriculture/forestry
- 47 g/GJ for residential plants

The same emission factors have been applied for all years.

Refinery gas, gas turbine

Sector 1A1b, SNAP 010300, 010304

The applied emission factor for refinery gas combusted in gas turbines (170 g/GJ) refers to plant specific data in year 2000. The only refinery gas fuelled gas turbine in operation in Denmark has, however, been included as a point source with plant specific emission data since 1994.

Refinery gas, other

Sector 1A1b, 1A2f, SNAP 010306, 032000

The refineries have been included as point sources with plant specific emission factors in the Danish inventory since 1994.

The emission factor 80 g/GJ applied for refinery gas combusted in other units than gas turbines is an implied emission factor estimated by DCE based on plant specific data for emission and fuel consumption for the two refineries in year 2007 and 2008.

Based on plant specific data for 2011, the implied emission factor 94 g/GJ have been estimated[10]. For 1994, the implied emission factor 83 g/GJ have been estimated. In future inventories, the implied emission factors for 1994 will be applied for 1990-2008 and the implied emission factor for 2011 will be applied for 2009 onwards .

Natural gas, power plants

Sector 1A1a, SNAP 010101, 010102
In general, plant specific data are available for natural gas fuelled power plants.

The emission factor for 2008 onwards refers to Danish legislation for large combustion plants (DEPA, 2003b). The emission factor 55 g/GJ applies for 5-500 MW_{th} plants installed before 2003. Emission limit values in the latest legislation from DEPA (2012b) have not been implemented in the inventory because the new limit value 28 g/GJ is only valid from 2016 for existing plants.

The emission factor for 2004-2007 also refers to DEPA (2003b). Until 2008, the emission limit for plants installed before 2003 is 97 g/GJ and this value have been applied.

The emission factor applied for 1990-2003 (115 g/GJ) has been estimated by DCE based on plant specific emission data for year 2000. Gas turbine plants were not included in the estimate.

Natural gas, gas turbines (and combined cycle plants)

Sector 1A1a, 1A2a-f, 1A4a, SNAP 010104, 030604, 030904, 031104, 031604, 020104
Gas turbines > $25MW_e$ have been included in the inventory as point sources with plant specific NO_x emission data.

The emission factor 48 g/GJ refers to Nielsen et al. (2010a). This emission measurement programme for decentralised CHP plants included estimation of emission factors for the years 2003-2006 and for 2007 onwards. The emission factor for 2007 onwards (48 g/GJ) have been applied in the inventory for the years 2007 onwards. The 2003-2006 emission factor (98 g/GJ) has been applied for 2005. The decline rate between 2005 and 2007 has been assumed linear.

The emission factor for year 2000 (124 g/GJ) refers to another Danish study (Nielsen & Illerup, 2003). This study included emission measurements from 17 gas turbine plants < $25MW_e$. The emission measurements included in the estimate represented 67% of the natural gas consumption in gas turbines < 25 MW_e in 2000. The decline rate of the emission factor in 2000-2005 has been assumed linear.

Emission factors for 1990 (161 g/GJ) and 1995 (141 g/GJ) was also included in Nielsen & Illerup (2003). The decline rate in 1990-1995 and 1995-2000 respectively, have been assumed linear.

[10] SNAP 010306, two refineries, all fuels included.

Natural gas, off shore gas turbines

Sector 1A1c, SPAP 010504
The emission factor for off shore gas turbines, 250 g/GJ, refer to Kristensen (2004). The emission factor estimate is based on plant specific data. The estimate was performed by Danish Gas Technology Centre for a DEPA NO_x working group.

Natural gas, gas engines

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 010105, 03xx05, 020105, 020204, 020304
The emission factor for natural gas fuelled engines refers to Nielsen et al. (2010a). In this Danish emission measurement programme for CHP plants, emission factors for 2007 and 2003-2006 have been estimated. New emission limits were valid for existing engines from end 2006 (DEPA, 1998). The emission factor for 2007 (135 g/GJ) have been applied in the inventories for 2007 onwards. The emission factor based on emission measurements from 2003-2006 (143 g/GJ) have been applied for 2005. A linear decline rate has been assumed from 2005 to 2007.

The emission factor for year 2000 (168 g/GJ) refer to the full load emission factors estimated in the previous emission factor survey (Nielsen & Illerup, 2003) and the correction factors for start-up and shut-down developed in another project (Nielsen et al., 2008). The decline rate between year 2000 and 2005 have been assumed linear.

The emission factors for 1990 (176 g/GJ) and 1995 (194 g/GJ) also refer to Nielsen & Illerup (2003). Time series for 1990-1995 and 1995-2000 have been estimated assuming linear increase/decrease.

Natural gas, district heating boilers and industrial boilers

Sector 1A1a, 1A2a-f, SNAP 010103, 0102, 03xx00-03xx03
Boilers installed in district heating plants or industry and boilers < 50 MW_{th} installed in power plants are included in this category.

The emission factor (42 g/GJ) refers to a report from Danish Gas Technology Centre (Larsen 2009). The emission factor is the average of the emission interval for large boilers[11] (30-55 g/GJ).

The emission limit for 120 kW – 50 MW boilers is 29 g/GJ for boilers installed after 2001 and 57 g/GJ for boilers installed before 2001 (DEPA, 2001a). Almost all boilers in operation are installed before 2001 (Kristensen, 2005; Wit, 2005) and thus the emission factor is in agreement with the legislation.

Improved emission factors for boilers will be estimated in an on-going project performed by Danish Gas Technology Centre.

Natural gas, non-metallic minerals

The emission factor for production of bricks and tiles is higher than the emission factor for other industrial combustion plants. Since this production

[11] For forced draught gas burners. The interval for low NO_x burners is 12-17 g/GJ.

is included in the industrial subsector non-metallic minerals, the emission factor for this category is higher (87 g/GJ).

The emission factor has been estimated based on plant specific data for 11 plants for years 2010 or 2011. Data for the estimate are based on EU ETS data for fuel consumption (EU ETS, 2011-2012) and NO_x emission data from annual environmental reports (DEPA, 2012a).

1.1.1 Natural gas, small boilers

Sector 1A4a, 1A4b, 1A4c, SNAP 020100, 020103, 020200, 020202, 020300
Small natural gas fuelled boilers that are either residential plants, commercial/institutional plants or plants in agriculture/forestry included in this category.

The emission factor applied for 1990 and onwards is 30 g/GJ. Several references have been taken into account. Larsen (2009) and DEPA (2001a) are the references for the applied emission factor.

- An environmental report from Danish Gas Technology Centre (Larsen, 2009) states the emission factor 19 g/GJ for condensing boilers in residential plants and 42 g/GJ for conventional boilers in residential plants.
- The emission limit value for 120 kW- 5 MW boilers installed after 2001 is 29 g/GJ (DEPA, 2001a). The emission limit for boilers installed before 2001 is 57 g/GJ.
- The IPCC Guidelines (IPCC, 1997) states the emission factor 47 g/GJ for residential boilers and 45 g/GJ for commercial boilers.
- The EMEP/EEA Guidebook (EEA, 2009) states the emission factor 70 g/GJ for small consumers and residential boilers.

Improved emission factors for boilers will be estimated in an on-going project performed by Danish Gas Technology Centre.

Waste, CHP plants

Sector 1A1a, SNAP 0101
The emission factor for 2006 onwards (102 g/GJ) refers to Nielsen et al. (2010a) that is a Danish measurement project for CHP plants. In 2006, 68 % of the waste was incinerated in plants installed with SNCR.

Most waste incineration plants report plant specific emission data. The implied emission factor for waste incineration plants was 100 g/GJ in 2011, and thus the emission data for 2011 confirm the current emission factor.

New emission limits for waste incineration plants were applicable from 2006 (DEPA, 2003a). The legislation includes two different emission limits for NO_x; 210 g/GJ for existing plants with a capacity of less than 6 tonnes/hour and 105 g/GJ for other plants.

The NO_x emission factor for year 2000 refers to an earlier Danish study (Nielsen & Illerup, 2003). The emission factor (124 g/GJ) has been applied for the inventories for year 2000-2003. A linear decline rate has been assumed for 2003-2006.

The first SNCR unit was installed in a waste incineration plant in 1998. The emission factor for 1990-1998 refers to the emission factor for plants without

SNCR in Nielsen et al. (2010a). This emission factor might be underestimated since the combustion technology might also have been improved and contributed to the lower emission level.

Waste, other plants

Sector 1A1a, 1A2a-f, 1A4a, SNAP 0102, 03, 0201
The NO_x emission factor (164 g/GJ) applied for non-power producing plants (mainly district heating plants) has been estimated by DCE based on plant specific emission data from non-power producing plants in year 2000. The same emission factor has been applied for all years. In recent years, the main part of waste incineration plants that do not produce power has been replaced by power producing plants.

The current legislation for plants < 6 ton/hour is 210 g/GJ (DEPA, 2003a).

Industrial waste

Since the waste incinerated in the Danish cement production plant differs from waste incinerated in other plants a separate fuel category is applied. However, for NO_x plant specific emission data are available and the default emission factor (164 g/GJ) is not actually applied.

The value refer to value for waste incineration in non-power producing plants.

Wood, CHP plants and large power plants

Sector 1A1a, SNAP 0101
The NO_x emission factor for wood combusted in CHP plants (81 g/GJ) refers to Nielsen et al. (2010a). This emission factor is based on 5 emission measurements from 2 plants. The fuel consumption of the two plants represented 42% of the wood consumption in CHP plants in year 2006. The emission factor is applied for all years.

Wood, residential plants

Sector 1A4b, SNAP 0202
The emission factor for wood combustion in residential plants, 120 g/GJ, refers to the IPCC Guidelines (IPCC, 1997). The emission factor for conventional stoves has been applied. The default emission factor for residential wood combustion is 100 g/GJ.

The emission factors in the EMEP/EEA Guidebook (EEA, 2009) are between 70 g/GJ and 120 g/GJ depending on technology.

In future inventories, the technology specific emission factors in the 2013 update of the EMEP/EEA Guidebook (EEA, 2013) will be applied for estimating a time series for the emission factor. The emission factor will be lower than the current emission factor: 81 g/GJ in 2012.

Wood, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4c, SNAP 0102, 03, 0201, 0203
The emission factor applied for wood combustion in district heating plants, industrial plants, commercial/institutional plants and plants in agriculture/forestry is 90 g/GJ referring to Serup et al. (1999). According to Setup et al. (1999), the emission factor for Danish district heating plants combust-

ing wood is 40-140 g/GJ and the typical value is 90 g/GJ. This emission factor has been applied for 1999 onwards.

For 1990-1998, the emission factor is 130 g/GJ. This is a rough estimate based on Serup et al. (1999), DEPA (2001a) and Christensen (1997). The emission limit for 1-50 MW boilers combusting wood is 143 g/GJ (DEPA, 2001a). Christensen (1997) states the emission factor 55-230 g/GJ.

The IPCC Guidelines (IPCC, 1997) states the emission factor 100 g/GJ for district heating and industry. The emission factor stated in the 2013 update of the EMEP/EEA Guidebook (EEA, 2013) is 91 g/GJ.

In future inventories, the emission factor 90 g/GJ will be applied for all years referring to Serup et al. (1999) and EEA (2013).

Straw, CHP plants and large power plants

Sector 1A1a, SNAP 0101
The emission factor for wood combusted in CHP plants and power plants (125 g/GJ) refers to Nielsen et al. (2010a). This emission measurement programme included 14 datasets from 5 plants representing 83 % of the straw consumption in CHP plants[12] in 2006.

The emission factor has also been applied for combustion of straw in large power plants. However, plant specific NO_x emission data are usually available for large power plants.

The emission factor has been applied for all years.

Straw, other plants

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP 0102, 03, 0201, 0202, 0203
The emission factor, 90 g/GJ, refers to Nikolaisen et al. (1998). According to Nikolaisen et al. (1998), the typical emission factor for Danish district heating plants combusting straw is 90 g/GJ with a typical interval of 40-150 g/GJ.

Due to lack of data from other non-power producing plants, the emission factor 90 g/GJ have been applied for these as well.

Data from EEA (2013) support the emission factor level. EEA (2013) states the emission factor 80 g/GJ for residential combustion of biomass and 91 g/GJ for biomass combustion in commercial/institutional/agricultural plants.

The emission factor has been applied for all years.

Bio oil

Sector 1A1a, 1A2a-f, 1A4a, 1A4b, 1A4c, SNAP all
The NO_x emission factors for bio oil have been assumed to be the same as for gas oil.

[12] $< 25MW_e$.

Biogas, gas engines

Sector 1A1a, 1A2e, 1A4a, 1A4c, SNAP 010105, 030905, 020105, 020304
The emission factor for 2006 onwards (202 g/GJ) refers to Nielsen et al. (2010a). The emission factor is based on emission measurements from 10 engines. A new emission limit (297 g/GJ) is valid for existing biogas engines from 2013 (DEPA, 2012c).

The emission factor for year 2000 (540 g/GJ) refers to an earlier Danish study (Nielsen & Illerup, 2003). This study included emission measurements on 15 gas engines. The emission measurements included in the estimate represented 21% of the biogas consumption in gas engines in year 2000. A linear decline rate of the emission factor has been assumed from year 2000 to year 2006.

Emission factors for 1990 (711 g/GJ) and 1995 (635 g/GJ) also refer to Nielsen & Illerup (2003). The decline rates in 1990-1995 and in 1995-2000 have been assumed constant.

Biogas, industrial boilers > 50 MW

Sector 1A2e, SNAP 030902
For industrial boilers > 50 MW the applied emission factor (59 g/GJ) refers to former Danish legislation for large boilers (DEPA, 1990; DEPA, 1995).

For boilers installed before 2003 the current emission limit is 79 g/GJ and the emission limit is 53 g/GJ for boilers approved in 2003 or later.

Biogas, other boilers

Sector 1A1a, 1A2a-f, 1A4a, 1A4c, SNAP 0102, 03, 0201, 0203
Boilers are in general < 50 MW and the emission factor refers to Danish legislation (DEPA, 2001a). The emission limit value for 120 kW – 50 MW is 28 g/GJ[13] (DEPA, 2001a) and this emission factor has been applied for all years.

Bio producer gas

Biomass producer gas is combusted in gas engines. The emission factor, 173 g/GJ, refers to Nielsen et al. (2010a).

[13] In some cases the limit is 54 g/GJ for existing plants.

Table 2A-4.25 Emission factors for dioxin, HCB and dioxin-like PCB, 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id_EA	snap_id	Dioxin, ng per GJ	HCB, ng per GJ	dl-PCB, ng per GJ
BIOMASS	111A	WOOD	1A1a	0101	14	5000	2800
				0102	1	5000	2800
			1A2 a-f	03	1	5000	2800
			1A4a i	020100	400	5000	2800
			1A4b i	all	371	5000	2997
			1A4c i	all	400	5000	2800
	117A	STRAW	1A1a	0101	19	113	3110
				0102	22	113	3110
			1A4b	0202	500	5000	3110
			1A4c i	0203	400	5000	3110
	215A	BIO OIL	1A1a	0101, 0102	0.882	220	93
			1A2a-f	03	0.882		
			1A4b i	0202	10	220	93
	309A	BIOGAS	1A1a	0101	0.025	190	90
				Engines	0.96	190	90
				0102	0.025	190	90
			1A2a-f	Not engines	0.025	190	90
				Engines	0.96	190	90
			1A4a i	Not engines	2	190	90
				Engines	0.96	190	90
			1A4c i	Not engines	2	190	90
				Engines	0.96	190	90
	310A	BIO PROD GAS	1A1a	010105	1.7	800	144
			1A4a	020105	1.7	800	144
WASTE	114A	WASTE	All	all	5	4300	109
	115A	INDUSTRIAL WASTE	All	All	5	4300	109
GAS	301A	NATURAL GAS	All	Engines	0.57		
			1A1, 1A2a-f	Not engines	0.025		
			1A4a-c	Not engines	2		
LIQUID	110A	PETROLEUM COKE	1A2a-f	03	1.32	220	839
	203A	RESIDUAL OIL	1A1a	0101, 0102	0.882	220	839
			1A1b	010306	0.882	220	839
			1A2 a-f	03	0.882	220	839
			1A4a	0201	10	220	839
			1A4b	0202	10	220	839
			1A4c i	0203	10	220	839
	204A	GAS OIL	1A1a	Not engines	0.882	220	93
				Engines	0.99	220	93
			1A1b	010306	0.882	220	93
			1A2 a-f	Not engines	0.882	220	93
				Engines	0.99	220	93
			1A4a i	Not engines	10	220	93
				Engines	0.99	220	93
			1A4b i	0202	10	220	93
			1A4c i	0203	10	220	93
	206A	KEROSENE	1A2a-f	03	0.882	220	93
			1A4a i	0201	10	220	93
			1A4b i	0202	10	220	93
			1A4c i	0203	10	220	93
	303A	LPG	1A1a	0101, 0102	0.025		
			1A2 a-f	03	0.025		
			1A4a i	0201	2		
			1A4b i	0202	2		
			1A4c i	0203	2		
	308A	REFINERY GAS	1A1b	010304	0.025		
				010306	0.025		
SOLID	101A	ANODE CARBON	1A2f	0320	1.32	6700	5700
	102A	COAL	1A1a	0101, 0102	1.32	6700	839
			1A2 a-f	03	1.32	6700	839
			1A4b i	0202	800	1,200,000	7403
			1A4c i	0203	300	23000	7403
	103A	FLY ASH FOSSIL	1A1a	0101	1.32		
	106A	BROWN COAL BRI.	1A4b i	0202	800	1,200,000	7403
	107A	COKE OVEN COKE	1A2 a-f	03	1.32	6700	5700
			1A4b i	0202	800	1,200,000	7403

Table 2A-4.26 Dioxin emission factor time-series for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
LIQUID	203A	RESIDUAL OIL	1A4c i	020304									10	10	10	10	10	10							0.882	0.882	
LIQUID	204A	GAS OIL	1A2f i	031205																			0.882	0.882	0.882	0.99	0.99
GAS	301A	NATURAL GAS	2A7d	030318						10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	2	0.025	0.025	0.025	0.025	0.025	0.025	0	0	0
WASTE	114A	WASTE	1A1a	010100	2095	1746	1396	1047																			
WASTE	114A	WASTE	1A1a	010101									348	253		157	157	157					5	5			
WASTE	114A	WASTE	1A1a	010102					907	767	628	488	348	253	157	157	157	157	81	5	5	5	5	5	5	5	5
WASTE	114A	WASTE	1A1a	010103					907	767	628	488	348	253	157	157	157	157	81	5	5	5	5	5	5	5	5
WASTE	114A	WASTE	1A1a	010104					907	767	628	488	348	253	157	157	157	157	81	5	5			5	5	5	5
WASTE	114A	WASTE	1A1a	010200	2095	1746	1396	1047																			
WASTE	114A	WASTE	1A1a	010202						767	628	488	348														
WASTE	114A	WASTE	1A1a	010203					907	767	628	488	348	348	348	348	348	348	177	5	5	5	5	5	5	5	5
WASTE	114A	WASTE	1A2a	030400					907	767																	
WASTE	114A	WASTE	1A2c	030600	2095	1746	1396	1047	907	767	628	488	348		348					5		5					
WASTE	114A	WASTE	1A2d	031100	2095	1746	1396	1047	907	767	628	488	348	348	348					5		5	5	5	5	5	5
WASTE	114A	WASTE	1A2e	030900	2095	1746	1396	1047	907	767	628		348	348	348					5		5	5	5	5	5	5
WASTE	114A	WASTE	1A2f i	030700	2095	1746	1396	1047	907	767			348														
WASTE	114A	WASTE	1A2f i	031000	2095	1746	1396	1047	907	767	628	488	348	348	348							5					
WASTE	114A	WASTE	1A2f i	031200	2095	1746			907	767																	
WASTE	114A	WASTE	1A2f i	031300	2095	1746	1396	1047	907	767	628	488	348		348					5		5	5	5	5	5	5
WASTE	114A	WASTE	1A2f i	031400			1396	1047	907	767	628	488	348	348	348					5		5					
WASTE	114A	WASTE	1A2f i	032000	2095	1746	1396	1047	907	767	628	488	348	348	348					5		5					
WASTE	114A	WASTE	1A4a i	020100	2095	1746	1396	1047	907	767	628	488	348	348				348	177	5	5		5		5	5	5
WASTE	114A	WASTE	1A4a i	020103					907	767	628	488	348	348	348	348	348	348	177	5	5	5	5	5	5	5	5
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											348	348	348	348	177	5	5	5	5	5	5	5	5
BIOMASS	111A	WOOD	1A4b i	020200	595	595	595	595	595	595	595	595	595	595	595	540	519	514	508	488	465	469	446	416	399	383	371
BIOMASS	111A	WOOD	1A4b i	020202																488	465	469	446	416	399	383	371
BIOMASS	111A	WOOD	1A4b i	020204																			446	416	399		
BIOMASS	215A	BIO OIL	1A4b i	020200																		0.882	10	10	10	10	10
BIOMASS	310A	BIO PROD GAS	1A4a i	020105									0	1.7		1.7	1.7		1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7

Table 2A-4.27 HCB emission factor time-series for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
WASTE	114A	WASTE	1A1a	010100	190000	158000	127000	95000																			
WASTE	114A	WASTE	1A1a	010101									32000	23000		12000	10000	8000					4300	4300			
WASTE	114A	WASTE	1A1a	010102					82000	70000	57000	45000	32000	23000	14000	12000	10000	8000	6000	4300	4300	4300	4300	4300	4300	4300	4300
WASTE	114A	WASTE	1A1a	010103					82000	70000	57000	45000	32000	23000	14000	12000	10000	8000	6000	4300	4300	4300	4300	4300	4300	4300	4300
WASTE	114A	WASTE	1A1a	010104					82000	70000	57000	45000	32000	23000	14000	12000	10000	8000	6000	4300	4300	4300	4300	4300	4300	4300	4300
WASTE	114A	WASTE	1A1a	010200	190000	158000	127000	95000																			
WASTE	114A	WASTE	1A1a	010202						70000	57000	45000	32000														
WASTE	114A	WASTE	1A1a	010203					82000	70000	57000	45000	32000	23000	14000	12000	10000	8000	6000	4300	4300	4300	4300	4300	4300	4300	4300
WASTE	114A	WASTE	1A2a	030400					82000	70000																	
WASTE	114A	WASTE	1A2c	030600	190000	158000	127000	95000	82000	70000	57000	45000	32000		14000					4300		4300					
WASTE	114A	WASTE	1A2d	031100	190000	158000	127000	95000	82000	70000	57000	45000	32000	23000	14000					4300		4300	4300	4300	4300	4300	4300
WASTE	114A	WASTE	1A2e	030900	190000	158000	127000	95000	82000	70000	57000		32000	23000	14000					4300		4300	4300	4300	4300	4300	4300
WASTE	114A	WASTE	1A2f i	030700	190000	158000	127000	95000	82000	70000			32000														
WASTE	114A	WASTE	1A2f i	031000	190000	158000	127000	95000	82000	70000	57000	45000	32000	23000	14000							4300					
WASTE	114A	WASTE	1A2f i	031200	190000	158000			82000	70000																	
WASTE	114A	WASTE	1A2f i	031300	190000	158000	127000	95000	82000	70000	57000	45000	32000		14000					4300		4300	4300	4300	4300	4300	4300
WASTE	114A	WASTE	1A2f i	031400			127000	95000	82000	70000	57000	45000	32000	23000	14000					4300		4300					
WASTE	114A	WASTE	1A2f i	032000	190000	158000	127000	95000	82000	70000	57000	45000	32000	23000	14000					4300		4300					
WASTE	114A	WASTE	1A4a i	020100	190000	158000	127000	95000	82000	70000	57000	45000	32000	23000				8000	6000	4300	4300		4300		4300	4300	4300
WASTE	114A	WASTE	1A4a i	020103					82000	70000	57000	45000	32000	23000	14000	12000	10000	8000	6000	4300	4300	4300	4300	4300	4300	4300	4300
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											14000	12000	10000	8000	6000	4300	4300	4300	4300	4300	4300	4300	4300

Table 2A-4.28 PCB emission factor time-series for the years 1990 to 2012.

fuel_type	fuel_id	fuel_gr_abbr	nfr_id	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
WASTE	114A	WASTE	1A1a	010100	45671	38063	30433	22825																			
WASTE	114A	WASTE	1A1a	010102					19773	16721	13690	10638	7586	5515	3423	3423	3423	3423	1766	109	109	109	109	109	109	109	109
WASTE	114A	WASTE	1A1a	010103					19773	16721	13690	10638	7586	5515	3423	3423	3423	3423	1766	109	109	109	109	109	109	109	109
WASTE	114A	WASTE	1A1a	010104					19773	16721	13690	10638	7586	5515	3423			3423			109				109	109	109
WASTE	114A	WASTE	1A1a	010200	45671	38063	30433	22825																			
WASTE	114A	WASTE	1A1a	010203					19773	16721	13690	10638	7586	5515	3423	3423	3423	3423	1766	109	109	109	109	109	109	109	109
WASTE	114A	WASTE	1A2a	030400					19773	16721																	
WASTE	114A	WASTE	1A2c	030600	45671	38063	30433	22825	19773	16721	13690	10638	7586		3423					109		109					
WASTE	114A	WASTE	1A2d	031100	45671	38063	30433	22825	19773	16721	13690	10638	7586	5515	3423					109		109	109	109	109	109	109
WASTE	114A	WASTE	1A2e	030900	45671	38063	30433	22825	19773	16721	13690		7586	5515	3423					109		109	109	109	109	109	109
WASTE	114A	WASTE	1A2f i	030700	45671	38063	30433	22825	19773	16721			7586														
WASTE	114A	WASTE	1A2f i	031000	45671	38063	30433	22825	19773	16721	13690	10638	7586	5515	3423							109					
WASTE	114A	WASTE	1A2f i	031200	45671	38063			19773	16721																	
WASTE	114A	WASTE	1A2f i	031300	45671	38063	30433	22825	19773	16721	13690	10638	7586		3423					109		109	109	109	109	109	109
WASTE	114A	WASTE	1A2f i	031400			30433	22825	19773	16721	13690	10638	7586	5515	3423					109		109					
WASTE	114A	WASTE	1A2f i	032000	45671	38063	30433	22825	19773	16721	13690	10638	7586	5515	3423					109		109					
WASTE	114A	WASTE	1A4a i	020100	45671	38063	30433	22825	19773	16721	13690	10638	7586	5515				3423	1766	109	109		109		109	109	109
WASTE	114A	WASTE	1A4a i	020103					19773	16721	13690	10638	7586	5515	3423	3423	3423	3423	1766	109	109	109	109	109	109	109	109
WASTE	115A	INDUSTR. WASTES	1A2f i	031600											3423	3423	3423	3423	1766	109	109	109	109	109	109	109	109
BIOMASS	111A	WOOD	1A4b i	020200	5453	5453	5453	5453	5453	5453	5453	5453	5453	5453	5453	4877	4638	4567	4489	4271	4028	4049	3799	3493	3306	3134	2997
BIOMASS	111A	WOOD	1A4b i	020202																4271	4028	4049	3799	3493	3306	3134	2997
BIOMASS	111A	WOOD	1A4b i	020204																			3799	3493	3306		

Table 2A-4.29 NH_3 emission factors 2012.

Fuel gr	Fuel	NFR		SNAP	NH_3 g/GJ
BIOMASS	WOOD	1A4b i	Residential	0202	5
	STRAW	1A4b i	Residential	0202	3.8
WASTE	MUNICIP. WASTES	1A1a	Electricity and heat production	0101, 0102	0.29
SOLID	COAL	1A4b i	Residential	0202	3.8
	BROWN COAL BRI.	1A4b i	Residential	0202	3.8
	COKE OVEN COKE	1A4b i	Residential	0202	3.8

Annex 2B

Transport

List of content

Annex 2B-1: Fleet data 1985-2012 for road transport (No. vehicles)

Sector	Subsector	Tech 2	FYear	LYear	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	75564	16627	13368	10706	8571	7246	6992	6618	6159	5646	5194	4994
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	404440	179963	156167	134583	102209	66638	55669	43359	30440	19722	12950	9402
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	97500	87416	63723	53008	61799	45282	38690	30726	21910	14275	8539	5582
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	152241	318620	330061	307288	254029	235151	221927	204913	179982	150784	119474	95486
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990		165103	178393	209260	261579	258381	253651	249450	243072	232062	220895	203911
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996			28375	60724	96922	141546	180780	219477	218990	216002	214711	212883
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000									39547	74071	106936	132750
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005												
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010												
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014												
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	90872	28856	23474	19524	15744	13167	12527	11642	10624	9570	8659	8291
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	344507	171158	152919	137410	110813	76213	63961	50125	35583	23605	15800	11566
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	87587	74393	54644	44813	52998	40866	35395	28785	21181	14516	9144	6258
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	210664	276844	281145	261224	218177	205239	196226	184150	165329	142253	115689	94495
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990		221807	211098	215194	242500	240697	238039	236139	232642	225250	217019	203365
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996			51521	101611	148509	235536	319571	414973	413070	407030	404816	402938
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000									105322	217501	303755	363391
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005												
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010												
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014												
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	3246	1388	1186	1033	897	911	945	971	986	987	989	1024
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	3113	3661	3581	3373	3096	2800	2589	2352	2039	1657	1381	1181
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	1078	564	531	687	859	865	865	846	773	702	599	520
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	4087	2263	2037	1700	1575	1659	1801	1950	2055	2081	2018	1904
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990		4323	3630	3161	2668	2810	3052	3331	3638	3874	4089	4161
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996			1263	2350	3350	5384	7888	10682	11000	11250	11334	11470
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000									3980	8667	14014	18870
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005												
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010												
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014												
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	69406	71018	70198	69500	68720	65169	62762	59117	54631	50590	48238	46384
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996			979	2163	3799	6613	9919	13122	13689	14318	15305	16471
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000									3064	8535	18211	28716
Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005												

Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010												
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014												
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	14055	14871	13888	13012	12136	11757	11413	10708	10043	9269	8435	7728
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996			1017	1988	3035	4323	5638	7401	7600	7595	7716	7698
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000									2079	5072	9083	13125
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005												
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010												
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014												
Passenger Cars	LPG cars	Conventional	0	1990	1136	1163	1166	1173	1184	734	495	310	171	96	56	30
Passenger Cars	LPG cars	Euro I	1991	1996				1	4	4	3	1	1	1	3	2
Passenger Cars	LPG cars	Euro II	1997	2000												
Passenger Cars	LPG cars	Euro III	2001	2005												
Passenger Cars	LPG cars	Euro IV	2006	2010												
Passenger Cars	2-Stroke	Conventional	0	9999	4823	5417	4804	4308	3747	3029	2443	1824	1248	761	400	300
Passenger Cars	Electric cars	Conventional	0	9999	130	133	133	134	136	155	163	187	230	292	298	322
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969												
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978												
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980												
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985												
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990												
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996												
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000											40	97
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005												
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010												
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014												
Passenger Cars	Diesel <1,4 l	Conventional	0	1990												
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996												
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000											361	1372
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005												
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010												
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014												
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	34172	44442	45625	46865	48934	49865	46712	42710	37987	34274	30224	27140
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998							3773	7509	12025	17550	17352	17103
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001											5272	9655
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006												
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011												
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015												
Light Duty Vehicles	Diesel <3,5t	Conventional	0	1994	113019	146986	150898	154999	161842	169142	160228	148520	133718	120795	105967	94102

Light Duty Vehicles	Diesel <3,5t	Euro I	1995	1998							16899	35370	56836	76717	75753	74373
Light Duty Vehicles	Diesel <3,5t	Euro II	1999	2001											24555	49951
Light Duty Vehicles	Diesel <3,5t	Euro III	2002	2006												
Light Duty Vehicles	Diesel <3,5t	Euro IV	2007	2011												
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	2015												
Light Duty Vehicles	LPG <3,5t	Conventional	0	1994	684	889	913	938	979	632	462	295	196	125	90	60
Light Duty Vehicles	LPG <3,5t	Euro I	1995	1998										1	1	1
Light Duty Vehicles	LPG <3,5t	Euro II	1999	2001												1
Light Duty Vehicles	LPG <3,5t	Euro III	2002	2006												
Light Duty Vehicles	LPG <3,5t	Euro IV	2007	2011												
Light Duty Vehicles	Electric <3,5t	Conventional	0	9999	3	4	4	4	4	3	2	2	1	1	1	1
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	0	9999	621	530	510	497	503	455	412	365	326	336	318	307
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	0	1993	8686	7049	6675	6430	6419	6194	5738	5137	4646	4156	3518	3011
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	1994	1996					66	376	711	976	973	967	906	834
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	1997	2001								89	521	1236	1782	2136
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	0	1993	7266	5897	5584	5379	5375	5316	5373	5207	4854	4491	4116	3782
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	1994	1996					51	298	671	968	1002	1081	1102	1099
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	1997	2001								94	429	798	1200	1575
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	0	1993	4984	4519	4461	4388	4454	3991	3248	2731	2360	1984	1623	1368
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	1994	1996					37	156	234	285	283	286	289	278
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	1997	2001								21	126	216	262	298
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	0	1993	5171	4689	4628	4552	4601	4348	4047	3669	3316	2924	2537	2143
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	1994	1996					58	334	708	1001	1007	985	963	905
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	1997	2001								98	535	937	1371	1642
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2010	2013												

Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	0	1993	4307	5179	5237	5326	5315	5031	4565	4059	3536	3067	2596	2097
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	1994	1996					67	469	1003	1452	1442	1400	1322	1204
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	1997	2001								152	748	1330	1898	2179
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	0	1993	7	8	8	9	9	7	6	6	6	6	6	4
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	1994	1996							0	1	1	1	1	1
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	1997	2001								0	1	2	3	3
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	0	1993	271	326	329	335	327	326	329	321	300	262	231	185
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	1994	1996					11	62	152	239	246	252	253	239
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	1997	2001								28	147	289	455	618
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT >32t	Conventional	0	1993	0	0	0	0	0	0	1	0	0	1	1	2
Heavy Duty Vehicles	Diesel RT >32t	Euro I	1994	1996							0	1	1	1	1	0
Heavy Duty Vehicles	Diesel RT >32t	Euro II	1997	2001								0	1	0	0	1
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	0	1993	5617	5132	5080	5011	5065	4783	4448	4025	3645	3208	2772	2481
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	1994	1996					63	356	759	1069	1076	1051	1028	1025
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	1997	2001								104	570	1000	1467	1862
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	0	1993	8359	10252	10740	11202	11174	10480	8917	7262	5877	4730	3842	3173
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	1994	1996					204	1616	3609	4958	4683	4110	3555	2884
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	1997	2001								495	2223	4240	5939	7098
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2002	2006												

Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	0	1993	1672	2083	2242	2382	2379	2398	2257	2045	1799	1469	1240	1029
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	1994	1996					49	333	888	1316	1327	1314	1305	1215
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	1997	2001								143	778	1564	2540	3548
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro I	1994	1996								1	1	1	1	1
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	1997	2001										1	1	1
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro V	2010	2013												
Buses	Gasoline Urban Buses	Conventional	0	9999	8	8	9	11	14	11	11	16	17	17	15	11
Buses	Diesel Urban Buses <15t	Conventional	0	1993	347	352	433	488	639	558	494	411	335	281	250	200
Buses	Diesel Urban Buses <15t	Euro I	1994	1996						49	81	122	130	132	124	118
Buses	Diesel Urban Buses <15t	Euro II	1997	2001									103	295	438	525
Buses	Diesel Urban Buses <15t	Euro III	2002	2006												
Buses	Diesel Urban Buses <15t	Euro IV	2007	2009												
Buses	Diesel Urban Buses <15t	Euro V	2010	2013												
Buses	Diesel Urban Buses 15 - 18t	Conventional	0	1993	2083	2109	2597	2928	3833	3475	3205	2861	2691	2353	2012	1701
Buses	Diesel Urban Buses 15 - 18t	Euro I	1994	1996						397	632	985	989	891	891	845
Buses	Diesel Urban Buses 15 - 18t	Euro II	1997	2001									183	568	817	1049
Buses	Diesel Urban Buses 15 - 18t	Euro III	2002	2006												
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2007	2009												
Buses	Diesel Urban Buses 15 - 18t	Euro V	2010	2013												
Buses	Diesel Urban Buses >18t	Conventional	0	1993	5	5	6	7	9	8	6	7	6	3	2	37
Buses	Diesel Urban Buses >18t	Euro I	1994	1996						1	1	3	3	3	2	28
Buses	Diesel Urban Buses >18t	Euro II	1997	2001										6	20	106
Buses	Diesel Urban Buses >18t	Euro III	2002	2006												
Buses	Diesel Urban Buses >18t	Euro IV	2007	2009												
Buses	Diesel Urban Buses >18t	Euro V	2010	2013												
Buses	Gasoline Coaches	Conventional	0	9999	931	942	1161	1309	1508	1762	1775	1786	1791	1808	1810	1796
Buses	Diesel Coaches <15t	Conventional	0	1993	3710	3756	4627	5215	6010	5926	5739	5506	5208	4941	4629	4340
Buses	Diesel Coaches <15t	Euro I	1994	1996						420	682	1113	1103	1091	1056	1079
Buses	Diesel Coaches <15t	Euro II	1997	2001									370	695	1039	1347

Buses	Diesel Coaches <15t	Euro III	2002	2006												
Buses	Diesel Coaches <15t	Euro IV	2007	2009												
Buses	Diesel Coaches <15t	Euro V	2010	2013												
Buses	Diesel Coaches 15 - 18t	Conventional	0	1993	804	814	1003	1131	1303	1389	1393	1342	1253	1241	1184	1133
Buses	Diesel Coaches 15 - 18t	Euro I	1994	1996						35	89	153	162	163	159	148
Buses	Diesel Coaches 15 - 18t	Euro II	1997	2001									44	77	119	173
Buses	Diesel Coaches 15 - 18t	Euro III	2002	2006												
Buses	Diesel Coaches 15 - 18t	Euro IV	2007	2009												
Buses	Diesel Coaches 15 - 18t	Euro V	2010	2013												
Buses	Diesel Coaches >18t	Conventional	0	1993	122	123	152	171	197	210	221	211	193	193	206	192
Buses	Diesel Coaches >18t	Euro I	1994	1996						20	42	78	84	82	81	78
Buses	Diesel Coaches >18t	Euro II	1997	2001									25	54	99	145
Buses	Diesel Coaches >18t	Euro III	2002	2006												
Buses	Diesel Coaches >18t	Euro IV	2007	2009												
Buses	Diesel Coaches >18t	Euro V	2010	2013												
Mopeds	2-stroke <50 cm³	Conventional	0	1999	151000	120000	118000	113000	109000	105000	114167	123333	132496	141636	150802	143569
Mopeds	2-stroke <50 cm³	Euro I	2000	2003												16403
Mopeds	2-stroke <50 cm³	Euro II	2004	2014												
Mopeds	4-stroke <50 cm³	Euro II	2004	2014												
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	6072	6470	6653	6737	6949	7255	7666	8228	8891	9524	10316	10536
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003												464
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006												
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999												
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	6881	7333	7541	7635	7875	8222	8688	9325	10077	10794	11692	11941
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003												526
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006												
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999												
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	18923	20165	20737	20996	21657	22611	23892	25645	27712	29683	32152	32838
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003												1447
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006												
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999												
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	8601	9166	9426	9544	9844	10278	10860	11657	12596	13492	14615	14926
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003												658
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006												
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999												

Sector	Subsector	Tech 2	FYear	LYear	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	4949	4963	5045	5223	5417	5688	6017	6367	6599	6784	6867	6833
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	7791	6441	5527	4770	4352	4057	4054	4021	4051	3997	4014	4024
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	4146	3061	2228	1672	1270	1027	853	726	631	566	520	467
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	78149	62695	47507	35638	25238	18614	13038	9396	6522	4731	3282	2418
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990	188827	166452	145685	119763	96437	73954	56825	40791	29907	20894	14633	9806
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996	211037	207661	203273	197813	189157	177729	161931	144861	127430	107614	87661	67243
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000	131463	130039	129601	128725	127432	126887	122693	118998	115799	111468	104577	96701
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005	20346	43295	64167	93617	135259	136188	133545	132050	131454	129736	127743	125511
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010						46062	87481	131346	170512	229373	227730	225805
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014											67894	155289
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	8215	8200	8321	8638	9068	9590	10256	10933	11397	11659	11779	11667
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	9555	7938	6866	5944	5373	5152	5259	5418	5580	5670	5749	5743
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	4775	3690	2780	2170	1670	1386	1183	1020	895	801	724	636
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	78552	64108	49671	37838	27501	20745	15213	11502	8470	6409	4690	3594
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	190772	171667	153308	129614	107639	85477	67960	51214	39588	29267	21797	15650
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	402008	397847	391776	383213	370015	348989	317437	286224	256621	220110	181444	140026
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	359754	355763	355858	352963	349516	350200	334149	320149	310654	298510	280024	258140
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	51742	107686	149320	197612	252007	258765	251961	248489	247402	243897	238197	233396
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010						55865	102438	130442	145805	160847	156500	155094
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014											15850	25993
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	1079	1128	1237	1391	1600	2061	2629	3223	3590	3776	3921	4420
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	1034	936	859	830	841	1031	1313	1734	2009	2238	2457	2858
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	479	444	399	369	318	311	330	319	297	271	243	268
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	1798	1696	1572	1431	1299	1182	1129	1031	935	835	734	743
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	4188	4196	4099	3992	3847	3772	3641	3404	3151	2818	2454	2316
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	11572	11776	11983	12425	12702	13046	13207	12846	12337	11594	10655	9901
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	18780	18760	18987	19329	19850	21109	21230	20991	20706	20140	19257	18272
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	4624	9882	14671	21339	29801	32250	33685	34091	34561	34549	33571	32596
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010						7894	14607	18442	20013	21352	20826	20873
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014											846	1125
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	44480	41523	38006	34340	30088	26004	22021	17989	14348	10977	8074	5859
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996	17245	18106	19220	20895	21613	21522	20504	19072	17688	15816	13503	10845
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000	28688	28633	28948	29194	29373	31180	32603	31362	30703	30387	29751	29009
Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005	10980	25186	38421	57411	82415	88649	104131	104503	105907	107353	107313	110697
Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010						27710	68948	93912	103857	111254	110710	112787
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014						3079	12844	38640	66553	119156	179520	226628
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	7120	6345	5723	5039	4460	3895	3402	2908	2516	2095	1656	1376

Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	7640	7463	7353	7287	7147	6944	6585	6018	5575	5022	4380	3823
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	13236	13141	13296	13564	13885	14771	14907	14386	13960	13559	12861	12557
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	3884	8635	12968	18885	25776	27913	29844	30102	30677	30829	30074	28854
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010						6563	15768	18658	20592	22307	22792	23793
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014						729	2860	5908	9868	14513	20115	26047
Passenger Cars	LPG cars	Conventional	0	1990	24	17	11	10	10	10	7	8	7	6	6	5
Passenger Cars	LPG cars	Euro I	1991	1996	2	3	2	4	4	3	2	2	2	3	2	2
Passenger Cars	LPG cars	Euro II	1997	2000		1	2	1	1	1			1	1	4	4
Passenger Cars	LPG cars	Euro III	2001	2005							1	2	4	3	3	3
Passenger Cars	LPG cars	Euro IV	2006	2010									1	1	4	4
Passenger Cars	2-Stroke	Conventional	0	9999	200	150	100	50								
Passenger Cars	Electric cars	Conventional	0	9999	301	280	250	211	183	185	188	191	276	350	800	1307
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969						33	65	98	124	142	157	214
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978						17	49	71	95	117	127	164
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980							3	2	3	4	3	4
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985					1	4	10	13	13	13	15	32
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990						13	20	27	30	31	33	35
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996					4	21	38	47	59	60	56	65
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000	96	95	94	94	95	117	141	159	171	185	198	239
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005	52	118	193	324	553	573	607	626	650	657	685	743
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010						257	645	1596	2031	2091	2067	2012
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014											113	207
Passenger Cars	Diesel <1,4 l	Conventional	0	1990					1	5	8	11	13	11	9	11
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996					3	45	85	96	98	93	92	86
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000	1407	1402	1401	1403	1406	1462	1395	1388	1404	1378	1347	1363
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005	1751	4929	8243	12614	17773	17986	17827	17580	17685	17471	17086	16976
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010						4746	13769	21404	23476	24508	24289	24022
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014						527	2784	10485	16524	26729	37853	50905
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	23832	21083	18787	16405	14063	11895	9933	7994	6336	4955	3852	3038
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	16862	16703	16454	16011	15464	14730	13333	12215	11198	10027	8622	7236
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	14319	14153	14012	13791	13616	13436	10305	9611	8985	8074	6752	5253
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006		3784	8014	13934	20623	26285	19003	18316	17583	15860	13792	11006
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011							3187	3814	3801	4055	4105	3680
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015												233
Light Duty Vehicles	Diesel <3,5t	Conventional	0	1994	80466	67925	56940	46624	37412	29739	24091	18856	14741	11426	9018	7286
Light Duty Vehicles	Diesel <3,5t	Euro I	1995	1998	72684	71182	69081	66775	63284	58503	52349	46834	41796	36667	31364	26257
Light Duty Vehicles	Diesel <3,5t	Euro II	1999	2001	74831	73532	72069	70326	68384	65694	55259	49908	45261	40307	34072	27892
Light Duty Vehicles	Diesel <3,5t	Euro III	2002	2006		27192	54236	92157	139815	191494	165460	156173	147683	134874	120633	103085

Light Duty Vehicles	Diesel <3,5t	Euro IV	2007	2011							37697	54077	54534	62080	78410	73628
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	2015						2832	11924	20902	21750	34043	32718	50059
Light Duty Vehicles	LPG <3,5t	Conventional	0	1994	36	27	21	14	10	9	7	5	4	4	4	4
Light Duty Vehicles	LPG <3,5t	Euro I	1995	1998	1											
Light Duty Vehicles	LPG <3,5t	Euro II	1999	2001				1	3	3	2	2	3	3	2	2
Light Duty Vehicles	LPG <3,5t	Euro III	2002	2006						5	7	7	8	8	7	7
Light Duty Vehicles	LPG <3,5t	Euro IV	2007	2011							1	3	4	3	4	3
Light Duty Vehicles	Electric <3,5t	Conventional	0	9999								1	7	4	17	128
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	0	9999	295	291	283	268	287	297	328	325	340	344	347	335
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	0	1993	2552	2088	1709	1430	1244	1075	937	793	653	540	481	440
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	1994	1996	769	715	656	594	492	434	359	290	234	191	157	141
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	1997	2001	2254	2161	2078	2003	1901	1728	1509	1250	1060	893	750	642
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2002	2006	166	460	755	1049	1437	1674	1661	1576	1450	1315	1209	1100
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2007	2009						52	363	758	911	968	972	941
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2010	2013							2	5	27	155	322	496
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2014	9999												1
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	0	1993	3406	3069	2766	2503	2241	2084	1901	1683	1419	1250	1128	1030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	1994	1996	1070	1040	985	948	885	828	748	667	545	481	418	359
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	1997	2001	1783	1840	1884	1858	1838	1706	1584	1352	1201	1079	951	856
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2002	2006	155	443	713	1061	1501	1949	2011	1924	1798	1631	1529	1390
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2007	2009	2	2	2	2	3	91	424	824	889	935	937	941
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2010	2013			1	1	1	1	41	181	352	551	724	889
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2014	9999												1
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	0	1993	1094	896	734	612	500	441	372	299	228	187	139	112
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	1994	1996	274	248	203	174	152	138	115	100	86	67	57	48
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	1997	2001	312	291	285	278	273	267	243	205	162	142	122	109
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2002	2006	10	32	46	58	82	100	109	108	104	95	77	71
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2007	2009				1	1	3	28	52	65	63	58	57
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2010	2013								8	11	35	52	57
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	0	1993	1897	1382	1158	1003	884	902	730	536	430	351	289	259
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	1994	1996	983	787	701	638	562	571	457	330	242	205	169	150
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	1997	2001	1926	1653	1586	1587	1564	1718	1459	1083	862	733	629	539
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2002	2006	194	389	665	919	1245	1745	1658	1469	1330	1207	1098	940
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2007	2009	4	4	6	7	14	101	457	699	747	757	748	707
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2010	2013					3	21	106	254	415	572	717	867
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2014	9999												2
Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	0	1993	1769	1231	984	797	655	626	464	307	217	163	140	114
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	1994	1996	1206	935	815	728	643	649	511	356	267	204	164	129

Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	1997	2001	2589	2176	2053	1970	1846	1974	1670	1245	986	838	697	561
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2002	2006	197	487	803	1143	1583	2274	2161	1907	1748	1590	1407	1188
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2007	2009	3	3	3	3	26	128	595	910	988	990	964	942
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2010	2013					7	24	124	293	493	696	920	1160
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2014	9999												1
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	0	1993	4	4	4	4	4	4	4	3	2	2	2	1
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	1994	1996	2	1	1	1	0	1	1	1	0	1		1
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	1997	2001	3	2	2	2	2	2	2	1	1	1	1	1
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2002	2006			0	2	2	3	3	3	3	3	3	2
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2007	2009							3	3	1	2	1	1
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2010	2013							1	1	1	1	2	3
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	0	1993	139	93	70	50	42	36	22	13	9	6	6	5
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	1994	1996	241	190	157	134	114	95	67	40	26	20	15	13
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	1997	2001	792	670	641	637	639	702	589	439	327	279	231	181
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2002	2006	82	193	341	509	747	1178	1146	1016	924	873	815	734
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2007	2009		0	1	1	21	97	412	619	674	686	677	668
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2010	2013						10	69	157	255	341	504	723
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2014	9999												1
Heavy Duty Vehicles	Diesel RT >32t	Conventional	0	1993	2	1	2	2	2	1	1	1				
Heavy Duty Vehicles	Diesel RT >32t	Euro I	1994	1996	1	1	1	1	1	1	1	1	1	1	1	1
Heavy Duty Vehicles	Diesel RT >32t	Euro II	1997	2001	1	0										
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2002	2006	1	1	2	1	2	3	3	3	3	3	2	3
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2007	2009							1	1	1			1
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2010	2013									1	2	4	4
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	0	1993	1887	1804	1515	1250	1033	763	659	552	445	365	304	279
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	1994	1996	954	1006	898	781	648	473	404	333	244	207	170	151
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	1997	2001	1872	2119	2035	1942	1802	1414	1281	1087	865	736	633	541
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2002	2006	188	497	852	1123	1432	1438	1457	1473	1333	1211	1103	946
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2007	2009	3	6	8	8	15	83	405	707	754	764	754	709
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2010	2013					3	17	93	255	416	573	718	870
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2014	9999												2
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	0	1993	2250	1980	1585	1255	973	712	583	456	328	253	223	188
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	1994	1996	2100	1834	1472	1214	979	714	597	465	345	271	224	178
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	1997	2001	7055	6586	5636	4638	3653	2749	2277	1781	1351	1128	937	752
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2002	2006	1009	2342	3625	4439	5378	5569	4881	4150	3380	2811	2234	1802
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2007	2009	4	7	6	10	76	214	994	1635	1720	1738	1605	1442
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2010	2013	1	1	1		27	151	675	1162	1550	2018	2802	3305
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2014	9999												7

Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	0	1993	708	549	388	287	219	170	123	95	67	61	58	50
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	1994	1996	1060	967	781	616	482	351	285	176	114	101	84	69
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	1997	2001	4062	4016	3731	3293	2841	2242	1791	1225	823	654	538	426
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2002	2006	552	1706	3011	4472	6217	7578	7024	5985	4772	3954	3229	2562
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2007	2009	1	5	6	6	82	340	2129	3557	3680	3845	3624	3280
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2010	2013	1	2	2	2	1	68	724	1428	1909	2680	3768	4838
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2014	9999												16
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro I	1994	1996	1	1	1	1	1							
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	1997	2001	1	1	1	1	1	1	1	1	1	1	1	1
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2007	2009							1	1	1	1		1
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2002	2006												1
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro V	2010	2013								1	3		1	
Buses	Gasoline Urban Buses	Conventional	0	9999	9	7	1	2	2	2	4	7	9	9	10	11
Buses	Diesel Urban Buses <15t	Conventional	0	1993	183	154	123	101	80	68	56	49	33	25	16	7
Buses	Diesel Urban Buses <15t	Euro I	1994	1996	118	96	106	88	84	75	57	53	28	16	15	10
Buses	Diesel Urban Buses <15t	Euro II	1997	2001	542	553	569	535	545	494	427	367	221	117	90	53
Buses	Diesel Urban Buses <15t	Euro III	2002	2006		56	155	248	378	461	439	433	416	363	332	255
Buses	Diesel Urban Buses <15t	Euro IV	2007	2009							119	262	434	425	461	491
Buses	Diesel Urban Buses <15t	Euro V	2010	2013										165	266	397
Buses	Diesel Urban Buses 15 - 18t	Conventional	0	1993	1506	1175	1030	880	758	629	544	460	336	276	217	151
Buses	Diesel Urban Buses 15 - 18t	Euro I	1994	1996	810	749	691	620	561	477	399	338	296	253	180	158
Buses	Diesel Urban Buses 15 - 18t	Euro II	1997	2001	1165	1156	1136	1066	1061	1033	1002	919	851	744	636	519
Buses	Diesel Urban Buses 15 - 18t	Euro III	2002	2006		288	456	596	733	1007	1008	989	962	969	951	870
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2007	2009							110	327	624	628	629	628
Buses	Diesel Urban Buses 15 - 18t	Euro V	2010	2013										217	404	562
Buses	Diesel Urban Buses >18t	Conventional	0	1993	47	45	25	24	23	16	7	6	6	2	2	1
Buses	Diesel Urban Buses >18t	Euro I	1994	1996	44	52	51	42	44	44	23	6	4	2	1	1
Buses	Diesel Urban Buses >18t	Euro II	1997	2001	220	225	224	218	217	215	213	161	148	142	105	48
Buses	Diesel Urban Buses >18t	Euro III	2002	2006		135	228	337	388	448	439	414	398	389	377	334
Buses	Diesel Urban Buses >18t	Euro IV	2007	2009							125	247	338	340	333	333
Buses	Diesel Urban Buses >18t	Euro V	2010	2013										97	162	280
Buses	Gasoline Coaches	Conventional	0	9999	1788	1763	1722	1663	1586	1522	1421	1306	1186	1052	913	769
Buses	Diesel Coaches <15t	Conventional	0	1993	3989	3649	3360	3029	2726	2438	2163	1927	1662	1439	1184	996
Buses	Diesel Coaches <15t	Euro I	1994	1996	1053	1031	982	956	920	873	814	733	664	614	545	488
Buses	Diesel Coaches <15t	Euro II	1997	2001	1658	1694	1740	1908	2023	2162	2144	2077	2011	1914	1801	1689
Buses	Diesel Coaches <15t	Euro III	2002	2006		253	482	751	1052	1361	1423	1439	1461	1454	1365	1215
Buses	Diesel Coaches <15t	Euro IV	2007	2009							228	480	793	822	798	742
Buses	Diesel Coaches <15t	Euro V	2010	2013										204	328	382

Buses	Diesel Coaches 15 - 18t	Conventional	0	1993	1061	1013	957	914	847	768	693	609	540	463	377	319
Buses	Diesel Coaches 15 - 18t	Euro I	1994	1996	161	173	176	176	184	176	177	178	193	179	154	135
Buses	Diesel Coaches 15 - 18t	Euro II	1997	2001	208	221	220	230	240	237	236	226	245	258	267	284
Buses	Diesel Coaches 15 - 18t	Euro III	2002	2006		19	46	61	71	90	81	99	106	107	109	119
Buses	Diesel Coaches 15 - 18t	Euro IV	2007	2009							11	38	69	66	65	64
Buses	Diesel Coaches 15 - 18t	Euro V	2010	2013										41	48	59
Buses	Diesel Coaches >18t	Conventional	0	1993	177	157	142	138	121	92	77	56	48	38	31	26
Buses	Diesel Coaches >18t	Euro I	1994	1996	76	79	74	70	65	60	56	49	46	36	26	20
Buses	Diesel Coaches >18t	Euro II	1997	2001	190	196	201	192	192	202	199	173	165	156	141	134
Buses	Diesel Coaches >18t	Euro III	2002	2006		32	92	152	230	293	302	312	321	322	309	322
Buses	Diesel Coaches >18t	Euro IV	2007	2009							55	114	180	194	197	193
Buses	Diesel Coaches >18t	Euro V	2010	2013										39	70	112
Mopeds	2-stroke <50 cm³	Conventional	0	1999	136233	128203	120288	112245	103814	95123	86611	78807	71061	63625	56546	50013
Mopeds	2-stroke <50 cm³	Euro I	2000	2003	28734	42762	48678	46056	43440	40735	37815	35222	32562	29999	27566	25345
Mopeds	2-stroke <50 cm³	Euro II	2004	2014				7996	16278	24801	33341	38136	42179	44312	46905	53316
Mopeds	4-stroke <50 cm³	Euro II	2004	2014				2665	5426	8267	11114	12712	14060	14771	15635	17772
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	10539	10440	10400	10480	10665	10952	11137	11004	10594	10060	9465	8930
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003	779	1097	1409	1356	1339	1361	1368	1357	1308	1250	1190	1136
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006				450	1115	1957	1864	1769	1655	1543	1425	1326
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999							1042	1673	1927	2033	2060	2049
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	12429	12827	13327	14028	14931	16063	17142	17806	18061	18108	18033	18059
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003	918	1348	1805	1814	1874	1996	2106	2196	2230	2250	2267	2297
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006				603	1560	2870	2870	2863	2822	2777	2715	2682
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999							1604	2707	3285	3659	3924	4143
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	34180	35273	36650	38576	41061	44174	47140	48967	49667	49797	49591	49662
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003	2525	3707	4964	4990	5154	5489	5792	6038	6133	6188	6234	6318
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006				1657	4291	7892	7891	7873	7761	7638	7467	7376
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999							4410	7445	9033	10061	10791	11394
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	15536	16033	16659	17535	18664	20079	21427	22258	22576	22635	22541	22574
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003	1148	1685	2257	2268	2343	2495	2633	2745	2788	2813	2834	2872
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006				753	1950	3587	3587	3578	3528	3472	3394	3353
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999							2005	3384	4106	4573	4905	5179

Annex 2B-2: Mileage data 1985-2012 for road transport (km)

Sector	Subsector	Tech 2	FYear	LYear	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	10987	10126	10512	10813	10717	10998	10369	9770	9516	9206	8738	8322
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	13512	12672	13276	13818	13785	14238	13441	12686	12361	11935	11315	10751
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	15074	14174	14709	15129	15002	15478	14621	13813	13487	13071	12472	11910
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	15016	15385	16091	16689	16643	17192	16255	15377	15047	14633	13973	13387
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990		15922	18158	18617	18423	18995	17947	16963	16578	16099	15347	14690
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996			9822	15599	17451	17935	18227	17893	19347	18764	17873	17076
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000									10518	15722	16679	17174
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005												
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010												
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014												
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	13245	12360	12855	13288	13221	13566	12782	12036	11712	11322	10737	10219
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	16412	15390	16109	16770	16715	17277	16317	15407	15023	14509	13761	13080
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	18351	17283	17934	18482	18333	18919	17876	16896	16503	15993	15257	14571
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	17890	18791	19630	20355	20297	20965	19820	18752	18345	17823	16991	16262
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990		19005	22385	22891	22603	23307	22019	20810	20338	19743	18813	17995
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996			12083	18712	20806	21397	21850	21413	23821	23096	21991	21008
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000									12863	18602	20691	21342
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005												
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010												
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014												
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	14692	13694	14191	14612	14494	14941	14084	13263	12911	12478	11825	11255
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	17959	16981	17820	18516	18543	19119	18039	17008	16558	16029	15211	14493
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	20799	19449	20135	20768	20669	21331	20133	19014	18551	17943	17090	16275
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	20329	21465	22268	22895	22702	23415	22104	20877	20384	19776	18841	17994
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990		21408	25931	26252	25851	26645	25127	23708	23150	22469	21401	20447
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996			14128	21423	23687	24914	24459	24235	26905	26023	24747	23618
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000									14567	20725	22239	23100
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005												
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010												
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014												
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	35362	42261	43428	41168	40097	42647	40813	39720	39124	37694	36387	33586
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996			67316	85071	76115	63947	57531	55204	56392	48899	44835	40694
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000									35632	44754	42660	41596
Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005												

Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010												
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014												
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	46795	53584	53600	45969	41568	42757	40159	38685	37779	36369	35252	32416
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996			75908	100414	95448	94680	87668	79953	77912	58365	47751	41527
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000									62706	82066	72553	64167
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005												
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010												
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014												
Passenger Cars	LPG cars	Conventional	0	1990	25575	26636	28202	29712	30233	31206	29655	28181	27555	26612	25314	25034
Passenger Cars	LPG cars	Euro I	1991	1996				38174	37417	38309	37546	35227	34476	33513	33997	31569
Passenger Cars	LPG cars	Euro II	1997	2000												
Passenger Cars	LPG cars	Euro III	2001	2005												
Passenger Cars	LPG cars	Euro IV	2006	2010												
Passenger Cars	2-Stroke	Conventional	0	9999	14642	15402	16008	16500	16419	16953	16011	15123	14770	14328	13647	13027
Passenger Cars	Electric cars	Conventional	0	9999	10260	10737	11377	11996	12218	15192	14786	13930	13775	13126	13594	13435
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969												
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978												
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980												
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985												
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990												
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996												
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000											10225	13907
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005												
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010												
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014												
Passenger Cars	Diesel <1,4 l	Conventional	0	1990												
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996												
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000											23322	27578
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005												
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010												
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014												
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	16590	15777	16152	16764	16864	17510	17508	16793	16443	16079	15437	15170
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998							11236	16067	17035	17363	19669	19114
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001											10620	16055
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006												
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011												
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015												
Light Duty Vehicles	Diesel <3,5t	Conventional	0	1994	29423	32398	32514	31159	30456	31409	31302	30275	29362	28039	26954	25182

Light Duty Vehicles	Diesel <3,5t	Euro I	1995	1998							20709	29650	31926	32950	36390	33622
Light Duty Vehicles	Diesel <3,5t	Euro II	1999	2001											20043	27919
Light Duty Vehicles	Diesel <3,5t	Euro III	2002	2006												
Light Duty Vehicles	Diesel <3,5t	Euro IV	2007	2011												
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	2015												
Light Duty Vehicles	LPG <3,5t	Conventional	0	1994	20338	19332	19790	20538	20660	20626	19555	18924	18421	17853	16944	16708
Light Duty Vehicles	LPG <3,5t	Euro I	1995	1998										16428	30783	29696
Light Duty Vehicles	LPG <3,5t	Euro II	1999	2001												16111
Light Duty Vehicles	LPG <3,5t	Euro III	2002	2006												
Light Duty Vehicles	LPG <3,5t	Euro IV	2007	2011												
Light Duty Vehicles	Electric <3,5t	Conventional	0	9999	12109	11522	11796	12244	12317	12509	11218	10676	12192	11836	11262	11034
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	0	9999	20176	18562	19950	20541	19045	18224	18229	17308	16292	15404	15444	14866
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	0	1993	31593	30572	33046	29469	24828	23910	25188	22923	20954	19357	17443	16450
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	1994	1996					23054	26299	36682	37885	39907	36293	32356	30112
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	1997	2001								24587	27344	31676	34883	36148
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	0	1993	37315	36012	38915	34698	29224	28272	29993	27218	24915	23136	20843	19695
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	1994	1996					27938	31807	42654	45806	48666	44243	39322	36691
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	1997	2001								29796	34383	41420	41778	43237
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	0	1993	27513	30299	32856	31321	26652	28985	28652	23167	21675	21127	22644	17020
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	1994	1996					23844	32017	43687	39124	40920	39134	41056	30408
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	1997	2001								24863	28125	38236	47872	37280
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	0	1993	49555	54586	59192	56427	48056	53001	52789	42730	40125	39183	41634	31119
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	1994	1996					41509	54202	69364	66546	72839	69704	72988	53993
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	1997	2001								43283	49885	65693	77120	63606
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2010	2013												

Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	0	1993	77104	85021	80265	84890	81445	80397	77249	73888	64558	62670	54436	50550
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	1994	1996					67784	77139	97621	109399	112920	107957	92590	84574
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	1997	2001								71827	78066	100546	97933	99869
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	0	1993	74213	81865	77431	81805	78420	81812	79350	79054	67611	64481	54746	52379
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	1994	1996							121173	94707	117422	111012	95023	86401
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	1997	2001								72706	86469	88492	100154	107624
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	0	1993	85446	94256	89150	94186	91028	93121	88668	84213	73749	72366	63114	58442
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	1994	1996					69026	80737	95841	108625	114746	109433	93722	85349
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	1997	2001								72706	78416	98957	96107	96195
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel RT >32t	Conventional	0	1993	56752	62603	59212	62557	59968	56125	80742	49186	42044	75528	64649	59903
Heavy Duty Vehicles	Diesel RT >32t	Euro I	1994	1996							71581	107606	120397	114825	89619	78093
Heavy Duty Vehicles	Diesel RT >32t	Euro II	1997	2001								72706	86871	118546	65155	82426
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	0	1993	53602	59453	64508	61415	52944	58371	58054	47394	44784	43638	46146	34196
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	1994	1996					45559	59585	76332	73342	80388	77115	80613	58763
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	1997	2001								47629	54989	72613	85120	69272
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	0	1993	84648	90436	86534	82989	83916	86825	79943	79896	73919	69127	62201	56625
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	1994	1996					61500	71410	83419	102475	117340	106705	99631	90683
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	1997	2001								66415	81057	94399	102498	102103
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2002	2006												

Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	0	1993	109789	114598	111039	100652	104396	108389	95165	94197	91124	81657	76385	72670
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	1994	1996					79563	92663	99809	121225	138856	122156	112618	105682
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	1997	2001								79383	92909	107228	111665	115340
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2010	2013												
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2014	9999												
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro I	1994	1996								138231	135435	116422	110616	104015
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	1997	2001										72370	137521	129314
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2007	2009												
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2002	2006												
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro V	2010	2013												
Buses	Gasoline Urban Buses	Conventional	0	9999	29543	28977	24021	21995	17353	26031	23506	19551	21801	20975	18284	16034
Buses	Diesel Urban Buses <15t	Conventional	0	1993	183187	207698	168762	142671	109361	117960	108353	102142	95506	91310	81145	73676
Buses	Diesel Urban Buses <15t	Euro I	1994	1996						96215	142149	144219	157743	147146	129841	116914
Buses	Diesel Urban Buses <15t	Euro II	1997	2001									91225	119788	134162	132924
Buses	Diesel Urban Buses <15t	Euro III	2002	2006												
Buses	Diesel Urban Buses <15t	Euro IV	2007	2009												
Buses	Diesel Urban Buses <15t	Euro V	2010	2013												
Buses	Diesel Urban Buses 15 - 18t	Conventional	0	1993	173862	197367	160377	135588	103937	112696	103596	99477	92134	87205	79413	72412
Buses	Diesel Urban Buses 15 - 18t	Euro I	1994	1996						96215	142765	138879	157646	147436	129279	115649
Buses	Diesel Urban Buses 15 - 18t	Euro II	1997	2001									91225	117036	134971	129338
Buses	Diesel Urban Buses 15 - 18t	Euro III	2002	2006												
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2007	2009												
Buses	Diesel Urban Buses 15 - 18t	Euro V	2010	2013												
Buses	Diesel Urban Buses >18t	Conventional	0	1993	226400	257009	208841	176562	135345	148089	129169	116874	115488	93970	71929	86260
Buses	Diesel Urban Buses >18t	Euro I	1994	1996						96215	172711	115545	162038	150495	138217	112266
Buses	Diesel Urban Buses >18t	Euro II	1997	2001										91104	108084	103154
Buses	Diesel Urban Buses >18t	Euro III	2002	2006												
Buses	Diesel Urban Buses >18t	Euro IV	2007	2009												
Buses	Diesel Urban Buses >18t	Euro V	2010	2013												
Buses	Gasoline Coaches	Conventional	0	9999	16804	17038	14174	13035	12050	13129	16303	18243	17792	17183	16236	15711
Buses	Diesel Coaches <15t	Conventional	0	1993	32231	37854	30875	26219	23552	24864	28995	33414	32601	31028	29777	27553
Buses	Diesel Coaches <15t	Euro I	1994	1996						16383	30705	36060	43701	40996	38739	35550
Buses	Diesel Coaches <15t	Euro II	1997	2001									24161	34986	37030	37435

Buses	Diesel Coaches <15t	Euro III	2002	2006												
Buses	Diesel Coaches <15t	Euro IV	2007	2009												
Buses	Diesel Coaches <15t	Euro V	2010	2013												
Buses	Diesel Coaches 15 - 18t	Conventional	0	1993	46554	54705	44620	37893	34040	32112	38024	44216	43217	41123	39645	37182
Buses	Diesel Coaches 15 - 18t	Euro I	1994	1996						26952	45374	59695	72100	67579	63928	58754
Buses	Diesel Coaches 15 - 18t	Euro II	1997	2001									39748	59444	60740	60185
Buses	Diesel Coaches 15 - 18t	Euro III	2002	2006												
Buses	Diesel Coaches 15 - 18t	Euro IV	2007	2009												
Buses	Diesel Coaches 15 - 18t	Euro V	2010	2013												
Buses	Diesel Coaches >18t	Conventional	0	1993	92397	108585	88569	75217	67569	66502	77292	89552	86760	82331	77766	72220
Buses	Diesel Coaches >18t	Euro I	1994	1996						42878	72260	92808	115142	107985	102154	93701
Buses	Diesel Coaches >18t	Euro II	1997	2001									63234	87431	91335	95313
Buses	Diesel Coaches >18t	Euro III	2002	2006												
Buses	Diesel Coaches >18t	Euro IV	2007	2009												
Buses	Diesel Coaches >18t	Euro V	2010	2013												
Mopeds	2-stroke <50 cm^3	Conventional	0	1999	1416	1341	1400	1469	1509	1544	1599	1711	1963	2203	2000	2010
Mopeds	2-stroke <50 cm^3	Euro I	2000	2003												1076
Mopeds	2-stroke <50 cm^3	Euro II	2004	2014												
Mopeds	4-stroke <50 cm^3	Euro II	2004	2014												
Motorcycles	2-stroke >50 cm^3	Conventional	0	1999	6850	6697	6704	7068	7252	7410	7244	6880	6680	6463	6078	5740
Motorcycles	2-stroke >50 cm^3	Euro I	2000	2003												4322
Motorcycles	2-stroke >50 cm^3	Euro II	2004	2006												
Motorcycles	2-stroke >50 cm^3	Euro III	2007	9999												
Motorcycles	4-stroke <250 cm^3	Conventional	0	1999	6850	6697	6704	7068	7252	7410	7244	6880	6680	6463	6078	5740
Motorcycles	4-stroke <250 cm^3	Euro I	2000	2003												4322
Motorcycles	4-stroke <250 cm^3	Euro II	2004	2006												
Motorcycles	4-stroke <250 cm^3	Euro III	2007	9999												
Motorcycles	4-stroke 250 - 750 cm^3	Conventional	0	1999	6850	6697	6704	7068	7252	7410	7244	6880	6680	6463	6078	5740
Motorcycles	4-stroke 250 - 750 cm^3	Euro I	2000	2003												4322
Motorcycles	4-stroke 250 - 750 cm^3	Euro II	2004	2006												
Motorcycles	4-stroke 250 - 750 cm^3	Euro III	2007	9999												
Motorcycles	4-stroke >750 cm^3	Conventional	0	1999	6850	6697	6704	7068	7252	7410	7244	6880	6680	6463	6078	5740
Motorcycles	4-stroke >750 cm^3	Euro I	2000	2003												4322
Motorcycles	4-stroke >750 cm^3	Euro II	2004	2006												
Motorcycles	4-stroke >750 cm^3	Euro III	2007	9999												

Sector	Subsector	Tech 2	FYear	LYear	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	7869	7768	7593	7412	6918	6482	6389	6055	5776	5467	5292	5079
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	10160	9981	9712	9418	8743	8139	7937	7514	7149	6739	6508	6236
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	11293	11141	10904	10631	9932	9290	9135	8680	8283	7831	7578	7270
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	12812	12661	12392	12110	11321	10629	10256	9906	9441	8897	8561	8176
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990	14012	13868	13584	13296	12442	11689	11413	10947	10460	9896	9569	9151
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996	16211	16019	15672	15300	14294	13402	13193	12561	12020	11395	11056	10627
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000	18159	17948	17556	17139	15991	14975	14782	13990	13351	12636	12241	11765
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005	9693	14122	15944	15903	15178	16977	16790	15878	15149	14338	13881	13337
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010						9067	13744	14370	14743	13940	15645	15027
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014											8406	11701
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	9649	9528	9313	9093	8492	7957	7858	7447	7107	6726	6511	6250
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	12344	12131	11809	11459	10629	9884	9667	9111	8667	8177	7902	7584
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	13788	13612	13324	12995	12132	11351	11194	10601	10119	9567	9265	8886
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	15470	15291	14950	14592	13613	12754	12461	11886	11331	10708	10340	9916
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	17102	16929	16583	16222	15170	14226	13981	13302	12701	12012	11628	11151
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	19934	19695	19267	18807	17565	16465	16213	15419	14746	13974	13551	13019
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	22231	21965	21480	20967	19565	18328	18051	17112	16331	15454	14966	14373
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	11898	17414	20033	20194	19474	20634	20321	19273	18394	17403	16838	16142
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010						11129	16919	18656	19084	18251	18770	18000
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014											10296	15855
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	10611	10487	10283	10090	9461	8916	8848	8398	8024	7583	7331	7052
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	13697	13480	13156	12854	11899	10999	10747	10097	9604	9083	8812	8499
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	15348	15169	14795	14485	13529	12670	12530	11863	11313	10701	10396	9993
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	16987	16805	16432	16038	14958	13996	13837	13074	12465	11786	11400	10935
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	19314	19091	18686	18256	17041	15954	15774	14926	14237	13488	13052	12559
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	22334	22050	21557	21047	19647	18397	18133	17178	16391	15513	15016	14420
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	25204	24880	24318	23732	22144	20744	20336	19307	18424	17425	16853	16145
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	13431	19503	21913	22034	21459	23318	22717	21635	20658	19538	18882	18104
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010						12528	19167	21128	21833	20987	20999	20164
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014											11573	18688
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	30342	29663	30687	30638	28016	26119	21907	23444	21533	20732	20558	19115
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996	36121	35088	36087	35846	32663	30053	26974	27319	24898	24043	23919	22366
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000	43922	41235	41711	41252	37510	34057	31516	31270	28407	27452	27266	25465
Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005	23955	32964	38627	38821	36272	38243	35241	34761	31564	30561	30354	28230
Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010						20846	28905	33241	33350	33010	33752	31660
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014						20846	25491	26060	28378	27978	30111	31194
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	28512	27974	28962	28929	26435	23948	23759	22352	20170	19613	19575	18370

Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	35930	34584	35270	34807	31561	28456	28427	26535	23936	23289	23340	22116
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	62355	48724	43301	40719	36289	32454	30870	29733	26845	26007	25874	24141
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	42598	57973	62445	56784	50073	47421	39034	34785	30679	29446	29083	27332
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010						32485	44190	49037	41813	37119	34187	30832
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014						32485	38678	44322	43444	43214	41146	38817
Passenger Cars	LPG cars	Conventional	0	1990	22415	21851	20927	20407	18906	17304	15442	14908	13803	12490	12087	10833
Passenger Cars	LPG cars	Euro I	1991	1996	28387	27999	28490	27879	25815	23399	22887	21670	20318	19523	19654	18606
Passenger Cars	LPG cars	Euro II	1997	2000		31538	30754	29812	27773	27787			22727	20577	18904	16990
Passenger Cars	LPG cars	Euro III	2001	2005							14961	25009	25508	23665	20230	17708
Passenger Cars	LPG cars	Euro IV	2006	2010									13953	26497	23106	20696
Passenger Cars	2-Stroke	Conventional	0	9999	12291	12154	11891	11609								
Passenger Cars	Electric cars	Conventional	0	9999	12364	12487	12254	11681	10761	9887	8459	9257	8288	9118	7368	8120
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969						6621	6513	6184	5900	5575	5378	5144
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978						7611	7532	7117	6784	6456	6266	6039
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980							9128	8663	8229	7771	7539	7229
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985					11385	9948	10021	9507	9069	8583	8109	7883
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990						11614	11488	10868	10306	9799	9473	9000
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996					14585	13495	13229	12578	12032	11408	11046	10567
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000	18697	18487	18086	17658	16460	15353	15127	14287	13621	12890	12497	11976
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005	9687	13912	15384	15170	14401	17114	16890	15972	15228	14408	13917	13368
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010						9067	12702	12193	14852	15507	15582	14979
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014											8403	12424
Passenger Cars	Diesel <1,4 l	Conventional	0	1990					27755	25870	20195	22357	20190	19276	19727	17962
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996					29641	27891	22719	24739	22721	21814	21622	20127
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000	38048	37220	38424	38221	34809	31433	31584	29436	26541	25851	25907	24498
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005	19592	26227	32202	33707	32256	34314	34528	32138	28977	28231	28300	26835
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010						18213	24839	28556	30318	30212	30946	29282
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014						18213	22062	22285	26396	25958	27381	26805
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	16229	15923	15590	15077	13995	13045	14073	11585	10837	10352	9636	9103
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	20185	19629	19084	18392	17019	15867	17181	14296	13550	13216	12643	12341
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	18632	21916	21295	20510	18964	17677	19124	15905	15061	14682	14031	13689
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006		11722	16961	17824	17877	18004	22096	18384	17401	16968	16226	15847
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011							12110	18383	19066	18217	17550	17871
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015												10247
Light Duty Vehicles	Diesel <3,5t	Conventional	0	1994	23519	22569	22795	22397	20777	19686	20754	18207	16802	16322	16011	15471
Light Duty Vehicles	Diesel <3,5t	Euro I	1995	1998	31006	29494	29561	28903	26692	25300	26687	23438	21646	21092	20806	20248
Light Duty Vehicles	Diesel <3,5t	Euro II	1999	2001	29302	33883	33943	33169	30594	28989	30560	26835	24753	24119	23778	23156
Light Duty Vehicles	Diesel <3,5t	Euro III	2002	2006		18355	27898	29513	29155	29500	36603	32181	29692	28947	28540	27815

Light Duty Vehicles	Diesel <3,5t	Euro IV	2007	2011							20289	30220	32943	31675	28960	32828
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	2015						18478	24202	27928	32447	29400	33302	27218
Light Duty Vehicles	LPG <3,5t	Conventional	0	1994	15378	14693	13669	12032	10422	10437	10453	8462	8231	7815	7487	7278
Light Duty Vehicles	LPG <3,5t	Euro I	1995	1998	26882											
Light Duty Vehicles	LPG <3,5t	Euro II	1999	2001				26621	24311	23755	24769	22124	20658	19613	19295	18756
Light Duty Vehicles	LPG <3,5t	Euro III	2002	2006						22160	28203	25620	24746	23736	22863	22356
Light Duty Vehicles	LPG <3,5t	Euro IV	2007	2011							15822	23749	27665	26444	25420	24960
Light Duty Vehicles	Electric <3,5t	Conventional	0	9999								11736	9258	11038	8068	8018
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	0	9999	15637	16704	15797	15284	14526	15520	17127	15235	14799	15095	14421	11319
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	0	1993	17555	15899	15373	15109	11852	10381	9304	7564	6067	5630	5475	4760
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	1994	1996	31797	28690	27720	27193	21469	19223	17600	14718	12188	11720	11483	10300
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	1997	2001	41424	39193	37869	37116	29441	26408	24062	20163	16699	16054	15776	14373
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2002	2006	26608	33528	40593	44021	36845	36376	35890	30122	24977	24046	23673	21401
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2007	2009						24022	26634	30074	31205	32784	33057	29985
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2010	2013							23745	28756	22683	22963	30032	31238
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2014	9999												21027
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	0	1993	20999	19041	18508	18160	14262	12574	11252	9064	7309	6670	6230	5295
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	1994	1996	38573	34845	33447	32780	25793	23049	20966	17472	14586	13965	13732	12337
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	1997	2001	49590	47514	46026	45324	35868	32101	29250	24606	20551	19609	19376	17399
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2002	2006	32748	41535	50625	52691	44235	43099	43431	36868	30995	29704	29326	26389
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2007	2009	32085	57865	47772	46787	34531	29689	34165	37414	39679	39794	39506	35578
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2010	2013			47115	46144	36317	29099	29348	31124	33722	36569	39808	38722
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2014	9999												36845
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	0	1993	17197	15678	15125	14591	13337	11853	10777	8964	7339	7081	6970	6432
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	1994	1996	30573	27575	26659	25571	23430	21009	18951	15864	13086	12536	12350	11316
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	1997	2001	39786	36339	35219	33898	31293	28220	25609	21631	17653	17084	16969	15734
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2002	2006	25939	33136	40304	41075	39536	40367	40247	33971	28018	27300	27002	24780
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2007	2009				43872	40215	30758	28175	33932	34265	38047	37386	34580
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2010	2013								24386	34805	28377	37228	39941
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	0	1993	31354	28485	27785	26718	24659	21953	19799	16454	13399	12849	12500	11184
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	1994	1996	54048	48968	47659	45903	42077	37638	34149	28425	23384	22682	22263	20511
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	1997	2001	70424	66757	64879	62491	57474	51562	47035	39361	32492	31628	31177	28888
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2002	2006	46965	60842	68989	74458	72743	70620	71117	59772	49349	48258	47464	44004
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2007	2009	45403	70832	71755	79578	62868	52425	54598	63084	63136	64166	63437	58695
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2010	2013					48862	53801	54097	55630	55557	60808	64497	63200
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2014	9999												42804
Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	0	1993	44699	41095	40144	38234	34823	31048	28241	23423	19199	18217	17701	15824
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	1994	1996	73953	67587	65983	62312	56632	50601	46253	38537	31950	30592	29937	26861

Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	1997	2001	96014	91503	89421	84683	77053	68994	63254	52904	43999	42249	41678	37384
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2002	2006	63686	80427	97199	100972	97719	95376	98317	82562	68864	66537	65879	59414
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2007	2009	62376	106351	110845	98270	69114	76473	74125	85219	85664	86853	85925	77330
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2010	2013					66080	81296	73989	76168	74942	81123	86260	82628
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2014	9999												56353
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	0	1993	44939	42151	40044	37721	34306	30520	27764	23315	18204	18548	18059	17251
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	1994	1996	72870	66888	64932	59815	59846	52832	48061	39945	35123	32924		28450
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	1997	2001	94817	86528	83997	79987	72997	64442	58166	51037	40222	44120	42955	36535
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2002	2006			66051	81831	110192	109123	99270	82506	68531	69828	67985	60359
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2007	2009							63653	94454	91708	92144	90976	84108
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2010	2013							63653	105808	87886	93442	92240	82462
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	0	1993	51503	46870	45155	43125	39576	35629	31681	26713	21646	22642	20693	19388
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	1994	1996	74915	69088	67408	63266	57637	50834	46085	38227	32045	32473	32020	28983
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	1997	2001	97370	96270	93945	88835	81258	72107	65910	55034	46003	47142	45909	40821
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2002	2006	63397	82736	96181	100949	98168	93655	100171	84589	70681	72224	70649	63020
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2007	2009		62598	84545	121119	69919	83240	75075	85403	85633	92136	90551	80466
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2010	2013						64373	71114	76710	76054	88349	87216	83841
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2014	9999												58702
Heavy Duty Vehicles	Diesel RT >32t	Conventional	0	1993	56213	51599	27663	26136	23942	18917	17209	14303				
Heavy Duty Vehicles	Diesel RT >32t	Euro I	1994	1996	69998	70083	68033	64086	58485	51631	46969	39037	32425	35787	34843	30924
Heavy Duty Vehicles	Diesel RT >32t	Euro II	1997	2001	110824	105966										
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2002	2006	62740	115180	99028	102706	87264	82996	79418	73115	76652	78102	87628	75316
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2007	2009							63653	105808	87886			77379
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2010	2013									87886	68183	76657	85692
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	0	1993	32408	29399	28876	28262	25969	24016	22207	19350	14701	15343	15300	12788
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	1994	1996	55334	50097	49153	48215	44114	40820	38016	33435	25869	27385	27566	23565
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	1997	2001	72203	68380	66970	65637	60193	55632	52022	45994	35734	38112	38572	33017
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2002	2006	48050	62204	71092	78113	76128	76146	78699	69796	54228	58113	58572	50405
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2007	2009	46453	72418	73947	83437	65671	56567	60589	74099	69595	77672	78573	67077
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2010	2013					51040	57911	59688	64900	61096	73121	79322	72081
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2014	9999												48737
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	0	1993	48112	43717	43168	41964	38857	36802	34493	31072	24481	27010	27845	23502
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	1994	1996	78398	71204	70175	67791	62711	58875	54932	48850	38263	42357	44087	37833
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	1997	2001	101183	96985	96677	94115	88121	83090	76632	68056	53129	58008	59761	50589
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2002	2006	68252	86315	101701	108823	110400	117037	121430	110059	86927	96562	97733	82177
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2007	2009	64138	96872	118439	91155	80530	89003	87231	109795	104049	121515	125950	104924
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2010	2013	63626	116998	116736		74047	89476	89628	108189	100922	122305	130457	122488
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2014	9999												87962

Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	0	1993	76003	68799	65556	61140	56358	51174	45518	37602	33403	31045	30957	27664
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	1994	1996	110697	100642	96515	90471	84051	76201	69347	57944	54294	52829	54976	51885
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	1997	2001	139916	136798	132096	124360	116363	104944	94121	77669	71987	67695	68312	65525
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2002	2006	90191	111040	129803	134683	136396	135797	140801	119475	112999	108722	109974	103805
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2007	2009	87910	102529	148583	155594	93826	105539	96872	114685	132657	134987	139813	132813
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2010	2013	87910	123254	159991	151244	138321	90278	93461	110193	123151	126984	133242	137653
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2014	9999												95740
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro I	1994	1996	113754	103723	99758	94304	89492							
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	1997	2001	141422	128952	124022	117242	111259	101197	91076	77175	73318	71764	74183	70542
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2007	2009							87504	148296	140884	137898		135551
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2002	2006												126062
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro V	2010	2013								79729	104793		95279	
Buses	Gasoline Urban Buses	Conventional	0	9999	15579	15526	14611	13087	17997	18361	33302	31424	35250	30704	26962	24419
Buses	Diesel Urban Buses <15t	Conventional	0	1993	69484	65605	63013	59405	53446	48573	44675	43353	38028	34078	31692	30675
Buses	Diesel Urban Buses <15t	Euro I	1994	1996	108582	100999	96838	91737	81466	75670	71538	66510	59167	53603	50460	47829
Buses	Diesel Urban Buses <15t	Euro II	1997	2001	131860	127923	123406	117254	103905	97082	91902	85181	77538	71842	68695	65658
Buses	Diesel Urban Buses <15t	Euro III	2002	2006		81916	110773	130640	123957	126569	136452	126717	111962	102346	98407	93387
Buses	Diesel Urban Buses <15t	Euro IV	2007	2009							83706	114450	119020	136850	129204	121754
Buses	Diesel Urban Buses <15t	Euro V	2010	2013										78390	122673	122988
Buses	Diesel Urban Buses 15 - 18t	Conventional	0	1993	67883	64392	62326	59190	52698	50100	47644	44933	40538	37823	36127	34126
Buses	Diesel Urban Buses 15 - 18t	Euro I	1994	1996	106807	98967	94505	89761	79737	74702	70868	65776	58629	53817	50245	47377
Buses	Diesel Urban Buses 15 - 18t	Euro II	1997	2001	130498	130636	125521	119264	105683	98725	93769	87636	78039	71684	68015	64388
Buses	Diesel Urban Buses 15 - 18t	Euro III	2002	2006		81916	130578	137019	128466	120209	135041	125675	111742	102106	96158	91852
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2007	2009							83706	107894	114047	138735	131097	123765
Buses	Diesel Urban Buses 15 - 18t	Euro V	2010	2013										78390	116290	126633
Buses	Diesel Urban Buses >18t	Conventional	0	1993	80649	76134	73463	69148	62605	58948	53947	52718	44128	38307	38724	37862
Buses	Diesel Urban Buses >18t	Euro I	1994	1996	104754	99766	95738	90872	80750	75344	73092	62172	54820	49093	46397	47071
Buses	Diesel Urban Buses >18t	Euro II	1997	2001	119246	142861	137074	129796	115282	107308	101977	94686	84801	77314	73770	68718
Buses	Diesel Urban Buses >18t	Euro III	2002	2006		81916	127231	131471	133178	127581	131055	122668	109347	99994	94649	89982
Buses	Diesel Urban Buses >18t	Euro IV	2007	2009							83706	120106	126273	134902	127556	120401
Buses	Diesel Urban Buses >18t	Euro V	2010	2013										78390	120260	116928
Buses	Gasoline Coaches	Conventional	0	9999	15044	14923	14430	14037	13151	12332	11849	11112	10252	9833	9326	8687
Buses	Diesel Coaches <15t	Conventional	0	1993	26929	26143	26488	26584	24194	22527	21780	20015	17658	17261	16601	15240
Buses	Diesel Coaches <15t	Euro I	1994	1996	34244	32950	33080	33021	29955	27774	26785	24638	21787	21352	20586	19041
Buses	Diesel Coaches <15t	Euro II	1997	2001	38045	40184	40224	40093	36410	33850	32709	30136	26671	26137	25170	23283
Buses	Diesel Coaches <15t	Euro III	2002	2006		23581	37335	40695	39914	39191	42182	38766	34269	33591	32378	29767
Buses	Diesel Coaches <15t	Euro IV	2007	2009							24584	33549	33826	41249	39652	36681
Buses	Diesel Coaches <15t	Euro V	2010	2013										22802	35400	37408

Buses	Diesel Coaches 15 - 18t	Conventional	0	1993	36133	35369	35855	36061	33280	31113	30305	28188	25296	25031	24576	23214
Buses	Diesel Coaches 15 - 18t	Euro I	1994	1996	56477	54178	54405	54233	49181	45474	43832	40202	35668	34826	33482	30934
Buses	Diesel Coaches 15 - 18t	Euro II	1997	2001	63385	66182	66524	66237	59825	55332	53359	49175	43470	42712	41296	38227
Buses	Diesel Coaches 15 - 18t	Euro III	2002	2006		38794	56152	71971	68771	65364	68179	62399	54978	53761	51665	47702
Buses	Diesel Coaches 15 - 18t	Euro IV	2007	2009							40443	50246	54782	68555	65943	60884
Buses	Diesel Coaches 15 - 18t	Euro V	2010	2013										37512	66509	61184
Buses	Diesel Coaches >18t	Conventional	0	1993	69827	67704	68423	68914	62540	58112	56472	52345	45744	45422	44120	40841
Buses	Diesel Coaches >18t	Euro I	1994	1996	90378	87280	87323	86828	78439	73096	70302	64768	57216	56129	53788	49629
Buses	Diesel Coaches >18t	Euro II	1997	2001	97615	107547	108048	107837	97310	89693	86222	79492	70671	69284	66957	62392
Buses	Diesel Coaches >18t	Euro III	2002	2006		61716	86146	105183	102584	104553	110765	101831	90059	88406	84731	78412
Buses	Diesel Coaches >18t	Euro IV	2007	2009							64341	91238	94128	107323	103438	95682
Buses	Diesel Coaches >18t	Euro V	2010	2013										59678	90780	90893
Mopeds	2-stroke <50 cm³	Conventional	0	1999	1565	1591	1581	1545	1518	1516	1511	1487	1472	1430	1395	1343
Mopeds	2-stroke <50 cm³	Euro I	2000	2003	1330	1516	1594	1703	1672	1670	1664	1638	1621	1575	1536	1479
Mopeds	2-stroke <50 cm³	Euro II	2004	2014				914	1315	1498	1600	1664	1716	1701	1688	1661
Mopeds	4-stroke <50 cm³	Euro II	2004	2014				914	1315	1498	1600	1664	1716	1701	1688	1661
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	5282	5050	4710	4284	3891	3541	3280	2996	2759	2725	2667	2613
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003	6296	6494	6371	6664	6007	5412	4965	4513	4151	4097	4007	3923
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006				3554	4496	4601	5465	4967	4568	4508	4408	4315
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999							2858	4149	4381	4530	4548	4513
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	5282	5050	4710	4284	3891	3541	3280	2996	2759	2725	2667	2613
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003	6296	6494	6371	6664	6007	5412	4965	4513	4151	4097	4007	3923
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006				3554	4496	4601	5465	4967	4568	4508	4408	4315
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999							2858	4149	4381	4530	4548	4513
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	5282	5050	4710	4284	3891	3541	3280	2996	2759	2725	2667	2613
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003	6296	6494	6371	6664	6007	5412	4965	4513	4151	4097	4007	3923
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006				3554	4496	4601	5465	4967	4568	4508	4408	4315
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999							2858	4149	4381	4530	4548	4513
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	5282	5050	4710	4284	3891	3541	3280	2996	2759	2725	2667	2613
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003	6296	6494	6371	6664	6007	5412	4965	4513	4151	4097	4007	3923
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006				3554	4496	4601	5465	4967	4568	4508	4408	4315
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999							2858	4149	4381	4530	4548	4513

Annex 2B-3: EU directive emission limits for road transportation vehicles

Annex 3: EU directive emission limits for road transportation vehicles

Private cars and light duty vehicles I (<1305 kg).

G prkm		EURO 1	EURO 2	EURO 3[1]	EURO 4	EURO 5	EURO 6
Normal temp.							
CO	Gasoline	2.72	2.2	2.3	1.0	1.0	1.0
	Diesel	2.72	1.0	0.64	0.5	0.5	0.5
HC	Gasoline	-	-	0.20	0.10	0.1	0.1
NMHC	Gasoline	-	-	-	-	0.068	0.068
NO_x	Gasoline	-	-	0.15	0.08	0.06	0.06
	Diesel	-	-	0.5	0.25	0.18	0.08
HC+NO_x	Gasoline	0.97	0.5	-	-		-
	Diesel	0.97	0.7/0.9[2]	0.56	0.30	0.23	0.17
Particulates	Diesel	0.14	0.08/0.10[2]	0.05	0.025	0.005	0.005
Particulates (#)		-	-	-	-	-	$6x10^{11}$[4]
Low temp.							
CO	Gasoline	-	-	-	15	15	15
HC	Gasoline	-	-	-	1.8	1.8	1.8
Evaporation							
HC[3]	Gasoline	2.0	2.0	2.0	2.0	2.0	2.0

[1] Changed test procedure at normal temperatures (40 s warm-up phase omitted) and for evaporation measurements. [2] Less stringent emission limits for direct injection diesel engines. [3] Unit: g/test. [4] Applicable for diesel and gasoline direct injection (GDI). $6x10^{12}$ within first three years of Euro 6 effective dates

Light duty vehicles II (1305-1760 kg)

G pr km		EURO 1	EURO 2	EURO 3[1]	EURO 4	EURO 5	EURO 6
Normal temp.							
CO	Gasoline	5.17	4.0	4.17	1.81	1.81	1.81
	Diesel	5.17	1.25	0.80	0.63	0.63	0.63
HC	Gasoline	-	-	0.25	0.13	0.13	0.13
NMHC	Gasoline	-	-	-	-	0.9	0.9
NO_x	Gasoline	-	-	0.18	0.10	0.75	0.75
	Diesel	-	-	0.65	0.33	0.235	0.105
HC+NO_x	Gasoline	1.4	0.6	-	-	-	-
	Diesel	1.4	1.0/1.3[2]	0.72	0.39	0.295	0.195
Particulates	Gasoline					0.005	0.005
	Diesel	0.19	0.12/0.14[2]	0.07	0.04	0.005	0.005
Particulates (#)		-	-	-	-	-	$6x10^{11}$[4]
Low temp.							
CO	Gasoline	-	-	-	24	24	24
HC	Gasoline	-	-		2.7	2.7	2.7
Evaporation							
HC[3]	Gasoline	2.0	2.0	2.0	2.0	2.0	2.0

[1] Changed test procedure at normal temperatures (40 s warm-up phase omitted) and for evaporation measurements. [2] Less stringent emission limits for direct injection diesel engines. [3] Unit: g/test. [4] Applicable for diesel and gasoline direct injection (GDI). $6x10^{12}$ within first three years of Euro 6 effective dates

Light duty vehicles III (>1760 kg).

G pr km		EURO 1	EURO 2	EURO 3[1)]	EURO 4	EURO 5	EURO 6
Normal temp.							
CO	Gasoline	6.9	5.0	5.22	2.27	2.27	2.27
	Diesel	6.9	1.5	0.95	0.74	0.74	0.74
HC	Gasoline	-	-	0.29	0.16	0.16	0.16
NMHC	Gasoline					0.108	0.108
NO_x	Gasoline	-	-	0.21	0.11	0.082	0.082
	Diesel	-	-	0.78	0.39	0.28	0.125
$HC+NO_x$	Gasoline	1.7	0.7	-	-	-	-
	Diesel	1.7	1.2/1.6[2)]	0.86	0.46	0.35	0.215
Particulates	Gasoline					0.005	0.005
	Diesel	0.25	0.17/0.20[2)]	0.10	0.06	0.005	0.005
Particulates (#)		-	-	-	-	-	$6x10^{11}$[4)]
Low temp.							
CO	Gasoline	-	-	-	30	30	30
HC	Gasoline	-	-	-	3.2	3.2	3.2
Evaporation							
HC[3)]	Gasoline	2.0	2.0	2.0	2.0	2.0	2.0

[1)] Changed test procedure at normal temperatures (40 s warm-up phase omitted) and for evaporation measurements. [2)] Less stringent emission limits for direct injection diesel engines. [3)] Unit: g/test. [4)] Applicable for diesel and gasoline direct injection (GDI). $6x10^{12}$ within first three years of Euro 6 effective dates.

Heavy duty diesel vehicles.

(g pr kWh)	Test[1)]	EURO I 1993	EURO II 1996	EURO III 2001	EURO IV 2006	EURO V 2009	EURO VI 2014	EEV[2)] 2000
CO	ECE/ESC	4.5	4.0	2.1	1.5	1.5	1.5	1.5
	ETC	-	-	(5.45)	4.0	4.0	4.0	3.0
HC	ECE/ESC	1.1	1.1	0.66	0.46	0.46	0.13	0.25
	ETC	-	-	(0.78)	0.55	0.55	0.16	0.40
NO_x	ECE/ESC	8.0	7.0	5.0	3.5	2.0	0.4	2.0
	ETC	-	-	(5.0)	3.5	2.0	0.4	2.0
Particulates[3)]	ECE/ESC	0.36/0.61	0.15/0.25	0.10/0.13	0.02	0.02	0.01	0.02
	ETC	-	-	(0.16/0.21)	0.03	0.03	0.01	0.02
	ELR	-	-	0.8	0.5	0.5		0.15
NH_3	ECE/ESC						10 (ppm)	
	ETC						10 (ppm)	

[1)] Test procedure: Euro 1 og Euro 2: ECE (stationary)

Euro 3: ESC (stationary) + ELR (load response)

Euro 4, Euro 5 og EEV: ESC (stationary) + ETC (transient) + ELR (load response)

[2)] EEV: Emission limits for extra environmental friendly vehicles, used as a basis for economical incitaments (gas fueled vehicles).

[3)] For Euro 1, Euro 2 og Euro 3 less stringent emission limits apply for small engines:

Euro 1: <85 kW

Euro 2: <0,7 l

Euro 3: <0,75 l

Annex 2B-4: Basis emission factors (g pr km)

Sector	Subsector	Tech 2	FYear	LYear	FCu	FCr	FCh	COu	COr	COh	PMu	PMr	PMh	NOxu	NOxr	NOxh
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	67,499	55,000	62,743	27,505	19,333	15,520	0,063	0,044	0,041	1,849	2,062	2,023
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	58,240	44,460	48,600	18,966	14,480	18,620	0,063	0,044	0,041	1,849	2,062	2,023
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	53,248	45,170	51,200	15,859	8,200	8,260	0,063	0,044	0,041	1,619	2,102	2,909
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	53,248	45,170	51,200	16,752	8,793	7,620	0,042	0,029	0,029	1,680	2,253	3,276
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990	51,420	43,440	47,700	9,087	4,956	4,292	0,030	0,020	0,020	1,691	2,089	2,662
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996	47,399	41,954	46,055	1,765	1,372	1,765	0,003	0,002	0,002	0,273	0,281	0,458
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000	46,486	39,509	44,016	0,659	0,575	0,749	0,003	0,002	0,002	0,154	0,154	0,181
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005	48,687	42,255	45,323	0,519	0,691	1,148	0,001	0,001	0,001	0,076	0,060	0,052
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010	50,038	44,193	48,285	0,195	0,287	0,529	0,001	0,001	0,001	0,054	0,030	0,019
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014	50,038	44,193	48,285	0,195	0,287	0,529	0,001	0,001	0,001	0,041	0,023	0,014
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	79,277	67,000	76,386	27,505	19,333	15,520	0,063	0,044	0,041	2,164	2,683	3,130
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	67,779	51,090	60,300	18,966	14,480	18,620	0,063	0,044	0,041	2,164	2,683	3,130
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	61,731	50,686	59,680	15,859	8,200	8,260	0,063	0,044	0,041	1,831	2,377	3,283
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	61,731	50,686	59,680	16,752	8,793	7,620	0,042	0,029	0,029	1,917	2,580	3,472
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	61,652	49,112	52,052	9,087	4,956	4,292	0,030	0,020	0,020	2,122	2,757	3,524
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	57,521	48,522	51,518	1,765	1,372	1,765	0,003	0,002	0,002	0,273	0,281	0,458
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	56,324	47,687	48,786	0,659	0,575	0,749	0,003	0,002	0,002	0,154	0,154	0,181
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	58,259	49,897	53,092	0,519	0,691	1,148	0,001	0,001	0,001	0,076	0,060	0,052
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	60,486	52,793	55,293	0,195	0,287	0,529	0,001	0,001	0,001	0,054	0,030	0,019
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014	60,486	52,793	55,293	0,195	0,287	0,529	0,001	0,001	0,001	0,041	0,023	0,014
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	96,536	80,000	88,267	27,505	19,333	15,520	0,063	0,044	0,041	2,860	4,090	5,500
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	73,798	57,090	66,300	18,966	14,480	18,620	0,063	0,044	0,041	2,860	4,090	5,500
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	75,270	63,260	70,700	15,859	8,200	8,260	0,063	0,044	0,041	2,066	2,675	3,680
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	75,270	63,260	70,700	16,752	8,793	7,620	0,042	0,029	0,029	2,806	3,441	4,604
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	71,055	58,080	69,900	9,087	4,956	4,292	0,030	0,020	0,020	2,293	2,750	3,687
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	74,616	61,902	65,020	1,765	1,372	1,765	0,003	0,002	0,002	0,273	0,281	0,458
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	76,837	65,226	66,732	0,659	0,575	0,749	0,003	0,002	0,002	0,154	0,154	0,181
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	70,798	57,424	56,826	0,519	0,691	1,148	0,001	0,001	0,001	0,076	0,060	0,052
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	86,099	67,877	65,859	0,195	0,287	0,529	0,001	0,001	0,001	0,054	0,030	0,019
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014	86,099	67,877	65,859	0,195	0,287	0,529	0,001	0,001	0,001	0,041	0,023	0,014
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	57,529	41,209	50,089	0,651	0,472	0,384	0,199	0,132	0,170	0,520	0,433	0,528
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996	47,836	42,807	48,388	0,419	0,215	0,208	0,057	0,062	0,107	0,603	0,562	0,663
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000	50,442	44,117	48,779	0,343	0,110	0,035	0,047	0,039	0,050	0,651	0,555	0,665

Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005	48,920	43,427	45,585	0,099	0,041	0,012	0,029	0,030	0,045	0,716	0,665	0,750
Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010	48,920	43,427	45,585	0,083	0,034	0,021	0,029	0,024	0,026	0,539	0,424	0,576
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014	48,889	43,371	45,487	0,083	0,034	0,021	0,006	0,005	0,005	0,663	0,521	0,708
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	57,529	41,209	50,089	0,651	0,472	0,384	0,199	0,132	0,170	0,824	0,723	0,861
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	65,267	58,299	64,360	0,419	0,215	0,208	0,057	0,062	0,107	0,603	0,562	0,663
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	65,267	58,299	64,360	0,343	0,110	0,035	0,047	0,039	0,050	0,651	0,555	0,665
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	65,267	58,299	64,360	0,099	0,041	0,012	0,029	0,030	0,045	0,716	0,665	0,750
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010	65,267	58,299	64,360	0,083	0,034	0,021	0,029	0,024	0,026	0,539	0,424	0,576
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	65,315	58,336	64,394	0,083	0,034	0,021	0,006	0,005	0,005	0,663	0,521	0,708
Passenger Cars	LPG cars	Conventional	0	1990	59,000	45,000	54,000	2,043	2,373	9,723	0,040	0,030	0,025	2,203	2,584	2,861
Passenger Cars	LPG cars	Euro I	1991	1996	49,145	45,155	54,125	1,310	1,445	3,560	0,040	0,030	0,025	0,340	0,283	0,298
Passenger Cars	LPG cars	Euro II	1997	2000	49,145	45,155	54,125	0,891	0,982	2,421	0,040	0,030	0,025	0,122	0,102	0,107
Passenger Cars	LPG cars	Euro III	2001	2005	49,145	45,155	54,125	0,733	0,809	1,993	0,040	0,030	0,025	0,082	0,068	0,071
Passenger Cars	LPG cars	Euro IV	2006	2010	49,145	45,155	54,125	0,445	0,491	1,210	0,040	0,030	0,025	0,044	0,037	0,039
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969	52,252	46,235	56,545	27,505	19,333	15,520	0,063	0,044	0,041	1,849	2,062	2,023
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978	45,084	37,374	43,799	18,966	14,480	18,620	0,063	0,044	0,041	1,849	2,062	2,023
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980	41,220	37,971	46,142	15,859	8,200	8,260	0,063	0,044	0,041	1,619	2,102	2,909
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985	41,220	37,971	46,142	16,752	8,793	7,620	0,042	0,029	0,029	1,680	2,253	3,276
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990	39,805	36,517	42,988	9,087	4,956	4,292	0,030	0,020	0,020	1,691	2,089	2,662
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996	36,693	35,268	41,505	1,765	1,372	1,765	0,003	0,002	0,002	0,273	0,281	0,458
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000	35,985	33,213	39,668	0,659	0,575	0,749	0,003	0,002	0,002	0,154	0,154	0,181
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005	37,689	35,521	40,846	0,519	0,691	1,148	0,001	0,001	0,001	0,076	0,060	0,052
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010	38,735	37,150	43,515	0,195	0,287	0,529	0,001	0,001	0,001	0,054	0,030	0,019
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014	38,735	37,150	43,515	0,195	0,287	0,529	0,001	0,001	0,001	0,041	0,023	0,014
Passenger Cars	Diesel <1,4 l	Conventional	0	1990	36,565	30,792	40,702	0,651	0,472	0,384	0,199	0,132	0,170	0,520	0,433	0,528
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996	30,404	31,986	39,319	0,419	0,215	0,208	0,057	0,062	0,107	0,603	0,562	0,663
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000	32,060	32,965	39,637	0,343	0,110	0,035	0,047	0,039	0,050	0,651	0,555	0,665
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005	31,093	32,450	37,042	0,099	0,041	0,012	0,029	0,030	0,045	0,716	0,665	0,750
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010	31,093	32,450	37,042	0,083	0,034	0,021	0,029	0,024	0,026	0,539	0,424	0,576
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014	31,073	32,408	36,962	0,083	0,034	0,021	0,006	0,005	0,005	0,663	0,521	0,708
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	82,270	59,883	56,470	14,925	6,075	7,389	0,040	0,040	0,040	2,671	3,118	3,387
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	96,450	70,388	66,450	4,187	0,862	1,087	0,003	0,002	0,002	0,427	0,400	0,429
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	96,450	70,388	66,450	2,554	0,526	0,663	0,003	0,002	0,002	0,145	0,136	0,146
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006	96,450	70,388	66,450	2,177	0,448	0,565	0,001	0,001	0,001	0,090	0,084	0,090
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011	96,450	70,388	66,450	1,172	0,241	0,304	0,001	0,001	0,001	0,043	0,040	0,043
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015	96,450	70,388	66,450	1,172	0,241	0,304	0,001	0,001	0,001	0,032	0,030	0,032
Light Duty Vehicles	Diesel <3,5t	Conventional	0	1994	76,718	65,934	72,142	1,124	1,009	1,060	0,285	0,303	0,322	1,673	0,843	0,834

Light Duty Vehicles	Diesel <3,5t	Euro I	1995	1998	68,860	58,185	63,660	0,393	0,328	0,423	0,070	0,066	0,090	1,138	0,975	1,022
Light Duty Vehicles	Diesel <3,5t	Euro II	1999	2001	68,860	58,185	63,660	0,393	0,328	0,423	0,070	0,066	0,090	1,138	0,975	1,022
Light Duty Vehicles	Diesel <3,5t	Euro III	2002	2006	68,860	58,185	63,660	0,322	0,269	0,347	0,047	0,044	0,061	0,956	0,819	0,859
Light Duty Vehicles	Diesel <3,5t	Euro IV	2007	2011	68,860	58,185	63,660	0,255	0,213	0,275	0,024	0,023	0,032	0,774	0,663	0,695
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	2015	68,860	58,185	63,660	0,255	0,213	0,275	0,001	0,001	0,002	0,558	0,478	0,501
Light Duty Vehicles	LPG <3,5t	Conventional	0	1994	88,500	67,500	81,000	3,064	3,559	14,584	0,060	0,045	0,038	3,305	3,876	4,291
Light Duty Vehicles	LPG <3,5t	Euro II	1999	2001	73,718	67,733	81,188	1,336	1,474	3,631	0,060	0,045	0,038	0,183	0,153	0,161
Light Duty Vehicles	LPG <3,5t	Euro III	2002	2006	73,718	67,733	81,188	1,100	1,214	2,990	0,060	0,045	0,038	0,122	0,102	0,107
Light Duty Vehicles	LPG <3,5t	Euro IV	2007	2011	73,718	67,733	81,188	0,668	0,737	1,815	0,060	0,045	0,038	0,066	0,055	0,058
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	0	9999	225,000	150,000	165,000	70,000	55,000	55,000	0,400	0,400	0,400	4,500	7,500	7,500
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	0	1993	125,002	110,985	112,984	2,060	1,509	1,351	0,321	0,240	0,216	4,211	4,104	4,476
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	1994	1996	100,036	91,682	104,222	0,668	0,501	0,546	0,126	0,095	0,090	2,939	2,938	3,316
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	1997	2001	94,988	88,592	101,003	0,534	0,466	0,461	0,059	0,053	0,061	3,223	3,118	3,414
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2002	2006	101,379	92,883	105,924	0,660	0,481	0,452	0,067	0,048	0,041	2,499	2,300	2,498
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2007	2009	98,559	92,910	106,610	0,342	0,270	0,258	0,015	0,013	0,014	1,707	1,645	1,801
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2010	2013	99,641	93,536	106,995	0,344	0,270	0,259	0,015	0,013	0,014	1,012	0,972	1,062
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2014	9999	98,248	91,130	103,414	0,355	0,276	0,260	0,001	0,001	0,001	0,233	0,097	0,060
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	0	1993	183,253	153,117	150,068	2,358	1,698	1,525	0,330	0,236	0,207	7,928	7,236	7,499
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	1994	1996	155,870	135,518	136,666	1,086	0,817	0,766	0,201	0,144	0,131	4,729	4,306	4,464
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	1997	2001	148,625	131,263	133,537	0,868	0,727	0,717	0,094	0,080	0,093	5,152	4,593	4,682
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2002	2006	157,573	137,771	138,996	1,084	0,771	0,733	0,104	0,073	0,063	3,997	3,536	3,485
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2007	2009	151,450	136,152	138,554	0,553	0,418	0,369	0,023	0,019	0,019	2,728	2,512	2,488
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2010	2013	153,617	137,425	139,289	0,560	0,421	0,374	0,023	0,019	0,019	1,647	1,483	1,468
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2014	9999	151,539	134,140	134,852	0,583	0,431	0,373	0,002	0,002	0,002	0,384	0,154	0,096
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	0	1993	198,513	163,310	159,212	2,546	1,876	1,693	0,351	0,254	0,233	8,826	7,718	7,748
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	1994	1996	170,171	144,307	143,334	1,200	0,918	0,866	0,218	0,159	0,147	5,321	4,638	4,638
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	1997	2001	163,223	140,030	139,590	0,985	0,820	0,804	0,103	0,087	0,103	5,815	4,975	4,889
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2002	2006	172,146	146,082	144,611	1,176	0,873	0,835	0,109	0,078	0,071	4,745	3,881	3,702
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2007	2009	163,114	142,925	143,274	0,599	0,448	0,410	0,024	0,020	0,020	3,208	2,754	2,620
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2010	2013	165,111	144,096	144,035	0,606	0,452	0,413	0,025	0,020	0,020	1,909	1,634	1,552
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	0	1993	261,662	205,735	193,152	3,512	2,514	2,221	0,483	0,341	0,298	11,287	9,455	9,120
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	1994	1996	212,834	172,142	164,411	1,612	1,206	1,117	0,298	0,209	0,181	6,721	5,601	5,385
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	1997	2001	204,313	167,263	160,324	1,267	1,025	1,002	0,129	0,105	0,122	7,473	6,118	5,804
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2002	2006	215,351	173,802	164,914	1,601	1,150	1,096	0,153	0,106	0,090	6,139	4,859	4,431
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2007	2009	201,093	168,074	161,976	0,829	0,602	0,523	0,031	0,024	0,023	4,079	3,400	3,171
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2010	2013	205,393	169,743	162,354	0,869	0,625	0,536	0,032	0,025	0,023	2,460	2,028	1,883
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2014	9999	200,654	165,826	158,608	0,870	0,625	0,536	0,003	0,002	0,002	0,694	0,262	0,135

Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	0	1993	315,898	243,280	222,355	2,558	1,885	1,712	0,482	0,353	0,319	12,251	9,862	9,114
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	1994	1996	269,815	211,940	195,827	2,068	1,563	1,437	0,383	0,264	0,231	8,634	6,952	6,468
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	1997	2001	261,049	207,213	191,812	1,620	1,285	1,399	0,172	0,137	0,157	9,465	7,549	6,947
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2002	2006	272,733	213,630	195,690	2,025	1,487	1,403	0,189	0,130	0,113	7,649	6,024	5,545
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2007	2009	257,598	207,458	192,565	1,003	0,728	0,628	0,041	0,031	0,028	5,146	4,223	3,967
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2010	2013	260,560	209,253	193,919	1,015	0,735	0,634	0,041	0,031	0,028	3,062	2,508	2,353
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2014	9999	255,823	204,120	188,510	1,045	0,753	0,646	0,004	0,003	0,003	0,710	0,287	0,164
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	0	1993	333,975	257,930	233,499	2,703	1,987	1,810	0,512	0,375	0,336	12,868	10,379	9,526
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	1994	1996	286,465	225,388	206,076	2,162	1,647	1,535	0,398	0,281	0,244	9,122	7,308	6,742
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	1997	2001	276,892	220,156	201,909	1,682	1,346	1,457	0,185	0,148	0,167	9,876	7,848	7,164
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2002	2006	289,328	227,449	206,788	2,121	1,582	1,481	0,201	0,141	0,118	7,733	6,089	5,633
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2007	2009	277,178	222,906	203,989	1,044	0,752	0,640	0,044	0,033	0,029	5,258	4,284	4,029
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2010	2013	280,496	224,942	205,435	1,056	0,760	0,647	0,044	0,033	0,029	3,127	2,544	2,388
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	0	1993	369,813	292,229	265,715	2,928	2,149	2,047	0,567	0,415	0,376	14,515	11,942	11,008
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	1994	1996	324,707	259,936	238,178	2,377	1,862	1,795	0,436	0,314	0,281	10,453	8,509	7,843
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	1997	2001	313,359	251,467	240,101	1,930	1,574	1,563	0,211	0,172	0,195	11,232	9,043	8,280
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2002	2006	327,617	262,877	239,852	2,325	1,732	1,685	0,214	0,153	0,135	8,883	7,017	6,445
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2007	2009	316,735	259,706	237,679	1,145	0,834	0,714	0,049	0,038	0,034	5,978	5,101	4,533
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2010	2013	320,475	262,095	239,548	1,159	0,844	0,722	0,049	0,038	0,034	3,554	3,030	2,690
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2014	9999	314,526	255,828	233,053	1,191	0,863	0,736	0,005	0,004	0,003	0,638	0,290	0,191
Heavy Duty Vehicles	Diesel RT >32t	Euro I	1994	1996	328,394	256,124	232,416	2,482	1,894	1,795	0,453	0,317	0,286	10,614	8,446	7,666
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2002	2006	330,977	257,873	232,502	2,398	1,789	1,725	0,219	0,153	0,135	9,225	7,224	6,550
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2007	2009	316,444	252,503	229,586	1,151	0,839	0,723	0,049	0,037	0,033	6,270	5,071	4,708
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2010	2013	319,806	254,559	231,118	1,166	0,847	0,729	0,049	0,037	0,033	3,735	3,012	2,790
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	0	1993	332,114	254,391	227,288	2,560	1,899	1,804	0,488	0,361	0,339	13,305	10,460	9,286
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	1994	1996	297,033	229,431	205,352	2,173	1,665	1,602	0,380	0,277	0,261	9,509	7,408	6,570
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	1997	2001	280,137	219,605	203,132	1,746	1,372	1,500	0,191	0,152	0,174	10,046	7,771	6,867
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2002	2006	294,936	228,574	203,723	2,067	1,559	1,515	0,184	0,132	0,120	8,110	6,154	5,397
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2007	2009	283,202	224,159	200,624	0,990	0,709	0,618	0,043	0,031	0,028	5,531	4,329	3,837
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2010	2013	286,144	226,034	202,156	1,002	0,717	0,625	0,043	0,032	0,028	3,297	2,575	2,277
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2014	9999	280,404	220,395	196,620	1,033	0,738	0,629	0,004	0,003	0,003	0,531	0,245	0,167
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	0	1993	385,216	290,623	255,748	3,006	2,216	2,091	0,579	0,419	0,384	15,378	11,908	10,419
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	1994	1996	338,164	257,767	227,915	2,561	1,946	1,861	0,464	0,324	0,293	10,891	8,408	7,387
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	1997	2001	329,707	253,289	223,868	2,056	1,607	1,775	0,227	0,177	0,201	11,695	8,978	7,885
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2002	2006	341,490	259,512	227,377	2,453	1,826	1,775	0,223	0,155	0,136	9,414	7,197	6,354
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2007	2009	327,133	254,126	224,236	1,157	0,830	0,704	0,050	0,036	0,032	6,398	5,061	4,523
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2010	2013	330,656	256,284	225,882	1,168	0,837	0,715	0,050	0,037	0,032	3,814	3,008	2,681

Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2014	9999	323,739	249,678	219,585	1,202	0,857	0,727	0,005	0,004	0,003	0,610	0,285	0,191
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	0	1993	427,609	323,566	283,490	3,242	2,400	2,283	0,622	0,462	0,425	17,311	13,363	11,617
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	1994	1996	376,029	287,195	252,542	2,823	2,135	2,079	0,500	0,358	0,333	12,142	9,377	8,189
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	1997	2001	364,063	281,631	253,871	2,313	1,826	1,823	0,257	0,201	0,227	12,955	9,936	8,683
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2002	2006	380,024	289,287	252,570	2,675	1,999	1,959	0,240	0,170	0,146	10,432	7,969	6,995
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2007	2009	367,275	285,007	249,788	1,241	0,894	0,759	0,054	0,040	0,035	7,035	5,657	4,952
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2010	2013	371,248	287,356	251,512	1,256	0,902	0,765	0,055	0,040	0,035	4,187	3,365	2,944
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2014	9999	363,184	279,711	244,208	1,288	0,921	0,779	0,006	0,004	0,004	0,564	0,294	0,214
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	1997	2001	439,443	338,240	299,997	2,783	2,192	2,191	0,317	0,246	0,275	15,566	11,836	10,222
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2007	2009	440,973	342,585	300,013	1,445	1,038	0,878	0,064	0,047	0,041	8,477	6,746	5,764
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2002	2006	451,915	343,013	304,759	3,169	2,369	2,341	0,278	0,194	0,184	12,548	9,501	8,223
Buses	Gasoline Urban Buses	Conventional	0	9999	225,000	150,000	165,000	70,000	55,000	55,000	0,400	0,400	0,400	4,500	7,500	7,500
Buses	Diesel Urban Buses <15t	Conventional	0	1993	265,880	211,064	197,424	4,479	3,144	2,830	0,729	0,490	0,413	9,347	7,678	7,133
Buses	Diesel Urban Buses <15t	Euro I	1994	1996	214,880	174,564	162,024	1,568	1,120	0,981	0,261	0,199	0,178	6,945	5,531	4,861
Buses	Diesel Urban Buses <15t	Euro II	1997	2001	207,395	170,373	158,652	1,391	0,958	0,806	0,129	0,107	0,103	7,552	5,971	5,224
Buses	Diesel Urban Buses <15t	Euro III	2002	2006	219,770	179,899	167,027	1,509	1,028	0,926	0,130	0,100	0,093	6,425	4,515	3,631
Buses	Diesel Urban Buses <15t	Euro IV	2007	2009	204,146	174,431	172,127	0,800	0,542	0,422	0,032	0,025	0,022	4,076	3,101	2,593
Buses	Diesel Urban Buses <15t	Euro V	2010	2013	207,620	176,864	174,491	0,813	0,551	0,430	0,032	0,025	0,023	2,432	1,845	1,545
Buses	Diesel Urban Buses 15 - 18t	Conventional	0	1993	338,177	261,819	230,080	4,720	3,242	2,606	0,656	0,439	0,351	15,108	12,139	10,803
Buses	Diesel Urban Buses 15 - 18t	Euro I	1994	1996	288,515	228,326	202,771	2,204	1,612	1,330	0,359	0,258	0,226	9,289	7,392	6,426
Buses	Diesel Urban Buses 15 - 18t	Euro II	1997	2001	279,657	224,821	202,070	1,892	1,310	1,120	0,179	0,146	0,137	9,989	7,828	6,822
Buses	Diesel Urban Buses 15 - 18t	Euro III	2002	2006	293,115	235,088	211,025	2,070	1,382	1,257	0,174	0,132	0,115	8,427	6,044	4,919
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2007	2009	276,404	230,306	217,637	1,045	0,709	0,556	0,044	0,033	0,028	5,452	4,181	3,521
Buses	Diesel Urban Buses 15 - 18t	Euro V	2010	2013	280,396	232,974	220,038	1,057	0,716	0,563	0,044	0,033	0,029	3,250	2,486	2,089
Buses	Diesel Urban Buses >18t	Conventional	0	1993	424,462	330,433	285,157	6,145	4,310	3,420	0,833	0,575	0,455	19,310	15,492	13,433
Buses	Diesel Urban Buses >18t	Euro I	1994	1996	369,176	292,254	253,780	2,882	2,132	1,965	0,451	0,336	0,311	11,840	9,361	8,043
Buses	Diesel Urban Buses >18t	Euro II	1997	2001	358,097	288,482	265,154	2,541	1,716	1,467	0,241	0,194	0,178	12,472	9,751	8,334
Buses	Diesel Urban Buses >18t	Euro III	2002	2006	373,469	299,269	262,705	2,691	1,778	1,703	0,209	0,151	0,142	10,561	7,685	6,305
Buses	Diesel Urban Buses >18t	Euro IV	2007	2009	359,379	300,406	272,408	1,287	0,869	0,664	0,054	0,039	0,032	7,106	5,505	4,635
Buses	Diesel Urban Buses >18t	Euro V	2010	2013	363,797	303,565	275,335	1,297	0,877	0,671	0,054	0,039	0,033	4,234	3,275	2,755
Buses	Gasoline Coaches	Conventional	0	9999	225,000	150,000	165,000	70,000	55,000	55,000	0,400	0,400	0,400	4,500	7,500	7,500
Buses	Diesel Coaches <15t	Conventional	0	1993	306,332	225,195	199,049	2,712	1,738	1,372	0,490	0,328	0,269	11,324	8,822	8,156
Buses	Diesel Coaches <15t	Euro I	1994	1996	280,973	207,851	184,178	2,199	1,466	1,186	0,395	0,260	0,209	8,768	6,699	6,147
Buses	Diesel Coaches <15t	Euro II	1997	2001	279,483	208,488	184,973	1,775	1,203	1,092	0,186	0,137	0,120	10,033	7,549	6,840
Buses	Diesel Coaches <15t	Euro III	2002	2006	303,872	224,218	197,656	2,308	1,464	1,283	0,223	0,145	0,115	8,591	6,046	5,368
Buses	Diesel Coaches <15t	Euro IV	2007	2009	290,989	221,962	197,681	1,241	0,813	0,689	0,048	0,034	0,030	5,666	4,225	3,842
Buses	Diesel Coaches <15t	Euro V	2010	2013	298,215	226,393	200,893	1,288	0,842	0,696	0,049	0,034	0,030	3,434	2,544	2,291

Buses	Diesel Coaches 15 - 18t	Conventional	0	1993	306,332	225,195	199,049	2,712	1,738	1,372	0,490	0,328	0,269	11,324	8,822	8,156
Buses	Diesel Coaches 15 - 18t	Euro I	1994	1996	280,973	207,851	184,178	2,199	1,466	1,186	0,395	0,260	0,209	8,768	6,699	6,147
Buses	Diesel Coaches 15 - 18t	Euro II	1997	2001	279,483	208,488	184,973	1,775	1,203	1,092	0,186	0,137	0,120	10,033	7,549	6,840
Buses	Diesel Coaches 15 - 18t	Euro III	2002	2006	303,872	224,218	197,656	2,308	1,464	1,283	0,223	0,145	0,115	8,591	6,046	5,368
Buses	Diesel Coaches 15 - 18t	Euro IV	2007	2009	290,989	221,962	197,681	1,241	0,813	0,689	0,048	0,034	0,030	5,666	4,225	3,842
Buses	Diesel Coaches 15 - 18t	Euro V	2010	2013	298,215	226,393	200,893	1,288	0,842	0,696	0,049	0,034	0,030	3,434	2,544	2,291
Buses	Diesel Coaches >18t	Conventional	0	1993	371,932	272,817	240,539	3,104	2,042	1,732	0,572	0,388	0,331	14,084	10,772	9,735
Buses	Diesel Coaches >18t	Euro I	1994	1996	329,598	243,565	215,080	2,511	1,722	1,458	0,452	0,302	0,246	10,737	8,049	7,206
Buses	Diesel Coaches >18t	Euro II	1997	2001	323,939	241,571	213,608	2,031	1,395	1,290	0,214	0,161	0,143	11,883	8,817	7,837
Buses	Diesel Coaches >18t	Euro III	2002	2006	335,657	242,331	211,644	2,557	1,669	1,439	0,242	0,156	0,126	9,681	6,781	5,889
Buses	Diesel Coaches >18t	Euro IV	2007	2009	319,737	238,136	211,184	1,328	0,875	0,742	0,052	0,036	0,032	6,428	4,728	4,226
Buses	Diesel Coaches >18t	Euro V	2010	2013	328,400	243,537	215,269	1,363	0,896	0,758	0,053	0,037	0,032	3,881	2,845	2,536
Mopeds	2-stroke <50 cm³	Conventional	0	1999	25,000	25,000	0,000	14,700	14,700	0,000	0,176	0,176	0,000	0,056	0,056	0,000
Mopeds	2-stroke <50 cm³	Euro I	2000	2003	20,000	20,000	0,000	4,600	4,600	0,000	0,045	0,045	0,000	0,180	0,180	0,000
Mopeds	2-stroke <50 cm³	Euro II	2004	2014	20,000	20,000	0,000	2,800	2,800	0,000	0,026	0,026	0,000	0,170	0,170	0,000
Mopeds	4-stroke <50 cm³	Euro II	2004	2014	20,000	20,000	0,000	4,200	4,200	0,000	0,007	0,007	0,000	0,170	0,170	0,000
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	27,115	28,317	39,640	15,605	19,285	28,470	0,200	0,200	0,200	0,029	0,030	0,035
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003	27,115	28,317	39,640	10,315	12,786	18,933	0,080	0,080	0,080	0,029	0,030	0,035
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006	24,892	25,627	35,438	8,146	10,067	14,890	0,040	0,040	0,040	0,040	0,050	0,060
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999	24,892	25,627	35,438	4,510	5,593	8,342	0,012	0,012	0,012	0,048	0,058	0,069
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	24,800	27,499	36,055	15,258	17,209	24,960	0,020	0,020	0,020	0,237	0,428	0,655
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003	27,015	30,386	40,330	10,391	14,456	24,910	0,020	0,020	0,020	0,304	0,424	0,567
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006	22,260	25,160	33,756	3,708	5,765	9,135	0,005	0,005	0,005	0,323	0,447	0,598
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999	19,262	20,359	25,932	2,060	3,201	5,092	0,005	0,005	0,005	0,253	0,382	0,612
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	26,648	23,766	26,620	20,461	19,486	22,990	0,020	0,020	0,020	0,196	0,300	0,548
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003	37,374	35,472	41,400	10,599	9,003	10,460	0,020	0,020	0,020	0,258	0,400	0,610
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006	34,197	33,450	41,276	2,230	2,436	6,092	0,005	0,005	0,005	0,257	0,390	0,577
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999	30,983	30,719	38,129	1,228	1,345	3,357	0,005	0,005	0,005	0,076	0,132	0,265
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	35,731	35,542	43,748	20,461	19,486	22,990	0,020	0,020	0,020	0,019	0,030	0,086
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003	43,101	41,041	47,500	10,599	9,003	10,460	0,020	0,020	0,020	0,125	0,178	0,392
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006	42,110	38,004	41,895	2,230	2,436	6,092	0,005	0,005	0,005	0,143	0,244	0,459
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999	40,343	37,470	43,083	1,228	1,345	3,357	0,005	0,005	0,005	0,104	0,200	0,484

Sector	Subsector	Tech 2	FYear	LYear	CH_4u	CH_4r	CH_4h	N_2Ou	N_2Or	N_2Oh	NH_3u	NH_3r	NH_3h	VOCu	VOCr	VOCh
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	2,354	1,597	1,247
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,862	1,256	1,121
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,480	0,895	0,698
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996	0,026	0,016	0,014	0,026	0,011	0,005	0,070	0,133	0,074	0,177	0,121	0,111
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000	0,017	0,013	0,011	0,013	0,005	0,003	0,180	0,150	0,084	0,071	0,047	0,042
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005	0,003	0,002	0,004	0,001	0,000	0,000	0,002	0,030	0,065	0,015	0,015	0,025
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,029	0,065	0,012	0,014	0,017
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,029	0,065	0,012	0,014	0,017
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	2,354	1,597	1,247
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,862	1,256	1,121
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,480	0,895	0,698
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	0,026	0,016	0,014	0,026	0,011	0,005	0,070	0,133	0,074	0,177	0,121	0,111
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	0,017	0,013	0,011	0,013	0,005	0,003	0,188	0,150	0,084	0,071	0,047	0,042
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	0,003	0,002	0,004	0,002	0,000	0,000	0,002	0,030	0,065	0,015	0,015	0,025
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,029	0,065	0,012	0,014	0,017
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,029	0,065	0,012	0,014	0,017
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	2,354	1,597	1,247
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,862	1,256	1,121
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,480	0,895	0,698
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	0,026	0,016	0,014	0,026	0,011	0,005	0,070	0,133	0,074	0,177	0,121	0,111
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	0,017	0,013	0,011	0,013	0,005	0,003	0,190	0,150	0,084	0,071	0,047	0,042
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	0,003	0,002	0,004	0,002	0,000	0,000	0,002	0,030	0,065	0,015	0,015	0,025
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,030	0,065	0,012	0,014	0,017
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,029	0,065	0,012	0,014	0,017
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	0,028	0,012	0,008	0,000	0,000	0,000	0,001	0,001	0,001	0,145	0,086	0,062
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996	0,011	0,009	0,003	0,002	0,004	0,004	0,001	0,001	0,001	0,053	0,031	0,026
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000	0,007	0,003	0,002	0,004	0,006	0,006	0,001	0,001	0,001	0,034	0,021	0,015
Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005	0,003	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,018	0,011	0,009
Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,011	0,006	0,006
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,011	0,006	0,006

Passenger Cars	Diesel >2,0 l	Conventional	0	1990	0,028	0,012	0,008	0,000	0,000	0,000	0,001	0,001	0,001	0,145	0,086	0,062
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	0,011	0,009	0,003	0,002	0,004	0,004	0,001	0,001	0,001	0,080	0,046	0,034
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	0,007	0,003	0,002	0,004	0,006	0,006	0,001	0,001	0,001	0,098	0,058	0,038
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	0,003	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,038	0,017	0,012
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,011	0,006	0,006
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,011	0,006	0,006
Passenger Cars	LPG cars	Conventional	0	1990	0,080	0,035	0,025	0,000	0,000	0,000	0,000	0,000	0,000	1,082	0,667	0,490
Passenger Cars	LPG cars	Euro I	1991	1996	0,080	0,035	0,025	0,021	0,013	0,008	0,000	0,000	0,000	0,239	0,071	0,083
Passenger Cars	LPG cars	Euro II	1997	2000	0,019	0,008	0,006	0,013	0,003	0,002	0,000	0,000	0,000	0,050	0,015	0,017
Passenger Cars	LPG cars	Euro III	2001	2005	0,013	0,006	0,004	0,005	0,002	0,001	0,000	0,000	0,000	0,036	0,011	0,012
Passenger Cars	LPG cars	Euro IV	2006	2010	0,004	0,002	0,001	0,005	0,002	0,001	0,000	0,000	0,000	0,007	0,002	0,002
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	2,354	1,597	1,247
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,862	1,256	1,121
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,849	1,061	0,950
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990	0,092	0,029	0,026	0,010	0,007	0,007	0,002	0,002	0,002	1,480	0,895	0,698
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996	0,026	0,016	0,014	0,023	0,009	0,004	0,070	0,132	0,074	0,177	0,121	0,111
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000	0,017	0,013	0,011	0,012	0,005	0,003	0,173	0,149	0,084	0,071	0,047	0,042
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005	0,003	0,002	0,004	0,001	0,000	0,000	0,002	0,030	0,065	0,015	0,015	0,025
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,029	0,065	0,012	0,014	0,017
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014	0,003	0,003	0,005	0,002	0,000	0,000	0,002	0,029	0,065	0,012	0,014	0,017
Passenger Cars	Diesel <1,4 l	Conventional	0	1990	0,028	0,012	0,008	0,000	0,000	0,000	0,001	0,001	0,001	0,145	0,086	0,062
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996	0,011	0,009	0,003	0,002	0,004	0,004	0,001	0,001	0,001	0,053	0,031	0,026
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000	0,007	0,003	0,002	0,004	0,006	0,006	0,001	0,001	0,001	0,034	0,021	0,015
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005	0,003	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,018	0,011	0,009
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,011	0,006	0,006
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,011	0,006	0,006
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	0,150	0,040	0,025	0,010	0,007	0,007	0,002	0,002	0,002	1,877	0,729	0,446
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	0,026	0,016	0,014	0,045	0,027	0,013	0,070	0,133	0,074	0,220	0,109	0,078
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	0,017	0,013	0,011	0,028	0,016	0,010	0,181	0,150	0,084	0,053	0,026	0,019
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006	0,003	0,002	0,004	0,008	0,001	0,001	0,002	0,030	0,065	0,031	0,015	0,011
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011	0,002	0,002	0,000	0,001	0,000	0,000	0,002	0,029	0,065	0,013	0,007	0,005
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015	0,002	0,002	0,000	0,001	0,000	0,000	0,002	0,029	0,065	0,013	0,007	0,005
Light Duty Vehicles	Diesel <3,5t	Conventional	0	1994	0,028	0,012	0,008	0,000	0,000	0,000	0,001	0,001	0,001	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5t	Euro I	1995	1998	0,011	0,009	0,003	0,002	0,004	0,004	0,001	0,001	0,001	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5t	Euro II	1999	2001	0,007	0,003	0,002	0,004	0,006	0,006	0,001	0,001	0,001	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5t	Euro III	2002	2006	0,003	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,081	0,065	0,063

Light Duty Vehicles	Diesel <3,5t	Euro IV	2007	2011	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,030	0,024	0,023
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	2015	0,000	0,000	0,000	0,009	0,004	0,004	0,001	0,001	0,001	0,030	0,024	0,023
Light Duty Vehicles	LPG <3,5t	Conventional	0	1994	0,120	0,053	0,038	0,000	0,000	0,000	0,000	0,000	0,000	1,623	1,000	0,735
Light Duty Vehicles	LPG <3,5t	Euro II	1999	2001	0,029	0,013	0,009	0,020	0,005	0,003	0,000	0,000	0,000	0,075	0,022	0,026
Light Duty Vehicles	LPG <3,5t	Euro III	2002	2006	0,019	0,008	0,006	0,008	0,003	0,002	0,000	0,000	0,000	0,054	0,016	0,019
Light Duty Vehicles	LPG <3,5t	Euro IV	2007	2011	0,006	0,003	0,002	0,008	0,003	0,002	0,000	0,000	0,000	0,011	0,003	0,004
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	0	9999	0,140	0,110	0,070	0,006	0,006	0,006	0,002	0,002	0,002	7,000	5,500	3,500
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	0	1993	0,085	0,023	0,020	0,030	0,030	0,030	0,003	0,003	0,003	1,298	0,789	0,576
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	1994	1996	0,085	0,023	0,020	0,030	0,030	0,030	0,003	0,003	0,003	0,253	0,167	0,130
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	1997	2001	0,054	0,020	0,019	0,030	0,030	0,030	0,003	0,003	0,003	0,171	0,111	0,086
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2002	2006	0,048	0,021	0,018	0,030	0,030	0,030	0,003	0,003	0,003	0,162	0,102	0,077
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2007	2009	0,003	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,022	0,017	0,017
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2010	2013	0,003	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,022	0,017	0,017
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2014	9999	0,001	0,000	0,000	0,030	0,030	0,030	0,003	0,003	0,003	0,011	0,008	0,007
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	0	1993	0,085	0,023	0,020	0,030	0,030	0,030	0,003	0,003	0,003	0,957	0,589	0,449
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	1994	1996	0,085	0,023	0,020	0,030	0,030	0,030	0,003	0,003	0,003	0,389	0,258	0,208
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	1997	2001	0,054	0,020	0,019	0,030	0,030	0,030	0,003	0,003	0,003	0,263	0,172	0,137
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2002	2006	0,048	0,021	0,018	0,030	0,030	0,030	0,003	0,003	0,003	0,252	0,157	0,120
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2007	2009	0,003	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,035	0,025	0,022
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2010	2013	0,003	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,035	0,026	0,022
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2014	9999	0,001	0,000	0,000	0,030	0,030	0,030	0,003	0,003	0,003	0,017	0,012	0,010
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	0	1993	0,085	0,023	0,020	0,030	0,030	0,030	0,003	0,003	0,003	1,012	0,646	0,509
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	1994	1996	0,085	0,023	0,020	0,030	0,030	0,030	0,003	0,003	0,003	0,429	0,279	0,229
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	1997	2001	0,054	0,020	0,019	0,030	0,030	0,030	0,003	0,003	0,003	0,281	0,186	0,150
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2002	2006	0,048	0,021	0,018	0,030	0,030	0,030	0,003	0,003	0,003	0,260	0,168	0,134
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2007	2009	0,003	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,034	0,025	0,024
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2010	2013	0,003	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,034	0,025	0,024
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	1,510	0,971	0,768
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,606	0,403	0,325
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,409	0,267	0,213
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,378	0,243	0,196
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,046	0,032	0,028
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,047	0,033	0,029
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2014	9999	0,002	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,024	0,017	0,015
Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,819	0,517	0,406
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,728	0,476	0,380
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,489	0,314	0,248

Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,453	0,287	0,225
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,059	0,040	0,035
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,059	0,041	0,035
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2014	9999	0,002	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,030	0,021	0,017
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,842	0,541	0,430
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,736	0,488	0,394
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,499	0,327	0,262
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,467	0,304	0,243
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,064	0,045	0,037
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,065	0,045	0,037
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,874	0,560	0,444
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,778	0,518	0,419
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,523	0,344	0,276
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,491	0,317	0,252
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,070	0,051	0,043
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,071	0,051	0,043
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2014	9999	0,002	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,034	0,024	0,020
Heavy Duty Vehicles	Diesel RT >32t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,812	0,527	0,419
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,496	0,316	0,249
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,070	0,048	0,041
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,070	0,049	0,041
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,736	0,476	0,380
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,678	0,450	0,363
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,450	0,296	0,238
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,415	0,269	0,215
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,059	0,041	0,036
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,060	0,042	0,036
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2014	9999	0,002	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,029	0,021	0,017
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,877	0,555	0,438
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,805	0,524	0,420
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,538	0,343	0,270
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,494	0,312	0,244
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,071	0,048	0,041
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,072	0,049	0,041
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2014	9999	0,002	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,035	0,024	0,020
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,901	0,570	0,450
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,844	0,546	0,433

Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,558	0,358	0,282
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,510	0,323	0,253
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,077	0,053	0,045
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2010	2013	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,078	0,053	0,045
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2014	9999	0,002	0,002	0,001	0,030	0,030	0,030	0,003	0,003	0,003	0,038	0,026	0,022
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	1997	2001	0,112	0,070	0,065	0,030	0,030	0,030	0,003	0,003	0,003	0,626	0,406	0,323
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2007	2009	0,005	0,006	0,004	0,030	0,030	0,030	0,003	0,003	0,003	0,090	0,063	0,053
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2002	2006	0,098	0,074	0,064	0,030	0,030	0,030	0,003	0,003	0,003	0,568	0,364	0,288
Buses	Gasoline Urban Buses	Conventional	0	9999	0,140	0,110	0,070	0,006	0,006	0,006	0,002	0,002	0,002	7,000	5,500	3,500
Buses	Diesel Urban Buses <15t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	2,628	1,738	1,490
Buses	Diesel Urban Buses <15t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,507	0,364	0,312
Buses	Diesel Urban Buses <15t	Euro II	1997	2001	0,114	0,052	0,046	0,030	0,030	0,030	0,003	0,003	0,003	0,350	0,245	0,209
Buses	Diesel Urban Buses <15t	Euro III	2002	2006	0,103	0,047	0,041	0,030	0,030	0,030	0,003	0,003	0,003	0,318	0,220	0,199
Buses	Diesel Urban Buses <15t	Euro IV	2007	2009	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,043	0,034	0,032
Buses	Diesel Urban Buses <15t	Euro V	2010	2013	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,044	0,034	0,033
Buses	Diesel Urban Buses 15 - 18t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	1,602	0,977	0,762
Buses	Diesel Urban Buses 15 - 18t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,659	0,431	0,351
Buses	Diesel Urban Buses 15 - 18t	Euro II	1997	2001	0,114	0,052	0,046	0,030	0,030	0,030	0,003	0,003	0,003	0,451	0,296	0,248
Buses	Diesel Urban Buses 15 - 18t	Euro III	2002	2006	0,103	0,047	0,041	0,030	0,030	0,030	0,003	0,003	0,003	0,416	0,269	0,232
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2007	2009	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,061	0,045	0,040
Buses	Diesel Urban Buses 15 - 18t	Euro V	2010	2013	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,061	0,046	0,040
Buses	Diesel Urban Buses >18t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	1,666	1,018	0,791
Buses	Diesel Urban Buses >18t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,720	0,477	0,386
Buses	Diesel Urban Buses >18t	Euro II	1997	2001	0,114	0,052	0,046	0,030	0,030	0,030	0,003	0,003	0,003	0,491	0,332	0,263
Buses	Diesel Urban Buses >18t	Euro III	2002	2006	0,103	0,047	0,041	0,030	0,030	0,030	0,003	0,003	0,003	0,446	0,291	0,241
Buses	Diesel Urban Buses >18t	Euro IV	2007	2009	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,074	0,055	0,047
Buses	Diesel Urban Buses >18t	Euro V	2010	2013	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,075	0,056	0,048
Buses	Gasoline Coaches	Conventional	0	9999	0,140	0,110	0,070	0,006	0,006	0,006	0,002	0,002	0,002	7,000	5,500	3,500
Buses	Diesel Coaches <15t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,907	0,533	0,393
Buses	Diesel Coaches <15t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,830	0,516	0,397
Buses	Diesel Coaches <15t	Euro II	1997	2001	0,114	0,052	0,046	0,030	0,030	0,030	0,003	0,003	0,003	0,586	0,359	0,272
Buses	Diesel Coaches <15t	Euro III	2002	2006	0,103	0,047	0,041	0,030	0,030	0,030	0,003	0,003	0,003	0,577	0,351	0,271
Buses	Diesel Coaches <15t	Euro IV	2007	2009	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,072	0,048	0,039
Buses	Diesel Coaches <15t	Euro V	2010	2013	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,074	0,049	0,039
Buses	Diesel Coaches 15 - 18t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,907	0,533	0,393
Buses	Diesel Coaches 15 - 18t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,830	0,516	0,397
Buses	Diesel Coaches 15 - 18t	Euro II	1997	2001	0,114	0,052	0,046	0,030	0,030	0,030	0,003	0,003	0,003	0,586	0,359	0,272

Buses	Diesel Coaches 15 - 18t	Euro III	2002	2006	0,103	0,047	0,041	0,030	0,030	0,030	0,003	0,003	0,003	0,577	0,351	0,271
Buses	Diesel Coaches 15 - 18t	Euro IV	2007	2009	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,072	0,048	0,039
Buses	Diesel Coaches 15 - 18t	Euro V	2010	2013	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,074	0,049	0,039
Buses	Diesel Coaches >18t	Conventional	0	1993	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	1,013	0,623	0,482
Buses	Diesel Coaches >18t	Euro I	1994	1996	0,175	0,080	0,070	0,030	0,030	0,030	0,003	0,003	0,003	0,915	0,581	0,457
Buses	Diesel Coaches >18t	Euro II	1997	2001	0,114	0,052	0,046	0,030	0,030	0,030	0,003	0,003	0,003	0,630	0,392	0,305
Buses	Diesel Coaches >18t	Euro III	2002	2006	0,103	0,047	0,041	0,030	0,030	0,030	0,003	0,003	0,003	0,608	0,371	0,286
Buses	Diesel Coaches >18t	Euro IV	2007	2009	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,076	0,050	0,042
Buses	Diesel Coaches >18t	Euro V	2010	2013	0,005	0,002	0,002	0,030	0,030	0,030	0,003	0,003	0,003	0,078	0,051	0,042
Mopeds	2-stroke <50 cm³	Conventional	0	1999	0,219	0,219	0,000	0,001	0,001	0,001	0,001	0,001	0,001	8,400	8,400	0,000
Mopeds	2-stroke <50 cm³	Euro I	2000	2003	0,044	0,044	0,000	0,001	0,001	0,001	0,001	0,001	0,001	3,400	3,400	0,000
Mopeds	2-stroke <50 cm³	Euro II	2004	2014	0,024	0,024	0,000	0,001	0,001	0,001	0,001	0,001	0,001	2,600	2,600	0,000
Mopeds	4-stroke <50 cm³	Euro II	2004	2014	0,024	0,024	0,000	0,001	0,001	0,001	0,001	0,001	0,001	0,790	0,790	0,000
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	0,150	0,150	0,150	0,002	0,002	0,002	0,002	0,002	0,002	8,393	7,078	9,800
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003	0,099	0,107	0,098	0,002	0,002	0,002	0,002	0,002	0,002	8,393	7,078	9,800
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006	0,030	0,032	0,030	0,002	0,002	0,002	0,002	0,002	0,002	2,593	2,569	4,155
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999	0,012	0,014	0,012	0,002	0,002	0,002	0,002	0,002	0,002	1,385	1,380	2,244
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	0,200	0,200	0,200	0,002	0,002	0,002	0,002	0,002	0,002	0,128	0,104	0,138
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003	0,142	0,144	0,132	0,002	0,002	0,002	0,002	0,002	0,002	1,242	0,866	0,976
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006	0,136	0,092	0,092	0,002	0,002	0,002	0,002	0,002	0,002	1,042	0,843	0,965
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999	0,082	0,032	0,028	0,002	0,002	0,002	0,002	0,002	0,002	0,456	0,441	0,511
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	0,200	0,200	0,200	0,002	0,002	0,002	0,002	0,002	0,002	0,545	0,487	0,361
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003	0,148	0,174	0,156	0,002	0,002	0,002	0,002	0,002	0,002	2,390	1,522	1,079
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006	0,156	0,120	0,122	0,002	0,002	0,002	0,002	0,002	0,002	1,326	0,925	0,828
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999	0,094	0,042	0,036	0,002	0,002	0,002	0,002	0,002	0,002	0,598	0,499	0,615
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	0,200	0,200	0,200	0,002	0,002	0,002	0,002	0,002	0,002	0,392	0,337	0,556
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003	0,092	0,092	0,154	0,002	0,002	0,002	0,002	0,002	0,002	2,495	1,643	1,554
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006	0,084	0,062	0,102	0,002	0,002	0,002	0,002	0,002	0,002	1,088	0,674	0,656
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999	0,050	0,022	0,030	0,002	0,002	0,002	0,002	0,002	0,002	0,384	0,309	0,416

Annex 2B-5: Reduction factors

Sector	Subsector	Tech 2	FYear	LYear	FCuR	FCrR	FChR	COuR	COrR	COhR	PMuR	PMrR	PMhR	NOxuR	NOxrR	NOxhR	VOCuR	VOCrR	VOChR
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000	1,93	5,83	4,43	62,65	58,10	57,55	0,00	0,00	0,00	43,59	45,20	60,45	60,19	61,27	62,09
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005	-2,72	-0,72	1,59	70,59	49,62	34,95	60,25	54,57	37,37	72,16	78,49	88,69	91,74	87,53	77,02
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010	-5,57	-5,34	-4,84	88,95	79,10	70,06	60,25	54,57	37,37	80,12	89,24	95,86	93,34	88,71	84,51
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014	-5,57	-5,34	-4,84	88,95	79,10	70,06	60,25	54,57	37,37	85,09	91,93	96,90	93,34	88,71	84,51
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	2,08	1,72	5,30	62,65	58,10	57,55	0,00	0,00	0,00	43,59	45,20	60,45	60,19	61,27	62,09
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	-1,28	-2,83	-3,05	70,59	49,62	34,95	60,25	54,57	37,37	72,16	78,49	88,69	91,74	87,53	77,02
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	-5,15	-8,80	-7,33	88,95	79,10	70,06	60,25	54,57	37,37	80,12	89,24	95,86	93,34	88,71	84,51
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014	-5,15	-8,80	-7,33	88,95	79,10	70,06	60,25	54,57	37,37	85,09	91,93	96,90	93,34	88,71	84,51
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	-2,98	-5,37	-2,63	62,65	58,10	57,55	0,00	0,00	0,00	43,59	45,20	60,45	60,19	61,27	62,09
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	5,12	7,23	12,60	70,59	49,62	34,95	60,25	54,57	37,37	72,16	78,49	88,69	91,74	87,53	77,02
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	-15,39	-9,65	-1,29	88,95	79,10	70,06	60,25	54,57	37,37	80,12	89,24	95,86	93,34	88,71	84,51
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014	-15,39	-9,65	-1,29	88,95	79,10	70,06	60,25	54,57	37,37	85,09	91,93	96,90	93,34	88,71	84,51
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000	-5,45	-3,06	-0,81	18,08	48,77	83,05	17,92	36,92	53,22	-7,94	1,18	-0,20	34,81	33,43	41,61

Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005	-2,27	-1,45	5,79	76,38	81,12	94,30	48,53	51,90	58,32	-18,71	-18,46	-12,98	65,94	63,35	66,25
Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010	-2,27	-1,45	5,79	80,09	84,22	89,72	49,02	60,57	75,83	10,60	24,53	13,19	79,38	79,24	77,57
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014	-2,20	-1,32	5,99	80,09	84,22	89,72	89,80	92,11	95,17	-9,96	7,17	-6,78	79,38	79,24	77,57
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	0,00	0,00	0,00	18,08	48,77	83,05	17,92	36,92	53,22	-7,94	1,18	-0,20	-22,14	-25,38	-11,51
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	0,00	0,00	0,00	76,38	81,12	94,30	48,53	51,90	58,32	-18,71	-18,46	-12,98	52,23	62,67	63,93
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010	0,00	0,00	0,00	80,09	84,22	89,72	49,02	60,57	75,83	10,60	24,53	13,19	86,39	86,10	83,20
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	-0,07	-0,06	-0,05	80,09	84,22	89,72	89,80	92,11	95,17	-9,96	7,17	-6,78	86,39	86,10	83,20
Passenger Cars	LPG cars	Conventional	0	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	LPG cars	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	LPG cars	Euro II	1997	2000	0,00	0,00	0,00	32,00	32,00	32,00	0,00	0,00	0,00	64,00	64,00	64,00	79,00	79,00	79,00
Passenger Cars	LPG cars	Euro III	2001	2005	0,00	0,00	0,00	44,00	44,00	44,00	0,00	0,00	0,00	76,00	76,00	76,00	85,00	85,00	85,00
Passenger Cars	LPG cars	Euro IV	2006	2010	0,00	0,00	0,00	66,00	66,00	66,00	0,00	0,00	0,00	87,00	87,00	87,00	97,00	97,00	97,00
Passenger Cars	Electric cars	Conventional	0	9999	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000	1,93	5,83	4,43	62,65	58,10	57,55	0,00	0,00	0,00	43,59	45,20	60,45	60,19	61,27	62,09
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005	-2,72	-0,72	1,59	70,59	49,62	34,95	60,25	54,57	37,37	72,16	78,49	88,69	91,74	87,53	77,02
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010	-5,57	-5,34	-4,84	88,95	79,10	70,06	60,25	54,57	37,37	80,12	89,24	95,86	93,34	88,71	84,51
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014	-5,57	-5,34	-4,84	88,95	79,10	70,06	60,25	54,57	37,37	85,09	91,93	96,90	93,34	88,71	84,51
Passenger Cars	Diesel <1,4 l	Conventional	0	1990	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000	-5,45	-3,06	-0,81	18,08	48,77	83,05	17,92	36,92	53,22	-7,94	1,18	-0,20	34,81	33,43	41,61
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005	-2,27	-1,45	5,79	76,38	81,12	94,30	48,53	51,90	58,32	-18,71	-18,46	-12,98	65,94	63,35	66,25
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010	-2,27	-1,45	5,79	80,09	84,22	89,72	49,02	60,57	75,83	10,60	24,53	13,19	79,38	79,24	77,57
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014	-2,20	-1,32	5,99	80,09	84,22	89,72	89,80	92,11	95,17	-9,96	7,17	-6,78	79,38	79,24	77,57
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	0,00	0,00	0,00	39,00	39,00	39,00	0,00	0,00	0,00	66,00	66,00	66,00	76,00	76,00	76,00
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006	0,00	0,00	0,00	48,00	48,00	48,00	60,25	54,57	37,37	79,00	79,00	79,00	86,00	86,00	86,00
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011	0,00	0,00	0,00	72,00	72,00	72,00	60,25	54,57	37,37	90,00	90,00	90,00	94,00	94,00	94,00
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015	0,00	0,00	0,00	72,00	72,00	72,00	60,25	54,57	37,37	92,50	92,50	92,50	94,00	94,00	94,00

Light Duty Vehicles	Diesel <3,5t	Conventional	0	1994	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Light Duty Vehicles	Diesel <3,5t	Euro I	1995	1998	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Light Duty Vehicles	Diesel <3,5t	Euro II	1999	2001	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Light Duty Vehicles	Diesel <3,5t	Euro III	2002	2006	0,00	0,00	0,00	18,00	18,00	18,00	33,00	33,00	33,00	16,00	16,00	16,00	38,00	38,00	38,00
Light Duty Vehicles	Diesel <3,5t	Euro IV	2007	2011	0,00	0,00	0,00	35,00	35,00	35,00	65,00	65,00	65,00	32,00	32,00	32,00	77,00	77,00	77,00
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	2015	0,00	0,00	0,00	35,00	35,00	35,00	98,25	98,25	98,25	51,00	51,00	51,00	77,00	77,00	77,00
Light Duty Vehicles	LPG <3,5t	Conventional	0	1994	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Light Duty Vehicles	LPG <3,5t	Euro II	1999	2001	0,00	0,00	0,00	32,00	32,00	32,00	0,00	0,00	0,00	64,00	64,00	64,00	79,00	79,00	79,00
Light Duty Vehicles	LPG <3,5t	Euro III	2002	2006	0,00	0,00	0,00	44,00	44,00	44,00	0,00	0,00	0,00	76,00	76,00	76,00	85,00	85,00	85,00
Light Duty Vehicles	LPG <3,5t	Euro IV	2007	2011	0,00	0,00	0,00	66,00	66,00	66,00	0,00	0,00	0,00	87,00	87,00	87,00	97,00	97,00	97,00
Light Duty Vehicles	Electric <3,5t	Conventional	0	9999	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	0	9999	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	1994	1996	19,97	17,39	7,76	67,55	66,82	59,55	60,69	60,33	58,47	30,21	28,42	25,92	80,53	78,89	77,38
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	1997	2001	24,01	20,18	10,60	74,08	69,13	65,86	81,61	77,85	71,87	23,47	24,02	23,73	86,86	85,98	85,16
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2002	2006	18,90	16,31	6,25	67,98	68,13	66,52	79,28	80,07	80,84	40,66	43,96	44,20	87,56	87,06	86,71
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2007	2009	21,15	16,29	5,64	83,37	82,11	80,91	95,44	94,65	93,58	59,45	59,91	59,77	98,28	97,79	97,11
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2010	2013	20,29	15,72	5,30	83,30	82,11	80,82	95,45	94,62	93,60	75,97	76,32	76,28	98,27	97,79	97,13
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2014	9999	21,40	17,89	8,47	82,75	81,73	80,76	99,54	99,46	99,36	94,47	97,63	98,67	99,16	98,98	98,77
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	1994	1996	14,94	11,49	8,93	53,96	51,87	49,75	39,18	39,03	36,52	40,35	40,49	40,47	59,34	56,17	53,69
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	1997	2001	18,90	14,27	11,02	63,18	57,16	53,02	71,53	66,12	55,10	35,02	36,53	37,57	72,55	70,85	69,48
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2002	2006	14,01	10,02	7,38	54,03	54,57	51,94	68,40	69,00	69,32	49,58	51,13	53,53	73,67	73,28	73,21
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2007	2009	17,35	11,08	7,67	76,57	75,39	75,78	93,10	92,09	90,79	65,60	65,29	66,82	96,38	95,67	95,13
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2010	2013	16,17	10,25	7,18	76,27	75,18	75,47	93,04	92,07	90,83	79,22	79,51	80,43	96,34	95,66	95,14
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2014	9999	17,31	12,39	10,14	75,26	74,61	75,54	99,29	99,20	99,09	95,16	97,87	98,72	98,22	97,93	97,71
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	1994	1996	14,28	11,64	9,97	52,86	51,03	48,87	37,82	37,42	37,06	39,71	39,91	40,14	57,63	56,88	54,97
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	1997	2001	17,78	14,26	12,32	61,29	56,29	52,49	70,72	65,68	55,94	34,11	35,54	36,90	72,19	71,22	70,63
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2002	2006	13,28	10,55	9,17	53,81	53,44	50,67	68,93	69,17	69,39	46,23	49,71	52,23	74,33	74,00	73,71
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2007	2009	17,83	12,48	10,01	76,48	76,13	75,80	93,03	92,25	91,58	63,65	64,32	66,18	96,64	96,09	95,32
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2010	2013	16,83	11,77	9,53	76,18	75,91	75,63	92,99	92,24	91,61	78,37	78,82	79,97	96,61	96,08	95,34
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	1994	1996	18,66	16,33	14,88	54,10	52,05	49,69	38,29	38,82	39,43	40,46	40,76	40,96	59,89	58,50	57,65
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	1997	2001	21,92	18,70	17,00	63,94	59,22	54,89	73,27	69,36	59,06	33,79	35,29	36,36	72,92	72,50	72,28
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2002	2006	17,70	15,52	14,62	54,42	54,24	50,66	68,29	69,01	69,76	45,61	48,61	51,42	74,94	75,03	74,44
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2007	2009	23,15	18,31	16,14	76,40	76,04	76,43	93,48	92,87	92,25	63,86	64,05	65,23	96,97	96,70	96,31

Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2010	2013	21,50	17,49	15,95	75,25	75,14	75,86	93,36	92,81	92,21	78,21	78,55	79,35	96,86	96,61	96,25
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2014	9999	23,32	19,40	17,88	75,24	75,14	75,87	99,34	99,28	99,22	93,85	97,23	98,52	98,43	98,28	98,07
Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	1994	1996	14,59	12,88	11,93	19,16	17,09	16,07	20,49	25,29	27,75	29,52	29,51	29,03	11,17	8,06	6,45
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	1997	2001	17,36	14,83	13,74	36,69	31,82	18,28	64,44	61,13	50,94	22,74	23,45	23,78	40,30	39,31	39,01
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2002	2006	13,66	12,19	11,99	20,84	21,10	18,05	60,89	63,32	64,58	37,56	38,91	39,16	44,75	44,58	44,64
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2007	2009	18,46	14,72	13,40	60,80	61,35	63,31	91,59	91,35	91,18	58,00	57,18	56,47	92,84	92,20	91,51
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2010	2013	17,52	13,99	12,79	60,33	61,00	62,95	91,54	91,32	91,17	75,01	74,57	74,18	92,77	92,15	91,47
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2014	9999	19,02	16,10	15,22	59,13	60,04	62,26	99,14	99,13	99,11	94,21	97,09	98,20	96,40	96,02	95,71
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	1994	1996	14,23	12,62	11,74	20,03	17,07	15,21	22,33	25,06	27,38	29,11	29,59	29,23	12,60	9,85	8,38
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	1997	2001	17,09	14,65	13,53	37,76	32,22	19,50	63,87	60,48	50,30	23,25	24,39	24,79	40,81	39,59	39,01
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2002	2006	13,37	11,82	11,44	21,52	20,38	18,17	60,68	62,36	64,94	39,91	41,33	40,87	44,52	43,89	43,54
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2007	2009	17,01	13,58	12,64	61,39	62,14	64,62	91,49	91,19	91,37	59,14	58,72	57,71	92,39	91,72	91,36
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2010	2013	16,01	12,79	12,02	60,92	61,74	64,28	91,43	91,15	91,35	75,70	75,49	74,93	92,31	91,66	91,32
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	1994	1996	12,20	11,05	10,36	18,82	13,37	12,31	23,04	24,44	25,14	27,98	28,75	28,76	10,90	7,44	5,56
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	1997	2001	15,27	13,95	9,64	34,08	26,77	23,67	62,75	58,53	48,13	22,62	24,28	24,79	40,10	38,55	37,82
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2002	2006	11,41	10,04	9,73	20,60	19,39	17,71	62,16	63,07	64,05	38,80	41,24	41,46	43,86	43,33	43,19
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2007	2009	14,35	11,13	10,55	60,90	61,17	65,11	91,34	90,97	90,96	58,81	57,29	58,82	91,98	90,92	90,30
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2010	2013	13,34	10,31	9,85	60,41	60,74	64,74	91,27	90,91	90,93	75,51	74,62	75,57	91,91	90,86	90,25
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2014	9999	14,95	12,46	12,29	59,32	59,85	64,03	99,11	99,08	99,09	95,61	97,57	98,26	96,11	95,65	95,39
Heavy Duty Vehicles	Diesel RT >32t	Euro I	1994	1996	12,62	11,53	10,93	16,13	13,50	12,48	20,12	23,79	25,25	28,73	28,95	28,74	8,76	5,59	4,01
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2002	2006	11,93	10,92	10,90	18,97	18,29	15,90	61,41	63,24	64,69	38,06	39,23	39,11	44,27	43,43	42,99
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2007	2009	15,80	12,78	12,01	61,10	61,71	64,74	91,36	91,17	91,27	57,90	57,34	56,23	92,18	91,31	90,51
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2010	2013	14,90	12,07	11,43	60,60	61,33	64,46	91,29	91,12	91,26	74,92	74,66	74,06	92,09	91,27	90,50
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	1994	1996	10,56	9,81	9,65	15,13	12,34	11,18	22,12	23,23	22,95	28,53	29,18	29,25	7,82	5,31	4,45
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	1997	2001	15,65	13,67	10,63	31,82	27,73	16,83	60,81	57,94	48,69	24,49	25,71	26,04	38,86	37,80	37,36
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2002	2006	11,19	10,15	10,37	19,25	17,89	15,99	62,26	63,46	64,44	39,05	41,17	41,88	43,54	43,44	43,48
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2007	2009	14,73	11,88	11,73	61,31	62,64	65,74	91,27	91,29	91,77	58,43	58,62	58,68	91,95	91,29	90,55
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2010	2013	13,84	11,15	11,06	60,85	62,25	65,37	91,19	91,23	91,73	75,22	75,38	75,48	91,88	91,23	90,51
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2014	9999	15,57	13,36	13,49	59,64	61,13	65,11	99,10	99,11	99,16	96,01	97,66	98,20	96,03	95,67	95,44
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	1994	1996	12,21	11,31	10,88	14,79	12,18	10,98	19,78	22,63	23,62	29,18	29,40	29,10	8,18	5,48	4,19
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	1997	2001	14,41	12,85	12,47	31,60	27,45	15,10	60,77	57,68	47,54	23,95	24,61	24,32	38,67	38,17	38,36
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2002	2006	11,35	10,70	11,09	18,41	17,61	15,12	61,53	63,00	64,68	38,79	39,57	39,01	43,62	43,84	44,36

Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2007	2009	15,08	12,56	12,32	61,51	62,53	66,34	91,40	91,31	91,63	58,39	57,50	56,59	91,92	91,32	90,66
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2010	2013	14,16	11,82	11,68	61,16	62,20	65,81	91,32	91,25	91,60	75,20	74,74	74,26	91,84	91,26	90,62
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2014	9999	15,96	14,09	14,14	60,02	61,34	65,21	99,12	99,11	99,15	96,03	97,61	98,17	96,02	95,69	95,45
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	1994	1996	12,06	11,24	10,92	12,93	11,05	8,95	19,65	22,36	21,85	29,86	29,82	29,51	6,26	4,20	3,76
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	1997	2001	14,86	12,96	10,45	28,66	23,92	20,16	58,75	56,55	46,55	25,17	25,64	25,26	38,00	37,21	37,26
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2002	2006	11,13	10,59	10,91	17,51	16,69	14,19	61,42	63,23	65,66	39,74	40,37	39,79	43,37	43,37	43,77
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2007	2009	14,11	11,92	11,89	61,73	62,77	66,78	91,26	91,37	91,76	59,36	57,67	57,38	91,47	90,74	89,97
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2010	2013	13,18	11,19	11,28	61,26	62,40	66,49	91,17	91,30	91,72	75,82	74,82	74,66	91,38	90,68	89,95
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2014	9999	15,07	13,55	13,86	60,29	61,63	65,88	99,10	99,12	99,16	96,74	97,80	98,16	95,81	95,44	95,19
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	1997	2001	15,12	13,22	11,08	27,35	21,99	18,67	57,33	55,25	45,19	26,42	26,84	26,77	38,07	36,01	34,82
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2007	2009	14,82	12,10	11,08	62,26	63,07	67,40	91,40	91,54	91,89	59,93	58,30	58,71	91,05	90,11	89,38
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2002	2006	12,71	11,99	9,67	17,25	15,70	13,12	62,64	64,66	63,21	40,69	41,27	41,10	43,87	42,68	41,90
Buses	Gasoline Urban Buses	Conventional	0	9999	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Urban Buses <15t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Urban Buses <15t	Euro I	1994	1996	19,18	17,29	17,93	64,98	64,38	65,34	64,18	59,36	56,81	25,70	27,96	31,85	80,69	79,04	79,08
Buses	Diesel Urban Buses <15t	Euro II	1997	2001	22,00	19,28	19,64	68,95	69,53	71,53	82,28	78,21	74,97	19,20	22,23	26,76	86,68	85,91	86,00
Buses	Diesel Urban Buses <15t	Euro III	2002	2006	17,34	14,77	15,40	66,31	67,30	67,27	82,14	79,67	77,43	31,27	41,19	49,10	87,89	87,33	86,64
Buses	Diesel Urban Buses <15t	Euro IV	2007	2009	23,22	17,36	12,81	82,13	82,75	85,07	95,64	94,92	94,57	56,39	59,61	63,64	98,36	98,06	97,83
Buses	Diesel Urban Buses <15t	Euro V	2010	2013	21,91	16,20	11,62	81,85	82,49	84,81	95,57	94,91	94,51	73,98	75,97	78,34	98,34	98,04	97,80
Buses	Diesel Urban Buses 15 - 18t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Urban Buses 15 - 18t	Euro I	1994	1996	14,69	12,79	11,87	53,30	50,29	48,97	45,25	41,27	35,52	38,51	39,11	40,52	58,83	55,91	53,90
Buses	Diesel Urban Buses 15 - 18t	Euro II	1997	2001	17,30	14,13	12,17	59,92	59,59	57,00	72,71	66,78	60,84	33,88	35,52	36,86	71,87	69,67	67,40
Buses	Diesel Urban Buses 15 - 18t	Euro III	2002	2006	13,33	10,21	8,28	56,14	57,37	51,77	73,49	70,02	67,33	44,22	50,21	54,47	74,05	72,45	69,52
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2007	2009	18,27	12,04	5,41	77,87	78,14	78,66	93,34	92,51	91,91	63,91	65,56	67,41	96,21	95,37	94,76
Buses	Diesel Urban Buses 15 - 18t	Euro V	2010	2013	17,09	11,02	4,36	77,61	77,91	78,39	93,29	92,44	91,82	78,49	79,52	80,66	96,18	95,33	94,71
Buses	Diesel Urban Buses >18t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Urban Buses >18t	Euro I	1994	1996	13,02	11,55	11,00	53,10	50,54	42,55	45,84	41,58	31,51	38,69	39,58	40,12	56,81	53,19	51,17
Buses	Diesel Urban Buses >18t	Euro II	1997	2001	15,64	12,70	7,01	58,65	60,18	57,11	71,05	66,18	60,82	35,41	37,06	37,96	70,55	67,39	66,73
Buses	Diesel Urban Buses >18t	Euro III	2002	2006	12,01	9,43	7,87	56,20	58,74	50,21	74,88	73,79	68,82	45,31	50,39	53,06	73,26	71,41	69,52
Buses	Diesel Urban Buses >18t	Euro IV	2007	2009	15,33	9,09	4,47	79,06	79,83	80,58	93,56	93,24	92,92	63,20	64,47	65,49	95,53	94,57	94,05
Buses	Diesel Urban Buses >18t	Euro V	2010	2013	14,29	8,13	3,44	78,89	79,66	80,38	93,49	93,15	92,82	78,07	78,86	79,49	95,49	94,52	93,98
Buses	Gasoline Coaches	Conventional	0	9999	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Coaches <15t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Coaches <15t	Euro I	1994	1996	8,28	7,70	7,47	18,93	15,68	13,60	19,31	20,59	22,44	22,57	24,07	24,64	8,47	3,14	-1,19
Buses	Diesel Coaches <15t	Euro II	1997	2001	8,76	7,42	7,07	34,56	30,80	20,45	62,13	58,30	55,34	11,40	14,43	16,14	35,38	32,63	30,64
Buses	Diesel Coaches <15t	Euro III	2002	2006	0,80	0,43	0,70	14,91	15,75	6,50	54,54	55,87	57,10	24,13	31,47	34,19	36,41	34,05	30,99

Buses	Diesel Coaches <15t	Euro IV	2007	2009	5,01	1,44	0,69	54,25	53,24	49,77	90,25	89,66	88,99	49,96	52,11	52,89	92,04	91,07	90,12
Buses	Diesel Coaches <15t	Euro V	2010	2013	2,65	-0,53	-0,93	52,50	51,58	49,26	90,05	89,49	88,84	69,67	71,16	71,91	91,83	90,88	89,96
Buses	Diesel Coaches 15 - 18t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Coaches 15 - 18t	Euro I	1994	1996	8,28	7,70	7,47	18,93	15,68	13,60	19,31	20,59	22,44	22,57	24,07	24,64	8,47	3,14	-1,19
Buses	Diesel Coaches 15 - 18t	Euro II	1997	2001	8,76	7,42	7,07	34,56	30,80	20,45	62,13	58,30	55,34	11,40	14,43	16,14	35,38	32,63	30,64
Buses	Diesel Coaches 15 - 18t	Euro III	2002	2006	0,80	0,43	0,70	14,91	15,75	6,50	54,54	55,87	57,10	24,13	31,47	34,19	36,41	34,05	30,99
Buses	Diesel Coaches 15 - 18t	Euro IV	2007	2009	5,01	1,44	0,69	54,25	53,24	49,77	90,25	89,66	88,99	49,96	52,11	52,89	92,04	91,07	90,12
Buses	Diesel Coaches 15 - 18t	Euro V	2010	2013	2,65	-0,53	-0,93	52,50	51,58	49,26	90,05	89,49	88,84	69,67	71,16	71,91	91,83	90,88	89,96
Buses	Diesel Coaches >18t	Conventional	0	1993	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Buses	Diesel Coaches >18t	Euro I	1994	1996	11,38	10,72	10,58	19,11	15,65	15,87	21,00	21,97	25,46	23,77	25,28	25,99	9,71	6,78	5,13
Buses	Diesel Coaches >18t	Euro II	1997	2001	12,90	11,45	11,20	34,56	31,66	25,53	62,65	58,54	56,71	15,63	18,15	19,50	37,83	37,12	36,81
Buses	Diesel Coaches >18t	Euro III	2002	2006	9,75	11,17	12,01	17,62	18,24	16,92	57,74	59,71	61,98	31,26	37,05	39,51	39,99	40,51	40,69
Buses	Diesel Coaches >18t	Euro IV	2007	2009	14,03	12,71	12,20	57,22	57,13	57,19	90,88	90,59	90,41	54,36	56,11	56,59	92,52	91,99	91,37
Buses	Diesel Coaches >18t	Euro V	2010	2013	11,70	10,73	10,51	56,10	56,11	56,24	90,69	90,43	90,28	72,44	73,59	73,96	92,33	91,84	91,19
Mopeds	2-stroke <50 cm³	Conventional	0	1999	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Mopeds	2-stroke <50 cm³	Euro I	2000	2003	20,00	20,00	20,00	68,71	68,71	68,71	74,43	74,43	74,43	-221,43	-221,43	-221,43	59,52	59,52	59,52
Mopeds	2-stroke <50 cm³	Euro II	2004	2014	20,00	20,00	20,00	80,95	80,95	80,95	85,23	85,23	85,23	-203,57	-203,57	-203,57	69,05	69,05	69,05
Mopeds	4-stroke <50 cm³	Euro II	2004	2014	20,00	20,00	20,00	71,43	71,43	71,43	96,02	96,02	96,02	-203,57	-203,57	-203,57	90,60	90,60	90,60
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003	0,00	0,00	0,00	33,90	33,70	33,50	60,00	60,00	60,00	0,00	0,00	0,00	0,00	0,00	0,00
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006	8,20	9,50	10,60	47,80	47,80	47,70	80,00	80,00	80,00	-38,70	-68,10	-70,70	69,10	63,70	57,60
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999	8,20	9,50	10,60	71,10	71,00	70,70	94,00	94,00	94,00	-64,90	-93,70	-98,30	83,50	80,50	77,10
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	8,20	9,50	10,60	0,00	0,00	0,00	0,00	0,00	0,00	22,10	-0,90	-15,50	89,70	88,00	85,90
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003	0,00	0,00	0,00	31,90	16,00	0,20	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006	17,60	17,20	16,30	75,70	66,50	63,40	75,00	75,00	75,00	-6,10	-5,40	-5,50	16,10	2,60	1,10
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999	28,70	33,00	35,70	86,50	81,40	79,60	75,00	75,00	75,00	16,90	9,90	-7,90	63,30	49,10	47,60
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	28,70	33,00	35,70	0,00	0,00	0,00	0,00	0,00	0,00	24,10	24,90	10,10	77,20	68,00	66,50
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003	0,00	0,00	0,00	48,20	53,80	54,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006	8,50	5,70	0,30	89,10	87,50	73,50	75,00	75,00	75,00	0,20	2,50	5,40	44,50	39,20	23,30
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999	17,10	13,40	7,90	94,00	93,10	85,40	75,00	75,00	75,00	70,40	67,00	56,50	75,00	67,20	43,00
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	17,10	13,40	7,90	0,00	0,00	0,00	0,00	0,00	0,00	85,00	83,20	78,10	84,30	79,50	64,20
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003	0,00	0,00	0,00	48,20	53,80	54,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006	2,30	7,40	11,80	89,10	87,50	73,50	75,00	75,00	75,00	-14,20	-37,30	-17,00	56,40	59,00	57,80
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999	6,40	8,70	9,30	94,00	93,10	85,40	75,00	75,00	75,00	16,90	-12,40	-23,50	84,60	81,20	73,20

Annex 2B-6: Deterioration factors in 2012

Sector	Subsector	Tech 2	FYear	LYear	COU	COR	COH	NOxU	NOxR	NOxH	VOCU	VOCR	VOCH
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	0	1969	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	1970	1978	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	1979	1980	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	1981	1985	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	1986	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	1991	1996	2,45676364	2,5358	2,5358	2,050881818	1,888	1,888	1,862736364	1,5974	1,5974
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	1997	2000	2,45676364	2,5358	2,5358	2,050881818	1,888	1,888	1,862736364	1,5974	1,5974
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2001	2005	1,43682734	1,1507381	1,1507381	1	1	1	1,175928207	1	1
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2006	2010	1,14113537	1,05078521	1,05078521	1	1	1	1,056995935	1	1
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2011	2014	0,93262402	0,98030202	0,98030202	1	1	1	0,973129172	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	1,84864636	1,76984	1,76984	2,050881818	1,888	1,888	1,891659091	1,7868	1,7868
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	1,84864636	1,76984	1,76984	2,050881818	1,888	1,888	1,891659091	1,7868	1,7868
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	1,18858397	1	1	1,281105214	1	1	1	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	1,10408306	1	1	1,154955172	1	1	1	1	1
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014	1,00889333	1	1	1,012847962	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	1,44665364	1,19748	1,19748	2,050881818	1,888	1,888	1,677460909	1,45388	1,45388
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	1,44665364	1,19748	1,19748	2,050881818	1,888	1,888	1,677460909	1,45388	1,45388
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	1,19577486	1	1	1,291840383	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	1,12718711	1	1	1,189446828	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014	1,01466181	1	1	1,02145962	1	1	1	1	1
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	0	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	1991	1996	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	1997	2000	1	1	1	1	1	1	1	1	1

Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2001	2005	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2006	2010	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2011	2014	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	1	1	1	1	1	1	1	1	1
Passenger Cars	LPG cars	Conventional	0	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	LPG cars	Euro I	1991	1996	1	1	1	1	1	1	1	1	1
Passenger Cars	LPG cars	Euro II	1997	2000	1	1	1	1	1	1	1	1	1
Passenger Cars	LPG cars	Euro III	2001	2005	1	1	1	1	1	1	1	1	1
Passenger Cars	LPG cars	Euro IV	2006	2010	1	1	1	1	1	1	1	1	1
Passenger Cars	Electric cars	Conventional	0	9999	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline <0,8 l	PRE ECE	0	1969	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	1970	1978	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline <0,8 l	ECE 15/02	1979	1980	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline <0,8 l	ECE 15/03	1981	1985	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline <0,8 l	ECE 15/04	1986	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline <0,8 l	Euro I	1991	1996	1,8900476	1,938392	1,938392	1,549472614	1,456479718	1,456479718	1,52718272	1,365015717	1,365015717
Passenger Cars	Gasoline <0,8 l	Euro II	1997	2000	2,36122605	2,43508833	2,43508833	1,966353722	1,815253853	1,815253853	1,806168374	1,558224411	1,558224411
Passenger Cars	Gasoline <0,8 l	Euro III	2001	2005	1,43155293	1,14895519	1,14895519	1	1	1	1,173806751	1	1
Passenger Cars	Gasoline <0,8 l	Euro IV	2006	2010	1,15421885	1,05520782	1,05520782	1	1	1	1,062258331	1	1
Passenger Cars	Gasoline <0,8 l	Euro V	2011	2014	0,93830805	0,98222339	0,98222339	1	1	1	0,975415386	1	1
Passenger Cars	Diesel <1,4 l	Conventional	0	1990	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel <1,4 l	Euro I	1991	1996	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel <1,4 l	Euro II	1997	2000	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel <1,4 l	Euro III	2001	2005	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel <1,4 l	Euro IV	2006	2010	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel <1,4 l	Euro V	2011	2014	1	1	1	1	1	1	1	1	1
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	1	1	1	1	1	1	1	1	1
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	2,45676364	2,5358	2,5358	2,050881818	1,888	1,888	1,862736364	1,5974	1,5974
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	2,45676364	2,5358	2,5358	2,050881818	1,888	1,888	1,862736364	1,5974	1,5974
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006	1,16742689	1	1	1,249520161	1	1	1	1	1
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011	1,08932894	1	1	1,132928986	1	1	1	1	1
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015	0,98987251	1	1	0,984452072	1	1	1	1	1

Annex 2B-7: Final fuel consumption factors (MJ/km) and emission factors (g/km) in 2012

Sector	Subsector	Tech 2	ForecastYear	Milu	Milr	Milh	FCu_MJ	FCr_MJ	FCh_MJ	FCu_g	FCr_g	FCh_g	CO_2_u	CO_2_r	CO_2_h	NO_X_u	NO_X_r	NO_X_h
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	2012	6948	17596	10159	4,336	2,409	2,748	101	56	64	305	170	194	2,051	2,062	2,023
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	2012	5025	12724	7347	3,741	1,947	2,129	87	45	50	263	137	150	2,051	2,062	2,023
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	2012	680	1722	994	3,420	1,978	2,243	80	46	52	241	139	158	1,796	2,102	2,909
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	2012	3957	10022	5786	3,420	1,978	2,243	80	46	52	241	139	158	1,864	2,253	3,276
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	2012	17966	45496	26269	3,303	1,903	2,089	77	44	49	233	134	147	1,876	2,089	2,662
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	2012	143072	362319	209195	3,045	1,838	2,017	71	43	47	214	129	142	1,148	0,531	0,864
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	2012	227787	576853	333062	3,005	1,731	1,928	70	40	45	212	122	136	0,739	0,291	0,342
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2012	335153	848750	490049	3,101	1,851	1,985	72	43	46	218	130	140	0,264	0,060	0,052
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2012	679359	1720425	993334	2,739	1,563	1,708	64	36	40	193	110	120	0,160	0,030	0,019
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2012	363791	921273	531922	2,625	1,463	1,598	61	34	37	185	103	113	0,146	0,023	0,014
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	2012	14599	36971	21346	5,093	2,935	3,346	119	69	78	359	207	236	2,401	2,683	3,130
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	2012	8722	22087	12752	4,354	2,238	2,641	102	52	62	307	158	186	2,401	2,683	3,130
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	2012	1131	2864	1654	3,965	2,220	2,614	93	52	61	279	156	184	2,031	2,377	3,283
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	2012	7136	18072	10434	3,965	2,220	2,614	93	52	61	279	156	184	2,126	2,580	3,472
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	2012	34941	88484	51089	3,960	2,151	2,280	92	50	53	279	151	161	2,354	2,757	3,524
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	2012	365004	924345	533695	3,695	2,125	2,257	86	50	53	260	150	159	1,131	0,531	0,864
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	2012	742835	1881173	1086146	3,643	2,089	2,137	85	49	50	257	147	150	0,727	0,291	0,342
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2012	754314	1910243	1102930	3,727	2,185	2,325	87	51	54	262	154	164	0,280	0,060	0,052
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2012	558941	1415476	817263	3,635	2,147	2,249	85	50	52	256	151	158	0,166	0,030	0,019
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2012	82516	208965	120652	3,503	2,031	2,127	82	47	50	247	143	150	0,144	0,023	0,014
Passenger Cars	Gasoline >2,0 l	PRE ECE	2012	6241	15805	9125	6,201	3,504	3,866	145	82	90	437	247	272	3,173	4,090	5,500
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	2012	4864	12318	7112	4,741	2,501	2,904	111	58	68	334	176	205	3,173	4,090	5,500
Passenger Cars	Gasoline >2,0 l	ECE 15/02	2012	537	1359	785	4,835	2,771	3,097	113	65	72	341	195	218	2,292	2,675	3,680
Passenger Cars	Gasoline >2,0 l	ECE 15/03	2012	1626	4119	2378	4,835	2,771	3,097	113	65	72	341	195	218	3,113	3,441	4,604
Passenger Cars	Gasoline >2,0 l	ECE 15/04	2012	5823	14747	8514	4,564	2,544	3,062	107	59	71	321	179	216	2,543	2,750	3,687
Passenger Cars	Gasoline >2,0 l	Euro I	2012	28584	72387	41795	4,793	2,711	2,848	112	63	66	338	191	201	0,993	0,531	0,864
Passenger Cars	Gasoline >2,0 l	Euro II	2012	59066	149579	86364	4,890	2,857	2,923	114	67	68	344	201	206	0,627	0,291	0,342
Passenger Cars	Gasoline >2,0 l	Euro III	2012	118155	299220	172762	4,626	2,515	2,489	108	59	58	326	177	175	0,237	0,060	0,052
Passenger Cars	Gasoline >2,0 l	Euro IV	2012	84269	213406	123216	5,586	3,202	3,107	130	75	73	393	225	219	0,142	0,030	0,019
Passenger Cars	Gasoline >2,0 l	Euro V	2012	4209	10659	6154	5,517	3,147	3,053	129	73	71	389	222	215	0,119	0,023	0,014
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	2012	48565	122988	71011	2,705	1,828	2,066	64	43	49	188	127	143	0,743	0,562	0,663
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	2012	147906	374561	216263	2,852	1,884	2,083	67	44	49	198	131	144	0,803	0,555	0,665
Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2012	625682	1584491	914849	2,766	1,854	1,946	65	44	46	192	129	135	0,883	0,665	0,750

Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2012	714935	1810517	1045350	2,715	1,809	1,899	64	43	45	188	125	132	0,665	0,424	0,576
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2012	1415407	3584409	2069555	2,578	1,687	1,769	61	40	42	179	117	123	0,818	0,521	0,708
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	2012	22421	56780	32784	3,253	1,760	2,139	77	42	51	226	122	148	0,641	0,433	0,528
Passenger Cars	Diesel >2,0 l	Euro I	2012	16926	42865	24749	3,691	2,489	2,748	87	59	65	256	173	191	0,743	0,562	0,663
Passenger Cars	Diesel >2,0 l	Euro II	2012	60694	153704	88745	3,691	2,489	2,748	87	59	65	256	173	191	0,803	0,555	0,665
Passenger Cars	Diesel >2,0 l	Euro III	2012	157901	399873	230877	3,691	2,489	2,748	87	59	65	256	173	191	0,883	0,665	0,750
Passenger Cars	Diesel >2,0 l	Euro IV	2012	146877	371956	214759	4,007	2,772	3,060	95	65	72	278	192	212	0,665	0,424	0,576
Passenger Cars	Diesel >2,0 l	Euro V	2012	202435	512650	295992	3,653	2,455	2,710	86	58	64	253	170	188	0,818	0,521	0,708
Passenger Cars	Diesel >2,0 l	Conventional	2012	5063	12821	7402	3,253	1,760	2,139	77	42	51	226	122	148	1,016	0,723	0,861
Passenger Cars	LPG cars	Euro I	2012	7	19	11	3,316	2,077	2,490	72	45	54	209	131	157	0,314	0,283	0,298
Passenger Cars	LPG cars	Euro II	2012	14	34	20	3,316	2,077	2,490	72	45	54	209	131	157	0,104	0,102	0,107
Passenger Cars	LPG cars	Euro III	2012	11	27	16	3,316	2,077	2,490	72	45	54	209	131	157	0,073	0,068	0,071
Passenger Cars	LPG cars	Euro IV	2012	17	42	24	3,316	2,077	2,490	72	45	54	209	131	157	0,039	0,037	0,039
Passenger Cars	LPG cars	Conventional	2012	11	27	16	3,980	2,070	2,484	87	45	54	251	131	157	2,034	2,584	2,861
Passenger Cars	Gasoline <0,8 l	PRE ECE	2012	220	558	322	3,357	2,025	2,477	78	47	58	236	143	174	2,051	2,062	2,023
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	2012	198	502	290	2,896	1,637	1,918	68	38	45	204	115	135	2,051	2,062	2,023
Passenger Cars	Gasoline <0,8 l	ECE 15/02	2012	6	15	8	2,648	1,663	2,021	62	39	47	186	117	142	1,796	2,102	2,909
Passenger Cars	Gasoline <0,8 l	ECE 15/03	2012	51	128	74	2,648	1,663	2,021	62	39	47	186	117	142	1,864	2,253	3,276
Passenger Cars	Gasoline <0,8 l	ECE 15/04	2012	63	160	92	2,557	1,599	1,883	60	37	44	180	113	133	1,876	2,089	2,662
Passenger Cars	Gasoline <0,8 l	Euro I	2012	138	348	201	2,357	1,545	1,818	55	36	42	166	109	128	1,011	0,410	0,666
Passenger Cars	Gasoline <0,8 l	Euro II	2012	572	1450	837	2,326	1,455	1,737	54	34	41	164	102	122	0,726	0,280	0,329
Passenger Cars	Gasoline <0,8 l	Euro III	2012	1988	5034	2907	2,401	1,556	1,789	56	36	42	169	110	126	0,264	0,060	0,052
Passenger Cars	Gasoline <0,8 l	Euro IV	2012	6034	15281	8823	2,222	1,412	1,653	52	33	39	156	99	116	0,160	0,030	0,019
Passenger Cars	Gasoline <0,8 l	Euro V	2012	515	1305	753	1,973	1,173	1,374	46	27	32	139	83	97	0,146	0,023	0,014
Passenger Cars	Diesel <1,4 l	Euro I	2012	347	878	507	1,719	1,366	1,679	41	32	40	119	95	116	0,743	0,562	0,663
Passenger Cars	Diesel <1,4 l	Euro II	2012	6688	16936	9779	1,813	1,408	1,692	43	33	40	126	98	117	0,803	0,555	0,665
Passenger Cars	Diesel <1,4 l	Euro III	2012	91206	230972	133358	1,758	1,386	1,582	42	33	37	122	96	110	0,883	0,665	0,750
Passenger Cars	Diesel <1,4 l	Euro IV	2012	140834	356652	205923	1,889	1,522	1,737	45	36	41	131	106	121	0,665	0,424	0,576
Passenger Cars	Diesel <1,4 l	Euro V	2012	273197	691850	399458	1,820	1,450	1,653	43	34	39	126	101	115	0,818	0,521	0,708
Passenger Cars	Diesel <1,4 l	Conventional	2012	40	100	58	2,068	1,315	1,738	49	31	41	143	91	121	0,641	0,433	0,528
Light Duty Vehicles	Gasoline <3,5t	Conventional	2012	5692	14238	7724	5,239	2,623	2,473	122	61	58	369	185	174	2,955	3,118	3,387
Light Duty Vehicles	Gasoline <3,5t	Euro I	2012	18381	45976	24940	6,142	3,083	2,911	143	72	68	433	217	205	1,532	0,755	0,810
Light Duty Vehicles	Gasoline <3,5t	Euro II	2012	14801	37022	20083	6,142	3,083	2,911	143	72	68	433	217	205	0,771	0,257	0,276
Light Duty Vehicles	Gasoline <3,5t	Euro III	2012	35902	89798	48713	6,142	3,083	2,911	143	72	68	433	217	205	0,322	0,084	0,090
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2012	13538	33861	18368	6,142	3,083	2,911	143	72	68	433	217	205	0,167	0,040	0,043
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	491	1229	667	6,142	3,083	2,911	143	72	68	433	217	205	0,150	0,030	0,032
Light Duty Vehicles	Diesel <3,5t	Conventional	2012	23203	58037	31483	4,309	2,815	3,080	102	66	73	299	195	214	2,052	0,843	0,834

Light Duty Vehicles	Diesel <3,5t	Euro I	2012	109438	273730	148489	3,868	2,484	2,718	91	59	64	268	172	189	1,396	0,975	1,022
Light Duty Vehicles	Diesel <3,5t	Euro II	2012	132946	332530	180386	3,868	2,484	2,718	91	59	64	268	172	189	1,396	0,975	1,022
Light Duty Vehicles	Diesel <3,5t	Euro III	2012	590213	1476262	800824	3,868	2,484	2,718	91	59	64	268	172	189	1,173	0,819	0,859
Light Duty Vehicles	Diesel <3,5t	Euro IV	2012	497535	1244453	675075	3,868	2,484	2,718	91	59	64	268	172	189	0,949	0,663	0,695
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	280459	701493	380537	3,868	2,484	2,718	91	59	64	268	172	189	0,684	0,478	0,501
Light Duty Vehicles	LPG <3,5t	Conventional	2012	6	15	8	5,919	3,105	3,726	129	68	81	373	196	235	3,058	3,876	4,291
Light Duty Vehicles	LPG <3,5t	Euro II	2012	8	19	10	4,930	3,116	3,735	107	68	81	311	197	236	0,171	0,153	0,161
Light Duty Vehicles	LPG <3,5t	Euro III	2012	32	81	44	4,930	3,116	3,735	107	68	81	311	197	236	0,115	0,102	0,107
Light Duty Vehicles	LPG <3,5t	Euro IV	2012	15	39	21	4,930	3,116	3,735	107	68	81	311	197	236	0,059	0,055	0,058
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	2012	582	2117	1092	9,855	6,570	7,227	230	153	169	694	463	509	4,500	7,500	7,500
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	2012	321	1168	603	5,338	4,739	4,824	126	112	114	370	329	335	4,211	4,104	4,476
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	2012	222	808	417	4,272	3,915	4,450	101	92	105	296	272	309	2,939	2,938	3,316
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	2012	1417	5150	2657	4,056	3,783	4,313	96	89	102	281	262	299	3,223	3,118	3,414
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2012	3616	13144	6781	4,329	3,966	4,523	102	94	107	300	275	314	2,499	2,300	2,498
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2012	4336	15759	8129	4,208	3,967	4,552	99	94	108	292	275	316	1,707	1,645	1,801
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2012	2380	8651	4463	4,076	3,810	4,362	96	90	103	283	264	303	1,957	0,821	0,447
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2012	3	12	6	4,195	3,891	4,416	99	92	104	291	270	306	0,233	0,097	0,060
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	2012	838	3045	1571	7,825	6,538	6,408	185	154	151	543	454	444	7,928	7,236	7,499
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	2012	679	2469	1274	6,656	5,787	5,836	157	137	138	462	401	405	4,729	4,306	4,464
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	2012	2288	8316	4290	6,346	5,605	5,702	150	132	135	440	389	396	5,152	4,593	4,682
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2012	5636	20485	10567	6,728	5,883	5,935	159	139	140	467	408	412	3,997	3,536	3,485
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2012	5143	18693	9643	6,467	5,814	5,916	153	137	140	449	403	410	2,728	2,512	2,488
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2012	5289	19226	9918	6,317	5,629	5,702	149	133	135	438	390	396	3,114	1,405	0,778
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2012	6	21	11	6,471	5,728	5,758	153	135	136	449	397	399	0,384	0,154	0,096
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	2012	110	400	207	8,477	6,973	6,798	200	165	161	588	484	472	8,826	7,718	7,748
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	2012	83	300	155	7,266	6,162	6,120	172	146	145	504	427	425	5,321	4,638	4,638
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	2012	263	955	493	6,970	5,979	5,961	165	141	141	483	415	413	5,815	4,975	4,889
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2012	270	982	507	7,351	6,238	6,175	174	147	146	510	433	428	4,745	3,881	3,702
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2012	303	1101	568	6,965	6,103	6,118	164	144	144	483	423	424	3,208	2,754	2,620
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2012	351	1277	659	6,828	5,922	5,890	161	140	139	474	411	409	3,478	1,582	0,881
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	2012	446	1620	836	11,173	8,785	8,248	264	207	195	775	609	572	11,287	9,455	9,120
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	2012	473	1718	886	9,088	7,350	7,020	215	174	166	630	510	487	6,721	5,601	5,385
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	2012	2391	8690	4483	8,724	7,142	6,846	206	169	162	605	495	475	7,473	6,118	5,804
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2012	6355	23099	11916	9,195	7,421	7,042	217	175	166	638	515	488	6,139	4,859	4,431
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2012	6370	23154	11944	8,587	7,177	6,916	203	170	163	596	498	480	4,079	3,400	3,171
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2012	8415	30586	15778	8,572	7,045	6,710	202	166	158	595	489	465	4,749	2,641	1,675
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2012	10	36	18	8,568	7,081	6,773	202	167	160	594	491	470	0,694	0,262	0,135

Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	2012	277	1008	520	13,489	10,388	9,495	319	245	224	936	721	659	12,251	9,862	9,114
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	2012	531	1931	996	11,521	9,050	8,362	272	214	197	799	628	580	8,634	6,952	6,468
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	2012	3222	11710	6041	11,147	8,848	8,190	263	209	193	773	614	568	9,465	7,549	6,947
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro III	2012	10842	39406	20328	11,646	9,122	8,356	275	215	197	808	633	580	7,649	6,024	5,545
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro IV	2012	11186	40657	20973	10,999	8,858	8,223	260	209	194	763	614	570	5,146	4,223	3,967
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro V	2012	14725	53523	27610	10,804	8,631	7,974	255	204	188	749	599	553	5,824	2,914	1,627
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro VI	2012	9	31	16	10,924	8,716	8,049	258	206	190	758	605	558	0,710	0,287	0,164
Heavy Duty Vehicles	Diesel RT 26 - 28t	Conventional	2012	3	10	5	14,261	11,014	9,970	337	260	235	989	764	692	12,868	10,379	9,526
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro I	2012	2	8	4	12,232	9,624	8,799	289	227	208	848	668	610	9,122	7,308	6,742
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro II	2012	3	10	5	11,823	9,401	8,622	279	222	204	820	652	598	9,876	7,848	7,164
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro III	2012	19	67	35	12,354	9,712	8,830	292	229	209	857	674	612	7,733	6,089	5,633
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro IV	2012	13	47	24	11,835	9,518	8,710	280	225	206	821	660	604	5,258	4,284	4,029
Heavy Duty Vehicles	Diesel RT 26 - 28t	Euro V	2012	32	115	59	11,469	9,153	8,338	271	216	197	796	635	578	6,554	3,004	1,426
Heavy Duty Vehicles	Diesel RT 28 - 32t	Conventional	2012	14	50	26	15,791	12,478	11,346	373	295	268	1095	866	787	14,515	11,942	11,008
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro I	2012	59	214	111	13,865	11,099	10,170	327	262	240	962	770	705	10,453	8,509	7,843
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro II	2012	1135	4125	2128	13,380	10,738	10,252	316	254	242	928	745	711	11,232	9,043	8,280
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro III	2012	7107	25832	13326	13,989	11,225	10,242	330	265	242	970	779	710	8,883	7,017	6,445
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro IV	2012	8262	30029	15491	13,525	11,089	10,149	319	262	240	938	769	704	5,978	5,101	4,533
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro V	2012	9313	33852	17463	13,087	10,653	9,720	309	252	230	908	739	674	6,484	2,684	1,391
Heavy Duty Vehicles	Diesel RT 28 - 32t	Euro VI	2012	9	33	17	13,430	10,924	9,951	317	258	235	932	758	690	0,638	0,290	0,191
Heavy Duty Vehicles	Diesel RT >32t	Euro I	2012	2	9	4	14,022	10,936	9,924	331	258	234	973	759	688	10,614	8,446	7,666
Heavy Duty Vehicles	Diesel RT >32t	Euro III	2012	29	105	54	14,133	11,011	9,928	334	260	234	980	764	689	9,225	7,224	6,550
Heavy Duty Vehicles	Diesel RT >32t	Euro IV	2012	12	43	22	13,512	10,782	9,803	319	255	232	937	748	680	6,270	5,071	4,708
Heavy Duty Vehicles	Diesel RT >32t	Euro V	2012	53	191	99	13,145	10,402	9,416	310	246	222	912	722	653	6,646	2,837	1,521
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Conventional	2012	146	1471	1953	14,181	10,863	9,705	335	257	229	984	753	673	13,305	10,460	9,286
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro I	2012	145	1468	1951	12,683	9,797	8,769	300	231	207	880	680	608	9,509	7,408	6,570
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro II	2012	728	7355	9770	11,962	9,377	8,674	283	221	205	830	650	602	10,046	7,771	6,867
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro III	2012	1944	19642	26091	12,594	9,760	8,699	297	231	205	874	677	603	8,110	6,154	5,397
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro IV	2012	1938	19586	26016	12,093	9,572	8,567	286	226	202	839	664	594	5,531	4,329	3,837
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro V	2012	2556	25828	34308	11,833	9,300	8,288	279	220	196	821	645	575	5,295	2,493	1,513
Heavy Duty Vehicles	Diesel TT/AT 28 - 34t	Euro VI	2012	3	30	40	11,973	9,411	8,396	283	222	198	831	653	582	0,531	0,245	0,167
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Conventional	2012	180	1822	2420	16,449	12,410	10,920	388	293	258	1141	861	758	15,378	11,908	10,419
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro I	2012	274	2770	3680	14,440	11,007	9,732	341	260	230	1002	763	675	10,891	8,408	7,387
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro II	2012	1551	15673	20819	14,078	10,815	9,559	333	255	226	977	750	663	11,695	8,978	7,885
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro III	2012	6038	61004	81032	14,582	11,081	9,709	344	262	229	1011	769	673	9,414	7,197	6,354
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro IV	2012	6168	62317	82777	13,969	10,851	9,575	330	256	226	969	753	664	6,398	5,061	4,523
Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro V	2012	16507	166787	221545	13,690	10,560	9,283	323	249	219	950	733	644	6,079	2,869	1,752

Heavy Duty Vehicles	Diesel TT/AT 34 - 40t	Euro VI	2012	25	254	337	13,824	10,661	9,376	326	252	221	959	740	650	0,610	0,285	0,191
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Conventional	2012	57	574	763	18,259	13,816	12,105	431	326	286	1267	958	840	17,311	13,363	11,617
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro I	2012	145	1464	1945	16,056	12,263	10,784	379	290	255	1114	851	748	12,142	9,377	8,189
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	2012	1137	11486	15258	15,545	12,026	10,840	367	284	256	1078	834	752	12,955	9,936	8,683
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2012	10842	109550	145517	16,227	12,353	10,785	383	292	255	1126	857	748	10,432	7,969	6,995
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2012	17764	179492	238421	15,683	12,170	10,666	370	287	252	1088	844	740	7,035	5,657	4,952
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2012	27152	274346	364417	15,260	11,749	10,255	360	277	242	1059	815	711	6,358	2,665	1,525
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2012	62	631	838	15,508	11,944	10,428	366	282	246	1076	828	723	0,564	0,294	0,214
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	2012	3	29	39	18,764	14,443	12,810	443	341	303	1302	1002	889	15,566	11,836	10,222
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2012	6	56	74	18,830	14,628	12,811	445	345	303	1306	1015	889	8,477	6,746	5,764
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2012	5	52	69	19,297	14,647	13,013	456	346	307	1339	1016	903	12,548	9,501	8,223
Buses	Gasoline Urban Buses	Conventional	2012	123	126	19	9,855	6,570	7,227	230	153	169	694	463	509	4,500	7,500	7,500
Buses	Diesel Urban Buses <15t	Conventional	2012	99	101	16	11,353	9,012	8,430	268	213	199	788	625	585	9,347	7,678	7,133
Buses	Diesel Urban Buses <15t	Euro I	2012	220	224	35	9,175	7,454	6,918	217	176	163	636	517	480	6,945	5,531	4,861
Buses	Diesel Urban Buses <15t	Euro II	2012	1599	1629	251	8,856	7,275	6,774	209	172	160	614	505	470	7,552	5,971	5,224
Buses	Diesel Urban Buses <15t	Euro III	2012	10945	11148	1721	9,384	7,682	7,132	222	181	168	651	533	495	6,425	4,515	3,631
Buses	Diesel Urban Buses <15t	Euro IV	2012	27476	27985	4320	8,717	7,448	7,350	206	176	174	605	517	510	4,076	3,101	2,593
Buses	Diesel Urban Buses <15t	Euro V	2012	22441	22857	3528	8,470	7,314	6,949	200	173	164	588	507	482	4,841	2,676	1,933
Buses	Diesel Urban Buses 15 - 18t	Conventional	2012	2368	2412	372	14,440	11,180	9,824	341	264	232	1002	775	681	15,108	12,139	10,803
Buses	Diesel Urban Buses 15 - 18t	Euro I	2012	3440	3504	541	12,320	9,750	8,658	291	230	204	855	676	601	9,289	7,392	6,426
Buses	Diesel Urban Buses 15 - 18t	Euro II	2012	15359	15643	2415	11,941	9,600	8,628	282	227	204	828	666	599	9,989	7,828	6,822
Buses	Diesel Urban Buses 15 - 18t	Euro III	2012	36728	37408	5775	12,516	10,038	9,011	296	237	213	868	696	625	8,427	6,044	4,919
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2012	35723	36385	5617	11,802	9,834	9,293	279	232	219	819	682	645	5,452	4,181	3,521
Buses	Diesel Urban Buses 15 - 18t	Euro V	2012	32710	33315	5143	11,432	9,470	8,955	270	224	212	793	657	621	6,085	2,796	2,156
Buses	Diesel Urban Buses >18t	Conventional	2012	17	18	3	18,125	14,109	12,176	428	333	288	1257	979	845	19,310	15,492	13,433
Buses	Diesel Urban Buses >18t	Euro I	2012	22	22	3	15,764	12,479	10,836	372	295	256	1093	866	752	11,840	9,361	8,043
Buses	Diesel Urban Buses >18t	Euro II	2012	1516	1544	238	15,291	12,318	11,322	361	291	267	1061	854	785	12,472	9,751	8,334
Buses	Diesel Urban Buses >18t	Euro III	2012	13813	14069	2172	15,947	12,779	11,217	377	302	265	1106	886	778	10,561	7,685	6,305
Buses	Diesel Urban Buses >18t	Euro IV	2012	18428	18769	2897	15,345	12,827	11,632	362	303	275	1064	890	807	7,106	5,505	4,635
Buses	Diesel Urban Buses >18t	Euro V	2012	15048	15326	2366	14,836	12,376	11,243	350	292	266	1029	858	780	5,523	2,620	1,912
Buses	Gasoline Coaches	Conventional	2012	1872	3581	1228	9,855	6,570	7,227	230	153	169	694	463	509	4,500	7,500	7,500
Buses	Diesel Coaches <15t	Conventional	2012	4254	8136	2789	13,080	9,616	8,499	309	227	201	907	667	590	11,324	8,822	8,156
Buses	Diesel Coaches <15t	Euro I	2012	2604	4981	1707	11,998	8,875	7,864	283	210	186	832	616	546	8,768	6,699	6,147
Buses	Diesel Coaches <15t	Euro II	2012	11020	21079	7226	11,934	8,902	7,898	282	210	187	828	618	548	10,033	7,549	6,840
Buses	Diesel Coaches <15t	Euro III	2012	10135	19386	6646	12,975	9,574	8,440	306	226	199	900	664	585	8,591	6,046	5,368
Buses	Diesel Coaches <15t	Euro IV	2012	7627	14589	5001	12,425	9,478	8,441	293	224	199	862	657	586	5,666	4,225	3,842
Buses	Diesel Coaches <15t	Euro V	2012	4004	7660	2626	12,141	9,185	8,144	287	217	192	842	637	565	7,922	3,947	2,471

Buses	Diesel Coaches 15 - 18t	Conventional	2012	2075	3969	1361	13,080	9,616	8,499	309	227	201	907	667	590	11,324	8,822	8,156
Buses	Diesel Coaches 15 - 18t	Euro I	2012	1170	2239	767	11,998	8,875	7,864	283	210	186	832	616	546	8,768	6,699	6,147
Buses	Diesel Coaches 15 - 18t	Euro II	2012	3042	5819	1995	11,934	8,902	7,898	282	210	187	828	618	548	10,033	7,549	6,840
Buses	Diesel Coaches 15 - 18t	Euro III	2012	1591	3043	1043	12,975	9,574	8,440	306	226	199	900	664	585	8,591	6,046	5,368
Buses	Diesel Coaches 15 - 18t	Euro IV	2012	1092	2089	716	12,425	9,478	8,441	293	224	199	862	657	586	5,666	4,225	3,842
Buses	Diesel Coaches 15 - 18t	Euro V	2012	1012	1935	663	12,141	9,185	8,144	287	217	192	842	637	565	7,922	3,947	2,471
Buses	Diesel Coaches >18t	Conventional	2012	298	569	195	15,881	11,649	10,271	375	275	243	1102	808	712	14,084	10,772	9,735
Buses	Diesel Coaches >18t	Euro I	2012	278	532	182	14,074	10,400	9,184	332	246	217	976	721	637	10,737	8,049	7,206
Buses	Diesel Coaches >18t	Euro II	2012	2343	4481	1536	13,832	10,315	9,121	327	244	215	959	716	633	11,883	8,817	7,837
Buses	Diesel Coaches >18t	Euro III	2012	7075	13534	4639	14,333	10,348	9,037	339	244	213	994	718	627	9,681	6,781	5,889
Buses	Diesel Coaches >18t	Euro IV	2012	5175	9899	3393	13,653	10,168	9,018	322	240	213	947	705	626	6,428	4,728	4,226
Buses	Diesel Coaches >18t	Euro V	2012	2853	5457	1871	13,421	9,918	8,750	317	234	207	931	688	607	8,476	4,163	2,596
Mopeds	2-stroke <50 cm³	Conventional	2012	40304	26869	0	1,095	1,095		26	26		77	77		0,056	0,056	
Mopeds	2-stroke <50 cm³	Euro I	2012	22486	14991	0	0,876	0,876		20	20		62	62		0,180	0,180	
Mopeds	2-stroke <50 cm³	Euro II	2012	53127	35418	0	0,876	0,876		20	20		62	62		0,170	0,170	
Mopeds	4-stroke <50 cm³	Euro II	2012	17709	11806	0	0,876	0,876		20	20		62	62		0,170	0,170	
Motorcycles	2-stroke >50 cm³	Conventional	2012	10671	9188	3477	1,188	1,240	1,736	28	29	41	84	87	122	0,029	0,030	0,035
Motorcycles	2-stroke >50 cm³	Euro I	2012	2038	1755	664	1,188	1,240	1,736	28	29	41	84	87	122	0,029	0,030	0,035
Motorcycles	2-stroke >50 cm³	Euro II	2012	2617	2254	853	1,090	1,122	1,552	25	26	36	77	79	109	0,040	0,050	0,060
Motorcycles	2-stroke >50 cm³	Euro III	2012	4228	3640	1378	1,090	1,122	1,552	25	26	36	77	79	109	0,048	0,058	0,069
Motorcycles	4-stroke <250 cm³	Conventional	2012	21578	18579	7032	1,086	1,204	1,579	25	28	37	76	85	111	0,237	0,428	0,655
Motorcycles	4-stroke <250 cm³	Euro I	2012	4121	3548	1343	1,183	1,331	1,766	28	31	41	83	94	124	0,304	0,424	0,567
Motorcycles	4-stroke <250 cm³	Euro II	2012	5293	4557	1725	0,975	1,102	1,479	23	26	35	69	78	104	0,323	0,447	0,598
Motorcycles	4-stroke <250 cm³	Euro III	2012	8549	7361	2786	0,844	0,892	1,136	20	21	27	59	63	80	0,253	0,382	0,612
Motorcycles	4-stroke 250 - 750 cm³	Conventional	2012	59341	51093	19337	1,167	1,041	1,166	27	24	27	82	73	82	0,196	0,300	0,548
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2012	11332	9757	3693	1,637	1,554	1,813	38	36	42	115	109	128	0,258	0,400	0,610
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2012	14555	12532	4743	1,498	1,465	1,808	35	34	42	105	103	127	0,257	0,390	0,577
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2012	23511	20243	7661	1,357	1,345	1,670	32	31	39	96	95	118	0,076	0,132	0,265
Motorcycles	4-stroke >750 cm³	Conventional	2012	26973	23224	8790	1,565	1,557	1,916	37	36	45	110	110	135	0,019	0,030	0,086
Motorcycles	4-stroke >750 cm³	Euro I	2012	5151	4435	1679	1,888	1,798	2,081	44	42	49	133	127	147	0,125	0,178	0,392
Motorcycles	4-stroke >750 cm³	Euro II	2012	6616	5697	2156	1,844	1,665	1,835	43	39	43	130	117	129	0,143	0,244	0,459
Motorcycles	4-stroke >750 cm³	Euro III	2012	10687	9201	3482	1,767	1,641	1,887	41	38	44	124	116	133	0,104	0,200	0,484

Sector	Subsector	Tech 2	Forecast Year	CO_u	CO_r	CO_h	VOC_u	VOC_r	VOC_h	TSP_u	TSP_r	TSP_h	CH_4_u	CH_4_r	CH_4_h	NMVOC _u	NMVOC _r	NMVOC _h	N_2O_u	N_2O_r	N_2O_h
Passenger Cars	Gasoline 0,8 - 1,4 l	PRE ECE	2012	91,825	19,333	15,520	10,514	1,991	1,285	0,063	0,044	0,041	0,219	0,029	0,026	10,295	1,962	1,259	0,010	0,007	0,007
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/00-01	2012	63,319	14,480	18,620	9,073	1,634	1,158	0,063	0,044	0,041	0,219	0,029	0,026	8,854	1,605	1,132	0,010	0,007	0,007
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/02	2012	52,946	8,200	8,260	8,928	1,429	0,985	0,063	0,044	0,041	0,219	0,029	0,026	8,709	1,400	0,959	0,010	0,007	0,007
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/03	2012	55,927	8,793	7,620	8,852	1,423	0,985	0,042	0,029	0,029	0,219	0,029	0,026	8,633	1,394	0,959	0,010	0,007	0,007
Passenger Cars	Gasoline 0,8 - 1,4 l	ECE 15/04	2012	30,337	4,956	4,292	7,844	1,251	0,732	0,030	0,020	0,020	0,219	0,029	0,026	7,625	1,222	0,706	0,010	0,007	0,007
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro I	2012	26,783	3,478	4,477	2,524	0,204	0,178	0,003	0,002	0,002	0,048	0,016	0,014	2,475	0,188	0,164	0,018	0,011	0,005
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro II	2012	17,782	1,457	1,901	1,401	0,084	0,068	0,003	0,002	0,002	0,067	0,013	0,011	1,334	0,071	0,057	0,013	0,005	0,003
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro III	2012	14,663	0,795	1,322	0,778	0,024	0,026	0,001	0,001	0,001	0,033	0,002	0,004	0,745	0,022	0,022	0,004	0,000	0,000
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro IV	2012	4,263	0,301	0,555	0,474	0,021	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,460	0,019	0,013	0,003	0,000	0,000
Passenger Cars	Gasoline 0,8 - 1,4 l	Euro V	2012	4,222	0,281	0,518	0,492	0,023	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,478	0,020	0,013	0,003	0,000	0,000
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	2012	91,825	19,333	15,520	10,331	1,975	1,283	0,063	0,044	0,041	0,219	0,029	0,026	10,112	1,946	1,257	0,010	0,007	0,007
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	2012	63,319	14,480	18,620	8,932	1,622	1,157	0,063	0,044	0,041	0,219	0,029	0,026	8,713	1,593	1,131	0,010	0,007	0,007
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	2012	52,946	8,200	8,260	8,804	1,418	0,984	0,063	0,044	0,041	0,219	0,029	0,026	8,585	1,389	0,958	0,010	0,007	0,007
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	2012	55,927	8,793	7,620	8,746	1,413	0,984	0,042	0,029	0,029	0,219	0,029	0,026	8,527	1,384	0,958	0,010	0,007	0,007
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	2012	30,337	4,956	4,292	7,747	1,243	0,731	0,030	0,020	0,020	0,219	0,029	0,026	7,528	1,213	0,705	0,010	0,007	0,007
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	2012	19,478	2,427	3,124	2,797	0,225	0,199	0,003	0,002	0,002	0,048	0,016	0,014	2,749	0,209	0,185	0,018	0,011	0,005
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	2012	12,894	1,017	1,326	1,548	0,092	0,076	0,003	0,002	0,002	0,067	0,013	0,011	1,481	0,079	0,065	0,013	0,005	0,003
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2012	10,670	0,691	1,148	0,854	0,022	0,026	0,001	0,001	0,001	0,033	0,002	0,004	0,821	0,020	0,022	0,004	0,000	0,000
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2012	3,134	0,287	0,529	0,514	0,020	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,500	0,018	0,013	0,003	0,000	0,000
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2012	3,115	0,287	0,529	0,521	0,021	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,507	0,018	0,013	0,003	0,000	0,000
Passenger Cars	Gasoline >2,0 l	PRE ECE	2012	91,825	19,333	15,520	10,241	1,967	1,283	0,063	0,044	0,041	0,219	0,029	0,026	10,022	1,938	1,257	0,010	0,007	0,007
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	2012	63,319	14,480	18,620	8,862	1,616	1,156	0,063	0,044	0,041	0,219	0,029	0,026	8,643	1,587	1,130	0,010	0,007	0,007
Passenger Cars	Gasoline >2,0 l	ECE 15/02	2012	52,946	8,200	8,260	8,742	1,413	0,984	0,063	0,044	0,041	0,219	0,029	0,026	8,523	1,384	0,958	0,010	0,007	0,007
Passenger Cars	Gasoline >2,0 l	ECE 15/03	2012	55,927	8,793	7,620	8,699	1,409	0,984	0,042	0,029	0,029	0,219	0,029	0,026	8,480	1,380	0,958	0,010	0,007	0,007
Passenger Cars	Gasoline >2,0 l	ECE 15/04	2012	30,337	4,956	4,292	7,697	1,238	0,731	0,030	0,020	0,020	0,219	0,029	0,026	7,478	1,209	0,705	0,010	0,007	0,007
Passenger Cars	Gasoline >2,0 l	Euro I	2012	13,524	1,642	2,114	1,928	0,184	0,162	0,003	0,002	0,002	0,048	0,016	0,014	1,880	0,168	0,148	0,018	0,011	0,005
Passenger Cars	Gasoline >2,0 l	Euro II	2012	8,853	0,688	0,897	1,064	0,076	0,062	0,003	0,002	0,002	0,067	0,013	0,011	0,997	0,063	0,051	0,013	0,005	0,003
Passenger Cars	Gasoline >2,0 l	Euro III	2012	7,422	0,691	1,148	0,584	0,022	0,026	0,001	0,001	0,001	0,033	0,002	0,004	0,551	0,020	0,022	0,004	0,000	0,000
Passenger Cars	Gasoline >2,0 l	Euro IV	2012	2,195	0,287	0,529	0,360	0,020	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,345	0,017	0,013	0,003	0,000	0,000
Passenger Cars	Gasoline >2,0 l	Euro V	2012	2,173	0,287	0,529	0,364	0,020	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,349	0,018	0,013	0,003	0,000	0,000
Passenger Cars	Diesel 1,4 - 2,0 l	Euro I	2012	0,746	0,215	0,208	0,140	0,031	0,026	0,145	0,062	0,107	0,019	0,009	0,003	0,120	0,022	0,023	0,002	0,004	0,004
Passenger Cars	Diesel 1,4 - 2,0 l	Euro II	2012	0,611	0,110	0,035	0,091	0,021	0,015	0,119	0,039	0,050	0,006	0,003	0,002	0,085	0,018	0,013	0,003	0,006	0,006
Passenger Cars	Diesel 1,4 - 2,0 l	Euro III	2012	0,176	0,041	0,012	0,048	0,011	0,009	0,075	0,030	0,045	0,003	0,000	0,000	0,045	0,011	0,009	0,016	0,004	0,004
Passenger Cars	Diesel 1,4 - 2,0 l	Euro IV	2012	0,148	0,034	0,021	0,029	0,006	0,006	0,074	0,024	0,026	0,000	0,000	0,000	0,029	0,006	0,006	0,016	0,004	0,004
Passenger Cars	Diesel 1,4 - 2,0 l	Euro V	2012	0,148	0,034	0,021	0,029	0,006	0,006	0,015	0,005	0,005	0,000	0,000	0,000	0,029	0,006	0,006	0,016	0,004	0,004
Passenger Cars	Diesel 1,4 - 2,0 l	Conventional	2012	1,158	0,472	0,384	0,384	0,086	0,062	0,507	0,132	0,170	0,021	0,012	0,008	0,363	0,074	0,054	0,000	0,000	0,000

Passenger Cars	Diesel >2,0 l	Euro I	2012	0,746	0,215	0,208	0,211	0,046	0,034	0,145	0,062	0,107	0,019	0,009	0,003	0,192	0,037	0,031	0,002	0,004	0,004
Passenger Cars	Diesel >2,0 l	Euro II	2012	0,611	0,110	0,035	0,258	0,058	0,038	0,119	0,039	0,050	0,006	0,003	0,002	0,252	0,055	0,036	0,003	0,006	0,006
Passenger Cars	Diesel >2,0 l	Euro III	2012	0,176	0,041	0,012	0,101	0,017	0,012	0,075	0,030	0,045	0,003	0,000	0,000	0,098	0,017	0,012	0,016	0,004	0,004
Passenger Cars	Diesel >2,0 l	Euro IV	2012	0,148	0,034	0,021	0,029	0,006	0,006	0,074	0,024	0,026	0,000	0,000	0,000	0,029	0,006	0,006	0,016	0,004	0,004
Passenger Cars	Diesel >2,0 l	Euro V	2012	0,148	0,034	0,021	0,029	0,006	0,006	0,015	0,005	0,005	0,000	0,000	0,000	0,029	0,006	0,006	0,016	0,004	0,004
Passenger Cars	Diesel >2,0 l	Conventional	2012	1,158	0,472	0,384	0,384	0,086	0,062	0,507	0,132	0,170	0,021	0,012	0,008	0,363	0,074	0,054	0,000	0,000	0,000
Passenger Cars	LPG cars	Euro I	2012	4,312	1,445	3,560	0,456	0,071	0,083	0,040	0,030	0,025	0,080	0,035	0,025	0,376	0,036	0,058	0,041	0,013	0,008
Passenger Cars	LPG cars	Euro II	2012	3,052	0,982	2,421	0,172	0,015	0,017	0,040	0,030	0,025	0,019	0,008	0,006	0,152	0,007	0,011	0,021	0,003	0,002
Passenger Cars	LPG cars	Euro III	2012	2,595	0,809	1,993	0,105	0,011	0,012	0,040	0,030	0,025	0,013	0,006	0,004	0,092	0,005	0,008	0,006	0,002	0,001
Passenger Cars	LPG cars	Euro IV	2012	0,986	0,491	1,210	0,046	0,002	0,002	0,040	0,030	0,025	0,004	0,002	0,001	0,042	0,000	0,001	0,006	0,002	0,001
Passenger Cars	LPG cars	Conventional	2012	6,725	2,373	9,723	2,063	0,667	0,490	0,040	0,030	0,025	0,080	0,035	0,025	1,983	0,632	0,465	0,000	0,000	0,000
Passenger Cars	Gasoline <0,8 l	PRE ECE	2012	91,825	19,333	15,520	10,501	1,990	1,285	0,063	0,044	0,041	0,219	0,029	0,026	10,283	1,961	1,259	0,010	0,007	0,007
Passenger Cars	Gasoline <0,8 l	ECE 15/00-01	2012	63,319	14,480	18,620	9,099	1,636	1,158	0,063	0,044	0,041	0,219	0,029	0,026	8,880	1,607	1,132	0,010	0,007	0,007
Passenger Cars	Gasoline <0,8 l	ECE 15/02	2012	52,946	8,200	8,260	8,931	1,430	0,985	0,063	0,044	0,041	0,219	0,029	0,026	8,713	1,400	0,959	0,010	0,007	0,007
Passenger Cars	Gasoline <0,8 l	ECE 15/03	2012	55,927	8,793	7,620	8,875	1,425	0,985	0,042	0,029	0,029	0,219	0,029	0,026	8,656	1,395	0,959	0,010	0,007	0,007
Passenger Cars	Gasoline <0,8 l	ECE 15/04	2012	30,337	4,956	4,292	7,853	1,252	0,732	0,030	0,020	0,020	0,219	0,029	0,026	7,634	1,223	0,706	0,010	0,007	0,007
Passenger Cars	Gasoline <0,8 l	Euro I	2012	25,783	2,659	3,422	2,465	0,176	0,152	0,003	0,002	0,002	0,048	0,016	0,014	2,416	0,160	0,138	0,016	0,009	0,004
Passenger Cars	Gasoline <0,8 l	Euro II	2012	17,719	1,399	1,825	1,396	0,082	0,066	0,003	0,002	0,002	0,067	0,013	0,011	1,329	0,069	0,055	0,012	0,005	0,003
Passenger Cars	Gasoline <0,8 l	Euro III	2012	14,660	0,794	1,320	0,778	0,024	0,026	0,001	0,001	0,001	0,033	0,002	0,004	0,745	0,022	0,022	0,004	0,000	0,000
Passenger Cars	Gasoline <0,8 l	Euro IV	2012	4,266	0,303	0,558	0,474	0,021	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,460	0,019	0,013	0,003	0,000	0,000
Passenger Cars	Gasoline <0,8 l	Euro V	2012	4,223	0,282	0,519	0,487	0,023	0,018	0,001	0,001	0,001	0,014	0,003	0,005	0,473	0,020	0,013	0,003	0,000	0,000
Passenger Cars	Diesel <1,4 l	Euro I	2012	0,746	0,215	0,208	0,140	0,031	0,026	0,057	0,062	0,107	0,019	0,009	0,003	0,120	0,022	0,023	0,002	0,004	0,004
Passenger Cars	Diesel <1,4 l	Euro II	2012	0,611	0,110	0,035	0,091	0,021	0,015	0,047	0,039	0,050	0,006	0,003	0,002	0,085	0,018	0,013	0,003	0,006	0,006
Passenger Cars	Diesel <1,4 l	Euro III	2012	0,176	0,041	0,012	0,048	0,011	0,009	0,029	0,030	0,045	0,003	0,000	0,000	0,045	0,011	0,009	0,016	0,004	0,004
Passenger Cars	Diesel <1,4 l	Euro IV	2012	0,148	0,034	0,021	0,029	0,006	0,006	0,029	0,024	0,026	0,000	0,000	0,000	0,029	0,006	0,006	0,016	0,004	0,004
Passenger Cars	Diesel <1,4 l	Euro V	2012	0,148	0,034	0,021	0,029	0,006	0,006	0,006	0,005	0,005	0,000	0,000	0,000	0,029	0,006	0,006	0,016	0,004	0,004
Passenger Cars	Diesel <1,4 l	Conventional	2012	1,158	0,472	0,384	0,384	0,086	0,062	0,199	0,132	0,170	0,021	0,012	0,008	0,363	0,074	0,054	0,000	0,000	0,000
Light Duty Vehicles	Gasoline <3,5t	Conventional	2012	48,873	6,075	7,389	8,118	1,030	0,477	0,040	0,040	0,040	0,208	0,040	0,025	7,910	0,990	0,452	0,010	0,007	0,007
Light Duty Vehicles	Gasoline <3,5t	Euro I	2012	35,603	2,186	2,756	2,364	0,184	0,125	0,003	0,002	0,002	0,048	0,016	0,014	2,316	0,168	0,111	0,047	0,027	0,013
Light Duty Vehicles	Gasoline <3,5t	Euro II	2012	24,502	1,333	1,681	1,229	0,050	0,031	0,003	0,002	0,002	0,066	0,013	0,011	1,163	0,037	0,020	0,074	0,016	0,010
Light Duty Vehicles	Gasoline <3,5t	Euro III	2012	18,238	0,448	0,565	0,706	0,023	0,012	0,001	0,001	0,001	0,032	0,002	0,004	0,674	0,021	0,008	0,011	0,001	0,001
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2012	5,834	0,241	0,304	0,422	0,013	0,005	0,001	0,001	0,001	0,013	0,002	0,000	0,409	0,011	0,005	0,004	0,000	0,000
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	5,717	0,241	0,304	0,462	0,017	0,006	0,001	0,001	0,001	0,013	0,002	0,000	0,449	0,015	0,006	0,003	0,000	0,000
Light Duty Vehicles	Diesel <3,5t	Conventional	2012	1,976	1,009	1,060	0,339	0,106	0,101	0,715	0,303	0,322	0,021	0,012	0,008	0,318	0,094	0,093	0,000	0,000	0,000
Light Duty Vehicles	Diesel <3,5t	Euro I	2012	0,691	0,328	0,423	0,339	0,106	0,101	0,175	0,066	0,090	0,019	0,009	0,003	0,320	0,097	0,098	0,002	0,004	0,004
Light Duty Vehicles	Diesel <3,5t	Euro II	2012	0,691	0,328	0,423	0,339	0,106	0,101	0,175	0,066	0,090	0,006	0,003	0,002	0,333	0,103	0,099	0,003	0,006	0,006
Light Duty Vehicles	Diesel <3,5t	Euro III	2012	0,566	0,269	0,347	0,210	0,065	0,063	0,117	0,044	0,061	0,003	0,000	0,000	0,207	0,065	0,063	0,016	0,004	0,004

Light Duty Vehicles	Diesel <3,5t	Euro IV	2012	0,449	0,213	0,275	0,078	0,024	0,023	0,061	0,023	0,032	0,000	0,000	0,000	0,078	0,024	0,023	0,016	0,004	0,004
Light Duty Vehicles	Diesel <3,5t	Euro V	2012	0,449	0,213	0,275	0,078	0,024	0,023	0,003	0,001	0,002	0,000	0,000	0,000	0,078	0,024	0,023	0,016	0,004	0,004
Light Duty Vehicles	LPG <3,5t	Conventional	2012	9,896	3,559	14,584	3,055	1,000	0,735	0,060	0,045	0,038	0,120	0,053	0,038	2,935	0,948	0,697	0,000	0,000	0,000
Light Duty Vehicles	LPG <3,5t	Euro II	2012	4,052	1,474	3,631	0,177	0,022	0,026	0,060	0,045	0,038	0,029	0,013	0,009	0,148	0,010	0,017	0,025	0,005	0,003
Light Duty Vehicles	LPG <3,5t	Euro III	2012	1,889	1,214	2,990	0,111	0,016	0,019	0,060	0,045	0,038	0,019	0,008	0,006	0,092	0,008	0,013	0,009	0,003	0,002
Light Duty Vehicles	LPG <3,5t	Euro IV	2012	1,456	0,737	1,815	0,068	0,003	0,004	0,060	0,045	0,038	0,006	0,003	0,002	0,062	0,001	0,002	0,009	0,003	0,002
Heavy Duty Vehicles	Gasoline >3,5t	Conventional	2012	70,000	55,000	55,000	7,000	5,500	3,500	0,400	0,400	0,400	0,140	0,110	0,070	6,860	5,390	3,430	0,006	0,006	0,006
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Conventional	2012	2,060	1,509	1,351	1,298	0,789	0,576	0,321	0,240	0,216	0,085	0,023	0,020	1,213	0,766	0,556	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro I	2012	0,668	0,501	0,546	0,253	0,167	0,130	0,126	0,095	0,090	0,085	0,023	0,020	0,168	0,144	0,110	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro II	2012	0,534	0,466	0,461	0,171	0,111	0,086	0,053	0,048	0,055	0,054	0,020	0,019	0,116	0,091	0,067	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro III	2012	0,660	0,481	0,452	0,162	0,102	0,077	0,062	0,045	0,039	0,048	0,021	0,018	0,114	0,081	0,058	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro IV	2012	0,342	0,270	0,258	0,022	0,017	0,017	0,015	0,013	0,014	0,003	0,002	0,001	0,020	0,016	0,015	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro V	2012	0,642	0,591	0,589	0,011	0,008	0,007	0,014	0,010	0,009	0,003	0,002	0,001	0,009	0,007	0,006	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 3,5 - 7,5t	Euro VI	2012	0,355	0,276	0,260	0,011	0,008	0,007	0,001	0,001	0,001	0,001	0,000	0,000	0,010	0,008	0,007	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Conventional	2012	2,358	1,698	1,525	0,957	0,589	0,449	0,330	0,236	0,207	0,085	0,023	0,020	0,872	0,566	0,429	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro I	2012	1,086	0,817	0,766	0,389	0,258	0,208	0,201	0,144	0,131	0,085	0,023	0,020	0,304	0,235	0,188	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro II	2012	0,868	0,727	0,717	0,263	0,172	0,137	0,085	0,072	0,083	0,054	0,020	0,019	0,208	0,152	0,118	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro III	2012	1,084	0,771	0,733	0,252	0,157	0,120	0,096	0,067	0,058	0,048	0,021	0,018	0,204	0,136	0,102	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro IV	2012	0,553	0,418	0,369	0,035	0,025	0,022	0,023	0,019	0,019	0,003	0,002	0,001	0,032	0,024	0,021	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro V	2012	1,003	0,820	0,772	0,019	0,014	0,012	0,024	0,017	0,015	0,003	0,002	0,001	0,017	0,012	0,011	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 7,5 - 12t	Euro VI	2012	0,583	0,431	0,373	0,017	0,012	0,010	0,002	0,002	0,002	0,001	0,000	0,000	0,016	0,012	0,010	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Conventional	2012	2,546	1,876	1,693	1,012	0,646	0,509	0,351	0,254	0,233	0,085	0,023	0,020	0,927	0,623	0,489	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro I	2012	1,200	0,918	0,866	0,429	0,279	0,229	0,218	0,159	0,147	0,085	0,023	0,020	0,344	0,256	0,209	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro II	2012	0,985	0,820	0,804	0,281	0,186	0,150	0,101	0,086	0,101	0,054	0,020	0,019	0,227	0,166	0,131	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro III	2012	1,176	0,873	0,835	0,260	0,168	0,134	0,104	0,075	0,068	0,048	0,021	0,018	0,212	0,147	0,116	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro IV	2012	0,599	0,448	0,410	0,034	0,025	0,024	0,024	0,020	0,020	0,003	0,002	0,001	0,031	0,024	0,023	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 12 - 14 t	Euro V	2012	1,137	0,900	0,821	0,019	0,014	0,013	0,024	0,017	0,016	0,003	0,002	0,001	0,017	0,013	0,012	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 14 - 20t	Conventional	2012	3,512	2,514	2,221	1,510	0,971	0,768	0,483	0,341	0,298	0,175	0,080	0,070	1,335	0,891	0,698	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro I	2012	1,612	1,206	1,117	0,606	0,403	0,325	0,298	0,209	0,181	0,175	0,080	0,070	0,431	0,323	0,255	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro II	2012	1,267	1,025	1,002	0,409	0,267	0,213	0,117	0,095	0,111	0,112	0,070	0,065	0,297	0,197	0,148	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro III	2012	1,601	1,150	1,096	0,378	0,243	0,196	0,141	0,097	0,083	0,098	0,074	0,064	0,280	0,168	0,133	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro IV	2012	0,829	0,602	0,523	0,046	0,032	0,028	0,031	0,024	0,023	0,005	0,006	0,004	0,041	0,026	0,024	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro V	2012	1,365	1,029	0,901	0,031	0,022	0,019	0,032	0,022	0,019	0,005	0,006	0,004	0,026	0,016	0,015	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 14 - 20t	Euro VI	2012	0,870	0,625	0,536	0,024	0,017	0,015	0,003	0,002	0,002	0,002	0,002	0,001	0,022	0,015	0,014	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 20 - 26t	Conventional	2012	2,558	1,885	1,712	0,819	0,517	0,406	0,482	0,353	0,319	0,175	0,080	0,070	0,644	0,437	0,336	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro I	2012	2,068	1,563	1,437	0,728	0,476	0,380	0,383	0,264	0,231	0,175	0,080	0,070	0,553	0,396	0,310	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel RT 20 - 26t	Euro II	2012	1,620	1,285	1,399	0,489	0,314	0,248	0,160	0,128	0,146	0,112	0,070	0,065	0,377	0,244	0,183	0,030	0,030	0,030

Heavy Duty Vehicles Diesel RT 20 - 26t	Euro III	2012	2,025	1,487	1,403	0,453	0,287	0,225	0,171	0,117	0,102	0,098	0,074	0,064	0,355	0,212	0,161	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 20 - 26t	Euro IV	2012	1,003	0,728	0,628	0,059	0,040	0,035	0,041	0,031	0,028	0,005	0,006	0,004	0,053	0,035	0,030	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 20 - 26t	Euro V	2012	1,787	1,376	1,225	0,034	0,024	0,020	0,041	0,028	0,024	0,005	0,006	0,004	0,029	0,018	0,016	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 20 - 26t	Euro VI	2012	1,045	0,753	0,646	0,030	0,021	0,017	0,004	0,003	0,003	0,002	0,002	0,001	0,028	0,019	0,016	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 26 - 28t	Conventional	2012	2,703	1,987	1,810	0,842	0,541	0,430	0,512	0,375	0,336	0,175	0,080	0,070	0,667	0,461	0,360	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 26 - 28t	Euro I	2012	2,162	1,647	1,535	0,736	0,488	0,394	0,398	0,281	0,244	0,175	0,080	0,070	0,561	0,408	0,324	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 26 - 28t	Euro II	2012	1,682	1,346	1,457	0,499	0,327	0,262	0,185	0,148	0,167	0,112	0,070	0,065	0,387	0,257	0,197	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 26 - 28t	Euro III	2012	2,121	1,582	1,481	0,467	0,304	0,243	0,201	0,141	0,118	0,098	0,074	0,064	0,369	0,229	0,179	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 26 - 28t	Euro IV	2012	1,044	0,752	0,640	0,064	0,045	0,037	0,044	0,033	0,029	0,005	0,006	0,004	0,059	0,039	0,033	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 26 - 28t	Euro V	2012	2,008	1,531	1,359	0,031	0,022	0,018	0,046	0,030	0,025	0,005	0,006	0,004	0,025	0,016	0,014	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 28 - 32t	Conventional	2012	2,928	2,149	2,047	0,874	0,560	0,444	0,567	0,415	0,376	0,175	0,080	0,070	0,699	0,480	0,374	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 28 - 32t	Euro I	2012	2,377	1,862	1,795	0,778	0,518	0,419	0,436	0,314	0,281	0,175	0,080	0,070	0,603	0,438	0,349	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 28 - 32t	Euro II	2012	1,930	1,574	1,563	0,523	0,344	0,276	0,182	0,148	0,168	0,112	0,070	0,065	0,411	0,275	0,211	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 28 - 32t	Euro III	2012	2,325	1,732	1,685	0,491	0,317	0,252	0,189	0,135	0,119	0,098	0,074	0,064	0,393	0,243	0,188	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 28 - 32t	Euro IV	2012	1,145	0,834	0,714	0,070	0,051	0,043	0,049	0,038	0,034	0,005	0,006	0,004	0,065	0,045	0,039	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 28 - 32t	Euro V	2012	2,312	1,748	1,527	0,033	0,024	0,020	0,052	0,035	0,029	0,005	0,006	0,004	0,028	0,018	0,016	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT 28 - 32t	Euro VI	2012	1,191	0,863	0,736	0,034	0,024	0,020	0,005	0,004	0,003	0,002	0,002	0,001	0,033	0,023	0,019	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT >32t	Euro I	2012	2,482	1,894	1,795	0,812	0,527	0,419	0,453	0,317	0,286	0,175	0,080	0,070	0,637	0,447	0,349	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT >32t	Euro III	2012	2,398	1,789	1,725	0,496	0,316	0,249	0,219	0,153	0,135	0,098	0,074	0,064	0,398	0,241	0,185	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT >32t	Euro IV	2012	1,151	0,839	0,723	0,070	0,048	0,041	0,049	0,037	0,033	0,005	0,006	0,004	0,064	0,043	0,037	0,030	0,030	0,030
Heavy Duty Vehicles Diesel RT >32t	Euro V	2012	2,346	1,790	1,602	0,034	0,024	0,020	0,050	0,034	0,030	0,005	0,006	0,004	0,029	0,018	0,015	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 28 - 34t	Conventional	2012	2,560	1,899	1,804	0,736	0,476	0,380	0,488	0,361	0,339	0,175	0,080	0,070	0,561	0,396	0,310	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 28 - 34t	Euro I	2012	2,173	1,665	1,602	0,678	0,450	0,363	0,380	0,277	0,261	0,175	0,080	0,070	0,503	0,370	0,293	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 28 - 34t	Euro II	2012	1,746	1,372	1,500	0,450	0,296	0,238	0,174	0,138	0,158	0,112	0,070	0,065	0,338	0,226	0,173	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 28 - 34t	Euro III	2012	2,067	1,559	1,515	0,415	0,269	0,215	0,169	0,121	0,111	0,098	0,074	0,064	0,317	0,195	0,151	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 28 - 34t	Euro IV	2012	0,990	0,709	0,618	0,059	0,041	0,036	0,043	0,031	0,028	0,005	0,006	0,004	0,054	0,036	0,032	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 28 - 34t	Euro V	2012	1,844	1,384	1,147	0,034	0,024	0,020	0,044	0,030	0,026	0,005	0,006	0,004	0,029	0,018	0,016	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 28 - 34t	Euro VI	2012	1,033	0,738	0,629	0,029	0,021	0,017	0,004	0,003	0,003	0,002	0,002	0,001	0,028	0,019	0,016	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 34 - 40t	Conventional	2012	3,006	2,216	2,091	0,877	0,555	0,438	0,579	0,419	0,384	0,175	0,080	0,070	0,702	0,475	0,368	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 34 - 40t	Euro I	2012	2,561	1,946	1,861	0,805	0,524	0,420	0,464	0,324	0,293	0,175	0,080	0,070	0,630	0,444	0,350	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 34 - 40t	Euro II	2012	2,056	1,607	1,775	0,538	0,343	0,270	0,211	0,165	0,188	0,112	0,070	0,065	0,426	0,274	0,205	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 34 - 40t	Euro III	2012	2,453	1,826	1,775	0,494	0,312	0,244	0,200	0,139	0,122	0,098	0,074	0,064	0,396	0,237	0,180	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 34 - 40t	Euro IV	2012	1,157	0,830	0,704	0,071	0,048	0,041	0,050	0,036	0,032	0,005	0,006	0,004	0,066	0,043	0,037	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 34 - 40t	Euro V	2012	2,113	1,626	1,379	0,041	0,028	0,023	0,052	0,035	0,030	0,005	0,006	0,004	0,035	0,022	0,019	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 34 - 40t	Euro VI	2012	1,202	0,857	0,727	0,035	0,024	0,020	0,005	0,004	0,003	0,002	0,002	0,001	0,033	0,022	0,019	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 40 - 50t	Conventional	2012	3,242	2,400	2,283	0,901	0,570	0,450	0,622	0,462	0,425	0,175	0,080	0,070	0,726	0,490	0,380	0,030	0,030	0,030
Heavy Duty Vehicles Diesel TT/AT 40 - 50t	Euro I	2012	2,823	2,135	2,079	0,844	0,546	0,433	0,500	0,358	0,333	0,175	0,080	0,070	0,669	0,466	0,363	0,030	0,030	0,030

Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro II	2012	2,313	1,826	1,823	0,558	0,358	0,282	0,225	0,176	0,199	0,112	0,070	0,065	0,446	0,288	0,217	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro III	2012	2,675	1,999	1,959	0,510	0,323	0,253	0,208	0,147	0,127	0,098	0,074	0,064	0,412	0,248	0,189	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro IV	2012	1,241	0,894	0,759	0,077	0,053	0,045	0,054	0,040	0,035	0,005	0,006	0,004	0,072	0,047	0,041	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro V	2012	2,525	1,942	1,648	0,037	0,026	0,021	0,058	0,039	0,033	0,005	0,006	0,004	0,032	0,020	0,017	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel TT/AT 40 - 50t	Euro VI	2012	1,288	0,921	0,779	0,038	0,026	0,022	0,006	0,004	0,004	0,002	0,002	0,001	0,036	0,024	0,020	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro II	2012	2,783	2,192	2,191	0,626	0,406	0,323	0,317	0,246	0,275	0,112	0,070	0,065	0,514	0,337	0,258	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel TT/AT 50 - 60t	Euro IV	2012	1,445	1,038	0,878	0,090	0,063	0,053	0,064	0,047	0,041	0,005	0,006	0,004	0,085	0,057	0,048	0,030	0,030	0,030
Heavy Duty Vehicles	Diesel TT/AT >60t	Euro III	2012	3,169	2,369	2,341	0,568	0,364	0,288	0,278	0,194	0,184	0,098	0,074	0,064	0,470	0,290	0,224	0,030	0,030	0,030
Buses	Gasoline Urban Buses	Conventional	2012	70,000	55,000	55,000	7,000	5,500	3,500	0,400	0,400	0,400	0,140	0,110	0,070	6,860	5,390	3,430	0,006	0,006	0,006
Buses	Diesel Urban Buses <15t	Conventional	2012	4,479	3,144	2,830	2,628	1,738	1,490	0,729	0,490	0,413	0,175	0,080	0,070	2,453	1,658	1,420	0,030	0,030	0,030
Buses	Diesel Urban Buses <15t	Euro I	2012	1,568	1,120	0,981	0,507	0,364	0,312	0,178	0,136	0,121	0,175	0,080	0,070	0,332	0,284	0,242	0,030	0,030	0,030
Buses	Diesel Urban Buses <15t	Euro II	2012	1,391	0,958	0,806	0,350	0,245	0,209	0,076	0,063	0,061	0,114	0,052	0,046	0,236	0,193	0,163	0,030	0,030	0,030
Buses	Diesel Urban Buses <15t	Euro III	2012	1,509	1,028	0,926	0,318	0,220	0,199	0,094	0,072	0,067	0,103	0,047	0,041	0,215	0,173	0,158	0,030	0,030	0,030
Buses	Diesel Urban Buses <15t	Euro IV	2012	0,800	0,542	0,422	0,043	0,034	0,032	0,032	0,025	0,022	0,005	0,002	0,002	0,038	0,031	0,030	0,030	0,030	0,030
Buses	Diesel Urban Buses <15t	Euro V	2012	1,784	1,211	0,942	0,020	0,016	0,016	0,029	0,019	0,019	0,005	0,002	0,002	0,015	0,014	0,014	0,030	0,030	0,030
Buses	Diesel Urban Buses 15 - 18t	Conventional	2012	4,720	3,242	2,606	1,602	0,977	0,762	0,656	0,439	0,351	0,175	0,080	0,070	1,427	0,897	0,692	0,030	0,030	0,030
Buses	Diesel Urban Buses 15 - 18t	Euro I	2012	2,204	1,612	1,330	0,659	0,431	0,351	0,247	0,177	0,155	0,175	0,080	0,070	0,484	0,351	0,281	0,030	0,030	0,030
Buses	Diesel Urban Buses 15 - 18t	Euro II	2012	1,892	1,310	1,120	0,451	0,296	0,248	0,122	0,099	0,093	0,114	0,052	0,046	0,337	0,244	0,203	0,030	0,030	0,030
Buses	Diesel Urban Buses 15 - 18t	Euro III	2012	2,070	1,382	1,257	0,416	0,269	0,232	0,147	0,111	0,097	0,103	0,047	0,041	0,312	0,222	0,191	0,030	0,030	0,030
Buses	Diesel Urban Buses 15 - 18t	Euro IV	2012	1,045	0,709	0,556	0,061	0,045	0,040	0,044	0,033	0,028	0,005	0,002	0,002	0,055	0,043	0,038	0,030	0,030	0,030
Buses	Diesel Urban Buses 15 - 18t	Euro V	2012	2,396	1,601	1,221	0,028	0,021	0,019	0,042	0,027	0,025	0,005	0,002	0,002	0,022	0,018	0,017	0,030	0,030	0,030
Buses	Diesel Urban Buses >18t	Conventional	2012	6,145	4,310	3,420	1,666	1,018	0,791	0,833	0,575	0,455	0,175	0,080	0,070	1,491	0,938	0,721	0,030	0,030	0,030
Buses	Diesel Urban Buses >18t	Euro I	2012	2,882	2,132	1,965	0,720	0,477	0,386	0,451	0,336	0,311	0,175	0,080	0,070	0,545	0,397	0,316	0,030	0,030	0,030
Buses	Diesel Urban Buses >18t	Euro II	2012	2,541	1,716	1,467	0,491	0,332	0,263	0,102	0,082	0,076	0,114	0,052	0,046	0,377	0,280	0,218	0,030	0,030	0,030
Buses	Diesel Urban Buses >18t	Euro III	2012	2,691	1,778	1,703	0,446	0,291	0,241	0,171	0,123	0,116	0,103	0,047	0,041	0,342	0,244	0,200	0,030	0,030	0,030
Buses	Diesel Urban Buses >18t	Euro IV	2012	1,287	0,869	0,664	0,074	0,055	0,047	0,054	0,039	0,032	0,005	0,002	0,002	0,069	0,053	0,045	0,030	0,030	0,030
Buses	Diesel Urban Buses >18t	Euro V	2012	2,964	1,878	1,405	0,034	0,024	0,023	0,054	0,034	0,032	0,005	0,002	0,002	0,028	0,022	0,021	0,030	0,030	0,030
Buses	Gasoline Coaches	Conventional	2012	70,000	55,000	55,000	7,000	5,500	3,500	0,400	0,400	0,400	0,140	0,110	0,070	6,860	5,390	3,430	0,006	0,006	0,006
Buses	Diesel Coaches <15t	Conventional	2012	2,712	1,738	1,372	0,907	0,533	0,393	0,490	0,328	0,269	0,175	0,080	0,070	0,732	0,453	0,323	0,030	0,030	0,030
Buses	Diesel Coaches <15t	Euro I	2012	2,199	1,466	1,186	0,830	0,516	0,397	0,395	0,260	0,209	0,175	0,080	0,070	0,655	0,436	0,327	0,030	0,030	0,030
Buses	Diesel Coaches <15t	Euro II	2012	1,775	1,203	1,092	0,586	0,359	0,272	0,159	0,117	0,103	0,114	0,052	0,046	0,472	0,307	0,227	0,030	0,030	0,030
Buses	Diesel Coaches <15t	Euro III	2012	2,308	1,464	1,283	0,577	0,351	0,271	0,187	0,122	0,097	0,103	0,047	0,041	0,474	0,304	0,230	0,030	0,030	0,030
Buses	Diesel Coaches <15t	Euro IV	2012	1,241	0,813	0,689	0,072	0,048	0,039	0,048	0,034	0,030	0,005	0,002	0,002	0,067	0,045	0,037	0,030	0,030	0,030
Buses	Diesel Coaches <15t	Euro V	2012	2,375	1,556	1,345	0,036	0,024	0,019	0,049	0,027	0,019	0,005	0,002	0,002	0,030	0,021	0,017	0,030	0,030	0,030
Buses	Diesel Coaches 15 - 18t	Conventional	2012	2,712	1,738	1,372	0,907	0,533	0,393	0,490	0,328	0,269	0,175	0,080	0,070	0,732	0,453	0,323	0,030	0,030	0,030
Buses	Diesel Coaches 15 - 18t	Euro I	2012	2,199	1,466	1,186	0,830	0,516	0,397	0,395	0,260	0,209	0,175	0,080	0,070	0,655	0,436	0,327	0,030	0,030	0,030
Buses	Diesel Coaches 15 - 18t	Euro II	2012	1,775	1,203	1,092	0,586	0,359	0,272	0,162	0,120	0,105	0,114	0,052	0,046	0,472	0,307	0,227	0,030	0,030	0,030

Buses	Diesel Coaches 15 - 18t	Euro III	2012	2,308	1,464	1,283	0,577	0,351	0,271	0,195	0,127	0,101	0,103	0,047	0,041	0,474	0,304	0,230	0,030	0,030	0,030
Buses	Diesel Coaches 15 - 18t	Euro IV	2012	1,241	0,813	0,689	0,072	0,048	0,039	0,048	0,034	0,030	0,005	0,002	0,002	0,067	0,045	0,037	0,030	0,030	0,030
Buses	Diesel Coaches 15 - 18t	Euro V	2012	2,375	1,556	1,345	0,036	0,024	0,019	0,049	0,027	0,019	0,005	0,002	0,002	0,030	0,021	0,017	0,030	0,030	0,030
Buses	Diesel Coaches >18t	Conventional	2012	3,104	2,042	1,732	1,013	0,623	0,482	0,572	0,388	0,331	0,175	0,080	0,070	0,838	0,543	0,412	0,030	0,030	0,030
Buses	Diesel Coaches >18t	Euro I	2012	2,511	1,722	1,458	0,915	0,581	0,457	0,452	0,302	0,246	0,175	0,080	0,070	0,740	0,501	0,387	0,030	0,030	0,030
Buses	Diesel Coaches >18t	Euro II	2012	2,031	1,395	1,290	0,630	0,392	0,305	0,169	0,127	0,113	0,114	0,052	0,046	0,516	0,340	0,259	0,030	0,030	0,030
Buses	Diesel Coaches >18t	Euro III	2012	2,557	1,669	1,439	0,608	0,371	0,286	0,190	0,123	0,099	0,103	0,047	0,041	0,505	0,324	0,245	0,030	0,030	0,030
Buses	Diesel Coaches >18t	Euro IV	2012	1,328	0,875	0,742	0,076	0,050	0,042	0,052	0,036	0,032	0,005	0,002	0,002	0,071	0,048	0,040	0,030	0,030	0,030
Buses	Diesel Coaches >18t	Euro V	2012	2,597	1,719	1,483	0,038	0,025	0,021	0,055	0,031	0,023	0,005	0,002	0,002	0,033	0,023	0,019	0,030	0,030	0,030
Mopeds	2-stroke <50 cm³	Conventional	2012	14,700	14,700		8,881	8,569		0,176	0,176		0,219	0,219		8,662	8,350		0,001	0,001	
Mopeds	2-stroke <50 cm³	Euro I	2012	4,600	4,600		3,858	3,561		0,045	0,045		0,044	0,044		3,814	3,517		0,001	0,001	
Mopeds	2-stroke <50 cm³	Euro II	2012	2,800	2,800		3,034	2,753		0,026	0,026		0,024	0,024		3,009	2,728		0,001	0,001	
Mopeds	4-stroke <50 cm³	Euro II	2012	4,200	4,200		1,224	0,943		0,007	0,007		0,024	0,024		1,199	0,918		0,001	0,001	
Motorcycles	2-stroke >50 cm³	Conventional	2012	15,605	19,285	28,470	9,341	7,323	9,836	0,200	0,200	0,200	0,150	0,150	0,150	9,191	7,173	9,686	0,002	0,002	0,002
Motorcycles	2-stroke >50 cm³	Euro I	2012	10,315	12,786	18,933	9,230	7,294	9,832	0,080	0,080	0,080	0,099	0,107	0,098	9,131	7,187	9,734	0,002	0,002	0,002
Motorcycles	2-stroke >50 cm³	Euro II	2012	8,146	10,067	14,890	3,410	2,780	4,186	0,040	0,040	0,040	0,030	0,032	0,030	3,380	2,749	4,156	0,002	0,002	0,002
Motorcycles	2-stroke >50 cm³	Euro III	2012	4,510	5,593	8,342	2,193	1,589	2,275	0,012	0,012	0,012	0,012	0,014	0,012	2,181	1,575	2,263	0,002	0,002	0,002
Motorcycles	4-stroke <250 cm³	Conventional	2012	15,258	17,209	24,960	1,075	0,348	0,174	0,020	0,020	0,020	0,200	0,200	0,200	0,875	0,148	-0,026	0,002	0,002	0,002
Motorcycles	4-stroke <250 cm³	Euro I	2012	10,391	14,456	24,910	2,079	1,082	1,008	0,020	0,020	0,020	0,142	0,144	0,132	1,937	0,938	0,876	0,002	0,002	0,002
Motorcycles	4-stroke <250 cm³	Euro II	2012	3,708	5,765	9,135	1,859	1,054	0,996	0,005	0,005	0,005	0,136	0,092	0,092	1,723	0,962	0,904	0,002	0,002	0,002
Motorcycles	4-stroke <250 cm³	Euro III	2012	2,060	3,201	5,092	1,264	0,649	0,542	0,005	0,005	0,005	0,082	0,032	0,028	1,182	0,617	0,514	0,002	0,002	0,002
Motorcycles	4-stroke 250 - 750 cm³	Conventional	2012	20,461	19,486	22,990	1,492	0,732	0,397	0,020	0,020	0,020	0,200	0,200	0,200	1,292	0,532	0,197	0,002	0,002	0,002
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2012	10,599	9,003	10,460	3,227	1,738	1,111	0,020	0,020	0,020	0,148	0,174	0,156	3,079	1,564	0,955	0,002	0,002	0,002
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2012	2,230	2,436	6,092	2,143	1,136	0,859	0,005	0,005	0,005	0,156	0,120	0,122	1,987	1,016	0,737	0,002	0,002	0,002
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2012	1,228	1,345	3,357	1,405	0,708	0,646	0,005	0,005	0,005	0,094	0,042	0,036	1,311	0,666	0,610	0,002	0,002	0,002
Motorcycles	4-stroke >750 cm³	Conventional	2012	20,461	19,486	22,990	1,339	0,581	0,592	0,020	0,020	0,020	0,200	0,200	0,200	1,139	0,381	0,392	0,002	0,002	0,002
Motorcycles	4-stroke >750 cm³	Euro I	2012	10,599	9,003	10,460	3,332	1,859	1,586	0,020	0,020	0,020	0,092	0,092	0,154	3,240	1,767	1,432	0,002	0,002	0,002
Motorcycles	4-stroke >750 cm³	Euro II	2012	2,230	2,436	6,092	1,904	0,884	0,687	0,005	0,005	0,005	0,084	0,062	0,102	1,820	0,822	0,585	0,002	0,002	0,002
Motorcycles	4-stroke >750 cm³	Euro III	2012	1,228	1,345	3,357	1,192	0,517	0,447	0,005	0,005	0,005	0,050	0,022	0,030	1,142	0,495	0,417	0,002	0,002	0,002

Annex 2B-8: Fuel consumption (GJ) and emissions (tonnes) per vehicle category and as totals

Sector	Year	FC (PJ)	SO_2	NO_X	NMVOC	CH_4	CO	CO_2	N_2O	NH_3	TSP
Passenger Cars	1985	66	1714	57216	68940	1576	543043	4847	164	48	1689
Passenger Cars	1986	67	1152	58346	68917	1599	515315	4901	166	49	1719
Passenger Cars	1987	67	1149	59333	68717	1621	492705	4914	168	50	1690
Passenger Cars	1988	68	1169	61147	68768	1645	455881	4975	173	51	1641
Passenger Cars	1989	67	848	61153	67298	1631	423852	4932	172	51	1602
Passenger Cars	1990	72	908	65510	70690	1737	431213	5235	183	54	1667
Passenger Cars	1991	76	953	68046	73286	1823	450464	5567	197	146	1704
Passenger Cars	1992	80	672	67915	72817	1838	436546	5816	214	339	1614
Passenger Cars	1993	82	365	66179	70395	1824	423024	5966	225	529	1557
Passenger Cars	1994	85	385	63881	67374	1774	391546	6197	241	807	1498
Passenger Cars	1995	86	387	59513	62856	1679	371759	6256	250	1073	1396
Passenger Cars	1996	86	391	55400	58678	1590	360862	6320	259	1323	1312
Passenger Cars	1997	89	398	52173	53954	1513	324514	6479	270	1663	1183
Passenger Cars	1998	90	407	48139	48596	1435	301585	6608	271	2013	1070
Passenger Cars	1999	91	317	43763	42860	1332	265548	6644	270	2291	984
Passenger Cars	2000	90	207	40012	35465	1237	241082	6603	267	2473	902
Passenger Cars	2001	89	204	36872	32566	1143	230578	6505	258	2479	838
Passenger Cars	2002	90	207	34667	29210	1057	210434	6592	255	2495	787
Passenger Cars	2003	92	211	32642	26639	981	200641	6749	252	2472	796
Passenger Cars	2004	93	213	30307	22720	881	175387	6804	245	2444	764
Passenger Cars	2005	92	42	27004	20423	776	167079	6703	230	2309	730
Passenger Cars	2006	92	42	24371	17301	681	147053	6749	220	2202	699
Passenger Cars	2007	97	44	23359	15080	616	133106	7077	222	2124	702
Passenger Cars	2008	98	45	22085	13224	541	122310	7168	218	1969	723
Passenger Cars	2009	96	44	20585	11501	482	109132	7021	210	1836	665
Passenger Cars	2010	96	44	19951	10345	427	102701	6934	206	1670	666
Passenger Cars	2011	96	43	19933	8517	375	84379	6814	208	1548	621
Passenger Cars	2012	96	42	19535	7537	333	77006	6723	204	1410	589
Light Duty Vehicles	1985	12	2488	5442	1851	81	13182	918	4	4	1383
Light Duty Vehicles	1986	14	1741	6187	2034	92	14486	1059	4	5	1595
Light Duty Vehicles	1987	15	1828	6505	2146	96	15339	1112	5	5	1684
Light Duty Vehicles	1988	15	1883	6663	2158	99	15137	1144	5	6	1676
Light Duty Vehicles	1989	16	1316	6845	2158	102	15084	1189	5	6	1731

Light Duty Vehicles	1990	17	1414	7313	2282	108	15974	1275	5	6	1854
Light Duty Vehicles	1991	18	1462	7623	2425	112	17120	1322	5	6	1960
Light Duty Vehicles	1992	18	936	7672	2505	115	17473	1312	6	6	1903
Light Duty Vehicles	1993	18	372	7946	2636	118	18674	1350	6	7	1992
Light Duty Vehicles	1994	20	400	8446	2778	126	19447	1445	6	7	2110
Light Duty Vehicles	1995	20	402	8344	2693	122	18847	1448	8	11	2045
Light Duty Vehicles	1996	20	411	8293	2567	117	18071	1475	11	19	1957
Light Duty Vehicles	1997	20	417	8186	2373	113	16226	1494	15	28	1737
Light Duty Vehicles	1998	21	424	8193	2265	110	15566	1525	19	38	1591
Light Duty Vehicles	1999	21	240	8161	2126	103	14284	1553	24	48	1432
Light Duty Vehicles	2000	21	50	8182	1939	96	13511	1581	29	58	1287
Light Duty Vehicles	2001	22	51	8292	1988	91	14006	1617	35	72	1184
Light Duty Vehicles	2002	23	53	8356	1873	84	13102	1669	40	78	1062
Light Duty Vehicles	2003	25	57	8788	1849	77	12940	1810	45	79	1036
Light Duty Vehicles	2004	27	62	9256	1759	74	12316	1970	52	80	953
Light Duty Vehicles	2005	28	13	9533	1736	64	12171	2100	58	78	918
Light Duty Vehicles	2006	31	15	10202	1694	57	11671	2319	65	77	900
Light Duty Vehicles	2007	34	16	10722	1632	50	11049	2502	71	73	885
Light Duty Vehicles	2008	31	15	9559	1349	39	9173	2320	67	59	741
Light Duty Vehicles	2009	29	13	8509	1147	32	7920	2110	62	53	629
Light Duty Vehicles	2010	27	13	7989	1065	27	7397	2028	60	48	579
Light Duty Vehicles	2011	26	12	7358	878	22	6060	1847	57	40	489
Light Duty Vehicles	2012	24	11	6687	757	18	5218	1674	53	34	424
Heavy Duty Vehicles	1985	25	5735	24022	1429	180	5850	1819	75	7	884
Heavy Duty Vehicles	1986	28	3881	27058	1579	203	6469	2050	83	8	994
Heavy Duty Vehicles	1987	27	3804	26499	1531	198	6300	2009	81	8	973
Heavy Duty Vehicles	1988	27	3734	25996	1473	195	6108	1972	79	8	953
Heavy Duty Vehicles	1989	28	2593	27058	1520	203	6297	2053	82	8	991
Heavy Duty Vehicles	1990	29	2664	27736	1506	208	6346	2110	83	8	1013
Heavy Duty Vehicles	1991	29	2706	28201	1540	211	6476	2143	85	8	1030
Heavy Duty Vehicles	1992	28	1727	27644	1481	208	6321	2103	82	8	1008
Heavy Duty Vehicles	1993	27	641	26586	1386	201	6027	2032	78	8	969
Heavy Duty Vehicles	1994	29	682	27825	1440	215	6254	2159	83	8	1017
Heavy Duty Vehicles	1995	29	685	27113	1432	220	6182	2169	86	9	999
Heavy Duty Vehicles	1996	30	702	26773	1384	227	6109	2220	88	9	987
Heavy Duty Vehicles	1997	30	713	26566	1316	229	5998	2254	90	9	940
Heavy Duty Vehicles	1998	31	725	26685	1237	231	5913	2292	93	9	877

Heavy Duty Vehicles	1999	32	416	27536	1189	238	5985	2390	98	10	841
Heavy Duty Vehicles	2000	31	73	26453	1064	226	5654	2316	95	10	759
Heavy Duty Vehicles	2001	32	76	26939	1032	231	5760	2403	99	10	726
Heavy Duty Vehicles	2002	32	76	25965	956	225	5706	2392	98	10	673
Heavy Duty Vehicles	2003	34	80	26293	937	233	5955	2513	103	10	658
Heavy Duty Vehicles	2004	35	82	26281	919	239	6121	2595	106	11	633
Heavy Duty Vehicles	2005	36	17	26299	899	244	6316	2690	108	11	613
Heavy Duty Vehicles	2006	38	18	26414	887	248	6541	2801	112	11	598
Heavy Duty Vehicles	2007	39	18	25325	799	223	6432	2879	115	12	539
Heavy Duty Vehicles	2008	36	17	21282	599	164	5497	2672	107	11	405
Heavy Duty Vehicles	2009	32	15	17192	442	117	4626	2345	94	9	302
Heavy Duty Vehicles	2010	33	15	16515	397	103	4705	2427	97	10	260
Heavy Duty Vehicles	2011	34	15	15688	353	90	4866	2426	101	10	240
Heavy Duty Vehicles	2012	32	14	13372	277	70	4580	2209	95	9	199
Buses	1985	7	1683	7284	744	77	3022	541	18	2	312
Buses	1986	8	1087	7830	793	83	3187	581	19	2	335
Buses	1987	8	1065	7674	778	81	3114	569	19	2	329
Buses	1988	8	1069	7710	780	82	3103	572	19	2	330
Buses	1989	8	730	7890	794	83	3132	585	19	2	338
Buses	1990	8	780	8414	845	89	3362	625	21	2	360
Buses	1991	8	781	8430	848	89	3389	626	21	2	361
Buses	1992	8	484	8049	816	85	3314	598	20	2	344
Buses	1993	8	189	8142	828	86	3401	605	20	2	348
Buses	1994	9	200	8526	865	93	3769	645	22	2	362
Buses	1995	9	206	8559	852	97	4034	667	23	2	359
Buses	1996	9	216	8733	843	103	4222	700	24	2	362
Buses	1997	9	215	8523	790	102	4070	695	24	2	343
Buses	1998	9	210	8231	725	97	3865	679	24	2	312
Buses	1999	9	113	7915	655	92	3601	662	24	2	282
Buses	2000	9	20	7567	594	86	3383	640	23	2	254
Buses	2001	9	20	7493	561	84	3242	639	23	2	229
Buses	2002	9	20	7296	523	81	3134	638	23	2	213
Buses	2003	9	21	7454	505	81	3072	672	25	3	200
Buses	2004	9	22	7417	483	80	2977	686	25	3	193
Buses	2005	9	4	6965	437	74	2734	658	24	2	170
Buses	2006	9	4	6762	407	71	2572	654	24	2	159
Buses	2007	9	4	6608	378	67	2426	662	25	2	149

Buses	2008	9	4	6105	328	57	2172	644	24	2	129
Buses	2009	8	4	5536	273	47	1899	619	23	2	108
Buses	2010	8	4	5315	240	41	1780	627	24	2	95
Buses	2011	8	4	5019	206	35	1680	601	24	2	84
Buses	2012	8	4	4580	169	29	1539	558	23	2	72
Mopeds	1985	0	1	12	1832	47	3144	17	0	0	38
Mopeds	1986	0	0	11	1645	42	2821	15	0	0	34
Mopeds	1987	0	0	10	1522	39	2611	14	0	0	31
Mopeds	1988	0	0	9	1435	37	2453	13	0	0	29
Mopeds	1989	0	0	9	1364	35	2326	13	0	0	28
Mopeds	1990	0	0	9	1386	35	2366	13	0	0	28
Mopeds	1991	0	0	9	1419	36	2428	13	0	0	29
Mopeds	1992	0	0	9	1426	36	2441	13	0	0	29
Mopeds	1993	0	0	9	1408	36	2418	13	0	0	29
Mopeds	1994	0	0	9	1390	35	2383	13	0	0	29
Mopeds	1995	0	0	10	1564	40	2683	15	0	0	32
Mopeds	1996	0	1	12	1801	46	3102	17	0	0	37
Mopeds	1997	0	1	15	2220	57	3822	21	0	0	46
Mopeds	1998	0	1	17	2655	68	4587	25	0	0	55
Mopeds	1999	0	1	17	2575	66	4435	24	0	0	53
Mopeds	2000	0	1	19	2507	64	4323	24	0	0	52
Mopeds	2001	0	1	19	1951	48	3310	19	0	0	39
Mopeds	2002	0	1	23	1972	48	3297	20	0	0	39
Mopeds	2003	0	1	25	1901	45	3153	20	0	0	37
Mopeds	2004	0	1	25	1785	42	2940	19	0	0	34
Mopeds	2005	0	0	27	1682	38	2740	19	0	0	32
Mopeds	2006	0	0	29	1606	36	2589	19	0	0	29
Mopeds	2007	0	0	31	1524	33	2437	19	0	0	27
Mopeds	2008	0	0	31	1419	30	2255	18	0	0	25
Mopeds	2009	0	0	32	1323	28	2085	18	0	0	23
Mopeds	2010	0	0	31	1193	24	1872	16	0	0	20
Mopeds	2011	0	0	30	1089	22	1687	15	0	0	18
Mopeds	2012	0	0	31	1001	19	1532	15	0	0	16
Motorcycles	1985	0	1	57	507	53	5437	25	1	1	13
Motorcycles	1986	0	1	57	508	53	5439	25	1	1	13
Motorcycles	1987	0	1	55	494	52	5299	25	1	1	13
Motorcycles	1988	0	1	56	506	53	5365	25	1	1	13

Motorcycles	1989	0	1	55	501	52	5284	25	1	1	13
Motorcycles	1990	0	1	59	536	56	5670	27	1	1	14
Motorcycles	1991	0	1	61	549	57	5839	27	1	1	14
Motorcycles	1992	0	1	65	588	61	6234	29	1	1	15
Motorcycles	1993	0	1	69	614	65	6599	31	1	1	16
Motorcycles	1994	0	1	74	662	69	7041	33	1	1	17
Motorcycles	1995	0	1	76	683	71	7275	34	1	1	17
Motorcycles	1996	0	1	78	692	73	7418	35	1	1	18
Motorcycles	1997	0	1	82	736	76	7784	36	1	1	19
Motorcycles	1998	1	1	85	757	79	8069	38	1	1	19
Motorcycles	1999	1	1	87	780	80	8222	38	1	1	20
Motorcycles	2000	1	1	87	751	79	8078	39	1	1	19
Motorcycles	2001	1	1	90	762	79	7929	39	1	1	19
Motorcycles	2002	1	1	94	788	80	7976	41	1	1	18
Motorcycles	2003	1	1	96	795	79	7880	41	1	1	18
Motorcycles	2004	1	1	97	784	78	7622	41	1	1	17
Motorcycles	2005	1	0	102	792	77	7420	42	1	1	16
Motorcycles	2006	1	0	110	821	79	7360	45	1	1	16
Motorcycles	2007	1	0	117	839	81	7341	48	1	1	15
Motorcycles	2008	1	0	117	811	78	6997	49	1	1	14
Motorcycles	2009	1	0	112	765	73	6538	47	1	1	13
Motorcycles	2010	1	0	113	742	73	6463	47	1	1	13
Motorcycles	2011	1	0	112	726	71	6285	46	1	1	12
Motorcycles	2012	1	0	111	699	70	6148	45	1	1	12
Total	1985	111	11621	94032	75302	2015	573678	8167	261	63	4320
Total	1986	118	7862	99488	75477	2072	547717	8632	274	65	4690
Total	1987	118	7847	100077	75187	2088	525368	8644	274	66	4721
Total	1988	118	7857	101581	75121	2110	488047	8702	276	67	4643
Total	1989	120	5488	103010	73635	2105	455974	8797	279	68	4701
Total	1990	126	5767	109042	77245	2233	464930	9284	292	72	4936
Total	1991	132	5903	112371	80067	2329	485715	9699	308	163	5097
Total	1992	134	3820	111354	79633	2343	472329	9872	322	356	4913
Total	1993	136	1569	108932	77266	2330	460142	9997	330	546	4910
Total	1994	143	1669	108761	74509	2312	430439	10493	353	825	5033
Total	1995	144	1682	103616	70081	2230	410780	10589	368	1096	4849
Total	1996	147	1721	99289	65965	2155	399783	10766	383	1354	4672
Total	1997	149	1744	95544	61389	2090	362414	10979	401	1703	4268

Total	1998	152	1768	91350	56235	2020	339585	11167	409	2063	3924
Total	1999	154	1088	87478	50185	1912	302074	11313	417	2352	3611
Total	2000	153	352	82320	42322	1788	276031	11203	415	2544	3273
Total	2001	153	353	79704	38860	1676	264825	11223	417	2565	3035
Total	2002	155	357	76400	35321	1574	243650	11352	417	2586	2793
Total	2003	161	371	75298	32626	1497	233641	11806	426	2565	2745
Total	2004	165	381	73383	28450	1393	207364	12115	430	2538	2595
Total	2005	166	77	69930	25969	1274	198459	12214	422	2402	2479
Total	2006	171	79	67887	22716	1172	177787	12587	423	2294	2403
Total	2007	179	83	66162	20251	1070	162791	13187	434	2212	2318
Total	2008	175	81	59179	17728	909	148403	12870	417	2043	2038
Total	2009	166	77	51966	15452	778	132200	12160	390	1902	1740
Total	2010	165	76	49914	13982	695	124918	12080	388	1731	1632
Total	2011	165	74	48140	11769	616	104957	11748	391	1602	1464
Total	2012	161	71	44316	10439	538	96022	11224	376	1456	1311

Annex 2B-9: COPERT IV:DEA statistics fuel use ratios and mileage adjustment factors

Sales			1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Fuel ratio	Gasoline	DEA:COPERT IV	1,06	1,01	1,05	1,10	1,13	1,16	1,14	1,12	1,13	1,14	1,12	1,13
	Diesel	DEA:COPERT IV	1,22	1,33	1,36	1,32	1,32	1,40	1,39	1,40	1,42	1,41	1,40	1,35
Consumption														
Fuel ratio	Gasoline	DEA:COPERT IV	1,11	1,11	1,10	1,11	1,12	1,13	1,13	1,13	1,14	1,15	1,17	1,19
	Diesel	DEA:COPERT IV	1,13	1,22	1,30	1,27	1,26	1,30	1,27	1,28	1,29	1,28	1,28	1,26
Continued														
Sales			2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Fuel ratio	Gasoline	DEA:COPERT IV	1,12	1,13	1,13	1,11	1,10	1,10	1,12	1,11	1,11	1,10	1,08	1,07
	Diesel	DEA:COPERT IV	1,36	1,35	1,42	1,44	1,40	1,40	1,43	1,40	1,34	1,37	1,38	1,37
Consumption														
Fuel ratio	Gasoline	DEA:COPERT IV	1,16	1,17	1,16	1,14	1,13	1,12	1,12	1,11	1,11	1,13	1,11	1,10
	Diesel	DEA:COPERT IV	1,27	1,25	1,28	1,29	1,26	1,27	1,29	1,26	1,22	1,25	1,24	1,23

Annex 2B-10

Correspondence table between actual aircraft type codes and representative aircraft types.

ICAO code	Representative aircraft	Type	ICAO code	Representative aircraft	Type	ICAO code	Representative aircraft	Type
B73	B737 400	L2J	BN2T	Cessna 208 Caravan	L2T	H60	S61	H2T
739	B737 400	L2J	BSTP	S61	H2T	HA4T	RJ 100	L2J
7474	B737 400	L2J	C10T	Cessna 208 Caravan	L1T	HEL	Shorts 360 300	
757	B757	L2J	C130	Lockheed C-130H Hercules	L4T	HF20	RJ 100	L2J
A109	S61	H2T	C141	DC10-30	L4J	HR16	F50	L2T
A124	B747 400	L4J	C160	F50	L2T	HS25	RJ 100	L2J
A139	S61	H2T	C17	A340	L4J	HS74	F50	L2T
A300	A310	L2J	C17C	A340	L4J	HTA0	BAe Jetstream 31	L2T
A304	A310	L2J	C208	Cessna 208 Caravan	L1T	HU30	S61	H1P
A306	A310	L2J	C20A	Shorts 360 300	L2T	HU50	Shorts 360 300	L2T
A30B	A310	L2J	C212	Shorts 360 300	L2T	IL18	Lockheed P-3B Orion	L4T
A310	A310	L2J	C25A	RJ 100	L2J	IL62	B767 300 ER	L4J
A318	A320	L2J	C25B	RJ 100	L2J	IL76	B767 300 ER	L4J
A319	A320	L2J	C27J	Dash8 400	L2T	IL86	A340	L4J
A320	A320	L2J	C30J	Lockheed C-130H Hercules	L4T	IL96	A340	L4J
A321	A320	L2J	C406	Shorts 360 300	L2T	J32	BAe Jetstream 31	L2T
A322	A320	L2J	C425	Reims F406 Caravan II	L2T	J328	RJ 100	L2J
A330	A330	L2J	C441	Reims F406 Caravan II	L2T	JET	RJ 100	
A332	A330	L2J	C5	DC10-30	L4J	JS20	BAe Jetstream 31	L2T
A333	A330	L2J	C500	RJ 100	L2J	JS31	BAe Jetstream 31	L2T
A340	A340	L4J	C501	RJ 100	L2J	JS32	BAe Jetstream 31	L2T
A343	A340	L4J	C510	RJ 100	L2J	JS41	BAe Jetstream 41	L2T
A550	S61	H1P	C525	RJ 100	L2J	JSTA	Shorts 360 300	L2T
A748	Shorts 360 300	L2T	C550	RJ 100	L2J	JSTB	Shorts 360 300	L2T
AB30	A310	L2J	C551	RJ 100	L2J	KA27	S61	H2T
AC14	Shorts 360 300	L2T	C560	RJ 100	L2J	KODI	De Havilland DHC-3 Turbo-Otter	L1T
AC6T	Shorts 360 300	L2T	C56X	RJ 100	L2J	L101	DC10-30	L3J
AC90	Shorts 360 300	L2T	C650	RJ 100	L2J	L188	Dash8 400	L4T
AC95	Shorts 360 300	L2T	C680	RJ 100	L2J	L29A	BAe146	L4J
ALO3	S61	H1T	C750	RJ 100	L2J	L29B	BAe146	L4J
AN12	Dash8 400	L4T	CL3	RJ 100	L2J	L329	BAe146	L4J

Continued

AN22	Lockheed C-130H Hercules	L4T	CL30	RJ 100	L2J	L382	Shorts 360 300	L2T
AN24	F50	L2T	CL60	RJ 100	L2J	LJ24	RJ 100	L2J
AN26	Antonov 26	L2T	CL65	RJ 100	L2J	LJ25	RJ 100	L2J
AN28	Shorts 360 300	L2T	CN35	F50	L2T	LJ31	RJ 100	L2J
AN30	Antonov 26	L2T	CRJ	RJ 100	L2J	LJ35	RJ 100	L2J
AN32	Antonov 26	L2T	CRJ1	RJ 100	L2J	LJ36	RJ 100	L2J
AN7	BAC1-11	L2J	CRJ2	RJ 100	L2J	LJ40	RJ 100	L2J
AN72	BAC1-11	L2J	CRJ7	RJ 100	L2J	LJ45	RJ 100	L2J
AN74	BAC1-11	L2J	CRJ9	CRJ9	L2J	LJ55	RJ 100	L2J
ANF	Dash8 400	L4T	CV44	Dash8 400	L2T	LJ60	RJ 100	L2J
APF	ATR 42-320	L2T	CV58	Dash8 400	L2T	LR24	RJ 100	L2J
AS32	S61	H2T	CVLT	Dash8 400	L2T	LR25	RJ 100	L2J
AS35	S61	H1T	D228	Dornier 328-110	L2T	LR31	RJ 100	L2J
AS50	S61	H1T	D328	Shorts 360 300	L2T	LR35	RJ 100	L2J
AS55	S61	H2T	DA10	RJ 100	L2J	LR36	RJ 100	L2J
AS65	S61	H2T	DA20	RJ 100	L2J	LR55	RJ 100	L2J
ASJ	Shorts 360 300	L2T	DA30	RJ 100	L2J	LR60	RJ 100	L2J
ASTR	RJ 100	L2J	DA50	RJ 100	L3J	LYNX	S61	H2T
AT42	ATR 42-320	L2T	DA90	RJ 100	L3J	M20K	Shorts 360 300	L2T
AT43	ATR 42-320	L2T	DC10	DC10-30	L3J	M7T	Cessna 208 Caravan	L1T
AT44	ATR 42-320	L2T	DC8	B767 300 ER	L2J	MD11	DC10-30	L3J
AT45	ATR 42-320	L2T	DC85	B767 300 ER	L4J	MD52	S61	H1T
AT5	ATR 42-320	L2T	DC86	B767 300 ER	L4J	MD80	MD 82	L2J
AT72	ATR 72-200	L2T	DC87	B767 300 ER	L4J	MD81	MD 82	L2J
ATP	S2000	L2T	DC8F	B767 300 ER	L2J	MD82	MD 82	L2J
ATR	ATR 42-320	L2T	DC8S	B767 300 ER	L4J	MD83	MD 82	L2J
ATR4	ATR 42-320	L2T	DC9	DC9	L2J	MD87	MD 82	L2J
ATR7	ATR 72-200	L2T	DC93	RJ 100	L2J	MD88	MD 82	L2J
AVRO	BAe146	L4J	DC94	DC9	L2J	MD90	B737 400	L2J
AW13	S61	H2T	DC95	DC9	L2J	MI14	S61	H2T
B06	S61	H1T	DF2	RJ 100	L2J	MI2	S61	H2T
B105	S61	H2T	DH 7	DHC7	L2T	MI8	S61	H2T
B12	S61	H2T	DH2T	De Havilland DHC-3 Turbo-Otter	L1T	MU2	Shorts 360 300	L2T
B190	Beech 1900C Airliner	L2T	DH4	Dash8 400	L2T	MU20	Shorts 360 300	L2T
B200	Shorts 360 300	L2T	DH6	Shorts 360 300	L2T	MU30	RJ 100	L2J
B206	S61	H1T	DH7	DHC7	L2T	N24A	Shorts 360 300	L2T

Continued

B212	S61	H2T	DH8	Dash8 400	L2T	N262	Shorts 360 300	L2T
B222	S61	H2T	DH8A	Dash8 400	L2T	ND26	Shorts 360 300	L2T
B321	A320	L2J	DH8C	Dash8 400	L2T	NH90	S61	L1P
B350	Beech Super King Air 350	L2T	DH8D	Dash8 400	L2T	NOMA	Shorts 360 300	L2T
B378	B737 400	L2J	DHC6	Shorts 360 300	L2T	OTH	F50	L2T
B407	S61	H1T	DHC8	Dash8 400	L2T	P180	Embraer 110P2A	L2T
B412	S61	H2T	E110	Embraer 110P2A	L2T	P46T	Cessna 208 Caravan	L1T
B429	S61	H2T	E120	Shorts 360 300	L2T	P750	Cessna 208 Caravan	L1T
B430	S61	H2T	E121	Embraer 110P2A	L2T	PA42	Reims F406 Caravan II	L2T
B461	BAe146	L4J	E135	RJ 100	L2J	PA60	Cessna 208 Caravan	L2T
B462	BAe146	L4J	E145	RJ 100	L2J	PAT4	Shorts 360 300	L2T
B463	BAe146	L4J	E170	CRJ9	L2J	PAY1	Reims F406 Caravan II	L2T
B46C	BAe146	L4J	E175	CRJ9	L2J	PAY2	Reims F406 Caravan II	L2T
B703	B757	L4J	E19	B737 100	L2J	PAY3	Reims F406 Caravan II	L2T
B707	B757	L2J	E190	B737 100	L2J	PAY4	Shorts 360 300	L2T
B712	B737 100	L2J	E195	B737 100	L2J	PAZT	Shorts 360 300	L2T
B717	DC9	L2J	E70	CRJ9	L2J	PC12	Cessna 208 Caravan	L1T
B720	B757	L4J	E90	B737 100	L2J	PC7	Cessna 208 Caravan	L1T
B721	B727	L3J	EA19	A320	L2J	PC9	Cessna 208 Caravan	L1T
B722	B727	L3J	EA30	A310	L2J	PRM1	RJ 100	L2J
B727	B727	L2J	EA31	A310	L2J	PUMA	S61	H2T
B72S	B727	L3J	EA32	A320	L2J	R22	S61	H1P
B732	B737 400	L2J	EA33	A330	L2J	R44	S61	H1P
B733	B737 400	L2J	EA34	A340	L4J	RH22	Shorts 360 300	L2T
B734	B737 400	L2J	EA50	RJ 100	L2J	RH44	S61	H1P
B735	B737 400	L2J	EC12	S61	H1P	RJ1H	BAe146	L4J
B736	B737 400	L2J	EC20	S61	H1T	RJ70	RJ 100	L4J
B737	B737 400	L2J	EC25	S61	H2T	RJ85	RJ 100	L4J
B738	B737 400	L2J	EC30	S61	H1T	S210	DC9	L2J
B739	B737 400	L2J	EC35	S61	H2T	S269	S61	H1P
B73A	B737 100	L2J	EC45	S61	H2T	S330	S61	H1T
B73B	B737 400	L2J	EC55	S61	H2T	S350	F50	L2T
B73C	B737 400	L2J	EH10	S61	H3T	S355	S61	H1T
B73E	B737 400	L2J	EMB	Shorts 360 300	L2T	S365	S61	H1T
B73G	B737 400	L2J	EN28	S61	H1P	S601	RJ 100	L2J
B73S	B737 400	L2J	ER3	RJ 100	L2J	S61	S61	H2T

Continued								
B741	B747 100-300	L4J	EXPL	S61	H2T	S65C	S61	H2T
B742	B747 100-300	L4J	F100	F100	L2J	S76	S61	H2T
B743	B747 100-300	L4J	F26T	Cessna 208 Caravan	L1T	S893	Shorts 360 300	L2T
B744	B747 400	L4J	F27	Fokker 27 Friendship	L2T	S92	S61	H2T
B747	B747 400	L4J	F28	F28	L2T	SA22	Shorts 360 300	L2T
B74A	B747 400	L4J	F2TH	RJ 100	L2J	SB05	RJ 100	L2J
B74B	B747 400	L4J	F406	Reims F406 Caravan II	L2T	SB20	S2000	L2T
B74D	B747 400	L4J	F50	F50	L2T	SBR1	RJ 100	L2J
B74F	B747 400	L4J	F70	F28	L2T	SC7	Shorts SC.7 Srs3M-200	L2T
B74S	B747 100-300	L4J	F71	F28	L2J	SF34	Saab 340B	L2T
B752	B757	L2J	F900	RJ 100	L3J	SH33	Shorts 330	L2T
B757	B757	L2J	FA10	RJ 100	L2J	SH36	Shorts 360 300	L2T
B762	B767 300 ER	L2J	FA20	RJ 100	L2J	SH60	S61	H2T
B763	B767 300 ER	L2J	FA50	RJ 100	L3J	SH7	Shorts 360 300	L2T
B764	B767 300 ER	L2J	FA7X	RJ 100	L3J	SK61	S61	H2T
B767	B767 300 ER	L2J	FK10	F100	L2J	SK76	S61	H2T
B772	B777	L2J	FK27	F50	L2T	STAR	Shorts 360 300	L2T
B773	B777	L2J	FK28	F28	L2J	SW2	Swearingen Metro III	L2T
B777	B777	L2J	FK50	F50	L2T	SW3	Swearingen Metro III	L2T
BA11	BAC1-11	L2J	FK70	F28	L2J	SW4	Swearingen Metro III	L2T
BA14	BAe146	L4J	FOUG	RJ 100	L2J	SW4A	S61	H1T
BA31	Shorts 360 300	L2T	G159	Shorts 360 300	L2T	SW4B	S61	H1T
BA32	Shorts 360 300	L2T	G2	Shorts 360 300	L2T	T134	F100	L2J
BA41	Shorts 360 300	L2T	G222	F28	L2T	T154	B727	L3J
BA46	BAe146	L4J	G3	F50	L2T	T204	B757	L2J
BAE1	BAe146	L4J	G4	CRJ9	L2J	TB21	Shorts 360 300	L2T
BATP	F50	L2T	GALX	RJ 100	L2J	TB9	Shorts 360 300	L2T
BE02	Shorts 360 300	L2T	GAZL	S61	H1T	TBM7	Cessna 208 Caravan	L1T
BE10	Beech Super King Air 200B	L2T	GIV	CRJ9	L2J	TBM8	Cessna 208 Caravan	L1T
BE20	Beech Super King Air 200B	L2T	GLEX	RJ 100	L2J	TEX2	Cessna 208 Caravan	L1T
BE30	Beech Super King Air 350	L2T	GLF2	RJ 100	L2J	TOR	RJ 100	L2J
BE40	RJ 100	L2J	GLF3	RJ 100	L2J	TU34	F100	L2J
BE90	Beech Super King Air 200B	L2T	GLF4	RJ 100	L2J	TU54	B757	L2J
BE99	Beech Super King Air 200B	L2T	GLF5	RJ 100	L2J	UH1	S61	H1T
BE9L	Reims F406 Caravan II	L2T	GULF	F50	L2T	VC10	B757	L4J
BE9T	Reims F406 Caravan II	L2T	H25A	RJ 100	L2J	VF14	RJ 100	L2J

Continued

BH06	S61	H1T	H25B	RJ 100	L2J	W3	S61	H2T
BH12	S61	H1T	H25C	RJ 100	L2J	WW24	RJ 100	L2J
BH21	S61	H1T	H269	S61	H1P	WW25	F50	L2T
BH41	S61	H1T	H36	S61	H1P	Y12	Shorts 360 300	L2T
BK17	S61	H2T	H46	S61	H2T	YK40	RJ 100	L3J
BN2	Shorts 360 300	L2T	H500	S61	H1T	YK42	DC9	L3J

LTO no. per representative aircraft type for domestic and int. flights (Copenhagen and other airports).

Flight	Airport name	Rep Aircraft	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Domestic	Copenhagen	A310	37	1	1	3	1	1		1	1			
Domestic	Copenhagen	A320	71	83	110	77	115	237	263	554	536	497	590	1121
Domestic	Copenhagen	A330	4	28	213	228	228	228	232	211	225	223	237	251
Domestic	Copenhagen	A340	7	3	5	1				1			2	1
Domestic	Copenhagen	Antonov 26				91	284	246	253	253	249	63		
Domestic	Copenhagen	ATR 42-320	4494	5333	4951	2933	804	3320	3393	3820	2455	2925	2799	889
Domestic	Copenhagen	ATR 72-200	2358	2783	4495	5218	6664	5775	5449	7005	5697	6763	8108	4238
Domestic	Copenhagen	B727		1										
Domestic	Copenhagen	B737 400	2264	1722	2212	959	514	549	1258	1376	2240	3521	3172	3108
Domestic	Copenhagen	B747 400					1		1			1		
Domestic	Copenhagen	B757	227	264	152	146	100	101	141	154	112	85	4	
Domestic	Copenhagen	B767 300 ER	206	182	24	1			1	24	15	1	4	4
Domestic	Copenhagen	BAC1-11												1
Domestic	Copenhagen	BAe146	491	532	581	665	1034	1286	1078	1171	1032	934	607	171
Domestic	Copenhagen	Beech Super King Air 200B	3	12	5	9	8	7	2	5	7	10	7	4
Domestic	Copenhagen	Cessna 208 Caravan				1		2	1	1				
Domestic	Copenhagen	CRJ9	2	3	2	3	1	1		65	1890	2792	2596	1488
Domestic	Copenhagen	Dash8 400	2016	3849	4188	8107	6686	4152	2462		1	1		210
Domestic	Copenhagen	DC10-30				1		1						
Domestic	Copenhagen	DC9	113	5										
Domestic	Copenhagen	Dornier 328-110						1						
Domestic	Copenhagen	F100					1		39	10				
Domestic	Copenhagen	F28									2			
Domestic	Copenhagen	F50	292	167	20	3	7	1	54	74				108
Domestic	Copenhagen	MD 82	4498	3131	1571	469	1345	1783	2686	2974	2130	1161	941	1646

Domestic	Copenhagen	Reims F406 Caravan II	2	2	8	11	6	3	1	1	1			1
Domestic	Copenhagen	RJ 100	2318	1048	325	327	560	882	1674	1802	1531	1472	1925	1062
Domestic	Copenhagen	S2000	19	10										
Domestic	Copenhagen	S61		1	1	8	3	3	3		4	15	16	12
Domestic	Copenhagen	Shorts 330	7											
Domestic	Copenhagen	Shorts 360 300	948	525	471	378	431	453	19	8	13	7	15	13
Domestic	Copenhagen	Swearingen Metro III	29	27	29	14	13	19	31	10	6	15	29	26
Domestic	Copenhagen	Saab 340B		6	4		16		15	93	372	313		

Flight	Airport name	Rep Aircraft	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
International	Copenhagen	A310	2488	1900	1179	1081	1142	1318	1181	1164	747	614	711	464
International	Copenhagen	A320	3895	7851	11850	17052	16184	18835	21042	24157	22594	24778	27104	28153
International	Copenhagen	A330	363	306	692	804	783	884	854	818	803	841	1043	881
International	Copenhagen	A340	456	1807	1845	2049	2028	1939	1752	1756	1488	1436	1696	1895
International	Copenhagen	Antonov 26	702	516	517	521	552	549	592	542	416	269	254	253
International	Copenhagen	ATR 42-320	2817	1097	1226	666	312	196	1020	821	1160	802	390	326
International	Copenhagen	ATR 72-200	1311	1059	1235	791	571	461	434	651	291	273	712	856
International	Copenhagen	B727	2051	1143	109	2	1	1	1		4	1		1
International	Copenhagen	B737 100						4	219	288	345	448	1557	4955
International	Copenhagen	B737 400	29665	25656	27987	25883	24782	19369	20690	25053	22285	25416	24361	22613
International	Copenhagen	B747 400	718	556	612	726	900	1084	1055	970	922	872	884	823
International	Copenhagen	B757	1701	2062	2285	2189	2011	2082	2625	2228	1867	1840	1644	1369
International	Copenhagen	B767 300 ER	3026	1103	546	91	151	285	414	678	639	731	670	643
International	Copenhagen	B777	40	266	150	157	168	171	242	264	267	394	431	764
International	Copenhagen	BAC1-11	1	1	5		5	4	3	5	1	1	1	1
International	Copenhagen	BAe146	4510	5849	5131	3878	4540	4098	3723	7660	3202	2280	1077	792
International	Copenhagen	Beech Super King Air 200B	13	12	16	16	48	37	60	37	37	30	54	40
International	Copenhagen	Cessna 208 Caravan	6	1		1	4	5	6	10	1	3	8	22
International	Copenhagen	CRJ9	56	48	43	70	443	1054	1398	1451	7235	12981	13811	15662
International	Copenhagen	Dash8 400	8122	10809	13457	14213	13972	14831	11580	630	1620	2071	3157	3671
International	Copenhagen	DC10-30	147	51	154	157	151	69	131	158	148	28	2	4
International	Copenhagen	DC9	5424	277	91	6	15	3	10	2	27	3		
International	Copenhagen	Dornier 328-110		3	6	9		1		1	2	1	1	
International	Copenhagen	Embraer 110P2A												2
International	Copenhagen	F100	625	464	6	307	666	664	750	1250	626	447	389	450
International	Copenhagen	F28	1433	832	716	727	554	648	390	539	430	128	43	83

International	Copenhagen	F50	6511	3335	6075	5107	4292	3268	2901	2634	794	679	767	193
International	Copenhagen	MD 82	32740	32219	23211	28009	28432	26979	24648	22120	15547	11841	13432	12890
International	Copenhagen	Reims F406 Caravan II	6	19	16	12	23	17	24	19	8	8	2	3
International	Copenhagen	RJ 100	5925	6637	7266	8647	8941	9060	9934	13795	12301	9836	9446	7251
International	Copenhagen	S2000	386	1029	346	496	1426	331	33	2	4	203	559	317
International	Copenhagen	S61	3541	3121	3	1	1	2	3	1	4		2	1
International	Copenhagen	Shorts 330	125			1								
International	Copenhagen	Shorts 360 300	545	89	154	137	280	63	73	224	201	157	25	27
International	Copenhagen	Swearingen Metro III	723	963	943	453	459	462	488	468	453	181	12	15
International	Copenhagen	Saab 340B	71	801	1145	1670	509	21	265	695	843	1303	738	1309

Flight	Airport name	Rep Aircraft	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Domestic	Other airports	A310	31	3			6		1					
Domestic	Other airports	A320	115	126	98	38	156	357	342	573	552	541	635	719
Domestic	Other airports	A330	9	5	2	7	4		2	1	3	1	1	2
Domestic	Other airports	A340	6	2	1		1							1
Domestic	Other airports	Antonov 26		1		83	274	249	254	252	252	63		
Domestic	Other airports	ATR 42-320	3182	4143	5143	3189	1773	3966	3714	3875	2579	3289	3588	1714
Domestic	Other airports	ATR 72-200	2342	2751	4629	5446	7368	5649	5324	6082	5506	6103	7369	4250
Domestic	Other airports	B727						1			1			
Domestic	Other airports	B737 400	2754	1755	2236	798	505	501	1295	1443	2246	3500	3075	3144
Domestic	Other airports	B747 400		1										
Domestic	Other airports	B757	46	41	50	43	16	17	21	9	4	2	2	
Domestic	Other airports	B767 300 ER	3	6	7		1		3	19	19	1	2	1
Domestic	Other airports	BAe Jetstream 31	249	328	349	331	626	699	582	331	147	89	33	51
Domestic	Other airports	BAe Jetstream 41	46	67	43	49	7		1				1	
Domestic	Other airports	BAe146	46	60	62	100	231	261	259	281	173	94	110	80
Domestic	Other airports	Beech 1900C Airliner	135	370	668	928	651	35	5	3	1			
Domestic	Other airports	Beech Super King Air 200B	194	155	245	241	218	231	153	118	80	66	81	78
Domestic	Other airports	Beech Super King Air 350	18	2	6	7	3	1	86	46	11	9	11	28
Domestic	Other airports	Cessna 208 Caravan	11	24	58	86	98	155	101	129	104	75	106	72
Domestic	Other airports	CRJ9								49	1899	2792	2600	1474
Domestic	Other airports	Dash8 400	2038	3828	4192	8105	6705	4157	2462					235
Domestic	Other airports	DC10-30				3								
Domestic	Other airports	DC9	113	6										
Domestic	Other airports	De Havilland DHC-3 Turbo-Otter				1	2							

Domestic	Other airports	Dornier 328-110				2		1	1					1
Domestic	Other airports	Embraer 110P2A	132	118	455	371	457	638	20	47	30	36	43	24
Domestic	Other airports	F100							37	1				
Domestic	Other airports	F50	140	183	9	2	2	1	53	69	4	1		105
Domestic	Other airports	Fokker 27 Friendship	63	1			1	3		8				
Domestic	Other airports	Lockheed C-130H Hercules	17	12	13	46	54	27	46	38	44	69	49	45
Domestic	Other airports	MD 82	4505	3140	1567	454	1358	1782	2692	3033	2155	1265	1148	1803
Domestic	Other airports	Reims F406 Caravan II	264	298	262	159	134	68	109	71	53	21	12	13
Domestic	Other airports	RJ 100	3160	2387	1930	1618	1107	1639	2718	2754	2403	2235	2379	1738
Domestic	Other airports	S2000	93	91	86	41	26	18	2	1				3
Domestic	Other airports	S61	220	3018	4452	4432	4209	4760	5451	4744	4995	4562	4272	4525
Domestic	Other airports	Shorts 330	7											
Domestic	Other airports	Shorts 360 300	389	207	144	63	145	131	317	465	530	266	39	47
Domestic	Other airports	Shorts SC.7 Srs3M-200	173			1		6	4				1	
Domestic	Other airports	Swearingen Metro III	135	155	263	97	124	211	172	89	93	67	155	173
Domestic	Other airports	Saab 340B		510	389		401	892	925	1015	973	888	167	3
Flight	Airport name	Rep Aircraft	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
International	Other airports	A310	151	19	28	20	9	12	13	4	1	2	6	1
International	Other airports	A320	937	1004	834	849	924	1192	1090	1156	1038	1307	1413	1422
International	Other airports	A330	60	11	3	13	3	7	10	5	2	13	17	12
International	Other airports	A340				2	3							
International	Other airports	Antonov 26	2	2		2	12	11	42	17	18	11	4	2
International	Other airports	ATR 42-320	161	242	403	527	1122	715	463	122	109	415	728	616
International	Other airports	ATR 72-200	15	45	82	46	140	264	363	458	431	451	356	218
International	Other airports	B727	82	90	77	26	26	46	1					
International	Other airports	B737 100	6					7	2		2	252	868	931
International	Other airports	B737 400	6906	6492	6680	6839	6734	4575	5592	6866	6179	7698	7544	7321
International	Other airports	B747 100-300		1		2	10		1		2	5	3	1
International	Other airports	B747 400	2	7	10	16	10	5	15	8	8	6	7	10
International	Other airports	B757	107	137	188	150	79	114	88	64	70	266	316	318
International	Other airports	B767 300 ER	48	71	55	69	37	15	19	39	52	51	43	52
International	Other airports	BAC1-11		1	2	2	2	1						
International	Other airports	BAe Jetstream 31	1885	1802	2124	2718	2298	1811	1099	792	876	757	681	992
International	Other airports	BAe Jetstream 41	739	905	983	689	118	2		5	2	3	2	1
International	Other airports	BAe146	284	229	414	229	335	538	506	974	979	225	186	165

InternationalOther airports	Beech 1900C Airliner	92	1083	579	548	441	32	8	7	6	4	7	3
InternationalOther airports	Beech Super King Air 200B	89	123	281	288	339	404	349	361	231	203	177	207
InternationalOther airports	Beech Super King Air 350	162	28	26	22	34	22	30	38	36	52	33	42
InternationalOther airports	Cessna 208 Caravan	27	33	164	201	208	227	202	391	360	180	162	142
InternationalOther airports	CRJ9						443	874	261		1	8	6
InternationalOther airports	Dash8 400	19	147	498	68	97	62	38	31	43	78	174	282
InternationalOther airports	DC10-30		1	1	1	6	3		1		1		4
InternationalOther airports	DC9		1	3	6			2		1			
InternationalOther airports	De Havilland DHC-3 Turbo-Otter			5	2	2		3					
InternationalOther airports	Dornier 328-110	1	3	7	6	7	9	12	8	26	10	6	5
InternationalOther airports	Embraer 110P2A	43	24	127	23	18	68	46	94	78	83	110	109
InternationalOther airports	F100	10		1	2	3	751	838	150	64	62	53	111
InternationalOther airports	F28						7	254	257	228	261	577	1200
InternationalOther airports	F50	241	164	59	2	7	38	5	44	300	48	72	10
InternationalOther airports	Fokker 27 Friendship	551	359	4	1	10	150	5	3	1		1	
InternationalOther airports	Lockheed C-130H Hercules	4	1	4	4	7	13	8	5	6	3	5	8
InternationalOther airports	MD 82	141	168	140	227	461	513	979	963	704	411	340	277
InternationalOther airports	Reims F406 Caravan II	195	410	394	267	268	197	254	131	94	45	34	39
InternationalOther airports	RJ 100	2740	3047	4544	5980	4083	4827	5706	6999	5866	7296	8466	7173
InternationalOther airports	S2000	430	472	651	760	811	101	10	14	3	31	119	239
InternationalOther airports	S61	33	55	108	120	106	163	168	136	104	95	94	92
InternationalOther airports	Shorts 330	12											
InternationalOther airports	Shorts 360 300	564	538	127	78	1680	2894	3074	2264	2044	1592	985	1405
InternationalOther airports	Shorts SC.7 Srs3M-200			5	4	5	7	1	3				
InternationalOther airports	Swearingen Metro III	290	309	328	290	374	453	481	427	249	306	341	240
InternationalOther airports	Saab 340B	6	56	112	11	222	713	637	790	407	312	97	66

No. of flights between Danish airports and airports in Greenland and Faroe Islands.

Area	Destination	Airport name	Distance NM	Rep Aircraft	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Greenland	Narsarsuaq	Billund	1694,92	RJ 100											1	
Greenland	Narsarsuaq	Copenhagen	1796,98	B737 400	2	9	10	7	4	5		5	1		26	27
Greenland	Narsarsuaq	Copenhagen	1796,98	B757	68	73	65	63	61	66	77	72	50	39		
Greenland	Narsarsuaq	Copenhagen	1796,98	F50				1								
Greenland	Narsarsuaq	Copenhagen	1796,98	MD 82	4											
Greenland	Narsarsuaq	Copenhagen	1796,98	RJ 100					1	1	1			1	2	
Greenland	Narsarsuaq	Karup	1675,49	B737 400												1
Greenland	Narsarsuaq	Roskilde	1783,48	Lockheed C-130H Hercules										1		
Greenland	Narsarsuaq	Roskilde	1783,48	RJ 100								1				
Greenland	Narsarsuaq	Sønderborg	1739,20	RJ 100										1		1
Greenland	Narsarsuaq	Aalborg	1670,63	A320						1						
Greenland	Narsarsuaq	Aalborg	1670,63	B737 400						1	5	12	12	2	3	2
Greenland	Narsarsuaq	Aalborg	1670,63	B757				1	7	6	8	2				
Greenland	Narsarsuaq	Aalborg	1670,63	MD 82									2	11	14	12
Greenland	Narsarsuaq	Aalborg	1670,63	RJ 100					1							
Greenland	Narsarsuaq	Aarhus	1717,06	RJ 100	1											
Greenland	Søndre Strømfjord	Billund	1766,74	B737 400										1		
Greenland	Søndre Strømfjord	Billund	1766,74	MD 82										1		2
Greenland	Søndre Strømfjord	Billund	1766,74	RJ 100	1	1				1						1
Greenland	Søndre Strømfjord	Copenhagen	1852,59	A310									1			
Greenland	Søndre Strømfjord	Copenhagen	1852,59	A320							47	44				1
Greenland	Søndre Strømfjord	Copenhagen	1852,59	A330		25	209	207	212	212	219	196	222	219	233	247
Greenland	Søndre Strømfjord	Copenhagen	1852,59	A340			1					1			2	
Greenland	Søndre Strømfjord	Copenhagen	1852,59	B737 400	1	12		1		34	3	2	6	3	31	25
Greenland	Søndre Strømfjord	Copenhagen	1852,59	B757	112	136	22	30	30	26	51	77	57	45	4	
Greenland	Søndre Strømfjord	Copenhagen	1852,59	B767 300 ER	191	167	8					8	1		4	3
Greenland	Søndre Strømfjord	Copenhagen	1852,59	DC10-30						1						
Greenland	Søndre Strømfjord	Copenhagen	1852,59	MD 82									1			
Greenland	Søndre Strømfjord	Copenhagen	1852,59	RJ 100		2	1	1	3	1	4	2	2		2	1
Greenland	Søndre Strømfjord	Copenhagen	1852,59	Shorts 360 300								1				
Greenland	Søndre Strømfjord	Roskilde	1842,33	F50								1				
Greenland	Søndre Strømfjord	Roskilde	1842,33	Lockheed C-130H Hercules							1		1			
Greenland	Søndre Strømfjord	Roskilde	1842,33	RJ 100				1					1			
Greenland	Søndre Strømfjord	Sønderborg	1815,87	RJ 100			13	6	6	4	1	13	11	13	19	11
Greenland	Søndre Strømfjord	Aalborg	1724,62	B737 400						1						

Greenland	Søndre Strømfjord	Aalborg	1724,62	RJ 100								4				
Greenland	Thule	Copenhagen	2084,23	A330				12	13	13	12	12				
Greenland	Thule	Copenhagen	2084,23	A340			4	1								
Greenland	Thule	Copenhagen	2084,23	B767 300 ER	12	13	11									
Greenland	Thule	Copenhagen	2084,23	MD 82	1											
Greenland	Thule	Copenhagen	2084,23	RJ 100					1							
Greenland	Thule	Roskilde	2078,83	RJ 100					1							
Greenland	Thule	Sønderborg	2081,53	RJ 100					1							
Faroe Islands	Vagar	Billund	632,83	A320												1
Faroe Islands	Vagar	Billund	632,83	ATR 42-320	2											
Faroe Islands	Vagar	Billund	632,83	ATR 72-200				1								
Faroe Islands	Vagar	Billund	632,83	B737 400	140	132	153	104		1						
Faroe Islands	Vagar	Billund	632,83	BAe146	34	46	56	97	208	214	215	162	119	57	79	20
Faroe Islands	Vagar	Billund	632,83	Dash8 400												1
Faroe Islands	Vagar	Billund	632,83	RJ 100					2	1	7	61	79	139	108	157
Faroe Islands	Vagar	Billund	632,83	S2000		1										
Faroe Islands	Vagar	Billund	632,83	Shorts 360 300						1						
Faroe Islands	Vagar	Copenhagen	725,70	A320												473
Faroe Islands	Vagar	Copenhagen	725,70	ATR 72-200				4	3			1				
Faroe Islands	Vagar	Copenhagen	725,70	B737 400	364	362	357	307		1						2
Faroe Islands	Vagar	Copenhagen	725,70	BAe146	488	529	579	664	1021	1270	1070	1088	1011	928	607	151
Faroe Islands	Vagar	Copenhagen	725,70	RJ 100		3			5	2	1	1	2	46	375	216
Faroe Islands	Vagar	Copenhagen	725,70	Shorts 360 300					1						2	5
Faroe Islands	Vagar	Karup	609,07	ATR 42-320										1		
Faroe Islands	Vagar	Karup	609,07	ATR 72-200					1							
Faroe Islands	Vagar	Roskilde	713,82	BAe146									1			
Faroe Islands	Vagar	Roskilde	713,82	RJ 100								2	1	2		
Faroe Islands	Vagar	Sønderborg	681,43	RJ 100			3		1		6	4	2	2	4	1
Faroe Islands	Vagar	Aalborg	597,73	ATR 72-200				1								
Faroe Islands	Vagar	Aalborg	597,73	B737 400	4			3	2	1	5	3				
Faroe Islands	Vagar	Aalborg	597,73	BAe146	1	2	2		10	27	34	36	33	26	26	20
Faroe Islands	Vagar	Aalborg	597,73	RJ 100		2						1	1	2		1
Faroe Islands	Vagar	Aalborg	597,73	Swearingen Metro III						1						
Faroe Islands	Vagar	Aarhus	646,87	BAe146				1								
Faroe Islands	Vagar	Aarhus	646,87	Beech Super King Air 350											1	
Faroe Islands	Vagar	Aarhus	646,87	RJ 100										1		

LTO fuel consumption and emission factors per representative aircraft type for Copenhagen Airport and other airports.

Origin	Representative aircraft	Fuel kg_LTO	Fuel GJ_LTO	SO_2 kg_LTO	NO_X kg_LTO	VOC kg_LTO	NMVOC kg_LTO	CH_4 kg_LTO	CO kg_LTO	CO_2 tons_LTO	N_2O kg_LTO	TSP kg_LTO
EKCH	A310	1200,971	52,242	1,201	21,747	2,417	2,175	0,242	11,518	3,761	0,100	0,070
EKCH	A320	609,300	26,505	0,609	9,940	1,595	1,436	0,160	11,029	1,908	0,100	0,070
EKCH	A330	1727,520	75,147	1,728	33,754	0,974	0,877	0,097	9,860	5,411	0,100	0,070
EKCH	A340	1573,488	68,447	1,573	33,462	8,487	7,638	0,849	22,757	4,928	0,100	0,070
EKCH	Antonov 26	143,310	6,234	0,143	0,202	7,559	6,803	0,756	10,907	0,449	0,100	0,070
EKCH	ATR 42-320	120,720	5,251	0,121	1,056	0,000	0,000	0,000	0,926	0,378	0,100	0,070
EKCH	ATR 72-200	144,130	6,270	0,144	1,514	0,000	0,000	0,000	0,775	0,451	0,100	0,070
EKCH	B727	1028,975	44,760	1,029	11,222	3,366	3,029	0,337	12,941	3,223	0,100	0,070
EKCH	B737 100	669,320	29,115	0,669	7,107	0,340	0,306	0,034	2,456	2,096	0,100	0,070
EKCH	B737 400	613,619	26,692	0,614	7,350	0,296	0,267	0,030	5,455	1,922	0,100	0,070
EKCH	B747 100-300	2603,373	113,247	2,603	53,265	16,181	14,563	1,618	34,464	8,154	0,100	0,070
EKCH	B747 400	2638,978	114,796	2,639	52,985	1,170	1,053	0,117	9,011	8,265	0,100	0,070
EKCH	B757	957,844	41,666	0,958	18,518	0,566	0,509	0,057	5,729	3,000	0,100	0,070
EKCH	B767 300 ER	1270,887	55,284	1,271	24,567	0,448	0,403	0,045	3,019	3,980	0,100	0,070
EKCH	B777	2022,840	87,994	2,023	50,760	10,356	9,320	1,036	27,738	6,336	0,100	0,070
EKCH	BAC1-11	474,566	20,644	0,475	4,466	9,648	8,684	0,965	17,460	1,486	0,100	0,070
EKCH	BAe Jetstream 31	47,110	2,049	0,047	0,381	0,048	0,043	0,005	0,551	0,148	0,100	0,070
EKCH	BAe Jetstream 41	64,920	2,824	0,065	0,483	0,096	0,087	0,010	0,884	0,203	0,100	0,070
EKCH	BAe146	422,117	18,362	0,422	3,590	0,528	0,475	0,053	4,714	1,322	0,100	0,070
EKCH	Beech 1900C Airliner	62,630	2,724	0,063	0,262	0,677	0,609	0,068	2,366	0,196	0,100	0,070
EKCH	Beech Super King Air 200B	54,170	2,356	0,054	0,251	0,140	0,126	0,014	0,814	0,170	0,100	0,070
EKCH	Beech Super King Air 350	60,770	2,643	0,061	0,252	0,251	0,226	0,025	2,001	0,190	0,100	0,070
EKCH	Cessna 208 Caravan	29,710	1,292	0,030	0,158	0,028	0,025	0,003	0,306	0,093	0,100	0,070
EKCH	CRJ9	365,221	15,887	0,365	3,877	0,020	0,018	0,002	2,028	1,144	0,100	0,070
EKCH	Dash8 400	124,022	5,395	0,124	0,884	0,605	0,545	0,061	1,432	0,388	0,100	0,070
EKCH	DC10-30	1836,099	79,870	1,836	39,603	10,300	9,270	1,030	27,670	5,751	0,100	0,070
EKCH	DC9	634,784	27,613	0,635	6,463	0,422	0,380	0,042	2,698	1,988	0,100	0,070
EKCH	De Havilland Dash 7	146,920	6,391	0,147	0,781	0,206	0,186	0,021	1,600	0,460	0,100	0,070
EKCH	De Havilland DHC-3 Turbo-Otter	32,400	1,409	0,032	0,177	0,018	0,016	0,002	0,284	0,101	0,100	0,070
EKCH	Dornier 328-110	130,990	5,698	0,131	1,246	0,000	0,000	0,000	0,757	0,410	0,100	0,070
EKCH	Embraer 110P2A	50,490	2,196	0,050	0,284	0,026	0,024	0,003	0,400	0,158	0,100	0,070
EKCH	F100	532,667	23,171	0,533	5,442	0,719	0,647	0,072	6,527	1,668	0,100	0,070
EKCH	F28	468,141	20,364	0,468	4,669	14,505	13,055	1,451	15,260	1,466	0,100	0,070
EKCH	F50	130,370	5,671	0,130	1,293	0,000	0,000	0,000	0,777	0,408	0,100	0,070
EKCH	Fokker 27 Friendship	169,480	7,372	0,169	0,346	1,862	1,676	0,186	8,035	0,531	0,100	0,070

Origin	Representative aircraft	Fuel kg_LTO	Fuel GJ_LTO	SO_2 kg_LTO	NO_X kg_LTO	VOC kg_LTO	NMVOC kg_LTO	CH_4 kg_LTO	CO kg_LTO	CO_2 tons_LTO	N_2O kg_LTO	TSP kg_LTO
EKCH	Lockheed C-130H Hercules	287,800	12,519	0,288	1,975	0,945	0,851	0,095	2,021	0,901	0,100	0,070
EKCH	Lockheed P-3B Orion	265,340	11,542	0,265	1,792	0,907	0,817	0,091	1,926	0,831	0,100	0,070
EKCH	MD 82	758,573	32,998	0,759	11,365	1,065	0,958	0,106	3,433	2,376	0,100	0,070
EKCH	Reims F406 Caravan II	42,010	1,827	0,042	0,216	0,040	0,036	0,004	0,475	0,132	0,100	0,070
EKCH	RJ 100	161,020	7,004	0,161	1,122	0,236	0,213	0,024	2,542	0,504	0,100	0,070
EKCH	S2000	103,169	4,488	0,103	0,593	0,038	0,034	0,004	0,734	0,323	0,100	0,070
EKCH	S61	48,676	2,117	0,049	0,385	0,028	0,025	0,003	0,378	0,152	0,100	0,070
EKCH	Shorts 330	73,080	3,179	0,073	0,389	0,126	0,113	0,013	0,851	0,229	0,100	0,070
EKCH	Shorts 360 300	86,790	3,775	0,087	0,412	0,738	0,664	0,074	3,440	0,272	0,100	0,070
EKCH	Shorts SC.7 Srs3M-200	25,060	1,090	0,025	0,181	0,714	0,643	0,071	0,529	0,078	0,100	0,070
EKCH	Swearingen Metro III	47,650	2,073	0,048	0,390	0,047	0,043	0,005	0,544	0,149	0,100	0,070
EKCH	Saab 340B	78,190	3,401	0,078	0,510	0,238	0,214	0,024	0,456	0,245	0,100	0,070
Other airports	A310	1065,140	46,334	1,065	21,167	1,166	1,050	0,117	5,789	3,336	0,100	0,070
Other airports	A320	532,087	23,146	0,532	9,582	1,464	1,317	0,146	8,403	1,666	0,100	0,070
Other airports	A330	1525,920	66,378	1,526	32,805	0,519	0,467	0,052	5,204	4,779	0,100	0,070
Other airports	A340	1394,928	60,679	1,395	32,697	4,380	3,942	0,438	11,634	4,369	0,100	0,070
Other airports	Antonov 26	105,450	4,587	0,105	0,164	3,701	3,331	0,370	5,980	0,330	0,100	0,070
Other airports	ATR 42-320	89,400	3,889	0,089	0,849	0,000	0,000	0,000	0,557	0,280	0,100	0,070
Other airports	ATR 72-200	107,950	4,696	0,108	1,243	0,000	0,000	0,000	0,475	0,338	0,100	0,070
Other airports	B727	875,431	38,081	0,875	10,682	1,832	1,649	0,183	7,569	2,742	0,100	0,070
Other airports	B737 100	569,168	24,759	0,569	6,760	0,244	0,220	0,024	1,511	1,783	0,100	0,070
Other airports	B737 400	528,911	23,008	0,529	6,988	0,148	0,133	0,015	2,905	1,657	0,100	0,070
Other airports	B747 100-300	2279,174	99,144	2,279	52,194	7,752	6,976	0,775	16,956	7,138	0,100	0,070
Other airports	B747 400	2333,706	101,516	2,334	51,524	0,899	0,809	0,090	4,817	7,309	0,100	0,070
Other airports	B757	839,780	36,530	0,840	18,033	0,299	0,269	0,030	3,002	2,630	0,100	0,070
Other airports	B767 300 ER	1132,405	49,260	1,132	23,981	0,275	0,248	0,028	1,796	3,547	0,100	0,070
Other airports	B777	1806,840	78,598	1,807	49,609	5,389	4,850	0,539	14,282	5,659	0,100	0,070
Other airports	BAC1-11	391,766	17,042	0,392	4,280	4,950	4,455	0,495	9,347	1,227	0,100	0,070
Other airports	BAe Jetstream 31	36,250	1,577	0,036	0,330	0,027	0,024	0,003	0,317	0,114	0,100	0,070
Other airports	BAe Jetstream 41	48,600	2,114	0,049	0,401	0,049	0,044	0,005	0,484	0,152	0,100	0,070
Other airports	BAe146	363,161	15,798	0,363	3,348	0,334	0,301	0,033	2,723	1,137	0,100	0,070
Other airports	Beech 1900C Airliner	47,450	2,064	0,047	0,218	0,364	0,328	0,036	1,409	0,149	0,100	0,070
Other airports	Beech Super King Air 200B	42,350	1,842	0,042	0,212	0,066	0,059	0,007	0,472	0,133	0,100	0,070
Other airports	Beech Super King Air 350	47,150	2,051	0,047	0,210	0,125	0,112	0,012	1,214	0,148	0,100	0,070
Other airports	Cessna 208 Caravan	24,250	1,055	0,024	0,138	0,014	0,012	0,001	0,168	0,076	0,100	0,070
Other airports	CRJ9	318,925	13,873	0,319	3,664	0,014	0,013	0,001	1,184	0,999	0,100	0,070

Other airports	Dash8 400	78,842	3,430	0,079	0,712	0,302	0,272	0,030	0,732	0,247	0,100	0,070
Other airports	DC10-30	1618,066	70,386	1,618	38,762	5,286	4,757	0,529	14,088	5,068	0,100	0,070
Other airports	DC9	538,259	23,414	0,538	6,142	0,281	0,253	0,028	1,636	1,686	0,100	0,070
Other airports	De Havilland Dash 7	115,600	5,029	0,116	0,668	0,097	0,087	0,010	0,909	0,362	0,100	0,070
Other airports	De Havilland DHC-3 Turbo-Otter	26,400	1,148	0,026	0,153	0,008	0,008	0,001	0,156	0,083	0,100	0,070
Other airports	Dornier 328-110	93,850	4,082	0,094	0,968	0,000	0,000	0,000	0,456	0,294	0,100	0,070
Other airports	Embraer 110P2A	40,350	1,755	0,040	0,239	0,014	0,013	0,001	0,227	0,126	0,100	0,070
Other airports	F100	447,982	19,487	0,448	5,301	0,440	0,396	0,044	3,666	1,403	0,100	0,070
Other airports	F28	388,971	16,920	0,389	4,460	7,163	6,447	0,716	8,274	1,218	0,100	0,070
Other airports	F50	95,750	4,165	0,096	1,043	0,000	0,000	0,000	0,466	0,300	0,100	0,070
Other airports	Fokker 27 Friendship	132,400	5,759	0,132	0,320	0,977	0,879	0,098	4,649	0,415	0,100	0,070
Other airports	Lockheed C-130H Hercules	214,000	9,309	0,214	1,555	0,501	0,450	0,050	1,170	0,670	0,100	0,070
Other airports	Lockheed P-3B Orion	194,300	8,452	0,194	1,389	0,479	0,431	0,048	1,107	0,609	0,100	0,070
Other airports	MD 82	660,780	28,744	0,661	10,974	0,725	0,652	0,072	2,198	2,070	0,100	0,070
Other airports	Reims F406 Caravan II	32,950	1,433	0,033	0,180	0,021	0,019	0,002	0,270	0,103	0,100	0,070
Other airports	RJ 100	130,900	5,694	0,131	1,007	0,117	0,105	0,012	1,257	0,410	0,100	0,070
Other airports	S2000	64,769	2,817	0,065	0,439	0,018	0,016	0,002	0,388	0,203	0,100	0,070
Other airports	S61	48,676	2,117	0,049	0,385	0,028	0,025	0,003	0,378	0,152	0,100	0,070
Other airports	Shorts 330	58,200	2,532	0,058	0,337	0,059	0,053	0,006	0,482	0,182	0,100	0,070
Other airports	Shorts 360 300	67,650	2,943	0,068	0,354	0,380	0,342	0,038	1,904	0,212	0,100	0,070
Other airports	Shorts SC.7 Srs3M-200	21,700	0,944	0,022	0,173	0,349	0,314	0,035	0,333	0,068	0,100	0,070
Other airports	Swearingen Metro III	37,150	1,616	0,037	0,341	0,027	0,024	0,003	0,319	0,116	0,100	0,070
Other airports	Saab 340B	58,450	2,543	0,058	0,448	0,151	0,136	0,015	0,278	0,183	0,100	0,070

Total distance flown (NM) and average cruise fuel consumption and emission factors per representative aircraft type for cruise flying.

Airport name	Flight	Rep Aircraft	NM total	Fuel kg_NM	Fuel GJ_NM	SO_2 g_NM	NO_X g_NM	VOC g_NM	NMVOC g_NM	CH_4 g_NM	CO g_NM	CO_2 kg_NM	N_2O g_NM	TSP g_NM
Copenhagen	Domestic	A320	74250,652	6,738	0,293	6,738	136,499	1,188	1,188	0	8,703	21,103	0,673	1,347
Copenhagen	Domestic	A330	494,598	14,886	0,647	14,886	415,692	16,039	16,039	0	32,448	46,624	1,488	2,977
Copenhagen	Domestic	A340	118,79	14,504	0,63	14,504	338,899	75,634	75,634	0	73,594	45,427	1,45	2,9
Copenhagen	Domestic	ATR 42-320	91366,085	1,746	0,075	1,746	15,257	0	0	0	17,36	5,469	0,174	0,349
Copenhagen	Domestic	ATR 72-200	423916,655	1,716	0,074	1,716	19,469	0	0	0	11,367	5,377	0,171	0,343
Copenhagen	Domestic	B737 400	381174,245	6,204	0,269	6,204	75,157	1,197	1,197	0	19,244	19,433	0,62	1,24
Copenhagen	Domestic	B767 300 ER	128,509	11,275	0,49	11,275	207,091	1,957	1,957	0	28,886	35,314	1,127	2,255
Copenhagen	Domestic	BAC1-11	118,79	5,698	0,247	5,698	78,988	1,409	1,409	0	11,393	17,846	0,569	1,139
Copenhagen	Domestic	BAe146	2453,552	5,399	0,234	5,399	69,36	2,812	2,812	0	11,466	16,91	0,539	1,079
Copenhagen	Domestic	Beech Super King Air 200B	234,339	0,789	0,034	0,789	3,832	2,352	2,352	0	14,024	2,473	0,078	0,157
Copenhagen	Domestic	CRJ9	159381,294	3,856	0,167	3,856	34,358	0,316	0,316	0	7,585	12,078	0,385	0,771
Copenhagen	Domestic	Dash8 400	20136,482	3,393	0,147	3,393	54,08	6,105	6,105	0	15,746	10,628	0,339	0,678
Copenhagen	Domestic	F50	11718,078	2,426	0,105	2,426	33,005	0	0	0	14,817	7,598	0,242	0,485
Copenhagen	Domestic	MD 82	182131,724	8,784	0,382	8,784	149,648	4,801	4,801	0	14,437	27,513	0,878	1,756
Copenhagen	Domestic	Reims F406 Caravan II	125,809	0,584	0,025	0,584	3,148	0,425	0,425	0	5,53	1,831	0,058	0,116
Copenhagen	Domestic	RJ 100	93295,911	2,954	0,128	2,954	29,167	2,361	2,361	0	22,389	9,251	0,295	0,59
Copenhagen	Domestic	S61	739,733	3,521	0,153	3,521	27,816	2,006	2,006	0	27,358	11,027	0,352	0,704
Copenhagen	Domestic	Shorts 360 300	711,658	1,612	0,07	1,612	9,34	7,665	7,665	0	40,802	5,05	0,161	0,322
Copenhagen	Domestic	Swearingen Metro III	3156,029	0,811	0,035	0,811	8,041	0,455	0,455	0	5,751	2,541	0,081	0,162
Copenhagen	International	A310	211613,648	8,994	0,391	8,994	142,038	1,563	1,563	0	7,885	28,171	0,899	1,798
Copenhagen	International	A320	17826903,56	5,477	0,238	5,477	80,851	0,956	0,956	0	5,311	17,154	0,547	1,095
Copenhagen	International	A330	2469946,022	11,97	0,52	11,97	158,439	11,473	11,473	0	16,245	37,49	1,197	2,394
Copenhagen	International	A340	7723021,202	12,795	0,556	12,795	209,498	10,021	10,021	0	13,542	40,076	1,279	2,559
Copenhagen	International	Antonov 26	76482,487	2,71	0,117	2,71	3,578	78,872	78,872	0	174,031	8,49	0,271	0,542
Copenhagen	International	ATR 42-320	96729,373	1,637	0,071	1,637	13,584	0	0	0	15,58	5,129	0,163	0,327
Copenhagen	International	ATR 72-200	301476,455	1,716	0,074	1,716	17,289	0	0	0	9,898	5,376	0,171	0,343
Copenhagen	International	B727	478,401	8,534	0,371	8,534	85,335	4,811	4,811	0	17,935	26,728	0,853	1,706
Copenhagen	International	B737 100	2391300,309	5,637	0,245	5,637	52,975	4,651	4,651	0	11,487	17,657	0,563	1,127
Copenhagen	International	B737 400	14477447,2	5,601	0,243	5,601	54,983	0,553	0,553	0	10	17,544	0,56	1,12
Copenhagen	International	B747 400	3199954,205	19,541	0,85	19,541	276,128	4,858	4,858	0	18,904	61,204	1,954	3,908
Copenhagen	International	B757	1861882,29	7,158	0,311	7,158	101,011	6,93	6,93	0	10,198	22,419	0,715	1,431
Copenhagen	International	B767 300 ER	1997777,181	9,718	0,422	9,718	127,81	4,748	4,748	0	10,992	30,437	0,971	1,943
Copenhagen	International	B777	2324122,056	13,908	0,605	13,908	218,791	13,28	13,28	0	17,285	43,56	1,39	2,781
Copenhagen	International	BAC1-11	1727,321	4,692	0,204	4,692	50,109	0,687	0,687	0	4,188	14,696	0,469	0,938
Copenhagen	International	BAe146	404392,758	5,107	0,222	5,107	40,203	1,924	1,924	0	6,728	15,995	0,51	1,021

Copenhagen	International	Beech Super King Air 200B	11013,476	0,751	0,032	0,751	3,119	3,342	3,342	0	18,848	2,353	0,075	0,15
Copenhagen	International	Cessna 208 Caravan	8748,908	0,55	0,023	0,55	3,189	0,066	0,066	0	1,971	1,725	0,055	0,11
Copenhagen	International	CRJ9	6143050,52	3,5	0,152	3,5	26,672	0,193	0,193	0	4,896	10,962	0,35	0,7
Copenhagen	International	Dash8 400	1079127,34	3,154	0,137	3,154	42,844	5,818	5,818	0	16,527	9,881	0,315	0,63
Copenhagen	International	DC10-30	4507,017	15,78	0,686	15,78	286,541	24,183	24,183	0	25,722	49,426	1,578	3,156
Copenhagen	International	Embraer 110P2A	981,1	0,923	0,04	0,923	5,345	0,199	0,199	0	3,571	2,893	0,092	0,184
Copenhagen	International	F100	222262,376	4,932	0,214	4,932	43,838	1,997	1,997	0	7,46	15,447	0,493	0,986
Copenhagen	International	F28	30325,554	4,731	0,205	4,731	50,654	9,729	9,729	0	9,592	14,817	0,473	0,946
Copenhagen	International	F50	45742,344	2,238	0,097	2,238	28,121	0	0	0	12,117	7,01	0,223	0,447
Copenhagen	International	MD 82	5617566,36	7,245	0,315	7,245	100,906	3,7	3,7	0	10,946	22,691	0,724	1,449
Copenhagen	International	Reims F406 Caravan II	974,081	0,582	0,025	0,582	2,855	0,683	0,683	0	8,114	1,825	0,058	0,116
Copenhagen	International	RJ 100	2919966,28	2,442	0,106	2,442	19,952	1,022	1,022	0	9,259	7,65	0,244	0,488
Copenhagen	International	S2000	132789,712	2,626	0,114	2,626	26,019	0,125	0,125	0	9,812	8,224	0,262	0,525
Copenhagen	International	S61	24,298	3,448	0,15	3,448	27,241	1,965	1,965	0	26,793	10,8	0,344	0,689
Copenhagen	International	Shorts 360 300	24683,032	1,463	0,063	1,463	7,181	4,926	4,926	0	34,542	4,584	0,146	0,292
Copenhagen	International	Swearingen Metro III	13392,54	0,793	0,034	0,793	7,862	0,497	0,497	0	6,958	2,484	0,079	0,158
Copenhagen	International	Saab 340B	268100,259	1,429	0,062	1,429	14,535	3,475	3,475	0	6,666	4,477	0,142	0,285
Other airports	Domestic	A320	80656,683	6,738	0,293	6,738	136,477	1,188	1,188	0	8,701	21,103	0,673	1,347
Other airports	Domestic	A330	237,58	14,897	0,648	14,897	416,925	16,044	16,044	0	32,433	46,657	1,489	2,979
Other airports	Domestic	A340	118,79	14,504	0,63	14,504	338,899	75,634	75,634	0	73,594	45,427	1,45	2,9
Other airports	Domestic	ATR 42-320	116993,431	1,745	0,075	1,745	15,252	0	0	0	17,355	5,468	0,174	0,349
Other airports	Domestic	ATR 72-200	418710,972	1,716	0,074	1,716	19,47	0	0	0	11,368	5,377	0,171	0,343
Other airports	Domestic	B737 400	387206,073	6,205	0,269	6,205	75,171	1,198	1,198	0	19,247	19,434	0,62	1,241
Other airports	Domestic	B767 300 ER	128,509	11,275	0,49	11,275	207,091	1,957	1,957	0	28,886	35,314	1,127	2,255
Other airports	Domestic	BAe Jetstream 31	3328,813	1,034	0,044	1,034	10,272	0,62	0,62	0	7,992	3,239	0,103	0,206
Other airports	Domestic	BAe146	3267,254	5,376	0,233	5,376	67,651	2,768	2,768	0	11,273	16,838	0,537	1,075
Other airports	Domestic	Beech Super King Air 200B	7749,417	0,788	0,034	0,788	3,82	2,368	2,368	0	14,103	2,471	0,078	0,157
Other airports	Domestic	Beech Super King Air 350	2056,68	0,865	0,037	0,865	3,554	4,357	4,357	0	33,972	2,71	0,086	0,173
Other airports	Domestic	Cessna 208 Caravan	6779,67	0,518	0,022	0,518	3,015	0,096	0,096	0	2,098	1,622	0,051	0,103
Other airports	Domestic	CRJ9	158337,026	3,856	0,167	3,856	34,357	0,316	0,316	0	7,585	12,078	0,385	0,771
Other airports	Domestic	Dash8 400	20791,441	3,393	0,147	3,393	54,08	6,105	6,105	0	15,746	10,628	0,339	0,678
Other airports	Domestic	Dornier 328-110	81,533	1,47	0,063	1,47	13,975	0	0	0	11,574	4,605	0,147	0,294
Other airports	Domestic	Embraer 110P2A	1510,784	0,846	0,036	0,846	5	0,183	0,183	0	3,276	2,65	0,084	0,169
Other airports	Domestic	F50	11374,667	2,426	0,105	2,426	33,003	0	0	0	14,816	7,598	0,242	0,485
Other airports	Domestic	Lockheed C-130H Hercules	5366,606	6,638	0,288	6,638	80,274	8,484	8,484	0	20,699	20,791	0,663	1,327
Other airports	Domestic	MD 82	196234,816	8,785	0,382	8,785	149,711	4,802	4,802	0	14,439	27,516	0,878	1,757
Other airports	Domestic	Reims F406 Caravan II	1041,029	0,584	0,025	0,584	3,151	0,423	0,423	0	5,506	1,831	0,058	0,116

Other airports	Domestic	RJ 100	147556,868	2,953	0,128	2,953	29,155	2,359	2,359	0	22,372	9,249	0,295	0,59
Other airports	Domestic	S2000	72,894	2,807	0,122	2,807	29,272	0,299	0,299	0	11,48	8,792	0,28	0,561
Other airports	Domestic	S61	481411,345	3,536	0,153	3,536	27,941	2,016	2,016	0	27,481	11,077	0,353	0,707
Other airports	Domestic	Shorts 360 300	2502,141	1,616	0,07	1,616	9,392	7,728	7,728	0	40,944	5,061	0,161	0,323
Other airports	Domestic	Swearingen Metro III	16364,914	0,811	0,035	0,811	8,044	0,455	0,455	0	5,735	2,542	0,081	0,162
Other airports	Domestic	Saab 340B	191,143	1,477	0,064	1,477	14,831	3,77	3,77	0	7,66	4,627	0,147	0,295
Other Airports	International	A310	1545,356	8,668	0,377	8,668	110,305	1,219	1,219	0	5,427	27,149	0,866	1,733
Other Airports	International	A320	2028122,379	5,084	0,221	5,084	67,477	0,884	0,884	0	4,191	15,923	0,508	1,016
Other Airports	International	A330	30263,493	12,459	0,541	12,459	170,214	11,908	11,908	0	16,681	39,021	1,245	2,491
Other Airports	International	Antonov 26	676,025	2,703	0,117	2,703	3,46	76,95	76,95	0	174,022	8,468	0,27	0,54
Other Airports	International	ATR 42-320	149127,674	1,656	0,072	1,656	13,87	0	0	0	15,884	5,187	0,165	0,331
Other Airports	International	ATR 72-200	69703,438	1,716	0,074	1,716	17,415	0	0	0	9,983	5,376	0,171	0,343
Other Airports	International	B737 100	282334,366	6,06	0,263	6,06	61,091	5,717	5,717	0	14,884	18,981	0,606	1,212
Other Airports	International	B737 400	6575224,668	5,593	0,243	5,593	53,685	0,469	0,469	0	8,842	17,52	0,559	1,118
Other Airports	International	B747 100-300	3110,691	21,107	0,918	21,107	366,338	6,182	6,182	0	19,092	66,11	2,11	4,221
Other Airports	International	B747 400	20271,053	18,845	0,819	18,845	264,175	6,356	6,356	0	22,75	59,024	1,884	3,769
Other Airports	International	B757	154359,99	7,689	0,334	7,689	145,989	7,743	7,743	0	13,061	24,084	0,768	1,537
Other Airports	International	B767 300 ER	110819,629	9,862	0,429	9,862	133,421	4,691	4,691	0	11,724	30,889	0,986	1,972
Other Airports	International	BAe Jetstream 31	245668,034	0,978	0,042	0,978	10,117	0,491	0,491	0	6,771	3,066	0,097	0,195
Other Airports	International	BAe Jetstream 41	743,52	1,355	0,058	1,355	13,563	0,418	0,418	0	7,1	4,246	0,135	0,271
Other Airports	International	BAe146	64998,853	5,129	0,223	5,129	43,716	2,035	2,035	0	7,381	16,066	0,512	1,025
Other Airports	International	Beech 1900C Airliner	1480,56	0,915	0,039	0,915	3,697	8,889	8,889	0	40,681	2,867	0,091	0,183
Other Airports	International	Beech Super King Air 200B	57431,313	0,752	0,032	0,752	3,129	3,329	3,329	0	18,785	2,355	0,075	0,15
Other Airports	International	Beech Super King Air 350	20978,917	0,831	0,036	0,831	3,102	4,059	4,059	0	34,91	2,602	0,083	0,166
Other Airports	International	Cessna 208 Caravan	65538,799	0,553	0,024	0,553	3,204	0,063	0,063	0	1,963	1,734	0,055	0,11
Other Airports	International	CRJ9	4008,636	3,482	0,151	3,482	25,192	0,144	0,144	0	3,901	10,907	0,348	0,696
Other Airports	International	Dash8 400	138736,982	3,084	0,134	3,084	39,518	5,733	5,733	0	16,761	9,661	0,308	0,616
Other Airports	International	DC10-30	8119,869	15,771	0,686	15,771	276,043	16,046	16,046	0	18,887	49,396	1,577	3,154
Other Airports	International	Dornier 328-110	3626,348	1,389	0,06	1,389	11,677	0	0	0	11,161	4,352	0,138	0,277
Other Airports	International	Embraer 110P2A	31467,005	0,905	0,039	0,905	5,266	0,196	0,196	0	3,504	2,837	0,09	0,181
Other Airports	International	F100	36292,094	5,146	0,223	5,146	50,806	2,32	2,32	0	9,293	16,118	0,514	1,029
Other Airports	International	F28	379250,424	4,785	0,208	4,785	51,621	10,639	10,639	0	10,857	14,989	0,478	0,957
Other Airports	International	F50	4612,308	2,136	0,092	2,136	25,468	0	0	0	10,645	6,69	0,213	0,427
Other Airports	International	Lockheed C-130H Hercules	4555,612	6,811	0,296	6,811	72,236	2,759	2,759	0	13,068	21,332	0,681	1,362
Other Airports	International	MD 82	341788,208	6,408	0,278	6,408	76,086	2,934	2,934	0	8,511	20,07	0,64	1,281
Other Airports	International	Reims F406 Caravan II	14881,194	0,582	0,025	0,582	2,825	0,708	0,708	0	8,374	1,824	0,058	0,116
Other Airports	International	RJ 100	3060615,06	2,427	0,105	2,427	19,675	0,982	0,982	0	8,861	7,602	0,242	0,485

Other Airports	International	S2000	43120,819	2,727	0,118	2,727	27,852	0,223	0,223	0	10,753	8,544	0,272	0,545
Other Airports	International	S61	19429,772	3,702	0,161	3,702	29,248	2,11	2,11	0	28,766	11,595	0,37	0,74
Other Airports	International	Shorts 360 300	477262,39	1,503	0,065	1,503	7,746	5,693	5,693	0	36,368	4,708	0,15	0,3
Other Airports	International	Swearingen Metro III	69133,787	0,799	0,034	0,799	7,921	0,483	0,483	0	6,541	2,504	0,079	0,159
Other Airports	International	Saab 340B	18340,692	1,409	0,061	1,409	14,416	3,354	3,354	0	6,257	4,415	0,14	0,281

Annex 2B-11 Basis fuel consumption and emission factors, deterioration factors, transient factors stock and activity data for non road working machinery and equipment, and recreational craft

Basis factors for diesel fuelled non road machinery.

Engine size [P=kW]	Emission Level	NO_x	VOC	CO	N_2O [g pr kWh]	NH_3	TSP	Fuel
P<19	<1981	12.0	5.0	7	0.035	0.002	2.8	300
P<19	1981-1990	11.5	3.8	6	0.035	0.002	2.3	285
P<19	1991-Stage I	11.2	2.5	5	0.035	0.002	1.6	270
P<19	Stage I	11.2	2.5	5	0.035	0.002	1.6	270
P<19	Stage II	11.2	2.5	5	0.035	0.002	1.6	270
P<19	Stage IIIA	11.2	2.5	5	0.035	0.002	1.6	270
P<19	Stage IIIB	11.2	2.5	5	0.035	0.002	1.6	270
P<19	Stage IV	11.2	2.5	5	0.035	0.002	1.6	270
19<=P<37	<1981	18.0	2.5	6.5	0.035	0.002	2	300
19<=P<37	1981-1990	18.0	2.2	5.5	0.035	0.002	1.4	281
19<=P<37	1991-Stage I	9.8	1.8	4.5	0.035	0.002	1.4	262
19<=P<37	Stage I	9.8	1.8	4.5	0.035	0.002	1.4	262
19<=P<37	Stage II	6.5	0.6	2.2	0.035	0.002	0.4	262
19<=P<37	Stage IIIA	6.2	0.6	2.2	0.035	0.002	0.4	262
19<=P<37	Stage IIIB	6.2	0.6	2.2	0.035	0.002	0.4	262
19<=P<37	Stage IV	6.2	0.6	2.2	0.035	0.002	0.4	262
37<=P<56	<1981	7.7	2.4	6	0.035	0.002	1.8	290
37<=P<56	1981-1990	8.6	2.0	5.3	0.035	0.002	1.2	275
37<=P<56	1991-Stage I	11.5	1.5	4.5	0.035	0.002	0.8	260
37<=P<56	Stage I	7.7	0.6	2.2	0.035	0.002	0.4	260
37<=P<56	Stage II	5.5	0.4	2.2	0.035	0.002	0.2	260
37<=P<56	Stage IIIA	3.9	0.4	2.2	0.035	0.002	0.2	260
37<=P<56	Stage IIIB	3.9	0.4	2.2	0.035	0.002	0.0225	260
37<=P<56	Stage IV	3.9	0.4	2.2	0.035	0.002	0.0225	260
56<=P<75	<1981	7.7	2.0	5	0.035	0.002	1.4	290
56<=P<75	1981-1990	8.6	1.6	4.3	0.035	0.002	1	275
56<=P<75	1991-Stage I	11.5	1.2	3.5	0.035	0.002	0.4	260
56<=P<75	Stage I	7.7	0.4	1.5	0.035	0.002	0.2	260
56<=P<75	Stage II	5.5	0.3	1.5	0.035	0.002	0.2	260
56<=P<75	Stage IIIA	4.0	0.3	1.5	0.035	0.002	0.2	260
56<=P<75	Stage IIIB	3.0	0.2	1.5	0.035	0.002	0.0225	260
56<=P<75	Stage IV	0.4	0.2	1.5	0.035	0.002	0.0225	260
75<=P<130	<1981	10.5	2.0	5	0.035	0.002	1.4	280
75<=P<130	1981-1990	11.8	1.6	4.3	0.035	0.002	1	268
75<=P<130	1991-Stage I	13.3	1.2	3.5	0.035	0.002	0.4	255
75<=P<130	Stage I	8.1	0.4	1.5	0.035	0.002	0.2	255
75<=P<130	Stage II	5.2	0.3	1.5	0.035	0.002	0.2	255
75<=P<130	Stage IIIA	3.4	0.3	1.5	0.035	0.002	0.2	255
75<=P<130	Stage IIIB	3.0	0.2	1.5	0.035	0.002	0.0225	255
75<=P<130	Stage IV	0.4	0.2	1.5	0.035	0.002	0.0225	255
130<=P<560	<1981	17.8	1.5	2.5	0.035	0.002	0.9	270
130<=P<560	1981-1990	12.4	1.0	2.5	0.035	0.002	0.8	260
130<=P<560	1991-Stage I	11.2	0.5	2.5	0.035	0.002	0.4	250
130<=P<560	Stage I	7.6	0.3	1.5	0.035	0.002	0.2	250
130<=P<560	Stage II	5.2	0.3	1.5	0.035	0.002	0.1	250
130<=P<560	Stage IIIA	3.4	0.3	1.5	0.035	0.002	0.1	250
130<=P<560	Stage IIIB	3.0	0.2	1.5	0.035	0.002	0.0225	250
130<=P<560	Stage IV	0.4	0.2	1.5	0.035	0.002	0.0225	250

Basis factors for 4-stroke gasoline non road machinery.

Engine	Size code	Size classe [S=ccm]	Emission Level	NO_x	VOC	CO	N_2O [g pr kWh]	NH_3	TSP	Fuel
4-stroke	SH2	20<=S<50	<1981	2.4	33	198	0.002	0.03	0.08	496
4-stroke	SH2	20<=S<50	1981-1990	3.5	27.5	165	0.002	0.03	0.08	474
4-stroke	SH2	20<=S<50	1991-Stage I	4.7	22	132	0.002	0.03	0.08	451
4-stroke	SH2	20<=S<50	Stage I	4.7	22	132	0.002	0.03	0.08	406
4-stroke	SH2	20<=S<50	Stage II	4.7	22	132	0.002	0.03	0.08	406
4-stroke	SH3	S>=50	<1981	2.4	33	198	0.002	0.03	0.08	496
4-stroke	SH3	S>=50	1981-1990	3.5	27.5	165	0.002	0.03	0.08	474
4-stroke	SH3	S>=50	1991-Stage I	4.7	22	132	0.002	0.03	0.08	451
4-stroke	SH3	S>=50	Stage I	4.7	22	132	0.002	0.03	0.08	406
4-stroke	SH3	S>=50	Stage II	4.7	22	132	0.002	0.03	0.08	406
4-stroke	SN1	S<66	<1981	1.2	26.9	822	0.002	0.03	0.08	603
4-stroke	SN1	S<66	1981-1990	1.8	22.5	685	0.002	0.03	0.08	603
4-stroke	SN1	S<66	1991-Stage I	2.4	18	548	0.002	0.03	0.08	603
4-stroke	SN1	S<66	Stage I	4.3	16.1	411	0.002	0.03	0.08	475
4-stroke	SN1	S<66	Stage II	4.3	16.1	411	0.002	0.03	0.08	475
4-stroke	SN2	66<=S<100	<1981	2.3	10.5	822	0.002	0.03	0.08	627
4-stroke	SN2	66<=S<100	1981-1990	3.5	8.7	685	0.002	0.03	0.08	599
4-stroke	SN2	66<=S<100	1991-Stage I	4.7	7	548	0.002	0.03	0.08	570
4-stroke	SN2	66<=S<100	Stage I	4.7	7	467	0.002	0.03	0.08	450
4-stroke	SN2	66<=S<100	Stage II	4.7	7	467	0.002	0.03	0.08	450
4-stroke	SN3	100<=S<225	<1981	2.6	19.1	525	0.002	0.03	0.08	601
4-stroke	SN3	100<=S<225	1981-1990	3.8	15.9	438	0.002	0.03	0.08	573
4-stroke	SN3	100<=S<225	1991-Stage I	5.1	12.7	350	0.002	0.03	0.08	546
4-stroke	SN3	100<=S<225	Stage I	5.1	11.6	350	0.002	0.03	0.08	546
4-stroke	SN3	100<=S<225	Stage II	5.1	9.4	350	0.002	0.03	0.08	546
4-stroke	SN4	S>=225	<1981	1.3	11.1	657	0.002	0.03	0.08	539
4-stroke	SN4	S>=225	1981-1990	2	9.3	548	0.002	0.03	0.08	514
4-stroke	SN4	S>=225	1991-Stage I	2.6	7.4	438	0.002	0.03	0.08	490
4-stroke	SN4	S>=225	Stage I	2.6	7.4	438	0.002	0.03	0.08	490
4-stroke	SN4	S>=225	Stage II	2.6	7.4	438	0.002	0.03	0.08	490

Basis factors for 2-stroke gasoline non road machinery.

Engine	Size code	Size classe [ccm]	Emission Level	NO_x	VOC	CO	N_2O [g pr kWh]	NH_3	TSP	Fuel
2-stroke	SH2	20<=S<50	<1981	1	305	695	0.002	0.01	7	882
2-stroke	SH2	20<=S<50	1981-1990	1	300	579	0.002	0.01	5.3	809
2-stroke	SH2	20<=S<50	1991-Stage I	1.1	203	463	0.002	0.01	3.5	735
2-stroke	SH2	20<=S<50	Stage I	1.5	188	379	0.002	0.01	3.5	720
2-stroke	SH2	20<=S<50	Stage II	1.5	44	379	0.002	0.01	3.5	500
2-stroke	SH3	S>=50	<1981	1.1	189	510	0.002	0.01	3.6	665
2-stroke	SH3	S>=50	1981-1990	1.1	158	425	0.002	0.01	2.7	609
2-stroke	SH3	S>=50	1991-Stage I	1.2	126	340	0.002	0.01	1.8	554
2-stroke	SH3	S>=50	Stage I	2	126	340	0.002	0.01	1.8	529
2-stroke	SH3	S>=50	Stage II	1.2	64	340	0.002	0.01	1.8	500
2-stroke	SN1	S<66	<1981	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN1	S<66	1981-1990	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN1	S<66	1991-Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN1	S<66	Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN1	S<66	Stage II	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN2	66<=S<100	<1981	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN2	66<=S<100	1981-1990	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN2	66<=S<100	1991-Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN2	66<=S<100	Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN2	66<=S<100	Stage II	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN3	100<=S<225	<1981	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN3	100<=S<225	1981-1990	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN3	100<=S<225	1991-Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN3	100<=S<225	Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN3	100<=S<225	Stage II	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN4	S>=225	<1981	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN4	S>=225	1981-1990	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN4	S>=225	1991-Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN4	S>=225	Stage I	0.5	155	418	0.002	0.01	2.6	652
2-stroke	SN4	S>=225	Stage II	0.5	155	418	0.002	0.01	2.6	652

Fuel consumption and emission factors for LPG fork lifts.

NO_x [g pr kWh]	VOC [g pr kWh]	CO [g pr kWh]	NH_3 [g pr kWh]	N_2O [g pr kWh]	TSP [g pr kWh]	FC [g pr kWh]
19	2.2	1.5	0.003	0.05	0.07	311

Fuel consumption and emission factors for All Terrain Vehicles (ATV's).

ATV type	NO_x [g pr GJ]	VOC [g pr GJ]	CO [g pr GJ]	NH_3 [g pr GJ]	N_2O [g pr GJ]	TSP [g pr GJ]	Fuel [kg pr hour]
Professional	108	1077	16306	2	2	32	1.125
Private	128	1527	22043	2	2	39	0.75

Fuel consumption and emission factors for recreational craft.

Fuel type	Vessel type	Engine	Engine type	Direktiv	Engine size	CO	VOC	N_2O	NH_3	NO_x	TSP	Fuel
					[kW]	[g pr kWh]						
Gasoline	Other boats (< 20 ft)	Out board	2-stroke	2003/44	8	202.5	45.9	0.01	0.002	2	10	791
Gasoline	Other boats (< 20 ft)	Out board	2-stroke	Konv.	8	427	257.0	0.01	0.002	2	10	791
Gasoline	Other boats (< 20 ft)	Out board	4-stroke	2003/44	8	202.5	24.0	0.03	0.002	7	0.08	426
Gasoline	Other boats (< 20 ft)	Out board	4-stroke	Konv.	8	520	24.0	0.03	0.002	7	0.08	426
Gasoline	Yawls and cabin boats	Out board	2-stroke	2003/44	20	162	36.5	0.01	0.002	3	10	791
Gasoline	Yawls and cabin boats	Out board	2-stroke	Konv.	20	374	172.0	0.01	0.002	3	10	791
Gasoline	Yawls and cabin boats	Out board	4-stroke	2003/44	20	162	14.0	0.03	0.002	10	0.08	426
Gasoline	Yawls and cabin boats	Out board	4-stroke	Konv.	20	390	14.0	0.03	0.002	10	0.08	426
Gasoline	Sailing boats (< 26 ft)	Out board	2-stroke	2003/44	10	189	43.0	0.01	0.002	2	10	791
Gasoline	Sailing boats (< 26 ft)	Out board	2-stroke	Konv.	10	427	257.0	0.01	0.002	2	10	791
Gasoline	Sailing boats (< 26 ft)	Out board	4-stroke	2003/44	10	189	24.0	0.03	0.002	7	0.08	426
Gasoline	Sailing boats (< 26 ft)	Out board	4-stroke	Konv.	10	520	24.0	0.03	0.002	7	0.08	426
Gasoline	Speed boats	In board	4-stroke	2003/44	90	141	10.0	0.03	0.002	12	0.08	426
Gasoline	Speed boats	In board	4-stroke	Konv.	90	346	10.0	0.03	0.002	12	0.08	426
Gasoline	Speed boats	Out board	2-stroke	2003/44	50	145.8	31.8	0.01	0.002	3	10	791
Gasoline	Speed boats	Out board	2-stroke	Konv.	50	374	172.0	0.01	0.002	3	10	791
Gasoline	Speed boats	Out board	4-stroke	2003/44	50	145.8	14.0	0.03	0.002	10	0.08	426
Gasoline	Speed boats	Out board	4-stroke	Konv.	50	390	14.0	0.03	0.002	10	0.08	426
Gasoline	Water scooters	Built in	2-stroke	2003/44	45	147	32.2	0.01	0.002	3	10	791
Gasoline	Water scooters	Built in	2-stroke	Konv.	45	374	172.0	0.01	0.002	3	10	791
Gasoline	Water scooters	Built in	4-stroke	2003/44	45	147	14.0	0.03	0.002	10	0.08	426
Gasoline	Water scooters	Built in	4-stroke	Konv.	45	390	14.0	0.03	0.002	10	0.08	426
Diesel	Motor boats (27-34 ft)	In board		2003/44	150	5	1.7	0.035	0.002	8.6	1	275
Diesel	Motor boats (27-34 ft)	In board		Konv.	150	5.3	2.0	0.035	0.002	8.6	1.2	275
Diesel	Motor boats (> 34 ft)	In board		2003/44	250	5	1.6	0.035	0.002	8.6	1	275
Diesel	Motor boats (> 34 ft)	In board		Konv.	250	5.3	2.0	0.035	0.002	8.6	1.2	275
Diesel	Motor boats (< 27 ft)	In board		2003/44	40	5	1.8	0.035	0.002	9.8	1	281
Diesel	Motor boats (< 27 ft)	In board		Konv.	40	5.5	2.2	0.035	0.002	18	1.4	281
Diesel	Motor sailors	In board		2003/44	30	5	1.9	0.035	0.002	9.8	1	281
Diesel	Motor sailors	In board		Konv.	30	5.5	2.2	0.035	0.002	18	1.4	281
Diesel	Sailing boats (> 26 ft)	In board		2003/44	30	5	1.9	0.035	0.002	9.8	1	281
Diesel	Sailing boats (> 26 ft)	In board		Konv.	30	5.5	2.2	0.035	0.002	18	1.4	281

CH_4 shares of VOC for diesel, gasoline and LPG.

Fuel type	CH_4 share of VOC
Diesel	0.016
Gasoline 4-stroke	0.1
Gasoline 2-stroke	0.009
LPG	0.05

Deterioration factors for diesel machinery.

Emission Level	NO_x	VOC	CO	TSP
<1981	0.024	0.047	0.185	0.473
1981-1990	0.024	0.047	0.185	0.473
1991-Stage I	0.024	0.047	0.185	0.473
Stage I	0.024	0.036	0.101	0.473
Stage II	0.009	0.034	0.101	0.473
Stage IIIA	0.008	0.027	0.151	0.473
Stage IIIB	0.008	0.027	0.151	0.473
Stage IV	0.008	0.027	0.151	0.473

Deterioration factors for gasoline 2-stroke machinery.

Engine	Size code	Size classe	Emission Level	NO_x	VOC	CO	TSP
2-stroke	SH2	20<=S<50	<1981	0	0.2	0.2	0
2-stroke	SH2	20<=S<50	1981-1990	0	0.2	0.2	0
2-stroke	SH2	20<=S<50	1991-Stage I	0	0.2	0.2	0
2-stroke	SH2	20<=S<50	Stage I	0	0.29	0.24	0
2-stroke	SH2	20<=S<50	Stage II	0	0.29	0.24	0
2-stroke	SH3	S>=50	<1981	-0.031	0.2	0.2	0
2-stroke	SH3	S>=50	1981-1990	-0.031	0.2	0.2	0
2-stroke	SH3	S>=50	1991-Stage I	-0.031	0.2	0.2	0
2-stroke	SH3	S>=50	Stage I	0	0.266	0.231	0
2-stroke	SH3	S>=50	Stage II	0	0.266	0.231	0
2-stroke	SN1	S<66	<1981	-0.6	0.201	0.9	1.1
2-stroke	SN1	S<66	1981-1990	-0.6	0.201	0.9	1.1
2-stroke	SN1	S<66	1991-Stage I	-0.6	0.201	0.9	1.1
2-stroke	SN1	S<66	Stage I	-0.33	0.266	1.109	5.103
2-stroke	SN1	S<66	Stage II	-0.33	0	1.109	5.103
2-stroke	SN2	66<=S<100	<1981	-0.6	0.201	0.9	1.1
2-stroke	SN2	66<=S<100	1981-1990	-0.6	0.201	0.9	1.1
2-stroke	SN2	66<=S<100	1991-Stage I	-0.6	0.201	0.9	1.1
2-stroke	SN2	66<=S<100	Stage I	-0.33	0.266	1.109	5.103
2-stroke	SN2	66<=S<100	Stage II	-0.33	0	1.109	5.103
2-stroke	SN3	100<=S<225	<1981	-0.6	0.201	0.9	1.1
2-stroke	SN3	100<=S<225	1981-1990	-0.6	0.201	0.9	1.1
2-stroke	SN3	100<=S<225	1991-Stage I	-0.6	0.201	0.9	1.1
2-stroke	SN3	100<=S<225	Stage I	-0.33	0.266	1.109	5.103
2-stroke	SN3	100<=S<225	Stage II	-0.33	0	1.109	5.103
2-stroke	SN4	S>=225	<1981	-0.6	0.201	0.9	1.1
2-stroke	SN4	S>=225	1981-1990	-0.6	0.201	0.9	1.1
2-stroke	SN4	S>=225	1991-Stage I	-0.6	0.201	0.9	1.1
2-stroke	SN4	S>=225	Stage I	-0.274	0	0.887	1.935
2-stroke	SN4	S>=225	Stage II	-0.274	0	0.887	1.935

Deterioration factors for gasoline 4-stroke machinery.

Engine	Size code	Size classe	Emission Level	NO_x	VOC	CO	TSP
4-stroke	SN1	S<66	<1981	-0.6	1.1	0.9	1.1
4-stroke	SN1	S<66	1981-1990	-0.6	1.1	0.9	1.1
4-stroke	SN1	S<66	1991-Stage I	-0.6	1.1	0.9	1.1
4-stroke	SN1	S<66	Stage I	-0.3	1.753	1.051	1.753
4-stroke	SN1	S<66	Stage II	-0.3	1.753	1.051	1.753
4-stroke	SN2	66<=S<100	<1981	-0.6	1.1	0.9	1.1
4-stroke	SN2	66<=S<100	1981-1990	-0.6	1.1	0.9	1.1
4-stroke	SN2	66<=S<100	1991-Stage I	-0.6	1.1	0.9	1.1
4-stroke	SN2	66<=S<100	Stage I	-0.3	1.753	1.051	1.753
4-stroke	SN2	66<=S<100	Stage II	-0.3	1.753	1.051	1.753
4-stroke	SN3	100<=S<225	<1981	-0.6	1.1	0.9	1.1
4-stroke	SN3	100<=S<225	1981-1990	-0.6	1.1	0.9	1.1
4-stroke	SN3	100<=S<225	1991-Stage I	-0.6	1.1	0.9	1.1
4-stroke	SN3	100<=S<225	Stage I	-0.3	1.753	1.051	1.753
4-stroke	SN3	100<=S<225	Stage II	-0.3	1.753	1.051	1.753
4-stroke	SN4	S>=225	<1981	-0.6	1.1	0.9	1.1
4-stroke	SN4	S>=225	1981-1990	-0.6	1.1	0.9	1.1
4-stroke	SN4	S>=225	1991-Stage I	-0.6	1.1	0.9	1.1
4-stroke	SN4	S>=225	Stage I	-0.599	1.095	1.307	1.095
4-stroke	SN4	S>=225	Stage II	-0.599	1.095	1.307	1.095
4-stroke	SH2	20<=S<50	<1981	0	0	0	0
4-stroke	SH2	20<=S<50	1981-1990	0	0	0	0
4-stroke	SH2	20<=S<50	1991-Stage I	0	0	0	0
4-stroke	SH2	20<=S<50	Stage I	0	0	0	0
4-stroke	SH2	20<=S<50	Stage II	0	0	0	0
4-stroke	SH3	S>=50	<1981	0	0	0	0
4-stroke	SH3	S>=50	1981-1990	0	0	0	0
4-stroke	SH3	S>=50	1991-Stage I	0	0	0	0
4-stroke	SH3	S>=50	Stage I	0	0	0	0
4-stroke	SH3	S>=50	Stage II	0	0	0	0

Transient factors for diesel machinery.

Emission Level	Load	NO_x	VOC	CO	TSP	Fuel
<1981	High	0.95	1.05	1.53	1.23	1.01
1981-1990	High	0.95	1.05	1.53	1.23	1.01
1991-Stage I	High	0.95	1.05	1.53	1.23	1.01
Stage I	High	0.95	1.05	1.53	1.23	1.01
Stage II	High	0.95	1.05	1.53	1.23	1.01
Stage IIIA	High	0.95	1.05	1.53	1.23	1.01
Stage IIIB	High	1	1	1	1	1
Stage IV	High	1	1	1	1	1
<1981	Low	1.1	2.29	2.57	1.97	1.18
1981-1990	Low	1.1	2.29	2.57	1.97	1.18
1991-Stage I	Low	1.1	2.29	2.57	1.97	1.18
Stage I	Low	1.1	2.29	2.57	1.97	1.18
Stage II	Low	1.1	2.29	2.57	1.97	1.18
Stage IIIA	Low	1.1	2.29	2.57	1.97	1.18
Stage IIIB	Low	1	1	1	1	1
Stage IV	Low	1	1	1	1	1

Annual working hours, load factors and lifetimes for agricultural tractors.

Tractor type	Annual working hours	Load factor	Lifetime (yrs)
Diesel	500 (0-7 years) 500-100 (7-16 years) 100 (>16 years)	0.5	30
Gasoline (certified)	100	0.4	37
Gasoline (non certified)	50	0.4	37

Annual working hours, load factors and lifetimes for harvesters.

Annual working hours	Load factor	Lifetime (yrs)
250-100 (linear decrease 0-24 years)	0.8	25

Annual working hours, load factors and lifetime for machine pool machinery.

Tractor type	Hours pr yr	Load factor	Lifetime (yrs)
Tractors	750	0.5	7
Harvesters	100	0.8	11
Self-propelled vehicles	500	0.75	6

Operational data for other machinery types in agriculture.

Machinery type	Fuel type	Load factor	Lifetime (yrs)	Hours	Size (kW)
ATV private	Gasoline	-	6	250	-
ATV professional	Gasoline	-	8	400	-
Bedding machines	Gasoline	0.3	10	50	3
Fodder trucks	Gasoline	0.4	10	200	8
Other (gasoline)	Gasoline	0.4	10	50	5
Scrapers	Gasoline	0.3	10	50	3
Self-propelled vehicles	Diesel	0.75	15	150	60
Sweepers	Gasoline	0.3	10	50	3

Annual working hours, load factors and lifetimes for forestry machinery.

Machinery type	Hours	Load factors	Lifetime
Chippers	1200	0.5	6
Tractors (other)	100 (1990) 400 (2004)	0.5	15
Tractors (silvicultural)	800	0.5	6
Harvesters	1200	0.5	8
Forwarders	1200	0.5	8
Chain saws (forestry)	800	0.4	3

Annual working hours, load factors and lifetime for fork lifts.

Hours pr yr	Load factor	Lifetime (yrs)
1200 (>=50 kW and <=10 years old) 650 (>=50 kW and >10 years old) 650 (<50 kW)	0.27	20

Operational data for construction machinery.

Machinery type	Load factor	Lifetime	Hours	Size
Track type dozers	0.5	10	1100	140
Track type loaders	0.5	10	1100	100 (1990) 150 (2004)
Wheel loaders (0-5 tonnes)	0.5	10	1200	20
Wheel loaders (> 5,1 tonnes)	0.5	10	1200	120
Wheel type excavators	0.6	10	1200	100
Track type excavators (0-5 tonnes)	0.6	10	1100	20
Track type excavators (>5,1 tonnes)	0.6	10	1100	120
Excavators/Loaders	0.45	10	700	50
Dump trucks	0.4	10	900 (1990) 1200 (2004)	60 (1990) 180 (2004)
Mini loaders	0.5	14	700	30
Telescopic loaders	0.5	14	1000	35

Stock and operational data for other machinery types in industry.

Sector	Fuel type	Machinery type	Size (kW)	No	Load Factor	Hours
Construction machinery	Diesel	Tampers/Land rollers	30	2800	0.45	600
Construction machinery	Diesel	Generators (diesel)	45	5000	0.5	200
Construction machinery	Diesel	Kompressors (diesel)	45	5000	0.5	500
Construction machinery	Diesel	Pumps (diesel)	75	1000	0.5	5
Construction machinery	Diesel	Asphalt pavers	80	300	0.35	700
Construction machinery	Diesel	Motor graders	100	100	0.4	700
Construction machinery	Diesel	Refuse compressors	160	100	0.25	1300
Construction machinery	Gasoline	Generators (gasoline)	2.5	11000	0.4	80
Construction machinery	Gasoline	Pumps (gasoline)	4	10000	0.4	300
Construction machinery	Gasoline	Kompressors (gasoline)	4	500	0.35	15
Industry	Diesel	Refrigerating units (distribution)	8	3000	0.5	1250
Industry	Diesel	Refrigerating units (long distance)	15	3500	0.5	200
Industry	Diesel	Tractors (transport, industry)	50	3000	0.4	500
Airport GSE and other	Diesel	Airport GSE and other (light duty)	100	500	0.5	400
Airport GSE and other	Diesel	Airport GSE and other (medium duty)	125	350	0.5	300
Airport GSE and other	Diesel	Airport GSE and other (Heavy duty)	175	650	0.5	200
Building and construction	Diesel	Vibratory plates	6	3500	0.6	300
Building and construction	Diesel	Aereal lifts (diesel)	30	150	0.4	400
Building and construction	Diesel	Sweepers (diesel)	30	200	0.4	300
Building and construction	Diesel	High pressure cleaners (diesel)	30	50	0.8	500
Building and construction	Gasoline	Rammers	2.5	3000	0.4	80
Building and construction	Gasoline	Drills	3	100	0.4	10
Building and construction	Gasoline	Vibratory plates (gasoline)	4	2500	0.5	200
Building and construction	Gasoline	Cutters	4	800	0.5	50
Building and construction	Gasoline	Other (gasoline)	5	1000	0.5	40
Building and construction	Gasoline	High pressure cleaners (gasoline)	5	500	0.6	200
Building and construction	Gasoline	Sweepers (gasoline)	10	500	0.4	150
Building and construction	Gasoline	Slicers	10	100	0.7	150
Building and construction	Gasoline	Aereal lifts (gasoline)	20	50	0.4	400

Operational data for the most important types of household and gardening machinery.

Machinery type	Engine	Size (kW)	Hours	Load factor	Lifetime (yrs)
Chain saws (private)	2-stroke	2	5	0.3	10
Chain saws (professional)	2-stroke	3	270	0.4	3
Cultivators (private-large)	4-stroke	3.7	5	0.6	5
Cultivators (private-small)	4-stroke	1	5	0.6	15
Cultivators (professional)	4-stroke	7	360	0.6	8
Hedge cutters (private)	2-stroke	0.9	10	0.5	10
Hedge cutters (professional)	2-stroke	2	300	0.5	4
Lawn movers (private)	4-stroke	2.5 (2000) 3.5 (2004)	25	0.4	8
Lawn movers (professional)	4-stroke	2.5 (2000) 3.5 (2004)	250	0.4	4
Riders (private)	4-stroke	11	50	0.5	12
Riders (professional)	4-stroke	13	330	0.5	5
Shrub clearers (private)	2-stroke	1	15	0.6	10
Shrub clearers (professional)	2-stroke	2	300	0.6	4
Trimmers (private)	2-stroke	0.9	20	0.5	10
Trimmers (professional)	2-stroke	0.9	200	0.5	4

Stock and operational data for other machines in household and gardening.

Machinery type	Engine	No.	Size (kW)	Hours	Load factor	Lifetime (yrs)
Chippers	2-stroke	200	10	100	0.7	10
Garden shredders	2-stroke	500	3	20	0.7	10
Other (gasoline)	2-stroke	200	2	20	0.5	10
Suction machines	2-stroke	300	4	80	0.5	10
Wood cutters	4-stroke	100	4	15	0.5	10

Operational data for recreational craft.

Fuel type	Vessel type	Engine type	Stroke	Hours	Lifetime	Load factor
Gasoline	Other boats (<20 ft)	Out board engine	2-stroke	30	10	0.5
Gasoline	Other boats (<20 ft)	Out board engine	4-stroke	30	10	0.5
Gasoline	Yawls and cabin boats	Out board engine	2-stroke	50	10	0.5
Gasoline	Yawls and cabin boats	Out board engine	4-stroke	50	10	0.5
Gasoline	Sailing boats (<26ft)	Out board engine	2-stroke	5	10	0.5
Gasoline	Sailing boats (<26ft)	Out board engine	4-stroke	5	10	0.5
Gasoline	Speed boats	In board engine	4-stroke	75	10	0.5
Gasoline	Speed boats	Out board engine	2-stroke	50	10	0.5
Gasoline	Speed boats	Out board engine	4-stroke	50	10	0.5
Gasoline	Water scooters	Built in	2-stroke	10	10	0.5
Gasoline	Water scooters	Built in	4-stroke	10	10	0.5
Diesel	Motor boats (27-34 ft)	In board engine		150	15	0.5
Diesel	Motor boats (>34 ft)	In board engine		100	15	0.5
Diesel	Motor boats (<27 ft)	In board engine		75	15	0.5
Diesel	Motor sailors	In board engine		75	15	0.5
Diesel	Sailing boats (<26ft)	In board engine		25	15	0.5

Stock data for diesel tractors 1985-2012.

Size (kW)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
37	<1981	3882	3792	3542	3543	3403	3234	3106	2922	2861	2610	2605	2273	2193	1918	1796
37	1981-1990	635	731	760	835	855	879	889	883	915	887	945	883	918	869	888
37	1991-Stage I							25	107	153	201	278	354	445	496	554
37	Stage I															
37	Stage II															
37	Stage IIIA															
45	<1981	25988	25387	23709	23718	22781	21650	20796	19563	19154	17475	17441	15219	14684	12840	12025
45	1981-1990	5740	6808	7263	8075	8476	8770	8867	8805	9128	8848	9419	8807	9151	8668	8856
45	1991-Stage I							203	202	209	203	216	202	210	199	203
49	1991-Stage I								154	281	485	602	618	702	749	765
52	1991-Stage I															247
52	Stage I															
52	Stage II															
52d	Stage IIIA															
56	1991-Stage I								201	338	428	747	943	1181	1280	1307
60	<1981	54651	53387	49857	49877	47907	45529	43732	41140	40278	36747	36676	32004	30879	27001	25287
60	1981-1990	11751	14613	15795	17797	19395	20542	20770	20624	21380	20725	22063	20628	21434	20304	20744
60	1991-Stage I							863	857	888	861	917	857	891	844	862
63	1991-Stage I								468	855	1325	2014	2384	2837	3011	3076
67	1991-Stage I															671
67	Stage I															
67	Stage II															
67	Stage IIIA															
67	Stage IIIB															
71	1991-Stage I								411	715	1179	1949	2507	3344	3594	3672
78	<1981	14558	14221	13281	13286	12761	12128	11649	10959	10729	9789	9770	8525	8226	7192	6736
78	1981-1990	4592	6152	7196	8559	10026	11323	11448	11368	11785	11424	12162	11371	11815	11192	11434
78	1991-Stage I							1233	1503	1713	1945	2429	2561	2946	2994	3287
78	Stage I															
78	Stage II															
78	Stage IIIA															
78	Stage IIIB															
86	1991-Stage I								108	193	333	589	880	1364	1532	1718
86	Stage I															
86	Stage II															

Continued

86	Stage IIIA															
86	Stage IIIB															
93	1991-Stage I															149
93	Stage I															
93	Stage II															
93	Stage IIIA															
93	Stage IIIB															
97	1991-Stage I								71	175	443	962	1556	2327	2638	2695
101	<1981	4659	4551	4250	4252	4084	3881	3728	3507	3433	3132	3126	2728	2632	2302	2156
101	1981-1990	1158	1434	1618	1921	2156	2377	2403	2387	2474	2398	2553	2387	2480	2350	2400
101	1991-Stage I							266	264	274	266	283	264	275	260	696
101	Stage I															
101	Stage II															
101	Stage IIIA															
101	Stage IIIB															
112	1991-Stage I								63	114	166	252	422	690	790	978
112	Stage I															
112	Stage II															
112	Stage IIIA															
112	Stage IIIB															
127	1991-Stage I								12	36	81	193	279	408	457	590
127	Stage I															
127	Stage II															
127	Stage IIIA															
127	Stage IIIB															
131	<1981	798	780	728	728	700	665	639	601	588	537	536	467	451	394	369
131	1981-1990	288	421	500	651	753	887	897	890	923	895	952	890	925	876	895
131	1991-Stage I							97	97	100	97	103	97	100	95	97
157	1981-1990		2	3	6	11	15	15	15	16	15	16	15	16	15	15
157	1991-Stage I							9	23	39	102	232	357	545	648	784
157	Stage I															
157	Stage II															
157	Stage IIIA															
157	Stage IIIB															
186	1991-Stage I															23
186	Stage I															

Continued	
186	Stage II
186	Stage IIIA
186	Stage IIIB

Size (kW)	Emission Level	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
37	<1981	1601	1449	1298	1148	993	833	664	504	342	176			
37	1981-1990	871	876	882	892	900	906	903	914	930	959	991	834	667
37	1991-Stage I	568	572	576	582	587	592	590	597	607	626	647	667	688
37	Stage I		33	56	83	84	84	84	85	86	89	92	95	98
37	Stage II					23	53	162	324	330	340	351	362	374
37	Stage IIIA									109	205	333	491	626
45	<1981	10715	9700	8690	7685	6646	5577	4447	3376	2290	1180			
45	1981-1990	8681	8731	8800	8894	8974	9037	9006	9116	9274	9563	9883	8931	7919
45	1991-Stage I	199	200	202	204	206	207	207	209	213	219	227	234	241
49	1991-Stage I	750	754	760	768	775	780	778	787	801	826	853	880	908
52	1991-Stage I	358	360	363	367	370	373	372	376	383	395	408	421	434
52	Stage I		132	242	377	381	383	382	387	393	406	419	432	446
52	Stage II					68	147	241	347	353	364	377	388	401
52	Stage IIIA									86	133	202	290	345
56	1991-Stage I	1281	1289	1299	1313	1325	1334	1329	1346	1369	1412	1459	1504	1552
60	<1981	22533	20397	18273	16162	13976	11729	9351	7099	4815	2482			
60	1981-1990	20333	20451	20612	20834	21019	21167	21096	21353	21723	22401	23150	21220	19172
60	1991-Stage I	845	850	856	866	873	879	876	887	903	931	962	991	1023
63	1991-Stage I	3015	3033	3057	3090	3117	3139	3128	3167	3221	3322	3433	3539	3653
67	1991-Stage I	1343	1351	1361	1376	1388	1398	1393	1410	1435	1479	1529	1576	1627
67	Stage I		533	835	1113	1123	1131	1127	1141	1161	1197	1237	1275	1316
67	Stage II					375	729	1144	1524	1550	1599	1652	1703	1758
67	Stage IIIA									303	472	658	890	919
67	Stage IIIB													162
71	1991-Stage I	3600	3620	3649	3688	3721	3747	3735	3780	3846	3966	4098	4225	4360
78	<1981	6002	5433	4868	4305	3723	3124	2491	1891	1283	661			
78	1981-1990	11208	11273	11361	11484	11586	11668	11628	11770	11974	12348	12761	12450	12123
78	1991-Stage I	3436	3727	3756	3797	3830	3857	3844	3891	3959	4082	4219	4349	4489
78	Stage I			325	329	332	334	333	337	343	354	365	377	389
78	Stage II				227	310	400	463	469	477	492	508	524	541

Continued														
78	Stage IIIA								63	121	147	183	226	233
78	Stage IIIB													41
86	1991-Stage I	1876	2023	2039	2061	2079	2094	2087	2112	2149	2216	2290	2361	2437
86	Stage I			134	136	137	138	137	139	142	146	151	156	161
86	Stage II				91	343	530	760	769	783	807	834	860	888
86	Stage IIIA								226	434	529	657	811	837
86	Stage IIIB													146
93	1991-Stage I	245	325	327	331	334	336	335	339	345	356	368	379	391
93	Stage I			114	115	116	117	116	118	120	123	128	132	136
93	Stage II				107	186	313	512	518	527	544	562	579	598
93	Stage IIIA								264	470	574	682	836	863
93	Stage IIIB													143
97	1991-Stage I	2642	2657	2678	2707	2731	2750	2741	2774	2822	2911	3008	3101	3200
101	<1981	1921	1739	1558	1378	1191	1000	797	605	410	212			
101	1981-1990	2353	2367	2385	2411	2432	2449	2441	2471	2514	2592	2679	2536	2385
101	1991-Stage I	1116	1567	1579	1596	1611	1622	1616	1636	1664	1716	1774	1828	1887
101	Stage I			232	234	236	238	237	240	244	252	260	268	277
101	Stage II				136	357	635	776	785	799	824	851	878	906
101	Stage IIIA								188	336	410	487	597	617
101	Stage IIIB													102
112	1991-Stage I	1265	1626	1639	1656	1671	1683	1677	1698	1727	1781	1841	1897	1958
112	Stage I			465	470	474	478	476	482	490	505	522	539	556
112	Stage II				337	732	1170	1763	1785	1815	1872	1935	1994	2059
112	Stage IIIA								378	663	823	971	1264	1304
112	Stage IIIB													248
127	1991-Stage I	707	847	854	863	871	877	874	884	900	928	959	988	1020
127	Stage I			152	154	155	156	156	158	161	166	171	176	182
127	Stage II				78	268	453	591	599	609	628	649	669	690
127	Stage IIIA								292	675	880	1048	1254	1295
127	Stage IIIB													166
131	<1981	329	298	267	236	204	171	137	104	70	36			
131	1981-1990	878	883	890	899	907	914	911	922	938	967	999	991	983
131	1991-Stage I	95	96	96	97	98	99	99	100	102	105	108	112	115
157	1981-1990	15	15	15	15	16	16	16	16	16	17	17	18	18
157	1991-Stage I	900	905	912	922	930	937	934	945	961	991	1025	1056	1090
157	Stage I		89	89	90	91	92	91	92	94	97	100	103	107

Continued														
157	Stage II			149	415	695	1089	1085	1098	1117	1152	1191	1227	1267
157	Stage IIIA							623	1453	2140	2586	3047	3141	3242
157	Stage IIIB												388	826
186	1991-Stage I	53	54	54	55	55	56	55	56	57	59	61	63	65
186	Stage I		47	48	48	49	49	49	49	50	52	54	55	57
186	Stage II			68	207	320	481	480	486	494	509	526	543	560
186	Stage IIIA							272	685	1103	1427	1665	1717	1772
186	Stage IIIB												228	561

Stock data for gasoline tractors 1985-2005.

Size (kW)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Certified	<1981	13176	12541	11906	11270	10635	10000	9053	8148	7285	6465	5687	4951	4258	3607	2998
Non certified	<1981	26352	25082	23811	22541	21270	20000	19042	18041	16998	15913	14785	13616	12403	11149	9852

Continued		2000	2001	2002	2003	2004	2005
Certified	<1981	2432	1908	1427	987	591	236
Non certified	<1981	8512	7131	5707	4240	2732	1180

Stock data for harvesters 1985-2012.

FSize	Size Group	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
0	0<S<=50	<1981	26601	24394	22599	22144	19842	18915	17241	15607	14575	12673	10700	9491	6966	5446	3589
0	0<S<=50	1981-1990	519	534	550	582	566	591	594	601	635	636	633	683	641	686	672
50	50<S<=60	<1981	2703	2648	2634	2785	2711	2828	2847	2876	3040	3044	3029	3271	3068	2930	2235
50	50<S<=60	1981-1990	853	1102	1164	1275	1258	1333	1341	1355	1432	1434	1427	1541	1446	1548	1516
50	50<S<=60	1991-Stage I							8	8	8	8	8	9	9	9	9
60	60<S<=70	<1981	1786	1750	1741	1841	1792	1869	1881	1901	2009	2012	2002	2162	2028	2171	2127
60	60<S<=70	1981-1990	1138	1679	1943	2237	2213	2348	2363	2388	2524	2527	2515	2716	2547	2727	2671
60	60<S<=70	1991-Stage I							8	16	18	21	22	24	23	24	24
70	70<S<=80	<1981	929	910	905	958	932	972	979	989	1045	1046	1041	1125	1055	1129	1106
70	70<S<=80	1981-1990	383	699	1026	1165	1318	1493	1502	1518	1604	1606	1598	1726	1619	1733	1698
70	70<S<=80	1991-Stage I							72	77	83	86	87	96	91	98	96
70	70<S<=80	Stage I															1
80	80<S<=90	<1981	323	317	315	333	324	338	340	344	363	364	362	391	367	393	385
80	80<S<=90	1981-1990	383	562	645	967	1107	1466	1475	1491	1575	1577	1570	1695	1590	1702	1667
80	80<S<=90	1991-Stage I							61	158	181	200	200	217	207	222	217
80	80<S<=90	Stage I															1
90	90<S<=100	1981-1990	89	175	235	387	515	670	674	681	720	721	717	775	726	778	762
90	90<S<=100	1991-Stage I							180	257	320	329	351	382	367	393	385
90	90<S<=100	Stage I															1
100	100<S<=120	1981-1990		54	106	219	334	589	592	599	633	634	630	681	639	684	670
100	100<S<=120	1991-Stage I							129	253	316	375	440	567	586	673	660
100	100<S<=120	Stage I															2
120	120<S<=140	1981-1990				4	69	183	184	186	197	197	196	212	199	213	208
120	120<S<=140	1991-Stage I							70	148	189	215	319	484	626	804	860
120	120<S<=140	Stage I															21
120	120<S<=140	Stage II															
120	120<S<=140	Stage IIIA															
120	120<S<=140	Stage IIIB															
140	140<S<=160	1991-Stage I								8	36	69	112	271	354	554	632
140	140<S<=160	Stage II															
140	140<S<=160	Stage IIIA															
140	140<S<=160	Stage IIIB															
160	160<S<=180	1991-Stage I											26	69	200	374	440
160	160<S<=180	Stage II															
160	160<S<=180	Stage IIIA															

Continued

160	160<S<=180	Stage IIIB				
180	180<S<=200	1991-Stage I	20	67	117	193
180	180<S<=200	Stage II				
180	180<S<=200	Stage IIIA				
180	180<S<=200	Stage IIIB				
200	200<S<=220	1991-Stage I			45	92
200	200<S<=220	Stage II				
200	200<S<=220	Stage IIIA				
200	200<S<=220	Stage IIIB				
220	220<S<=240	1991-Stage I				3
220	220<S<=240	Stage II				
220	220<S<=240	Stage IIIA				
220	220<S<=240	Stage IIIB				
240	240<S<=260	1991-Stage I				3
240	240<S<=260	Stage II				
240	240<S<=260	Stage IIIA				
240	240<S<=260	Stage IIIB				
260	260<S<=280	1991-Stage I				14
260	260<S<=280	Stage II				
260	260<S<=280	Stage IIIA				
260	260<S<=280	Stage IIIB				
280	280<S<=300	1991-Stage I				
280	280<S<=300	Stage II				
280	280<S<=300	Stage IIIA				
280	280<S<=300	Stage IIIB				
300	300<S<=320	Stage II				
300	300<S<=320	Stage IIIA				
300	300<S<=320	Stage IIIB				

Continued

FSize	Size Group	Emission Level	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
0	0<S<=50	<1981	2873	1854	1275	754	269								
0	0<S<=50	1981-1990	715	758	778	816	882	913	779	628	448	268	78	38	
50	50<S<=60	<1981	1999	1570	1260	897	391								
50	50<S<=60	1981-1990	1612	1711	1755	1841	1990	2060	1856	1645	1335	1034	730	296	170
50	50<S<=60	1991-Stage I	10	10	10	11	12	12	12	12	12	12	13	15	16
60	60<S<=70	<1981	2073	1648	1340	981	482								

Continued															
60	60<S<=70	1981-1990	2841	3014	3093	3243	3506	3630	3344	3062	2659	2284	1922	1053	539
60	60<S<=70	1991-Stage I	25	27	27	29	31	32	32	32	32	33	35	39	43
70	70<S<=80	<1981	1176	1248	1105	735	216								
70	70<S<=80	1981-1990	1806	1916	1966	2061	2229	2307	2164	2043	1939	1862	1813	1415	806
70	70<S<=80	1991-Stage I	102	109	112	117	126	131	130	129	131	134	141	161	175
70	70<S<=80	Stage I	1	1	1	1	1	1	1	1	1	1	2	2	2
80	80<S<=90	<1981	409	434	445	467	216								
80	80<S<=90	1981-1990	1773	1881	1931	2024	2189	2266	2123	2002	1897	1819	1768	1642	1592
80	80<S<=90	1991-Stage I	231	245	252	264	285	295	294	292	295	303	317	363	394
80	80<S<=90	Stage I	1	1	1	1	1	1	1	1	1	1	2	2	2
90	90<S<=100	1981-1990	810	860	882	925	1000	1035	1031	1023	986	964	957	915	860
90	90<S<=100	1991-Stage I	410	435	446	468	506	524	521	518	523	538	563	643	698
90	90<S<=100	Stage I	1	1	1	1	1	1	1	1	1	1	2	2	2
100	100<S<=120	1981-1990	712	756	775	813	879	910	906	900	909	934	978	1008	979
100	100<S<=120	1991-Stage I	702	744	764	801	866	896	892	886	896	920	963	1100	1195
100	100<S<=120	Stage I	2	2	2	3	3	3	3	3	3	3	3	4	4
120	120<S<=140	1981-1990	222	235	241	253	274	283	282	280	283	291	304	348	378
120	120<S<=140	1991-Stage I	918	977	1003	1051	1137	1177	1172	1163	1176	1208	1264	1444	1569
120	120<S<=140	Stage I	26	31	32	33	36	37	37	37	37	38	40	46	50
120	120<S<=140	Stage II					3	4	4	4	4	4	4	4	5
120	120<S<=140	Stage IIIA							1	1	1	4	5	5	6
120	120<S<=140	Stage IIIB												3	3
140	140<S<=160	1991-Stage I	715	795	816	855	925	957	953	946	957	983	1028	1175	1277
140	140<S<=160	Stage II			20	35	48	56	56	56	56	58	60	69	75
140	140<S<=160	Stage IIIA							5	8	12	16	18	21	23
140	140<S<=160	Stage IIIB												5	8
160	160<S<=180	1991-Stage I	533	602	618	648	700	725	722	716	724	744	779	890	967
160	160<S<=180	Stage II			40	70	91	105	105	104	105	108	113	129	140
160	160<S<=180	Stage IIIA							9	14	20	24	27	31	34
160	160<S<=180	Stage IIIB												4	9
180	180<S<=200	1991-Stage I	249	300	308	323	349	362	360	357	361	371	389	444	482
180	180<S<=200	Stage II			61	91	114	129	128	127	129	132	138	158	172
180	180<S<=200	Stage IIIA							9	14	20	24	27	31	34
180	180<S<=200	Stage IIIB												4	9
200	200<S<=220	1991-Stage I	142	187	192	201	218	225	224	223	225	231	242	277	301
200	200<S<=220	Stage II			40	70	91	105	105	104	105	108	113	129	140

Continued

200	200<S<=220	Stage IIIA							9	14	20	24	27	31	34
200	200<S<=220	Stage IIIB												4	9
220	220<S<=240	1991-Stage I	48	151	155	162	175	181	181	179	181	186	195	223	242
220	220<S<=240	Stage II			72	114	164	221	220	219	221	227	238	271	295
220	220<S<=240	Stage IIIA							61	123	196	237	276	315	342
220	220<S<=240	Stage IIIB												45	91
240	240<S<=260	1991-Stage I	71	142	145	152	165	170	170	169	170	175	183	209	227
240	240<S<=260	Stage II			72	125	201	301	299	297	301	309	323	369	401
240	240<S<=260	Stage IIIA							113	232	371	450	525	599	651
240	240<S<=260	Stage IIIB												85	172
260	260<S<=280	1991-Stage I	61	131	134	140	152	157	157	155	157	161	169	193	210
260	260<S<=280	Stage II			72	125	201	301	299	297	301	309	323	369	401
260	260<S<=280	Stage IIIA							113	232	371	450	525	599	651
260	260<S<=280	Stage IIIB												85	172
280	280<S<=300	1991-Stage I		33	34	36	39	40	40	40	40	41	43	49	53
280	280<S<=300	Stage II			72	125	201	301	299	297	301	309	323	369	401
280	280<S<=300	Stage IIIA							113	232	371	450	525	599	651
280	280<S<=300	Stage IIIB												85	172
300	300<S<=320	Stage II				25	60	108	108	107	108	111	116	133	145
300	300<S<=320	Stage IIIA							57	116	185	225	262	300	326
300	300<S<=320	Stage IIIB												43	86

Stock data for fork lifts 1985-2012.

FuelCode	Size (kW)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
205B	35	<1981	387	361	336	311	285	260	234	209	183	158	133	107	84	58	30
205B	35	1981-1990	120	162	202	239	270	297	297	297	297	297	297	297	297	297	297
205B	35	1991-Stage I							26	49	65	93	131	168	218	247	275
205B	35	Stage II															
205B	35	Stage IIIA															
205B	45	<1981	1612	1506	1400	1294	1188	1082	976	870	764	658	552	446	349	243	126
205B	45	1981-1990	499	674	839	994	1122	1233	1233	1233	1233	1233	1233	1233	1233	1233	1233
205B	45	1991-Stage I							108	203	270	386	544	699	905	1063	1063
205B	45	Stage I															151
205B	45	Stage II															
205B	45	Stage IIIA															
205B	50	<1981	2173	2031	1888	1745	1602	1459	1316	1174	1031	888	745	602	471	328	170
205B	50	1981-1990	673	909	1131	1340	1512	1662	1662	1662	1662	1662	1662	1662	1662	1662	1662
205B	50	1991-Stage I							145	273	363	519	732	940	1217	1469	1469
205B	50	Stage I															240
205B	50	Stage II															
205B	50	Stage IIIA															
205B	75	<1981	497	465	432	399	367	334	301	269	236	203	170	138	108	75	39
205B	75	1981-1990	154	208	259	307	347	382	382	382	382	382	382	382	382	382	382
205B	75	1991-Stage I							33	63	84	120	169	217	281	354	354
205B	75	Stage I															70
205B	75	Stage II															
205B	75	Stage IIIA															
205B	75	Stage IIIB															
205B	120	<1981	111	103	96	89	81	74	67	60	52	45	38	31	24	17	9
205B	120	1981-1990	34	46	57	68	77	85	85	85	85	85	85	85	85	85	85
205B	120	1991-Stage I							7	14	19	27	38	49	63	97	97
205B	120	Stage I															32
205B	120	Stage II															
205B	120	Stage IIIA															
205B	120	Stage IIIB															
3030	33		5420	5427	5390	5323	5265	5215	5156	5068	4947	4863	4835	4792	4732	4765	4712
3030	40		4917	4923	4889	4828	4775	4730	4676	4596	4486	4410	4384	4344	4289	4295	4223
3030	50		2149	2151	2137	2110	2087	2067	2044	2008	1960	1926	1915	1897	1874	1926	1941
3030	78		97	97	96	95	94	93	92	91	89	88	88	87	86	90	92
3030	120															1	2

Continued															
FuelCode	Size (kW)	Emission Level	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
205B	35	<1981													
205B	35	1981-1990	297	277	249	232	198	177	135	95	58	27			
205B	35	1991-Stage I	304	304	304	304	304	304	304	304	304	304	304	278	255
205B	35	Stage II		23	53	75	89	117	152	152	152	152	152	152	152
205B	35	Stage IIIA								41	76	92	99	126	153
205B	45	<1981													
205B	45	1981-1990	1233	1151	1036	964	820	734	559	394	239	111			
205B	45	1991-Stage I	1063	1063	1063	1063	1063	1063	1063	1063	1063	1063	1063	955	860
205B	45	Stage I	303	422	524	664	664	664	664	664	664	664	664	664	664
205B	45	Stage II					104	232	452	612	612	612	612	612	612
205B	45	Stage IIIA									126	181	225	346	467
205B	50	<1981													
205B	50	1981-1990	1662	1551	1396	1299	1105	989	753	531	322	150			
205B	50	1991-Stage I	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1469	1324	1196
205B	50	Stage I	461	682	897	1135	1135	1135	1135	1135	1135	1135	1135	1135	1135
205B	50	Stage II					187	447	818	1134	1134	1134	1134	1134	1134
205B	50	Stage IIIA									181	275	354	562	770
205B	75	<1981													
205B	75	1981-1990	382	357	321	299	255	228	174	123	75	35			
205B	75	1991-Stage I	354	354	354	354	354	354	354	354	354	354	354	321	291
205B	75	Stage I	162	234	311	311	311	311	311	311	311	311	311	311	311
205B	75	Stage II				58	129	208	326	326	326	326	326	326	326
205B	75	Stage IIIA								142	213	252	294	376	376
205B	75	Stage IIIB													82
205B	120	<1981													
205B	120	1981-1990	85	80	72	67	57	51	39	28	17	8			
205B	120	1991-Stage I	97	97	97	97	97	97	97	97	97	97	97	90	83
205B	120	Stage I	71	89	118	118	118	118	118	118	118	118	118	118	118
205B	120	Stage II				16	38	58	112	112	112	112	112	112	112
205B	120	Stage IIIA								58	70	76	140	179	179
205B	120	Stage IIIB													39
3030	33		4718	4677	4655	4595	4494	4345	4220	4154	4043	3941	3746	3644	3572
3030	40		4218	4214	4244	4224	4166	4116	4048	4005	3951	3878	3723	3660	3624
3030	50		1897	1938	2003	2020	2018	2029	2061	2136	2198	2192	2142	2172	2214
3030	78		88	95	98	99	104	104	114	123	147	149	151	161	172
3030	120		2	2	3	3	3	3	3	3	3	3	7	8	9

Stock data for construction machinery 1985-2012.

EquipmentName (Eng)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Track type dozers	<1981	125	100	75	50	25										
Track type dozers	1981-1990	125	150	175	200	225	250	221	193	166	139	114	89	66	43	21
Track type dozers	1991-Stage I							25	48	71	93	114	134	153	172	189
Track type dozers	Stage II															
Track type dozers	Stage IIIA															
Track type dozers	Stage IIIB															
Track type loaders	<1981	50	40	30	20	10										
Track type loaders	1981-1990	50	60	70	80	90	100	89	79	68	58	48	38	28	19	9
Track type loaders	1991-Stage I							10	20	29	39	48	57	66	75	83
Track type loaders	Stage II															
Track type loaders	Stage IIIA															
Track type loaders	Stage IIIB															
Wheel loaders (0-5 tonnes)	1981-1990							186	331	434	496	517	496	434	331	186
Wheel loaders (0-5 tonnes)	1991-Stage I							21	83	186	331	517	744	1013	1323	1674
Wheel loaders (0-5 tonnes)	Stage II															
Wheel loaders (0-5 tonnes)	Stage IIIA															
Wheel loaders (> 5,1 tonnes)	<1981	1250	1000	750	500	250										
Wheel loaders (> 5,1 tonnes)	1981-1990	1250	1500	1750	2000	2250	2500	2228	1960	1698	1441	1188	941	698	460	228
Wheel loaders (> 5,1 tonnes)	1991-Stage I							248	490	728	960	1188	1411	1629	1841	1822
Wheel loaders (> 5,1 tonnes)	Stage I															228
Wheel loaders (> 5,1 tonnes)	Stage II															
Wheel loaders (> 5,1 tonnes)	Stage IIIA															
Wheel loaders (> 5,1 tonnes)	Stage IIIB															
Wheel type excavators	<1981	500	400	300	200	100										
Wheel type excavators	1981-1990	500	600	700	800	900	1000	862	732	611	498	394	298	211	132	62
Wheel type excavators	1991-Stage I							96	183	262	332	394	447	491	528	493
Wheel type excavators	Stage I															62
Wheel type excavators	Stage II															
Wheel type excavators	Stage IIIA															
Wheel type excavators	Stage IIIB															
Track type excavators (0-5 tonnes)	1981-1990							459	816	1071	1224	1275	1224	1071	816	459
Track type excavators (0-5 tonnes)	1991-Stage I							51	204	459	816	1275	1837	2500	3265	4132
Track type excavators (0-5 tonnes)	Stage II															
Track type excavators (0-5 tonnes)	Stage IIIA															
Track type excavators (>5,1 tonnes)	<1981	1000	800	600	400	200										

Continued

Track type excavators (>5,1 tonnes)	1981-1990	1000	1200	1400	1600	1800	2000	1798	1596	1394	1194	993	794	594	396	198
Track type excavators (>5,1 tonnes)	1991-Stage I							200	399	598	796	993	1190	1387	1583	1581
Track type excavators (>5,1 tonnes)	Stage I															198
Track type excavators (>5,1 tonnes)	Stage II															
Track type excavators (>5,1 tonnes)	Stage IIIA															
Track type excavators (>5,1 tonnes)	Stage IIIB															
Excavators/Loaders	<1981	2100	1680	1260	840	420										
Excavators/Loaders	1981-1990	2100	2520	2940	3360	3780	4200	3807	3408	3003	2592	2175	1752	1323	888	447
Excavators/Loaders	1991-Stage I							423	852	1287	1728	2175	2628	3087	3552	3575
Excavators/Loaders	Stage I															447
Excavators/Loaders	Stage II															
Excavators/Loaders	Stage IIIA															
Dump trucks	<1981	250	200	150	100	50										
Dump trucks	1981-1990	250	300	350	400	450	500	489	469	441	404	358	304	241	169	89
Dump trucks	1991-Stage I							54	117	189	269	358	455	561	676	711
Dump trucks	Stage I															89
Dump trucks	Stage II															
Dump trucks	Stage IIIA															
Dump trucks	Stage IIIB															
Mini loaders	<1981	1800	1600	1400	1200	1000	800	635	447	235						
Mini loaders	1981-1990	1000	1200	1400	1600	1800	2000	2118	2237	2355	2473	2332	2168	1980	1768	1532
Mini loaders	1991-Stage I							212	447	706	989	1296	1626	1980	2357	2758
Mini loaders	Stage II															
Mini loaders	Stage IIIA															
Telescopic loaders	1981-1990											149	265	348	398	414
Telescopic loaders	1991-Stage I											83	199	348	530	746
Telescopic loaders	Stage II															
Telescopic loaders	Stage IIIA															

Continued

EquipmentName (Eng)	Emission Level	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Track type dozers	<1981													
Track type dozers	1981-1990													
Track type dozers	1991-Stage I	206	201	177	154	132	128	125	116	95	59	27		
Track type dozers	Stage II			20	38	56	86	100	116	126	119	109	105	75
Track type dozers	Stage IIIA							25	58	95	119	137	132	126
Track type dozers	Stage IIIB												26	50

Continued														
Track type loaders	<1981													
Track type loaders	1981-1990													
Track type loaders	1991-Stage I	91	91	81	71	62	61	71	68	55	38	19		
Track type loaders	Stage II			9	18	26	40	56	68	73	76	75	72	51
Track type loaders	Stage IIIA							14	34	55	76	94	90	85
Track type loaders	Stage IIIB												18	34
Wheel loaders (0-5 tonnes)	1981-1990													
Wheel loaders (0-5 tonnes)	1991-Stage I	2067	2046	1984	1881	1736	1444	1269	1045	726	353			
Wheel loaders (0-5 tonnes)	Stage II		227	496	806	1158	1444	1903	2090	2177	2117	2024	1644	1265
Wheel loaders (0-5 tonnes)	Stage IIIA								348	726	1058	1349	1644	1897
Wheel loaders (> 5,1 tonnes)	<1981													
Wheel loaders (> 5,1 tonnes)	1981-1990													
Wheel loaders (> 5,1 tonnes)	1991-Stage I	1802	1559	1322	1089	861	677	485	273					
Wheel loaders (> 5,1 tonnes)	Stage I	450	668	881	871	861	902	969	1092	1174	854	547	266	
Wheel loaders (> 5,1 tonnes)	Stage II				218	431	677	969	1092	1174	1138	1094	1062	1098
Wheel loaders (> 5,1 tonnes)	Stage IIIA								273	587	854	1094	1328	1372
Wheel loaders (> 5,1 tonnes)	Stage IIIB													274
Wheel type excavators	<1981													
Wheel type excavators	1981-1990													
Wheel type excavators	1991-Stage I	459	372	293	223	162	118	74	38					
Wheel type excavators	Stage I	115	160	196	179	162	157	148	152	146	103	62	31	
Wheel type excavators	Stage II				45	81	118	148	152	146	138	124	122	127
Wheel type excavators	Stage IIIA								38	73	103	124	153	159
Wheel type excavators	Stage IIIB													32
Track type excavators (0-5 tonnes)	1981-1990													
Track type excavators (0-5 tonnes)	1991-Stage I	5101	5050	4897	4642	4285	3889	3599	3027	2073	995			
Track type excavators (0-5 tonnes)	Stage II		561	1224	1990	2857	3889	5399	6054	6220	5968	5554	4398	3502
Track type excavators (0-5 tonnes)	Stage IIIA								1009	2073	2984	3702	4398	5252
Track type excavators (>5,1 tonnes)	<1981													
Track type excavators (>5,1 tonnes)	1981-1990													
Track type excavators (>5,1 tonnes)	1991-Stage I	1579	1380	1181	983	785	683	536	313					
Track type excavators (>5,1 tonnes)	Stage I	395	591	787	786	785	910	1073	1251	1338	980	623	303	
Track type excavators (>5,1 tonnes)	Stage II				197	393	683	1073	1251	1338	1307	1245	1213	1252
Track type excavators (>5,1 tonnes)	Stage IIIA								313	669	980	1245	1516	1565
Track type excavators (>5,1 tonnes)	Stage IIIB													313
Excavators/Loaders	<1981													

Continued

Excavators/Loaders	1981-1990													
Excavators/Loaders	1991-Stage I	3599	3170	2735	2295	1848	1370	938	481					
Excavators/Loaders	Stage I	900	1359	1824	2295	2310	2283	2344	2403	2314	1688	1137	691	319
Excavators/Loaders	Stage II					462	913	1406	1922	1851	1688	1516	1382	1278
Excavators/Loaders	Stage IIIA									463	844	1137	1382	1597
Dump trucks	<1981													
Dump trucks	1981-1990													
Dump trucks	1991-Stage I	745	682	611	530	442	385	301	176					
Dump trucks	Stage I	186	292	407	530	552	642	752	880	943	739	514	319	150
Dump trucks	Stage II					110	257	451	704	754	739	685	637	600
Dump trucks	Stage IIIA									189	369	514	637	600
Dump trucks	Stage IIIB													150
Mini loaders	<1981													
Mini loaders	1981-1990	1273	990	684	354									
Mini loaders	1991-Stage I	3183	3301	3419	3537	3656	3063	2540	2055	1599	1178	809	504	259
Mini loaders	Stage II		330	684	1061	1462	1701	1905	1761	1599	1413	1214	1009	777
Mini loaders	Stage IIIA								294	533	707	809	841	777
Telescopic loaders	1981-1990	398	348	265	149									
Telescopic loaders	1991-Stage I	994	1160	1326	1491	1657	1740	1837	1846	1687	1343	1009	732	466
Telescopic loaders	Stage II		116	265	447	663	966	1378	1582	1687	1612	1514	1464	1397
Telescopic loaders	Stage IIIA								264	562	806	1009	1220	1397

Stock data for machine pools 1985-2012.

EquipmentName (Eng)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Tractors (machine pools)	<1981	1236	627													
Tractors (machine pools)	1981-1990	3091	3763	4575	4515	4370	4100	3643	2808	2368	1786	1214	604			
Tractors (machine pools)	1991-Stage I							607	1123	1776	2382	3035	3624	4324	4210	4336
Tractors (machine pools)	Stage I															
Tractors (machine pools)	Stage II															
Tractors (machine pools)	Stage IIIA															
Tractors (machine pools)	Stage IIIB															
Harvesters (machine pools)	<1981	969	776	661	472	287	139									
Harvesters (machine pools)	1981-1990	807	932	1157	1257	1294	1385	1385	1197	927	794	712	512	421	282	162
Harvesters (machine pools)	1991-Stage I							139	266	348	454	593	615	737	751	729
Harvesters (machine pools)	Stage II															
Harvesters (machine pools)	Stage IIIA															
Harvesters (machine pools)	Stage IIIB															
Self-propelled vehicles (machine pools)	1981-1990									72	61	38				
Self-propelled vehicles (machine pools)	1991-Stage I									72	122	190	263	278	277	295
Self-propelled vehicles (machine pools)	Stage II															
Self-propelled vehicles (machine pools)	Stage IIIA															
Self-propelled vehicles (machine pools)	Stage IIIB															

EquipmentName (Eng)	Emission Level	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Tractors (machine pools)	<1981													
Tractors (machine pools)	1981-1990													
Tractors (machine pools)	1991-Stage I	3956	4069	3323	2566	2066	1421	927	487					
Tractors (machine pools)	Stage I			554	513	517	474	464	487	524				
Tractors (machine pools)	Stage II				513	1033	1421	1855	1946	2094	1985	1535	947	473
Tractors (machine pools)	Stage IIIA								487	1047	1488	2046	2366	2366
Tractors (machine pools)	Stage IIIB													473
Harvesters (machine pools)	<1981													
Harvesters (machine pools)	1981-1990	78												
Harvesters (machine pools)	1991-Stage I	778	779	651	531	472	300	257	211	169	127	85	42	
Harvesters (machine pools)	Stage II			65	118	177	171	172	169	169	169	169	169	169
Harvesters (machine pools)	Stage IIIA							43	85	127	169	211	211	211
Harvesters (machine pools)	Stage IIIB												42	85
Self-propelled vehicles (machine pools)	1981-1990													
Self-propelled vehicles (machine pools)	1991-Stage I	289	314	237	203	153	99	49						
Self-propelled vehicles (machine pools)	Stage II			47	102	153	199	194	189	142	94	47		
Self-propelled vehicles (machine pools)	Stage IIIA							49	94	142	189	236	236	189
Self-propelled vehicles (machine pools)	Stage IIIB												47	94

Stock data for household and gardening 1985-2012.

EquipmentName (Eng)	Emission Level	SNAPCode	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Lawn movers (private)	<1981	0809	253125	168750	84375												
Lawn movers (private)	1981-1990	0809	421875	506250	590625	675000	675000	675000	590625	506250	421875	337500	253125	168750	84375		
Lawn movers (private)	1991-Stage I	0809							84375	168750	253125	337500	421875	506250	590625	675000	675000
Lawn movers (private)	Stage I	0809															
Lawn movers (private)	Stage II	0809															
Cultivators (private-large)	<1981	0809	73333	66000	58667	51333	44000	36667	29333	22000	14667	7333					
Cultivators (private-large)	1981-1990	0809	36667	44000	51333	58667	66000	73333	73333	73333	73333	73333	73333	66000	58667	51333	44000
Cultivators (private-large)	1991-Stage I	0809							7333	14667	22000	29333	36667	44000	51333	58667	66000
Cultivators (private-large)	Stage II	0809															
Cultivators (private-small)	1981-1990	0809	10000	10000	10000	10000	10000	10000	8000	6000	4000	2000					
Cultivators (private-small)	1991-Stage I	0809							2000	4000	6000	8000	10000	10000	10000	10000	10000
Cultivators (private-small)	Stage II	0809															
Chain saws (private)	<1981	0809	125000	100000	75000	50000	25000										
Chain saws (private)	1981-1990	0809	125000	150000	175000	200000	225000	250000	227250	204000	180250	156000	131250	106000	80250	54000	27250
Chain saws (private)	1991-Stage I	0809							25250	51000	77250	104000	131250	159000	187250	216000	245250
Chain saws (private)	Stage I	0809															
Chain saws (private)	Stage II	0809															
Riders (private)	<1981	0809	40950	35100	29250	23400	17550	11700	5880								
Riders (private)	1981-1990	0809	29250	35100	40950	46800	52650	58500	58796	59388	54248	49167	44056	38828	33392	27660	21544
Riders (private)	1991-Stage I	0809							5880	11878	18083	24583	31469	38828	46748	55320	64631
Riders (private)	Stage I	0809															
Riders (private)	Stage II	0809															
Shrub clearers (private)	<1981	0809	24000	19200	14400	9600	4800										
Shrub clearers (private)	1981-1990	0809	24000	28800	33600	38400	43200	48000	47520	46080	43680	40320	36000	30720	24480	17280	9120
Shrub clearers (private)	1991-Stage I	0809							5280	11520	18720	26880	36000	46080	57120	69120	82080
Shrub clearers (private)	Stage I	0809															
Shrub clearers (private)	Stage II	0809															
Hedge cutters (private)	<1981	0809	6850	5480	4110	2740	1370										
Hedge cutters (private)	1981-1990	0809	6850	8220	9590	10960	12330	13700	15237	16128	16373	15972	14925	13232	10893	7908	4277
Hedge cutters (private)	1991-Stage I	0809							1693	4032	7017	10648	14925	19848	25417	31632	38493
Hedge cutters (private)	Stage I	0809															
Hedge cutters (private)	Stage II	0809															
Trimmers (private)	<1981	0809	25500	20400	15300	10200	5100										
Trimmers (private)	1981-1990	0809	25500	30600	35700	40800	45900	51000	48086	44686	40800	36429	31571	26229	20400	14086	7286
Trimmers (private)	1991-Stage I	0809							5343	11171	17486	24286	31571	39343	47600	56343	65571

Continued

Trimmers (private)	Stage I	0809															
Trimmers (private)	Stage II	0809															
Lawn movers (professional)	1981-1990	0811	25000	25000	25000	25000	25000	25000	18750	12500	6250						
Lawn movers (professional)	1991-Stage I	0811							6250	12500	18750	25000	25000	25000	25000	25000	25000
Lawn movers (professional)	Stage I	0811															
Lawn movers (professional)	Stage II	0811															
Cultivators (professional)	<1981	0811	3750	2500	1250												
Cultivators (professional)	1981-1990	0811	6250	7500	8750	10000	10000	10000	8750	7500	6250	5000	3750	2500	1250		
Cultivators (professional)	1991-Stage I	0811							1250	2500	3750	5000	6250	7500	8750	10000	10000
Cultivators (professional)	Stage I	0811															
Cultivators (professional)	Stage II	0811															
Chain saws (professional)	1981-1990	0811	10000	10000	10000	10000	10000	10000	7333	4000							
Chain saws (professional)	1991-Stage I	0811							3667	8000	13000	14000	15000	16000	17000	18000	19000
Chain saws (professional)	Stage I	0811															
Chain saws (professional)	Stage II	0811															
Riders (professional)	1981-1990	0811	4800	4800	4800	4800	4800	4800	3878	2966	2035	1056					
Riders (professional)	1991-Stage I	0811							970	1978	3053	4224	5520	5760	6000	6240	6480
Riders (professional)	Stage I	0811															
Riders (professional)	Stage II	0811															
Shrub clearers (professional)	1981-1990	0811	2000	2000	2000	2000	2000	2000	1650	1200	650						
Shrub clearers (professional)	1991-Stage I	0811							550	1200	1950	2800	3000	3200	3400	3600	3800
Shrub clearers (professional)	Stage I	0811															
Shrub clearers (professional)	Stage II	0811															
Hedge cutters (professional)	1981-1990	0811	1300	1300	1300	1300	1300	1300	1178	920	528						
Hedge cutters (professional)	1991-Stage I	0811							393	920	1583	2380	2650	2920	3190	3460	3730
Hedge cutters (professional)	Stage I	0811															
Hedge cutters (professional)	Stage II	0811															
Trimmers (professional)	1981-1990	0811	9000	9000	9000	9000	9000	9000	7071	4929	2571						
Trimmers (professional)	1991-Stage I	0811							2357	4929	7714	10714	11143	11571	12000	12429	12857
Trimmers (professional)	Stage I	0811															
Trimmers (professional)	Stage II	0811															

Continued

EquipmentName (Eng)	Emission Level	SNAPCode	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Lawn movers (private)	<1981	0809													
Lawn movers (private)	1981-1990	0809													
Lawn movers (private)	1991-Stage I	0809	675000	675000	675000	675000	675000	595000	513750	428125	342500	256875	171250	85625	

Continued

Lawn movers (private)	Stage I	0809						85000	171250	256875	256875	256875	256875	256875	256875
Lawn movers (private)	Stage II	0809									85625	171250	256875	342500	428125
Cultivators (private-large)	<1981	0809													
Cultivators (private-large)	1981-1990	0809	36667	29333	22000	14667	7333								
Cultivators (private-large)	1991-Stage I	0809	73333	80667	88000	95333	102667	102667	95333	88000	80667	73333	66000	58667	51333
Cultivators (private-large)	Stage II	0809						7333	14667	22000	29333	36667	44000	51333	58667
Cultivators (private-small)	1981-1990	0809													
Cultivators (private-small)	1991-Stage I	0809	10000	10000	10000	10000	10000	8000	6000	4000	2000				
Cultivators (private-small)	Stage II	0809						2000	4000	6000	8000	10000	10000	10000	10000
Chain saws (private)	<1981	0809													
Chain saws (private)	1981-1990	0809													
Chain saws (private)	1991-Stage I	0809	275000	280750	286500	292250	298000	268200	238400	208600	178800	149000	119200	89400	59600
Chain saws (private)	Stage I	0809						29800	59600	89400	89400	89400	89400	89400	89400
Chain saws (private)	Stage II	0809									29800	59600	89400	119200	149000
Riders (private)	<1981	0809													
Riders (private)	1981-1990	0809	14954	7910											
Riders (private)	1991-Stage I	0809	74771	87015	101775	109920	119360	117741	114313	107663	99047	86666	74285	61904	49523
Riders (private)	Stage I	0809						10704	22863	23925	24762	24762	24762	24762	24762
Riders (private)	Stage II	0809								11963	24762	37143	49523	61904	74285
Shrub clearers (private)	<1981	0809													
Shrub clearers (private)	1981-1990	0809													
Shrub clearers (private)	1991-Stage I	0809	96000	107000	118000	129000	140000	126000	112000	98000	84000	70000	56000	42000	28000
Shrub clearers (private)	Stage I	0809						14000	28000	42000	42000	42000	42000	42000	42000
Shrub clearers (private)	Stage II	0809									14000	28000	42000	56000	70000
Hedge cutters (private)	<1981	0809													
Hedge cutters (private)	1981-1990	0809													
Hedge cutters (private)	1991-Stage I	0809	46000	52900	59800	66700	73600	66240	58880	51520	44160	36800	29440	22080	14720
Hedge cutters (private)	Stage I	0809						7360	14720	22080	22080	22080	22080	22080	22080
Hedge cutters (private)	Stage II	0809									7360	14720	22080	29440	36800
Trimmers (private)	<1981	0809													
Trimmers (private)	1981-1990	0809													
Trimmers (private)	1991-Stage I	0809	75286	77714	80143	82571	85000	76500	68000	59500	51000	42500	34000	25500	17000
Trimmers (private)	Stage I	0809						8500	17000	25500	25500	25500	25500	25500	25500
Trimmers (private)	Stage II	0809									8500	17000	25500	34000	42500
Lawn movers (professional)	1981-1990	0811													
Lawn movers (professional)	1991-Stage I	0811	25000	25000	25000	25000	25000	18750	12500	6250					

Continued															
Lawn movers (professional)	Stage I	0811						6250	12500	18750	18750	12500	6250		
Lawn movers (professional)	Stage II	0811									6250	12500	18750	25000	25000
Cultivators (professional)	<1981	0811													
Cultivators (professional)	1981-1990	0811													
Cultivators (professional)	1991-Stage I	0811	10000	10000	10000	10000	10000	8750	7500	6250	5000	3750	2500	1250	
Cultivators (professional)	Stage I	0811						1250	2500	3750	3750	3750	3750	3750	3750
Cultivators (professional)	Stage II	0811									1250	2500	3750	5000	6250
Chain saws (professional)	1981-1990	0811													
Chain saws (professional)	1991-Stage I	0811	20000	27500	35000	42500	50000	33333	16667						
Chain saws (professional)	Stage I	0811						16667	33333	50000	50000	33333	16667		
Chain saws (professional)	Stage II	0811										16667	33333	50000	50000
Riders (professional)	1981-1990	0811													
Riders (professional)	1991-Stage I	0811	6720	7802	9726	12492	16100	15728	13398	9444	4800				
Riders (professional)	Stage I	0811						3932	8932	9444	9600	9600	4800		
Riders (professional)	Stage II	0811								4722	9600	14400	19200	24000	24000
Shrub clearers (professional)	1981-1990	0811													
Shrub clearers (professional)	1991-Stage I	0811	4000	5500	7000	8500	10000	7500	5000	2500					
Shrub clearers (professional)	Stage I	0811						2500	5000	7500	7500	5000	2500		
Shrub clearers (professional)	Stage II	0811									2500	5000	7500	10000	10000
Hedge cutters (professional)	1981-1990	0811													
Hedge cutters (professional)	1991-Stage I	0811	4000	4600	5200	5800	6400	4800	3200	1600					
Hedge cutters (professional)	Stage I	0811						1600	3200	4800	4800	3200	1600		
Hedge cutters (professional)	Stage II	0811									1600	3200	4800	6400	6400
Trimmers (professional)	1981-1990	0811													
Trimmers (professional)	1991-Stage I	0811	13286	13714	14143	14571	15000	11250	7500	3750					
Trimmers (professional)	Stage I	0811						3750	7500	11250	11250	7500	3750		
Trimmers (professional)	Stage II	0811									3750	7500	11250	15000	15000

Stock data for small boats and pleasure crafts 1985-2012.

Brændstof	Motortakt	Boat type	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Diesel		Motor boats (27-34 ft)	1550	1550	1719	1889	2058	2228	2397	2567	2736	2906	3075	3244	3414	3583	3753
Diesel		Motor boats (> 34 ft)	450	450	503	556	608	661	714	767	819	872	925	978	1031	1083	1136
Diesel		Motor boats <(27 ft)	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Diesel		Motor sailors	3500	3500	3583	3667	3750	3833	3917	4000	4083	4167	4250	4333	4417	4500	4583
Diesel		Sailing boats (> 26 ft)	7500	7500	7917	8333	8750	9167	9583	10000	10417	10833	11250	11667	12083	12500	12917
Benzin	2-takt	Other boats (< 20 ft)	4000	4000	4056	4111	4167	4222	4278	4333	4389	4444	4500	4556	4565	4527	4439
Benzin	2-takt	Yawls and cabin boats	4000	4000	4056	4111	4167	4222	4278	4333	4389	4444	4500	4556	4565	4527	4439
Benzin	2-takt	Sailing boats (< 26 ft)	19000	19000	18778	18556	18333	18111	17889	17667	17444	17222	17000	16778	16390	15843	15144
Benzin	2-takt	Speed boats	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	2970	2910	2820
Benzin	2-takt	Water scooters	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	990	970	940
Benzin	4-takt	Other boats (< 20 ft)													46	140	283
Benzin	4-takt	Yawls and cabin boats													46	140	283
Benzin	4-takt	Sailing boats (< 26 ft)													166	490	967
Benzin	4-takt	Speed boats	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Benzin	4-takt	Speed boats													30	90	180
Benzin	4-takt	Water scooters													10	30	60

Continued

Brændstof	Motortakt	Boat type	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Diesel		Motor boats (27-34 ft)	3922	4092	4261	4431	4600	4600	4600	4600	4600	4600	4600	4600	4600
Diesel		Motor boats (> 34 ft)	1189	1242	1294	1347	1400	1400	1400	1400	1400	1400	1400	1400	1400
Diesel		Motor boats <(27 ft)	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Diesel		Motor sailors	4667	4750	4833	4917	5000	5000	5000	5000	5000	5000	5000	5000	5000
Diesel		Sailing boats (> 26 ft)	13333	13750	14167	14583	15000	15000	15000	15000	15000	15000	15000	15000	15000
Benzin	2-takt	Other boats (< 20 ft)	4300	4108	3862	3560	3200	2750	2250	1800	1400	1050	750	500	300
Benzin	2-takt	Yawls and cabin boats	4300	4108	3862	3560	3200	2750	2250	1800	1400	1050	750	500	300
Benzin	2-takt	Sailing boats (< 26 ft)	14300	13317	12201	10960	9600	8250	6750	5400	4200	3150	2250	1500	900
Benzin	2-takt	Speed boats	2700	2550	2370	2160	1920	1650	1350	1080	840	630	450	300	180
Benzin	2-takt	Water scooters	900	850	790	720	640	550	450	360	280	210	150	100	60
Benzin	4-takt	Other boats (< 20 ft)	478	725	1027	1384	1800	2250	2750	3200	3600	3950	4250	4500	4700
Benzin	4-takt	Yawls and cabin boats	478	725	1027	1384	1800	2250	2750	3200	3600	3950	4250	4500	4700
Benzin	4-takt	Sailing boats (< 26 ft)	1589	2350	3243	4262	5400	6750	8250	9600	10800	11850	12750	13500	14100
Benzin	4-takt	Speed boats	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Benzin	4-takt	Speed boats	300	450	630	840	1080	1350	1650	1920	2160	2370	2550	2700	2820
Benzin	4-takt	Water scooters	100	150	210	280	360	450	550	640	720	790	850	900	940

Engine sizes (kW) for recreational craft 1985-2012.

Motor type	Boat type	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004-2012
2-takt	Other boats (< 20 ft)	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
2-takt	Yawls and cabin boats	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
2-takt	Sailing boats (< 26 ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2-takt	Speed boats	25	31	32	33	35	36	38	39	40	42	43	44	46	47	49	50
2-takt	Water scooters	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
4-takt	Other boats (< 20 ft)									8	8	8	8	8	8	8	8
4-takt	Yawls and cabin boats									20	20	20	20	20	20	20	20
4-takt	Sailing boats (< 26 ft)									10	10	10	10	10	10	10	10
4-takt	Speed boats (in board eng.)	45	55	58	60	63	65	68	70	73	75	78	80	83	85	88	90
4-takt	Speed boats (out board eng.)									40	42	43	44	46	47	49	50
4-takt	Water scooters									45	45	45	45	45	45	45	45
Diesel	Motor boats (27-34 ft)	70	88	92	97	101	106	110	114	119	123	128	132	137	141	146	150
Diesel	Motor boats (> 34 ft)	120	149	156	163	171	178	185	192	199	207	214	221	228	236	243	250
Diesel	Motor boats <(27 ft)	20	24	26	27	28	29	30	31	32	33	34	36	37	38	39	40
Diesel	Motor sailors	20	22	23	23	24	24	25	26	26	27	27	28	28	29	29	30
Diesel	Sailing boats (> 26 ft)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

Annex 3B-12 Traffic data and different technical and operational data for Danish domestic ferries

Annual traffic data for ferries (no. of round trips) for Danish domestic ferries.

Domestic ferry lines	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Korsør-Nyborg, DSB	9305	9167	9237	8959	8813	8789	8746	3258	0	0	0
Korsør-Nyborg, Vognmandsruten	7512	7363	7468	7496	7502	7828	7917	8302	3576	0	0
Halsskov-Knudshoved	10601	10582	11701	11767	12420	12970	13539	13612	5732	0	0
Kalundborg-Juelsminde	0	1326	1733	1542	1541	1508	856	0	0	0	0
Kalundborg-Århus	1907	2400	3162	2921	2913	3540	4962	4888	4483	1454	1870
Sjællands Odde-Ebeltoft	3908	3978	4008	3988	4325	4569	5712	8153	7851	7720	4775
Sjællands Odde-Århus	0	0	0	0	0	0	0	0	0	2339	1799
Hundested-Grenaa	1026	1025	1032	1030	718	602	67	0	0	0	0
København-Rønne	558	545	484	412	427	426	437	465	458	506	491
Køge-Rønne	0	0	0	0	0	0	0	0	0	0	0
Kalundborg-Samsø	873	873	860	881	826	811	813	823	824	850	828
Tårs-Spodsbjerg	7656	8835	9488	9535	9402	9562	9000	9129	7052	6442	6477
Hirtshals-Torshavn	0	0	0	0	0	0	0	0	0	0	0
Hanstholm-Torshavn	0	14	15	0	0	0	0	0	0	48	67
Esbjerg-Torshavn	9	9	9	15	14	13	0	0	0	0	0
Local ferries	176891	179850	181834	178419	202445	209129	182750	197489	200027	202054	201833

Continued	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Korsør-Nyborg, DSB	0	0	0	0	0	0	0	0	0	0	0	0
Korsør-Nyborg, Vognmandsruten	0	0	0	0	0	0	0	0	0	0	0	0
Halsskov-Knudshoved	0	0	0	0	0	0	0	0	0	0	0	0
Kalundborg-Juelsminde	0	0	0	0	0	0	0	0	0	0	0	0
Kalundborg-Århus	1804	2037	1800	1750	1725	1724	1695	1694	1668	1552	1158	845
Sjællands Odde-Ebeltoft	4226	3597	3191	2906	2889	2690	2670	2577	2454	2409	1960	844
Sjællands Odde-Århus	1817	1825	2359	2863	2795	2853	2810	2814	2810	2735	2796	2304
Hundested-Grenaa	0	0	0	0	0	0	0	0	0	0	0	0
København-Rønne	430	413	397	293	0	0	0	0	0	0	0	0
Køge-Rønne	0	0	0	154	488	436	399	428	407	459	365	370
Kalundborg-Samsø	817	833	831	841	867	862	887	921	969	937	919	927
Tårs-Spodsbjerg	6498	6468	6516	6497	6494	6460	6493	6504	6474	6529	6185	6235
Hirtshals-Torshavn	0	0	0	0	0	0	0	0	0	13	63	58
Hanstholm-Torshavn	94	85	50	59	51	51	48	52	27	20	0	0
Esbjerg-Torshavn	0	0	0	0	0	0	0	0	35	30	0	0
Local ferries	200130	208396	208501	206297	205564	203413	205260	210089	209082	205461	202510	204036

Ferry data: Service, name, engine year, main engine MCR (kW), engine type, specific fuel consumption (sfc), aux. engine (kW).

Ferry service	Ferry name	Engine year	Main engine MCR (kW)	Engine type	Sfc (g/kWh)	Fuel type	Aux engine (kW)
Esbjerg-Torshavn	Gamle Norrøna	1973	11768	Medium speed (4-stroke)	239	Diesel	2354
Esbjerg-Torshavn	Nye Norrøna	2003	21600	Medium speed (4-stroke)	190	Fuel	4320
Halsskov-Knudshoved	ARVEPRINS KNUD	1963	8238	Slow speed (2-stroke)	220	Fuel	1666
Halsskov-Knudshoved	DRONNING MARGRETHE II	1973	8826	Medium speed (4-stroke)	230	Diesel	1692
Halsskov-Knudshoved	HEIMDAL	1983	8309	Medium speed (4-stroke)	220	Diesel	740
Halsskov-Knudshoved	KNUDSHOVED	1961	6400	Slow speed (2-stroke)	220	Fuel	1840
Halsskov-Knudshoved	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	225	Fuel	1426
Halsskov-Knudshoved	KRAKA	1982	8309	Medium speed (4-stroke)	220	Diesel	740
Halsskov-Knudshoved	LODBROG	1982	8309	Medium speed (4-stroke)	220	Diesel	740
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE	1960	8238	Slow speed (2-stroke)	220	Fuel	1360
Halsskov-Knudshoved	PRINSESSE ELISABETH	1964	8238	Slow speed (2-stroke)	220	Fuel	1360
Halsskov-Knudshoved	ROMSØ	1973	8826	Medium speed (4-stroke)	230	Diesel	1728
Halsskov-Knudshoved	SPROGØ	1962	6400	Slow speed (2-stroke)	220	Fuel	1840
Hanstholm-Torshavn	Gamle Norrøna	1973	11768	Medium speed (4-stroke)	239	Diesel	2354
Hanstholm-Torshavn	Nye Norrøna	2003	21600	Medium speed (4-stroke)	190	Fuel	4320
Hirtshals-Torshavn	Nye Norrøna	2003	21600	Medium speed (4-stroke)	190	Fuel	4320
Hundested-Grenaa	DJURSLAND	1974	9856	Medium speed (4-stroke)	230	Diesel	900
Hundested-Grenaa	KATTEGAT	1995	23200	High speed (4-stroke)	205	Diesel	1223
Hundested-Grenaa	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	235	Fuel	1375
Hundested-Grenaa	PRINSESSE ANNE-MARIE	1960	8238	Slow speed (2-stroke)	220	Fuel	1360
Kalundborg-Juelsminde	Mercandia I	1989	2950	High speed (4-stroke)	220	Diesel	0
Kalundborg-Juelsminde	Mercandia II	1989	2950	High speed (4-stroke)	220	Diesel	0
Kalundborg-Juelsminde	Mercandia III	1989	2950	High speed (4-stroke)	220	Diesel	0
Kalundborg-Juelsminde	Mercandia IV	1989	2950	High speed (4-stroke)	220	Diesel	0
Kalundborg-Samsø	HOLGER DANSKE	1976	2354	High speed (4-stroke)	225	Diesel	600
Kalundborg-Samsø	KALUNDBORG	1952	3825	Slow speed (2-stroke)	235	Fuel	570
Kalundborg-Samsø	KYHOLM	1998	2940	High speed (4-stroke)	195	Diesel	864
Kalundborg-Samsø	VESBORG	1995	1770	High speed (4-stroke)	200	Diesel	494
Kalundborg-Århus	ASK	1984	8826	Medium speed (4-stroke)	215	Diesel	2220
Kalundborg-Århus	ASK	1984	8826	Medium speed (4-stroke)	215	Diesel	3000
Kalundborg-Århus	ASK	1984	9840	Medium speed (4-stroke)	215	Diesel	3000
Kalundborg-Århus	CAT-LINK I	1995	17280	High speed (4-stroke)	205	Diesel	1160
Kalundborg-Århus	CAT-LINK II	1995	17280	High speed (4-stroke)	205	Diesel	1160
Kalundborg-Århus	CAT-LINK III	1995	22000	High speed (4-stroke)	205	Diesel	800
Kalundborg-Århus	CAT-LINK IV	1998	28320	High speed (4-stroke)	205	Diesel	920

Continued							
Kalundborg-Århus	CAT-LINK V	1998	28320	High speed (4-stroke)	205	Diesel	920
Kalundborg-Århus	KATTEGAT SYD	1979	7650	Medium speed (4-stroke)	225	Diesel	1366
Kalundborg-Århus	KNUDSHOVED	1961	6400	Slow speed (2-stroke)	220	Fuel	1840
Kalundborg-Århus	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	225	Fuel	1426
Kalundborg-Århus	KRAKA	1982	8309	Medium speed (4-stroke)	220	Diesel	740
Kalundborg-Århus	MAREN MOLS	1996	11700	Slow speed (2-stroke)	180	Diesel	2530
Kalundborg-Århus	METTE MOLS	1996	11700	Slow speed (2-stroke)	180	Diesel	2530
Kalundborg-Århus	NIELS KLIM	1986	12474	Slow speed (2-stroke)	215	Fuel	4440
Kalundborg-Århus	PEDER PAARS	1985	12474	Slow speed (2-stroke)	215	Fuel	4440
Kalundborg-Århus	PRINSESSE ELISABETH	1964	8238	Slow speed (2-stroke)	220	Fuel	1360
Kalundborg-Århus	ROSTOCK LINK	1975	8385	Medium speed (4-stroke)	230	Diesel	2500
Kalundborg-Århus	SØLØVEN/SØBJØRNEN	1992	4000	High speed (4-stroke)	210	Diesel	272
Kalundborg-Århus	URD	1981	8826	Medium speed (4-stroke)	215	Diesel	2220
Kalundborg-Århus	URD	1981	8826	Medium speed (4-stroke)	215	Diesel	3000
Kalundborg-Århus	URD	1981	9840	Medium speed (4-stroke)	215	Diesel	3000
Korsør-Nyborg, DSB	ASA-THOR	1965	6472	Slow speed (2-stroke)	220	Fuel	1305
Korsør-Nyborg, DSB	DRONNING INGRID	1980	18720	Medium speed (4-stroke)	220	Diesel	2932
Korsør-Nyborg, DSB	DRONNING MARGRETHE II	1973	8826	Medium speed (4-stroke)	230	Diesel	1692
Korsør-Nyborg, DSB	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	225	Fuel	1426
Korsør-Nyborg, DSB	KRONPRINS FREDERIK	1981	18720	Medium speed (4-stroke)	220	Diesel	2932
Korsør-Nyborg, DSB	PRINS JOACHIM	1980	18720	Medium speed (4-stroke)	220	Diesel	2932
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED	1962	6400	Slow speed (2-stroke)	220	Fuel	1840
Korsør-Nyborg, Vognmandsruten	Superflex Alfa	1989	2950	High speed (4-stroke)	220	Diesel	0
Korsør-Nyborg, Vognmandsruten	Superflex Bravo	1989	2950	High speed (4-stroke)	220	Diesel	0
Korsør-Nyborg, Vognmandsruten	Superflex Charlie	1988	2950	High speed (4-stroke)	220	Diesel	0
København-Rønne	JENS KOFOED	1979	12950	Medium speed (4-stroke)	233	Fuel	2889
København-Rønne	POVL ANKER	1979	12950	Medium speed (4-stroke)	233	Fuel	2889
Køge-Rønne	DUEODDE	2005	8640	Medium speed (4-stroke)	190	Fuel	1545
Køge-Rønne	HAMMERODDE	2005	8640	Medium speed (4-stroke)	190	Fuel	1545
Køge-Rønne	JENS KOFOED	1979	12950	Medium speed (4-stroke)	233	Fuel	2889
Køge-Rønne	POVL ANKER	1979	12950	Medium speed (4-stroke)	233	Fuel	2889
Sjællands Odde-Ebeltoft	MAI MOLS	1996	24800	Gas turbine	263	Diesel	752
Sjællands Odde-Ebeltoft	MAREN MOLS	1975	12062	Medium speed (4-stroke)	230	Fuel	1986
Sjællands Odde-Ebeltoft	MAREN MOLS 2	1996	11700	Slow speed (2-stroke)	180	Diesel	2530
Sjællands Odde-Ebeltoft	MAX MOLS	1998	28320	High speed (4-stroke)	209	Diesel	920
Sjællands Odde-Ebeltoft	METTE MOLS	1975	12062	Medium speed (4-stroke)	230	Fuel	1986

Continued							
Sjællands Odde-Ebeltoft	METTE MOLS 2	1996	11700	Slow speed (2-stroke)	180	Diesel	2530
Sjællands Odde-Ebeltoft	MIE MOLS	1971	5884	Medium speed (4-stroke)	230	Diesel	
Sjællands Odde-Ebeltoft	MIE MOLS 2	1996	24800	Gas turbine	263	Diesel	752
Sjællands Odde-Århus	KatExpress	2009	36000	High speed (4-stroke)	190	Diesel	1440
Sjællands Odde-Århus	MADS MOLS	1998	28320	High speed (4-stroke)	205	Diesel	920
Sjællands Odde-Århus	MAI MOLS	1996	24800	Gas turbine	263	Diesel	752
Sjællands Odde-Århus	MAX MOLS	1998	28320	High speed (4-stroke)	209	Diesel	920
Sjællands Odde-Århus	MIE MOLS	1996	24800	Gas turbine	263	Diesel	752
Tårs-Spodsbjerg	FRIGG SYDFYEN	1984	1300	Medium speed (4-stroke)	220	Diesel	780
Tårs-Spodsbjerg	Langeland	2011	875	High speed	210	Diesel	
Tårs-Spodsbjerg	Lolland	2011	875	High speed	210	Diesel	
Tårs-Spodsbjerg	ODIN SYDFYEN	1982	1180	Medium speed (4-stroke)	220	Diesel	780
Tårs-Spodsbjerg	SPODSBJERG	1972	1530	Medium speed (4-stroke)	225	Diesel	300
Tårs-Spodsbjerg	SPODSBJERG	2006	1530	Medium speed (4-stroke)	190	Diesel	300
Tårs-Spodsbjerg	THOR SYDFYEN	1978	1176	Medium speed (4-stroke)	225	Diesel	300

Ferry data: Sailing time (single trip).

Ferry service	Ferry name	1985-1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Esbjerg-Torshavn	Gamle Norrøna	1860	1860	1860	1860	1860	1860	1860	1860	1860	1860
Esbjerg-Torshavn	Nye Norrøna										
Halsskov-Knudshoved	ARVEPRINS KNUD	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	DRONNING MARGRETHE II	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	HEIMDAL	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	KNUDSHOVED	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	KONG FREDERIK IX	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	KRAKA	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	LODBROG	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	PRINSESSE ELISABETH	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	ROMSØ	60	60	60	60	60	60	60	60	60	
Halsskov-Knudshoved	SPROGØ	60	60	60	60	60	60	60	60	60	
Hanstholm-Torshavn	Gamle Norrøna	1740	1740	1740	1740	1740	1740	1740	1740	1740	1740
Hanstholm-Torshavn	Nye Norrøna										
Hirtshals-Torshavn	Nye Norrøna										
Hundested-Grenaa	DJURSLAND	160	160	160	160	160					
Hundested-Grenaa	KATTEGAT						90	90			
Hundested-Grenaa	KONG FREDERIK IX					170					
Hundested-Grenaa	PRINSESSE ANNE-MARIE					165					
Kalundborg-Juelsminde	Mercandia I	160	160	160	160	160	160	160			
Kalundborg-Juelsminde	Mercandia II	160	160	160	160	160	160	160			
Kalundborg-Juelsminde	Mercandia III	160	160	160	160	160	160	160			
Kalundborg-Juelsminde	Mercandia IV	160	160	160	160	160	160	160			
Kalundborg-Samsø	HOLGER DANSKE			120	120	120	120	120	120	120	
Kalundborg-Samsø	KALUNDBORG	120	120	120							
Kalundborg-Samsø	KYHOLM									110	110
Kalundborg-Samsø	VESBORG									120	
Kalundborg-Århus	ASK		195	195	195	195	195	195	195	195	195
Kalundborg-Århus	CAT-LINK I						80	85	90	95	
Kalundborg-Århus	CAT-LINK II						80	85	90	95	
Kalundborg-Århus	CAT-LINK III							85	90	95	
Kalundborg-Århus	CAT-LINK IV									80	80
Kalundborg-Århus	CAT-LINK V									80	80
Kalundborg-Århus	KATTEGAT SYD										195

Continued

Kalundborg-Århus	KNUDSHOVED		190								
Kalundborg-Århus	KONG FREDERIK IX		190	190	190	190	190	190			
Kalundborg-Århus	KRAKA									195	
Kalundborg-Århus	MAREN MOLS										
Kalundborg-Århus	METTE MOLS										
Kalundborg-Århus	NIELS KLIM	185	185								
Kalundborg-Århus	PEDER PAARS	185	185								
Kalundborg-Århus	PRINSESSE ELISABETH		185								
Kalundborg-Århus	ROSTOCK LINK										195
Kalundborg-Århus	SØLØVEN/SØBJØRNEN		90	90	90	90	90	90			
Kalundborg-Århus	URD		195	195	195	195	195	195	195	195	195
Korsør-Nyborg, DSB	ASA-THOR	65	65	65	65	65	65	65	65		
Korsør-Nyborg, DSB	DRONNING INGRID	65	65	65	65	65	65	65	65		
Korsør-Nyborg, DSB	DRONNING MARGRETHE II	65	65	65	65	65	65	65	65		
Korsør-Nyborg, DSB	KONG FREDERIK IX	75	75	75	75	75	75	75	75		
Korsør-Nyborg, DSB	KRONPRINS FREDERIK	65	65	65	65	65	65	65	65		
Korsør-Nyborg, DSB	PRINS JOACHIM	65	65	65	65	65	65	65	65		
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED	75	75	75	75	75	75	75	75		
Korsør-Nyborg, Vognmandsruten	Superflex Alfa	70	70	70	70	70	70	70	70	70	
Korsør-Nyborg, Vognmandsruten	Superflex Bravo	70	70	70	70	70	70	70	70	70	
Korsør-Nyborg, Vognmandsruten	Superflex Charlie	70	70	70	70	70	70	70	70	70	
København-Rønne	JENS KOFOED	420	420	420	420	420	420	420	420	420	420
København-Rønne	POVL ANKER	420	420	420	420	420	420	420	420	420	420
Køge-Rønne	DUEODDE										
Køge-Rønne	HAMMERODDE										
Køge-Rønne	JENS KOFOED										
Køge-Rønne	POVL ANKER										
Sjællands Odde-Ebeltoft	MAI MOLS							45	45	45	45
Sjællands Odde-Ebeltoft	MAREN MOLS	100	100	100	100	100	100	100			
Sjællands Odde-Ebeltoft	MAREN MOLS 2							100	100	100	95
Sjællands Odde-Ebeltoft	MAX MOLS										
Sjællands Odde-Ebeltoft	METTE MOLS	100	100	100	100	100	100	100			
Sjællands Odde-Ebeltoft	METTE MOLS 2							100	100	100	95
Sjællands Odde-Ebeltoft	MIE MOLS	105	105	105	105	105	105	105			
Sjællands Odde-Ebeltoft	MIE MOLS 2							45	45	45	45
Sjællands Odde-Århus	KatExpress										

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Sjællands Odde-Århus	MADS MOLS										60
Sjællands Odde-Århus	MAI MOLS										
Sjællands Odde-Århus	MAX MOLS										60
Sjællands Odde-Århus	MIE MOLS										
Tårs-Spodsbjerg	FRIGG SYDFYEN	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	Langeland										
Tårs-Spodsbjerg	Lolland										
Tårs-Spodsbjerg	ODIN SYDFYEN	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	SPODSBJERG	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	THOR SYDFYEN	45	45	45	45	45	17	45	45	45	

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Ferry service	Ferry name	2000	2001	2002	2003	2004	2005	2006-2008	2009	2010	2011	2012
Esbjerg-Torshavn	Gamle Norrøna	1860	1860	1860								
Esbjerg-Torshavn	Nye Norrøna				1860	1860	1860	1860	1860	1860	1860	1860
Halsskov-Knudshoved	ARVEPRINS KNUD											
Halsskov-Knudshoved	DRONNING MARGRETHE II											
Halsskov-Knudshoved	HEIMDAL											
Halsskov-Knudshoved	KNUDSHOVED											
Halsskov-Knudshoved	KONG FREDERIK IX											
Halsskov-Knudshoved	KRAKA											
Halsskov-Knudshoved	LODBROG											
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE											
Halsskov-Knudshoved	PRINSESSE ELISABETH											
Halsskov-Knudshoved	ROMSØ											
Halsskov-Knudshoved	SPROGØ											
Hanstholm-Torshavn	Gamle Norrøna	1740	1740	1740								
Hanstholm-Torshavn	Nye Norrøna				1740	1740	1740	1740	1740	1740	1740	1740
Hirtshals-Torshavn	Nye Norrøna									1740	1740	1740
Hundested-Grenaa	DJURSLAND											
Hundested-Grenaa	KATTEGAT											
Hundested-Grenaa	KONG FREDERIK IX											
Hundested-Grenaa	PRINSESSE ANNE-MARIE											
Kalundborg-Juelsminde	Mercandia I											
Kalundborg-Juelsminde	Mercandia II											
Kalundborg-Juelsminde	Mercandia III											
Kalundborg-Juelsminde	Mercandia IV											

Continued

Kalundborg-Samsø	HOLGER DANSKE												
Kalundborg-Samsø	KALUNDBORG												
Kalundborg-Samsø	KYHOLM	110	110	110	110	110	110		110	110	110	110	110
Kalundborg-Samsø	VESBORG												
Kalundborg-Århus	ASK												
Kalundborg-Århus	CAT-LINK I												
Kalundborg-Århus	CAT-LINK II												
Kalundborg-Århus	CAT-LINK III												
Kalundborg-Århus	CAT-LINK IV												
Kalundborg-Århus	CAT-LINK V												
Kalundborg-Århus	KATTEGAT SYD												
Kalundborg-Århus	KNUDSHOVED												
Kalundborg-Århus	KONG FREDERIK IX												
Kalundborg-Århus	KRAKA												
Kalundborg-Århus	MAREN MOLS	160	160	155	155	155	155		165	165	165	165	165
Kalundborg-Århus	METTE MOLS	160	160	155	155	155	155		165	165	165	165	165
Kalundborg-Århus	NIELS KLIM												
Kalundborg-Århus	PEDER PAARS												
Kalundborg-Århus	PRINSESSE ELISABETH												
Kalundborg-Århus	ROSTOCK LINK												
Kalundborg-Århus	SØLØVEN/SØBJØRNEN												
Kalundborg-Århus	URD												
Korsør-Nyborg, DSB	ASA-THOR												
Korsør-Nyborg, DSB	DRONNING INGRID												
Korsør-Nyborg, DSB	DRONNING MARGRETHE II												
Korsør-Nyborg, DSB	KONG FREDERIK IX												
Korsør-Nyborg, DSB	KRONPRINS FREDERIK												
Korsør-Nyborg, DSB	PRINS JOACHIM												
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED												
Korsør-Nyborg, Vognmandsruten	Superflex Alfa												
Korsør-Nyborg, Vognmandsruten	Superflex Bravo												
Korsør-Nyborg, Vognmandsruten	Superflex Charlie												
København-Rønne	JENS KOFOED	420	420	420	420	420							
København-Rønne	POVL ANKER	420	420	420	420	420							
Køge-Rønne	DUEODDE						375		375	375	375		
Køge-Rønne	HAMMERODDE						375		375	375	375	375	375

Continued

Køge-Rønne	JENS KOFOED					375	375					
Køge-Rønne	POVL ANKER					375	375	375				
Sjællands Odde-Ebeltoft	MAI MOLS	45	45	45	45	45	45	50	50	50	50	50
Sjællands Odde-Ebeltoft	MAREN MOLS											
Sjællands Odde-Ebeltoft	MAREN MOLS 2											
Sjællands Odde-Ebeltoft	MAX MOLS											55
Sjællands Odde-Ebeltoft	METTE MOLS											
Sjællands Odde-Ebeltoft	METTE MOLS 2											
Sjællands Odde-Ebeltoft	MIE MOLS											
Sjællands Odde-Ebeltoft	MIE MOLS 2	45	45	45	45	45	45	50	50	50	50	50
Sjællands Odde-Århus	KatExpress											72
Sjællands Odde-Århus	MADS MOLS	65	65	65	65	65	65					
Sjællands Odde-Århus	MAI MOLS			65	65	65	65	68	68	68	68	68
Sjællands Odde-Århus	MAX MOLS	65	65	65	65	65	65	70	70	70	70	70
Sjællands Odde-Århus	MIE MOLS			65	65	65	65	68	68	68	68	68
Tårs-Spodsbjerg	FRIGG SYDFYEN	45	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	Langeland											45
Tårs-Spodsbjerg	Lolland											45
Tårs-Spodsbjerg	ODIN SYDFYEN	45	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	SPODSBJERG	45	45	45	45	45	45	45	45	45		
Tårs-Spodsbjerg	THOR SYDFYEN											

Ferry data: Load factor (% MCR) – 1985-2000

Ferry service	Ferry name	1985-1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Esbjerg-Torshavn	Gamle Norrøna	90	90	90	90	90	90	90	90	90	90	90
Esbjerg-Torshavn	Nye Norrøna											
Halsskov-Knudshoved	ARVEPRINS KNUD	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	DRONNING MARGRETHE II	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	HEIMDAL	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	KNUDSHOVED	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	KONG FREDERIK IX	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	KRAKA	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	LODBROG	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	PRINSESSE ELISABETH	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	ROMSØ	85	85	85	85	85	85	85	85	85		
Halsskov-Knudshoved	SPROGØ	85	85	85	85	85	85	85	85	85		
Hanstholm-Torshavn	Gamle Norrøna	90	90	90	90	90	90	90	90	90	90	90
Hanstholm-Torshavn	Nye Norrøna											
Hirtshals-Torshavn	Nye Norrøna											
Hundested-Grenaa	DJURSLAND	80	80	80	80	80						
Hundested-Grenaa	KATTEGAT						85	85				
Hundested-Grenaa	KONG FREDERIK IX					65						
Hundested-Grenaa	PRINSESSE ANNE-MARIE					85						
Kalundborg-Juelsminde	Mercandia I	75	75	75	75	75	75	75				
Kalundborg-Juelsminde	Mercandia II	70	70	70	70	70	70	70				
Kalundborg-Juelsminde	Mercandia III	70	70	70	70	70	70	70				
Kalundborg-Juelsminde	Mercandia IV	70	70	70	70	70	70	70				
Kalundborg-Samsø	HOLGER DANSKE			85	85	85	85	85	85	85		
Kalundborg-Samsø	KALUNDBORG	80	80	80								
Kalundborg-Samsø	KYHOLM									85	85	85
Kalundborg-Samsø	VESBORG									95		
Kalundborg-Århus	ASK		85	85	85	80	80	80	80	80	80	
Kalundborg-Århus	CAT-LINK I						95	90	90	85		
Kalundborg-Århus	CAT-LINK II						95	90	90	85		
Kalundborg-Århus	CAT-LINK III							95	95	90		
Kalundborg-Århus	CAT-LINK IV									95	95	
Kalundborg-Århus	CAT-LINK V									95	95	
Kalundborg-Århus	KATTEGAT SYD										85	

Continued

Kalundborg-Århus	KNUDSHOVED		85									
Kalundborg-Århus	KONG FREDERIK IX		85	85	85	85	85	85				
Kalundborg-Århus	KRAKA									85		85
Kalundborg-Århus	MAREN MOLS											85
Kalundborg-Århus	METTE MOLS											
Kalundborg-Århus	NIELS KLIM	85	85									
Kalundborg-Århus	PEDER PAARS	85	85									
Kalundborg-Århus	PRINSESSE ELISABETH		80									
Kalundborg-Århus	ROSTOCK LINK										80	
Kalundborg-Århus	SØLØVEN/SØBJØRNEN		90	90	90	90	90	90				
Kalundborg-Århus	URD		85	85	85	85	85	85	85	80	80	
Korsør-Nyborg, DSB	ASA-THOR	85	85	85	85	85	85	85	85			
Korsør-Nyborg, DSB	DRONNING INGRID	60	60	60	60	60	60	60	60			
Korsør-Nyborg, DSB	DRONNING MARGRETHE II	85	85	85	85	85	85	85	85			
Korsør-Nyborg, DSB	KONG FREDERIK IX	70	70	70	70	70	70	70	70			
Korsør-Nyborg, DSB	KRONPRINS FREDERIK	60	60	60	60	60	60	60	60			
Korsør-Nyborg, DSB	PRINS JOACHIM	60	60	60	60	60	60	60	60			
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED	70	70	70	70	70	70	70	70			
Korsør-Nyborg, Vognmandsruten	Superflex Alfa	70	70	70	70	70	70	70	70	70		
Korsør-Nyborg, Vognmandsruten	Superflex Bravo	70	70	70	70	70	70	70	70	70		
Korsør-Nyborg, Vognmandsruten	Superflex Charlie	70	70	70	70	70	70	70	70	70		30,77
København-Rønne	JENS KOFOED	30,77	30,77	30,77	30,77	30,77	30,77	30,77	30,77	30,77	30,77	30,77
København-Rønne	POVL ANKER	30,77	30,77	30,77	30,77	30,77	30,77	30,77	30,77	30,77	30,77	
Køge-Rønne	DUEODDE											
Køge-Rønne	HAMMERODDE											
Køge-Rønne	JENS KOFOED											
Køge-Rønne	POVL ANKER											80
Sjællands Odde-Ebeltoft	MAI MOLS							80	80	80	80	
Sjællands Odde-Ebeltoft	MAREN MOLS	75	75	75	75	75	75	75				
Sjællands Odde-Ebeltoft	MAREN MOLS 2							80	80	80	85	
Sjællands Odde-Ebeltoft	MAX MOLS											
Sjællands Odde-Ebeltoft	METTE MOLS	75	75	75	75	75	75	75				
Sjællands Odde-Ebeltoft	METTE MOLS 2							80	80	80	85	
Sjællands Odde-Ebeltoft	MIE MOLS	85	85	85	85	85	85	85				80
Sjællands Odde-Ebeltoft	MIE MOLS 2							80	80	80	80	
Sjællands Odde-Århus	KatExpress											85

Continued												
Sjællands Odde-Århus	MADS MOLS										90	85
Sjællands Odde-Århus	MAI MOLS											
Sjællands Odde-Århus	MAX MOLS										90	80
Sjællands Odde-Århus	MIE MOLS											
Tårs-Spodsbjerg	FRIGG SYDFYEN	80	80	80	80	80	80	80	80	80	80	
Tårs-Spodsbjerg	Langeland											80
Tårs-Spodsbjerg	Lolland											80
Tårs-Spodsbjerg	ODIN SYDFYEN	80	80	80	80	80	80	80	80	80	80	2000
Tårs-Spodsbjerg	SPODSBJERG	75	80	80	80	80	80	80	80	80	80	90
Tårs-Spodsbjerg	THOR SYDFYEN	80	80	80	80	80	80	80	80	80		

Ferry data: Load factor (% MCR) – 2001-2012

Ferry service	Ferry name	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Esbjerg-Torshavn	Gamle Norrøna	90	90										
Esbjerg-Torshavn	Nye Norrøna			90	90	90	90	90	90	90	90	90	90
Halsskov-Knudshoved	ARVEPRINS KNUD												
Halsskov-Knudshoved	DRONNING MARGRETHE II												
Halsskov-Knudshoved	HEIMDAL												
Halsskov-Knudshoved	KNUDSHOVED												
Halsskov-Knudshoved	KONG FREDERIK IX												
Halsskov-Knudshoved	KRAKA												
Halsskov-Knudshoved	LODBROG												
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE												
Halsskov-Knudshoved	PRINSESSE ELISABETH												
Halsskov-Knudshoved	ROMSØ												
Halsskov-Knudshoved	SPROGØ												
Hanstholm-Torshavn	Gamle Norrøna	90	90										
Hanstholm-Torshavn	Nye Norrøna			90	90	90	90	90	90	90	90	90	90
Hirtshals-Torshavn	Nye Norrøna										90	90	90
Hundested-Grenaa	DJURSLAND												
Hundested-Grenaa	KATTEGAT												
Hundested-Grenaa	KONG FREDERIK IX												
Hundested-Grenaa	PRINSESSE ANNE-MARIE												
Kalundborg-Juelsminde	Mercandia I												

Continued

Kalundborg-Juelsminde	Mercandia II												
Kalundborg-Juelsminde	Mercandia III												
Kalundborg-Juelsminde	Mercandia IV												
Kalundborg-Samsø	HOLGER DANSKE												
Kalundborg-Samsø	KALUNDBORG												
Kalundborg-Samsø	KYHOLM	85	85	85	85	85	85	85	85	85	85	85	85
Kalundborg-Samsø	VESBORG												
Kalundborg-Århus	ASK												
Kalundborg-Århus	CAT-LINK I												
Kalundborg-Århus	CAT-LINK II												
Kalundborg-Århus	CAT-LINK III												
Kalundborg-Århus	CAT-LINK IV												
Kalundborg-Århus	CAT-LINK V												
Kalundborg-Århus	KATTEGAT SYD												
Kalundborg-Århus	KNUDSHOVED												
Kalundborg-Århus	KONG FREDERIK IX												
Kalundborg-Århus	KRAKA												
Kalundborg-Århus	MAREN MOLS	85	85	85	85	85	82	80	80	80	80	80	80
Kalundborg-Århus	METTE MOLS	85	85	85	85	85	82	80	80	80	80	80	80
Kalundborg-Århus	NIELS KLIM												
Kalundborg-Århus	PEDER PAARS												
Kalundborg-Århus	PRINSESSE ELISABETH												
Kalundborg-Århus	ROSTOCK LINK												
Kalundborg-Århus	SØLØVEN/SØBJØRNEN												
Kalundborg-Århus	URD												
Korsør-Nyborg, DSB	ASA-THOR												
Korsør-Nyborg, DSB	DRONNING INGRID												
Korsør-Nyborg, DSB	DRONNING MARGRETHE II												
Korsør-Nyborg, DSB	KONG FREDERIK IX												
Korsør-Nyborg, DSB	KRONPRINS FREDERIK												
Korsør-Nyborg, DSB	PRINS JOACHIM												
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED												
Korsør-Nyborg, Vognmandsruten	Superflex Alfa												
Korsør-Nyborg, Vognmandsruten	Superflex Bravo												
Korsør-Nyborg, Vognmandsruten	Superflex Charlie												
København-Rønne	JENS KOFOED	30,77	30,77	30,77	30,77								

Continued

København-Rønne	POVL ANKER	30,77	30,77	30,77	30,77								
Køge-Rønne	DUEODDE					69,07	65	65	65	65	65		
Køge-Rønne	HAMMERODDE					69,07	65	65	65	65	65	65	65
Køge-Rønne	JENS KOFOED				31,34	31,34							
Køge-Rønne	POVL ANKER				31,34	31,34	45	49	49				
Sjællands Odde-Ebeltoft	MAI MOLS	80	80	80	80	80	79	78	75	74	77	78	83
Sjællands Odde-Ebeltoft	MAREN MOLS												
Sjællands Odde-Ebeltoft	MAREN MOLS 2												
Sjællands Odde-Ebeltoft	MAX MOLS												60
Sjællands Odde-Ebeltoft	METTE MOLS												
Sjællands Odde-Ebeltoft	METTE MOLS 2												
Sjællands Odde-Ebeltoft	MIE MOLS												
Sjællands Odde-Ebeltoft	MIE MOLS 2	80	80	80	80	80	79	78	75	74	77	78	83
Sjællands Odde-Århus	KatExpress												72
Sjællands Odde-Århus	MADS MOLS	85	85	85	85	85							
Sjællands Odde-Århus	MAI MOLS		75	75	75	75	69	69	69	68	71	70	73
Sjællands Odde-Århus	MAX MOLS	85	85	85	85	85	67	67	67	64	65	62	64
Sjællands Odde-Århus	MIE MOLS		75	75	75	75	69	69	69	68	71	70	73
Tårs-Spodsbjerg	FRIGG SYDFYEN	80	80	80	80	80	80	80	80	80	80	80	80
Tårs-Spodsbjerg	Langeland												80
Tårs-Spodsbjerg	Lolland												80
Tårs-Spodsbjerg	ODIN SYDFYEN	80	80	80	80	80	80	80	80	80	80	80	80
Tårs-Spodsbjerg	SPODSBJERG	80	80	80	80	80	80	80	80	80	80		
Tårs-Spodsbjerg	THOR SYDFYEN												

Ferry data: Round trip shares (%) – 1985-2000.

Ferry service	Ferry name	1985-1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Esbjerg-Torshavn	Gamle Norrøna	100	100	100	100	100	100	100	100	100	100	100
Esbjerg-Torshavn	Nye Norrøna											
Halsskov-Knudshoved	ARVEPRINS KNUD	21	20	20	20	21	19	19	18	20		
Halsskov-Knudshoved	DRONNING MARGRETHE II	2	0	0	0	0	0	0	0	0		
Halsskov-Knudshoved	HEIMDAL	23	24	22	24	23	21	21	19	22		
Halsskov-Knudshoved	KNUDSHOVED	0	0	0	0	0	0	2	5	0		
Halsskov-Knudshoved	KONG FREDERIK IX	0	0	0	0	0	0	0	0	0		
Halsskov-Knudshoved	KRAKA	24	25	23	23	21	20	20	20	21		
Halsskov-Knudshoved	LODBROG	0	0	0	0	0	0	0	7	14		
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE	0	0	0	0	0	6	2	0	0		
Halsskov-Knudshoved	PRINSESSE ELISABETH	0	0	0	3	0	0	0	0	0		
Halsskov-Knudshoved	ROMSØ	21	22	21	16	20	19	21	21	23		
Halsskov-Knudshoved	SPROGØ	9	9	15	14	15	15	14	11	1		
Hanstholm-Torshavn	Gamle Norrøna	100	100	100	100	100	100	100	100	100	100	100
Hanstholm-Torshavn	Nye Norrøna											
Hirtshals-Torshavn	Nye Norrøna											
Hundested-Grenaa	DJURSLAND	100	100	100	100	50						
Hundested-Grenaa	KATTEGAT						100	100				
Hundested-Grenaa	KONG FREDERIK IX					5						
Hundested-Grenaa	PRINSESSE ANNE-MARIE					45						
Kalundborg-Juelsminde	Mercandia I	25	25	25	25	25	25	25				
Kalundborg-Juelsminde	Mercandia II	25	25	25	25	25	25	25				
Kalundborg-Juelsminde	Mercandia III	25	25	25	25	25	25	25				
Kalundborg-Juelsminde	Mercandia IV	25	25	25	25	25	25	25				
Kalundborg-Samsø	HOLGER DANSKE			95	100	100	100	100	100	92		
Kalundborg-Samsø	KALUNDBORG	100	100	5								
Kalundborg-Samsø	KYHOLM									6	100	100
Kalundborg-Samsø	VESBORG									2		
Kalundborg-Århus	ASK		16	32	26	33	27	18	11	12	2	
Kalundborg-Århus	CAT-LINK I						17	25	28	11		
Kalundborg-Århus	CAT-LINK II						1	23	28	8		
Kalundborg-Århus	CAT-LINK III							8	24	19		
Kalundborg-Århus	CAT-LINK IV									23	26	
Kalundborg-Århus	CAT-LINK V									15	26	
Kalundborg-Århus	KATTEGAT SYD										2	

Continued

Kalundborg-Århus	KNUDSHOVED		4									
Kalundborg-Århus	KONG FREDERIK IX		4	0	7	0	0	2				
Kalundborg-Århus	KRAKA									2		
Kalundborg-Århus	MAREN MOLS											50
Kalundborg-Århus	METTE MOLS											50
Kalundborg-Århus	NIELS KLIM	50	20									
Kalundborg-Århus	PEDER PAARS	50	16									
Kalundborg-Århus	PRINSESSE ELISABETH		4									
Kalundborg-Århus	ROSTOCK LINK										22	
Kalundborg-Århus	SØLØVEN/SØBJØRNEN		21	36	34	34	28	5				
Kalundborg-Århus	URD		16	32	33	33	27	18	11	9	22	
Korsør-Nyborg, DSB	ASA-THOR	13	13	13	11	9	9	9	6			
Korsør-Nyborg, DSB	DRONNING INGRID	26	28	26	28	28	29	28	31			
Korsør-Nyborg, DSB	DRONNING MARGRETHE II	3	0	3	1	3	1	2	0			
Korsør-Nyborg, DSB	KONG FREDERIK IX	0	0	0	0	3	4	1	0			
Korsør-Nyborg, DSB	KRONPRINS FREDERIK	27	28	27	29	28	29	29	32			
Korsør-Nyborg, DSB	PRINS JOACHIM	25	27	25	27	27	27	27	28			
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED	6	4	5	4	1	1	4	3			
Korsør-Nyborg, Vognmandsruten	Superflex Alfa	33	33	33	33	33	33	33	33	33		
Korsør-Nyborg, Vognmandsruten	Superflex Bravo	33	33	33	33	33	33	33	33	33		
Korsør-Nyborg, Vognmandsruten	Superflex Charlie	34	34	34	34	34	34	34	34	34		
København-Rønne	JENS KOFOED	50	50	50	50	50	50	50	50	50	50	50
København-Rønne	POVL ANKER	50	50	50	50	50	50	50	50	50	50	50
Køge-Rønne	DUEODDE											
Køge-Rønne	HAMMERODDE											
Køge-Rønne	JENS KOFOED											
Køge-Rønne	POVL ANKER											
Sjællands Odde-Ebeltoft	MAI MOLS							21	35	35	35	50
Sjællands Odde-Ebeltoft	MAREN MOLS	40	40	40	40	40	40	15				
Sjællands Odde-Ebeltoft	MAREN MOLS 2							18	15	15	15	
Sjællands Odde-Ebeltoft	MAX MOLS											
Sjællands Odde-Ebeltoft	METTE MOLS	40	40	40	40	40	40	17				
Sjællands Odde-Ebeltoft	METTE MOLS 2							15	15	15	15	
Sjællands Odde-Ebeltoft	MIE MOLS	20	20	20	20	20	20	5				
Sjællands Odde-Ebeltoft	MIE MOLS 2							9	35	35	35	50
Sjællands Odde-Århus	KatExpress											

Continued

Sjællands Odde-Århus	MADS MOLS										50	95
Sjællands Odde-Århus	MAI MOLS											
Sjællands Odde-Århus	MAX MOLS										50	5
Sjællands Odde-Århus	MIE MOLS											
Tårs-Spodsbjerg	FRIGG SYDFYEN	41	40	39	38	36	36	36	32	33	45	45
Tårs-Spodsbjerg	Langeland											
Tårs-Spodsbjerg	Lolland											
Tårs-Spodsbjerg	ODIN SYDFYEN	41	40	39	38	36	36	36	32	33	45	45
Tårs-Spodsbjerg	SPODSBJERG	4	2	8	8	9	8	8	19	20	10	10
Tårs-Spodsbjerg	THOR SYDFYEN	14	18	14	16	19	20	20	17	14		

Ferry data: Round trip shares (%) – 2001-2012.

Ferry service	Ferry name	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Esbjerg-Torshavn	Gamle Norrøna	100	100										
Esbjerg-Torshavn	Nye Norrøna			100	100	100	100	100	100	100	100	100	100
Halsskov-Knudshoved	ARVEPRINS KNUD												
Halsskov-Knudshoved	DRONNING MARGRETHE II												
Halsskov-Knudshoved	HEIMDAL												
Halsskov-Knudshoved	KNUDSHOVED												
Halsskov-Knudshoved	KONG FREDERIK IX												
Halsskov-Knudshoved	KRAKA												
Halsskov-Knudshoved	LODBROG												
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE												
Halsskov-Knudshoved	PRINSESSE ELISABETH												
Halsskov-Knudshoved	ROMSØ												
Halsskov-Knudshoved	SPROGØ												
Hanstholm-Torshavn	Gamle Norrøna	100	100										
Hanstholm-Torshavn	Nye Norrøna			100	100	100	100	100	100	100	100	100	100
Hirtshals-Torshavn	Nye Norrøna										100	100	100
Hundested-Grenaa	DJURSLAND												
Hundested-Grenaa	KATTEGAT												
Hundested-Grenaa	KONG FREDERIK IX												
Hundested-Grenaa	PRINSESSE ANNE-MARIE												
Kalundborg-Juelsminde	Mercandia I												
Kalundborg-Juelsminde	Mercandia II												

Continued

Kalundborg-Juelsminde	Mercandia III												
Kalundborg-Juelsminde	Mercandia IV												
Kalundborg-Samsø	HOLGER DANSKE												
Kalundborg-Samsø	KALUNDBORG												
Kalundborg-Samsø	KYHOLM	100	100	100	100	100	100	100	100	100	100	100	100
Kalundborg-Samsø	VESBORG												
Kalundborg-Århus	ASK												
Kalundborg-Århus	CAT-LINK I												
Kalundborg-Århus	CAT-LINK II												
Kalundborg-Århus	CAT-LINK III												
Kalundborg-Århus	CAT-LINK IV												
Kalundborg-Århus	CAT-LINK V												
Kalundborg-Århus	KATTEGAT SYD												
Kalundborg-Århus	KNUDSHOVED												
Kalundborg-Århus	KONG FREDERIK IX												
Kalundborg-Århus	KRAKA												
Kalundborg-Århus	MAREN MOLS	50	50	50	50	50	50	50	50	50	50	50	50
Kalundborg-Århus	METTE MOLS	50	50	50	50	50	50	50	50	50	50	50	50
Kalundborg-Århus	NIELS KLIM												
Kalundborg-Århus	PEDER PAARS												
Kalundborg-Århus	PRINSESSE ELISABETH												
Kalundborg-Århus	ROSTOCK LINK												
Kalundborg-Århus	SØLØVEN/SØBJØRNEN												
Kalundborg-Århus	URD												
Korsør-Nyborg, DSB	ASA-THOR												
Korsør-Nyborg, DSB	DRONNING INGRID												
Korsør-Nyborg, DSB	DRONNING MARGRETHE II												
Korsør-Nyborg, DSB	KONG FREDERIK IX												
Korsør-Nyborg, DSB	KRONPRINS FREDERIK												
Korsør-Nyborg, DSB	PRINS JOACHIM												
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED												
Korsør-Nyborg, Vognmandsruten	Superflex Alfa												
Korsør-Nyborg, Vognmandsruten	Superflex Bravo												
Korsør-Nyborg, Vognmandsruten	Superflex Charlie												
København-Rønne	JENS KOFOED	50	50	50	50								
København-Rønne	POVL ANKER	50	50	50	50								

Continued													
Køge-Rønne	DUEODDE					25	49	47	46	51	46		
Køge-Rønne	HAMMERODDE					35	49	53	47	49	54	100	100
Køge-Rønne	JENS KOFOED				50	20							
Køge-Rønne	POVL ANKER				50	20	3	1	7				
Sjællands Odde-Ebeltoft	MAI MOLS	50	50	50	50	50	50	50	50	50	50	50	47
Sjællands Odde-Ebeltoft	MAREN MOLS												
Sjællands Odde-Ebeltoft	MAREN MOLS 2												
Sjællands Odde-Ebeltoft	MAX MOLS												6
Sjællands Odde-Ebeltoft	METTE MOLS												
Sjællands Odde-Ebeltoft	METTE MOLS 2												
Sjællands Odde-Ebeltoft	MIE MOLS												
Sjællands Odde-Ebeltoft	MIE MOLS 2	50	50	50	50	50	50	50	50	50	50	50	47
Sjællands Odde-Århus	KatExpress												18
Sjællands Odde-Århus	MADS MOLS	90	95	60	60	35							
Sjællands Odde-Århus	MAI MOLS		1	10	15	15	20	19	19	20	18	20	6
Sjællands Odde-Århus	MAX MOLS	10	3	20	10	35	60	62	62	60	64	60	70
Sjællands Odde-Århus	MIE MOLS		1	10	15	15	20	19	19	20	18	20	6
Tårs-Spodsbjerg	FRIGG SYDFYEN	45	45	45	45	45	45	45	45	45	45	50	21
Tårs-Spodsbjerg	Langeland												40
Tårs-Spodsbjerg	Lolland												29
Tårs-Spodsbjerg	ODIN SYDFYEN	45	45	45	45	45	45	45	45	45	45	50	10
Tårs-Spodsbjerg	SPODSBJERG	10	10	10	10	10	10	10	10	10	10		
Tårs-Spodsbjerg	THOR SYDFYEN												

Annex 2B-13 Fuel consumption and emission factors, engine specific (NO_x, CO, VOC (NMVOC and CH_4)), and fuel type specific (S-%, SO_2, PM) for ship engines

Specific fuel consumption and NO_x emission factors (g pr kWh) per engine year for diesel ship engines.

Year	High speed 4-stroke sfc (g pr kWh)	Medium speed 4-stroke sfc (g pr kWh)	Slow speed 2-stroke sfc (g pr kWh)	High speed 4-stroke NO_X (g pr kWh)	Medium speed 4-stroke NO_X (g pr kWh)	Slow speed 2-stroke NO_X (g pr kWh)
1949	265.5	255.5	235.5	7.3	8.0	14.5
1950	265.0	255.0	235.0	7.3	8.0	14.5
1951	264.5	254.5	234.5	7.3	8.0	14.5
1952	264.0	254.0	234.0	7.3	8.0	14.5
1953	263.5	253.5	233.5	7.3	8.0	14.5
1954	263.0	253.0	233.0	7.3	8.0	14.5
1955	262.4	252.4	232.4	7.3	8.0	14.5
1956	261.9	251.9	231.9	7.4	8.1	14.6
1957	261.3	251.3	231.3	7.5	8.2	14.7
1958	260.7	250.7	230.7	7.6	8.3	14.8
1959	260.1	250.1	230.1	7.7	8.4	14.9
1960	259.5	249.5	229.5	7.8	8.5	15.0
1961	258.9	248.9	228.9	7.9	8.6	15.1
1962	258.2	248.2	228.2	8.0	8.7	15.1
1963	257.6	247.6	227.6	8.1	8.8	15.2
1964	256.9	246.9	226.9	8.2	8.9	15.3
1965	256.1	246.1	226.1	8.3	9.0	15.4
1966	255.4	245.4	225.4	8.3	9.1	15.5
1967	254.6	244.6	224.6	8.4	9.2	15.6
1968	253.8	243.8	223.8	8.5	9.3	15.7
1969	253.0	243.0	223.0	8.6	9.4	15.8
1970	252.1	242.1	222.1	8.7	9.5	15.9
1971	251.2	241.2	221.2	8.8	9.6	16.0
1972	250.3	240.3	220.3	8.9	9.7	16.1
1973	249.3	239.3	219.3	9.0	9.8	16.2
1974	248.3	238.3	218.3	9.1	9.9	16.3
1975	247.3	237.3	217.3	9.2	10.0	16.4
1976	246.2	236.2	216.2	9.3	10.1	16.4
1977	245.0	235.0	215.0	9.3	10.2	16.5
1978	243.8	233.8	213.8	9.4	10.3	16.6
1979	242.6	232.6	212.6	9.5	10.4	16.7
1980	241.3	231.3	211.3	9.6	10.5	16.8
1981	239.9	229.9	209.9	9.7	10.6	16.9
1982	238.5	228.5	208.5	9.8	10.7	17.0
1983	237.0	227.0	207.0	9.9	10.8	17.4
1984	235.5	225.5	205.5	10.0	10.9	17.8
1985	233.9	223.9	203.9	10.1	11.0	18.2
1986	232.2	222.2	202.2	10.2	11.1	18.6
1987	230.5	220.5	200.5	10.3	11.3	19.0
1988	228.6	218.6	198.6	10.5	11.4	19.3
1989	226.7	216.7	196.7	10.6	11.6	19.5
1990	224.8	214.8	194.8	10.7	11.7	19.8
1991	222.7	212.7	192.7	10.9	11.9	20.0
1992	220.5	210.5	190.5	11.0	12.0	19.8
1993	218.3	208.3	188.3	11.1	12.1	19.6
1994	216.0	206.0	186.0	11.3	12.3	19.4
1995	213.6	203.6	183.6	11.4	12.4	19.3
1996	211.0	201.0	181.0	11.5	12.6	19.1
1997	208.4	198.4	178.4	11.7	12.7	18.9
1998	205.7	195.7	175.7	11.8	12.9	18.7
1999	202.9	192.9	172.9	11.9	13.0	18.5
2000-2010	199.9	189.9	169.9	11.0	12.0	16.0
2011-2012	199.9	189.9	169.9	8.69	9.72	13.6

CO and VOC emission factors (g/kg fuel) for ship engines.

	High speed 4-stroke CO	Medium speed 4-stroke CO	Slow speed 2-stroke CO	High speed 4-stroke VOC	Medium speed 4-stroke VOC	Slow speed 2-stroke VOC
1949	6.03	6.26	6.79	1.88	1.96	2.12
1950	6.04	6.27	6.81	1.89	1.96	2.13
1951	6.05	6.29	6.82	1.89	1.96	2.13
1952	6.06	6.30	6.84	1.89	1.97	2.14
1953	6.07	6.31	6.85	1.90	1.97	2.14
1954	6.08	6.33	6.87	1.90	1.98	2.15
1955	6.10	6.34	6.88	1.91	1.98	2.15
1956	6.11	6.35	6.90	1.91	1.99	2.16
1957	6.12	6.37	6.92	1.91	1.99	2.16
1958	6.14	6.38	6.93	1.92	1.99	2.17
1959	6.15	6.40	6.95	1.92	2.00	2.17
1960	6.17	6.41	6.97	1.93	2.00	2.18
1961	6.18	6.43	6.99	1.93	2.01	2.18
1962	6.20	6.45	7.01	1.94	2.01	2.19
1963	6.21	6.46	7.03	1.94	2.02	2.20
1964	6.23	6.48	7.05	1.95	2.03	2.20
1965	6.25	6.50	7.08	1.95	2.03	2.21
1966	6.26	6.52	7.10	1.96	2.04	2.22
1967	6.28	6.54	7.12	1.96	2.04	2.23
1968	6.30	6.56	7.15	1.97	2.05	2.23
1969	6.32	6.58	7.17	1.98	2.06	2.24
1970	6.35	6.61	7.20	1.98	2.06	2.25
1971	6.37	6.63	7.23	1.99	2.07	2.26
1972	6.39	6.66	7.26	2.00	2.08	2.27
1973	6.42	6.69	7.29	2.01	2.09	2.28
1974	6.44	6.71	7.33	2.01	2.10	2.29
1975	6.47	6.74	7.36	2.02	2.11	2.30
1976	6.50	6.77	7.40	2.03	2.12	2.31
1977	6.53	6.81	7.44	2.04	2.13	2.33
1978	6.56	6.84	7.48	2.05	2.14	2.34
1979	6.60	6.88	7.53	2.06	2.15	2.35
1980	6.63	6.92	7.57	2.07	2.16	2.37
1981	6.67	6.96	7.62	2.08	2.17	2.38
1982	6.71	7.00	7.67	2.10	2.19	2.40
1983	6.75	7.05	7.73	2.11	2.20	2.42
1984	6.79	7.10	7.79	2.12	2.22	2.43
1985	6.84	7.15	7.85	2.14	2.23	2.45
1986	6.89	7.20	7.91	2.15	2.25	2.47
1987	6.94	7.26	7.98	2.17	2.27	2.49
1988	7.00	7.32	8.05	2.19	2.29	2.52
1989	7.06	7.38	8.13	2.21	2.31	2.54
1990	7.12	7.45	8.22	2.22	2.33	2.57
1991	7.18	7.52	8.30	2.25	2.35	2.59
1992	7.25	7.60	8.40	2.27	2.37	2.62
1993	7.33	7.68	8.50	2.29	2.40	2.66
1994	7.41	7.77	8.60	2.31	2.43	2.69
1995	7.49	7.86	8.72	2.34	2.46	2.72
1996	7.58	7.96	8.84	2.37	2.49	2.76
1997	7.68	8.06	8.97	2.40	2.52	2.80
1998	7.78	8.18	9.11	2.43	2.56	2.85
1999	7.89	8.30	9.26	2.46	2.59	2.89
2000	8.00	8.43	9.42	2.50	2.63	2.94

NMVOC and CH_4 emission factors (g/kg fuel) for ship engines.

	High speed 4-stroke NMVOC	Medium speed 4-stroke NMVOC	Slow speed 2-stroke NMVOC	High speed 4-stroke CH_4	Medium speed 4-stroke CH_4	Slow speed 2-stroke CH_4
1949	1.83	1.90	2.06	0.06	0.06	0.06
1950	1.83	1.90	2.06	0.06	0.06	0.06
1951	1.83	1.91	2.07	0.06	0.06	0.06
1952	1.84	1.91	2.07	0.06	0.06	0.06
1953	1.84	1.91	2.08	0.06	0.06	0.06
1954	1.84	1.92	2.08	0.06	0.06	0.06
1955	1.85	1.92	2.09	0.06	0.06	0.06
1956	1.85	1.93	2.09	0.06	0.06	0.06
1957	1.86	1.93	2.10	0.06	0.06	0.06
1958	1.86	1.93	2.10	0.06	0.06	0.07
1959	1.86	1.94	2.11	0.06	0.06	0.07
1960	1.87	1.94	2.11	0.06	0.06	0.07
1961	1.87	1.95	2.12	0.06	0.06	0.07
1962	1.88	1.95	2.13	0.06	0.06	0.07
1963	1.88	1.96	2.13	0.06	0.06	0.07
1964	1.89	1.96	2.14	0.06	0.06	0.07
1965	1.89	1.97	2.14	0.06	0.06	0.07
1966	1.90	1.98	2.15	0.06	0.06	0.07
1967	1.90	1.98	2.16	0.06	0.06	0.07
1968	1.91	1.99	2.17	0.06	0.06	0.07
1969	1.92	2.00	2.17	0.06	0.06	0.07
1970	1.92	2.00	2.18	0.06	0.06	0.07
1971	1.93	2.01	2.19	0.06	0.06	0.07
1972	1.94	2.02	2.20	0.06	0.06	0.07
1973	1.95	2.03	2.21	0.06	0.06	0.07
1974	1.95	2.04	2.22	0.06	0.06	0.07
1975	1.96	2.04	2.23	0.06	0.06	0.07
1976	1.97	2.05	2.24	0.06	0.06	0.07
1977	1.98	2.06	2.26	0.06	0.06	0.07
1978	1.99	2.07	2.27	0.06	0.06	0.07
1979	2.00	2.09	2.28	0.06	0.06	0.07
1980	2.01	2.10	2.30	0.06	0.06	0.07
1981	2.02	2.11	2.31	0.06	0.07	0.07
1982	2.03	2.12	2.33	0.06	0.07	0.07
1983	2.05	2.14	2.34	0.06	0.07	0.07
1984	2.06	2.15	2.36	0.06	0.07	0.07
1985	2.07	2.17	2.38	0.06	0.07	0.07
1986	2.09	2.18	2.40	0.06	0.07	0.07
1987	2.10	2.20	2.42	0.07	0.07	0.07
1988	2.12	2.22	2.44	0.07	0.07	0.08
1989	2.14	2.24	2.47	0.07	0.07	0.08
1990	2.16	2.26	2.49	0.07	0.07	0.08
1991	2.18	2.28	2.52	0.07	0.07	0.08
1992	2.20	2.30	2.55	0.07	0.07	0.08
1993	2.22	2.33	2.58	0.07	0.07	0.08
1994	2.25	2.35	2.61	0.07	0.07	0.08
1995	2.27	2.38	2.64	0.07	0.07	0.08
1996	2.30	2.41	2.68	0.07	0.07	0.08
1997	2.33	2.44	2.72	0.07	0.08	0.08
1998	2.36	2.48	2.76	0.07	0.08	0.09
1999	2.39	2.51	2.81	0.07	0.08	0.09
2000	2.43	2.55	2.85	0.08	0.08	0.09

S-%, SO_2 and PM emission factors (g/kg fuel and g/GJ) per fuel type for diesel ship engines.

Fuel type	SNAPCode	Year	S %	SO_2 (g/kg)	TSP (g/kg)	PM_{10} (g/kg)	$PM_{2.5}$ (g/kg)	SO_2 (g/GJ)	TSP (g/GJ)	PM_{10} (g/GJ)	$PM_{2.5}$ (g/GJ)
Fuel	National sea	1990	2,6	52,8	6,1	6,0	6,0	1291,0	149,2	147,8	147,0
Fuel	National sea	1991	2,4	47,0	4,9	4,9	4,8	1149,1	120,2	119,0	118,4
Fuel	National sea	1992	1,8	36,0	3,3	3,2	3,2	880,2	79,8	79,0	78,6
Fuel	National sea	1993	2,4	47,8	5,1	5,0	5,0	1168,7	123,9	122,6	122,0
Fuel	National sea	1994	2,6	52,4	6,0	6,0	5,9	1281,2	147,0	145,6	144,8
Fuel	National sea	1995	3,0	59,0	7,7	7,6	7,6	1442,5	188,0	186,1	185,2
Fuel	National sea	1996	2,6	51,4	5,8	5,7	5,7	1256,7	141,7	140,2	139,5
Fuel	National sea	1997	2,7	54,8	6,6	6,5	6,5	1339,9	160,8	159,2	158,4
Fuel	National sea	1998	2,0	39,4	3,7	3,7	3,6	963,3	90,6	89,7	89,2
Fuel	National sea	1999	2,0	39,4	3,7	3,7	3,6	963,3	90,6	89,7	89,2
Fuel	National sea	2000	1,8	36,2	3,3	3,3	3,2	885,1	80,4	79,6	79,2
Fuel	National sea	2001	1,7	34,0	3,0	3,0	3,0	831,3	74,1	73,4	73,0
Fuel	National sea	2002	1,5	30,2	2,6	2,6	2,6	738,4	64,3	63,7	63,3
Fuel	National sea	2003	1,6	32,4	2,9	2,8	2,8	792,2	69,8	69,1	68,8
Fuel	National sea	2004	2,0	39,6	3,7	3,7	3,7	968,2	91,3	90,4	89,9
Fuel	National sea	2005	2,0	40,0	3,8	3,8	3,7	978,0	92,6	91,7	91,3
Fuel	National sea	2006	1,9	38,8	3,6	3,6	3,6	948,7	88,6	87,7	87,3
Fuel	National sea	2007	1,2	24,0	2,1	2,1	2,1	586,8	51,0	50,5	50,3
Fuel	National sea	2008	1,2	24,0	2,1	2,1	2,1	586,8	51,0	50,5	50,3
Fuel	National sea	2009	1,2	24,0	2,1	2,1	2,1	586,8	51,0	50,5	50,3
Fuel	National sea	2010	1,0	20,0	1,8	1,8	1,8	489,0	44,0	43,5	43,3
Fuel	National sea	2011	1,0	20,0	1,8	1,8	1,8	489,0	44,0	43,5	43,3
Fuel	National sea	2012	1,0	20,0	1,8	1,8	1,8	489,0	44,0	43,5	43,3
Fuel	International sea	1990	3,0	59,2	7,7	7,7	7,6	1447,4	189,4	187,5	186,6
Fuel	International sea	1991	2,9	57,8	7,4	7,3	7,2	1413,2	179,8	178,0	177,1
Fuel	International sea	1992	2,9	57,6	7,3	7,2	7,2	1408,3	178,5	176,7	175,8
Fuel	International sea	1993	3,2	64,0	9,3	9,2	9,1	1564,8	226,5	224,2	223,1
Fuel	International sea	1994	3,0	60,6	8,2	8,1	8,0	1481,7	199,6	197,6	196,6
Fuel	International sea	1995	3,3	66,0	10,0	9,9	9,8	1613,7	244,0	241,6	240,4
Fuel	International sea	1996	3,4	68,4	10,9	10,8	10,8	1672,4	266,9	264,2	262,9
Fuel	International sea	1997	3,5	69,0	11,2	11,0	11,0	1687,0	272,9	270,2	268,8
Fuel	International sea	1998	3,4	68,4	10,9	10,8	10,8	1672,4	266,9	264,2	262,9
Fuel	International sea	1999	3,5	69,0	11,2	11,0	11,0	1687,0	272,9	270,2	268,8
Fuel	International sea	2000	3,4	67,2	10,4	10,3	10,3	1643,0	255,2	252,6	251,4
Fuel	International sea	2001	3,4	68,4	10,9	10,8	10,8	1672,4	266,9	264,2	262,9
Fuel	International sea	2002	3,4	68,8	11,1	11,0	10,9	1682,2	270,9	268,2	266,8

Continued											
Fuel	International sea	2003	3,1	62,2	8,7	8,6	8,5	1520,8	211,8	209,7	208,6
Fuel	International sea	2004	3,2	64,0	9,3	9,2	9,1	1564,8	226,5	224,2	223,1
Fuel	International sea	2005	3,5	70,0	11,6	11,5	11,4	1711,5	283,2	280,4	279,0
Fuel	International sea	2006	3,4	67,0	10,4	10,3	10,2	1638,1	253,3	250,8	249,5
Fuel	International sea	2007	1,5	30,0	2,6	2,6	2,6	733,5	63,8	63,2	62,9
Fuel	International sea	2008	1,5	30,0	2,6	2,6	2,6	733,5	63,8	63,2	62,9
Fuel	International sea	2009	1,5	30,0	2,6	2,6	2,6	733,5	63,8	63,2	62,9
Fuel	International sea	2010	1,0	20,0	1,8	1,8	1,8	489,0	44,0	43,5	43,3
Fuel	International sea	2011	1,0	20,0	1,8	1,8	1,8	489,0	44,0	43,5	43,3
Fuel	International sea	2012	1,0	20,0	1,8	1,8	1,8	489,0	44,0	43,5	43,3
Diesel		1990	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1991	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1992	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1993	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1994	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1995	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1996	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1997	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1998	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		1999	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2000	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2001	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2002	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2003	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2004	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2005	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2006	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2007	0,2	4,0	1,0	1,0	1,0	93,7	23,2	23,0	22,9
Diesel		2008	0,1	2,0	0,9	0,9	0,9	46,8	21,5	21,3	21,2
Diesel		2009	0,1	2,0	0,9	0,9	0,9	46,8	21,5	21,3	21,2
Diesel		2010	0,1	2,0	0,9	0,9	0,9	46,8	21,5	21,3	21,2
Diesel		2011	0,1	2,0	0,9	0,9	0,9	46,8	21,5	21,3	21,2
Diesel		2012	0,1	2,0	0,9	0,9	0,9	46,8	21,5	21,3	21,2

Annex 2B-14 Fuel sales figures from DEA, and further processed fuel consumption data suited for the Danish inventory

Sector	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Agriculture, Forestry and Horticulture															
- LPG	96	89	401	358	510	488	459	397	260	227	227	234	204	243	179
- motor gasoline	435	187	321	323	315	284	261	252	231	184	179	210	77	68	62
- gas/dieselolie	10904	10904	10904	10904	11836	11937	12387	12915	12628	12457	12723	13575	14231	13651	14256
Fishing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- LPG	0	0	34	29	50	42	34	30	12	18	16	36	5	1	16
- motor gasoline	0	1	2	2	9	9	10	8	7	7	8	7	6	6	60
- petroleum	7	2	9	5	12	26	9	5	4	3	4	3	3	2	0
- gas/dieselolie	9152	10248	8390	9499	10038	10422	10809	10868	8843	8796	8277	8750	8748	9186	9282
- fuelolie	27	5	82	68	251	285	113	231	146	8	19	219	260	27	0
Manufactoring Industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- LPG	2860	2839	2688	2553	2080	2032	2076	1827	1858	2029	2234	2404	2106	2017	1917
- motor gasoline	262	273	453	326	136	177	161	158	145	138	110	86	82	137	80
- gas/dieselolie	15576	15441	14743	13346	12670	12259	12934	11901	11323	10154	10401	10184	8921	8720	8852
- fuelolie	29465	29451	21518	19056	16741	15989	17133	16694	14600	15438	14000	12632	11009	10943	8704
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- LPG	305	343	500	451	575	500	573	708	579	522	501	509	471	575	422
- motor gasoline	19	85	52	48	36	34	26	24	20	23	25	34	27	23	27
- gas/dieselolie	5313	4962	4378	4220	3945	3548	3797	3839	3871	4145	5317	5572	6079	5947	6556
Single family houses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- motor gasoline	1006	1046	1073	1114	1128	1131	1146	1158	1168	1194	1233	1258	1299	1317	1357
- gas/dieselolie	74257	69392	68349	59832	46935	41152	45219	38406	45029	39770	40004	41836	36491	34902	32936
Multi-family houses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- gas/dieselolie	10584	9968	10112	7266	7350	5311	5420	4507	4938	3909	3284	3460	3105	2948	2739
Road transport, DEA statistics															
- gasoline	66 037	68 670	70 502	73 151	74 152	74 326	75 290	76 084	76 697	78 425	80 998	82 656	85 341	86 520	89 129
- gas/diesel oil	45 609	49 738	49 626	49 686	51 854	54 746	58 427	57 511	56 796	58 755	58 561	59 851	60 528	61 072	63 619
- bioethanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
- biodiesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-road, DEA statistics															
- LPG	2 955	2 929	3 089	2 911	2 590	2 520	2 535	2 224	2 118	2 257	2 461	2 638	2 310	2 260	2 097
- gasoline	1 722	1 590	1 898	1 810	1 616	1 626	1 595	1 592	1 563	1 540	1 547	1 589	1 485	1 545	1 526

Continued															
- gas/diesel oil	31 793	31 307	30 025	28 469	28 451	27 744	29 118	28 655	27 822	26 755	28 441	29 331	29 231	28 319	29 665
Non-road, NERI model															
- LPG	1232	1233	1225	1209	1196	1185	1172	1151	1124	1105	1099	1088	1075	1086	1077
- gasoline	2998	2950	2903	2856	2813	2770	2702	2641	2587	2550	2521	2499	2479	2463	2456
- gas/diesel oil	26357	26895	26577	27075	26940	26800	26734	26046	26073	25235	25798	25139	25536	24844	24885
Recreational craft, NERI model															
- gasoline	270	270	279	289	299	309	319	329	339	348	358	368	377	385	391
- gas/diesel oil	219	219	247	277	309	343	378	415	454	495	537	581	628	676	726
Non-road, added 0202															
- gas/diesel oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-road, added 0203 and 0301															
- gas/diesel oil	5436	4412	3448	1395	1510	944	2384	2609	1748	1521	2642	4192	3695	3475	4780
- LPG	1724	1696	1864	1701	1393	1335	1363	1073	994	1152	1362	1549	1235	1175	1020
Non-road, added 0203															
- gas/diesel oil	1864	1537	1252	534	628	406	1014	1176	794	708	1182	1940	1799	1675	2297
- LPG	56	52	242	209	274	259	247	192	122	116	125	137	109	126	87
Non-road, added 0301															
- gas/diesel oil	3572	2875	2196	860	882	538	1370	1433	955	813	1460	2252	1896	1800	2483
- LPG	1668	1644	1622	1492	1119	1076	1116	881	872	1036	1237	1412	1126	1048	933
Non-road, added road transport															
- gasoline	-1276	-1360	-1005	-1046	-1197	-1145	-1107	-1049	-1023	-1010	-975	-909	-994	-918	-931
Fisheries, added national sea transport															
- fuel oil	27	5	82	68	251	285	113	231	146	8	19	219	260	27	0
Fisheries, consumed by recreational craft															
- gasoline	0	1	2	2	9	9	10	8	7	7	8	7	6	6	60
National sea transport, input NERI model															
- LPG	3	1	3	-	2	2	2	3	16	1	2	1	2	3	1
- kerosene	5	-	5	3	1	0	2	1	1	1	1	1	0	1	0
- gas/diesel oil	3 074	3 045	3 032	3 230	2 669	2 782	3 313	3 501	4 971	5 035	6 049	6 764	5 899	4 113	3 409
- fuel oil	2 541	3 424	3 922	2 795	4 228	3 845	4 429	3 646	2 797	2 160	1 592	1 379	1 210	1 367	1 435
Fisheries, input NERI model															
- LPG	-	-	34	29	50	42	34	30	12	18	16	36	5	1	16
- gasoline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
- kerosene	7	2	9	5	12	26	9	5	4	3	4	3	3	2	0
- gas/diesel oil	8 932	10 029	8 143	9 222	9 729	10 080	10 431	10 453	8 389	8 301	7 740	8 169	8 120	8 510	8 556
International sea transport, input NERI model															

Continued

- gas/diesel oil	-	7 867	8 547	9 743	10 514	11 633	12 590	16 881	19 114	24 123	26 743	27 231	25 325	31 243	26 085
- fuel oil	-	12 236	20 883	27 532	27 667	28 543	23 470	20 998	36 988	39 024	39 509	35 739	32 427	26 952	28 526
National sea transport, output NERI model															
- gas/diesel oil	5285	5285	5285	5285	5285	5285	6015	6920	6673	6618	7028	8465	8967	7333	6201
- fuel oil	4571	4571	4571	4571	4571	4571	3926	3202	3201	3362	3382	2826	2052	1590	1455
- kerosene	5	0	5	3	1	0	2	1	1	1	1	1	0	1	0
- LPG	3	1	3	0	2	2	2	3	16	1	2	1	2	3	1
Fisheries, output NERI model															
- gas/diesel oil	7064	8131	6233	7509	7455	7920	8170	7482	7075	7097	7134	6744	5329	5567	6375
- kerosene	7	2	9	5	12	26	9	5	4	3	4	3	3	2	0
- LPG	0	0	34	29	50	42	34	30	12	18	16	36	5	1	16
International sea transport, output NERI model															
- gas/diesel oil	6828	7524	8204	9400	10171	11289	12149	16433	18726	23742	26370	26955	25049	30967	25474
- fuel oil	9394	11507	20155	26804	26938	27815	22742	20269	36259	38296	38780	35010	31698	26223	27797
Ferry and Cargo Vessel estimates from international sea transport		729	729	729	729	729	729	729	729	729	729	729	729	729	729
National sea transport, added 0301															
- fuel oil	-2 030	- 419	80	-1 048	386	3	1 233	1 174	325	- 473	-1 061	- 718	- 113	506	709
Road transport, NERI excl. traded fuels															
- gasoline	64 492	67 041	69 220	71 819	72 664	72 882	73 874	74 714	75 342	77 074	79 674	81 385	83 976	85 223	87 867
- gas/diesel oil	45 609	49 738	49 626	49 686	51 854	54 746	58 427	57 511	56 796	58 755	58 561	59 851	60 528	61 072	63 619
- bioethanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
- biodiesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Road transport, input NERI model incl. traded fuels															
- gasoline	64 492	62 442	62 716	63 442	62 546	66 279	70 589	74 320	76 459	79 209	80 101	80 958	83 089	84 832	84 506
- gas/diesel oil	45 609	54 939	54 827	54 887	57 055	59 947	61 296	59 950	59 522	63 561	64 013	65 590	66 374	67 206	69 501
- bioethanol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
- biodiesel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Continued

Sector	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Agriculture, Forestry and Horticulture													
- LPG	199	210	176	169	152	133	128	121	114	126	138	142	137
- motor gasoline	41	43	31	47	57	58	22	23	22	34	33	28	33
- gas/dieselolie	14387	14018	14235	14019	13422	12871	13437	12899	14142	14855	14984	14609	14528
Fishing	0	0	0	0	0	0	0	0	0	0	0	0	0
- LPG	13	19	21	20	18	20	20	18	12	12	12	11	10

Continued

- motor gasoline	67	3	3	0	0	0	1	1	1	1	1	1	1
- petroleum	25	1	1	1	1	1	0	0	0	0	0	0	0
- gas/dieselolie	9347	8908	8888	8428	7337	7340	7362	6854	6258	6075	6037	5739	4659
- fuelolie	0	0	4	84	35	126	86	13	14	17	0	0	0
Manufactoring Industry	0	0	0	0	0	0	0	0	0	0	0	0	0
- LPG	1819	1526	1405	1472	1488	1478	1482	1216	1178	1029	1093	986	1150
- motor gasoline	97	69	42	26	30	21	32	16	15	97	84	118	15
- gas/dieselolie	8635	10099	9155	9964	10515	10022	9132	8170	7449	6141	6242	4902	4234
- fuelolie	8221	7395	7818	6916	6940	6055	8527	6422	5319	4015	5032	3835	3388
Construction	0	0	0	0	0	0	0	0	0	0	0	0	0
- LPG	165	179	236	226	228	224	248	222	172	103	94	98	104
- motor gasoline	33	24	26	27	27	27	27	28	26	20	22	21	16
- gas/dieselolie	5950	6356	6226	6226	6227	6338	6187	6410	6339	5429	5341	5370	4353
Single Family Houses	0	0	0	0	0	0	0	0	0	0	0	0	0
- motor gasoline	1355	1317	1313	1303	1288	1250	1216	1193	1135	1079	1031	958	912
- gas/dieselolie	27929	28996	26967	24932	22863	21712	19572	18012	16585	15625	16536	13698	11162
Multi-family Houses	0	0	0	0	0	0	0	0	0	0	0	0	0
- gas/dieselolie	2346	2511	2031	2095	2427	2151	1625	1411	1610	1658	1630	1305	1388
Road transport, DEA statistics													
- gasoline	88 975	86 474	86 247	85 611	84 629	82 118	79 822	78 325	74 545	70 880	67 720	62 879	59 864
- gas/diesel oil	64 282	66 254	66 814	70 875	75 422	79 476	86 223	93 111	93 437	88 454	92 359	91 185	87 187
- bioethanol	-	-	-	-	-	-	151	252	210	204	1 118	2 124	2 003
- biodiesel	-	-	-	-	-	-	-	-	10	139	16	3 492	6 526
Non-road, DEA statistics													
- LPG	2 018	1 736	1 581	1 641	1 640	1 612	1 610	1 337	1 292	1 155	1 232	1 128	1 287
- gasoline	1 525	1 453	1 412	1 404	1 402	1 356	1 296	1 259	1 199	1 230	1 170	1 125	975
- gas/diesel oil	28 972	30 473	29 616	30 209	30 164	29 232	28 757	27 479	27 929	26 425	26 567	24 881	23 115
Non-road, NERI model													
- LPG	1071	1073	1084	1079	1065	1049	1038	1040	986	817	985	976	974
- gasoline	2458	2622	2833	3090	3391	3604	3807	3923	3975	3942	3982	3974	3948
- gas/diesel oil	24630	24923	25100	25301	25670	26418	27784	29727	30914	27321	30280	30243	30620
Recreational craft, NERI model													
- gasoline	396	400	403	404	404	393	382	371	361	353	346	340	335
- gas/diesel oil	777	831	886	944	1002	1002	1002	1002	1002	1002	1002	1002	1002
Non-road, added 0202													

Continued													
- gas/diesel oil	0	0	0	0	0	0	0	-2248	-2984	-897	-3712	-5362	-7505
Non-road, added 0203 and 0301													
- gas/diesel oil	4342	5550	4516	4908	4494	2814	974	0	0	0	0	0	0
- LPG	947	662	497	563	575	562	572	298	306	338	247	152	313
Non-road, added 0203													
- gas/diesel oil	2156	2553	2171	2278	2000	1239	455	0	0	0	0	0	0
- LPG	93	80	55	58	53	46	46	27	27	37	28	19	33
Non-road, added 0301													
- gas/diesel oil	2186	2997	2346	2630	2494	1575	519	0	0	0	0	0	0
- LPG	854	582	442	505	522	516	526	271	279	301	219	133	279
Non-road, added road transport													
- gasoline	-932	-1169	-1421	-1686	-1990	-2248	-2511	-2663	-2776	-2712	-2812	-2849	-2973
Fisheries, added national sea transport													
- fuel oil	0	0	4	84	35	126	86	13	14	17	0	0	0
Fisheries, consumed by recreational craft													
- gasoline	67	3	3	0	0	0	1	1	1	1	1	1	1
National sea transport, input NERI model													
- LPG	0	-	-	0	0	0	0	0	-	-	-	-	-
- kerosene	1	1	1	1	1	1	0	-	-	-	-	-	-
- gas/diesel oil	5 348	5 608	5 855	6 009	5 259	6 646	5 986	5 233	6 954	6 489	5 665	5 654	5 595
- fuel oil	1 509	1 513	2 068	1 907	1 704	1 506	1 367	1 110	1 174	1 062	868	732	624
Fisheries, input NERI model													
- LPG	13	19	21	20	18	20	20	18	12	12	12	11	10
- gasoline	-	-	-	-	-	-	-	-	-	-	-	1	1
- kerosene	25	1	1	1	1	1	0	0	0	-	-	-	-
- gas/diesel oil	8 570	8 077	8 001	7 484	6 335	6 338	6 360	5 852	5 256	5 073	5 035	4 737	3 657
International sea transport, input NERI model													
- gas/diesel oil	20 892	19 022	19 505	18 549	14 357	11 630	10 829	9 124	11 218	10 433	11 493	10 432	10 431
- fuel oil	33 165	25 924	17 547	20 462	17 298	20 591	31 565	35 243	27 164	11 091	17 493	18 909	11 278
National sea transport, output NERI model													
- gas/diesel oil	5258	5233	5061	4475	4591	4559	4426	4435	4357	4235	4049	3714	2903
- fuel oil	1444	1400	1387	1862	1853	1859	2026	2004	2148	2287	2456	2375	2353
- kerosene	1	1	1	1	1	1	0	0	0	0	0	0	0
- LPG	0	0	0	0	0	0	0	0	0	0	0	0	10
Fisheries, output NERI model													
- gas/diesel oil	9403	9384	9664	9294	7286	8725	8166	6966	8142	7597	6787	6827	6466

Continued													
- kerosene	25	1	1	1	1	1	0	0	0	0	0	0	0
- LPG	13	19	21	20	18	20	20	18	12	12	12	11	10
International sea transport, output NERI model													
- gas/diesel oil	20148	18090	18636	18273	14074	11330	10583	8809	10928	10164	11356	10282	10314
- fuel oil	32437	25195	16818	19247	16118	19411	30172	33848	25650	9416	15682	17120	9515
Ferry and Cargo Vessel estimates from international sea transport	729	729	729	1215	1180	1180	1393	1396	1514	1675	1812	1789	1764
National sea transport, added 0301													
- fuel oil	794	842	1 409	1 260	1 032	826	734	502	540	450	224	145	34
Road transport, NERI excl. traded fuels													
- gasoline	87 713	84 907	84 426	83 521	82 235	79 477	76 930	75 292	71 409	67 815	64 564	59 691	56 556
- gas/diesel oil	64 282	66 254	66 814	70 875	75 422	79 476	86 223	93 111	93 437	88 454	92 359	91 185	87 187
- bioethanol	-	-	-	-	-	-	151	252	210	204	1 118	2 124	2 003
- biodiesel	-	-	-	-	-	-	-	-	10	139	16	3 492	6 526
Road transport, input NERI model incl. traded fuels													
- gasoline	83 312	81 852	81 963	81 878	80 593	77 835	76 109	75 292	71 409	67 815	62 757	57 884	54 750
- gas/diesel oil	69 196	70 916	72 552	78 766	84 209	88 264	95 010	103 871	103 480	97 421	101 326	101 658	97 661
- bioethanol	-	-	-	-	-	-	151	252	210	204	1 118	2 124	2 003
- biodiesel	-	-	-	-	-	-	-	-	10	139	16	3 492	6 526

Annex 2B-15 Emission factors and total emissions in CollectER format

1990 emission factors for SO_2, NO_x; NMVOC, CH_4, CO, CO_2, N_2O, NH_3; TSP; PM_{10} and $PM_{2.5}$.

Year		SNAP ID	Category		Fuel type	SO_2 g pr GJ	NO_x g pr GJ	NMVOC g pr GJ	CH_4 g pr GJ	CO g pr GJ	CO_2 g pr GJ	N_2O g pr GJ	NH_3 g pr GJ	TSP g pr GJ	PM_{10} g pr GJ	$PM_{2.5}$ g pr GJ
1990	A	070101	Passenger cars	Highway	Diesel	93,68	279,53	25,07	3,74	179,70	74,00	0,00	0,47	79,48	79,48	79,48
1990	A	070101	Passenger cars	Highway	Gasoline	2,28	1315,35	381,72	10,89	3817,22	73,00	2,72	0,84	12,84	12,84	12,84
1990	A	070101	Passenger cars	Highway	LPG	0,00	1151,70	187,09	10,06	3914,25	63,10	0,00	0,00	10,06	10,06	10,06
1990	A	070102	Passenger cars	Rural	Diesel	93,68	280,57	42,09	6,82	268,08	74,00	0,00	0,57	75,13	75,13	75,13
1990	A	070102	Passenger cars	Rural	Gasoline	2,28	1148,38	500,38	13,79	4273,20	73,00	3,08	0,95	14,97	14,97	14,97
1990	A	070102	Passenger cars	Rural	LPG	0,00	1248,46	305,18	16,91	1146,38	63,10	0,00	0,00	14,49	14,49	14,49
1990	A	070103	Passenger cars	Urban	Diesel	93,68	220,85	103,04	6,82	344,97	74,00	0,00	0,32	144,24	144,24	144,24
1990	A	070103	Passenger cars	Urban	Gasoline	2,28	558,41	1095,32	56,50	12514,04	73,00	2,71	0,54	12,37	12,37	12,37
1990	A	070103	Passenger cars	Urban	LPG	0,00	528,01	473,05	20,80	1587,66	63,10	0,00	0,00	10,40	10,40	10,40
1990	A	070201	Light duty vehicles	Highway	Diesel	93,68	270,67	30,19	2,60	344,14	74,00	0,00	0,32	104,48	104,48	104,48
1990	A	070201	Light duty vehicles	Highway	Gasoline	2,28	1369,26	170,29	10,11	2987,40	73,00	2,63	0,81	16,17	16,17	16,17
1990	A	070201	Light duty vehicles	Highway	LPG	0,00	1151,70	187,09	10,06	3914,25	63,10	0,00	0,00	10,06	10,06	10,06
1990	A	070202	Light duty vehicles	Rural	Diesel	93,68	299,25	33,22	4,26	358,42	74,00	0,00	0,36	107,73	107,73	107,73
1990	A	070202	Light duty vehicles	Rural	Gasoline	2,28	1188,86	262,59	15,25	2316,18	73,00	2,48	0,76	15,25	15,25	15,25
1990	A	070202	Light duty vehicles	Rural	LPG	0,00	1248,46	305,18	16,91	1146,38	63,10	0,00	0,00	14,49	14,49	14,49
1990	A	070203	Light duty vehicles	Urban	Diesel	93,68	469,24	74,81	4,58	463,37	74,00	0,00	0,23	165,76	165,76	165,76
1990	A	070203	Light duty vehicles	Urban	Gasoline	2,28	547,55	874,08	39,84	9527,46	73,00	1,84	0,37	7,37	7,37	7,37
1990	A	070203	Light duty vehicles	Urban	LPG	0,00	487,91	487,73	19,58	1705,63	63,10	0,00	0,00	9,79	9,79	9,79
1990	A	070301	Heavy duty vehicles	Highway	Diesel	93,68	978,47	41,71	6,44	200,02	74,00	3,08	0,31	35,10	35,10	35,10
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	2,28	1037,78	474,61	9,69	7610,35	73,00	0,83	0,28	55,35	55,35	55,35
1990	A	070302	Heavy duty vehicles	Rural	Diesel	93,68	984,85	57,74	6,78	211,25	74,00	2,92	0,29	35,73	35,73	35,73
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	2,28	1141,55	820,40	16,74	8371,39	73,00	0,91	0,30	60,88	60,88	60,88
1990	A	070303	Heavy duty vehicles	Urban	Diesel	93,68	966,99	86,86	12,42	269,91	74,00	2,30	0,23	42,21	42,21	42,21
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	2,28	456,62	696,09	14,21	7102,99	73,00	0,61	0,20	40,59	40,59	40,59
1990	A	070400	Mopeds	Urban	Gasoline	2,28	18,26	12503,20	200,00	12602,74	73,00	0,91	0,91	171,69	171,69	171,69
1990	A	070501	Motorcycles	Highway	Gasoline	2,28	264,11	1072,19	129,96	16302,60	73,00	1,35	1,35	31,73	31,73	31,73
1990	A	070502	Motorcycles	Rural	Gasoline	2,28	185,41	981,69	159,32	15782,07	73,00	1,66	1,66	38,90	38,90	38,90
1990	A	070503	Motorcycles	Urban	Gasoline	2,28	112,92	1149,21	155,11	15187,59	73,00	1,61	1,61	37,87	37,87	37,87
1990	A	080100	Military		AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	A	080100	Military		Diesel	93,68	719,72	55,39	6,74	268,73	74,00	1,73	0,32	66,49	66,49	66,49
1990	A	080100	Military		Gasoline	2,28	991,97	1128,00	27,57	6765,35	73,00	2,85	0,79	14,34	14,34	14,34
1990	A	080100	Military		Jet fuel	22,99	250,57	24,94	2,65	229,89	72,00	2,30	0,00	1,16	1,16	1,16

Continued															
1990	A	080200	Railways	Diesel	93,68	1225,13	79,94	3,07	223,21	74,00	2,04	0,20	50,26	50,26	50,26
1990	A	080200	Railways	Kerosene	5,00	50,00	3,00	7,00	20,00	72,00	2,00	0,00	121,95	115,85	110,06
1990	A	080300	Inland waterways	Diesel	93,68	983,64	171,79	2,79	453,65	74,00	2,96	0,17	106,93	106,93	106,93
1990	A	080300	Inland waterways	Gasoline	2,28	291,33	3606,55	50,38	13853,27	73,00	0,78	0,08	182,44	182,44	182,44
1990	A	080402	National sea traffic	Diesel	93,68	1104,18	50,57	1,56	166,83	74,00	4,68	0,00	23,21	22,98	22,87
1990	A	080402	National sea traffic	Kerosene	2,30	50,00	3,00	7,00	20,00	72,00	0,00	0,00	5,00	5,00	5,00
1990	A	080402	National sea traffic	LPG	0,00	1249,00	384,94	20,26	443,00	63,10	0,00	0,00	0,20	0,20	0,20
1990	A	080402	National sea traffic	Residual oil	1290,95	1615,26	53,44	1,65	176,29	78,00	4,89	0,00	149,25	147,75	147,01
1990	A	080403	Fishing	Diesel	93,68	1052,12	49,13	1,52	162,08	74,00	4,68	0,00	23,21	22,98	22,87
1990	A	080403	Fishing	Kerosene	2,30	50,00	3,00	7,00	20,00	72,00	0,00	0,00	5,00	5,00	5,00
1990	A	080403	Fishing	LPG	0,00	1249,00	384,94	20,26	443,00	63,10	0,00	0,00	0,20	0,20	0,20
1990	A	080404	International sea traffic	Diesel	93,68	1208,60	49,46	1,53	163,17	74,00	4,68	0,00	23,21	22,98	22,87
1990	A	080404	International sea traffic	Residual oil	1447,43	1689,57	53,98	1,67	178,09	78,00	4,89	0,00	189,43	187,53	186,59
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22,99	314,51	14,93	1,59	90,41	72,00	5,70	0,00	1,16	1,16	1,16
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	22,99	309,25	16,47	1,75	168,98	72,00	7,10	0,00	1,16	1,16	1,16
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22,99	330,11	12,36	1,31	90,75	72,00	2,30	0,00	1,16	1,16	1,16
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	22,99	244,20	6,48	0,69	54,10	72,00	2,30	0,00	1,16	1,16	1,16
1990	A	080600	Agriculture	Diesel	93,68	758,87	156,85	2,55	635,53	74,00	2,93	0,17	144,45	144,45	144,45
1990	A	080600	Agriculture	Gasoline	2,28	31,60	949,55	88,42	47524,17	73,00	1,28	0,09	6,56	6,56	6,56
1990	A	080700	Forestry	Diesel	93,68	857,48	156,47	2,54	645,65	74,00	2,97	0,17	149,05	149,05	149,05
1990	A	080700	Forestry	Gasoline	2,28	40,39	7206,91	60,42	18057,40	73,00	0,37	0,07	101,22	101,22	101,22
1990	A	080800	Industry	Diesel	93,68	933,58	178,23	2,90	655,80	74,00	2,94	0,17	154,50	154,50	154,50
1990	A	080800	Industry	Gasoline	2,28	136,27	1610,77	120,61	14797,46	73,00	1,33	0,09	12,40	12,40	12,40
1990	A	080800	Industry	LPG	0,00	1328,11	146,09	7,69	104,85	63,10	3,50	0,21	4,89	4,89	4,89
1990	A	080900	Household and gardening	Gasoline	2,28	63,98	3366,01	95,22	32901,19	73,00	1,15	0,08	20,75	20,75	20,75
1990	A	081100	Commercial and institutional	Gasoline	2,28	68,83	2280,66	97,87	29887,31	73,00	1,09	0,08	24,00	24,00	24,00
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22,99	283,87	20,73	2,20	129,70	72,00	4,58	0,00	1,16	1,16	1,16
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	22,99	324,87	34,25	3,64	157,15	72,00	3,79	0,00	1,16	1,16	1,16
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22,99	314,86	11,78	1,25	84,05	72,00	2,30	0,00	1,16	1,16	1,16
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	22,99	290,20	10,08	1,07	37,65	72,00	2,30	0,00	1,16	1,16	1,16

1990 emission factors for Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Selenium and Zinc.

Year		SNAP ID	Category		Fuel type	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Selenium	Zinc
						mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ
1990	A	070101	Passenger cars	Highway	Diesel	0,002	0,292	0,926	0,657	0,124	0,296	1,757	0,002	58,606
1990	A	070101	Passenger cars	Highway	Gasoline	0,007	0,273	0,386	1,043	0,199	0,321	1472,004	0,005	54,458
1990	A	070101	Passenger cars	Highway	LPG	0,000	0,300	0,270	1,052	0,000	0,300	0,901	0,000	60,097
1990	A	070102	Passenger cars	Rural	Diesel	0,002	0,355	1,083	0,770	0,124	0,358	2,133	0,002	71,144
1990	A	070102	Passenger cars	Rural	Gasoline	0,007	0,308	0,417	1,165	0,199	0,356	1472,109	0,005	61,472
1990	A	070102	Passenger cars	Rural	LPG	0,000	0,361	0,325	1,262	0,000	0,361	1,082	0,000	72,116
1990	A	070103	Passenger cars	Urban	Diesel	0,002	0,198	0,691	0,488	0,124	0,201	1,192	0,002	39,770
1990	A	070103	Passenger cars	Urban	Gasoline	0,007	0,178	0,300	0,711	0,199	0,226	1471,720	0,005	35,492
1990	A	070103	Passenger cars	Urban	LPG	0,000	0,194	0,175	0,679	0,000	0,194	0,582	0,000	38,818
1990	A	070201	Light duty vehicles	Highway	Diesel	0,002	0,193	0,678	0,478	0,124	0,196	1,161	0,002	38,731
1990	A	070201	Light duty vehicles	Highway	Gasoline	0,007	0,253	0,367	0,972	0,199	0,301	1471,943	0,005	50,405
1990	A	070201	Light duty vehicles	Highway	LPG	0,000	0,198	0,178	0,693	0,000	0,198	0,594	0,000	39,594
1990	A	070202	Light duty vehicles	Rural	Diesel	0,002	0,211	0,723	0,511	0,124	0,214	1,269	0,002	42,337
1990	A	070202	Light duty vehicles	Rural	Gasoline	0,007	0,239	0,355	0,922	0,199	0,287	1471,901	0,005	47,576
1990	A	070202	Light duty vehicles	Rural	LPG	0,000	0,238	0,214	0,831	0,000	0,238	0,713	0,000	47,513
1990	A	070203	Light duty vehicles	Urban	Diesel	0,002	0,135	0,533	0,374	0,124	0,138	0,813	0,002	27,133
1990	A	070203	Light duty vehicles	Urban	Gasoline	0,007	0,118	0,246	0,499	0,199	0,166	1471,538	0,005	23,388
1990	A	070203	Light duty vehicles	Urban	LPG	0,000	0,120	0,108	0,421	0,000	0,120	0,361	0,000	24,068
1990	A	070301	Heavy duty vehicles	Highway	Diesel	0,002	0,150	0,570	0,401	0,124	0,153	0,903	0,002	30,130
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	0,007	0,207	0,326	0,813	0,199	0,255	1471,807	0,005	41,332
1990	A	070302	Heavy duty vehicles	Rural	Diesel	0,002	0,143	0,555	0,390	0,124	0,147	0,866	0,002	28,884
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	0,007	0,220	0,338	0,857	0,199	0,268	1471,845	0,005	43,830
1990	A	070303	Heavy duty vehicles	Urban	Diesel	0,002	0,115	0,483	0,338	0,124	0,118	0,693	0,002	23,142
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	0,007	0,143	0,268	0,586	0,199	0,190	1471,613	0,005	28,351
1990	A	070400	Mopeds	Urban	Gasoline	0,007	0,005	0,144	0,103	0,199	0,053	1471,199	0,005	0,753
1990	A	070501	Motorcycles	Highway	Gasoline	0,007	0,134	0,260	0,556	0,199	0,182	1471,587	0,005	26,666
1990	A	070502	Motorcycles	Rural	Gasoline	0,007	0,163	0,287	0,659	0,199	0,211	1471,675	0,005	32,520
1990	A	070503	Motorcycles	Urban	Gasoline	0,007	0,159	0,283	0,644	0,199	0,207	1471,663	0,005	31,681
1990	A	080100	Military		AvGas	0,007	0,253	0,367	0,972	0,198	0,301	12785,388	0,005	50,452
1990	A	080100	Military		Diesel	0,002	0,172	0,625	0,440	0,124	0,175	1,035	0,002	34,517
1990	A	080100	Military		Gasoline	0,007	0,256	0,371	0,984	0,199	0,304	1471,954	0,005	51,135
1990	A	080100	Military		Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080200	Railways		Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080200	Railways		Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Continued													
1990	A	080300	Inland waterways	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080300	Inland waterways	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080402	National sea traffic	Diesel	1,171	0,234	0,937	1,171	1,170	1,639	2,340	4,684	11,710
1990	A	080402	National sea traffic	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	Residual oil	12,225	0,733	4,890	12,225	0,490	733,496	4,890	9,780	22,005
1990	A	080403	Fishing	Diesel	1,171	0,234	0,937	1,171	1,170	1,639	2,340	4,684	11,710
1990	A	080403	Fishing	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080403	Fishing	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080404	International sea traffic	Diesel	1,171	0,234	0,937	1,171	1,170	1,639	2,340	4,684	11,710
1990	A	080404	International sea traffic	Residual oil	12,225	0,733	4,890	12,225	0,490	733,496	4,890	9,780	22,005
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080600	Agriculture	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080600	Agriculture	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080700	Forestry	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080700	Forestry	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080800	Industry	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080800	Industry	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080800	Industry	LPG	0,000	0,131	0,118	0,457	0,000	0,131	0,392	0,000	26,126
1990	A	080900	Household and gardening	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	081100	Commercial and institutional	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

1990 emission factors for Dioxins/, Flouranthene, Benzo(b), Benzo(k), Benzo(a), Benzo(g,h,i) and indeno(1,2,3-c,d).

Year		SNAP ID	Category		Fuel type	Dioxins/	Flouranthene	Benzo(b)	Benzo(k)	Benzo(a)	Benzo(g,h,i)	indeno(1,2,3-c,d)
						microg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ
1990	A	070101	Passenger cars	Highway	Diesel	0,001	12,250	0,748	0,678	0,818	1,589	0,771
1990	A	070101	Passenger cars	Highway	Gasoline	0,013	8,507	0,553	0,425	0,468	1,106	0,425
1990	A	070101	Passenger cars	Highway	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070102	Passenger cars	Rural	Diesel	0,001	14,889	0,909	0,824	0,994	1,932	0,937
1990	A	070102	Passenger cars	Rural	Gasoline	0,015	9,540	0,620	0,477	0,525	1,240	0,477
1990	A	070102	Passenger cars	Rural	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070103	Passenger cars	Urban	Diesel	0,001	9,303	0,568	0,515	0,621	1,207	0,586
1990	A	070103	Passenger cars	Urban	Gasoline	0,010	6,427	0,418	0,321	0,354	0,835	0,321
1990	A	070103	Passenger cars	Urban	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070201	Light duty vehicles	Highway	Diesel	0,000	8,505	0,519	0,470	0,568	1,104	0,536
1990	A	070201	Light duty vehicles	Highway	Gasoline	0,013	8,086	0,526	0,404	0,445	1,051	0,404
1990	A	070201	Light duty vehicles	Highway	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070202	Light duty vehicles	Rural	Diesel	0,001	9,306	0,568	0,515	0,622	1,207	0,586
1990	A	070202	Light duty vehicles	Rural	Gasoline	0,012	7,625	0,495	0,381	0,419	0,991	0,381
1990	A	070202	Light duty vehicles	Rural	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070203	Light duty vehicles	Urban	Diesel	0,000	6,954	0,425	0,385	0,464	0,902	0,438
1990	A	070203	Light duty vehicles	Urban	Gasoline	0,007	4,558	0,296	0,228	0,251	0,592	0,228
1990	A	070203	Light duty vehicles	Urban	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070301	Heavy duty vehicles	Highway	Diesel	0,001	2,086	0,526	0,780	0,097	0,078	0,136
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070302	Heavy duty vehicles	Rural	Diesel	0,001	2,208	0,557	0,825	0,103	0,082	0,144
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070303	Heavy duty vehicles	Urban	Diesel	0,001	1,788	0,451	0,668	0,083	0,067	0,117
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070400	Mopeds	Urban	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070501	Motorcycles	Highway	Gasoline	0,020	12,673	0,824	0,634	0,697	1,647	0,634
1990	A	070502	Motorcycles	Rural	Gasoline	0,024	15,176	0,986	0,759	0,834	1,973	0,759
1990	A	070503	Motorcycles	Urban	Gasoline	0,024	15,300	0,994	0,765	0,841	1,989	0,765
1990	A	080100	Military		AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	080100	Military		Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290
1990	A	080100	Military		Gasoline	0,006	5,257	0,277	0,116	0,142	0,825	0,300
1990	A	080100	Military		Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080200	Railways		Diesel	0,001	1,366	0,348	0,389	0,057	0,049	0,089
1990	A	080200	Railways		Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Continued											
1990	A	080300	Inland waterways	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290
1990	A	080300	Inland waterways	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	080402	National sea traffic	Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180
1990	A	080402	National sea traffic	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	Residual oil	0,013	5,190	0,270	0,050	0,020	0,070	0,030
1990	A	080403	Fishing	Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180
1990	A	080403	Fishing	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080403	Fishing	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080404	International sea traffic	Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180
1990	A	080404	International sea traffic	Residual oil	0,013	4,120	0,200	0,090	0,070	0,260	0,200
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080600	Agriculture	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290
1990	A	080600	Agriculture	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	080700	Forestry	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290
1990	A	080700	Forestry	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	080800	Industry	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290
1990	A	080800	Industry	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	080800	Industry	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080900	Household and gardening	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	A	081100	Commercial and institutional	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000

1990 emission factors for SO_2, NO_x; NMVOC, CH_4, CO, CO_2, N_2O, NH_3; TSP; PM_{10} and $PM_{2.5}$.

Year		SNAP ID	Category		Fuel type	SO_2	NO_x	NMVOC	CH_4	CO	CO_2	N_2O	NH_3	TSP	PM_{10}	$PM_{2.5}$
						g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ
1990	A	070101	Passenger cars	Highway	Diesel	93,68	279,53	25,07	3,74	179,70	74,00	0,00	0,47	79,48	79,48	79,48
1990	A	070101	Passenger cars	Highway	Gasoline	2,28	1315,35	381,72	10,89	3817,22	73,00	2,72	0,84	12,84	12,84	12,84
1990	A	070101	Passenger cars	Highway	LPG	0,00	1151,70	187,09	10,06	3914,25	63,10	0,00	0,00	10,06	10,06	10,06
1990	A	070102	Passenger cars	Rural	Diesel	93,68	280,57	42,09	6,82	268,08	74,00	0,00	0,57	75,13	75,13	75,13
1990	A	070102	Passenger cars	Rural	Gasoline	2,28	1148,38	500,38	13,79	4273,20	73,00	3,08	0,95	14,97	14,97	14,97
1990	A	070102	Passenger cars	Rural	LPG	0,00	1248,46	305,18	16,91	1146,38	63,10	0,00	0,00	14,49	14,49	14,49
1990	A	070103	Passenger cars	Urban	Diesel	93,68	220,85	103,04	6,82	344,97	74,00	0,00	0,32	144,24	144,24	144,24
1990	A	070103	Passenger cars	Urban	Gasoline	2,28	558,41	1095,32	56,50	12514,03	73,00	2,71	0,54	12,37	12,37	12,37
1990	A	070103	Passenger cars	Urban	LPG	0,00	528,01	473,05	20,80	1587,66	63,10	0,00	0,00	10,40	10,40	10,40
1990	A	070201	Light duty vehicles	Highway	Diesel	93,68	270,67	30,19	2,60	344,14	74,00	0,00	0,32	104,48	104,48	104,48
1990	A	070201	Light duty vehicles	Highway	Gasoline	2,28	1369,26	170,29	10,11	2987,40	73,00	2,63	0,81	16,17	16,17	16,17
1990	A	070201	Light duty vehicles	Highway	LPG	0,00	1151,70	187,09	10,06	3914,25	63,10	0,00	0,00	10,06	10,06	10,06
1990	A	070202	Light duty vehicles	Rural	Diesel	93,68	299,25	33,22	4,26	358,42	74,00	0,00	0,36	107,73	107,73	107,73
1990	A	070202	Light duty vehicles	Rural	Gasoline	2,28	1188,86	262,59	15,25	2316,18	73,00	2,48	0,76	15,25	15,25	15,25
1990	A	070202	Light duty vehicles	Rural	LPG	0,00	1248,46	305,18	16,91	1146,38	63,10	0,00	0,00	14,49	14,49	14,49
1990	A	070203	Light duty vehicles	Urban	Diesel	93,68	469,24	74,81	4,58	463,37	74,00	0,00	0,23	165,76	165,76	165,76
1990	A	070203	Light duty vehicles	Urban	Gasoline	2,28	547,55	874,08	39,84	9527,46	73,00	1,84	0,37	7,37	7,37	7,37
1990	A	070203	Light duty vehicles	Urban	LPG	0,00	487,91	487,73	19,58	1705,63	63,10	0,00	0,00	9,79	9,79	9,79
1990	A	070301	Heavy duty vehicles	Highway	Diesel	93,68	978,47	41,71	6,44	200,02	74,00	3,08	0,31	35,10	35,10	35,10
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	2,28	1037,78	474,61	9,69	7610,35	73,00	0,83	0,28	55,35	55,35	55,35
1990	A	070302	Heavy duty vehicles	Rural	Diesel	93,68	984,85	57,74	6,78	211,25	74,00	2,92	0,29	35,73	35,73	35,73
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	2,28	1141,55	820,40	16,74	8371,39	73,00	0,91	0,30	60,88	60,88	60,88
1990	A	070303	Heavy duty vehicles	Urban	Diesel	93,68	966,99	86,86	12,42	269,91	74,00	2,30	0,23	42,21	42,21	42,21
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	2,28	456,62	696,09	14,21	7102,99	73,00	0,61	0,20	40,59	40,59	40,59
1990	A	070400	Mopeds	Urban	Gasoline	2,28	51,14	7471,23	200,00	13424,66	73,00	0,91	0,91	160,73	160,73	160,73
1990	A	070501	Motorcycles	Highway	Gasoline	2,28	264,11	1072,19	129,96	16302,60	73,00	1,35	1,35	31,73	31,73	31,73
1990	A	070502	Motorcycles	Rural	Gasoline	2,28	185,41	981,69	159,32	15782,07	73,00	1,66	1,66	38,90	38,90	38,90
1990	A	070503	Motorcycles	Urban	Gasoline	2,28	112,92	1149,21	155,11	15187,59	73,00	1,61	1,61	37,87	37,87	37,87
1990	A	080100	Military		AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	A	080100	Military		Diesel	93,68	719,72	55,39	6,74	268,73	74,00	1,73	0,32	66,49	66,49	66,49
1990	A	080100	Military		Gasoline	2,28	992,06	1114,62	27,57	6767,54	73,00	2,85	0,79	14,31	14,31	14,31
1990	A	080100	Military		Jet fuel	22,99	250,57	24,94	2,65	229,89	72,00	2,30	0,00	1,16	1,16	1,16
1990	A	080200	Railways		Diesel	93,68	1225,13	79,94	3,07	223,21	74,00	2,04	0,20	50,26	50,26	50,26
1990	A	080200	Railways		Kerosene	5,00	50,00	3,00	7,00	20,00	72,00	2,00	0,00	121,95	115,85	110,06

Continued

1990	A	080300	Inland waterways	Diesel	93,68	983,64	171,79	2,79	453,65	74,00	2,96	0,17	106,93	106,93	106,93
1990	A	080300	Inland waterways	Gasoline	2,28	291,33	3606,55	50,38	13853,27	73,00	0,78	0,08	182,44	182,44	182,44
1990	A	080402	National sea traffic	Diesel	93,68	1104,18	50,57	1,56	166,83	74,00	4,68	0,00	23,21	22,98	22,87
1990	A	080402	National sea traffic	Kerosene	2,30	50,00	3,00	7,00	20,00	72,00	0,00	0,00	5,00	5,00	5,00
1990	A	080402	National sea traffic	LPG	0,00	1249,00	384,94	20,26	443,00	63,10	0,00	0,00	0,20	0,20	0,20
1990	A	080402	National sea traffic	Residual oil	1290,95	1615,26	53,44	1,65	176,29	78,00	4,89	0,00	149,25	147,75	147,01
1990	A	080403	Fishing	Diesel	93,68	1052,12	49,13	1,52	162,08	74,00	4,68	0,00	23,21	22,98	22,87
1990	A	080403	Fishing	Kerosene	2,30	50,00	3,00	7,00	20,00	72,00	0,00	0,00	5,00	5,00	5,00
1990	A	080403	Fishing	LPG	0,00	1249,00	384,94	20,26	443,00	63,10	0,00	0,00	0,20	0,20	0,20
1990	A	080404	International sea traffic	Diesel	93,68	1208,60	49,46	1,53	163,17	74,00	4,68	0,00	23,21	22,98	22,87
1990	A	080404	International sea traffic	Residual oil	1447,43	1689,57	53,98	1,67	178,09	78,00	4,89	0,00	189,43	187,53	186,59
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22,99	314,51	14,86	1,65	90,41	72,00	5,70	0,00	1,16	1,16	1,16
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	22,99	309,25	16,40	1,82	168,98	72,00	7,10	0,00	1,16	1,16	1,16
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22,99	330,11	13,67	0,00	90,75	72,00	2,30	0,00	1,16	1,16	1,16
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	22,99	244,20	7,17	0,00	54,10	72,00	2,30	0,00	1,16	1,16	1,16
1990	A	080600	Agriculture	Diesel	93,68	758,87	156,85	2,55	635,53	74,00	2,93	0,17	144,45	144,45	144,45
1990	A	080600	Agriculture	Gasoline	2,28	31,60	949,55	88,42	47524,17	73,00	1,28	0,09	6,56	6,56	6,56
1990	A	080700	Forestry	Diesel	93,68	857,48	156,47	2,54	645,65	74,00	2,97	0,17	149,05	149,05	149,05
1990	A	080700	Forestry	Gasoline	2,28	40,39	7206,91	60,42	18057,40	73,00	0,37	0,07	101,22	101,22	101,22
1990	A	080800	Industry	Diesel	93,68	933,58	178,23	2,90	655,80	74,00	2,94	0,17	154,50	154,50	154,50
1990	A	080800	Industry	Gasoline	2,28	136,27	1610,77	120,61	14797,46	73,00	1,33	0,09	12,40	12,40	12,40
1990	A	080800	Industry	LPG	0,00	1328,11	146,09	7,69	104,85	63,10	3,50	0,21	4,89	4,89	4,89
1990	A	080900	Household and gardening	Gasoline	2,28	63,98	3366,01	95,22	32901,19	73,00	1,15	0,08	20,75	20,75	20,75
1990	A	081100	Commercial and institutional	Gasoline	2,28	68,83	2280,66	97,87	29887,31	73,00	1,09	0,08	24,00	24,00	24,00
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22,99	283,87	20,64	2,29	129,70	72,00	4,58	0,00	1,16	1,16	1,16
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	22,99	324,87	34,10	3,79	157,15	72,00	3,79	0,00	1,16	1,16	1,16
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22,99	314,86	13,03	0,00	84,05	72,00	2,30	0,00	1,16	1,16	1,16
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	22,99	290,20	11,15	0,00	37,65	72,00	2,30	0,00	1,16	1,16	1,16

1990 emission factors for Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Selenium and Zinc.

Year		SNAP ID	Category		Fuel type	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Selenium	Zinc
						mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ
1990	A	070101	Passenger cars	Highway	Diesel	0,002	0,292	0,926	0,657	0,124	0,296	1,757	0,002	58,606
1990	A	070101	Passenger cars	Highway	Gasoline	0,007	0,273	0,386	1,043	0,199	0,321	1472,004	0,005	54,458
1990	A	070101	Passenger cars	Highway	LPG	0,000	0,300	0,270	1,052	0,000	0,300	0,901	0,000	60,097
1990	A	070102	Passenger cars	Rural	Diesel	0,002	0,355	1,083	0,770	0,124	0,358	2,133	0,002	71,144
1990	A	070102	Passenger cars	Rural	Gasoline	0,007	0,308	0,417	1,165	0,199	0,356	1472,109	0,005	61,472
1990	A	070102	Passenger cars	Rural	LPG	0,000	0,361	0,325	1,262	0,000	0,361	1,082	0,000	72,116
1990	A	070103	Passenger cars	Urban	Diesel	0,002	0,198	0,691	0,488	0,124	0,201	1,192	0,002	39,770
1990	A	070103	Passenger cars	Urban	Gasoline	0,007	0,178	0,300	0,711	0,199	0,226	1471,720	0,005	35,492
1990	A	070103	Passenger cars	Urban	LPG	0,000	0,194	0,175	0,679	0,000	0,194	0,582	0,000	38,818
1990	A	070201	Light duty vehicles	Highway	Diesel	0,002	0,193	0,678	0,478	0,124	0,196	1,161	0,002	38,731
1990	A	070201	Light duty vehicles	Highway	Gasoline	0,007	0,253	0,367	0,972	0,199	0,301	1471,943	0,005	50,405
1990	A	070201	Light duty vehicles	Highway	LPG	0,000	0,198	0,178	0,693	0,000	0,198	0,594	0,000	39,594
1990	A	070202	Light duty vehicles	Rural	Diesel	0,002	0,211	0,723	0,511	0,124	0,214	1,269	0,002	42,337
1990	A	070202	Light duty vehicles	Rural	Gasoline	0,007	0,239	0,355	0,922	0,199	0,287	1471,901	0,005	47,576
1990	A	070202	Light duty vehicles	Rural	LPG	0,000	0,238	0,214	0,831	0,000	0,238	0,713	0,000	47,513
1990	A	070203	Light duty vehicles	Urban	Diesel	0,002	0,135	0,533	0,374	0,124	0,138	0,813	0,002	27,133
1990	A	070203	Light duty vehicles	Urban	Gasoline	0,007	0,118	0,246	0,499	0,199	0,166	1471,538	0,005	23,388
1990	A	070203	Light duty vehicles	Urban	LPG	0,000	0,120	0,108	0,421	0,000	0,120	0,361	0,000	24,068
1990	A	070301	Heavy duty vehicles	Highway	Diesel	0,002	0,150	0,570	0,401	0,124	0,153	0,903	0,002	30,130
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	0,007	0,207	0,326	0,813	0,199	0,255	1471,807	0,005	41,332
1990	A	070302	Heavy duty vehicles	Rural	Diesel	0,002	0,143	0,555	0,390	0,124	0,147	0,866	0,002	28,884
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	0,007	0,220	0,338	0,857	0,199	0,268	1471,845	0,005	43,830
1990	A	070303	Heavy duty vehicles	Urban	Diesel	0,002	0,115	0,483	0,338	0,124	0,118	0,693	0,002	23,142
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	0,007	0,143	0,268	0,586	0,199	0,190	1471,613	0,005	28,351
1990	A	070400	Mopeds	Urban	Gasoline	0,007	0,005	0,144	0,103	0,199	0,053	1471,199	0,005	0,753
1990	A	070501	Motorcycles	Highway	Gasoline	0,007	0,134	0,260	0,556	0,199	0,182	1471,587	0,005	26,666
1990	A	070502	Motorcycles	Rural	Gasoline	0,007	0,163	0,287	0,659	0,199	0,211	1471,675	0,005	32,520
1990	A	070503	Motorcycles	Urban	Gasoline	0,007	0,159	0,283	0,644	0,199	0,207	1471,663	0,005	31,681
1990	A	080100	Military		AvGas	0,007	0,253	0,367	0,972	0,198	0,301	12785,388	0,005	50,452
1990	A	080100	Military		Diesel	0,002	0,172	0,625	0,440	0,124	0,175	1,035	0,002	34,517
1990	A	080100	Military		Gasoline	0,007	0,256	0,371	0,984	0,199	0,304	1471,954	0,005	51,135
1990	A	080100	Military		Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080200	Railways		Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080200	Railways		Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Continued													
1990	A	080300	Inland waterways	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080300	Inland waterways	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080402	National sea traffic	Diesel	1,171	0,234	0,937	1,171	1,170	1,639	2,340	4,684	11,710
1990	A	080402	National sea traffic	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	Residual oil	12,225	0,733	4,890	12,225	0,490	733,496	4,890	9,780	22,005
1990	A	080403	Fishing	Diesel	1,171	0,234	0,937	1,171	1,170	1,639	2,340	4,684	11,710
1990	A	080403	Fishing	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080403	Fishing	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080404	International sea traffic	Diesel	1,171	0,234	0,937	1,171	1,170	1,639	2,340	4,684	11,710
1990	A	080404	International sea traffic	Residual oil	12,225	0,733	4,890	12,225	0,490	733,496	4,890	9,780	22,005
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080600	Agriculture	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080600	Agriculture	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080700	Forestry	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080700	Forestry	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080800	Industry	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
1990	A	080800	Industry	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	080800	Industry	LPG	0,000	0,131	0,118	0,457	0,000	0,131	0,392	0,000	26,126
1990	A	080900	Household and gardening	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	A	081100	Commercial and institutional	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

1990 emission factors for Dioxins/, Flouranthene, Benzo(b), Benzo(k), Benzo(a), Benzo(g,h,i), indeno(1,2,3-c,d), HCB and PCB.

Year		SNAP ID	Category		Fuel type	Dioxins/ microg pr GJ	Flouranthene mg pr GJ	Benzo(b) mg pr GJ	Benzo(k) mg pr GJ	Benzo(a) mg pr GJ	Benzo(g,h,i) mg pr GJ	indeno(1,2,3-c,d) mg pr GJ	HCB ng pr GJ	PCB ng pr GJ
1990	A	070101	Passenger cars	Highway	Diesel	0,001	12,250	0,748	0,678	0,818	1,589	0,771	6,150	21,300
1990	A	070101	Passenger cars	Highway	Gasoline	0,013	8,507	0,553	0,425	0,468	1,106	0,425	0,159	1029,731
1990	A	070101	Passenger cars	Highway	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070102	Passenger cars	Rural	Diesel	0,001	14,889	0,909	0,824	0,994	1,932	0,937	6,150	21,300
1990	A	070102	Passenger cars	Rural	Gasoline	0,015	9,540	0,620	0,477	0,525	1,240	0,477	0,159	1029,731
1990	A	070102	Passenger cars	Rural	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070103	Passenger cars	Urban	Diesel	0,001	9,303	0,568	0,515	0,621	1,207	0,586	6,150	21,300
1990	A	070103	Passenger cars	Urban	Gasoline	0,010	6,427	0,418	0,321	0,354	0,835	0,321	0,159	1029,731
1990	A	070103	Passenger cars	Urban	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070201	Light duty vehicles	Highway	Diesel	0,000	8,505	0,519	0,470	0,568	1,104	0,536	6,150	21,300
1990	A	070201	Light duty vehicles	Highway	Gasoline	0,013	8,086	0,526	0,404	0,445	1,051	0,404	0,159	1029,731
1990	A	070201	Light duty vehicles	Highway	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070202	Light duty vehicles	Rural	Diesel	0,001	9,306	0,568	0,515	0,622	1,207	0,586	6,150	21,300
1990	A	070202	Light duty vehicles	Rural	Gasoline	0,012	7,625	0,495	0,381	0,419	0,991	0,381	0,159	1029,731
1990	A	070202	Light duty vehicles	Rural	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070203	Light duty vehicles	Urban	Diesel	0,000	6,954	0,425	0,385	0,464	0,902	0,438	6,150	21,300
1990	A	070203	Light duty vehicles	Urban	Gasoline	0,007	4,558	0,296	0,228	0,251	0,592	0,228	0,159	1029,731
1990	A	070203	Light duty vehicles	Urban	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	070301	Heavy duty vehicles	Highway	Diesel	0,001	2,086	0,526	0,780	0,097	0,078	0,136	6,150	526,000
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,159	1029,731
1990	A	070302	Heavy duty vehicles	Rural	Diesel	0,001	2,208	0,557	0,825	0,103	0,082	0,144	6,150	526,000
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,159	1029,731
1990	A	070303	Heavy duty vehicles	Urban	Diesel	0,001	1,788	0,451	0,668	0,083	0,067	0,117	6,150	526,000
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,159	1029,731
1990	A	070400	Mopeds	Urban	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,159	1029,731
1990	A	070501	Motorcycles	Highway	Gasoline	0,020	12,673	0,824	0,634	0,697	1,647	0,634	0,159	1029,731
1990	A	070502	Motorcycles	Rural	Gasoline	0,024	15,176	0,986	0,759	0,834	1,973	0,759	0,159	1029,731
1990	A	070503	Motorcycles	Urban	Gasoline	0,024	15,300	0,994	0,765	0,841	1,989	0,765	0,159	1029,731
1990	A	080100	Military		AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
1990	A	080100	Military		Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290	6,150	330,743
1990	A	080100	Military		Gasoline	0,006	5,257	0,277	0,116	0,142	0,825	0,300	0,159	1029,731
1990	A	080100	Military		Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080200	Railways		Diesel	0,001	1,366	0,348	0,389	0,057	0,049	0,089	6,150	526,000
1990	A	080200	Railways		Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Continued

1990	A	080300	Inland waterways	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290	6,150	526,000
1990	A	080300	Inland waterways	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,159	1029,731
1990	A	080402	National sea traffic	Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180	1,950	8,760
1990	A	080402	National sea traffic	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080402	National sea traffic	Residual oil	0,013	5,190	0,270	0,050	0,020	0,070	0,030	3,500	14,000
1990	A	080403	Fishing	Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180	1,950	8,760
1990	A	080403	Fishing	Kerosene	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080403	Fishing	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080404	International sea traffic	Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180	1,950	8,760
1990	A	080404	International sea traffic	Residual oil	0,013	4,120	0,200	0,090	0,070	0,260	0,200	3,500	14,000
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080600	Agriculture	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290	6,150	526,000
1990	A	080600	Agriculture	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,159	1029,731
1990	A	080700	Forestry	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290	6,150	526,000
1990	A	080700	Forestry	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,159	1029,731
1990	A	080800	Industry	Diesel	0,001	4,391	0,571	0,568	0,290	0,550	0,290	6,150	526,000
1990	A	080800	Industry	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,159	1029,731
1990	A	080800	Industry	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	A	080900	Household and gardening	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,159	1029,731
1990	A	081100	Commercial and institutional	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,159	1029,731
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

2012 emission factors for SO_2, NO_x; NMVOC, CH_4, CO, CO_2, N_2O, NH_3; TSP; PM_{10} and $PM_{2.5}$.

Year		SNAP ID	Category		Fuel type	SO_2	NO_x	NMVOC	CH_4	CO	CO_2	N_2O	NH_3	TSP	PM_{10}	$PM_{2.5}$
						g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	kg pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ	g pr GJ
2012	A	070101	Passenger cars	Highway	Bio ethanol	0,00	133,00	31,74	3,63	695,05	0,00	0,74	32,49	1,02	1,02	1,02
2012	A	070101	Passenger cars	Highway	Biodiesel	0,00	345,09	4,01	0,11	12,92	0,00	2,07	0,51	12,10	12,10	12,10
2012	A	070101	Passenger cars	Highway	Diesel	0,47	345,09	4,01	0,11	12,92	74,00	2,07	0,51	12,10	12,10	12,10
2012	A	070101	Passenger cars	Highway	Gasoline	0,46	133,00	31,74	3,63	695,05	73,00	0,74	32,49	1,02	1,02	1,02
2012	A	070101	Passenger cars	Highway	LPG	0,00	245,42	39,01	4,09	1401,42	63,10	0,78	0,00	10,05	10,05	10,05
2012	A	070102	Passenger cars	Rural	Bio ethanol	0,00	110,36	36,67	3,50	555,44	0,00	1,37	33,65	0,97	0,97	0,97
2012	A	070102	Passenger cars	Rural	Biodiesel	0,00	288,67	5,25	0,21	24,66	0,00	2,22	0,54	10,09	10,09	10,09
2012	A	070102	Passenger cars	Rural	Diesel	0,47	288,67	5,25	0,21	24,66	74,00	2,22	0,54	10,09	10,09	10,09
2012	A	070102	Passenger cars	Rural	Gasoline	0,46	110,36	36,67	3,50	555,44	73,00	1,37	33,65	0,97	0,97	0,97
2012	A	070102	Passenger cars	Rural	LPG	0,00	267,71	59,24	6,87	542,88	63,10	1,57	0,00	14,45	14,45	14,45
2012	A	070103	Passenger cars	Urban	Bio ethanol	0,00	138,64	295,15	11,54	3243,70	0,00	2,06	7,68	0,88	0,88	0,88
2012	A	070103	Passenger cars	Urban	Biodiesel	0,00	290,68	16,07	0,52	71,75	0,00	5,49	0,37	18,31	18,31	18,31
2012	A	070103	Passenger cars	Urban	Diesel	0,47	290,68	16,07	0,52	71,75	74,00	5,49	0,37	18,31	18,31	18,31
2012	A	070103	Passenger cars	Urban	Gasoline	0,46	138,64	295,15	11,54	3243,70	73,00	2,06	7,68	0,88	0,88	0,88
2012	A	070103	Passenger cars	Urban	LPG	0,00	134,04	138,14	9,48	937,64	63,10	3,74	0,00	11,64	11,64	11,64
2012	A	070201	Light duty vehicles	Highway	Bio ethanol	0,00	164,40	19,61	2,76	555,42	0,00	1,88	22,93	1,37	1,37	1,37
2012	A	070201	Light duty vehicles	Highway	Biodiesel	0,00	283,25	18,22	0,18	122,71	0,00	1,51	0,37	18,27	18,27	18,27
2012	A	070201	Light duty vehicles	Highway	Diesel	0,47	283,25	18,22	0,18	122,71	74,00	1,51	0,37	18,27	18,27	18,27
2012	A	070201	Light duty vehicles	Highway	Gasoline	0,46	164,40	19,61	2,76	555,42	73,00	1,88	22,93	1,37	1,37	1,37
2012	A	070201	Light duty vehicles	Highway	LPG	0,00	136,68	20,73	2,25	1046,75	63,10	0,41	0,00	10,04	10,04	10,04
2012	A	070202	Light duty vehicles	Rural	Bio ethanol	0,00	143,84	28,80	3,00	420,31	0,00	3,01	22,65	1,22	1,22	1,22
2012	A	070202	Light duty vehicles	Rural	Biodiesel	0,00	295,92	20,62	0,41	105,18	0,00	1,65	0,40	14,95	14,95	14,95
2012	A	070202	Light duty vehicles	Rural	Diesel	0,47	295,92	20,62	0,41	105,18	74,00	1,65	0,40	14,95	14,95	14,95
2012	A	070202	Light duty vehicles	Rural	Gasoline	0,46	143,84	28,80	3,00	420,31	73,00	3,01	22,65	1,22	1,22	1,22
2012	A	070202	Light duty vehicles	Rural	LPG	0,00	149,37	31,44	3,78	435,27	63,10	0,93	0,00	14,45	14,45	14,45
2012	A	070203	Light duty vehicles	Urban	Bio ethanol	0,00	130,10	200,38	8,08	3760,68	0,00	4,56	4,44	0,74	0,74	0,74
2012	A	070203	Light duty vehicles	Urban	Biodiesel	0,00	275,24	42,60	0,81	141,68	0,00	3,51	0,26	25,22	25,22	25,22
2012	A	070203	Light duty vehicles	Urban	Diesel	0,47	275,24	42,60	0,81	141,68	74,00	3,51	0,26	25,22	25,22	25,22
2012	A	070203	Light duty vehicles	Urban	Gasoline	0,46	130,10	200,38	8,08	3760,68	73,00	4,56	4,44	0,74	0,74	0,74
2012	A	070203	Light duty vehicles	Urban	LPG	0,00	78,75	73,39	5,36	563,91	63,10	1,97	0,00	11,94	11,94	11,94
2012	A	070301	Heavy duty vehicles	Highway	Bio ethanol	0,00	1037,78	474,61	9,69	7610,35	0,00	0,83	0,28	55,35	55,35	55,35
2012	A	070301	Heavy duty vehicles	Highway	Biodiesel	0,00	392,17	7,43	2,04	136,80	0,00	3,13	0,31	6,18	6,18	6,18
2012	A	070301	Heavy duty vehicles	Highway	Diesel	0,47	392,17	7,43	2,04	136,80	74,00	3,13	0,31	6,18	6,18	6,18
2012	A	070301	Heavy duty vehicles	Highway	Gasoline	0,46	1037,78	474,61	9,69	7610,35	73,00	0,83	0,28	55,35	55,35	55,35

Continued

2012	A	070302	Heavy duty vehicles	Rural	Bio ethanol	0,00	1141,55	820,40	16,74	8371,39	0,00	0,91	0,30	60,88	60,88	60,88
2012	A	070302	Heavy duty vehicles	Rural	Biodiesel	0,00	454,93	10,02	2,34	134,81	0,00	2,95	0,29	6,64	6,64	6,64
2012	A	070302	Heavy duty vehicles	Rural	Diesel	0,47	454,93	10,02	2,34	134,81	74,00	2,95	0,29	6,64	6,64	6,64
2012	A	070302	Heavy duty vehicles	Rural	Gasoline	0,46	1141,55	820,40	16,74	8371,39	73,00	0,91	0,30	60,88	60,88	60,88
2012	A	070303	Heavy duty vehicles	Urban	Bio ethanol	0,00	456,62	696,09	14,21	7102,99	0,00	0,61	0,20	40,59	40,59	40,59
2012	A	070303	Heavy duty vehicles	Urban	Biodiesel	0,00	570,34	14,75	3,73	149,48	0,00	2,50	0,25	8,10	8,10	8,10
2012	A	070303	Heavy duty vehicles	Urban	Diesel	0,47	570,34	14,75	3,73	149,48	74,00	2,50	0,25	8,10	8,10	8,10
2012	A	070303	Heavy duty vehicles	Urban	Gasoline	0,46	456,62	696,09	14,21	7102,99	73,00	0,61	0,20	40,59	40,59	40,59
2012	A	070400	Mopeds	Urban	Bio ethanol	0,00	145,74	4413,69	91,50	7300,73	0,00	1,06	1,06	76,35	76,35	76,35
2012	A	070400	Mopeds	Urban	Gasoline	0,46	145,74	4413,69	91,50	7300,73	73,00	1,06	1,06	76,35	76,35	76,35
2012	A	070501	Motorcycles	Highway	Bio ethanol	0,00	270,47	651,06	90,62	10392,91	0,00	1,27	1,27	15,72	15,72	15,72
2012	A	070501	Motorcycles	Highway	Gasoline	0,46	270,47	651,06	90,62	10392,91	73,00	1,27	1,27	15,72	15,72	15,72
2012	A	070502	Motorcycles	Rural	Bio ethanol	0,00	192,46	650,59	109,49	9619,73	0,00	1,55	1,55	19,14	19,14	19,14
2012	A	070502	Motorcycles	Rural	Gasoline	0,46	192,46	650,59	109,49	9619,73	73,00	1,55	1,55	19,14	19,14	19,14
2012	A	070503	Motorcycles	Urban	Bio ethanol	0,00	118,83	802,17	115,50	9267,95	0,00	1,51	1,51	18,65	18,65	18,65
2012	A	070503	Motorcycles	Urban	Gasoline	0,46	118,83	802,17	115,50	9267,95	73,00	1,51	1,51	18,65	18,65	18,65
2012	A	080100	Military		AvGas	22,99	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
2012	A	080100	Military		Diesel	0,44	356,14	12,51	1,14	92,27	74,00	2,81	0,38	11,76	11,76	11,76
2012	A	080100	Military		Gasoline	0,44	127,06	160,98	7,39	1522,54	73,00	1,46	24,95	1,51	1,51	1,51
2012	A	080100	Military		Jet fuel	22,99	250,57	24,94	2,65	229,89	72,00	2,30	0,00	1,16	1,16	1,16
2012	A	080200	Railways		Diesel	0,47	751,17	56,43	2,17	125,99	74,00	2,04	0,20	24,24	24,24	24,24
2012	A	080200	Railways		Gasoline											
2012	A	080200	Railways		Kerosene											
2012	A	080300	Inland waterways		Diesel	46,84	817,03	156,52	2,55	439,34	74,00	2,97	0,17	95,54	95,54	95,54
2012	A	080300	Inland waterways		Gasoline	0,46	567,23	877,36	64,41	11258,30	73,00	1,55	0,10	17,43	17,43	17,43
2012	A	080402	National sea traffic		Diesel	46,84	1081,18	50,38	1,66	111,43	74,00	4,68	0,00	21,55	21,33	21,22
2012	A	080402	National sea traffic		Kerosene											
2012	A	080402	National sea traffic		LPG	0,00	1249,00	384,94	20,26	443,00	63,10	0,00	0,00	0,20	0,20	0,20
2012	A	080402	National sea traffic		Residual oil	489,00	1925,97	63,12	1,95	208,23	78,00	4,89	0,00	43,98	43,54	43,32
2012	A	080403	Fishing		Diesel	46,84	1340,90	57,72	1,79	190,43	74,00	4,68	0,00	21,55	21,33	21,22
2012	A	080403	Fishing		Gasoline											
2012	A	080403	Fishing		Kerosene											
2012	A	080403	Fishing		LPG	0,00	1249,00	384,94	20,26	443,00	63,10	0,00	0,00	0,20	0,20	0,20
2012	A	080404	International sea traffic		Diesel	46,84	1585,62	57,71	1,78	190,37	74,00	4,68	0,00	21,55	21,33	21,22
2012	A	080404	International sea traffic		Residual oil	489,00	2119,92	63,46	1,96	209,36	78,00	4,89	0,00	43,98	43,54	43,32
2012	A	080501	Air traffic, Dom. < 3000 ft.		AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00

Continued															
2012	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22,99	309,39	16,41	1,82	147,19	72,00	9,24	0,00	1,16	1,16	1,16
2012	A	080502	Air traffic, Int. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
2012	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	22,99	298,57	38,17	4,24	184,54	72,00	7,24	0,00	1,16	1,16	1,16
2012	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22,99	278,02	6,83	0,00	95,20	72,00	2,30	0,00	1,16	1,16	1,16
2012	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	22,99	238,74	6,01	0,00	48,19	72,00	2,30	0,00	1,16	1,16	1,16
2012	A	080600	Agriculture	Diesel	0,47	530,77	48,98	0,80	308,69	74,00	3,19	0,18	39,27	39,27	39,27
2012	A	080600	Agriculture	Gasoline	0,46	110,77	1184,09	159,58	21731,05	73,00	1,71	1,51	31,03	31,03	31,03
2012	A	080700	Forestry	Diesel	0,47	347,95	25,87	0,42	226,21	74,00	3,21	0,18	23,40	23,40	23,40
2012	A	080700	Forestry	Gasoline	0,46	54,79	3964,24	30,97	17915,98	73,00	0,46	0,09	82,19	82,19	82,19
2012	A	080800	Industry	Diesel	0,47	489,22	54,19	0,88	306,75	74,00	3,10	0,18	47,52	47,52	47,52
2012	A	080800	Industry	Gasoline	0,46	212,00	1528,15	108,83	14105,02	73,00	1,49	0,10	20,45	20,45	20,45
2012	A	080800	Industry	LPG	0,00	1328,11	146,09	7,69	104,85	63,10	3,50	0,21	4,89	4,89	4,89
2012	A	080900	Household and gardening	Gasoline	0,46	107,75	2283,84	75,45	30678,27	73,00	1,26	0,09	17,21	17,21	17,21
2012	A	081100	Commercial and institutional	Gasoline	0,46	93,28	1548,54	64,42	30913,57	73,00	1,13	0,09	28,53	28,53	28,53
2012	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
2012	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	22,99	302,09	18,59	2,07	191,64	72,00	5,66	0,00	1,16	1,16	1,16
2012	P	080502	Air traffic, Int. < 3000 ft.	AvGas	22,83	859,00	1242,60	21,90	6972,00	73,00	2,00	1,60	10,00	10,00	10,00
2012	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	22,99	339,36	33,80	3,76	237,36	72,00	3,87	0,00	1,16	1,16	1,16
2012	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	22,99	299,41	9,63	0,00	50,21	72,00	2,30	0,00	1,16	1,16	1,16
2012	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	22,99	309,94	8,90	0,00	31,29	72,00	2,30	0,00	1,16	1,16	1,16

2012 emission factors for Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Selenium and Zinc.

Year		SNAP ID	Category		Fuel type	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Selenium	Zinc
						mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ	mg pr GJ
2012	A	070101	Passenger cars	Highway	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070101	Passenger cars	Highway	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070101	Passenger cars	Highway	Diesel	0,002	0,312	0,977	0,694	0,124	0,316	1,880	0,002	62,685
2012	A	070101	Passenger cars	Highway	Gasoline	0,007	0,332	0,438	1,248	0,199	0,380	1,009	0,005	66,216
2012	A	070101	Passenger cars	Highway	LPG	0,000	0,294	0,265	1,030	0,000	0,294	0,883	0,000	58,875
2012	A	070102	Passenger cars	Rural	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070102	Passenger cars	Rural	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070102	Passenger cars	Rural	Diesel	0,002	0,335	1,035	0,735	0,124	0,339	2,017	0,002	67,260
2012	A	070102	Passenger cars	Rural	Gasoline	0,007	0,351	0,456	1,316	0,199	0,399	1,067	0,005	70,066
2012	A	070102	Passenger cars	Rural	LPG	0,000	0,353	0,318	1,235	0,000	0,353	1,059	0,000	70,585
2012	A	070103	Passenger cars	Urban	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070103	Passenger cars	Urban	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070103	Passenger cars	Urban	Diesel	0,002	0,227	0,763	0,540	0,124	0,230	1,366	0,002	45,556
2012	A	070103	Passenger cars	Urban	Gasoline	0,007	0,205	0,324	0,804	0,199	0,253	0,628	0,005	40,805
2012	A	070103	Passenger cars	Urban	LPG	0,000	0,213	0,192	0,746	0,000	0,213	0,639	0,000	42,625
2012	A	070201	Light duty vehicles	Highway	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070201	Light duty vehicles	Highway	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070201	Light duty vehicles	Highway	Diesel	0,002	0,239	0,793	0,561	0,124	0,242	1,438	0,002	47,956
2012	A	070201	Light duty vehicles	Highway	Gasoline	0,007	0,253	0,368	0,973	0,199	0,301	0,774	0,005	50,509
2012	A	070201	Light duty vehicles	Highway	LPG	0,000	0,172	0,154	0,601	0,000	0,172	0,515	0,000	34,315
2012	A	070202	Light duty vehicles	Rural	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070202	Light duty vehicles	Rural	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070202	Light duty vehicles	Rural	Diesel	0,002	0,261	0,849	0,602	0,124	0,265	1,572	0,002	52,429
2012	A	070202	Light duty vehicles	Rural	Gasoline	0,007	0,239	0,355	0,925	0,199	0,287	0,732	0,005	47,723
2012	A	070202	Light duty vehicles	Rural	LPG	0,000	0,206	0,185	0,720	0,000	0,206	0,617	0,000	41,136
2012	A	070203	Light duty vehicles	Urban	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070203	Light duty vehicles	Urban	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070203	Light duty vehicles	Urban	Diesel	0,002	0,168	0,617	0,434	0,124	0,172	1,014	0,002	33,839
2012	A	070203	Light duty vehicles	Urban	Gasoline	0,007	0,122	0,250	0,515	0,199	0,170	0,381	0,005	24,327
2012	A	070203	Light duty vehicles	Urban	LPG	0,000	0,127	0,115	0,446	0,000	0,127	0,382	0,000	25,489
2012	A	070301	Heavy duty vehicles	Highway	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070301	Heavy duty vehicles	Highway	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070301	Heavy duty vehicles	Highway	Diesel	0,002	0,159	0,593	0,417	0,124	0,162	0,958	0,002	31,954
2012	A	070301	Heavy duty vehicles	Highway	Gasoline	0,007	0,260	0,374	0,997	0,199	0,308	0,794	0,005	51,857

Continued															
2012	A	070302	Heavy duty vehicles	Rural	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070302	Heavy duty vehicles	Rural	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070302	Heavy duty vehicles	Rural	Diesel	0,002	0,152	0,577	0,406	0,124	0,156	0,920	0,002	30,681
2012	A	070302	Heavy duty vehicles	Rural	Gasoline	0,007	0,295	0,405	1,119	0,199	0,343	0,898	0,005	58,799
2012	A	070303	Heavy duty vehicles	Urban	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070303	Heavy duty vehicles	Urban	Biodiesel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070303	Heavy duty vehicles	Urban	Diesel	0,002	0,132	0,527	0,369	0,124	0,136	0,798	0,002	26,630
2012	A	070303	Heavy duty vehicles	Urban	Gasoline	0,007	0,206	0,325	0,806	0,199	0,253	0,630	0,005	40,950
2012	A	070400	Mopeds	Urban	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070400	Mopeds	Urban	Gasoline	0,007	0,005	0,144	0,103	0,199	0,053	0,027	0,005	0,753
2012	A	070501	Motorcycles	Highway	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070501	Motorcycles	Highway	Gasoline	0,007	0,134	0,260	0,555	0,199	0,182	0,415	0,005	26,609
2012	A	070502	Motorcycles	Rural	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070502	Motorcycles	Rural	Gasoline	0,007	0,162	0,286	0,654	0,199	0,210	0,500	0,005	32,240
2012	A	070503	Motorcycles	Urban	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070503	Motorcycles	Urban	Gasoline	0,007	0,158	0,282	0,640	0,199	0,206	0,488	0,005	31,445
2012	A	080100	Military		AvGas	0,007	0,253	0,367	0,972	0,198	0,301	12785,390	0,005	50,452
2012	A	080100	Military		Diesel	0,002	0,214	0,718	0,508	0,116	0,217	1,287	0,002	42,931
2012	A	080100	Military		Gasoline	0,007	0,286	0,393	1,086	0,192	0,333	0,872	0,004	57,120
2012	A	080100	Military		Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080200	Railways		Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
2012	A	080200	Railways		Gasoline									
2012	A	080200	Railways		Kerosene									
2012	A	080300	Inland waterways		Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
2012	A	080300	Inland waterways		Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
2012	A	080402	National sea traffic		Diesel	1,170	0,230	0,940	1,170	1,170	1,640	2,340	4,680	11,710
2012	A	080402	National sea traffic		Kerosene									
2012	A	080402	National sea traffic		LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080402	National sea traffic		Residual oil	12,220	0,730	4,890	12,220	0,490	733,500	4,890	9,780	22,000
2012	A	080403	Fishing		Diesel	1,170	0,230	0,940	1,170	1,170	1,640	2,340	4,680	11,710
2012	A	080403	Fishing		Gasoline									
2012	A	080403	Fishing		Kerosene									
2012	A	080403	Fishing		LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080404	International sea traffic		Diesel	1,170	0,230	0,940	1,170	1,170	1,640	2,340	4,680	11,710
2012	A	080404	International sea traffic		Residual oil	12,220	0,730	4,890	12,220	0,490	733,500	4,890	9,780	22,000
2012	A	080501	Air traffic, Dom. < 3000 ft.		AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452

Continued													
2012	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
2012	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080600	Agriculture	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
2012	A	080600	Agriculture	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
2012	A	080700	Forestry	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
2012	A	080700	Forestry	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
2012	A	080800	Industry	Diesel	0,002	0,186	0,660	0,465	0,124	0,189	1,118	0,002	37,295
2012	A	080800	Industry	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
2012	A	080800	Industry	LPG	0,000	0,131	0,118	0,457	0,000	0,131	0,392	0,000	26,126
2012	A	080900	Household and gardening	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
2012	A	081100	Commercial and institutional	Gasoline	0,007	0,253	0,367	0,972	0,198	0,301	0,773	0,005	50,452
2012	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
2012	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,007	0,253	0,367	0,972	0,198	0,301	13505,692	0,005	50,452
2012	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

2012 emission factors for Dioxins/, Flouranthene, Benzo(b), Benzo(k), Benzo(a), Benzo(g,h,i), indeno(1,2,3-c,d), HCB and PCB.

Year		SNAP ID	Category		Fuel type	Dioxins/ microg pr GJ	Flouranthene mg pr GJ	Benzo(b) mg pr GJ	Benzo(k) mg pr GJ	Benzo(a) mg pr GJ	Benzo(g,h,i) mg pr GJ	indeno(1,2,3-c,d) mg pr GJ	HCB ng pr GJ	PCB ng pr GJ
2012	A	070101	Passenger cars	Highway	Bio ethanol	0,000	1,137	0,208	0,252	0,206	0,417	0,299	0,010	0,457
2012	A	070101	Passenger cars	Highway	Biodiesel	0,000	12,815	0,782	0,709	0,856	1,663	0,807	6,150	21,300
2012	A	070101	Passenger cars	Highway	Diesel	0,000	12,815	0,782	0,709	0,856	1,663	0,807	6,150	21,300
2012	A	070101	Passenger cars	Highway	Gasoline	0,000	1,137	0,208	0,252	0,206	0,417	0,299	0,010	0,457
2012	A	070101	Passenger cars	Highway	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070102	Passenger cars	Rural	Bio ethanol	0,000	1,251	0,232	0,280	0,229	0,464	0,334	0,010	0,457
2012	A	070102	Passenger cars	Rural	Biodiesel	0,001	14,593	0,891	0,807	0,975	1,894	0,919	6,150	21,300
2012	A	070102	Passenger cars	Rural	Diesel	0,001	14,593	0,891	0,807	0,975	1,894	0,919	6,150	21,300
2012	A	070102	Passenger cars	Rural	Gasoline	0,000	1,251	0,232	0,280	0,229	0,464	0,334	0,010	0,457
2012	A	070102	Passenger cars	Rural	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070103	Passenger cars	Urban	Bio ethanol	0,000	0,720	0,129	0,155	0,127	0,257	0,184	0,010	0,457
2012	A	070103	Passenger cars	Urban	Biodiesel	0,001	9,684	0,591	0,536	0,647	1,257	0,610	6,150	21,300
2012	A	070103	Passenger cars	Urban	Diesel	0,001	9,684	0,591	0,536	0,647	1,257	0,610	6,150	21,300
2012	A	070103	Passenger cars	Urban	Gasoline	0,000	0,720	0,129	0,155	0,127	0,257	0,184	0,010	0,457
2012	A	070103	Passenger cars	Urban	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070201	Light duty vehicles	Highway	Bio ethanol	0,001	1,029	0,159	0,184	0,154	0,317	0,217	0,010	0,457
2012	A	070201	Light duty vehicles	Highway	Biodiesel	0,001	9,234	0,564	0,511	0,617	1,198	0,581	6,150	21,300
2012	A	070201	Light duty vehicles	Highway	Diesel	0,001	9,234	0,564	0,511	0,617	1,198	0,581	6,150	21,300
2012	A	070201	Light duty vehicles	Highway	Gasoline	0,001	1,029	0,159	0,184	0,154	0,317	0,217	0,010	0,457
2012	A	070201	Light duty vehicles	Highway	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070202	Light duty vehicles	Rural	Bio ethanol	0,001	0,971	0,150	0,174	0,146	0,300	0,205	0,010	0,457
2012	A	070202	Light duty vehicles	Rural	Biodiesel	0,001	10,103	0,617	0,559	0,675	1,311	0,636	6,150	21,300
2012	A	070202	Light duty vehicles	Rural	Diesel	0,001	10,103	0,617	0,559	0,675	1,311	0,636	6,150	21,300
2012	A	070202	Light duty vehicles	Rural	Gasoline	0,001	0,971	0,150	0,174	0,146	0,300	0,205	0,010	0,457
2012	A	070202	Light duty vehicles	Rural	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070203	Light duty vehicles	Urban	Bio ethanol	0,000	0,561	0,087	0,101	0,084	0,173	0,118	0,010	0,457
2012	A	070203	Light duty vehicles	Urban	Biodiesel	0,000	7,261	0,443	0,402	0,485	0,942	0,457	6,150	21,300
2012	A	070203	Light duty vehicles	Urban	Diesel	0,000	7,261	0,443	0,402	0,485	0,942	0,457	6,150	21,300
2012	A	070203	Light duty vehicles	Urban	Gasoline	0,000	0,561	0,087	0,101	0,084	0,173	0,118	0,010	0,457
2012	A	070203	Light duty vehicles	Urban	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	070301	Heavy duty vehicles	Highway	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457
2012	A	070301	Heavy duty vehicles	Highway	Biodiesel	0,001	2,030	0,512	0,759	0,095	0,076	0,133	6,150	526,000
2012	A	070301	Heavy duty vehicles	Highway	Diesel	0,001	2,030	0,512	0,759	0,095	0,076	0,133	6,150	526,000
2012	A	070301	Heavy duty vehicles	Highway	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457

Continued														
2012	A	070302	Heavy duty vehicles	Rural	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457
2012	A	070302	Heavy duty vehicles	Rural	Biodiesel	0,001	2,066	0,521	0,772	0,096	0,077	0,135	6,150	526,000
2012	A	070302	Heavy duty vehicles	Rural	Diesel	0,001	2,066	0,521	0,772	0,096	0,077	0,135	6,150	526,000
2012	A	070302	Heavy duty vehicles	Rural	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457
2012	A	070303	Heavy duty vehicles	Urban	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457
2012	A	070303	Heavy duty vehicles	Urban	Biodiesel	0,001	1,676	0,423	0,626	0,078	0,063	0,110	6,150	526,000
2012	A	070303	Heavy duty vehicles	Urban	Diesel	0,001	1,676	0,423	0,626	0,078	0,063	0,110	6,150	526,000
2012	A	070303	Heavy duty vehicles	Urban	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457
2012	A	070400	Mopeds	Urban	Bio ethanol	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457
2012	A	070400	Mopeds	Urban	Gasoline	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,457
2012	A	070501	Motorcycles	Highway	Bio ethanol	0,020	12,799	0,832	0,640	0,704	1,664	0,640	0,010	0,457
2012	A	070501	Motorcycles	Highway	Gasoline	0,020	12,799	0,832	0,640	0,704	1,664	0,640	0,010	0,457
2012	A	070502	Motorcycles	Rural	Bio ethanol	0,024	15,331	0,996	0,766	0,843	1,993	0,766	0,010	0,457
2012	A	070502	Motorcycles	Rural	Gasoline	0,024	15,331	0,996	0,766	0,843	1,993	0,766	0,010	0,457
2012	A	070503	Motorcycles	Urban	Bio ethanol	0,024	15,500	1,007	0,775	0,852	2,015	0,775	0,010	0,457
2012	A	070503	Motorcycles	Urban	Gasoline	0,024	15,500	1,007	0,775	0,852	2,015	0,775	0,010	0,457
2012	A	080100	Military		AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
2012	A	080100	Military		Diesel	0,001	4,350	0,510	0,496	0,256	0,464	0,264	6,150	214,151
2012	A	080100	Military		Gasoline	0,007	2,152	0,180	0,115	0,118	0,358	0,179	0,010	0,457
2012	A	080100	Military		Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080200	Railways		Diesel	0,001	1,411	0,360	0,402	0,059	0,051	0,092	6,150	526,000
2012	A	080200	Railways		Gasoline									
2012	A	080200	Railways		Kerosene									
2012	A	080300	Inland waterways		Diesel	0,001	4,350	0,510	0,496	0,256	0,464	0,264	6,150	526,000
2012	A	080300	Inland waterways		Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,010	0,457
2012	A	080402	National sea traffic		Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180	1,950	8,760
2012	A	080402	National sea traffic		Kerosene									
2012	A	080402	National sea traffic		LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080402	National sea traffic		Residual oil	0,013	5,190	0,270	0,050	0,020	0,070	0,030	3,500	14,000
2012	A	080403	Fishing		Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180	1,950	8,760
2012	A	080403	Fishing		Gasoline									
2012	A	080403	Fishing		Kerosene									
2012	A	080403	Fishing		LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080404	International sea traffic		Diesel	0,012	7,420	0,640	0,300	0,150	1,430	1,180	1,950	8,760
2012	A	080404	International sea traffic		Residual oil	0,013	4,120	0,200	0,090	0,070	0,260	0,200	3,500	14,000
2012	A	080501	Air traffic, Dom. < 3000 ft.		AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000

Continued

2012	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
2012	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080600	Agriculture	Diesel	0,001	4,350	0,510	0,496	0,256	0,464	0,264	6,150	526,000
2012	A	080600	Agriculture	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,010	0,457
2012	A	080700	Forestry	Diesel	0,001	4,350	0,510	0,496	0,256	0,464	0,264	6,150	526,000
2012	A	080700	Forestry	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,010	0,457
2012	A	080800	Industry	Diesel	0,001	4,350	0,510	0,496	0,256	0,464	0,264	6,150	526,000
2012	A	080800	Industry	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,010	0,457
2012	A	080800	Industry	LPG	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	A	080900	Household and gardening	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,010	0,457
2012	A	081100	Commercial and institutional	Gasoline	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,010	0,457
2012	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
2012	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,005	4,329	0,209	0,071	0,114	0,689	0,245	0,000	0,000
2012	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
2012	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

1990 emissions for SO_2, NO_x; NMVOC, CH_4, CO, CO_2, N_2O, NH_3; TSP; PM_{10} and $PM_{2.5}$.

Year		SNAP ID	Category		Fuel type	Fuel	SO_2	NO_x	NMVOC	CH_4	CO	CO_2	N_2O	NH_3	TSP	PM_{10}	$PM_{2.5}$
						PJ	tonnes	tonnes	tonnes	tonnes	tonnes	ktonnes	tonnes	ton-nes	tonnes	tonnes	tonnes
1990	A	070101	Passenger cars	Highway	Diesel	1,84	172,33	514,23	46,12	6,88	330,57	136,13	0,00	0,86	146,22	146,22	146,22
1990	A	070101	Passenger cars	Highway	Gasoline	13,64	31,14	17941,01	5206,57	148,53	52065,85	995,70	37,14	11,43	175,16	175,16	175,16
1990	A	070101	Passenger cars	Highway	LPG	0,02	0,00	20,08	3,26	0,18	68,23	1,10	0,00	0,00	0,18	0,18	0,18
1990	A	070102	Passenger cars	Rural	Diesel	3,74	350,29	1049,16	157,40	25,50	1002,43	276,71	0,00	2,13	280,94	280,94	280,94
1990	A	070102	Passenger cars	Rural	Gasoline	29,81	68,05	34230,22	14915,05	411,15	127372,70	2175,93	91,75	28,23	446,30	446,30	446,30
1990	A	070102	Passenger cars	Rural	LPG	0,04	0,00	44,81	10,95	0,61	41,15	2,26	0,00	0,00	0,52	0,52	0,52
1990	A	070103	Passenger cars	Urban	Diesel	2,57	240,85	567,80	264,93	17,55	886,92	190,26	0,00	0,81	370,85	370,85	370,85
1990	A	070103	Passenger cars	Urban	Gasoline	19,93	45,50	11129,18	21829,78	1126,14	249404,91	1454,89	54,00	10,80	246,59	246,59	246,59
1990	A	070103	Passenger cars	Urban	LPG	0,03	0,00	13,47	12,07	0,53	40,50	1,61	0,00	0,00	0,27	0,27	0,27
1990	A	070201	Light duty vehicles	Highway	Diesel	3,35	314,00	907,29	101,20	8,71	1153,53	248,05	0,00	1,09	350,21	350,21	350,21
1990	A	070201	Light duty vehicles	Highway	Gasoline	0,40	0,90	542,61	67,48	4,01	1183,85	28,93	1,04	0,32	6,41	6,41	6,41
1990	A	070201	Light duty vehicles	Highway	LPG	0,01	0,00	16,85	2,74	0,15	57,28	0,92	0,00	0,00	0,15	0,15	0,15
1990	A	070202	Light duty vehicles	Rural	Diesel	7,98	747,28	2387,17	265,03	34,00	2859,22	590,31	0,00	2,83	859,40	859,40	859,40
1990	A	070202	Light duty vehicles	Rural	Gasoline	1,09	2,50	1300,90	287,33	16,69	2534,47	79,88	2,71	0,83	16,69	16,69	16,69
1990	A	070202	Light duty vehicles	Rural	LPG	0,03	0,00	39,65	9,69	0,54	36,40	2,00	0,00	0,00	0,46	0,46	0,46
1990	A	070203	Light duty vehicles	Urban	Diesel	3,71	347,82	1742,28	277,76	16,99	1720,50	274,76	0,00	0,84	615,45	615,45	615,45
1990	A	070203	Light duty vehicles	Urban	Gasoline	0,67	1,53	367,62	586,86	26,75	6396,69	49,01	1,24	0,25	4,95	4,95	4,95
1990	A	070203	Light duty vehicles	Urban	LPG	0,02	0,00	9,07	9,07	0,36	31,71	1,17	0,00	0,00	0,18	0,18	0,18
1990	A	070301	Heavy duty vehicles	Highway	Diesel	10,37	971,35	10145,87	432,52	66,80	2074,02	767,32	31,95	3,20	363,93	363,93	363,93
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	0,03	0,08	35,45	16,21	0,33	259,98	2,49	0,03	0,01	1,89	1,89	1,89
1990	A	070302	Heavy duty vehicles	Rural	Diesel	17,72	1659,89	17450,79	1023,06	120,07	3743,13	1311,23	51,77	5,18	633,09	633,09	633,09
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	0,09	0,21	103,04	74,05	1,51	755,60	6,59	0,08	0,03	5,50	5,50	5,50
1990	A	070303	Heavy duty vehicles	Urban	Diesel	8,67	811,84	8380,30	752,74	107,60	2339,19	641,31	19,90	1,99	365,78	365,78	365,78
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	0,08	0,17	34,44	52,51	1,07	535,81	5,51	0,05	0,02	3,06	3,06	3,06
1990	A	070400	Mopeds	Urban	Gasoline	0,18	0,40	9,01	1316,72	35,25	2365,94	12,87	0,16	0,16	28,33	28,33	28,33
1990	A	070501	Motorcycles	Highway	Gasoline	0,06	0,13	14,85	60,27	7,31	916,37	4,10	0,08	0,08	1,78	1,78	1,78
1990	A	070502	Motorcycles	Rural	Gasoline	0,13	0,31	24,98	132,28	21,47	2126,59	9,84	0,22	0,22	5,24	5,24	5,24
1990	A	070503	Motorcycles	Urban	Gasoline	0,17	0,39	19,53	198,77	26,83	2626,92	12,63	0,28	0,28	6,55	6,55	6,55
1990	A	080100	Military		AvGas	0,00	0,11	4,22	6,11	0,11	34,26	0,36	0,01	0,01	0,05	0,05	0,05
1990	A	080100	Military		Diesel	0,15	13,69	105,20	8,10	0,99	39,28	10,82	0,25	0,05	9,72	9,72	9,72
1990	A	080100	Military		Gasoline	0,00	0,00	0,98	1,10	0,03	6,67	0,07	0,00	0,00	0,01	0,01	0,01
1990	A	080100	Military		Jet fuel	1,50	34,41	375,06	37,33	3,96	344,09	107,77	3,44		1,74	1,74	1,74
1990	A	080200	Railways		Diesel	4,01	375,64	4912,78	320,54	12,32	895,07	296,74	8,18	0,82	201,55	201,55	201,55
1990	A	080200	Railways		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Continued

1990	A	080300	Inland waterways	Diesel	0,34	32,10	337,02	58,86	0,96	155,43	25,35	1,01	0,06	36,64	36,64	36,64
1990	A	080300	Inland waterways	Gasoline	0,31	0,71	90,06	1114,91	15,58	4282,54	22,57	0,24	0,02	56,40	56,40	56,40
1990	A	080402	National sea traffic	Diesel	5,29	495,12	5836,01	267,28	8,27	881,74	391,12	24,76		122,69	121,47	120,85
1990	A	080402	National sea traffic	Residual oil	4,57	5901,32	7383,82	244,28	7,56	805,87	356,56	22,35		682,25	675,43	672,02
1990	A	080403	Fishing	Diesel	7,92	741,91	8332,71	389,10	12,03	1283,63	586,07	37,10		183,85	182,01	181,09
1990	A	080403	Fishing	Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080403	Fishing	Residual oil	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00		0,00	0,00	0,00
1990	A	080404	International sea traffic	Diesel	11,29	1057,56	13644,52	558,38	17,27	1842,07	835,42	52,88		262,07	259,45	258,14
1990	A	080404	International sea traffic	Residual oil	27,81	40259,78	46994,61	1501,54	46,44	4953,54	2169,54	136,01		5268,82	5216,14	5189,79
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,10	2,40	90,15	130,41	2,30	731,69	7,66	0,21	0,17	1,05	1,05	1,05
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,42	9,71	132,78	6,27	0,70	38,17	30,40	2,40		0,49	0,49	0,49
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,03	0,70	26,34	38,10	0,67	213,76	2,24	0,06	0,05	0,31	0,31	0,31
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,13	3,04	40,93	2,17	0,24	22,36	9,53	0,94		0,15	0,15	0,15
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	1,03	23,59	338,70	14,02	0,00	93,11	73,87	2,36		1,19	1,19	1,19
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	1,61	37,06	393,62	11,56	0,00	87,20	116,06	3,71		1,87	1,87	1,87
1990	A	080600	Agriculture	Diesel	16,50	1545,32	12518,46	2587,36	42,07	10483,86	1220,72	48,34	2,76	2382,90	2382,90	2382,90
1990	A	080600	Agriculture	Gasoline	0,71	1,62	22,40	673,10	62,68	33688,19	51,75	0,91	0,06	4,65	4,65	4,65
1990	A	080700	Forestry	Diesel	0,15	13,62	124,63	22,74	0,37	93,84	10,76	0,43	0,02	21,66	21,66	21,66
1990	A	080700	Forestry	Gasoline	0,34	0,78	13,79	2460,65	20,63	6165,33	24,92	0,13	0,03	34,56	34,56	34,56
1990	A	080800	Industry	Diesel	10,16	951,61	9483,66	1810,53	29,44	6661,90	751,72	29,87	1,71	1569,49	1569,49	1569,49
1990	A	080800	Industry	Gasoline	0,18	0,40	23,88	282,25	21,13	2592,92	12,79	0,23	0,02	2,17	2,17	2,17
1990	A	080800	Industry	LPG	1,18	0,00	1573,62	173,10	9,11	124,23	74,76	4,14	0,25	5,80	5,80	5,80
1990	A	080900	Household and gardening	Gasoline	0,54	1,22	34,24	1801,26	50,96	17606,46	39,06	0,62	0,04	11,10	11,10	11,10
1990	A	081100	Commercial and institutional	Gasoline	1,01	2,31	69,51	2303,07	98,83	30181,04	73,72	1,10	0,08	24,24	24,24	24,24
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,01	0,20	7,42	10,74	0,19	60,25	0,63	0,02	0,01	0,09	0,09	0,09
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,50	11,54	142,54	10,36	1,15	65,13	36,16	2,30		0,58	0,58	0,58
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,01	0,13	4,82	6,97	0,12	39,13	0,41	0,01	0,01	0,06	0,06	0,06
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	2,00	46,00	650,12	68,24	7,58	314,49	144,09	7,58		2,32	2,32	2,32
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	1,31	30,00	410,96	17,01	0,00	109,71	93,97	3,00		1,51	1,51	1,51
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	20,33	467,36	5899,81	226,68	0,00	765,45	1463,78	46,74		23,58	23,58	23,58

1990 emissions for Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Selenium and Zinc.

Year		SNAP ID	Category		Fuel type	Fuel	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Selenium	Zinc
						PJ	kg	kg	kg	kg	kg	kg	kg	kg	kg
1990	A	070101	Passenger cars	Highway	Diesel	1,84	0,00	0,54	1,70	1,21	0,23	0,54	3,23	0,00	107,81
1990	A	070101	Passenger cars	Highway	Gasoline	13,64	0,09	3,72	5,26	14,22	2,71	4,38	20077,75	0,06	742,80
1990	A	070101	Passenger cars	Highway	LPG	0,02	0,00	0,01	0,00	0,02	0,00	0,01	0,02	0,00	1,05
1990	A	070102	Passenger cars	Rural	Diesel	3,74	0,01	1,33	4,05	2,88	0,46	1,34	7,98	0,01	266,03
1990	A	070102	Passenger cars	Rural	Gasoline	29,81	0,20	9,19	12,43	34,73	5,92	10,61	43879,62	0,14	1832,30
1990	A	070102	Passenger cars	Rural	LPG	0,04	0,00	0,01	0,01	0,05	0,00	0,01	0,04	0,00	2,59
1990	A	070103	Passenger cars	Urban	Diesel	2,57	0,01	0,51	1,78	1,25	0,32	0,52	3,07	0,01	102,25
1990	A	070103	Passenger cars	Urban	Gasoline	19,93	0,14	3,55	5,98	14,16	3,96	4,51	29331,40	0,09	707,35
1990	A	070103	Passenger cars	Urban	LPG	0,03	0,00	0,00	0,00	0,02	0,00	0,00	0,01	0,00	0,99
1990	A	070201	Light duty vehicles	Highway	Diesel	3,35	0,01	0,65	2,27	1,60	0,42	0,66	3,89	0,01	129,82
1990	A	070201	Light duty vehicles	Highway	Gasoline	0,40	0,00	0,10	0,15	0,39	0,08	0,12	583,30	0,00	19,97
1990	A	070201	Light duty vehicles	Highway	LPG	0,01	0,00	0,00	0,00	0,01	0,00	0,00	0,01	0,00	0,58
1990	A	070202	Light duty vehicles	Rural	Diesel	7,98	0,02	1,68	5,77	4,07	0,99	1,71	10,12	0,02	337,73
1990	A	070202	Light duty vehicles	Rural	Gasoline	1,09	0,01	0,26	0,39	1,01	0,22	0,31	1610,62	0,00	52,06
1990	A	070202	Light duty vehicles	Rural	LPG	0,03	0,00	0,01	0,01	0,03	0,00	0,01	0,02	0,00	1,51
1990	A	070203	Light duty vehicles	Urban	Diesel	3,71	0,01	0,50	1,98	1,39	0,46	0,51	3,02	0,01	100,74
1990	A	070203	Light duty vehicles	Urban	Gasoline	0,67	0,00	0,08	0,16	0,33	0,13	0,11	987,98	0,00	15,70
1990	A	070203	Light duty vehicles	Urban	LPG	0,02	0,00	0,00	0,00	0,01	0,00	0,00	0,01	0,00	0,45
1990	A	070301	Heavy duty vehicles	Highway	Diesel	10,37	0,02	1,55	5,91	4,16	1,29	1,59	9,36	0,02	312,42
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	0,03	0,00	0,01	0,01	0,03	0,01	0,01	50,28	0,00	1,41
1990	A	070302	Heavy duty vehicles	Rural	Diesel	17,72	0,04	2,54	9,83	6,90	2,20	2,60	15,34	0,04	511,81
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	0,09	0,00	0,02	0,03	0,08	0,02	0,02	132,85	0,00	3,96
1990	A	070303	Heavy duty vehicles	Urban	Diesel	8,67	0,02	0,99	4,19	2,93	1,08	1,03	6,01	0,02	200,56
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	0,08	0,00	0,01	0,02	0,04	0,01	0,01	111,01	0,00	2,14
1990	A	070400	Mopeds	Urban	Gasoline	0,18	0,00	0,00	0,03	0,02	0,04	0,01	259,28	0,00	0,13
1990	A	070501	Motorcycles	Highway	Gasoline	0,06	0,00	0,01	0,01	0,03	0,01	0,01	82,72	0,00	1,50
1990	A	070502	Motorcycles	Rural	Gasoline	0,13	0,00	0,02	0,04	0,09	0,03	0,03	198,30	0,00	4,38
1990	A	070503	Motorcycles	Urban	Gasoline	0,17	0,00	0,03	0,05	0,11	0,03	0,04	254,55	0,00	5,48
1990	A	080100	Military		AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	62,82	0,00	0,25
1990	A	080100	Military		Diesel	0,15	0,00	0,03	0,09	0,06	0,02	0,03	0,15	0,00	5,05
1990	A	080100	Military		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,45	0,00	0,05
1990	A	080100	Military		Jet fuel	1,50		0,00	0,00	0,00		0,00		0,00	0,00
1990	A	080200	Railways		Diesel	4,01	0,01	0,74	2,65	1,87	0,50	0,76	4,48	0,01	149,55
1990	A	080200	Railways		Gasoline	0,00		0,00	0,00	0,00		0,00	0,00	0,00	0,00

Continued

1990	A	080300	Inland waterways	Diesel	0,34	0,00	0,06	0,23	0,16	0,04	0,06	0,38	0,00	12,78
1990	A	080300	Inland waterways	Gasoline	0,31	0,00	0,08	0,11	0,30	0,06	0,09	0,24	0,00	15,60
1990	A	080402	National sea traffic	Diesel	5,29	6,19	1,24	4,95	6,19	6,18	8,66	12,37	24,76	61,89
1990	A	080402	National sea traffic	Residual oil	4,57	55,88	3,35	22,35	55,88	2,24	3353,02	22,35	44,71	100,59
1990	A	080403	Fishing	Diesel	7,92	9,27	1,85	7,42	9,27	9,27	12,98	18,53	37,10	92,74
1990	A	080403	Fishing	Gasoline	0,00		0,00	0,00	0,00		0,00	0,00	0,00	0,00
1990	A	080403	Fishing	Residual oil	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080404	International sea traffic	Diesel	11,29	13,22	2,64	10,58	13,22	13,21	18,51	26,42	52,88	132,20
1990	A	080404	International sea traffic	Residual oil	27,81	340,03	20,40	136,01	340,03	13,63	20401,92	136,01	272,03	612,06
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,10	0,00	0,03	0,04	0,10	0,02	0,03	1417,38	0,00	5,29
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,42		0,00	0,00	0,00		0,00		0,00	0,00
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,03	0,00	0,01	0,01	0,03	0,01	0,01	414,08	0,00	1,55
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,13		0,00	0,00	0,00		0,00		0,00	0,00
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	1,03		0,00	0,00	0,00		0,00		0,00	0,00
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	1,61		0,00	0,00	0,00		0,00		0,00	0,00
1990	A	080600	Agriculture	Diesel	16,50	0,04	3,06	10,88	7,67	2,04	3,12	18,44	0,04	615,23
1990	A	080600	Agriculture	Gasoline	0,71	0,00	0,18	0,26	0,69	0,14	0,21	0,55	0,00	35,76
1990	A	080700	Forestry	Diesel	0,15	0,00	0,03	0,10	0,07	0,02	0,03	0,16	0,00	5,42
1990	A	080700	Forestry	Gasoline	0,34	0,00	0,09	0,13	0,33	0,07	0,10	0,26	0,00	17,23
1990	A	080800	Industry	Diesel	10,16	0,02	1,88	6,70	4,73	1,26	1,92	11,36	0,02	378,86
1990	A	080800	Industry	Gasoline	0,18	0,00	0,04	0,06	0,17	0,03	0,05	0,14	0,00	8,84
1990	A	080800	Industry	LPG	1,18	0,00	0,15	0,14	0,54	0,00	0,15	0,46	0,00	30,96
1990	A	080900	Household and gardening	Gasoline	0,54	0,00	0,14	0,20	0,52	0,11	0,16	0,41	0,00	27,00
1990	A	081100	Commercial and institutional	Gasoline	1,01	0,01	0,26	0,37	0,98	0,20	0,30	0,78	0,00	50,95
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,01	0,00	0,00	0,00	0,01	0,00	0,00	116,72	0,00	0,44
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,50		0,00	0,00	0,00		0,00		0,00	0,00
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,01	0,00	0,00	0,00	0,01	0,00	0,00	75,80	0,00	0,28
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	2,00		0,00	0,00	0,00		0,00		0,00	0,00
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	1,31		0,00	0,00	0,00		0,00		0,00	0,00
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	20,33		0,00	0,00	0,00		0,00		0,00	0,00

1990 emissions for Dioxins/, Flouranthene, Benzo(b), Benzo(k), Benzo(a), Benzo(g,h,i), indeno(1,2,3-c,d), HCB and PCB.

Year		SNAP ID	Category		Fuel type	Fuel	Dioxins/	Flouranthene	Benzo(b)	Benzo(k)	Benzo(a)	Benzo(g,h,i)	indeno(1,2,3-c,d)	HCB	PCB
						PJ	g	kg	kg	kg	kg	kg	kg	g	g
1990	A	070101	Passenger cars	Highway	Diesel	1,84	0,00	22,53	1,38	1,25	1,50	2,92	1,42	0,01	0,04
1990	A	070101	Passenger cars	Highway	Gasoline	13,64	0,18	116,03	7,54	5,80	6,38	15,08	5,80	0,00	14,05
1990	A	070101	Passenger cars	Highway	LPG	0,02								0,00	0,00
1990	A	070102	Passenger cars	Rural	Diesel	3,74	0,00	55,68	3,40	3,08	3,72	7,22	3,51	0,02	0,08
1990	A	070102	Passenger cars	Rural	Gasoline	29,81	0,45	284,37	18,48	14,21	15,64	36,97	14,21	0,00	30,69
1990	A	070102	Passenger cars	Rural	LPG	0,04								0,00	0,00
1990	A	070103	Passenger cars	Urban	Diesel	2,57	0,00	23,92	1,46	1,32	1,60	3,10	1,51	0,02	0,05
1990	A	070103	Passenger cars	Urban	Gasoline	19,93	0,20	128,10	8,33	6,40	7,05	16,65	6,40	0,00	20,52
1990	A	070103	Passenger cars	Urban	LPG	0,03								0,00	0,00
1990	A	070201	Light duty vehicles	Highway	Diesel	3,35	0,00	28,51	1,74	1,58	1,90	3,70	1,80	0,02	0,07
1990	A	070201	Light duty vehicles	Highway	Gasoline	0,40	0,01	3,20	0,21	0,16	0,18	0,42	0,16	0,00	0,41
1990	A	070201	Light duty vehicles	Highway	LPG	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	070202	Light duty vehicles	Rural	Diesel	7,98	0,00	74,23	4,53	4,11	4,96	9,63	4,67	0,05	0,17
1990	A	070202	Light duty vehicles	Rural	Gasoline	1,09	0,01	8,34	0,54	0,42	0,46	1,08	0,42	0,00	1,13
1990	A	070202	Light duty vehicles	Rural	LPG	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	070203	Light duty vehicles	Urban	Diesel	3,71	0,00	25,82	1,58	1,43	1,72	3,35	1,63	0,02	0,08
1990	A	070203	Light duty vehicles	Urban	Gasoline	0,67	0,00	3,06	0,20	0,15	0,17	0,40	0,15	0,00	0,69
1990	A	070203	Light duty vehicles	Urban	LPG	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	070301	Heavy duty vehicles	Highway	Diesel	10,37	0,01	21,63	5,46	8,08	1,01	0,81	1,41	0,06	5,45
1990	A	070301	Heavy duty vehicles	Highway	Gasoline	0,03								0,00	0,04
1990	A	070302	Heavy duty vehicles	Rural	Diesel	17,72	0,02	39,12	9,87	14,62	1,83	1,46	2,56	0,11	9,32
1990	A	070302	Heavy duty vehicles	Rural	Gasoline	0,09								0,00	0,09
1990	A	070303	Heavy duty vehicles	Urban	Diesel	8,67	0,01	15,49	3,91	5,79	0,72	0,58	1,01	0,05	4,56
1990	A	070303	Heavy duty vehicles	Urban	Gasoline	0,08								0,00	0,08
1990	A	070400	Mopeds	Urban	Gasoline	0,18								0,00	0,18
1990	A	070501	Motorcycles	Highway	Gasoline	0,06	0,00	0,71	0,05	0,04	0,04	0,09	0,04	0,00	0,06
1990	A	070502	Motorcycles	Rural	Gasoline	0,13	0,00	2,04	0,13	0,10	0,11	0,27	0,10	0,00	0,14
1990	A	070503	Motorcycles	Urban	Gasoline	0,17	0,00	2,65	0,17	0,13	0,15	0,34	0,13	0,00	0,18
1990	A	080100	Military		AvGas	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080100	Military		Diesel	0,15	0,00	0,64	0,08	0,08	0,04	0,08	0,04	0,00	0,05
1990	A	080100	Military		Gasoline	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080100	Military		Jet fuel	1,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080200	Railways		Diesel	4,01	0,00	5,48	1,40	1,56	0,23	0,20	0,36	0,02	2,11
1990	A	080200	Railways		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Continued

1990	A	080300	Inland waterways	Diesel	0,34	0,00	1,50	0,20	0,19	0,10	0,19	0,10	0,00	0,18
1990	A	080300	Inland waterways	Gasoline	0,31	0,00	1,34	0,06	0,02	0,04	0,21	0,08	0,00	0,32
1990	A	080402	National sea traffic	Diesel	5,29	0,06	39,22	3,38	1,59	0,79	7,56	6,24	0,01	0,05
1990	A	080402	National sea traffic	Residual oil	4,57	0,06	23,72	1,23	0,23	0,09	0,32	0,14	0,02	0,06
1990	A	080403	Fishing	Diesel	7,92	0,10	58,77	5,07	2,38	1,19	11,33	9,35	0,02	0,07
1990	A	080403	Fishing	Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080403	Fishing	Residual oil	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080404	International sea traffic	Diesel	11,29	0,14	83,77	7,23	3,39	1,69	16,14	13,32	0,02	0,10
1990	A	080404	International sea traffic	Residual oil	27,81	0,37	114,60	5,56	2,50	1,95	7,23	5,56	0,10	0,39
1990	A	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,10	0,00	0,45	0,02	0,01	0,01	0,07	0,03	0,00	0,00
1990	A	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,42	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080502	Air traffic, Int. < 3000 ft.	AvGas	0,03	0,00	0,13	0,01	0,00	0,00	0,02	0,01	0,00	0,00
1990	A	080502	Air traffic, Int. < 3000 ft.	Jet fuel	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	1,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080504	Air traffic, Int. > 3000 ft.	Jet fuel	1,61	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1990	A	080600	Agriculture	Diesel	16,50	0,01	72,44	9,41	9,37	4,78	9,07	4,79	0,10	8,68
1990	A	080600	Agriculture	Gasoline	0,71	0,00	3,07	0,15	0,05	0,08	0,49	0,17	0,00	0,73
1990	A	080700	Forestry	Diesel	0,15	0,00	0,64	0,08	0,08	0,04	0,08	0,04	0,00	0,08
1990	A	080700	Forestry	Gasoline	0,34	0,00	1,48	0,07	0,02	0,04	0,24	0,08	0,00	0,35
1990	A	080800	Industry	Diesel	10,16	0,01	44,61	5,80	5,77	2,94	5,59	2,95	0,06	5,34
1990	A	080800	Industry	Gasoline	0,18	0,00	0,76	0,04	0,01	0,02	0,12	0,04	0,00	0,18
1990	A	080800	Industry	LPG	1,18								0,00	0,00
1990	A	080900	Household and gardening	Gasoline	0,54	0,00	2,32	0,11	0,04	0,06	0,37	0,13	0,00	0,55
1990	A	081100	Commercial and institutional	Gasoline	1,01	0,01	4,37	0,21	0,07	0,12	0,70	0,25	0,00	1,04
1990	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,01	0,00	0,04	0,00	0,00	0,00	0,01	0,00		
1990	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
1990	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,01	0,00	0,02	0,00	0,00	0,00	0,00	0,00		
1990	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	2,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
1990	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	1,31	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
1990	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	20,33	0,00	0,00	0,00	0,00	0,00	0,00	0,00		

2012 emissions for SO_2, NO_x; NMVOC, CH_4, CO, CO_2, N_2O, NH_3; TSP; PM_{10} and $PM_{2.5}$.

Year		SNAP ID	Category		Fuel type	Fuel	SO_2	NO_x	NMVOC	CH_4	CO	CO_2	N_2O	NH_3	TSP	PM_{10}	$PM_{2.5}$
						PJ	tonnes	tonnes	tonnes	tonnes	tonnes	ktonnes	ton-nes	tonnes	tonnes	tonnes	tonnes
2012	A	070101	Passenger cars	Highway	Bio ethanol	0,51	0,00	67,81	16,18	1,85	354,39	0,00	0,38	16,57	0,52	0,52	0,52
2012	A	070101	Passenger cars	Highway	Biodiesel	0,74	0,00	254,21	2,96	0,08	9,52	0,00	1,52	0,37	8,92	8,92	8,92
2012	A	070101	Passenger cars	Highway	Diesel	11,03	5,16	3804,87	44,23	1,16	142,42	815,90	22,79	5,59	133,46	133,46	133,46
2012	A	070101	Passenger cars	Highway	Gasoline	13,94	6,37	1854,54	442,61	50,59	9691,85	1017,93	10,27	453,08	14,24	14,24	14,24
2012	A	070101	Passenger cars	Highway	LPG	0,00	0,00	0,05	0,01	0,00	0,30	0,01	0,00	0,00	0,00	0,00	0,00
2012	A	070102	Passenger cars	Rural	Bio ethanol	0,83	0,00	92,05	30,58	2,92	463,27	0,00	1,14	28,06	0,81	0,81	0,81
2012	A	070102	Passenger cars	Rural	Biodiesel	1,19	0,00	343,09	6,24	0,25	29,31	0,00	2,64	0,65	11,99	11,99	11,99
2012	A	070102	Passenger cars	Rural	Diesel	17,79	8,33	5135,05	93,38	3,72	438,75	1316,38	39,47	9,68	179,51	179,51	179,51
2012	A	070102	Passenger cars	Rural	Gasoline	22,81	10,42	2517,30	836,39	79,89	12669,41	1665,10	31,28	767,44	22,21	22,21	22,21
2012	A	070102	Passenger cars	Rural	LPG	0,00	0,00	0,08	0,02	0,00	0,17	0,02	0,00	0,00	0,00	0,00	0,00
2012	A	070103	Passenger cars	Urban	Bio ethanol	0,57	0,00	79,02	168,23	6,58	1848,83	0,00	1,18	4,38	0,50	0,50	0,50
2012	A	070103	Passenger cars	Urban	Biodiesel	0,70	0,00	202,02	11,17	0,36	49,87	0,00	3,82	0,26	12,73	12,73	12,73
2012	A	070103	Passenger cars	Urban	Diesel	10,40	4,87	3023,73	167,13	5,36	746,34	769,77	57,15	3,82	190,51	190,51	190,51
2012	A	070103	Passenger cars	Urban	Gasoline	15,59	7,12	2161,08	4600,64	179,84	50561,05	1137,88	32,16	119,78	13,77	13,77	13,77
2012	A	070103	Passenger cars	Urban	LPG	0,00	0,00	0,03	0,03	0,00	0,19	0,01	0,00	0,00	0,00	0,00	0,00
2012	A	070201	Light duty vehicles	Highway	Bio ethanol	0,01	0,00	2,01	0,24	0,03	6,81	0,00	0,02	0,28	0,02	0,02	0,02
2012	A	070201	Light duty vehicles	Highway	Biodiesel	0,38	0,00	107,10	6,89	0,07	46,40	0,00	0,57	0,14	6,91	6,91	6,91
2012	A	070201	Light duty vehicles	Highway	Diesel	5,66	2,65	1602,96	103,12	0,99	694,44	418,78	8,53	2,08	103,42	103,42	103,42
2012	A	070201	Light duty vehicles	Highway	Gasoline	0,34	0,15	55,09	6,57	0,92	186,11	24,46	0,63	7,68	0,46	0,46	0,46
2012	A	070201	Light duty vehicles	Highway	LPG	0,00	0,00	0,04	0,01	0,00	0,33	0,02	0,00	0,00	0,00	0,00	0,00
2012	A	070202	Light duty vehicles	Rural	Bio ethanol	0,02	0,00	3,44	0,69	0,07	10,06	0,00	0,07	0,54	0,03	0,03	0,03
2012	A	070202	Light duty vehicles	Rural	Biodiesel	0,64	0,00	188,52	13,14	0,26	67,01	0,00	1,05	0,26	9,52	9,52	9,52
2012	A	070202	Light duty vehicles	Rural	Diesel	9,54	4,47	2821,59	196,64	3,90	1002,88	705,59	15,73	3,83	142,52	142,52	142,52
2012	A	070202	Light duty vehicles	Rural	Gasoline	0,65	0,30	94,11	18,85	1,96	275,02	47,77	1,97	14,82	0,80	0,80	0,80
2012	A	070202	Light duty vehicles	Rural	LPG	0,00	0,00	0,07	0,02	0,00	0,21	0,03	0,00	0,00	0,01	0,01	0,01
2012	A	070203	Light duty vehicles	Urban	Bio ethanol	0,02	0,00	2,48	3,82	0,15	71,68	0,00	0,09	0,08	0,01	0,01	0,01
2012	A	070203	Light duty vehicles	Urban	Biodiesel	0,40	0,00	109,10	16,88	0,32	56,16	0,00	1,39	0,10	10,00	10,00	10,00
2012	A	070203	Light duty vehicles	Urban	Diesel	5,93	2,78	1632,94	252,72	4,79	840,58	439,03	20,82	1,53	149,62	149,62	149,62
2012	A	070203	Light duty vehicles	Urban	Gasoline	0,52	0,24	67,81	104,45	4,21	1960,17	38,05	2,38	2,31	0,38	0,38	0,38
2012	A	070203	Light duty vehicles	Urban	LPG	0,00	0,00	0,02	0,02	0,00	0,17	0,02	0,00	0,00	0,00	0,00	0,00
2012	A	070301	Heavy duty vehicles	Highway	Bio ethanol	0,00	0,00	0,62	0,28	0,01	4,54	0,00	0,00	0,00	0,03	0,03	0,03
2012	A	070301	Heavy duty vehicles	Highway	Biodiesel	0,96	0,00	375,59	7,12	1,96	131,01	0,00	3,00	0,30	5,92	5,92	5,92
2012	A	070301	Heavy duty vehicles	Highway	Diesel	14,33	6,71	5621,53	106,53	29,27	1960,92	1060,75	44,88	4,49	88,65	88,65	88,65
2012	A	070301	Heavy duty vehicles	Highway	Gasoline	0,02	0,01	16,92	7,74	0,16	124,12	1,19	0,01	0,00	0,90	0,90	0,90

Continued

2012	A	070302	Heavy duty vehicles	Rural	Biodiesel	1,14	0,00	518,83	11,43	2,67	153,74	0,00	3,36	0,34	7,57	7,57	7,57
2012	A	070302	Heavy duty vehicles	Rural	Diesel	17,07	8,00	7765,50	171,00	39,94	2301,11	1263,14	50,32	5,03	113,27	113,27	113,27
2012	A	070302	Heavy duty vehicles	Rural	Gasoline	0,04	0,02	42,14	30,28	0,62	309,02	2,69	0,03	0,01	2,25	2,25	2,25
2012	A	070303	Heavy duty vehicles	Urban	Diesel	5,91	2,77	3372,53	87,20	22,08	883,88	437,58	14,79	1,48	47,88	47,88	47,88
2012	A	070303	Heavy duty vehicles	Urban	Gasoline	0,02	0,01	11,19	17,06	0,35	174,10	1,79	0,01	0,00	0,99	0,99	0,99
2012	A	070400	Mopeds	Urban	Bio ethanol	0,01	0,00	1,08	32,67	0,68	54,03	0,00	0,01	0,01	0,57	0,57	0,57
2012	A	070501	Motorcycles	Highway	Gasoline	0,11	0,05	29,05	69,92	9,73	1116,11	7,84	0,14	0,14	1,69	1,69	1,69
2012	A	070502	Motorcycles	Rural	Bio ethanol	0,01	0,00	1,64	5,54	0,93	81,96	0,00	0,01	0,01	0,16	0,16	0,16
2012	A	070502	Motorcycles	Rural	Gasoline	0,23	0,11	44,84	151,59	25,51	2241,45	17,01	0,36	0,36	4,46	4,46	4,46
2012	A	070503	Motorcycles	Urban	Bio ethanol	0,01	0,00	1,21	8,14	1,17	94,09	0,00	0,02	0,02	0,19	0,19	0,19
2012	A	070503	Motorcycles	Urban	Gasoline	0,28	0,13	32,99	222,71	32,07	2573,10	20,27	0,42	0,42	5,18	5,18	5,18
2012	A	080100	Military		AvGas	0,00	0,09	3,21	4,64	0,08	26,02	0,27	0,01	0,01	0,04	0,04	0,04
2012	A	080100	Military		Diesel	0,88	0,39	313,55	11,02	1,00	81,24	65,15	2,47	0,34	10,36	10,36	10,36
2012	A	080100	Military		Gasoline	0,00	0,00	0,19	0,24	0,01	2,30	0,11	0,00	0,04	0,00	0,00	0,00
2012	A	080100	Military		Jet fuel	0,70	16,05	174,89	17,41	1,85	160,46	50,25	1,61	0,00	0,81	0,81	0,81
2012	A	080200	Railways		Diesel	3,37	1,58	2530,89	190,12	7,30	424,51	249,33	6,87	0,67	81,68	81,68	81,68
2012	A	080200	Railways		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080200	Railways		Kerosene	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080300	Inland waterways		Diesel	1,00	46,94	818,78	156,85	2,55	440,28	74,16	2,98	0,17	95,75	95,75	95,75
2012	A	080300	Inland waterways		Gasoline	0,34	0,15	190,06	293,98	21,58	3772,37	24,46	0,52	0,04	5,84	5,84	5,84
2012	A	080402	National sea traffic		Diesel	2,90	135,99	3139,13	146,27	4,81	323,52	214,85	13,60	0,00	62,56	61,93	61,62
2012	A	080402	National sea traffic		Kerosene	0,00											
2012	A	080402	National sea traffic		LPG	0,01	0,00	12,12	3,74	0,20	4,30	0,61	0,00	0,00	0,00	0,00	0,00
2012	A	080402	National sea traffic		Residual oil	2,35	1150,72	4532,21	148,53	4,59	490,00	183,55	11,51		103,50	102,47	101,95
2012	A	080403	Fishing		Diesel	6,47	302,86	8670,24	373,24	11,54	1231,32	478,48	30,29	0,00	139,32	137,93	137,23
2012	A	080403	Fishing		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080403	Fishing		Kerosene	0,00											
2012	A	080403	Fishing		LPG	0,01	0,00	12,12	3,74	0,20	4,30	0,61	0,00	0,00	0,00	0,00	0,00
2012	A	080404	International sea traffic		Diesel	10,31	483,08	16353,79	595,16	18,41	1963,42	763,22	48,31		222,23	220,01	218,90
2012	A	080404	International sea traffic		Residual oil	9,51	4652,66	20170,41	603,83	18,68	1992,00	742,15	46,53		418,48	414,30	412,21
2012	A	080501	Air traffic, Dom. < 3000 ft.		AvGas	0,06	1,42	53,48	77,36	1,36	434,06	4,54	0,12	0,10	0,62	0,62	0,62
2012	A	080501	Air traffic, Dom. < 3000 ft.		Jet fuel	0,23	5,32	71,62	3,80	0,42	34,07	16,67	2,14		0,27	0,27	0,27
2012	A	080502	Air traffic, Int. < 3000 ft.		AvGas	0,00	0,02	0,68	0,98	0,02	5,49	0,06	0,00	0,00	0,01	0,01	0,01
2012	A	080502	Air traffic, Int. < 3000 ft.		Jet fuel	0,33	7,67	99,58	12,73	1,41	61,55	24,01	2,42		0,39	0,39	0,39
2012	A	080503	Air traffic, Dom. > 3000 ft.		Jet fuel	0,49	11,22	135,75	3,34	0,00	46,48	35,15	1,12		0,57	0,57	0,57
2012	A	080504	Air traffic, Int. > 3000 ft.		Jet fuel	3,54	81,38	845,12	21,27	0,00	170,61	254,88	8,14		4,11	4,11	4,11

Continued

2012	A	080600	Agriculture	Diesel	17,64	8,26	9364,59	864,10	14,05	5446,35	1305,62	56,21	3,21	692,88	692,88	692,88
2012	A	080600	Agriculture	Gasoline	0,52	0,24	57,46	614,21	82,78	11272,32	37,87	0,89	0,79	16,09	16,09	16,09
2012	A	080700	Forestry	Diesel	0,16	0,07	55,24	4,11	0,07	35,91	11,75	0,51	0,03	3,72	3,72	3,72
2012	A	080700	Forestry	Gasoline	0,07	0,03	3,84	277,81	2,17	1255,55	5,12	0,03	0,01	5,76	5,76	5,76
2012	A	080800	Industry	Diesel	12,82	6,00	6270,79	694,64	11,29	3931,91	948,53	39,70	2,27	609,10	609,10	609,10
2012	A	080800	Industry	Gasoline	0,16	0,07	33,14	238,85	17,01	2204,59	11,41	0,23	0,02	3,20	3,20	3,20
2012	A	080800	Industry	LPG	0,97	0,00	1293,53	142,29	7,49	102,12	61,46	3,40	0,20	4,77	4,77	4,77
2012	A	080900	Household and gardening	Gasoline	0,86	0,39	92,15	1953,14	64,53	26236,07	62,43	1,08	0,08	14,71	14,71	14,71
2012	A	081100	Commercial and institutional	Gasoline	2,35	1,07	219,03	3636,05	151,26	72586,61	171,41	2,65	0,21	66,99	66,99	66,99
2012	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,00	0,01	0,43	0,62	0,01	3,48	0,04	0,00	0,00	0,00	0,00	0,00
2012	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,25	5,83	76,58	4,71	0,52	48,58	18,25	1,44		0,29	0,29	0,29
2012	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,00	0,00	0,10	0,14	0,00	0,80	0,01	0,00	0,00	0,00	0,00	0,00
2012	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	2,76	63,36	935,33	93,17	10,35	654,21	198,45	10,67	0,00	3,20	3,20	3,20
2012	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,80	18,51	241,03	7,75	0,00	40,42	57,96	1,85	0,00	0,93	0,93	0,93
2012	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	28,22	648,83	8747,67	251,07	0,00	883,26	2032,12	64,88	0,00	32,74	32,74	32,74

2012 emissions for Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Selenium and Zinc.

Year		SNAP ID	Category		Fuel type	Fuel	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Selenium	Zinc
						PJ	kg	kg	kg	kg	kg	kg	kg	kg	kg
2012	A	070101	Passenger cars	Highway	Bio ethanol	0,51	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070101	Passenger cars	Highway	Biodiesel	0,74	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070101	Passenger cars	Highway	Diesel	11,03	0,03	3,45	10,78	7,65	1,37	3,48	20,72	0,03	691,14
2012	A	070101	Passenger cars	Highway	Gasoline	13,94	0,10	4,63	6,11	17,41	2,77	5,30	14,07	0,06	923,33
2012	A	070101	Passenger cars	Highway	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01
2012	A	070102	Passenger cars	Rural	Bio ethanol	0,83	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070102	Passenger cars	Rural	Biodiesel	1,19	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070102	Passenger cars	Rural	Diesel	17,79	0,04	5,97	18,40	13,08	2,21	6,03	35,88	0,04	1196,48
2012	A	070102	Passenger cars	Rural	Gasoline	22,81	0,16	8,01	10,40	30,01	4,53	9,10	24,34	0,10	1598,17
2012	A	070102	Passenger cars	Rural	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02
2012	A	070103	Passenger cars	Urban	Bio ethanol	0,57	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070103	Passenger cars	Urban	Biodiesel	0,70	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070103	Passenger cars	Urban	Diesel	10,40	0,02	2,36	7,94	5,61	1,29	2,40	14,21	0,02	473,89
2012	A	070103	Passenger cars	Urban	Gasoline	15,59	0,11	3,19	5,05	12,53	3,10	3,94	9,79	0,07	636,04
2012	A	070103	Passenger cars	Urban	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01
2012	A	070201	Light duty vehicles	Highway	Bio ethanol	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070201	Light duty vehicles	Highway	Biodiesel	0,38	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070201	Light duty vehicles	Highway	Diesel	5,66	0,01	1,35	4,49	3,18	0,70	1,37	8,14	0,01	271,39
2012	A	070201	Light duty vehicles	Highway	Gasoline	0,34	0,00	0,08	0,12	0,33	0,07	0,10	0,26	0,00	16,92
2012	A	070201	Light duty vehicles	Highway	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01
2012	A	070202	Light duty vehicles	Rural	Bio ethanol	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070202	Light duty vehicles	Rural	Biodiesel	0,64	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070202	Light duty vehicles	Rural	Diesel	9,54	0,02	2,49	8,10	5,74	1,18	2,52	14,99	0,02	499,91
2012	A	070202	Light duty vehicles	Rural	Gasoline	0,65	0,00	0,16	0,23	0,61	0,13	0,19	0,48	0,00	31,23
2012	A	070202	Light duty vehicles	Rural	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02
2012	A	070203	Light duty vehicles	Urban	Bio ethanol	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070203	Light duty vehicles	Urban	Biodiesel	0,40	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070203	Light duty vehicles	Urban	Diesel	5,93	0,01	1,00	3,66	2,58	0,74	1,02	6,02	0,01	200,76
2012	A	070203	Light duty vehicles	Urban	Gasoline	0,52	0,00	0,06	0,13	0,27	0,10	0,09	0,20	0,00	12,68
2012	A	070203	Light duty vehicles	Urban	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01
2012	A	070301	Heavy duty vehicles	Highway	Bio ethanol	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070301	Heavy duty vehicles	Highway	Biodiesel	0,96	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070301	Heavy duty vehicles	Highway	Diesel	14,33	0,03	2,28	8,50	5,98	1,78	2,33	13,73	0,03	458,05
2012	A	070301	Heavy duty vehicles	Highway	Gasoline	0,02	0,00	0,00	0,01	0,02	0,00	0,01	0,01	0,00	0,85

Continued

2012	A	070302	Heavy duty vehicles	Rural	Biodiesel	1,14	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070302	Heavy duty vehicles	Rural	Diesel	17,07	0,04	2,60	9,85	6,93	2,12	2,66	15,70	0,04	523,71
2012	A	070302	Heavy duty vehicles	Rural	Gasoline	0,04	0,00	0,01	0,01	0,04	0,01	0,01	0,03	0,00	2,17
2012	A	070303	Heavy duty vehicles	Urban	Diesel	5,91	0,01	0,78	3,11	2,18	0,73	0,80	4,72	0,01	157,47
2012	A	070303	Heavy duty vehicles	Urban	Gasoline	0,02	0,00	0,01	0,01	0,02	0,00	0,01	0,02	0,00	1,00
2012	A	070400	Mopeds	Urban	Bio ethanol	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070501	Motorcycles	Highway	Gasoline	0,11	0,00	0,01	0,03	0,06	0,02	0,02	0,04	0,00	2,86
2012	A	070502	Motorcycles	Rural	Bio ethanol	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070502	Motorcycles	Rural	Gasoline	0,23	0,00	0,04	0,07	0,15	0,05	0,05	0,12	0,00	7,51
2012	A	070503	Motorcycles	Urban	Bio ethanol	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070503	Motorcycles	Urban	Gasoline	0,28	0,00	0,04	0,08	0,18	0,06	0,06	0,14	0,00	8,73
2012	A	080100	Military		AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	47,71	0,00	0,19
2012	A	080100	Military		Diesel	0,88	0,00	0,19	0,63	0,45	0,10	0,19	1,13	0,00	37,80
2012	A	080100	Military		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,09
2012	A	080100	Military		Jet fuel	0,70	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080200	Railways		Diesel	3,37	0,01	0,63	2,22	1,57	0,42	0,64	3,77	0,01	125,66
2012	A	080200	Railways		Gasoline	0,00		0,00	0,00	0,00		0,00	0,00	0,00	0,00
2012	A	080200	Railways		Kerosene	0,00									
2012	A	080300	Inland waterways		Diesel	1,00	0,00	0,19	0,66	0,47	0,12	0,19	1,12	0,00	37,38
2012	A	080300	Inland waterways		Gasoline	0,34	0,00	0,08	0,12	0,33	0,07	0,10	0,26	0,00	16,91
2012	A	080402	National sea traffic		Diesel	2,90	3,40	0,67	2,73	3,40	3,40	4,76	6,79	13,59	34,00
2012	A	080402	National sea traffic		Kerosene	0,00									
2012	A	080402	National sea traffic		LPG	0,01									
2012	A	080402	National sea traffic		Residual oil	2,35	28,76	1,72	11,51	28,76	1,15	1726,08	11,51	23,01	51,77
2012	A	080403	Fishing		Diesel	6,47	7,57	1,49	6,08	7,57	7,57	10,60	15,13	30,26	75,72
2012	A	080403	Fishing		Gasoline	0,00		0,00	0,00	0,00		0,00	0,00	0,00	0,00
2012	A	080403	Fishing		Kerosene	0,00									
2012	A	080403	Fishing		LPG	0,01									
2012	A	080404	International sea traffic		Diesel	10,31	12,07	2,37	9,69	12,07	12,07	16,91	24,13	48,27	120,77
2012	A	080404	International sea traffic		Residual oil	9,51	116,27	6,95	46,53	116,27	4,66	6979,03	46,53	93,05	209,32
2012	A	080501	Air traffic, Dom. < 3000 ft.		AvGas	0,06	0,00	0,02	0,02	0,06	0,01	0,02	840,83	0,00	3,14
2012	A	080501	Air traffic, Dom. < 3000 ft.		Jet fuel	0,23		0,00	0,00	0,00		0,00	0,00	0,00	0,00
2012	A	080502	Air traffic, Int. < 3000 ft.		AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,63	0,00	0,04
2012	A	080502	Air traffic, Int. < 3000 ft.		Jet fuel	0,33		0,00	0,00	0,00		0,00	0,00	0,00	0,00
2012	A	080503	Air traffic, Dom. > 3000 ft.		Jet fuel	0,49		0,00	0,00	0,00		0,00	0,00	0,00	0,00
2012	A	080504	Air traffic, Int. > 3000 ft.		Jet fuel	3,54		0,00	0,00	0,00		0,00	0,00	0,00	0,00

Continued

2012	A	080600	Agriculture	Diesel	17,64	0,04	3,27	11,64	8,21	2,19	3,34	19,72	0,04	658,02
2012	A	080600	Agriculture	Gasoline	0,52	0,00	0,13	0,19	0,50	0,10	0,16	0,40	0,00	26,17
2012	A	080700	Forestry	Diesel	0,16	0,00	0,03	0,10	0,07	0,02	0,03	0,18	0,00	5,92
2012	A	080700	Forestry	Gasoline	0,07	0,00	0,02	0,03	0,07	0,01	0,02	0,05	0,00	3,54
2012	A	080800	Industry	Diesel	12,82	0,03	2,38	8,46	5,96	1,59	2,42	14,33	0,03	478,05
2012	A	080800	Industry	Gasoline	0,16	0,00	0,04	0,06	0,15	0,03	0,05	0,12	0,00	7,89
2012	A	080800	Industry	LPG	0,97	0,00	0,13	0,11	0,45	0,00	0,13	0,38	0,00	25,45
2012	A	080900	Household and gardening	Gasoline	0,86	0,01	0,22	0,31	0,83	0,17	0,26	0,66	0,00	43,15
2012	A	081100	Commercial and institutional	Gasoline	2,35	0,02	0,59	0,86	2,28	0,46	0,71	1,81	0,01	118,46
2012	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6,73	0,00	0,03
2012	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,25		0,00	0,00	0,00		0,00		0,00	0,00
2012	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,55	0,00	0,01
2012	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	2,76	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	28,22	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

2012 emissions for Dioxins/, Flouranthene, Benzo(b), Benzo(k), Benzo(a), Benzo(g,h,i), indeno(1,2,3-c,d), HCB and PCB.

Year		SNAP ID	Category		Fuel type	Fuel	Dioxins/	Flouranthene	Benzo(b)	Benzo(k)	Benzo(a)	Benzo(g,h,i)	indeno(1,2,3-c,d)	HCB	PCB
						PJ	g	kg	kg	kg	kg	kg	kg	g	g
2012	A	070101	Passenger cars	Highway	Bio ethanol	0,51	0,00	0,58	0,11	0,13	0,10	0,21	0,15	0,00	0,00
2012	A	070101	Passenger cars	Highway	Biodiesel	0,74	0,00	9,44	0,58	0,52	0,63	1,23	0,59	0,00	0,02
2012	A	070101	Passenger cars	Highway	Diesel	11,03	0,00	141,29	8,62	7,82	9,44	18,34	8,90	0,07	0,23
2012	A	070101	Passenger cars	Highway	Gasoline	13,94	0,01	15,85	2,91	3,51	2,87	5,81	4,17	0,00	0,01
2012	A	070101	Passenger cars	Highway	LPG	0,00								0,00	0,00
2012	A	070102	Passenger cars	Rural	Bio ethanol	0,83	0,00	1,04	0,19	0,23	0,19	0,39	0,28	0,00	0,00
2012	A	070102	Passenger cars	Rural	Biodiesel	1,19	0,00	17,34	1,06	0,96	1,16	2,25	1,09	0,01	0,03
2012	A	070102	Passenger cars	Rural	Diesel	17,79	0,01	259,60	15,85	14,36	17,34	33,69	16,35	0,11	0,38
2012	A	070102	Passenger cars	Rural	Gasoline	22,81	0,01	28,53	5,28	6,40	5,22	10,57	7,61	0,00	0,01
2012	A	070102	Passenger cars	Rural	LPG	0,00								0,00	0,00
2012	A	070103	Passenger cars	Urban	Bio ethanol	0,57	0,00	0,41	0,07	0,09	0,07	0,15	0,10	0,00	0,00
2012	A	070103	Passenger cars	Urban	Biodiesel	0,70	0,00	6,73	0,41	0,37	0,45	0,87	0,42	0,00	0,01
2012	A	070103	Passenger cars	Urban	Diesel	10,40	0,01	100,73	6,15	5,57	6,73	13,07	6,34	0,06	0,22
2012	A	070103	Passenger cars	Urban	Gasoline	15,59	0,00	11,23	2,00	2,41	1,97	4,01	2,86	0,00	0,01
2012	A	070103	Passenger cars	Urban	LPG	0,00								0,00	0,00
2012	A	070201	Light duty vehicles	Highway	Bio ethanol	0,01	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070201	Light duty vehicles	Highway	Biodiesel	0,38	0,00	3,49	0,21	0,19	0,23	0,45	0,22	0,00	0,01
2012	A	070201	Light duty vehicles	Highway	Diesel	5,66	0,00	52,26	3,19	2,89	3,49	6,78	3,29	0,03	0,12
2012	A	070201	Light duty vehicles	Highway	Gasoline	0,34	0,00	0,34	0,05	0,06	0,05	0,11	0,07	0,00	0,00
2012	A	070201	Light duty vehicles	Highway	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070202	Light duty vehicles	Rural	Bio ethanol	0,02	0,00	0,02	0,00	0,00	0,00	0,01	0,00	0,00	0,00
2012	A	070202	Light duty vehicles	Rural	Biodiesel	0,64	0,00	6,44	0,39	0,36	0,43	0,84	0,41	0,00	0,01
2012	A	070202	Light duty vehicles	Rural	Diesel	9,54	0,01	96,33	5,88	5,33	6,43	12,50	6,06	0,06	0,20
2012	A	070202	Light duty vehicles	Rural	Gasoline	0,65	0,00	0,64	0,10	0,11	0,10	0,20	0,13	0,00	0,00
2012	A	070202	Light duty vehicles	Rural	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070203	Light duty vehicles	Urban	Bio ethanol	0,02	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070203	Light duty vehicles	Urban	Biodiesel	0,40	0,00	2,88	0,18	0,16	0,19	0,37	0,18	0,00	0,01
2012	A	070203	Light duty vehicles	Urban	Diesel	5,93	0,00	43,08	2,63	2,38	2,88	5,59	2,71	0,04	0,13
2012	A	070203	Light duty vehicles	Urban	Gasoline	0,52	0,00	0,29	0,05	0,05	0,04	0,09	0,06	0,00	0,00
2012	A	070203	Light duty vehicles	Urban	LPG	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	070301	Heavy duty vehicles	Highway	Bio ethanol	0,00								0,00	0,00
2012	A	070301	Heavy duty vehicles	Highway	Biodiesel	0,96	0,00	1,94	0,49	0,73	0,09	0,07	0,13	0,01	0,50
2012	A	070301	Heavy duty vehicles	Highway	Diesel	14,33	0,01	29,11	7,34	10,88	1,36	1,09	1,90	0,09	7,54
2012	A	070301	Heavy duty vehicles	Highway	Gasoline	0,02								0,00	0,00

Continued

2012	A	070302	Heavy duty vehicles	Rural	Biodiesel	1,14	0,00	2,36	0,59	0,88	0,11	0,09	0,15	0,01	0,60
2012	A	070302	Heavy duty vehicles	Rural	Diesel	17,07	0,02	35,27	8,90	13,18	1,65	1,32	2,31	0,10	8,98
2012	A	070302	Heavy duty vehicles	Rural	Gasoline	0,04								0,00	0,00
2012	A	070303	Heavy duty vehicles	Urban	Diesel	5,91	0,01	9,91	2,50	3,70	0,46	0,37	0,65	0,04	3,11
2012	A	070303	Heavy duty vehicles	Urban	Gasoline	0,02								0,00	0,00
2012	A	070400	Mopeds	Urban	Bio ethanol	0,01								0,00	0,00
2012	A	070501	Motorcycles	Highway	Gasoline	0,11	0,00	1,37	0,09	0,07	0,08	0,18	0,07	0,00	0,00
2012	A	070502	Motorcycles	Rural	Bio ethanol	0,01	0,00	0,13	0,01	0,01	0,01	0,02	0,01	0,00	0,00
2012	A	070502	Motorcycles	Rural	Gasoline	0,23	0,01	3,57	0,23	0,18	0,20	0,46	0,18	0,00	0,00
2012	A	070503	Motorcycles	Urban	Bio ethanol	0,01	0,00	0,16	0,01	0,01	0,01	0,02	0,01	0,00	0,00
2012	A	070503	Motorcycles	Urban	Gasoline	0,28	0,01	4,30	0,28	0,22	0,24	0,56	0,22	0,00	0,00
2012	A	080100	Military		AvGas	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080100	Military		Diesel	0,88	0,00	3,83	0,45	0,44	0,23	0,41	0,23	0,01	0,19
2012	A	080100	Military		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080100	Military		Jet fuel	0,70	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080200	Railways		Diesel	3,37	0,00	4,75	1,21	1,35	0,20	0,17	0,31	0,02	1,77
2012	A	080200	Railways		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080200	Railways		Kerosene	0,00								0,00	0,00
2012	A	080300	Inland waterways		Diesel	1,00	0,00	4,36	0,51	0,50	0,26	0,47	0,26	0,01	0,53
2012	A	080300	Inland waterways		Gasoline	0,34	0,00	1,45	0,07	0,02	0,04	0,23	0,08	0,00	0,00
2012	A	080402	National sea traffic		Diesel	2,90	0,03	21,54	1,86	0,87	0,44	4,15	3,43	0,01	0,03
2012	A	080402	National sea traffic		Kerosene	0,00									
2012	A	080402	National sea traffic		LPG	0,01								0,00	0,00
2012	A	080402	National sea traffic		Residual oil	2,35	0,03	12,21	0,64	0,12	0,05	0,16	0,07	0,01	0,03
2012	A	080403	Fishing		Diesel	6,47	0,08	47,98	4,14	1,94	0,97	9,25	7,63	0,01	0,06
2012	A	080403	Fishing		Gasoline	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080403	Fishing		Kerosene	0,00									
2012	A	080403	Fishing		LPG	0,01								0,00	0,00
2012	A	080404	International sea traffic		Diesel	10,31	0,12	76,53	6,60	3,09	1,55	14,75	12,17	0,02	0,09
2012	A	080404	International sea traffic		Residual oil	9,51	0,13	39,20	1,90	0,86	0,67	2,47	1,90	0,03	0,13
2012	A	080501	Air traffic, Dom. < 3000 ft.		AvGas	0,06	0,00	0,27	0,01	0,00	0,01	0,04	0,02	0,00	0,00
2012	A	080501	Air traffic, Dom. < 3000 ft.		Jet fuel	0,23	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080502	Air traffic, Int. < 3000 ft.		AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080502	Air traffic, Int. < 3000 ft.		Jet fuel	0,33	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080503	Air traffic, Dom. > 3000 ft.		Jet fuel	0,49	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012	A	080504	Air traffic, Int. > 3000 ft.		Jet fuel	3,54	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

Continued

2012	A	080600	Agriculture	Diesel	17,64	0,01	76,75	9,01	8,75	4,51	8,19	4,66	0,11	9,28
2012	A	080600	Agriculture	Gasoline	0,52	0,00	2,25	0,11	0,04	0,06	0,36	0,13	0,00	0,00
2012	A	080700	Forestry	Diesel	0,16	0,00	0,69	0,08	0,08	0,04	0,07	0,04	0,00	0,08
2012	A	080700	Forestry	Gasoline	0,07	0,00	0,30	0,01	0,00	0,01	0,05	0,02	0,00	0,00
2012	A	080800	Industry	Diesel	12,82	0,01	55,76	6,54	6,36	3,28	5,95	3,39	0,08	6,74
2012	A	080800	Industry	Gasoline	0,16	0,00	0,68	0,03	0,01	0,02	0,11	0,04	0,00	0,00
2012	A	080800	Industry	LPG	0,97								0,00	0,00
2012	A	080900	Household and gardening	Gasoline	0,86	0,00	3,70	0,18	0,06	0,10	0,59	0,21	0,00	0,00
2012	A	081100	Commercial and institutional	Gasoline	2,35	0,01	10,16	0,49	0,17	0,27	1,62	0,57	0,00	0,00
2012	P	080501	Air traffic, Dom. < 3000 ft.	AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
2012	P	080501	Air traffic, Dom. < 3000 ft.	Jet fuel	0,25	0,00	0,00	0,00	0,00	0,00	0,00	0,00		
2012	P	080502	Air traffic, Int. < 3000 ft.	AvGas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	
2012	P	080502	Air traffic, Int. < 3000 ft.	Jet fuel	2,76	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	
2012	P	080503	Air traffic, Dom. > 3000 ft.	Jet fuel	0,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	
2012	P	080504	Air traffic, Int. > 3000 ft.	Jet fuel	28,22	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	

Non-exhaust emission factors, activity data and total non-exhaust emissions of TSP, PM_{10} and $PM_{2.5}$ in 2012.

Year	Source	Category	Mileage kmkveh	TSP mg pr km	PM_{10} mg pr km	$PM_{2.5}$ mg pr km	As µg pr km	Cd µg pr km	Cr µg pr km	Cu µg pr km	Hg µg pr km	Ni µg pr km	Pb µg pr km	Se µg pr km	Zn µg pr km
2012	Brake wear	1	43734320	6,2	6,1	2,4	0,1	0,1	0,7	649,8	0,0	0,7	85,7	0,1	124,7
2012	Brake wear	2	8369840	11,9	11,7	4,7	0,1	0,1	1,3	1254,9	0,0	1,3	165,5	0,2	240,8
2012	Brake wear	3	3155814	29,8	29,2	11,6	0,3	0,1	4,9	224,3	0,0	3,4	12,1	0,6	223,5
2012	Brake wear	4	766075	47,5	46,5	18,5	0,5	0,1	3,0	650,2	0,0	7,5	34,7	0,9	443,3
2012	Brake wear	5	222709	6,2	6,1	2,4	0,1	0,1	0,7	649,2	0,0	0,7	85,6	0,1	124,6
2012	Brake wear	6	475124	4,2	4,1	1,6	0,0	0,0	0,4	439,2	0,0	0,4	57,9	0,1	84,3
2012	Road abrasion	1	43734320	15,0	7,5	4,1	0,0	0,0	0,3	0,1	0,0	0,2	0,7	0,0	1,1
2012	Road abrasion	2	8369840	15,0	7,5	4,1	0,0	0,0	0,3	0,1	0,0	0,2	0,7	0,0	1,1
2012	Road abrasion	3	3155814	76,0	38,0	20,5	0,0	0,0	1,5	0,8	0,0	1,2	3,6	0,0	5,7
2012	Road abrasion	4	766075	76,0	38,0	20,5	0,0	0,0	1,5	0,8	0,0	1,2	3,6	0,0	5,7
2012	Road abrasion	5	222709	6,0	3,0	1,6	0,0	0,0	0,1	0,1	0,0	0,1	0,3	0,0	0,5
2012	Road abrasion	6	475124	6,0	3,0	1,6	0,0	0,0	0,1	0,1	0,0	0,1	0,3	0,0	0,5
2012	Tyre wear	1	43734320	10,8	6,5	4,6	0,0	0,0	0,0	0,2	0,0	0,3	0,9	0,2	118,5
2012	Tyre wear	2	8369840	17,2	10,3	7,2	0,0	0,0	0,1	0,3	0,0	0,4	1,4	0,3	187,7
2012	Tyre wear	3	3155814	65,5	39,3	27,5	0,1	0,2	0,2	1,0	0,0	1,7	5,3	1,3	716,8
2012	Tyre wear	4	766075	61,5	36,9	25,8	0,0	0,2	0,2	1,0	0,0	1,6	4,9	1,2	672,1
2012	Tyre wear	5	222709	14,2	8,5	6,0	0,0	0,0	0,1	0,2	0,0	0,4	1,1	0,3	154,9
2012	Tyre wear	6	475124	17,8	10,7	7,5	0,0	0,0	0,1	0,3	0,0	0,5	1,4	0,4	194,1
2012	Total	1	43734320	32,0	20,1	11,0	0,1	0,1	1,0	650,1	0,0	1,2	87,3	0,3	244,3
2012	Total	2	8369840	44,1	29,5	15,9	0,1	0,2	1,6	1255,3	0,0	1,9	167,5	0,6	429,7
2012	Total	3	3155814	171,3	106,5	59,7	0,3	0,3	6,6	226,1	0,0	6,3	21,0	1,9	946,1
2012	Total	4	766075	184,9	121,4	64,8	0,5	0,3	4,8	651,9	0,0	10,3	43,2	2,2	1121,1
2012	Total	5	222709	26,3	17,6	10,0	0,1	0,1	0,8	649,5	0,0	1,1	87,0	0,4	280,0
2012	Total	6	475124	27,9	17,7	10,7	0,1	0,1	0,6	439,6	0,0	1,0	59,6	0,4	278,9

Continued

Year	Source	Category	TSP tonnes	PM_{10} tonnes	$PM_{2.5}$ tonnes	As kg	Cd kg	Cr kg	Cu kg	Hg kg	Ni kg	Pb kg	Se kg	Zn kg
2012	Brake wear	1	270	265	105	2,705	2,653	28,453	28417,620		28,480	3746,887	5,409	5453,656
2012	Brake wear	2	100	98	39	1,000	0,981	10,517	10503,469		10,527	1384,891	1,999	2015,732
2012	Brake wear	3	94	92	37	0,939	0,288	15,398	707,779		10,703	38,213	1,878	705,436
2012	Brake wear	4	36	36	14	0,364	0,110	2,329	498,107		5,783	26,571	0,727	339,585
2012	Brake wear	5	1	1	1	0,014	0,013	0,145	144,588		0,145	19,064	0,028	27,748
2012	Brake wear	6	2	2	1	0,020	0,019	0,209	208,685		0,209	27,515	0,040	40,049
2012	Road abrasion	1	656	328	177	0,000	0,062	13,019	6,554	0,037	10,414	30,849	0,000	49,568
2012	Road abrasion	2	126	63	34	0,000	0,012	2,491	1,254	0,007	1,993	5,904	0,000	9,486
2012	Road abrasion	3	240	120	65	0,000	0,023	4,760	2,396	0,014	3,807	11,279	0,000	18,122
2012	Road abrasion	4	58	29	16	0,000	0,006	1,155	0,582	0,003	0,924	2,738	0,000	4,399
2012	Road abrasion	5	1	1	0	0,000	0,000	0,027	0,013	0,000	0,021	0,063	0,000	0,101
2012	Road abrasion	6	3	1	1	0,000	0,000	0,057	0,028	0,000	0,045	0,134	0,000	0,215
2012	Tyre wear	1	474	284	199	0,379	1,232	1,706	7,391		12,082	38,140	9,476	5181,351
2012	Tyre wear	2	144	86	60	0,115	0,374	0,517	2,241		3,664	11,566	2,874	1571,309
2012	Tyre wear	3	207	124	87	0,165	0,538	0,745	3,227		5,275	16,652	4,137	2262,229
2012	Tyre wear	4	47	28	20	0,038	0,122	0,169	0,734		1,201	3,790	0,942	514,867
2012	Tyre wear	5	3	2	1	0,003	0,008	0,011	0,049		0,080	0,254	0,063	34,503
2012	Tyre wear	6	8	5	4	0,007	0,022	0,030	0,132		0,215	0,679	0,169	92,228
2012	Total	1	1400	877	482	3,084	3,947	43,177	28431,564	0,037	50,976	3815,876	14,885	10684,575
2012	Total	2	369	247	133	1,115	1,366	13,525	10506,965	0,007	16,183	1402,361	4,873	3596,528
2012	Total	3	541	336	188	1,104	0,849	20,902	713,402	0,014	19,786	66,144	6,015	2985,788
2012	Total	4	142	93	50	0,401	0,238	3,654	499,423	0,003	7,908	33,099	1,669	858,851
2012	Total	5	6	4	2	0,016	0,022	0,183	144,650	0,000	0,247	19,381	0,091	62,352
2012	Total	6	13	8	5	0,027	0,042	0,296	208,845	0,000	0,469	28,328	0,208	132,493

Annex 2B-16 Fuel consumption and emissions in NFR format

Fuel 1985-2012.

NFR category	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Manufacturing industries/Construction (mobile)	11,7	11,7	11,6	11,6	11,6	11,5	11,5	11,5	11,5	11,5	11,6	11,7	11,7	11,9	11,9
Civil aviation (International, LTO)	1,7	1,8	1,8	1,9	2,1	2,2	2,1	2,3	2,3	2,4	2,5	2,8	3,0	3,0	3,2
Civil aviation (International, Cruise)	17,7	19,1	20,6	22,0	23,0	21,9	20,6	21,2	20,7	22,8	23,4	24,6	25,0	27,0	28,6
Civil aviation (Domestic, LTO)	1,1	1,0	1,1	1,1	1,1	1,0	0,9	0,9	0,9	0,9	0,9	0,9	1,0	0,9	0,8
Civil aviation (Domestic, Cruise)	2,5	2,3	2,7	2,7	2,6	2,3	1,9	1,8	1,8	1,8	1,8	1,9	1,9	1,8	1,7
Road transport: Passenger cars	66,3	67,0	67,2	68,1	67,5	71,6	76,2	79,6	81,6	84,8	85,6	86,4	88,6	90,4	90,9
Road transport:Light duty vehicles	12,4	14,3	15,1	15,5	16,1	17,3	17,9	17,8	18,3	19,6	19,6	20,0	20,2	20,7	21,0
Road transport:Heavy duty vehicles	31,9	35,6	34,9	34,4	35,7	37,0	37,4	36,5	35,6	37,9	38,3	39,5	39,9	40,2	41,3
Road transport: Mopeds & motorcycles	0,6	0,6	0,5	0,5	0,5	0,5	0,6	0,6	0,6	0,6	0,7	0,7	0,8	0,9	0,9
Railways	4,9	4,9	4,4	4,6	4,2	4,0	4,1	4,3	4,5	4,1	4,1	4,1	4,0	3,3	3,1
International navigation (Shipping)	16,2	19,0	28,4	36,2	37,1	39,1	34,9	36,7	55,0	62,0	65,1	62,0	56,7	57,2	53,3
National navigation (Shipping)	10,4	10,3	10,4	10,4	10,5	10,5	10,6	10,9	10,7	10,8	11,3	12,2	12,0	10,0	8,8
Commercial/Institutional: Mobile	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,1	1,1	1,1	1,1	1,2
Residential: Household and gardening (mobile)	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,6	0,6	0,6
Agriculture/Forestry/Fishing: Off-road agriculture/forestry	17,4	17,9	17,5	18,0	17,8	17,7	17,5	16,7	16,7	15,8	16,2	15,4	15,7	14,8	14,8
Agriculture/Forestry/Fishing: National fishing	7,1	8,1	6,3	7,5	7,5	8,0	8,2	7,5	7,1	7,1	7,2	6,8	5,3	5,6	6,4
Other, Mobile (military)	5,5	4,3	5,0	2,7	2,3	1,6	3,9	1,9	3,3	3,5	3,4	2,4	2,3	2,8	2,5

Continued	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Manufacturing industries/Construction (mobile)	12,0	12,1	12,3	12,4	12,5	13,0	14,0	15,1	15,4	11,4	14,4	14,0	13,9
Civil aviation (International, LTO)	3,3	3,3	3,0	2,8	3,1	3,1	3,0	3,0	3,2	2,7	2,9	3,0	3,1
Civil aviation (International, Cruise)	29,3	29,8	25,6	26,9	30,9	32,7	32,9	33,7	33,6	29,4	30,8	31,6	31,8
Civil aviation (Domestic, LTO)	0,7	0,7	0,6	0,5	0,4	0,5	0,5	0,6	0,6	0,6	0,6	0,6	0,5
Civil aviation (Domestic, Cruise)	1,5	1,6	1,4	1,4	1,4	1,4	1,5	1,7	1,7	1,5	1,5	1,4	1,3
Road transport: Passenger cars	90,3	88,9	90,1	92,2	93,0	91,6	92,3	96,8	98,0	96,0	95,6	96,1	96,1
Road transport:Light duty vehicles	21,4	21,9	22,6	24,5	26,7	28,4	31,4	33,9	31,4	28,6	27,5	25,8	24,1
Road transport:Heavy duty vehicles	40,0	41,1	41,0	43,0	44,3	45,3	46,7	47,9	44,8	40,1	41,3	42,3	39,9
Road transport: Mopeds & motorcycles	0,9	0,8	0,8	0,8	0,8	0,8	0,9	0,9	0,9	0,9	0,9	0,9	0,9
Railways	3,1	2,9	2,8	3,0	2,9	3,1	3,1	3,1	3,2	3,1	3,3	3,4	3,4
International navigation (Shipping)	52,6	43,3	35,5	37,5	30,2	30,7	40,8	42,7	36,6	19,6	27,0	27,4	19,8
National navigation (Shipping)	7,9	7,9	7,7	7,7	7,9	7,8	7,8	7,8	7,9	7,9	7,9	7,4	6,6
Commercial/Institutional: Mobile	1,2	1,3	1,5	1,8	2,0	2,2	2,4	2,4	2,4	2,4	2,4	2,3	2,3
Residential: Household and gardening (mobile)	0,6	0,6	0,7	0,7	0,8	0,8	0,8	0,9	0,9	0,9	0,9	0,9	0,9
Agriculture/Forestry/Fishing: Off-road agriculture/forestry	14,4	14,5	14,6	14,6	14,9	15,0	15,5	16,4	17,2	17,4	17,7	18,0	18,4
Agriculture/Forestry/Fishing: National fishing	9,4	9,4	9,7	9,3	7,3	8,7	8,2	7,0	8,2	7,6	6,8	6,8	6,5
Other, Mobile (military)	1,5	1,3	1,2	1,3	3,3	3,7	1,7	2,4	1,5	2,2	1,5	2,7	1,6

Emissions 1985-1999.

pol_name	NFR category	Unit	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Manufacturing industries/Construction (mobile)	[tonnes]	2402	1441	1440	1438	956	952	955	957	957	959	968	244	246	249	251
SO_2	Civil aviation (International, LTO)	[tonnes]	38	41	42	44	49	50	48	52	53	55	59	63	68	69	73
SO_2	Civil aviation (International, Cruise)	[tonnes]	406	439	473	506	528	504	473	488	476	525	537	566	574	620	658
SO_2	Civil aviation (Domestic, LTO)	[tonnes]	25	23	24	24	25	24	20	20	20	20	21	22	23	20	18
SO_2	Civil aviation (Domestic, Cruise)	[tonnes]	57	54	61	62	59	54	44	42	41	42	42	44	45	42	38
SO_2	Road transport: Passenger cars	[tonnes]	1714	1152	1149	1169	848	908	953	672	365	385	387	391	398	407	317
SO_2	Road transport:Light duty vehicles	[tonnes]	2488	1741	1828	1883	1316	1414	1462	936	372	400	402	411	417	424	240
SO_2	Road transport:Heavy duty vehicles	[tonnes]	7418	4968	4868	4803	3323	3444	3487	2211	830	882	892	918	927	934	528
SO_2	Road transport: Mopeds & motorcycles	[tonnes]	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
SO_2	Railways	[tonnes]	1152	695	618	641	393	376	382	263	105	95	96	95	93	78	40
SO_2	International navigation (Shipping)	[tonnes]	17037	20752	35647	46755	47058	41317	33277	30084	58492	58965	65049	61075	55822	46756	49282
SO_2	National navigation (Shipping)	[tonnes]	7480	7480	7484	7228	7231	6429	5111	3506	4410	4974	5588	4400	3649	2283	2051
SO_2	Commercial/Institutional: Mobile	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
SO_2	Residential: Household and gardening (mobile)	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SO_2	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	3774	2341	2298	2369	1571	1561	1552	1485	1487	1407	1451	347	353	335	334
SO_2	Agriculture/Forestry/Fishing: National fishing	[tonnes]	993	1143	876	703	698	742	765	701	663	665	668	632	499	521	597
SO_2	Other, Mobile (military)	[tonnes]	408	260	193	72	70	48	206	82	76	80	80	56	54	65	47
NO_x	Manufacturing industries/Construction (mobile)	[tonnes]	10903	10964	11011	11044	11065	11081	11282	11440	11558	11677	11882	12080	12248	12425	12262
NO_x	Civil aviation (International, LTO)	[tonnes]	568	611	616	652	723	722	687	752	768	773	829	882	941	972	1030
NO_x	Civil aviation (International, Cruise)	[tonnes]	5096	5518	5952	6383	6591	6293	5899	6094	5935	6543	6688	7022	7117	7690	8174
NO_x	Civil aviation (Domestic, LTO)	[tonnes]	400	378	381	383	384	373	312	321	335	353	371	369	381	334	296
NO_x	Civil aviation (Domestic, Cruise)	[tonnes]	803	754	856	868	824	750	608	581	564	586	587	602	617	577	520
NO_x	Road transport: Passenger cars	[tonnes]	57216	58346	59333	61147	61153	65510	68046	67915	66179	63881	59513	55400	52173	48139	43763
NO_x	Road transport:Light duty vehicles	[tonnes]	5442	6187	6505	6663	6845	7313	7623	7672	7946	8446	8344	8293	8186	8193	8161
NO_x	Road transport:Heavy duty vehicles	[tonnes]	31306	34887	34173	33706	34948	36150	36631	35693	34728	36351	35672	35506	35089	34915	35451
NO_x	Road transport: Mopeds & motorcycles	[tonnes]	69	67	65	65	64	68	70	75	78	83	87	90	97	103	104
NO_x	Railways	[tonnes]	6025	6063	5391	5589	5145	4913	4995	5284	5485	4971	5015	4977	4846	4089	3730
NO_x	International navigation (Shipping)	[tonnes]	22455	26921	42068	54983	56940	60639	53939	55808	87852	99296	105113	100507	93239	92360	89143
NO_x	National navigation (Shipping)	[tonnes]	13299	13339	13414	13486	13568	13649	13180	12882	12753	12999	13679	14756	13543	11175	8720
NO_x	Commercial/Institutional: Mobile	[tonnes]	66	67	68	70	70	70	75	80	85	89	93	95	98	101	102
NO_x	Residential: Household and gardening (mobile)	[tonnes]	31	32	33	34	34	34	36	38	40	42	43	45	46	48	49
NO_x	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	11308	11907	11873	12471	12568	12679	12930	12627	12886	12461	13178	13139	13754	13273	13466
NO_x	Agriculture/Forestry/Fishing: National fishing	[tonnes]	6851	8008	6280	7673	7774	8387	8792	8198	7877	8063	8264	7999	6422	6846	8030
NO_x	Other, Mobile (military)	[tonnes]	2285	1951	1586	1003	874	485	1755	947	1234	1223	1637	910	1117	1300	1025
NMVOC	Manufacturing industries/Construction (mobile)	[tonnes]	2422	2395	2368	2339	2304	2266	2231	2191	2147	2107	2088	2095	2083	2074	1997

NMVOC	Civil aviation (International, LTO)	[tonnes]	85	97	107	121	135	115	107	107	106	84	115	121	123	124	116
NMVOC	Civil aviation (International, Cruise)	[tonnes]	194	211	228	245	249	238	223	231	224	247	252	264	267	289	308
NMVOC	Civil aviation (Domestic, LTO)	[tonnes]	186	185	158	165	162	158	146	143	140	169	184	171	164	147	142
NMVOC	Civil aviation (Domestic, Cruise)	[tonnes]	33	31	36	36	34	31	25	24	23	24	24	25	25	24	22
NMVOC	Road transport: Passenger cars	[tonnes]	44673	44130	43893	42358	40705	42446	44762	44188	43910	41686	39723	38622	35137	32615	28797
NMVOC	Road transport:Light duty vehicles	[tonnes]	1333	1468	1555	1524	1518	1607	1729	1753	1878	1948	1917	1905	1766	1743	1663
NMVOC	Road transport:Heavy duty vehicles	[tonnes]	2173	2372	2308	2253	2314	2351	2388	2297	2214	2305	2284	2227	2106	1962	1844
NMVOC	Road transport: Mopeds & motorcycles	[tonnes]	2125	1946	1819	1736	1659	1708	1754	1788	1801	1812	1995	2238	2664	3109	3034
NMVOC	Road transport: Gasoline evaporation	[tonnes]	24997	25561	25612	27250	27439	29132	29433	29607	27463	26759	24162	20974	19717	16806	14846
NMVOC	Railways	[tonnes]	393	396	352	365	336	321	326	345	358	324	327	325	316	267	276
NMVOC	International navigation (Shipping)	[tonnes]	825	974	1472	1892	1947	2060	1839	1928	2933	3318	3501	3343	3082	3102	2929
NMVOC	National navigation (Shipping)	[tonnes]	1560	1560	1592	1622	1654	1686	1719	1761	1786	1820	1879	1975	1969	1873	1776
NMVOC	Commercial/Institutional: Mobile	[tonnes]	2347	2333	2318	2303	2303	2303	2314	2302	2265	2285	2367	2458	2547	2636	2741
NMVOC	Residential: Household and gardening (mobile)	[tonnes]	1844	1833	1821	1809	1805	1801	1797	1792	1789	1785	1780	1774	1767	1759	1758
NMVOC	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	6020	6027	5902	5909	5824	5744	5360	4914	4584	4272	4146	3847	3687	3399	3219
NMVOC	Agriculture/Forestry/Fishing: National fishing	[tonnes]	337	390	314	375	383	405	417	384	360	366	370	361	279	292	344
NMVOC	Other, Mobile (military)	[tonnes]	564	440	169	467	299	53	158	84	120	117	143	88	99	110	104
CH_4	Manufacturing industries/Construction (mobile)	[tonnes]	63	63	62	61	61	60	58	57	56	54	53	53	53	53	51
CH_4	Civil aviation (International, LTO)	[tonnes]	6	7	8	9	10	9	8	8	8	8	11	12	12	13	12
CH_4	Civil aviation (International, Cruise)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH_4	Civil aviation (Domestic, LTO)	[tonnes]	5	5	5	5	5	4	4	4	4	5	5	5	5	4	4
CH_4	Civil aviation (Domestic, Cruise)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH_4	Road transport: Passenger cars	[tonnes]	1576	1599	1621	1645	1631	1737	1823	1838	1824	1774	1679	1590	1513	1435	1332
CH_4	Road transport:Light duty vehicles	[tonnes]	81	92	96	99	102	108	112	115	118	126	122	117	113	110	103
CH_4	Road transport:Heavy duty vehicles	[tonnes]	257	286	280	277	287	297	301	293	287	307	317	330	331	328	330
CH_4	Road transport: Mopeds & motorcycles	[tonnes]	100	95	91	89	86	91	93	97	101	104	111	119	133	147	147
CH_4	Railways	[tonnes]	15	15	14	14	13	12	13	13	14	12	13	12	12	10	11
CH_4	International navigation (Shipping)	[tonnes]	26	30	46	59	60	64	57	60	91	103	108	103	95	96	91
CH_4	National navigation (Shipping)	[tonnes]	30	30	31	31	32	32	33	34	34	35	36	38	38	35	34
CH_4	Commercial/Institutional: Mobile	[tonnes]	104	102	100	99	99	99	97	95	92	90	89	89	89	89	90
CH_4	Residential: Household and gardening (mobile)	[tonnes]	55	54	53	52	51	51	50	49	48	48	47	46	45	45	45
CH_4	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	145	142	137	134	130	126	118	111	105	98	95	89	85	80	77
CH_4	Agriculture/Forestry/Fishing: National fishing	[tonnes]	10	12	10	12	12	13	13	12	11	11	12	11	9	9	11
CH_4	Other, Mobile (military)	[tonnes]	28	23	16	17	13	5	17	9	12	12	17	10	12	13	11
CO	Manufacturing industries/Construction (mobile)	[tonnes]	9863	9784	9702	9611	9502	9379	9294	9188	9070	8956	8910	8963	8939	8907	8647
CO	Civil aviation (International, LTO)	[tonnes]	427	480	508	583	669	590	557	574	580	450	506	532	577	598	619
CO	Civil aviation (International, Cruise)	[tonnes]	676	727	781	833	894	853	800	825	808	892	915	970	987	1065	1123

CO	Civil aviation (Domestic, LTO)	[tonnes]	1039	1037	885	931	916	895	826	801	780	941	1024	958	923	824	802
CO	Civil aviation (Domestic, Cruise)	[tonnes]	218	204	233	237	224	203	162	154	150	157	156	159	162	149	130
CO	Road transport: Passenger cars	[tonnes]	543043	515315	492705	455881	423852	431213	450464	436546	423024	391546	371759	360862	324514	301585	265548
CO	Road transport:Light duty vehicles	[tonnes]	13182	14486	15339	15137	15084	15974	17120	17473	18674	19447	18847	18071	16226	15566	14284
CO	Road transport:Heavy duty vehicles	[tonnes]	8872	9656	9414	9210	9429	9708	9864	9635	9428	10023	10216	10331	10068	9777	9586
CO	Road transport: Mopeds & motorcycles	[tonnes]	8581	8259	7909	7818	7610	8036	8267	8675	9017	9423	9958	10519	11606	12657	12656
CO	Railways	[tonnes]	1098	1105	982	1018	937	895	910	963	999	906	914	907	883	745	717
CO	International navigation (Shipping)	[tonnes]	2722	3214	4855	6243	6424	6796	6065	6361	9677	10946	11548	11030	10168	10233	9662
CO	National navigation (Shipping)	[tonnes]	5472	5473	5636	5797	5962	6126	6297	6491	6623	6805	7057	7246	7150	6983	6779
CO	Commercial/Institutional: Mobile	[tonnes]	31348	30972	30583	30181	30181	30181	29610	28987	28319	27809	27575	27800	28012	28211	28817
CO	Residential: Household and gardening (mobile)	[tonnes]	19086	18725	18352	17968	17789	17606	17238	16880	16708	16556	16422	16311	16217	16136	16286
CO	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	60053	58421	56249	54554	52494	50431	47422	44184	41431	38543	36465	33697	31539	28859	26698
CO	Agriculture/Forestry/Fishing: National fishing	[tonnes]	1112	1286	1007	1214	1223	1303	1348	1243	1177	1193	1208	1161	915	964	1121
CO	Other, Mobile (military)	[tonnes]	4229	3121	1313	3191	1971	424	1019	518	852	874	896	621	605	684	694
CO_2	Manufacturing industries/Construction (mobile)	[ktonnes]	850	849	848	846	843	839	841	841	839	839	846	851	858	865	871
CO_2	Civil aviation (International, LTO)	[ktonnes]	119	128	132	139	154	156	151	163	167	173	184	199	212	217	230
CO_2	Civil aviation (International, Cruise)	[ktonnes]	1272	1375	1481	1586	1655	1580	1481	1530	1492	1645	1683	1772	1798	1942	2060
CO_2	Civil aviation (Domestic, LTO)	[ktonnes]	77	72	77	77	78	75	62	62	62	64	66	69	72	63	55
CO_2	Civil aviation (Domestic, Cruise)	[ktonnes]	179	169	191	194	184	168	137	132	128	133	132	136	140	131	119
CO_2	Road transport: Passenger cars	[ktonnes]	4847	4901	4914	4975	4932	5235	5567	5816	5966	6197	6256	6320	6479	6608	6644
CO_2	Road transport:Light duty vehicles	[ktonnes]	918	1059	1112	1144	1189	1275	1322	1312	1350	1445	1448	1475	1494	1525	1553
CO_2	Road transport:Heavy duty vehicles	[ktonnes]	2360	2632	2579	2544	2638	2734	2769	2701	2637	2804	2836	2920	2949	2971	3052
CO_2	Road transport: Mopeds & motorcycles	[ktonnes]	43	41	39	38	37	39	41	42	44	46	49	52	57	63	63
CO_2	Railways	[ktonnes]	364	366	326	338	311	297	302	319	331	300	303	301	293	247	232
CO_2	International navigation (Shipping)	[ktonnes]	1238	1454	2179	2786	2854	3005	2673	2797	4214	4744	4976	4725	4326	4337	4053
CO_2	National navigation (Shipping)	[ktonnes]	784	784	787	790	793	796	803	817	803	814	850	917	898	745	655
CO_2	Commercial/Institutional: Mobile	[ktonnes]	74	74	74	74	74	74	74	75	75	77	78	80	81	83	85
CO_2	Residential: Household and gardening (mobile)	[ktonnes]	40	40	39	39	39	39	39	39	39	39	40	40	41	41	42
CO_2	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[ktonnes]	1283	1320	1294	1329	1318	1308	1295	1238	1235	1168	1199	1141	1159	1097	1091
CO_2	Agriculture/Forestry/Fishing: National fishing	[ktonnes]	523	602	464	558	556	591	607	556	525	527	529	502	395	412	473
CO_2	Other, Mobile (military)	[ktonnes]	402	316	361	196	165	119	287	141	237	252	252	176	171	204	182
N_2O	Manufacturing industries/Construction (mobile)	[tonnes]	34	34	34	34	34	34	34	35	35	35	35	36	36	36	37
N_2O	Civil aviation (International, LTO)	[tonnes]	6	6	7	7	8	9	8	9	10	10	11	12	13	13	14
N_2O	Civil aviation (International, Cruise)	[tonnes]	41	44	47	51	53	50	47	49	48	53	54	57	57	62	66
N_2O	Civil aviation (Domestic, LTO)	[tonnes]	4	4	5	5	5	5	5	5	5	5	5	6	6	5	5
N_2O	Civil aviation (Domestic, Cruise)	[tonnes]	6	5	6	6	6	5	4	4	4	4	4	4	4	4	4
N_2O	Road transport: Passenger cars	[tonnes]	164	166	168	173	172	183	197	214	225	241	250	259	270	271	270

N_2O	Road transport:Light duty vehicles	[tonnes]	4	4	5	5	5	5	5	6	6	6	8	11	15	19	24
N_2O	Road transport:Heavy duty vehicles	[tonnes]	93	103	100	98	102	104	105	102	98	105	108	112	115	118	122
N_2O	Road transport: Mopeds & motorcycles	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N_2O	Railways	[tonnes]	10	10	9	9	9	8	8	9	9	8	8	8	8	7	6
N_2O	International navigation (Shipping)	[tonnes]	78	92	137	175	179	189	168	176	265	298	313	297	272	273	255
N_2O	National navigation (Shipping)	[tonnes]	48	48	48	48	48	48	49	50	49	49	51	55	54	44	39
N_2O	Commercial/Institutional: Mobile	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N_2O	Residential: Household and gardening (mobile)	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
N_2O	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	48	49	49	50	50	50	50	48	48	46	47	45	46	44	44
N_2O	Agriculture/Forestry/Fishing: National fishing	[tonnes]	33	38	29	35	35	37	38	35	33	33	33	32	25	26	30
N_2O	Other, Mobile (military)	[tonnes]	12	9	11	6	5	4	8	4	7	8	7	5	5	6	6
NH_3	Manufacturing industries/Construction (mobile)	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
NH_3	Civil aviation (International, LTO)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Civil aviation (International, Cruise)	[tonnes]															0
NH_3	Civil aviation (Domestic, LTO)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Civil aviation (Domestic, Cruise)	[tonnes]															0
NH_3	Road transport: Passenger cars	[tonnes]	48	49	50	51	51	54	146	339	529	807	1073	1323	1663	2013	2291
NH_3	Road transport:Light duty vehicles	[tonnes]	4	5	5	6	6	6	6	6	7	7	11	19	28	38	48
NH_3	Road transport:Heavy duty vehicles	[tonnes]	9	10	10	10	10	10	11	10	10	11	11	11	12	12	12
NH_3	Road transport: Mopeds & motorcycles	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NH_3	Railways	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NH_3	International navigation (Shipping)	[tonnes]		0						0	0						
NH_3	National navigation (Shipping)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Commercial/Institutional: Mobile	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Residential: Household and gardening (mobile)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
NH_3	Agriculture/Forestry/Fishing: National fishing	[tonnes]		0	0	0	0	0	0	0	0	0	0		0	0	0
NH_3	Other, Mobile (military)	[tonnes]	1	1	0	0	0	0	1	0	0	0	1	0	0	1	1
TSP	Manufacturing industries/Construction (mobile)	[tonnes]	1823	1778	1733	1686	1634	1577	1533	1484	1433	1383	1349	1317	1284	1249	1193
TSP	Civil aviation (International, LTO)	[tonnes]	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4
TSP	Civil aviation (International, Cruise)	[tonnes]	20	22	24	26	27	25	24	25	24	27	27	29	29	31	33
TSP	Civil aviation (Domestic, LTO)	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TSP	Civil aviation (Domestic, Cruise)	[tonnes]	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2
TSP	Road transport: Passenger cars	[tonnes]	1689	1719	1690	1641	1602	1667	1704	1614	1557	1498	1396	1312	1183	1070	984
TSP	Road transport:Light duty vehicles	[tonnes]	1383	1595	1684	1676	1731	1854	1960	1903	1992	2110	2045	1957	1737	1591	1432
TSP	Road transport:Heavy duty vehicles	[tonnes]	1197	1330	1302	1283	1329	1373	1391	1352	1317	1379	1358	1348	1283	1189	1123
TSP	Road transport: Mopeds & motorcycles	[tonnes]	51	47	44	42	41	42	43	44	45	45	50	55	64	74	73

TSP	Road transport: Automobile tyre and brake wear	[tonnes]	866	926	929	940	956	1009	1051	1069	1080	1142	1160	1184	1220	1250	1277
TSP	Road transport: Automobile road abrasion	[tonnes]	684	727	728	735	746	785	820	835	842	889	904	920	947	970	991
TSP	Railways	[tonnes]	247	249	222	229	211	202	205	217	225	204	206	204	199	168	146
TSP	International navigation (Shipping)	[tonnes]	2832	3448	5914	7810	7866	5531	4371	3999	8648	8194	10076	9968	9231	7717	8177
TSP	National navigation (Shipping)	[tonnes]	1099	1099	1103	1098	1103	898	710	519	660	762	919	723	670	451	417
TSP	Commercial/Institutional: Mobile	[tonnes]	24	24	24	24	24	24	24	23	22	23	24	25	27	28	29
TSP	Residential: Household and gardening (mobile)	[tonnes]	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11
TSP	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	2606	2617	2517	2549	2492	2444	2344	2188	2136	1954	1922	1736	1659	1504	1428
TSP	Agriculture/Forestry/Fishing: National fishing	[tonnes]	177	203	156	174	173	184	190	174	164	165	166	157	124	129	148
TSP	Other, Mobile (military)	[tonnes]	101	101	50	18	26	12	114	67	64	55	117	46	73	77	47
PM_{10}	Manufacturing industries/Construction (mobile)	[tonnes]	1823	1778	1733	1686	1634	1577	1533	1484	1433	1383	1349	1317	1284	1249	1193
PM_{10}	Civil aviation (International, LTO)	[tonnes]	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4
PM_{10}	Civil aviation (International, Cruise)	[tonnes]	20	22	24	26	27	25	24	25	24	27	27	29	29	31	33
PM_{10}	Civil aviation (Domestic, LTO)	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
PM_{10}	Civil aviation (Domestic, Cruise)	[tonnes]	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2
PM_{10}	Road transport: Passenger cars	[tonnes]	1689	1719	1690	1641	1602	1667	1704	1614	1557	1498	1396	1312	1183	1070	984
PM_{10}	Road transport:Light duty vehicles	[tonnes]	1383	1595	1684	1676	1731	1854	1960	1903	1992	2110	2045	1957	1737	1591	1432
PM_{10}	Road transport:Heavy duty vehicles	[tonnes]	1197	1330	1302	1283	1329	1373	1391	1352	1317	1379	1358	1348	1283	1189	1123
PM_{10}	Road transport: Mopeds & motorcycles	[tonnes]	51	47	44	42	41	42	43	44	45	45	50	55	64	74	73
PM_{10}	Road transport: Automobile tyre and brake wear	[tonnes]	646	690	693	701	713	752	783	796	803	849	863	880	906	928	948
PM_{10}	Road transport: Automobile road abrasion	[tonnes]	342	364	364	368	373	393	410	417	421	444	452	460	474	485	495
PM_{10}	Railways	[tonnes]	247	249	222	229	211	202	205	217	225	204	206	204	199	168	146
PM_{10}	International navigation (Shipping)	[tonnes]	2803	3413	5855	7732	7788	5476	4327	3959	8561	8112	9975	9869	9139	7639	8095
PM_{10}	National navigation (Shipping)	[tonnes]	1089	1089	1093	1088	1093	890	704	515	655	756	911	717	664	448	414
PM_{10}	Commercial/Institutional: Mobile	[tonnes]	24	24	24	24	24	24	24	23	22	23	24	25	27	28	29
PM_{10}	Residential: Household and gardening (mobile)	[tonnes]	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11
PM_{10}	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	2606	2617	2517	2549	2492	2444	2344	2188	2136	1954	1922	1736	1659	1504	1428
PM_{10}	Agriculture/Forestry/Fishing: National fishing	[tonnes]	175	201	154	173	171	182	188	172	163	163	164	155	122	128	147
PM_{10}	Other, Mobile (military)	[tonnes]	101	101	50	18	26	12	114	67	64	55	117	46	73	77	47
$PM_{2.5}$	Manufacturing industries/Construction (mobile)	[tonnes]	1823	1778	1733	1686	1634	1577	1533	1484	1433	1383	1349	1317	1284	1249	1193
$PM_{2.5}$	Civil aviation (International, LTO)	[tonnes]	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4
$PM_{2.5}$	Civil aviation (International, Cruise)	[tonnes]	20	22	24	26	27	25	24	25	24	27	27	29	29	31	33
$PM_{2.5}$	Civil aviation (Domestic, LTO)	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
$PM_{2.5}$	Civil aviation (Domestic, Cruise)	[tonnes]	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2
$PM_{2.5}$	Road transport: Passenger cars	[tonnes]	1689	1719	1690	1641	1602	1667	1704	1614	1557	1498	1396	1312	1183	1070	984
$PM_{2.5}$	Road transport:Light duty vehicles	[tonnes]	1383	1595	1684	1676	1731	1854	1960	1903	1992	2110	2045	1957	1737	1591	1432
$PM_{2.5}$	Road transport:Heavy duty vehicles	[tonnes]	1197	1330	1302	1283	1329	1373	1391	1352	1317	1379	1358	1348	1283	1189	1123

$PM_{2.5}$	Road transport: Mopeds & motorcycles	[tonnes]	51	47	44	42	41	42	43	44	45	45	50	55	64	74	73
$PM_{2.5}$	Road transport: Automobile tyre and brake wear	[tonnes]	354	378	379	384	391	412	429	437	441	467	474	484	499	511	522
$PM_{2.5}$	Road transport: Automobile road abrasion	[tonnes]	185	196	197	198	202	212	221	225	227	240	244	248	256	262	267
$PM_{2.5}$	Railways	[tonnes]	247	249	222	229	211	202	205	217	225	204	206	204	199	168	146
$PM_{2.5}$	International navigation (Shipping)	[tonnes]	2789	3396	5825	7693	7748	5448	4305	3939	8518	8071	9925	9819	9093	7601	8054
$PM_{2.5}$	National navigation (Shipping)	[tonnes]	1084	1084	1088	1083	1088	886	701	513	652	753	907	714	662	446	413
$PM_{2.5}$	Commercial/Institutional: Mobile	[tonnes]	24	24	24	24	24	24	24	23	22	23	24	25	27	28	29
$PM_{2.5}$	Residential: Household and gardening (mobile)	[tonnes]	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11
$PM_{2.5}$	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	2606	2617	2517	2549	2492	2444	2344	2188	2136	1954	1922	1736	1659	1504	1428
$PM_{2.5}$	Agriculture/Forestry/Fishing: National fishing	[tonnes]	174	200	154	172	171	181	187	171	162	162	163	154	122	127	146
$PM_{2.5}$	Other, Mobile (military)	[tonnes]	101	101	50	18	26	12	114	67	64	55	117	46	73	77	47
Arsenic	Manufacturing industries/Construction (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Civil aviation (International, Cruise)	[kg]															0
Arsenic	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Civil aviation (Domestic, Cruise)	[kg]															0
Arsenic	Road transport: Passenger cars	[kg]	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Arsenic	Road transport:Light duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Road transport:Heavy duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Road transport: Automobile tyre and brake wear	[kg]	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5
Arsenic	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	International navigation (Shipping)	[kg]	123	149	256	339	341	353	292	267	465	496	505	325	417	357	369
Arsenic	National navigation (Shipping)	[kg]	62	62	62	62	62	62	55	47	47	49	50	44	36	28	25
Arsenic	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Agriculture/Forestry/Fishing: National fishing	[kg]	8	10	7	9	9	9	10	9	8	8	8	8	6	7	7
Arsenic	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Manufacturing industries/Construction (mobile)	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Cadmium	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Road transport: Passenger cars	[kg]	17	17	17	18	18	19	20	21	22	23	23	23	23	24	24
Cadmium	Road transport:Light duty vehicles	[kg]	2	3	3	3	3	3	3	3	3	4	4	4	4	4	4

Cadmium	Road transport:Heavy duty vehicles	[kg]	5	5	5	5	5	5	5	5	5	5	5	6	6	6	6
Cadmium	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Road transport: Automobile tyre and brake wear	[kg]	4	4	4	4	4	5	5	5	5	5	5	5	6	6	6
Cadmium	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Railways	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cadmium	International navigation (Shipping)	[kg]	8	10	17	22	22	23	20	19	31	34	35	20	29	26	26
Cadmium	National navigation (Shipping)	[kg]	5	5	5	5	5	5	4	4	4	4	4	4	4	3	3
Cadmium	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Cadmium	Agriculture/Forestry/Fishing: National fishing	[kg]	2	2	1	2	2	2	2	2	2	2	2	2	1	1	1
Cadmium	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Manufacturing industries/Construction (mobile)	[kg]	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Chromium	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Road transport: Passenger cars	[kg]	28	28	29	29	29	31	33	34	35	37	37	37	38	39	39
Chromium	Road transport:Light duty vehicles	[kg]	8	9	9	10	10	11	11	11	11	12	12	13	13	13	13
Chromium	Road transport:Heavy duty vehicles	[kg]	18	20	19	19	19	20	20	20	19	20	21	21	22	22	23
Chromium	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Road transport: Automobile tyre and brake wear	[kg]	40	43	43	44	45	47	48	49	49	52	53	54	55	56	58
Chromium	Road transport: Automobile road abrasion	[kg]	14	14	14	15	15	16	16	17	17	18	18	18	19	19	20
Chromium	Railways	[kg]	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2
Chromium	International navigation (Shipping)	[kg]	52	63	106	140	141	147	123	115	195	210	214	131	178	157	160
Chromium	National navigation (Shipping)	[kg]	28	28	28	28	28	28	25	23	22	23	24	22	19	15	14
Chromium	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	11	11	11	12	11	11	11	11	11	10	10	10	10	10	10
Chromium	Agriculture/Forestry/Fishing: National fishing	[kg]	7	8	6	7	7	7	8	7	7	7	7	6	5	5	6
Chromium	Other, Mobile (military)	[kg]	1	1	0	0	0	0	1	1	1	0	1	0	1	1	1
Copper	Manufacturing industries/Construction (mobile)	[kg]	6	6	5	5	5	5	5	5	5	5	5	6	6	6	6
Copper	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Road transport: Passenger cars	[kg]	61	62	63	65	64	69	73	77	79	82	83	83	86	87	87

Copper	Road transport:Light duty vehicles	[kg]	6	7	8	8	8	9	9	9	9	10	10	10	11	11	11
Copper	Road transport:Heavy duty vehicles	[kg]	13	14	14	13	14	14	14	14	13	14	15	15	15	16	16
Copper	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Road transport: Automobile tyre and brake wear	[kg]	24140	25381	25781	26436	26684	28446	29937	30964	31721	33385	33712	34115	35210	36060	36569
Copper	Road transport: Automobile road abrasion	[kg]	7	7	7	7	7	8	8	8	8	9	9	9	9	10	10
Copper	Railways	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Copper	International navigation (Shipping)	[kg]	123	149	256	339	341	353	292	267	465	496	505	325	417	357	369
Copper	National navigation (Shipping)	[kg]	62	62	62	62	63	63	56	48	47	49	50	45	36	29	26
Copper	Commercial/Institutional: Mobile	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper	Residential: Household and gardening (mobile)	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	9	9	9	9	9	9	9	8	8	8	8	8	8	7	7
Copper	Agriculture/Forestry/Fishing: National fishing	[kg]	8	10	7	9	9	9	10	9	8	8	8	9	6	7	7
Copper	Other, Mobile (military)	[kg]	1	1	0	0	0	0	1	0	0	0	1	0	1	1	0
Mercury	Manufacturing industries/Construction (mobile)	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mercury	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Civil aviation (International, Cruise)	[kg]															0
Mercury	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Civil aviation (Domestic, Cruise)	[kg]															0
Mercury	Road transport: Passenger cars	[kg]	13	13	13	13	13	14	14	15	16	16	16	16	17	17	17
Mercury	Road transport:Light duty vehicles	[kg]	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
Mercury	Road transport:Heavy duty vehicles	[kg]	4	4	4	4	4	5	5	5	4	5	5	5	5	5	5
Mercury	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Road transport: Automobile tyre and brake wear	[kg]															
Mercury	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Railways	[kg]	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0
Mercury	International navigation (Shipping)	[kg]	13	14	19	24	25	27	25	29	40	47	50	14	45	49	43
Mercury	National navigation (Shipping)	[kg]	9	9	9	9	9	9	9	10	9	10	10	11	12	10	8
Mercury	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mercury	Agriculture/Forestry/Fishing: National fishing	[kg]	8	10	7	9	9	9	10	9	8	8	8	8	6	7	7
Mercury	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Manufacturing industries/Construction (mobile)	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Nickel	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Nickel	Road transport: Passenger cars	[kg]	20	20	20	21	21	22	23	25	25	26	26	27	27	28	28
Nickel	Road transport:Light duty vehicles	[kg]	2	3	3	3	3	3	4	4	4	4	4	4	4	4	4
Nickel	Road transport:Heavy duty vehicles	[kg]	5	5	5	5	5	5	5	5	5	5	6	6	6	6	6
Nickel	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Road transport: Automobile tyre and brake wear	[kg]	51	54	55	55	56	59	61	62	63	66	67	69	71	72	74
Nickel	Road transport: Automobile road abrasion	[kg]	11	12	12	12	12	12	13	13	13	14	14	15	15	15	16
Nickel	Railways	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nickel	International navigation (Shipping)	[kg]	6902	8453	14797	19676	19776	20420	16701	14894	26627	28129	28488	19451	23291	19285	20431
Nickel	National navigation (Shipping)	[kg]	3362	3362	3362	3362	3362	3362	2889	2360	2359	2477	2492	2087	1520	1179	1077
Nickel	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	3	4	3	4	3	3	3	3	3	3	3	3	3	3	3
Nickel	Agriculture/Forestry/Fishing: National fishing	[kg]	12	13	10	12	12	13	13	12	12	12	12	11	9	9	10
Nickel	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead	Manufacturing industries/Construction (mobile)	[kg]	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Lead	Civil aviation (International, LTO)	[kg]	348	405	393	498	603	490	465	452	456	153	175	126	145	145	124
Lead	Civil aviation (International, Cruise)	[kg]															0
Lead	Civil aviation (Domestic, LTO)	[kg]	1815	1825	1506	1594	1563	1534	1423	1378	1328	1639	1788	1640	1559	1399	1387
Lead	Civil aviation (Domestic, Cruise)	[kg]															0
Lead	Road transport: Passenger cars	[kg]	203835	184449	143450	138437	119660	93303	72652	65867	28571	77	77	78	80	81	82
Lead	Road transport:Light duty vehicles	[kg]	6086	5953	4864	4732	4113	3199	2473	2264	1018	21	21	22	22	23	23
Lead	Road transport:Heavy duty vehicles	[kg]	769	703	530	482	416	325	252	225	113	31	32	33	34	34	35
Lead	Road transport: Mopeds & motorcycles	[kg]	1998	1726	1279	1203	1025	795	597	539	236	0	0	0	0	0	0
Lead	Road transport: Automobile tyre and brake wear	[kg]	3144	3303	3358	3446	3477	3709	3907	4047	4149	4366	4407	4457	4602	4714	4780
Lead	Road transport: Automobile road abrasion	[kg]	32	34	34	35	35	37	39	39	40	42	42	43	45	46	47
Lead	Railways	[kg]	5	6	5	5	5	4	5	5	5	5	5	5	4	4	4
Lead	International navigation (Shipping)	[kg]	62	74	118	153	156	162	140	138	221	243	251	132	214	201	196
Lead	National navigation (Shipping)	[kg]	35	35	35	35	35	35	34	33	32	33	34	35	32	26	23
Lead	Commercial/Institutional: Mobile	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lead	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	19	20	19	20	20	19	19	18	18	17	18	17	17	16	16
Lead	Agriculture/Forestry/Fishing: National fishing	[kg]	17	19	15	18	17	19	19	18	17	17	17	16	12	13	15
Lead	Other, Mobile (military)	[kg]	1206	855	168	879	478	64	82	63	121	86	104	99	125	118	79
Selenium	Manufacturing industries/Construction (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Selenium	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport: Passenger cars	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport:Light duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport:Heavy duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport: Automobile tyre and brake wear	[kg]	17	19	19	19	19	20	21	21	22	23	23	24	24	25	26
Selenium	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	International navigation (Shipping)	[kg]	124	148	236	306	311	325	279	275	442	486	503	264	427	402	391
Selenium	National navigation (Shipping)	[kg]	69	69	69	69	69	69	67	64	63	64	66	67	62	50	43
Selenium	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Agriculture/Forestry/Fishing: National fishing	[kg]	33	38	29	35	35	37	38	35	33	33	33	32	25	26	30
Selenium	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	Manufacturing industries/Construction (mobile)	[kg]	424	423	423	422	421	419	420	420	419	419	422	425	428	432	435
Zinc	Civil aviation (International, LTO)	[kg]	1	2	1	2	2	2	2	2	2	1	1	0	1	1	0
Zinc	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	Civil aviation (Domestic, LTO)	[kg]	7	7	6	6	6	6	5	5	5	6	7	6	6	5	5
Zinc	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	Road transport: Passenger cars	[kg]	3331	3405	3438	3529	3526	3763	4001	4211	4329	4501	4544	4563	4686	4756	4779
Zinc	Road transport:Light duty vehicles	[kg]	470	543	570	590	614	659	680	678	695	753	761	777	793	812	828
Zinc	Road transport:Heavy duty vehicles	[kg]	926	1027	1002	978	1012	1032	1048	1014	977	1047	1080	1108	1125	1146	1184
Zinc	Road transport: Mopeds & motorcycles	[kg]	11	11	11	11	11	11	12	13	13	14	15	15	16	16	16
Zinc	Road transport: Automobile tyre and brake wear	[kg]	11168	11887	11968	12160	12345	13068	13648	13950	14153	14952	15163	15444	15928	16316	16640
Zinc	Road transport: Automobile road abrasion	[kg]	52	55	55	56	56	59	62	63	64	67	68	69	72	73	75
Zinc	Railways	[kg]	183	185	164	170	157	150	152	161	167	151	153	152	148	124	117
Zinc	International navigation (Shipping)	[kg]	287	341	540	700	712	744	643	638	1017	1121	1162	595	991	940	910
Zinc	National navigation (Shipping)	[kg]	184	184	186	187	189	191	187	184	183	188	195	202	193	165	151
Zinc	Commercial/Institutional: Mobile	[kg]	51	51	51	51	51	51	51	52	52	53	54	55	56	57	59
Zinc	Residential: Household and gardening (mobile)	[kg]	28	27	27	27	27	27	27	27	27	27	27	28	28	28	29
Zinc	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	664	682	668	685	679	674	666	636	634	600	614	584	593	561	558
Zinc	Agriculture/Forestry/Fishing: National fishing	[kg]	83	95	73	88	87	93	96	88	83	83	84	80	62	65	75
Zinc	Other, Mobile (military)	[kg]	63	61	24	23	22	5	57	35	31	28	63	26	46	54	37
HCB	Manufacturing industries/Construction (mobile)	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Civil aviation (International, LTO)	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Civil aviation (International, Cruise)	[g]						0	0	0	0	0	0	0	0	0	0

HCB	Civil aviation (Domestic, LTO)	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Civil aviation (Domestic, Cruise)	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Road transport: Passenger cars	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Road transport:Light duty vehicles	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Road transport:Heavy duty vehicles	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Road transport: Mopeds & motorcycles	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Railways	[g]						0	0	0	0	0	0	0	0	0	0
HCB	International navigation (Shipping)	[g]						0	0	0	0	0	0	0	0	0	0
HCB	National navigation (Shipping)	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Commercial/Institutional: Mobile	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Residential: Household and gardening (mobile)	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Agriculture/Forestry/Fishing: National fishing	[g]						0	0	0	0	0	0	0	0	0	0
HCB	Other, Mobile (military)	[g]						0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Manufacturing industries/Construction (mobile)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (International, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (International, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (Domestic, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (Domestic, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road transport: Passenger cars	[g]	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Dioxins/furans	Road transport:Light duty vehicles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road transport:Heavy duty vehicles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road transport: Mopeds & motorcycles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Railways	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	International navigation (Shipping)	[g]	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1
Dioxins/furans	National navigation (Shipping)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Commercial/Institutional: Mobile	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Residential: Household and gardening (mobile)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Agriculture/Forestry/Fishing: National fishing	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Other, Mobile (military)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flouranthene	Manufacturing industries/Construction (mobile)	[kg]	999	999	998	997	994	45	44	45	46	45	46	46	46	46	46
Flouranthene	Civil aviation (International, LTO)	[kg]	6	6	6	7	7	0	0	0	0	0	0	0	0	0	0
Flouranthene	Civil aviation (International, Cruise)	[kg]	60	65	70	75	79	0	0	0	0	0	0	0	0	0	0
Flouranthene	Civil aviation (Domestic, LTO)	[kg]	4	3	4	4	4	0	0	0	0	1	1	1	0	0	0
Flouranthene	Civil aviation (Domestic, Cruise)	[kg]	9	8	9	9	9	0	0	0	0	0	0	0	0	0	0
Flouranthene	Road transport: Passenger cars	[kg]	563	574	578	592	591	631	652	645	626	606	561	519	491	455	424

Flouranthene	Road transport:Light duty vehicles	[kg]	102	118	124	128	133	143	148	147	151	161	162	164	167	170	172
Flouranthene	Road transport:Heavy duty vehicles	[kg]	65	73	72	71	73	76	77	75	74	79	80	82	82	82	83
Flouranthene	Road transport: Mopeds & motorcycles	[kg]	5	5	5	5	5	5	6	6	6	7	7	7	7	8	8
Flouranthene	Railways	[kg]	479	482	428	444	409	5	5	6	6	6	6	6	6	5	4
Flouranthene	International navigation (Shipping)	[kg]	89	103	144	180	186	198	184	205	288	334	355	344	316	338	304
Flouranthene	National navigation (Shipping)	[kg]	85	85	88	91	94	66	68	71	70	70	74	82	82	67	58
Flouranthene	Commercial/Institutional: Mobile	[kg]	3	3	3	3	3	4	4	4	4	5	5	5	5	5	5
Flouranthene	Residential: Household and gardening (mobile)	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flouranthene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	1572	1625	1594	1644	1634	78	75	73	74	68	71	67	67	63	63
Flouranthene	Agriculture/Forestry/Fishing: National fishing	[kg]	52	60	46	56	55	59	61	56	52	53	53	50	40	41	47
Flouranthene	Other, Mobile (military)	[kg]	147	147	79	23	37	1	7	4	4	3	8	3	6	6	4
Benzo(b) flouranthene	Manufacturing industries/Construction (mobile)	[kg]	100	100	100	100	99	6	6	6	6	6	6	6	6	6	6
Benzo(b) flouranthene	Civil aviation (International, LTO)	[kg]	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Civil aviation (International, Cruise)	[kg]	6	7	7	8	8	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Civil aviation (Domestic, Cruise)	[kg]	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Road transport: Passenger cars	[kg]	36	37	37	38	38	41	42	42	42	41	39	37	36	35	34
Benzo(b) flouranthene	Road transport:Light duty vehicles	[kg]	6	7	8	8	8	9	9	9	9	10	10	10	10	11	11
Benzo(b) flouranthene	Road transport:Heavy duty vehicles	[kg]	16	18	18	18	18	19	19	19	19	20	20	21	21	21	21
Benzo(b) flouranthene	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Benzo(b) flouranthene	Railways	[kg]	48	48	43	44	41	1	1	1	2	1	1	1	1	1	1
Benzo(b) flouranthene	International navigation (Shipping)	[kg]	6	7	9	11	12	13	12	15	19	23	25	24	22	25	22
Benzo(b) flouranthene	National navigation (Shipping)	[kg]	7	7	7	7	8	5	5	6	5	5	6	7	7	6	5
Benzo(b) flouranthene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	157	162	159	164	163	10	9	9	9	9	9	8	8	8	8
Benzo(b) flouranthene	Agriculture/Forestry/Fishing: National fishing	[kg]	5	5	4	5	5	5	5	5	5	5	5	4	3	4	4
Benzo(b) flouranthene	Other, Mobile (military)	[kg]	15	15	8	2	4	0	1	1	1	0	1	0	1	1	1
Benzo(k) flouranthene	Manufacturing industries/Construction (mobile)	[kg]	43	43	43	43	43	6	6	6	6	6	6	6	6	6	6
Benzo(k) flouranthene	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Civil aviation (International, Cruise)	[kg]	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Road transport: Passenger cars	[kg]	29	29	29	30	30	32	34	34	34	34	33	32	32	32	31
Benzo(k) flouranthene	Road transport:Light duty vehicles	[kg]	6	6	7	7	7	8	8	8	8	9	9	9	9	9	10
Benzo(k) flouranthene	Road transport:Heavy duty vehicles	[kg]	24	27	27	26	27	28	29	28	28	29	30	31	30	31	31
Benzo(k) flouranthene	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Benzo(k) flouranthene	Railways	[kg]	21	21	18	19	18	2	2	2	2	2	2	2	2	1	1
Benzo(k) flouranthene	International navigation (Shipping)	[kg]	3	3	4	5	5	6	6	7	9	11	11	11	10	12	10
Benzo(k) flouranthene	National navigation (Shipping)	[kg]	3	3	3	3	3	2	2	2	2	2	3	3	3	3	2
Benzo(k) flouranthene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	67	70	68	70	70	10	9	9	9	9	9	8	8	8	7
Benzo(k) flouranthene	Agriculture/Forestry/Fishing: National fishing	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Benzo(k) flouranthene	Other, Mobile (military)	[kg]	6	6	3	1	2	0	1	1	1	0	1	0	1	1	1
Benzo(a) pyrene	Manufacturing industries/Construction (mobile)	[kg]	71	71	71	71	71	3	3	3	3	3	3	3	3	3	3
Benzo(a) pyrene	Civil aviation (International, LTO)	[kg]	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Civil aviation (International, Cruise)	[kg]	4	5	5	5	6	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Civil aviation (Domestic, Cruise)	[kg]	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Road transport: Passenger cars	[kg]	32	33	33	34	34	36	37	38	37	37	36	34	34	33	32
Benzo(a) pyrene	Road transport:Light duty vehicles	[kg]	7	8	8	8	9	9	10	10	10	11	11	11	11	11	12
Benzo(a) pyrene	Road transport:Heavy duty vehicles	[kg]	3	3	3	3	3	4	4	4	3	4	4	4	4	4	4
Benzo(a) pyrene	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Railways	[kg]	34	34	31	32	29	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	International navigation (Shipping)	[kg]	2	2	3	3	3	4	3	4	5	6	7	6	6	6	6
Benzo(a) pyrene	National navigation (Shipping)	[kg]	2	2	3	3	3	1	1	1	1	1	1	2	2	1	1
Benzo(a) pyrene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	112	116	114	117	117	5	5	5	5	4	4	4	4	4	4
Benzo(a) pyrene	Agriculture/Forestry/Fishing: National fishing	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(a) pyrene	Other, Mobile (military)	[kg]	10	11	6	2	3	0	0	0	0	0	1	0	0	0	0
Benzo(g,h,i) perylene	Manufacturing industries/Construction (mobile)	[kg]	143	143	143	142	142	6	6	6	6	5	6	5	5	5	5
Benzo(g,h,i) perylene	Civil aviation (International, LTO)	[kg]	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Civil aviation (International, Cruise)	[kg]	9	9	10	11	11	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Civil aviation (Domestic, LTO)	[kg]	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Civil aviation (Domestic, Cruise)	[kg]	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Road transport: Passenger cars	[kg]	73	75	75	77	77	82	85	86	84	83	79	76	74	71	68
Benzo(g,h,i) perylene	Road transport:Light duty vehicles	[kg]	13	15	16	17	17	19	19	19	20	21	21	21	22	22	23
Benzo(g,h,i) perylene	Road transport:Heavy duty vehicles	[kg]	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Benzo(g,h,i) perylene	Road transport: Mopeds & motorcycles	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(g,h,i) perylene	Railways	[kg]	68	69	61	63	58	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	International navigation (Shipping)	[kg]	12	14	17	20	22	23	23	29	36	44	48	48	44	51	44
Benzo(g,h,i) perylene	National navigation (Shipping)	[kg]	11	11	11	12	12	8	9	11	10	10	11	13	14	11	10

Benzo(g,h,i) perylene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
Benzo(g,h,i) perylene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	225	232	228	235	233	10	9	9	9	8	9	8	8	7	7
Benzo(g,h,i) perylene	Agriculture/Forestry/Fishing: National fishing	[kg]	10	12	9	11	11	11	12	11	10	10	10	10	8	8	9
Benzo(g,h,i) perylene	Other, Mobile (military)	[kg]	21	21	11	3	5	0	1	1	1	0	1	0	1	1	0
indeno(1,2,3-c,d) pyrene	Manufacturing industries/Construction (mobile)	[kg]	71	71	71	71	71	3	3	3	3	3	3	3	3	3	3
indeno(1,2,3-c,d) pyrene	Civil aviation (International, LTO)	[kg]	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Civil aviation (International, Cruise)	[kg]	4	5	5	5	6	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Civil aviation (Domestic, Cruise)	[kg]	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Road transport: Passenger cars	[kg]	29	30	30	31	31	33	34	35	35	36	35	35	35	35	35
indeno(1,2,3-c,d) pyrene	Road transport:Light duty vehicles	[kg]	6	7	8	8	8	9	9	9	9	10	10	10	10	11	11
indeno(1,2,3-c,d) pyrene	Road transport:Heavy duty vehicles	[kg]	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
indeno(1,2,3-c,d) pyrene	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Railways	[kg]	34	34	31	32	29	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	International navigation (Shipping)	[kg]	10	11	14	16	17	19	19	23	29	36	39	39	36	42	36
indeno(1,2,3-c,d) pyrene	National navigation (Shipping)	[kg]	8	8	8	8	9	7	7	8	8	8	9	10	11	9	8
indeno(1,2,3-c,d) pyrene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	112	116	114	117	117	5	5	5	5	4	5	4	4	4	4
indeno(1,2,3-c,d) pyrene	Agriculture/Forestry/Fishing: National fishing	[kg]	8	10	7	9	9	9	10	9	8	8	8	8	6	7	8
indeno(1,2,3-c,d) pyrene	Other, Mobile (military)	[kg]	10	11	6	2	3	0	0	0	0	0	1	0	0	0	0
PCB	Manufacturing industries/Construction (mobile)	[g]						6	6	5	5	5	5	5	6	6	6
PCB	Civil aviation (International, LTO)	[g]						0	0	0	0	0	0	0	0	0	0
PCB	Civil aviation (International, Cruise)	[g]						0	0	0	0	0	0	0	0	0	0
PCB	Civil aviation (Domestic, LTO)	[g]						0	0	0	0	0	0	0	0	0	0
PCB	Civil aviation (Domestic, Cruise)	[g]						0	0	0	0	0	0	0	0	0	0
PCB	Road transport: Passenger cars	[g]						65	59	52	42	0	0	0	0	0	0
PCB	Road transport:Light duty vehicles	[g]						3	2	2	2	0	0	0	0	0	0
PCB	Road transport:Heavy duty vehicles	[g]						20	20	19	19	20	20	21	21	21	22
PCB	Road transport: Mopeds & motorcycles	[g]						1	0	0	0	0	0	0	0	0	0
PCB	Railways	[g]						2	2	2	2	2	2	2	2	2	2
PCB	International navigation (Shipping)	[g]						0	0	0	1	1	1	1	1	1	1
PCB	National navigation (Shipping)	[g]						1	1	1	1	0	0	0	0	0	0
PCB	Commercial/Institutional: Mobile	[g]						1	1	1	1	0	0	0	0	0	0
PCB	Residential: Household and gardening (mobile)	[g]						1	0	0	0	0	0	0	0	0	0
PCB	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[g]						10	10	9	9	8	8	8	8	7	7

PCB	Agriculture/Forestry/Fishing: National fishing	[g]	0	0	0	0	0	0	0	0	0	0
PCB	Other, Mobile (military)	[g]	0	1	0	0	0	1	0	0	0	0

Emissions 2000-2012.

pol_name	NFR category	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SO_2	Manufacturing industries/Construction (mobile)	[tonnes]	253	256	258	261	263	28	30	33	33	25	31	6	6
SO_2	Civil aviation (International, LTO)	[tonnes]	76	76	70	65	71	71	68	70	74	63	66	69	71
SO_2	Civil aviation (International, Cruise)	[tonnes]	674	686	587	618	711	751	756	776	771	676	707	726	730
SO_2	Civil aviation (Domestic, LTO)	[tonnes]	15	16	13	12	10	10	11	13	13	13	14	13	13
SO_2	Civil aviation (Domestic, Cruise)	[tonnes]	34	36	32	32	31	33	34	38	38	36	35	33	30
SO_2	Road transport: Passenger cars	[tonnes]	207	204	207	211	213	42	42	44	45	44	44	43	42
SO_2	Road transport:Light duty vehicles	[tonnes]	50	51	53	57	62	13	15	16	15	13	13	12	11
SO_2	Road transport:Heavy duty vehicles	[tonnes]	94	96	96	101	104	21	22	22	21	19	19	19	18
SO_2	Road transport: Mopeds & motorcycles	[tonnes]	2	2	2	2	2	0	0	0	0	0	0	0	0
SO_2	Railways	[tonnes]	7	7	7	7	7	1	1	1	1	1	2	2	2
SO_2	International navigation (Shipping)	[tonnes]	55182	43830	30036	30982	26540	34283	50417	25652	19326	7383	8200	8853	5136
SO_2	National navigation (Shipping)	[tonnes]	1844	1733	1582	1984	2319	2339	2431	1685	1512	1588	1438	1383	1334
SO_2	Commercial/Institutional: Mobile	[tonnes]	3	3	4	4	5	1	1	1	1	1	1	1	1
SO_2	Residential: Household and gardening (mobile)	[tonnes]	1	1	2	2	2	0	0	0	0	0	0	0	0
SO_2	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	326	330	331	333	339	34	35	37	39	40	40	8	9
SO_2	Agriculture/Forestry/Fishing: National fishing	[tonnes]	881	879	905	871	683	817	765	653	381	356	318	320	303
SO_2	Other, Mobile (military)	[tonnes]	27	12	19	17	46	57	26	40	19	25	20	37	17
NO_x	Manufacturing industries/Construction (mobile)	[tonnes]	12096	11869	11617	11214	10744	10706	10843	10827	10142	7247	8665	8046	7597
NO_x	Civil aviation (International, LTO)	[tonnes]	1070	1059	1002	936	1027	1026	1000	1025	1078	923	951	1014	1036
NO_x	Civil aviation (International, Cruise)	[tonnes]	8376	8542	7722	8149	9445	9998	10158	10376	10214	8920	9159	9452	9593
NO_x	Civil aviation (Domestic, LTO)	[tonnes]	264	269	230	203	165	178	188	223	224	210	215	198	202
NO_x	Civil aviation (Domestic, Cruise)	[tonnes]	459	483	412	393	386	405	414	470	473	425	408	380	377
NO_x	Road transport: Passenger cars	[tonnes]	40012	36872	34667	32642	30307	27004	24371	23359	22085	20585	19951	19933	19535
NO_x	Road transport:Light duty vehicles	[tonnes]	8182	8292	8356	8788	9256	9533	10202	10722	9559	8509	7989	7358	6687
NO_x	Road transport:Heavy duty vehicles	[tonnes]	34020	34432	33260	33748	33698	33265	33176	31932	27387	22728	21830	20707	17952
NO_x	Road transport: Mopeds & motorcycles	[tonnes]	107	109	117	120	123	128	139	148	148	144	144	142	141
NO_x	Railways	[tonnes]	3727	3396	3396	3540	3478	3724	3542	3555	2920	2603	2818	2501	2531
NO_x	International navigation (Shipping)	[tonnes]	91641	75429	60383	65339	53439	56540	78012	83555	70401	35658	51065	52516	36524
NO_x	National navigation (Shipping)	[tonnes]	8087	8197	8315	8443	8469	8634	8979	9054	9303	9498	9557	9064	8692
NO_x	Commercial/Institutional: Mobile	[tonnes]	104	112	124	138	155	177	199	215	222	220	217	215	219
NO_x	Residential: Household and gardening (mobile)	[tonnes]	50	54	59	64	69	72	76	79	82	84	87	89	92
NO_x	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	13324	13630	13359	12961	12690	12233	11739	11379	11018	10544	10178	9828	9481

NO_x	Agriculture/Forestry/Fishing: National fishing	[tonnes]	12009	12157	12677	12325	9758	11776	11094	9509	11137	10405	9335	9281	8682
NO_x	Other, Mobile (military)	[tonnes]	526	663	463	511	1256	1300	603	760	488	725	456	798	492
NMVOC	Manufacturing industries/Construction (mobile)	[tonnes]	1926	1873	1815	1754	1676	1627	1589	1524	1383	992	1191	1128	1076
NMVOC	Civil aviation (International, LTO)	[tonnes]	121	114	115	107	121	119	113	110	122	98	89	101	107
NMVOC	Civil aviation (International, Cruise)	[tonnes]	316	246	259	261	282	289	301	300	276	243	240	255	272
NMVOC	Civil aviation (Domestic, LTO)	[tonnes]	138	136	133	124	131	133	127	135	120	102	93	78	86
NMVOC	Civil aviation (Domestic, Cruise)	[tonnes]	20	16	17	17	23	27	24	24	21	20	14	11	11
NMVOC	Road transport: Passenger cars	[tonnes]	26022	24494	22017	20547	17574	16131	13779	12250	11001	9640	8894	7195	6420
NMVOC	Road transport:Light duty vehicles	[tonnes]	1616	1689	1604	1613	1551	1555	1539	1498	1255	1074	1010	834	724
NMVOC	Road transport:Heavy duty vehicles	[tonnes]	1659	1593	1479	1443	1402	1336	1294	1177	927	716	637	559	446
NMVOC	Road transport: Mopeds & motorcycles	[tonnes]	3000	2464	2495	2430	2300	2179	2106	2028	1896	1758	1622	1493	1386
NMVOC	Road transport: Gasoline evaporation	[tonnes]	10024	8620	7727	6592	5622	4769	3998	3298	2649	2265	1820	1688	1463
NMVOC	Railways	[tonnes]	253	248	243	223	217	235	230	231	205	174	189	175	190
NMVOC	International navigation (Shipping)	[tonnes]	2940	2433	1989	2130	1731	1792	2418	2563	2195	1160	1628	1668	1199
NMVOC	National navigation (Shipping)	[tonnes]	1731	1702	1661	1602	1534	1423	1305	1190	1095	1010	932	840	749
NMVOC	Commercial/Institutional: Mobile	[tonnes]	2845	3504	4188	4897	5631	5775	5922	6022	5844	5159	4423	3636	3636
NMVOC	Residential: Household and gardening (mobile)	[tonnes]	1757	1824	1894	1972	2053	2084	2115	2134	2109	2071	2032	1993	1953
NMVOC	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	3011	2863	2663	2467	2286	2216	2194	2196	2169	2073	1965	1848	1760
NMVOC	Agriculture/Forestry/Fishing: National fishing	[tonnes]	508	515	536	520	412	496	468	402	469	439	394	397	377
NMVOC	Other, Mobile (military)	[tonnes]	55	53	45	45	100	106	51	68	40	55	40	59	33
CH_4	Manufacturing industries/Construction (mobile)	[tonnes]	50	49	48	47	46	45	44	43	41	30	38	37	36
CH_4	Civil aviation (International, LTO)	[tonnes]	12	12	12	11	12	12	12	12	13	10	10	11	12
CH_4	Civil aviation (International, Cruise)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
CH_4	Civil aviation (Domestic, LTO)	[tonnes]	4	4	3	3	3	4	3	4	3	3	2	2	2
CH_4	Civil aviation (Domestic, Cruise)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
CH_4	Road transport: Passenger cars	[tonnes]	1237	1143	1057	981	881	776	681	616	541	482	427	375	333
CH_4	Road transport:Light duty vehicles	[tonnes]	96	91	84	77	74	64	57	50	39	32	27	22	18
CH_4	Road transport:Heavy duty vehicles	[tonnes]	312	314	305	314	319	319	319	290	221	164	144	125	99
CH_4	Road transport: Mopeds & motorcycles	[tonnes]	143	127	127	124	119	116	115	114	108	101	97	93	89
CH_4	Railways	[tonnes]	10	10	9	9	8	9	9	9	8	7	7	7	7
CH_4	International navigation (Shipping)	[tonnes]	91	75	62	66	54	55	75	79	68	36	50	52	37
CH_4	National navigation (Shipping)	[tonnes]	33	33	34	34	35	35	35	35	35	35	35	34	34
CH_4	Commercial/Institutional: Mobile	[tonnes]	92	101	113	127	144	157	169	175	174	167	160	151	151
CH_4	Residential: Household and gardening (mobile)	[tonnes]	45	48	51	55	60	62	64	65	66	66	65	65	65
CH_4	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	75	74	73	72	72	75	83	91	96	101	104	105	99
CH_4	Agriculture/Forestry/Fishing: National fishing	[tonnes]	16	16	17	16	13	16	15	13	15	14	12	12	12
CH_4	Other, Mobile (military)	[tonnes]	5	6	5	5	12	12	6	7	4	5	3	6	3

CO	Manufacturing industries/Construction (mobile)	[tonnes]	8395	8227	8030	7842	7600	7528	7542	7499	7127	5199	6530	6358	6239
CO	Civil aviation (International, LTO)	[tonnes]	640	626	635	638	705	701	650	669	789	663	668	724	722
CO	Civil aviation (International, Cruise)	[tonnes]	1150	1169	973	1030	1143	1206	1201	1237	1190	1027	1048	1066	1054
CO	Civil aviation (Domestic, LTO)	[tonnes]	783	778	757	716	733	733	711	763	689	593	569	486	520
CO	Civil aviation (Domestic, Cruise)	[tonnes]	112	113	106	119	126	128	131	138	134	124	120	113	87
CO	Road transport: Passenger cars	[tonnes]	241082	230578	210434	200641	175387	167079	147053	133106	122310	109132	102701	84379	77006
CO	Road transport:Light duty vehicles	[tonnes]	13511	14006	13102	12940	12316	12171	11671	11049	9173	7920	7397	6060	5218
CO	Road transport:Heavy duty vehicles	[tonnes]	9036	9002	8840	9026	9098	9050	9113	8858	7668	6524	6485	6546	6119
CO	Road transport: Mopeds & motorcycles	[tonnes]	12401	11239	11273	11033	10563	10160	9949	9778	9252	8623	8335	7972	7679
CO	Railways	[tonnes]	694	637	627	611	599	648	626	629	526	450	481	398	425
CO	International navigation (Shipping)	[tonnes]	9699	8025	6562	7025	5709	5912	7977	8454	7243	3826	5371	5504	3955
CO	National navigation (Shipping)	[tonnes]	6832	7034	7217	7408	7601	7631	7281	6915	6565	6210	5835	5420	5030
CO	Commercial/Institutional: Mobile	[tonnes]	29423	32889	37681	43798	51239	58128	64197	67870	70290	72227	72338	72458	72587
CO	Residential: Household and gardening (mobile)	[tonnes]	16451	17390	18463	19890	21444	22482	23547	24366	25092	25341	25616	25915	26236
CO	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	24524	22761	20821	18971	17231	16035	15887	16837	17503	18049	18432	18663	18010
CO	Agriculture/Forestry/Fishing: National fishing	[tonnes]	1667	1683	1750	1698	1344	1620	1527	1311	1536	1439	1290	1301	1236
CO	Other, Mobile (military)	[tonnes]	399	308	311	302	706	798	380	538	306	414	311	495	270
CO_2	Manufacturing industries/Construction (mobile)	[ktonnes]	877	886	895	905	910	952	1023	1104	1126	834	1051	1023	1021
CO_2	Civil aviation (International, LTO)	[ktonnes]	239	237	218	205	221	221	213	218	231	198	206	217	223
CO_2	Civil aviation (International, Cruise)	[ktonnes]	2110	2147	1840	1936	2226	2353	2368	2429	2416	2118	2215	2275	2287
CO_2	Civil aviation (Domestic, LTO)	[ktonnes]	48	50	42	38	30	33	35	41	42	41	45	42	39
CO_2	Civil aviation (Domestic, Cruise)	[ktonnes]	106	113	99	100	98	102	108	120	120	111	111	103	93
CO_2	Road transport: Passenger cars	[ktonnes]	6603	6505	6592	6749	6804	6703	6749	7077	7168	7021	6934	6814	6723
CO_2	Road transport:Light duty vehicles	[ktonnes]	1581	1617	1669	1810	1970	2100	2319	2502	2320	2110	2028	1847	1674
CO_2	Road transport:Heavy duty vehicles	[ktonnes]	2956	3043	3030	3185	3280	3348	3456	3541	3316	2964	3053	3027	2767
CO_2	Road transport: Mopeds & motorcycles	[ktonnes]	63	59	61	61	61	61	64	67	67	65	63	61	60
CO_2	Railways	[ktonnes]	228	211	210	218	216	232	227	228	237	230	242	249	249
CO_2	International navigation (Shipping)	[ktonnes]	4021	3304	2691	2853	2299	2352	3136	3292	2809	1487	2063	2096	1505
CO_2	National navigation (Shipping)	[ktonnes]	588	587	578	576	588	585	588	586	590	592	591	559	498
CO_2	Commercial/Institutional: Mobile	[ktonnes]	87	98	112	129	149	162	172	175	176	174	173	171	171
CO_2	Residential: Household and gardening (mobile)	[ktonnes]	43	46	49	53	57	59	61	62	63	63	63	63	62
CO_2	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[ktonnes]	1063	1074	1076	1079	1099	1112	1144	1210	1275	1290	1306	1332	1360
CO_2	Agriculture/Forestry/Fishing: National fishing	[ktonnes]	698	696	716	689	540	647	606	517	603	563	503	506	479
CO_2	Other, Mobile (military)	[ktonnes]	111	97	89	92	239	271	126	175	108	160	107	193	116
N_2O	Manufacturing industries/Construction (mobile)	[tonnes]	37	38	38	38	39	40	43	47	48	35	45	43	43
N_2O	Civil aviation (International, LTO)	[tonnes]	15	14	13	13	14	14	13	13	14	12	12	13	13
N_2O	Civil aviation (International, Cruise)	[tonnes]	67	69	59	62	71	75	76	78	77	68	71	73	73

N_2O	Civil aviation (Domestic, LTO)	[tonnes]	4	4	5	5	5	5	5	5	5	4	5	5	4
N_2O	Civil aviation (Domestic, Cruise)	[tonnes]	3	4	3	3	3	3	3	4	4	4	4	3	3
N_2O	Road transport: Passenger cars	[tonnes]	267	258	255	252	245	230	220	222	218	210	206	208	204
N_2O	Road transport:Light duty vehicles	[tonnes]	29	35	40	45	52	58	65	71	67	62	60	57	53
N_2O	Road transport:Heavy duty vehicles	[tonnes]	119	123	121	128	131	132	137	140	131	117	121	124	117
N_2O	Road transport: Mopeds & motorcycles	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1
N_2O	Railways	[tonnes]	6	6	6	6	6	6	6	6	7	6	7	7	7
N_2O	International navigation (Shipping)	[tonnes]	253	208	170	180	145	148	197	207	177	94	130	132	95
N_2O	National navigation (Shipping)	[tonnes]	34	34	34	33	34	34	34	34	34	34	34	33	29
N_2O	Commercial/Institutional: Mobile	[tonnes]	1	1	2	2	2	2	3	3	3	3	3	3	3
N_2O	Residential: Household and gardening (mobile)	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1
N_2O	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	43	44	44	45	46	46	48	51	54	54	55	56	58
N_2O	Agriculture/Forestry/Fishing: National fishing	[tonnes]	44	44	45	44	34	41	38	33	38	36	32	32	30
N_2O	Other, Mobile (military)	[tonnes]	3	3	3	3	8	9	4	6	4	5	4	7	4
NH_3	Manufacturing industries/Construction (mobile)	[tonnes]	2	2	2	2	2	2	2	3	3	2	3	2	2
NH_3	Civil aviation (International, LTO)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Civil aviation (International, Cruise)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Civil aviation (Domestic, LTO)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Civil aviation (Domestic, Cruise)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Road transport: Passenger cars	[tonnes]	2473	2479	2495	2472	2444	2309	2202	2124	1969	1836	1670	1548	1410
NH_3	Road transport:Light duty vehicles	[tonnes]	58	72	78	79	80	78	77	73	59	53	48	40	34
NH_3	Road transport:Heavy duty vehicles	[tonnes]	12	12	12	13	13	13	14	14	13	12	12	12	12
NH_3	Road transport: Mopeds & motorcycles	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1
NH_3	Railways	[tonnes]	1	1	1	1	1	1	1	1	1	1	1	1	1
NH_3	International navigation (Shipping)	[tonnes]													
NH_3	National navigation (Shipping)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Commercial/Institutional: Mobile	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Residential: Household and gardening (mobile)	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	3	3	3	3	3	3	3	3	4	4	4	4	4
NH_3	Agriculture/Forestry/Fishing: National fishing	[tonnes]	0	0	0	0	0	0	0	0	0	0	0	0	0
NH_3	Other, Mobile (military)	[tonnes]	0	0	0	0	1	1	0	0	1	1	0	0	0
TSP	Manufacturing industries/Construction (mobile)	[tonnes]	1135	1121	1098	1075	1037	1011	998	968	883	606	706	660	617
TSP	Civil aviation (International, LTO)	[tonnes]	4	4	4	3	4	4	3	4	4	3	3	4	4
TSP	Civil aviation (International, Cruise)	[tonnes]	34	35	30	31	36	38	38	39	39	34	36	37	37
TSP	Civil aviation (Domestic, LTO)	[tonnes]	2	2	2	1	1	1	1	2	1	1	1	1	1
TSP	Civil aviation (Domestic, Cruise)	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	2
TSP	Road transport: Passenger cars	[tonnes]	902	838	787	796	764	730	699	702	723	665	666	621	589

TSP	Road transport:Light duty vehicles	[tonnes]	1287	1184	1062	1036	953	918	900	885	741	629	579	489	424
TSP	Road transport:Heavy duty vehicles	[tonnes]	1013	956	887	858	826	783	758	688	534	410	355	324	271
TSP	Road transport: Mopeds & motorcycles	[tonnes]	71	58	57	55	51	48	45	43	40	36	33	30	28
TSP	Road transport: Automobile tyre and brake wear	[tonnes]	1269	1273	1291	1343	1387	1397	1446	1517	1477	1397	1397	1419	1387
TSP	Road transport: Automobile road abrasion	[tonnes]	982	985	996	1035	1065	1066	1099	1155	1132	1075	1080	1103	1084
TSP	Railways	[tonnes]	141	125	124	119	115	124	120	120	101	84	95	78	82
TSP	International navigation (Shipping)	[tonnes]	8745	7143	4988	4501	3978	5761	7888	2365	1873	820	934	975	641
TSP	National navigation (Shipping)	[tonnes]	383	373	357	387	430	425	421	336	327	325	306	290	268
TSP	Commercial/Institutional: Mobile	[tonnes]	30	38	46	55	63	65	66	66	67	67	67	67	67
TSP	Residential: Household and gardening (mobile)	[tonnes]	11	11	12	13	13	13	14	14	14	14	14	15	15
TSP	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	1334	1280	1204	1135	1075	1011	955	914	875	834	796	762	718
TSP	Agriculture/Forestry/Fishing: National fishing	[tonnes]	218	218	224	216	169	203	190	162	175	164	146	147	139
TSP	Other, Mobile (military)	[tonnes]	17	34	16	19	42	36	16	16	13	20	10	15	11
PM_{10}	Manufacturing industries/Construction (mobile)	[tonnes]	1135	1121	1098	1075	1037	1011	998	968	883	606	706	660	617
PM_{10}	Civil aviation (International, LTO)	[tonnes]	4	4	4	3	4	4	3	4	4	3	3	4	4
PM_{10}	Civil aviation (International, Cruise)	[tonnes]	34	35	30	31	36	38	38	39	39	34	36	37	37
PM_{10}	Civil aviation (Domestic, LTO)	[tonnes]	2	2	2	1	1	1	1	2	1	1	1	1	1
PM_{10}	Civil aviation (Domestic, Cruise)	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	2
PM_{10}	Road transport: Passenger cars	[tonnes]	902	838	787	796	764	730	699	702	723	665	666	621	589
PM_{10}	Road transport:Light duty vehicles	[tonnes]	1287	1184	1062	1036	953	918	900	885	741	629	579	489	424
PM_{10}	Road transport:Heavy duty vehicles	[tonnes]	1013	956	887	858	826	783	758	688	534	410	355	324	271
PM_{10}	Road transport: Mopeds & motorcycles	[tonnes]	71	58	57	55	51	48	45	43	40	36	33	30	28
PM_{10}	Road transport: Automobile tyre and brake wear	[tonnes]	942	945	958	996	1028	1035	1071	1122	1092	1033	1032	1048	1024
PM_{10}	Road transport: Automobile road abrasion	[tonnes]	491	493	498	517	532	533	550	577	566	538	540	552	542
PM_{10}	Railways	[tonnes]	141	125	124	119	115	124	120	120	101	84	95	78	82
PM_{10}	International navigation (Shipping)	[tonnes]	8658	7072	4938	4456	3938	5703	7809	2341	1854	812	925	965	634
PM_{10}	National navigation (Shipping)	[tonnes]	381	371	355	384	427	422	418	334	325	323	304	289	266
PM_{10}	Commercial/Institutional: Mobile	[tonnes]	30	38	46	55	63	65	66	66	67	67	67	67	67
PM_{10}	Residential: Household and gardening (mobile)	[tonnes]	11	11	12	13	13	13	14	14	14	14	14	15	15
PM_{10}	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	1334	1280	1204	1135	1075	1011	955	914	875	834	796	762	718
PM_{10}	Agriculture/Forestry/Fishing: National fishing	[tonnes]	216	216	222	214	167	201	188	160	174	162	145	146	138
PM_{10}	Other, Mobile (military)	[tonnes]	17	34	16	19	42	36	16	16	13	20	10	15	11
$PM_{2.5}$	Manufacturing industries/Construction (mobile)	[tonnes]	1135	1121	1098	1075	1037	1011	998	968	883	606	706	660	617
$PM_{2.5}$	Civil aviation (International, LTO)	[tonnes]	4	4	4	3	4	4	3	4	4	3	3	4	4
$PM_{2.5}$	Civil aviation (International, Cruise)	[tonnes]	34	35	30	31	36	38	38	39	39	34	36	37	37
$PM_{2.5}$	Civil aviation (Domestic, LTO)	[tonnes]	2	2	2	1	1	1	1	2	1	1	1	1	1
$PM_{2.5}$	Civil aviation (Domestic, Cruise)	[tonnes]	2	2	2	2	2	2	2	2	2	2	2	2	2

$PM_{2.5}$	Road transport: Passenger cars	[tonnes]	902	838	787	796	764	730	699	702	723	665	666	621	589
$PM_{2.5}$	Road transport:Light duty vehicles	[tonnes]	1287	1184	1062	1036	953	918	900	885	741	629	579	489	424
$PM_{2.5}$	Road transport:Heavy duty vehicles	[tonnes]	1013	956	887	858	826	783	758	688	534	410	355	324	271
$PM_{2.5}$	Road transport: Mopeds & motorcycles	[tonnes]	71	58	57	55	51	48	45	43	40	36	33	30	28
$PM_{2.5}$	Road transport: Automobile tyre and brake wear	[tonnes]	519	520	528	549	567	571	591	620	604	571	572	581	567
$PM_{2.5}$	Road transport: Automobile road abrasion	[tonnes]	265	266	269	279	288	288	297	312	306	290	292	298	293
$PM_{2.5}$	Railways	[tonnes]	141	125	124	119	115	124	120	120	101	84	95	78	82
$PM_{2.5}$	International navigation (Shipping)	[tonnes]	8614	7036	4913	4434	3918	5675	7770	2330	1845	808	920	960	631
$PM_{2.5}$	National navigation (Shipping)	[tonnes]	379	370	354	383	425	421	417	333	324	322	303	288	265
$PM_{2.5}$	Commercial/Institutional: Mobile	[tonnes]	30	38	46	55	63	65	66	66	67	67	67	67	67
$PM_{2.5}$	Residential: Household and gardening (mobile)	[tonnes]	11	11	12	13	13	13	14	14	14	14	14	15	15
$PM_{2.5}$	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[tonnes]	1334	1280	1204	1135	1075	1011	955	914	875	834	796	762	718
$PM_{2.5}$	Agriculture/Forestry/Fishing: National fishing	[tonnes]	215	215	221	213	167	199	187	159	173	161	144	145	137
$PM_{2.5}$	Other, Mobile (military)	[tonnes]	17	34	16	19	42	36	16	16	13	20	10	15	11
Arsenic	Manufacturing industries/Construction (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Road transport: Passenger cars	[kg]	1	1	1	1	1	1	1	1	1	1	0	0	0
Arsenic	Road transport:Light duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Road transport:Heavy duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Road transport: Automobile tyre and brake wear	[kg]	5	5	5	6	6	6	6	6	6	6	6	6	6
Arsenic	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	International navigation (Shipping)	[kg]	420	329	227	257	213	250	381	424	326	127	205	221	128
Arsenic	National navigation (Shipping)	[kg]	24	23	23	28	28	28	30	30	31	33	35	33	32
Arsenic	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic	Agriculture/Forestry/Fishing: National fishing	[kg]	11	11	11	11	9	10	10	8	10	9	8	8	8
Arsenic	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Manufacturing industries/Construction (mobile)	[kg]	2	2	2	2	2	2	3	3	3	2	3	3	3
Cadmium	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0

Cadmium	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Road transport: Passenger cars	[kg]	24	24	24	25	25	25	25	26	27	26	27	27	28
Cadmium	Road transport:Light duty vehicles	[kg]	4	4	4	5	5	6	6	7	6	6	6	5	5
Cadmium	Road transport:Heavy duty vehicles	[kg]	6	6	6	6	6	6	7	7	6	6	6	6	6
Cadmium	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Road transport: Automobile tyre and brake wear	[kg]	6	6	6	6	6	6	7	7	7	6	6	6	6
Cadmium	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Railways	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Cadmium	International navigation (Shipping)	[kg]	28	23	17	18	15	17	24	27	21	9	14	15	9
Cadmium	National navigation (Shipping)	[kg]	3	2	2	3	3	3	3	3	3	3	3	3	3
Cadmium	Commercial/Institutional: Mobile	[kg]	0	0	0	0	1	1	1	1	1	1	1	1	1
Cadmium	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	3	3	3	3	3	3	3	3	3	3	3	3	3
Cadmium	Agriculture/Forestry/Fishing: National fishing	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	1
Cadmium	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Manufacturing industries/Construction (mobile)	[kg]	7	7	7	8	8	8	9	9	10	7	9	9	9
Chromium	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Road transport: Passenger cars	[kg]	40	39	41	43	44	44	45	49	52	52	54	57	59
Chromium	Road transport:Light duty vehicles	[kg]	14	14	14	16	17	18	20	22	21	19	19	18	17
Chromium	Road transport:Heavy duty vehicles	[kg]	22	23	23	24	25	25	25	26	24	22	23	23	22
Chromium	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Road transport: Automobile tyre and brake wear	[kg]	57	57	58	60	62	63	65	67	65	61	61	62	60
Chromium	Road transport: Automobile road abrasion	[kg]	19	20	20	21	21	21	22	23	22	21	21	22	22
Chromium	Railways	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2
Chromium	International navigation (Shipping)	[kg]	178	140	100	111	92	106	157	174	136	56	87	93	56
Chromium	National navigation (Shipping)	[kg]	13	12	12	14	14	14	15	15	15	16	17	16	15
Chromium	Commercial/Institutional: Mobile	[kg]	0	0	1	1	1	1	1	1	1	1	1	1	1
Chromium	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	9	9	9	9	10	10	10	11	11	11	11	12	12
Chromium	Agriculture/Forestry/Fishing: National fishing	[kg]	9	9	9	9	7	8	8	7	8	7	6	6	6
Chromium	Other, Mobile (military)	[kg]	0	1	0	0	1	1	0	0	0	1	0	1	1
Copper	Manufacturing industries/Construction (mobile)	[kg]	6	6	6	6	6	6	7	7	7	5	7	7	7
Copper	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0

Copper	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Road transport: Passenger cars	[kg]	87	86	87	89	90	88	87	90	89	88	87	87	86
Copper	Road transport:Light duty vehicles	[kg]	11	11	12	13	14	15	16	18	16	15	14	14	13
Copper	Road transport:Heavy duty vehicles	[kg]	16	16	16	17	17	18	18	18	17	15	16	16	15
Copper	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	Road transport: Automobile tyre and brake wear	[kg]	36664	36363	37202	38485	39844	39994	41352	43562	42803	41250	40671	41107	40494
Copper	Road transport: Automobile road abrasion	[kg]	10	10	10	10	11	11	11	12	11	11	11	11	11
Copper	Railways	[kg]	1	1	1	1	1	1	1	1	1	1	2	2	2
Copper	International navigation (Shipping)	[kg]	420	329	227	257	213	250	381	424	326	127	205	221	128
Copper	National navigation (Shipping)	[kg]	25	24	24	29	29	29	31	30	32	34	36	34	33
Copper	Commercial/Institutional: Mobile	[kg]	1	1	1	2	2	2	2	2	2	2	2	2	2
Copper	Residential: Household and gardening (mobile)	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	7	7	7	7	7	7	7	8	8	8	9	9	9
Copper	Agriculture/Forestry/Fishing: National fishing	[kg]	11	11	11	11	9	10	10	8	10	9	8	8	8
Copper	Other, Mobile (military)	[kg]	0	0	0	0	1	1	0	0	0	1	0	1	0
Mercury	Manufacturing industries/Construction (mobile)	[kg]	1	1	1	1	1	1	2	2	2	1	2	2	2
Mercury	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Road transport: Passenger cars	[kg]	17	17	17	17	17	17	17	17	17	17	16	16	15
Mercury	Road transport:Light duty vehicles	[kg]	3	3	3	3	4	4	4	4	4	4	4	3	3
Mercury	Road transport:Heavy duty vehicles	[kg]	5	5	5	5	6	6	6	6	6	5	5	5	5
Mercury	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Road transport: Automobile tyre and brake wear	[kg]													
Mercury	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	International navigation (Shipping)	[kg]	39	34	30	31	24	23	27	27	25	17	21	20	17
Mercury	National navigation (Shipping)	[kg]	7	7	7	6	6	6	6	6	6	6	6	6	5
Mercury	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2
Mercury	Agriculture/Forestry/Fishing: National fishing	[kg]	11	11	11	11	9	10	10	8	10	9	8	8	8
Mercury	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Manufacturing industries/Construction (mobile)	[kg]	2	2	2	2	2	2	3	3	3	2	3	3	3
Nickel	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0

Nickel	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Road transport: Passenger cars	[kg]	28	27	28	29	29	28	29	30	30	30	29	30	30
Nickel	Road transport:Light duty vehicles	[kg]	4	5	5	5	6	6	6	7	7	6	6	6	5
Nickel	Road transport:Heavy duty vehicles	[kg]	6	6	6	6	7	7	7	7	6	6	6	6	6
Nickel	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Road transport: Automobile tyre and brake wear	[kg]	73	73	74	77	80	80	83	86	84	79	79	80	78
Nickel	Road transport: Automobile road abrasion	[kg]	16	16	16	16	17	17	17	18	18	17	17	18	17
Nickel	Railways	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Nickel	International navigation (Shipping)	[kg]	23825	18510	12366	14147	11846	14256	22148	24842	18832	6924	11521	12574	6996
Nickel	National navigation (Shipping)	[kg]	1068	1036	1026	1374	1367	1371	1494	1477	1583	1685	1809	1749	1731
Nickel	Commercial/Institutional: Mobile	[kg]	0	0	0	1	1	1	1	1	1	1	1	1	1
Nickel	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	3	3	3	3	3	3	3	3	3	3	3	3	4
Nickel	Agriculture/Forestry/Fishing: National fishing	[kg]	15	15	16	15	12	14	13	11	13	12	11	11	11
Nickel	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead	Manufacturing industries/Construction (mobile)	[kg]	13	13	13	13	13	14	15	16	16	12	15	15	15
Lead	Civil aviation (International, LTO)	[kg]	118	114	113	106	111	117	22	10	113	52	10	52	12
Lead	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead	Civil aviation (Domestic, LTO)	[kg]	1369	1343	1328	1252	1304	1297	1245	1329	1182	991	929	776	848
Lead	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead	Road transport: Passenger cars	[kg]	82	81	84	88	91	91	93	100	105	106	109	116	119
Lead	Road transport:Light duty vehicles	[kg]	24	24	25	28	30	32	35	39	36	34	33	32	30
Lead	Road transport:Heavy duty vehicles	[kg]	34	36	35	37	38	38	39	40	37	33	35	36	34
Lead	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead	Road transport: Automobile tyre and brake wear	[kg]	4796	4754	4867	5035	5214	5234	5414	5708	5612	5413	5335	5391	5314
Lead	Road transport: Automobile road abrasion	[kg]	46	46	47	49	50	50	52	54	53	51	51	52	51
Lead	Railways	[kg]	3	3	3	3	3	4	3	3	4	3	4	4	4
Lead	International navigation (Shipping)	[kg]	206	166	126	137	112	121	172	186	151	70	103	108	71
Lead	National navigation (Shipping)	[kg]	21	20	20	21	21	21	22	22	22	22	23	22	20
Lead	Commercial/Institutional: Mobile	[kg]	1	1	1	1	2	2	2	2	2	2	2	2	2
Lead	Residential: Household and gardening (mobile)	[kg]	0	0	1	1	1	1	1	1	1	1	1	1	1
Lead	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	16	16	16	16	16	17	17	18	19	19	20	20	20
Lead	Agriculture/Forestry/Fishing: National fishing	[kg]	22	22	23	22	17	20	19	16	19	18	16	16	15
Lead	Other, Mobile (military)	[kg]	114	89	106	79	84	60	47	81	40	66	80	49	49
Selenium	Manufacturing industries/Construction (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0

Selenium	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport: Passenger cars	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport:Light duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport:Heavy duty vehicles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Road transport: Automobile tyre and brake wear	[kg]	25	25	26	27	28	28	29	30	30	28	28	28	28
Selenium	Road transport: Automobile road abrasion	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	International navigation (Shipping)	[kg]	412	331	252	274	224	243	345	372	302	140	207	216	141
Selenium	National navigation (Shipping)	[kg]	39	38	37	39	40	40	41	40	41	42	43	41	37
Selenium	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	Agriculture/Forestry/Fishing: National fishing	[kg]	44	44	45	43	34	41	38	33	38	36	32	32	30
Selenium	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	Manufacturing industries/Construction (mobile)	[kg]	438	443	447	452	455	476	512	553	564	417	526	512	511
Zinc	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	Civil aviation (Domestic, LTO)	[kg]	5	5	5	5	5	5	5	5	4	4	3	3	3
Zinc	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	Road transport: Passenger cars	[kg]	4774	4725	4842	4976	5073	4973	5002	5231	5313	5282	5302	5467	5519
Zinc	Road transport:Light duty vehicles	[kg]	846	863	898	980	1065	1127	1238	1352	1260	1175	1142	1096	1033
Zinc	Road transport:Heavy duty vehicles	[kg]	1146	1191	1180	1242	1281	1285	1318	1342	1251	1119	1166	1208	1143
Zinc	Road transport: Mopeds & motorcycles	[kg]	16	16	17	17	17	17	18	19	19	19	19	19	19
Zinc	Road transport: Automobile tyre and brake wear	[kg]	16580	16583	16857	17520	18106	18228	18861	19827	19361	18410	18350	18617	18239
Zinc	Road transport: Automobile road abrasion	[kg]	74	74	75	78	80	81	83	87	86	81	82	83	82
Zinc	Railways	[kg]	115	106	106	110	109	117	114	115	119	116	122	126	126
Zinc	International navigation (Shipping)	[kg]	950	766	588	637	519	560	788	848	692	326	478	497	330
Zinc	National navigation (Shipping)	[kg]	142	143	143	149	152	152	153	152	154	155	156	150	140
Zinc	Commercial/Institutional: Mobile	[kg]	60	68	77	89	103	112	119	121	122	121	119	118	118
Zinc	Residential: Household and gardening (mobile)	[kg]	29	32	34	36	39	41	42	43	44	44	43	43	43
Zinc	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	543	548	549	550	559	566	583	617	650	658	667	680	694
Zinc	Agriculture/Forestry/Fishing: National fishing	[kg]	110	110	113	109	85	102	96	82	95	89	79	80	76
Zinc	Other, Mobile (military)	[kg]	14	32	16	22	53	48	24	26	25	44	25	44	38

HCB	Manufacturing industries/Construction (mobile)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Civil aviation (International, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Civil aviation (International, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Civil aviation (Domestic, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Civil aviation (Domestic, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Road transport: Passenger cars	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Road transport:Light duty vehicles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Road transport:Heavy duty vehicles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Road transport: Mopeds & motorcycles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Railways	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	International navigation (Shipping)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	National navigation (Shipping)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Commercial/Institutional: Mobile	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Residential: Household and gardening (mobile)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Agriculture/Forestry/Fishing: National fishing	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	Other, Mobile (military)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Manufacturing industries/Construction (mobile)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (International, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (International, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (Domestic, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil aviation (Domestic, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road transport: Passenger cars	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road transport:Light duty vehicles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road transport:Heavy duty vehicles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road transport: Mopeds & motorcycles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Railways	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	International navigation (Shipping)	[g]	1	1	0	0	0	0	1	1	0	0	0	0	0
Dioxins/furans	National navigation (Shipping)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Commercial/Institutional: Mobile	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Residential: Household and gardening (mobile)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Agriculture/Forestry/Fishing: National fishing	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Other, Mobile (military)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
Flouranthene	Manufacturing industries/Construction (mobile)	[kg]	48	48	49	49	50	52	56	61	63	46	58	57	56
Flouranthene	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Flouranthene	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0

Flouranthene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Flouranthene	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Flouranthene	Road transport: Passenger cars	[kg]	398	374	367	374	378	372	383	434	478	483	517	562	593
Flouranthene	Road transport:Light duty vehicles	[kg]	175	177	183	201	216	231	255	282	262	239	230	218	206
Flouranthene	Road transport:Heavy duty vehicles	[kg]	80	81	81	85	87	89	92	95	89	79	82	84	79
Flouranthene	Road transport: Mopeds & motorcycles	[kg]	8	8	8	8	8	9	9	10	10	10	10	10	10
Flouranthene	Railways	[kg]	4	4	4	4	4	4	4	4	5	4	5	5	5
Flouranthene	International navigation (Shipping)	[kg]	283	238	208	215	171	164	203	205	187	114	149	147	116
Flouranthene	National navigation (Shipping)	[kg]	52	51	50	49	50	50	49	49	49	49	49	46	40
Flouranthene	Commercial/Institutional: Mobile	[kg]	5	6	7	8	9	10	10	10	10	10	10	10	10
Flouranthene	Residential: Household and gardening (mobile)	[kg]	3	3	3	3	3	3	4	4	4	4	4	4	4
Flouranthene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	63	63	63	63	65	65	67	71	75	76	77	78	80
Flouranthene	Agriculture/Forestry/Fishing: National fishing	[kg]	70	70	72	69	54	65	61	52	60	56	50	51	48
Flouranthene	Other, Mobile (military)	[kg]	2	4	2	3	6	6	3	3	3	5	3	5	4
Benzo(b) flouranthene	Manufacturing industries/Construction (mobile)	[kg]	6	6	6	6	6	6	7	7	7	5	7	7	7
Benzo(b) flouranthene	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Road transport: Passenger cars	[kg]	32	31	31	31	32	31	32	35	38	38	39	42	43
Benzo(b) flouranthene	Road transport:Light duty vehicles	[kg]	11	11	11	13	13	14	16	17	16	15	14	13	13
Benzo(b) flouranthene	Road transport:Heavy duty vehicles	[kg]	20	21	20	21	22	23	23	24	22	20	21	21	20
Benzo(b) flouranthene	Road transport: Mopeds & motorcycles	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(b) flouranthene	Railways	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(b) flouranthene	International navigation (Shipping)	[kg]	19	17	15	16	12	11	13	12	12	8	10	10	9
Benzo(b) flouranthene	National navigation (Shipping)	[kg]	4	4	4	4	4	4	4	4	4	4	4	4	3
Benzo(b) flouranthene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	1	1	0	0	0	0
Benzo(b) flouranthene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	7	7	7	7	7	8	8	8	9	9	9	9	9
Benzo(b) flouranthene	Agriculture/Forestry/Fishing: National fishing	[kg]	6	6	6	6	5	6	5	4	5	5	4	4	4
Benzo(b) flouranthene	Other, Mobile (military)	[kg]	0	0	0	0	1	1	0	0	0	1	0	1	0
Benzo(k) flouranthene	Manufacturing industries/Construction (mobile)	[kg]	6	5	5	6	6	6	6	7	7	5	7	6	6
Benzo(k) flouranthene	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Road transport: Passenger cars	[kg]	31	30	30	31	32	32	33	36	38	38	39	41	42

Benzo(k) flouranthene	Road transport:Light duty vehicles	[kg]	10	10	10	11	12	13	14	16	15	14	13	12	12
Benzo(k) flouranthene	Road transport:Heavy duty vehicles	[kg]	30	30	30	32	33	33	34	35	33	30	31	31	30
Benzo(k) flouranthene	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	1	0	0	0	0
Benzo(k) flouranthene	Railways	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(k) flouranthene	International navigation (Shipping)	[kg]	9	8	7	7	6	5	6	6	6	4	5	5	4
Benzo(k) flouranthene	National navigation (Shipping)	[kg]	2	2	2	2	2	2	2	2	2	2	2	2	2
Benzo(k) flouranthene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	7	7	7	7	7	7	7	8	8	8	9	9	9
Benzo(k) flouranthene	Agriculture/Forestry/Fishing: National fishing	[kg]	3	3	3	3	2	3	2	2	2	2	2	2	2
Benzo(k) flouranthene	Other, Mobile (military)	[kg]	0	0	0	0	1	1	0	0	0	1	0	1	0
Benzo(a) pyrene	Manufacturing industries/Construction (mobile)	[kg]	3	3	3	3	3	3	3	4	4	3	3	3	3
Benzo(a) pyrene	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Road transport: Passenger cars	[kg]	31	30	30	31	32	32	33	37	40	40	42	44	46
Benzo(a) pyrene	Road transport:Light duty vehicles	[kg]	12	12	12	14	15	16	17	19	18	16	16	15	14
Benzo(a) pyrene	Road transport:Heavy duty vehicles	[kg]	4	4	4	4	4	4	4	4	4	4	4	4	4
Benzo(a) pyrene	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	1	1	1	1	1	1	1
Benzo(a) pyrene	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	International navigation (Shipping)	[kg]	5	4	4	4	3	3	4	4	3	2	3	3	2
Benzo(a) pyrene	National navigation (Shipping)	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(a) pyrene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	4	4	4	4	4	4	4	4	4	4	4	5	5
Benzo(a) pyrene	Agriculture/Forestry/Fishing: National fishing	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(a) pyrene	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Manufacturing industries/Construction (mobile)	[kg]	5	5	5	5	5	6	6	7	7	5	6	6	6
Benzo(g,h,i) perylene	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Road transport: Passenger cars	[kg]	66	63	63	64	66	65	66	73	79	79	82	87	91
Benzo(g,h,i) perylene	Road transport:Light duty vehicles	[kg]	23	23	24	27	28	30	34	37	34	31	30	29	27
Benzo(g,h,i) perylene	Road transport:Heavy duty vehicles	[kg]	3	3	3	3	3	3	3	4	3	3	3	3	3
Benzo(g,h,i) perylene	Road transport: Mopeds & motorcycles	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1

Benzo(g,h,i) perylene	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	International navigation (Shipping)	[kg]	37	32	31	31	24	21	23	21	22	17	20	19	17
Benzo(g,h,i) perylene	National navigation (Shipping)	[kg]	8	8	8	7	7	7	7	7	7	7	7	6	5
Benzo(g,h,i) perylene	Commercial/Institutional: Mobile	[kg]	1	1	1	1	1	2	2	2	2	2	2	2	2
Benzo(g,h,i) perylene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	1	1	1	1	1	1	1	1	1
Benzo(g,h,i) perylene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	7	7	7	7	7	7	7	8	8	8	8	9	9
Benzo(g,h,i) perylene	Agriculture/Forestry/Fishing: National fishing	[kg]	13	13	14	13	10	12	12	10	12	11	10	10	9
Benzo(g,h,i) perylene	Other, Mobile (military)	[kg]	0	0	0	0	1	1	0	0	0	1	0	0	0
indeno(1,2,3-c,d) pyrene	Manufacturing industries/Construction (mobile)	[kg]	3	3	3	3	3	3	3	4	4	3	4	3	3
indeno(1,2,3-c,d) pyrene	Civil aviation (International, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Civil aviation (International, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Civil aviation (Domestic, LTO)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Civil aviation (Domestic, Cruise)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Road transport: Passenger cars	[kg]	34	34	34	36	37	36	38	41	44	44	45	47	49
indeno(1,2,3-c,d) pyrene	Road transport:Light duty vehicles	[kg]	11	11	12	13	14	15	17	18	17	15	15	14	13
indeno(1,2,3-c,d) pyrene	Road transport:Heavy duty vehicles	[kg]	5	5	5	6	6	6	6	6	6	5	5	5	5
indeno(1,2,3-c,d) pyrene	Road transport: Mopeds & motorcycles	[kg]	0	0	0	0	0	0	0	0	1	0	0	0	0
indeno(1,2,3-c,d) pyrene	Railways	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	International navigation (Shipping)	[kg]	30	26	25	25	20	17	19	17	18	14	17	16	14
indeno(1,2,3-c,d) pyrene	National navigation (Shipping)	[kg]	7	7	6	6	6	6	6	6	6	5	5	5	4
indeno(1,2,3-c,d) pyrene	Commercial/Institutional: Mobile	[kg]	0	0	0	0	0	1	1	1	1	1	1	1	1
indeno(1,2,3-c,d) pyrene	Residential: Household and gardening (mobile)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[kg]	4	4	4	4	4	4	4	4	5	5	5	5	5
indeno(1,2,3-c,d) pyrene	Agriculture/Forestry/Fishing: National fishing	[kg]	11	11	11	11	9	10	10	8	10	9	8	8	8
indeno(1,2,3-c,d) pyrene	Other, Mobile (military)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Manufacturing industries/Construction (mobile)	[g]	6	6	6	6	6	6	7	7	7	5	7	7	7
PCB	Civil aviation (International, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Civil aviation (International, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Civil aviation (Domestic, LTO)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Civil aviation (Domestic, Cruise)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Road transport: Passenger cars	[g]	0	0	0	0	0	0	0	1	1	1	1	1	1
PCB	Road transport:Light duty vehicles	[g]	0	0	0	0	0	1	1	1	1	1	1	1	0
PCB	Road transport:Heavy duty vehicles	[g]	21	21	21	23	23	24	24	25	23	21	22	22	21
PCB	Road transport: Mopeds & motorcycles	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Railways	[g]	2	2	1	2	2	2	2	2	2	2	2	2	2
PCB	International navigation (Shipping)	[g]	1	1	0	0	0	0	1	1	0	0	0	0	0
PCB	National navigation (Shipping)	[g]	0	1	1	1	1	1	1	1	1	1	1	1	1

PCB	Commercial/Institutional: Mobile	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Residential: Household and gardening (mobile)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Agriculture/Forestry/Fishing: Off-road agriculture/forestry	[g]	7	7	7	7	8	8	8	8	9	9	9	9	9
PCB	Agriculture/Forestry/Fishing: National fishing	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB	Other, Mobile (military)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0

Annex 2B-17 Uncertainty estimates

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Mg SO_2	Mg SO_2	%	%	%	%	%	%	%	%	%
Road Transportation	SO_2	5767	71	2	50	50,040	1,939	-0,0367953	0,0044	-1,8397635	0,0125428	1,8398062
Other mobile sources	SO_2	10186	1755	10	50	50,990	49,014	0,036694	0,1100	1,8346999	1,555404	2,4052869
Total	SO_2	15952,627	1825,2714				2406,128					9,1702923
Total uncertainties					**Year (%):**		**49,052**			**Trend (%):**		**3,028**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Gg Nox	Gg Nox	%	%	%	%	%	%	%	%	%
Road Transportation	Nox	109042	44316	2	50	50,040	26,608	-0,0736921	0,2745	-3,6846062	0,7764342	3,7655243
Other mobile sources	Nox	52394	39025	10	100	100,499	47,059	0,0739499	0,2417	7,3949876	3,4186851	8,1469779
Total	Nox	161435,22	83340,689				2922,588					80,552423
Total uncertainties					**Year (%):**		**54,061**			**Trend (%):**		**8,975**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data Gg NMVOC	Input data Gg NMVOC	Input data %	Input data %	%	%	%	%	%	%	%
Road Transportation	NMVOC	77245	10439	2	50	50,040	25,597	-0,0719012	0,1134	-3,5950597	0,320613	3,6093278
Other mobile sources	NMVOC	14852	9968	10	100	100,499	49,090	0,0723875	0,1082	7,2387518	1,5307393	7,3988303
Total	NMVOC	92096,497	20407,978				3065,024					67,769937
Total uncertainties					**Year (%):**		**55,363**			**Trend (%):**		**8,232**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data Gg CO	Input data Gg CO	Input data %	Input data %	%	%	%	%	%	%	%
Road Transportation	CO	464930	96022	2	50	50,040	21,140	-0,1452409	0,1648	-7,2620471	0,4660419	7,2769859
Other mobile sources	CO	117831	131274	10	100	100,499	58,043	0,1461043	0,2253	14,610427	3,1856901	14,953702
Total	CO	582761,87	227296,35				3815,840					276,56771
Total uncertainties					**Year (%):**		**61,772**			**Trend (%):**		**16,630**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Gg NH_3	Gg NH_3	%	%	%	%	%	%	%	%	%
Road Transportation	NH_3	72	1456	2	1000	1000,002	994,422	1,3756215	18,7332	1375,6215	52,985618	1376,6416
Other mobile sources	NH_3	6	8	10	1000	1000,050	5,580	-1,3871875	0,1051	-1387,1875	1,4866232	1387,1883
Total	NH_3	77,736964	1464,4373				988906,015					3819433,5
Total uncertainties					**Year (%):**		**994,438**			**Trend (%):**		**1954,337**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		Gg TSP	Gg TSP	%	%	%	%	%	%	%	%	%
Road Transportation	TSP	5525	3782	2	50	50,040	33,180	0,0226883	0,4299	1,1344132	1,2158015	1,6628489
Other mobile sources	TSP	3274	1922	10	100	100,499	33,860	-0,0227461	0,2184	-2,2746067	3,0888616	3,8360008
Total	TSP	8799,0925	5704,1546				2247,458					17,479969
Total uncertainties					**Year (%):**		**47,407**			**Trend (%):**		**4,181**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Arsenic	5	6	2	1000	1000,002	137,513	0,0440142	0,0831	44,014186	0,2351674	44,014814
Other mobile sources	Arsenic	71	40	10	1000	1000,050	862,531	-0,0436345	0,5215	-43,634523	7,3749385	44,253377
Total	Arsenic	76,381538	46,182656				762869,102					3895,6652
Total uncertainties					**Year (%):**		**873,424**			**Trend (%):**		**62,415**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Cadmium	32	45	2	1000	1000,002	792,465	0,106301	0,9959	106,30098	2,8166893	106,33829
Other mobile sources	Cadmium	13	12	10	1000	1000,050	207,547	-0,1067404	0,2608	-106,74036	3,6882819	106,80406
Total	Cadmium	45,176429	56,771004				671076,645					22714,939
Total uncertainties					**Year (%):**		**819,193**			**Trend (%):**		**150,715**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Chromium	124	179	2	1000	1000,002	796,331	0,1351811	0,9884	135,18114	2,7957381	135,21005
Other mobile sources	Chromium	57	46	10	1000	1000,050	203,681	-0,1356843	0,2528	-135,68426	3,5752206	135,73135
Total	Chromium	180,94141	224,59334				675628,570					36704,757
Total uncertainties					**Year (%):**		**821,966**			**Trend (%):**		**191,585**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Copper	28545	40619	2	1000	1000,002	998,500	0,0022876	1,4185	2,2875863	4,0122238	4,6185486
Other mobile sources	Copper	90	61	10	1000	1000,050	1,502	-0,0023103	0,0021	-2,3103183	0,0301857	2,3105155
Total	Copper	28634,749	40680,523				997003,654					26,669473
Total uncertainties					**Year (%):**		**998,501**			**Trend (%):**		**5,164**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Mercury	21	23	2	1000	1000,002	569,699	0,0826025	0,5380	82,602457	1,5216671	82,616471
Other mobile sources	Mercury	22	17	10	1000	1000,050	430,324	-0,0825726	0,4064	-82,572553	5,7467105	82,772285
Total	Mercury	42,860667	40,475229				509735,281					13676,733
Total uncertainties					**Year (%):**		**713,957**			**Trend (%):**		**116,948**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Nickel	102	137	2	1000	1000,002	72,645	0,0234411	0,0393	23,441056	0,1112731	23,44132
Other mobile sources	Nickel	3382	1750	10	1000	1000,050	927,402	-0,0232225	0,5022	-23,222525	7,1023663	24,284343
Total	Nickel	3483,9596	1886,7526				865351,331					1139,2248
Total uncertainties					**Year (%):**		**930,243**			**Trend (%):**		**33,752**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Lead	101368	5549	2	1000	1000,002	849,269	-0,0081036	0,0536	-8,1035617	0,1515668	8,104979
Other mobile sources	Lead	2179	985	10	1000	1000,050	150,740	0,0081812	0,0095	8,18117	0,1345043	8,1822756
Total	Lead	103547,4	6533,6164				743980,803					132,64032
Total uncertainties					**Year (%):**		**862,543**			**Trend (%):**		**11,517**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Selenium	21	28	2	1000	1000,002	296,469	0,1003607	0,2217	100,36067	0,6271416	100,36263
Other mobile sources	Selenium	107	67	10	1000	1000,050	703,567	-0,099688	0,5262	-99,687992	7,4411696	99,965327
Total	Selenium	127,27237	95,186774				582900,212					20065,724
Total uncertainties					**Year (%):**		**763,479**			**Trend (%):**		**141,654**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Zinc	18592	26035	2	1000	1000,002	937,041	0,0231857	1,2883	23,185688	3,6438945	23,470281
Other mobile sources	Zinc	1616	1749	10	1000	1000,050	62,964	-0,0233803	0,0866	-23,380301	1,2241961	23,412329
Total	Zinc	20208,721	27784,465				882009,792					1098,9912
Total uncertainties					**Year (%):**		**939,154**			**Trend (%):**		**33,151**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		g dioxins	g dioxins	%	%	%	%	%	%	%	%	%
Road Transportation	Dioxins	1	0	2	1000	1000,002	369,605	-0,1054783	0,0958	-105,47829	0,270888	105,47864
Other mobile sources	Dioxins	0	0	10	1000	1000,050	630,428	0,1060673	0,1634	106,06732	2,3101316	106,09248
Total	Dioxins	1,1745721	0,3043602				534046,543					22381,357
Total uncertainties					**Year (%):**		**730,785**			**Trend (%):**		**149,604**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Flouranthene	855	887	2	1000	1000,002	782,469	0,0163931	0,7948	16,393056	2,2481046	16,546488
Other mobile sources	Flouranthene	261	247	10	1000	1000,050	217,544	-0,0164801	0,2210	-16,48013	3,1249691	16,773793
Total	Flouranthene	1116,4817	1134,1151				659582,352					555,14638
Total uncertainties					**Year (%):**		**812,147**			**Trend (%):**		**23,562**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Benzo(b) flouranthene	69	77	2	1000	1000,002	751,243	0,0368088	0,7948	36,808824	2,2480773	36,87741
Other mobile sources	Benzo(b) flouranthene	27	25	10	1000	1000,050	248,771	-0,0369675	0,2632	-36,967536	3,7220345	37,154438
Total	Benzo(b) flouranthene	96,299788	101,88546				626252,687					2740,3956
Total uncertainties					**Year (%):**		**791,361**			**Trend (%):**		**52,349**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Benzo(k) flouranthene	69	84	2	1000	1000,002	802,259	0,0467743	0,9319	46,774308	2,6357718	46,848513
Other mobile sources	Benzo(k) flouranthene	21	21	10	1000	1000,050	197,753	-0,0470185	0,2297	-47,018527	3,2483696	47,130603
Total	Benzo(k) flouranthene	90,168213	104,73764				682725,060					4416,077
Total uncertainties					**Year (%):**		**826,272**			**Trend (%):**		**66,454**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Benzo(a) pyrene	49	64	2	1000	1000,002	859,981	0,0461166	1,0760	46,116603	3,0435262	46,216925
Other mobile sources	Benzo(a) pyrene	11	10	10	1000	1000,050	140,027	-0,0464138	0,1752	-46,413823	2,47771	46,47991
Total	Benzo(a) pyrene	59,705685	74,706713				759175,444					4296,3862
Total uncertainties					**Year (%):**		**871,307**			**Trend (%):**		**65,547**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	Benzo(g,h,i) perylene	104	122	2	1000	1000,002	792,729	0,0575137	0,8650	57,513722	2,4467244	57,565742
Other mobile sources	Benzo(g,h,i) perylene	37	32	10	1000	1000,050	207,283	-0,0577886	0,2262	-57,788649	3,19869	57,877108
Total	Benzo(g,h,i) perylene	140,72025	153,55805				671385,886					6663,5743
Total uncertainties					**Year (%):**		**819,381**			**Trend (%):**		**81,631**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emis-sion factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		kg	kg	%	%	%	%	%	%	%	%	%
Road Transportation	indeno(1,2,3-c,d) pyrene	47	68	2	1000	1000,002	762,420	0,1329208	0,9439	132,92083	2,6698	132,94764
Other mobile sources	indeno(1,2,3-c,d) pyrene	25	21	10	1000	1000,050	237,593	-0,1333298	0,2941	-133,32975	4,1597536	133,39463
Total	indeno(1,2,3-c,d) pyrene	71,711905	88,783343				637735,047					35469,203
Total uncertainties					**Year (%):**		**798,583**			**Trend (%):**		**188,333**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		g	g	%	%	%	%	%	%	%	%	%
Road Transportation	HCB	0	1	2	1000	1000,002	721,813	0,1497636	1,0445	149,76357	2,9544202	149,79271
Other mobile sources	HCB	0	0	10	1000	1000,050	278,202	-0,1501147	0,4026	-150,11471	5,6932076	150,22263
Total	HCB	0,6139601	0,8884714				598410,766					45004,695
Total uncertainties					**Year (%):**		**773,570**			**Trend (%):**		**212,143**

Source category	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in year t	Type A sensitivity	Type B sensitivity	Uncertainty in trend in national emissions introduced by emission factor uncertainty	Uncertainty in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced into the trend in total national emissions
		Input data	Input data	Input data	Input data							
		g	g	%	%	%	%	%	%	%	%	%
Road Transportation	PCB	88	22	2	1000	1000,002	544,172	-0,1028208	0,2071	-102,82077	0,585741	102,82244
Other mobile sources	PCB	20	19	10	1000	1000,050	455,852	0,1034706	0,1735	103,47056	2,45325	103,49963
Total	PCB	107,86305	41,048545				503924,155					21284,629
Total uncertainties					**Year (%):**		**709,876**			**Trend (%):**		**145,893**

Annex 2C - Agriculture

Table 2C.1a Nitrogen excretion rates in average, 1985 – 2012, kg N per head per year.

Livestock categories:	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Dairy Cattle	121.49	123.66	125.82	128.05	130.33	129.49	128.63	127.76	126.89	126.06	125.23	125.08	124.94	124.82
Non-Dairy Cattle	34.72	35.14	35.16	35.37	35.26	35.59	36.06	36.65	36.26	36.17	36.26	36.01	36.59	35.95
Sheep	21.04	21.04	21.04	21.04	21.04	21.18	21.33	21.47	21.61	21.76	21.90	20.11	18.32	16.53
Goats	21.04	21.04	21.04	21.04	21.04	21.18	21.33	21.47	21.61	21.76	21.90	20.11	18.32	16.53
Horses	45.07	45.07	45.07	45.07	45.07	44.15	43.23	42.31	41.40	40.48	39.56	39.56	39.56	39.56
Swine	12.88	12.94	12.72	12.66	12.35	11.84	11.50	11.16	10.45	10.48	9.70	9.92	9.67	9.63
Laying hens	0.56	0.61	0.66	0.68	0.72	0.72	0.74	0.71	0.76	0.75	0.76	0.77	0.75	0.77
Broilers	0.40	0.40	0.42	0.50	0.49	0.55	0.56	0.48	0.47	0.55	0.50	0.46	0.49	0.50
Turkeys	1.25	1.25	1.25	1.25	1.25	1.31	1.38	1.45	1.52	1.59	1.66	1.77	1.89	2.00
Other poultry	0.29	0.27	0.28	0.29	0.32	0.29	0.31	0.28	0.29	0.34	0.40	0.32	0.31	0.34
Other	5.33	5.24	5.15	5.07	4.97	4.95	4.88	4.85	4.82	4.76	4.71	4.72	4.70	4.69
N-excretion, total (M kg N/year)	264	267	269	271	273	271	270	269	266	265	263	259	256	251

Continued

Livestock categories:	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Dairy Cattle	124.60	125.31	125.31	127.16	129.79	131.56	133.30	134.66	137.58	137.98	138.12	138.63	138.47	138.03
Non-Dairy Cattle	36.43	36.39	35.86	37.45	37.29	38.86	40.88	43.33	44.79	45.53	44.81	43.15	44.11	43.39
Sheep	14.75	16.95	16.95	16.95	16.95	16.95	16.95	16.95	16.95	16.95	16.95	16.95	16.95	16.95
Goats	14.75	16.95	16.95	16.36	16.36	16.36	15.83	15.74	15.64	16.32	16.37	16.40	16.43	16.55
Horses	39.56	39.56	39.56	39.56	39.56	39.56	39.56	39.56	39.56	39.56	39.56	39.56	39.56	39.56
Swine	9.98	9.61	9.53	9.91	9.51	9.69	9.19	8.52	8.54	8.63	8.33	7.81	7.98	8.01
Laying hens	0.77	0.75	0.77	0.79	0.90	0.91	0.95	1.13	0.97	0.89	0.90	0.80	0.78	0.72
Broilers	0.48	0.45	0.48	0.49	0.58	0.68	0.58	0.47	0.53	0.63	0.40	0.47	0.44	0.43
Turkeys	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63	1.63
Other poultry	0.34	0.32	0.36	0.36	0.30	0.28	0.24	0.25	0.13	0.14	0.15	0.13	0.09	0.13
Other	4.69	4.68	4.67	4.66	4.66	5.14	5.42	5.22	5.22	5.32	5.55	5.85	5.68	5.47
N-excretion, total (M kg N/year)	248	253	252	255	258	262	265	267	272	274	273	271	272	271

Table 2C.1b Nitrogen excretion given as TAN (Total Ammonical Nitrogen), 2007-2012, kg N per head per year.

	2007	2008	2009	2010	2011	2012
Cattle, Large breed						
Dairy cows	66.67	67.00	65.70	65.69	67.20	65.82
Bulls[a, c]	16.11	16.11	16.11	16.11	16.10	16.11
Heifers[b]	35.86	35.86	35.86	33.49	33.85	33.85
Pigs						
Sows	19.77	19.21	19.34	18.67	18.66	18.99
Fattening pigs[c]	2.04	2.03	1.96	1.87	1.86	1.88
Weaners[c]	0.31	0.33	0.31	0.29	0.29	0.31
Fur animals						
Mink	3.85	3.93	4.11	4.34	4.20	4.06

[a] 6 months to slaughter. Per produced animal.

[b] 6 months to calving.

[c] per produced animal.

Table 2C.2 Percentage distribution of housing type – dairy cattle and fattening pigs 1985 – 2012.

	1985	1986[1]	1987	1988	1989	1990	1991	1992	1993[1]	1994	1995	1996	1997	1998
Dairy cattle														
Tied-up stables	85	84	83	82	80	79	78	77	76	74	73	72	66	60
Loose-holdings with beds	14	15	15	16	17	18	18	19	20	21	21	22	26	30
Deep litter	1	2	2	2	3	3	4	4	5	5	6	6	8	10
Fattening pigs														
Full slatted floor	29	33	38	42	47	51	56	60	60	60	60	60	60	60
Partly slatted floor	30	29	27	26	24	23	21	20	21	23	24	25	26	28
Solid floor	40	36	33	29	26	22	19	15	14	12	11	9	8	6
Deep litter	1	2	2	3	3	4	4	5	5	5	5	6	6	6

Continued

	1999	2000	2001	2002	2003	2004	2005	2006	2007[1]	2008[1]	2009[1]	2010[1]	2011[1]	2012[1]
Dairy cattle														
Tied-up stables	60	46	40	35	26	22	20	18	17	14	12	12	10	9
Loose-holdings with beds	30	43	49	54	63	67	70	73	76	79	82	82	85	86
Deep litter	10	11	11	11	11	11	10	9	7	7	6	6	5	5
Fattening pigs														
Full slatted floor	60	58	57	56	55	53	53	53	53	53	54	54	53	52
Partly slatted floor	29	31	33	34	35	38	38	38	39	41	42	42	43	46
Solid floor	5	5	4	4	4	3	3	4	4	3	2	2	1	1
Deep litter	6	6	6	6	6	6	6	5	5	4	3	3	2	2

[1] Due to rounding of figures the sum can differ from 100 %.

Table 2C.3 Cover of slurry tanks 1985-2012, pct. with no or full cover

	1985-1999	2000-2001	2002	2003-2012
Cattle		%		
No cover	20	5	5	2
Full cover	80	95	95	98
Swine				
No cover	40	20	10	5
Full cover	60	80	90	95
Fur animals				
No cover	20	5	5	2
Full cover	80	95	95	98

Table 2C.4 Assumptions for synthetic fertiliser

EMEP/EEA fertiliser types[1]	Danish fertiliser types
Ammonium nitrate (AN)	Ammonium nitrate
Anhydrous ammonia	Liquid ammonia
Ammonium phosphates (MAP, DAP)	Calcium and boron calcium nitrate
	Diammonphosphate
	Other NP fertiliser types
	Magnesium fertiliser
Ammonium sulphate (AS)	Ammonium sulphate
Calcium ammonium nitrate (CAN)	Calcium ammonium nitrate and other nitrate types
Calcium nitrate (CN)	-
Ammonia solutions (AN)	Other nitrogen fertiliser
Ammonia solutions (Urea AN)	-
Urea ammonium solutions (UAS)	-
Urea	Urea
Other NK and NPK	NPK-fertiliser
	NK fertiliser

[1] EMEP/EEA emission inventory guidebook 2013, Table 3-2 Emission factors for total NH_3 emissions from soils due to N fertiliser volatilization

Table 2C.5 Emissions of pollutants from field burning of agricultural wastes, 1985-2012.

	Unit	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
NO_X	Gg	1.53	1.32	1.25	0.93	0.98	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.10	0.12
CO	Gg	37.58	32.29	30.67	22.93	24.13	1.89	1.97	1.88	2.06	1.98	2.24	2.23	2.37	2.98
NMVOC	Gg	4.02	3.45	3.28	2.45	2.58	0.20	0.21	0.20	0.22	0.21	0.24	0.24	0.25	0.32
SO_2	Gg	0.19	0.16	0.16	0.12	0.12	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
NH_3	Gg	1.53	1.32	1.25	0.93	0.98	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.10	0.12
TSP	Mg	3.70	3.18	3.02	2.26	2.38	0.19	0.19	0.19	0.20	0.20	0.22	0.22	0.23	0.29
PM_{10}	Mg	3.70	3.18	3.02	2.26	2.38	0.19	0.19	0.19	0.20	0.20	0.22	0.22	0.23	0.29
$PM_{2,5}$	Mg	3.51	3.01	2.86	2.14	2.25	0.18	0.18	0.18	0.19	0.19	0.21	0.21	0.22	0.28
Pb	Mg	0.55	0.47	0.45	0.34	0.35	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
Cd	Mg	0.03	0.03	0.03	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hg	Mg	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As	Mg	0.04	0.03	0.03	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cr	Mg	0.14	0.12	0.11	0.09	0.09	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cu	Mg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ni	Mg	0.11	0.10	0.09	0.07	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Se	Mg	0.02	0.02	0.02	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn	Mg	0.02	0.02	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
HCB	kg	2.22	1.90	1.80	1.33	1.40	0.08	0.08	0.08	0.09	0.08	0.10	0.09	0.10	0.12
DIOX	g I-Teq	0.38	0.32	0.31	0.23	0.24	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03
Benzo(a)pyrene	Mg	1.78	1.53	1.45	1.08	1.14	0.09	0.09	0.09	0.10	0.09	0.11	0.11	0.11	0.14
Benzo(b)fluoranthene	Mg	1.74	1.50	1.42	1.06	1.12	0.09	0.09	0.09	0.10	0.09	0.10	0.10	0.11	0.14
Benzo(k)fluoranthene	Mg	0.68	0.59	0.56	0.42	0.44	0.03	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.05
Indeno(1,2,3-cd)pyrene	Mg	0.65	0.56	0.53	0.40	0.42	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.04	0.05
PCB's	kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 2C.5 Emissions of pollutants from field burning of agricultural wastes, 1985-2012 – *Continued.*

Continued	Unit	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
NO_X	Gg	0.12	0.11	0.12	0.10	0.12	0.13	0.13	0.13	0.11	0.10	0.12	0.09	0.09	0.10
CO	Gg	2.83	2.79	2.93	2.44	2.93	3.07	3.12	3.16	2.73	2.53	2.98	2.17	2.15	2.52
NMVOC	Gg	0.30	0.30	0.31	0.26	0.31	0.33	0.33	0.34	0.29	0.27	0.32	0.23	0.23	0.27
SO_2	Gg	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01
NH_3	Gg	0.12	0.11	0.12	0.10	0.12	0.13	0.13	0.13	0.11	0.10	0.12	0.09	0.09	0.10
TSP	Mg	0.28	0.27	0.29	0.24	0.29	0.30	0.31	0.31	0.27	0.25	0.29	0.21	0.21	0.25
PM_{10}	Mg	0.28	0.27	0.29	0.24	0.29	0.30	0.31	0.31	0.27	0.25	0.29	0.21	0.21	0.25
$PM_{2,5}$	Mg	0.26	0.26	0.27	0.23	0.27	0.29	0.29	0.30	0.26	0.24	0.28	0.20	0.20	0.24
Pb	Mg	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03
Cd	Mg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hg	Mg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As	Mg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cr	Mg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cu	Mg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ni	Mg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Se	Mg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn	Mg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
HCB	kg	0.12	0.12	0.12	0.10	0.12	0.13	0.13	0.13	0.11	0.11	0.12	0.09	0.09	0.11
DIOX	g I-Teq	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.03
Benzo(a)pyrene	Mg	0.13	0.13	0.14	0.12	0.14	0.15	0.15	0.15	0.13	0.12	0.14	0.10	0.10	0.12
Benzo(b)fluoranthene	Mg	0.13	0.13	0.14	0.11	0.14	0.14	0.14	0.15	0.13	0.12	0.14	0.10	0.10	0.12
Benzo(k)fluoranthene	Mg	0.05	0.05	0.05	0.04	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.05
Indeno(1,2,3-cd)pyrene	Mg	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.05	0.04	0.04	0.04
PCB's	kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 2C.6 Activity data for field burning of agricultural wastes, 1985-2012, tonnes.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Straw from grass seed production	37 230	40 539	43 783	48 221	52 588	35 012	36 986	36 969	39 964	38 579	43 688	43 482	46 193	59 797
Bales of wet straw	796 728	676 008	636 901	460 594	482 902	7 032	6 727	4 826	5 672	5 429	6 118	6 044	6 309	6 298

Continued

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Straw from grass seed production	56 927	55 748	58 969	48 400	59 583	62 657	63 626	64 911	55 553	50 552	59 852	42 755	42 296	50 201
Bales of wet straw	5 859	6 100	6 027	5 667	5 414	5 488	5 524	5 239	5 146	5 662	6 280	5 469	5 436	5 804

References

EMEP/EEA Air Pollutant Emission Inventory Guidebook, 2013: Available at: http://www.eea.europa.eu//publications/emep-eea-guidebook-2013 (13-01-2014)

Annex 2D - Waste

Annex 2D-1 Human cremation activity data, 1980-2012

Table 2D-1 shows the development in total number of nationally deceased persons, number of cremations and the development in the fraction of cremated corpses from the total number of deceased. Data for the total number of nationally deceased persons are collected from Statistics Denmark, 2013. The data describing the number of cremations and the cremation fraction in the period 1984-2012 are gathered from the Association of Danish Crematoria (DKL, 2013). By assuming that the development of the cremation fraction is constant back to the year 1980, the fraction from 1980-1983 can be calculated from the trend of the development of 1984-2009. An estimation of the number of annual cremations from 1980-1983 is then found by multiplying the calculated cremation fraction with the number of nationally deceased persons.

Table 2D-1 Data human cremations (DKL 2013, Statistics Denmark 2013).

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Nationally deceased	55939	56359	55368	57156	57109	58378	58100	58136	58984	59397
Cremations	33986	34556	34256	35681	34811	36705	36805	37652	38711	39231
Cremation fraction, %	60.8	61.3	61.9	62.4	61.0	62.8	62.8	64.7	65.6	66.1
Continued	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Nationally deceased	60926	59581	60821	62809	61099	63127	61043	59898	58453	59179
Cremations	40991	40666	41455	43194	42762	43847	43262	42891	41660	42299
Cremation fraction, %	67.3	68.3	68.2	68.8	70.0	69.5	70.8	71.6	69.1	74.4
Continued	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Nationally deceased	57998	58355	58610	57574	55806	54962	55477	55604	54591	54872
Cremations	41651	41707	42539	41997	41555	40758	41233	41766	41788	42408
Cremation fraction, %	71.8	71.5	72.6	72.9	74.5	74.2	74.3	75.1	76.6	77.3
Continued	2010	2011	2012							
Nationally deceased	54368	52516	52325							
Cremations	42050	41248	40909							
Cremation fraction, %	77.3	78.6	79,6							

Annex 2D-2 Animal cremation activity data, 1980-2012

Table 2D-2 Activity data. Source: direct contact with all Danish pet crematoria.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total, Mg	50	60	70	80	90	100	110	120	130	140
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total, Mg	150	160	170	180	190	200	210	220	235	368
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total, Mg	443	452	451	462	571	762	1116	1284	1338	1339
	2010	2011	2012							
Total, Mg	1449	1219	1238							

Annex 2D-3 Emissions from human cremation, 1980-2012

Table 2D-3a Total national emissions from incineration of corpses – 1980 to 1989.

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SO_2	Mg	3.83	3.90	3.86	4.02	3.92	4.14	4.15	4.25	4.36	4.42
NO_X	Mg	28.04	28.51	28.26	29.44	28.72	30.28	30.36	31.06	31.94	32.37
NMVOC	Mg	0.442	0.449	0.445	0.464	0.453	0.477	0.478	0.489	0.503	0.510
CO	Mg	0.340	0.346	0.343	0.357	0.348	0.367	0.368	0.377	0.387	0.392
TSP	Mg	1.31	1.33	1.32	1.38	1.34	1.42	1.42	1.45	1.49	1.51
PM_{10}	Mg	1.18	1.20	1.19	1.24	1.21	1.27	1.28	1.31	1.34	1.36
$PM_{2.5}$	Mg	1.18	1.20	1.19	1.24	1.21	1.27	1.28	1.31	1.34	1.36
As	kg	0.46	0.47	0.47	0.49	0.47	0.50	0.50	0.51	0.53	0.53
Cd	kg	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.20
Cr	kg	0.46	0.47	0.46	0.48	0.47	0.50	0.50	0.51	0.52	0.53
Cu	kg	0.42	0.43	0.43	0.44	0.43	0.46	0.46	0.47	0.48	0.49
Hg	kg	38.03	38.67	38.33	39.93	38.95	41.07	41.18	42.13	43.32	43.90
Ni	kg	0.59	0.60	0.59	0.62	0.60	0.64	0.64	0.65	0.67	0.68
Pb	kg	1.02	1.04	1.03	1.07	1.05	1.10	1.11	1.13	1.16	1.18
Se	kg	0.67	0.68	0.68	0.71	0.69	0.73	0.73	0.74	0.77	0.78
Zn	kg	5.44	5.53	5.49	5.71	5.57	5.88	5.89	6.03	6.20	6.28
HCB	g	5.15	5.24	5.19	5.41	5.28	5.56	5.58	5.71	5.87	5.95
PCDD/F	mg	11.90	12.09	11.99	12.49	12.18	12.85	12.88	13.18	13.55	13.73
benzo(b)flouranthene	g	0.25	0.25	0.25	0.26	0.25	0.26	0.27	0.27	0.28	0.28
benzo(k)flouranthene	g	0.22	0.22	0.22	0.23	0.22	0.24	0.24	0.24	0.25	0.25
benzo(a)pyrene	g	0.45	0.46	0.45	0.47	0.46	0.48	0.49	0.50	0.51	0.52
indeno(1.2.3-c-d)pyrene	g	0.24	0.24	0.24	0.25	0.24	0.26	0.26	0.26	0.27	0.27
PCB	g	14.05	14.29	14.17	14.76	14.40	15.18	15.22	15.57	16.01	16.22

Table 2D-3b Total national emissions from incineration of corpses – 1990 to 1999.

	Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Mg	4.62	4.59	4.67	4.87	4.82	4.94	4.88	4.84	4.70	4.77
NO_X	Mg	33.82	33.55	34.20	35.64	35.28	36.17	35.69	35.39	34.37	34.90
NMVOC	Mg	0.533	0.529	0.539	0.562	0.556	0.570	0.562	0.558	0.542	0.550
CO	Mg	0.410	0.407	0.415	0.432	0.428	0.438	0.433	0.429	0.417	0.423
TSP	Mg	1.58	1.57	1.60	1.67	1.65	1.69	1.67	1.65	1.61	1.63
PM_{10}	Mg	1.42	1.41	1.44	1.50	1.48	1.52	1.50	1.49	1.45	1.47
$PM_{2.5}$	Mg	1.42	1.41	1.44	1.50	1.48	1.52	1.50	1.49	1.45	1.47
As	kg	0.56	0.55	0.56	0.59	0.58	0.60	0.59	0.58	0.57	0.58
Cd	kg	0.21	0.20	0.21	0.22	0.22	0.22	0.22	0.22	0.21	0.21
Cr	kg	0.56	0.55	0.56	0.59	0.58	0.59	0.59	0.58	0.56	0.57
Cu	kg	0.51	0.51	0.52	0.54	0.53	0.55	0.54	0.53	0.52	0.53
Hg	kg	45.87	45.51	46.39	48.33	47.85	49.06	48.41	48.00	46.62	47.33
Ni	kg	0.71	0.70	0.72	0.75	0.74	0.76	0.75	0.74	0.72	0.73
Pb	kg	1.23	1.22	1.24	1.30	1.28	1.32	1.30	1.29	1.25	1.27
Se	kg	0.81	0.80	0.82	0.85	0.85	0.87	0.86	0.85	0.82	0.84
Zn	kg	6.56	6.51	6.64	6.92	6.85	7.02	6.93	6.87	6.67	6.77
HCB	g	6.21	6.16	6.28	6.55	6.48	6.65	6.56	6.50	6.31	6.41
PCDD/F	mg	14.35	14.23	14.51	15.12	14.97	15.35	15.14	15.01	14.58	14.80
benzo(b)flouranthene	g	0.30	0.29	0.30	0.31	0.31	0.32	0.31	0.31	0.30	0.31
benzo(k)flouranthene	g	0.26	0.26	0.27	0.28	0.28	0.28	0.28	0.28	0.27	0.27
benzo(a)pyrene	g	0.54	0.54	0.55	0.57	0.56	0.58	0.57	0.57	0.55	0.56
indeno(1.2.3-c-d)pyrene	g	0.29	0.28	0.29	0.30	0.30	0.31	0.30	0.30	0.29	0.30
PCB	g	16.95	16.82	17.14	17.86	17.68	18.13	17.89	17.74	17.23	17.49

Table 2D-3c Total national emissions from incineration of corpses – 2000 to 2009.

	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	Mg	4.70	4.70	4.80	4.74	4.69	4.60	4.65	4.71	4.71	4.78
NO_X	Mg	34.36	34.41	35.09	34.65	34.28	33.63	34.02	34.46	34.48	34.99
NMVOC	Mg	0.541	0.542	0.553	0.546	0.540	0.530	0.536	0.543	0.543	0.551
CO	Mg	0.417	0.417	0.425	0.420	0.416	0.408	0.412	0.418	0.418	0.424
TSP	Mg	1.61	1.61	1.64	1.62	1.60	1.57	1.59	1.61	1.61	1.64
PM_{10}	Mg	1.45	1.45	1.48	1.46	1.44	1.41	1.43	1.45	1.45	1.47
$PM_{2.5}$	Mg	1.45	1.45	1.48	1.46	1.44	1.41	1.43	1.45	1.45	1.47
As	kg	0.57	0.57	0.58	0.57	0.57	0.55	0.56	0.57	0.57	0.58
Cd	kg	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Cr	kg	0.56	0.57	0.58	0.57	0.56	0.55	0.56	0.57	0.57	0.58
Cu	kg	0.52	0.52	0.53	0.52	0.52	0.51	0.51	0.52	0.52	0.53
Hg	kg	46.61	46.67	47.60	46.99	46.50	45.61	46.14	46.74	46.76	47.45
Ni	kg	0.72	0.72	0.74	0.73	0.72	0.71	0.71	0.72	0.72	0.73
Pb	kg	1.25	1.25	1.28	1.26	1.25	1.22	1.24	1.25	1.25	1.27
Se	kg	0.82	0.82	0.84	0.83	0.82	0.81	0.82	0.83	0.83	0.84
Zn	kg	6.67	6.68	6.81	6.72	6.65	6.53	6.60	6.69	6.69	6.79
HCB	g	6.31	6.32	6.45	6.37	6.30	6.18	6.25	6.33	6.33	6.43
PCDD/F	mg	14.58	14.60	14.89	14.70	14.54	14.27	14.43	14.62	14.63	14.84
benzo(b)flouranthene	g	0.30	0.30	0.31	0.30	0.30	0.29	0.30	0.30	0.30	0.31
benzo(k)flouranthene	g	0.27	0.27	0.27	0.27	0.27	0.26	0.27	0.27	0.27	0.27
benzo(a)pyrene	g	0.55	0.55	0.56	0.55	0.55	0.54	0.54	0.55	0.55	0.56
indeno(1.2.3-c-d)pyrene	g	0.29	0.29	0.30	0.29	0.29	0.28	0.29	0.29	0.29	0.30
PCB	g	17.22	17.25	17.59	17.37	17.18	16.86	17.05	17.27	17.28	17.54

Table 2D-3d Total national emissions from incineration of corpses – 2010 to 2012.

	Unit	2010	2011	2012
SO_2	Mg	4.74	4.65	4.61
NO_X	Mg	34.69	34.03	33.75
NMVOC	Mg	0.547	0.536	0.532
CO	Mg	0.421	0.412	0.409
TSP	Mg	1.62	0.02	0.02
PM_{10}	Mg	1.46	0.01	0.01
$PM_{2.5}$	Mg	1.46	0.01	0.01
As	kg	0.57	0.01	0.01
Cd	kg	0.21	0.002	0.002
Cr	kg	0.57	0.01	0.01
Cu	kg	0.52	0.01	0.01
Hg	kg	47.05	0.46	0.46
Ni	kg	0.73	0.01	0.01
Pb	kg	1.26	0.01	0.01
Se	kg	0.83	0.01	0.01
Zn	kg	6.73	0.07	0.07
HCB	g	6.37	6.25	6.20
PCDD/F	mg	14.72	0.14	0.14
benzo(b)flouranthene	g	0.30	0.003	0.003
benzo(k)flouranthene	g	0.27	0.003	0.003
benzo(a)pyrene	g	0.56	0.005	0.005
indeno(1.2.3-c-d)pyrene	g	0.29	0.003	0.003
PCB	g	17.39	17.06	16.92

Annex 2D-4 Emissions from animal cremation, 1980-2012

Table 2D-4a Total national emissions from incineration of carcasses – 1980 to 1989.

Pollutant name	unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SO_2	Mg	0.09	0.10	0.12	0.14	0.16	0.17	0.19	0.21	0.23	0.24
NO_X	Mg	0.63	0.76	0.89	1.02	1.14	1.27	1.40	1.52	1.65	1.78
NMVOC	Mg	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28
CO	Mg	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
NH_3	Mg	0.10	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27
TSP	Mg	0.11	0.13	0.15	0.17	0.20	0.22	0.24	0.26	0.28	0.31
PM_{10}	Mg	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.18	0.20	0.21
$PM_{2.5}$	Mg	0.07	0.08	0.09	0.10	0.12	0.13	0.14	0.16	0.17	0.18
As	kg	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Cd	kg	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cr	kg	0.004	0.004	0.005	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cu	kg	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.003	0.003
Ni	kg	0.003	0.004	0.004	0.005	0.01	0.01	0.01	0.01	0.01	0.01
Pb	kg	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03
Se	kg	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04
Zn	kg	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03
HCB	g	0.12	0.14	0.16	0.19	0.21	0.23	0.26	0.28	0.30	0.33
PCDD/F	mg	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40
benzo(b)flouranthene	g	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
benzo(k)flouranthene	g	0.005	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
benzo(a)pyrene	g	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03
indeno(1,2,3-c-d)pyrene	g	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PCB	g	0.32	0.38	0.45	0.51	0.57	0.64	0.70	0.76	0.83	0.89

Table 2D-4b Total national emissions from incineration of carcasses – 1990 to 1999.

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Mg	0.26	0.28	0.29	0.31	0.33	0.35	0.36	0.38	0.41	0.64
NO_X	Mg	1.90	2.03	2.16	2.28	2.41	2.54	2.67	2.79	2.98	4.67
NMVOC	Mg	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.47	0.74
CO	Mg	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.06
NH_3	Mg	0.29	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.45	0.70
TSP	Mg	0.33	0.35	0.37	0.39	0.41	0.44	0.46	0.48	0.51	0.80
PM_{10}	Mg	0.23	0.24	0.26	0.28	0.29	0.31	0.32	0.34	0.36	0.56
$PM_{2.5}$	Mg	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.29	0.31	0.48
As	kg	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.08
Cd	kg	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.004
Cr	kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03
Cu	kg	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.005	0.01
Ni	kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Pb	kg	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.07
Se	kg	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.11
Zn	kg	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.07
HCB	g	0.35	0.37	0.40	0.42	0.44	0.47	0.49	0.51	0.55	0.86
PCDD/F	mg	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20	2.35	3.68
benzo(b)flouranthene	g	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04
benzo(k)flouranthene	g	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04
benzo(a)pyrene	g	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.07
indeno(1,2,3-c-d)pyrene	g	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04
PCB	g	0.95	1.02	1.08	1.15	1.21	1.27	1.34	1.40	1.49	2.34

Table 2D-4c Total national emissions from incineration of carcasses – 2000 to 2009.

	unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	Mg	0.77	0.78	0.78	0.80	0.99	1.32	1.94	2.23	2.32	2.32
NO_X	Mg	5.63	5.74	5.73	5.86	7.25	9.68	14.17	16.30	16.99	16.99
NMVOC	Mg	0.89	0.90	0.90	0.92	1.14	1.52	2.23	2.57	2.68	2.68
CO	Mg	0.07	0.07	0.07	0.07	0.09	0.12	0.17	0.20	0.21	0.21
NH_3	Mg	0.84	0.86	0.86	0.88	1.09	1.45	2.12	2.44	2.54	2.54
TSP	Mg	0.97	0.99	0.98	1.01	1.25	1.66	2.43	2.80	2.92	2.92
PM_{10}	Mg	0.68	0.69	0.69	0.71	0.87	1.17	1.71	1.96	2.05	2.05
$PM_{2.5}$	Mg	0.58	0.59	0.59	0.60	0.75	1.00	1.46	1.68	1.75	1.75
As	kg	0.09	0.09	0.09	0.10	0.12	0.16	0.23	0.27	0.28	0.28
Cd	kg	0.004	0.005	0.005	0.005	0.01	0.01	0.01	0.01	0.01	0.01
Cr	kg	0.03	0.03	0.03	0.03	0.04	0.05	0.08	0.09	0.09	0.09
Cu	kg	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03
Ni	kg	0.03	0.03	0.03	0.03	0.03	0.05	0.07	0.08	0.08	0.08
Pb	kg	0.08	0.08	0.08	0.08	0.10	0.14	0.20	0.23	0.24	0.24
Se	kg	0.13	0.14	0.14	0.14	0.17	0.23	0.34	0.39	0.41	0.41
Zn	kg	0.08	0.09	0.09	0.09	0.11	0.14	0.21	0.24	0.25	0.25
HCB	g	1.03	1.05	1.05	1.08	1.33	1.78	2.60	2.99	3.12	3.12
PCDD/F	mg	4.43	4.52	4.51	4.62	5.71	7.62	11.16	12.84	13.38	13.39
benzo(b)flouranthene	g	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.14	0.15	0.15
benzo(k)flouranthene	g	0.04	0.04	0.04	0.05	0.06	0.08	0.11	0.13	0.13	0.13
benzo(a)pyrene	g	0.09	0.09	0.09	0.09	0.12	0.15	0.23	0.26	0.27	0.27
indeno(1,2,3-c-d)pyrene	g	0.05	0.05	0.05	0.05	0.06	0.08	0.12	0.14	0.14	0.14
PCB	g	2.82	2.88	2.87	2.94	3.63	4.85	7.10	8.17	8.51	8.52

Table 2D-4d Total national emissions from incineration of carcasses – 2010 to 2012.

	unit	2010	2011	2012
SO_2	Mg	2.51	2.11	2.15
NO_X	Mg	18.39	15.47	15.71
NMVOC	Mg	2.90	2.44	2.48
CO	Mg	0.22	0.19	0.19
NH_3	Mg	2.75	2.32	2.35
TSP	Mg	3.16	2.66	2.70
PM_{10}	Mg	2.22	1.86	1.89
$PM_{2.5}$	Mg	1.90	1.60	1.62
As	kg	0.30	0.25	0.26
Cd	kg	0.01	0.01	0.01
Cr	kg	0.10	0.09	0.09
Cu	kg	0.03	0.02	0.02
Ni	kg	0.09	0.07	0.07
Pb	kg	0.26	0.22	0.22
Se	kg	0.44	0.37	0.38
Zn	kg	0.28	0.23	0.24
HCB	g	3.38	2.84	2.89
PCDD/F	mg	14.49	12.19	12.38
benzo(b)flouranthene	g	0.16	0.14	0.14
benzo(k)flouranthene	g	0.14	0.12	0.12
benzo(a)pyrene	g	0.29	0.25	0.25
indeno(1,2,3-c-d)pyrene	g	0.16	0.13	0.13
PCB	g	9.22	7.75	7.87

Annex 2D-5 Compost production activity data, 1985-2012

Table 2D-5 Activity data composting, Gg.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Composting of garden and park waste	130	161	193	225	256	288	320	351	383	414
Composting of organic waste from households and other sources	5	7	9	11	13	16	19	23	26	29
Composting of sludge	NAV	NAV	NAV	NAV	NAV	NAV	NAV	NAV	NAV	NAV
Home composting of garden and vegetable food waste	19	19	19	20	20	20	20	20	20	21
Total	154	187	221	256	289	324	359	394	429	464

Continued	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Composting of garden and park waste	376	452	528	551	634	677	630	685	716	682
Composting of organic waste from households and other sources	40	38	47	43	49	47	52	63	66	53
Composting of sludge	7	6	7	57	134	218	211	348	336	53
Home composting of garden and vegetable food waste	21	21	21	21	21	21	21	22	22	22
Total	444	517	603	672	838	963	914	1118	1140	810

Continued	2005	2006	2007	2008	2009	2010	2011	2012
Composting of garden and park waste	737	782	876	795	847	877	901	924
Composting of organic waste from households and other sources	45	48	44	46	70	58	59	59
Composting of sludge	50	67	91	94	107	120	132	145
Home composting of garden and vegetable food waste	22	22	22	22	23	23	23	23
Total	854	919	1033	957	1047	1078	1115	1151

NAV = Not available.

Annex 2D-6 Emissions from composting, 1985-2012

Table 2D-6 National emissions from composting, Mg.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
CO	74.6	92.0	110.0	128.1	145.5	163.5	181.5	198.9	216.9	234.5
NH_3	99.0	119.9	141.5	163.7	184.7	206.5	228.4	249.8	271.6	293.4
Continued	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CO	213.1	255.8	298.6	311.5	358.2	382.4	356.0	387.0	404.4	385.3
NH_3	273.2	322.5	375.2	404.8	484.9	538.8	506.8	588.7	606.2	493.1
Continued	2005	2006	2007	2008	2009	2010	2011	2012		
CO	416.2	441.5	494.4	448.8	478.2	495.0	508.5	521.5		
NH_3	526.5	562.2	630.7	578.7	623.4	644.4	664.1	683.3		

Annex 2D-7 Combusted biogas at biogas production plants activity data, 1994-2004

Table 2D-7 Activity data for combustion of biogas at biogas production plants, GJ.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
GJ	857	4711	4503	4447	35416	43688	40990	27270	30567	35544	28744

Annex 2D-8 Combusted biogas at biogas production plants emissions, 1994-2004

Table 2D-8 Emissions from combustion of biogas at biogas production plants.

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
SO_2	Mg	0.02	0.1	0.1	0.1	0.9	1.1	1.0	0.7	0.8	0.9	0.7
NO_x	Mg	0.02	0.1	0.1	0.1	1.0	1.2	1.1	0.8	0.9	1.0	0.8
NMVOC	Mg	0.002	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	0.1
CH_4	kg	0.9	4.7	4.5	4.4	35.4	43.7	41.0	27.3	30.6	35.5	28.7
CO	Mg	0.03	0.2	0.2	0.2	1.3	1.6	1.5	1.0	1.1	1.3	1.0
CO_2	Mg	71.6	393.8	376.5	371.8	2960.8	3652.3	3426.8	2279.8	2555.4	2971.5	2403.0
N2O	kg	0.1	0.5	0.5	0.4	3.5	4.4	4.1	2.7	3.1	3.6	2.9
TSP	kg	1.3	7.1	6.8	6.7	53.1	65.5	61.5	40.9	45.9	53.3	43.1
PM_{10}	kg	1.3	7.1	6.8	6.7	53.1	65.5	61.5	40.9	45.9	53.3	43.1
$PM_{2.5}$	kg	1.3	7.1	6.8	6.7	53.1	65.5	61.5	40.9	45.9	53.3	43.1
As	g	0.03	0.2	0.2	0.2	1.4	1.7	1.6	1.1	1.2	1.4	1.1
Cd	g	0.002	0.01	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cr	g	0.2	0.8	0.8	0.8	6.4	7.9	7.4	4.9	5.5	6.4	5.2
Cu	g	0.3	1.5	1.4	1.4	11.0	13.5	12.7	8.5	9.5	11.0	8.9
Hg	g	0.1	0.6	0.5	0.5	4.2	5.2	4.9	3.3	3.7	4.3	3.4
Ni	g	0.2	1.1	1.0	1.0	8.1	10.0	9.4	6.3	7.0	8.2	6.6
Pb	g	0.00	0.02	0.0	0.0	0.2	0.2	0.2	0.1	0.2	0.2	0.1
Se	g	0.2	1.0	0.9	0.9	7.4	9.2	8.6	5.7	6.4	7.5	6.0
Zn	g	3.4	18.6	17.8	17.6	139.9	172.6	161.9	107.7	120.7	140.4	113.5
HCB	mg	0.2	0.9	0.9	0.8	6.7	8.3	7.8	5.2	5.8	6.8	5.5
PCDD/F	ug	0.02	0.1	0.1	0.1	0.9	1.1	1.0	0.7	0.8	0.9	0.7
PCBs	mg	0.1	0.4	0.4	0.4	3.2	3.9	3.7	2.5	2.8	3.2	2.6

Annex 2D-9 Occurrence of all fires, building and vehicle fires, 1980-2012

Table 2D-9 Occurrence of accidental fires, 1990-2012.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
All fires	17751	17751	17751	17751	17751	17751	17751	17751	17751	18784
Building fires	10621	10621	10621	10621	10621	10621	10621	10621	10621	11239
Vehicle fires	3497	3497	3497	3497	3497	3497	3497	3497	3497	3700
Field fires	3633	3633	3633	3633	3633	3633	3633	3633	3633	3845
Continued	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
All fires	17025	17589	19124	16803	16918	19543	19756	18236	16320	17538
Building fires	10187	10524	11443	10054	10123	11694	11821	10911	9765	10494
Vehicle fires	3354	3465	3767	3310	3333	3850	3892	3592	3215	3455
Field fires	3485	3600	3914	3439	3463	4000	4043	3732	3340	3589
Continued	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
All fires	17174	16894	16362	18443	15927	16551	16965	18263	20643	18930
Building fires	10276	10108	9790	11035	9530	9903	10151	12527	12124	10652
Vehicle fires	3383	3328	3223	3633	3137	3260	3342	3223	4068	3930
Field fires	3515	3458	3349	3775	3260	3387	3472	2513	4451	4348
Continued	2010	2011	2012							
All fires	16728	16157	14084							
Building fires	9325	11447	9932							
Vehicle fires	3459	3255	2889							
Field fires	3944	1455	1263							

Annex 2D-10 Accidental building fires full scale equivalent activity data, 1980-2012

Table 2D-10 Accidental building fires full scale equivalent activity data, 1980-2012.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Container fires	782	782	782	782	782	782	782	782	782	827
Detached house fires	810	810	810	810	810	810	810	810	810	857
Undetached house fires	240	240	240	240	240	240	240	240	240	254
Apartment building fires	383	383	383	383	383	383	383	383	383	405
Industry building fire	334	334	334	334	334	334	334	334	334	353
Additional building fires	455	455	455	455	455	455	455	455	455	482
Continued	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Container fires	750	775	842	740	745	861	870	803	719	772
Detached house fires	777	802	873	767	772	892	901	832	745	800
Undetached house fires	231	238	259	228	229	265	268	247	221	237
Apartment building fires	367	379	412	362	365	421	426	393	352	378
Industry building fire	320	331	360	316	318	368	372	343	307	330
Additional building fires	437	451	490	431	434	501	507	468	418	450
Continued	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Container fires	756	744	721	812	701	729	747	958	962	799
Detached house fires	784	771	747	841	727	755	774	757	886	876
Undetached house fires	233	229	222	250	216	224	230	343	278	208
Apartment building fires	370	364	353	398	343	357	366	405	433	413
Industry building fire	323	318	308	347	300	311	319	435	346	344
Additional building fires	440	433	420	473	408	424	435	483	523	466
Continued	2010	2011	2012							
Container fires	594	729	584							
Detached house fires	833	818	742							
Undetached house fires	194	206	181							
Apartment building fires	348	362	327							
Industry building fire	281	334	298							
Additional building fires	429	740	610							

Annex 2D-11 Emission factors for accidental detached house fires, 1980-2012

Table 2D-11a Emission factors for accidental detached building fires, 1980-1989.

Detached houses		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SO_2	kg	247.1	247.1	247.2	247.3	247.3	247.9	249.1	250.2	250.9	251.0
NO_X	kg	18.5	18.5	18.5	18.5	18.5	18.5	18.6	18.7	18.8	18.8
NMVOC	kg	92.3	92.3	92.4	92.4	92.4	92.6	93.1	93.5	93.8	93.8
CO	kg	258.5	258.5	258.6	258.7	258.7	259.4	260.6	261.8	262.5	262.6
TSP	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
PM_{10}	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
$PM_{2.5}$	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
As	g	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Cd	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Cr	g	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Cu	g	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Hg	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Pb	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
PCDD/F	mg	3.2	3.2	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.3
Benzo[b]fluoranthene	g	11.7	11.7	11.7	11.7	11.7	11.7	11.8	11.8	11.9	11.9
Benzo[k]fluoranthene	g	4.1	4.1	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2
Benzo[a]pyrene	g	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5
Indeno[1,2,3-cd]pyrene	g	8.0	8.0	8.0	8.0	8.0	8.0	8.1	8.1	8.1	8.1

Table 2D-11b Emission factors for accidental detached building fires, 1990-1999.

Detached houses		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	kg	250.5	249.8	249.1	249.7	249.0	248.5	248.1	248.9	248.4	248.7
NO_X	kg	18.7	18.7	18.6	18.7	18.6	18.6	18.5	18.6	18.6	18.6
NMVOC	kg	93.6	93.3	93.1	93.3	93.0	92.9	92.7	93.0	92.8	92.9
CO	kg	262.0	261.3	260.6	261.2	260.5	260.0	259.6	260.4	259.8	260.1
TSP	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
PM_{10}	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
$PM_{2.5}$	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
As	g	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Cd	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Cr	g	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Cu	g	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Hg	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Pb	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
PCDD/F	mg	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.3	3.2	3.3
Benzo[b]fluoranthene	g	11.9	11.8	11.8	11.8	11.8	11.8	11.7	11.8	11.8	11.8
Benzo[k]fluoranthene	g	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.2	4.1	4.1
Benzo[a]pyrene	g	7.5	7.5	7.4	7.5	7.4	7.4	7.4	7.4	7.4	7.4
Indeno[1,2,3-cd]pyrene	g	8.1	8.1	8.1	8.1	8.1	8.0	8.0	8.1	8.0	8.1

Table 2D-11c Emission factors for accidental detached building fires, 2000-2009.

Detached houses		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	kg	250.7	256.2	258.4	260.0	261.0	260.3	261.9	256.9	258.2	259.5
NO_X	kg	18.7	19.1	19.3	19.4	19.5	19.4	19.6	19.2	19.3	19.4
NMVOC	kg	93.7	95.7	96.5	97.2	97.5	97.2	97.8	96.0	96.5	96.9
CO	kg	262.3	268.0	270.3	272.0	273.1	272.3	274.0	268.7	270.1	271.4
TSP	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
PM_{10}	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
$PM_{2.5}$	kg	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8	143.8
As	g	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Cd	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Cr	g	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Cu	g	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Hg	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Pb	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
PCDD/F	mg	3.3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Benzo[b]fluoranthene	g	11.9	12.1	12.2	12.3	12.4	12.3	12.4	12.2	12.2	12.3
Benzo[k]fluoranthene	g	4.2	4.3	4.3	4.3	4.4	4.3	4.4	4.3	4.3	4.3
Benzo[a]pyrene	g	7.5	7.7	7.7	7.8	7.8	7.8	7.8	7.7	7.7	7.8
Indeno[1,2,3-cd]pyrene	g	8.1	8.3	8.4	8.4	8.5	8.4	8.5	8.3	8.4	8.4

Table 2D-11d Emission factors for accidental detached building fires, 2010-2012.

Detached houses		2010	2011	2012
SO_2	kg	261.5	265.3	265.3
NO_x	kg	19.5	19.8	19.8
NMVOC	kg	97.7	99.1	99.1
CO	kg	273.6	277.6	277.6
TSP	kg	143.8	143.8	143.8
PM_{10}	kg	143.8	143.8	143.8
$PM_{2.5}$	kg	143.8	143.8	143.8
As	g	1.35	1.35	1.35
Cd	g	0.85	0.85	0.85
Cr	g	1.29	1.29	1.29
Cu	g	2.99	2.99	2.99
Hg	g	0.85	0.85	0.85
Pb	g	0.42	0.42	0.42
PCDD/F	mg	3.4	3.5	3.5
Benzo[b]fluoranthene	g	12.4	12.6	12.6
Benzo[k]fluoranthene	g	4.4	4.4	4.4
Benzo[a]pyrene	g	7.8	7.9	7.9
Indeno[1.2.3-cd]pyrene	g	8.5	8.6	8.6

Annex 2D-12 Emission factors for accidental undetached house fires, 1980-2012

Table 2D-12a Emission factors for accidental undetached building fires, 1980-1989.

Undetached houses		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SO_2	kg	208.2	208.3	208.4	208.1	208.1	208.0	207.8	207.6	207.4	207.0
NO_X	kg	15.6	15.6	15.6	15.6	15.5	15.5	15.5	15.5	15.5	15.5
NMVOC	kg	77.8	77.8	77.9	77.8	77.7	77.7	77.7	77.6	77.5	77.4
CO	kg	217.8	217.9	218.0	217.8	217.7	217.6	217.4	217.2	216.9	216.6
TSP	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
PM_{10}	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
$PM_{2.5}$	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
As	g	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cd	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cr	g	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cu	g	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Hg	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Pb	g	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
PCDD/F	mg	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Benzo[b]fluoranthene	g	9.9	9.9	9.9	9.9	9.8	9.8	9.8	9.8	9.8	9.8
Benzo[k]fluoranthene	g	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Benzo[a]pyrene	g	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Indeno[1,2,3-cd]pyrene	g	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7

Table 2D-12b Emission factors for accidental undetached building fires, 1990-1999.

Undetached houses		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	kg	206.6	206.2	206.1	206.1	206.1	206.4	206.8	207.5	208.2	209.1
NO_X	kg	15.4	15.4	15.4	15.4	15.4	15.4	15.5	15.5	15.6	15.6
NMVOC	kg	77.2	77.1	77.0	77.0	77.0	77.1	77.3	77.5	77.8	78.1
CO	kg	216.2	215.8	215.7	215.6	215.7	216.0	216.4	217.1	217.8	218.7
TSP	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
PM_{10}	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
$PM_{2.5}$	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
As	g	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cd	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cr	g	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cu	g	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Hg	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Pb	g	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
PCDD/F	mg	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Benzo[b]fluoranthene	g	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.9	9.9
Benzo[k]fluoranthene	g	3.4	3.4	3.4	3.4	3.4	3.4	3.5	3.5	3.5	3.5
Benzo[a]pyren	g	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Indeno[1,2,3-cd]pyrene	g	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.8

Table 2D-12c Emission factors for accidental undetached building fires, 2000-2009.

Undetached houses		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	kg	209.8	210.1	210.5	210.8	211.2	210.5	211.2	212.0	212.8	213.8
NO_X	kg	15.7	15.7	15.7	15.8	15.8	15.7	15.8	15.8	15.9	16.0
NMVOC	kg	78.4	78.5	78.7	78.8	78.9	78.6	78.9	79.2	79.5	79.9
CO	kg	219.5	219.8	220.3	220.6	220.9	220.2	221.0	221.8	222.7	223.6
TSP	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
PM_{10}	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
$PM_{2.5}$	kg	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6
As	g	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cd	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cr	g	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cu	g	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Hg	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Pb	g	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
PCDD/F	mg	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Benzo[b]fluoranthene	g	9.9	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.1	10.1
Benzo[k]fluoranthene	g	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.6
Benzo[a]pyrene	g	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.4	6.4
Indeno[1,2,3-cd]pyrene	g	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9

Table 2D-12d Emission factors for accidental undetached building fires, 2010-2012.

Undetached houses		2010	2011	2012
SO_2	kg	214.6	214.4	214.4
NO_x	kg	16.0	16.0	16.0
NMVOC	kg	80.2	80.1	80.1
CO	kg	224.5	224.3	224.3
TSP	kg	61.6	61.6	61.6
PM_{10}	kg	61.6	61.6	61.6
$PM_{2.5}$	kg	61.6	61.6	61.6
As	g	0.6	0.58	0.58
Cd	g	0.4	0.36	0.36
Cr	g	0.6	0.55	0.55
Cu	g	1.3	1.28	1.28
Hg	g	0.4	0.36	0.36
Pb	g	0.2	0.18	0.18
PCDD/F	mg	2.8	2.8	2.8
Benzo[b]fluoranthene	g	10.2	10.1	10.1
Benzo[k]fluoranthene	g	3.6	3.6	3.6
Benzo[a]pyrene	g	6.4	6.4	6.4
Indeno[1.2.3-cd]pyrene	g	6.9	6.9	6.9

Annex 2D-13 Emission factors for accidental apartment building fires, 1980-2012

Table 2D-13a Emission factors for accidental apartment building fires, 1980-1989.

Apartment buildings		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SO_2	kg	119.4	119.4	119.5	119.6	119.8	120.1	120.3	120.4	120.3	120.2
NO_X	kg	8.9	8.9	8.9	8.9	9.0	9.0	9.0	9.0	9.0	9.0
NMVOC	kg	44.6	44.6	44.6	44.7	44.8	44.9	45.0	45.0	45.0	44.9
CO	kg	124.9	124.9	125.0	125.2	125.4	125.6	125.9	125.9	125.9	125.8
TSP	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
PM_{10}	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
$PM_{2.5}$	kg	43.780	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
As	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cd	g	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Cr	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cu	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Hg	g	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Pb	g	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PCDD/F	mg	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Benzo[b]fluoranthene	g	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Benzo[k]fluoranthene	g	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Benzo[a]pyrene	g	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Indeno[1,2,3-cd]pyrene	g	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9

Table 2D-13b Emission factors for accidental apartment building fires, 1990-1999.

Apartment buildings		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	kg	120.2	120.2	120.3	120.3	120.3	120.4	120.4	120.4	120.4	120.4
NO_X	kg	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
NMVOC	kg	44.9	44.9	45.0	44.9	45.0	45.0	45.0	45.0	45.0	45.0
CO	kg	125.8	125.8	125.9	125.8	125.9	125.9	126.0	125.9	126.0	126.0
TSP	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
PM_{10}	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
$PM_{2.5}$	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
As	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cd	g	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Cr	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cu	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Hg	g	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Pb	g	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PCDD/F	mg	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Benzo[b]fluoranthene	g	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Benzo[k]fluoranthene	g	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Benzo[a]pyrene	g	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Indeno[1,2,3-cd]pyrene	g	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9

Table 2D-13c Emission factors for accidental apartment building fires, 2000-2009.

Apartment buildings		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	kg	120.5	120.5	120.6	120.8	121.1	121.4	121.9	122.4	122.9	123.3
NO_X	kg	9.0	9.0	9.0	9.0	9.1	9.1	9.1	9.1	9.2	9.2
NMVOC	kg	45.0	45.0	45.1	45.1	45.3	45.4	45.5	45.7	45.9	46.1
CO	kg	126.0	126.1	126.2	126.4	126.7	127.0	127.5	128.0	128.6	129.0
TSP	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
PM_{10}	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
$PM_{2.5}$	kg	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78	43.78
As	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cd	g	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Cr	g	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Cu	g	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Hg	g	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Pb	g	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
PCDD/F	mg	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Benzo[b]fluoranthene	g	5.7	5.7	5.7	5.7	5.7	5.7	5.8	5.8	5.8	5.8
Benzo[k]fluoranthene	g	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
Benzo[a]pyrene	g	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.7	3.7	3.7
Indeno[1,2,3-cd]pyrene	g	3.9	3.9	3.9	3.9	3.9	3.9	3.9	4.0	4.0	4.0

Table 2D-13d Emission factors for accidental apartment building fires, 2010-2012.

Apartment buildings		2010	2011	2012
SO_2	kg	123.5	124.6	124.6
NO_x	kg	9.2	9.3	9.3
NMVOC	kg	46.1	46.6	46.6
CO	kg	129.2	130.4	130.4
TSP	kg	43.78	43.78	43.78
PM_{10}	kg	43.78	43.78	43.78
$PM_{2.5}$	kg	43.78	43.78	43.78
As	g	0.4	0.4	0.41
Cd	g	0.3	0.3	0.26
Cr	g	0.4	0.4	0.39
Cu	g	0.9	0.9	0.91
Hg	g	0.3	0.3	0.26
Pb	g	0.1	0.1	0.13
PCDD/F	mg	1.6	1.6	1.6
Benzo[b]fluoranthene	g	5.8	5.9	5.9
Benzo[k]fluoranthene	g	2.1	2.1	2.1
Benzo[a]pyrene	g	3.7	3.7	3.7
Indeno[1.2.3-cd]pyrene	g	4.0	4.0	4.0

Annex 2D-14 Average building floor space, 1980-2012

Table 2D-14 Average floor space in building types.

Year	Detached	Undetached	Apartment
1980	154	130	74
1981	154	130	74
1982	154	130	74
1983	154	130	74
1984	154	130	75
1985	154	130	75
1986	155	129	75
1987	156	129	75
1988	156	129	75
1989	156	129	75
1990	156	129	75
1991	156	128	75
1992	155	128	75
1993	155	128	75
1994	155	128	75
1995	155	129	75
1996	155	129	75
1997	155	129	75
1998	155	130	75
1999	155	130	75
2000	156	131	75
2001	160	131	75
2002	161	131	75
2003	162	131	75
2004	163	132	75
2005	162	131	76
2006	163	132	76
2007	160	132	76
2008	161	133	77
2009	162	133	77
2010	163	134	77
2011	164	132	78
2012	165	134	78

Annex 2D-15 Emissions from building fires, 1980-2012

Table 2D-15a National emissions from building fires, 1980-1989.

	unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SO_2	Mg	580.42	580.47	580.55	580.65	580.69	581.31	582.33	583.17	583.66	617.57
NO_x	Mg	32.91	32.91	32.92	32.92	32.93	32.97	33.05	33.11	33.15	35.07
NMVOC	Mg	153.34	153.36	153.39	153.43	153.45	153.68	154.06	154.37	154.56	163.53
CO	Mg	460.67	460.72	460.81	460.92	460.96	461.60	462.67	463.55	464.07	491.00
TSP	Mg	175.77	175.77	175.77	175.77	175.77	175.77	175.77	175.77	175.77	186.00
PM_{10}	Mg	175.77	175.77	175.77	175.77	175.77	175.77	175.77	175.77	175.77	186.00
$PM_{2.5}$	Mg	175.77	175.77	175.77	175.77	175.77	175.77	175.77	175.77	175.77	186.00
As	kg	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.74
Cd	kg	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.10
Cr	kg	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.66
Cu	kg	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.87
Hg	kg	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.10
Pb	kg	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.54
PCDD/F	g I-TEQ	6.21	6.21	6.21	6.21	6.21	6.22	6.23	6.24	6.25	6.61
Benzo(b)fluoranthene	kg	20.84	20.84	20.85	20.85	20.85	20.88	20.93	20.97	20.99	22.21
Benzo(k)fluoranthene	kg	7.35	7.35	7.35	7.35	7.35	7.36	7.38	7.39	7.40	7.83
Benzo(a)pyrene	kg	13.16	13.16	13.17	13.17	13.17	13.19	13.22	13.24	13.26	14.03
Indeno(1,2,3-cd)pyrene	kg	14.26	14.26	14.26	14.27	14.27	14.29	14.32	14.35	14.36	15.20

Table 2D-15b National emissions from building fires, 1990-1999.

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Mg	559.3	577.1	626.9	551.2	554.5	640.2	647.0	598.0	535.0	575.3
NO_x	Mg	31.8	32.8	35.6	31.3	31.5	36.3	36.7	33.9	30.4	32.6
NMVOC	Mg	148.0	152.7	165.8	145.8	146.7	169.3	171.0	158.2	141.5	152.2
CO	Mg	444.5	458.6	497.9	438.0	440.5	508.4	513.7	475.1	424.9	457.1
TSP	Mg	168.6	174.2	189.4	166.4	167.5	193.5	195.6	180.6	161.6	173.7
PM_{10}	Mg	168.6	174.2	189.4	166.4	167.5	193.5	195.6	180.6	161.6	173.7
$PM_{2.5}$	Mg	168.6	174.2	189.4	166.4	167.5	193.5	195.6	180.6	161.6	173.7
As	kg	1.58	1.63	1.78	1.56	1.57	1.81	1.83	1.69	1.52	1.63
Cd	kg	1.00	1.03	1.12	0.98	0.99	1.14	1.16	1.07	0.95	1.03
Cr	kg	1.51	1.56	1.70	1.49	1.50	1.73	1.75	1.62	1.45	1.55
Cu	kg	3.51	3.62	3.94	3.46	3.48	4.02	4.07	3.76	3.36	3.61
Hg	kg	1.00	1.03	1.12	0.98	0.99	1.14	1.16	1.07	0.95	1.03
Pb	kg	0.49	0.51	0.55	0.49	0.49	0.57	0.57	0.53	0.47	0.51
PCDD/F	g I-TEQ	6.0	6.2	6.7	5.9	5.9	6.9	6.9	6.4	5.7	6.2
Benzo(b)fluoranthene	kg	20.1	20.7	22.5	19.8	19.9	23.0	23.2	21.5	19.2	20.7
Benzo(k)fluoranthene	kg	7.1	7.3	7.9	7.0	7.0	8.1	8.2	7.6	6.8	7.3
Benzo(a)pyrene	kg	12.7	13.1	14.2	12.5	12.6	14.5	14.7	13.6	12.1	13.1
Indeno(1,2,3-cd)pyrene	kg	13.8	14.2	15.4	13.6	13.6	15.7	15.9	14.7	13.2	14.1

Table 2D-15c National emissions from building fires, 2000-2009.

	unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	Mg	565.2	560.2	544.4	615.2	532.1	552.4	567.8	683.6	638.3	615.9
NO_x	Mg	32.1	31.9	31.0	35.1	30.4	31.5	32.4	37.4	37.2	35.2
NMVOC	Mg	149.7	148.9	144.8	163.8	141.8	147.2	151.4	173.5	172.2	164.6
CO	Mg	449.5	446.6	434.4	491.3	425.2	441.2	453.9	524.1	520.8	493.0
TSP	Mg	170.1	167.3	162.0	182.6	157.7	163.9	168.0	182.3	195.9	185.2
PM_{10}	Mg	170.1	167.3	162.0	182.6	157.7	163.9	168.0	182.3	195.9	185.2
$PM_{2.5}$	Mg	170.1	167.3	162.0	182.6	157.7	163.9	168.0	182.3	195.9	185.2
As	kg	1.59	1.57	1.52	1.71	1.48	1.54	1.57	1.71	1.84	1.74
Cd	kg	1.00	0.99	0.96	1.08	0.93	0.97	0.99	1.08	1.16	1.09
Cr	kg	1.52	1.50	1.45	1.63	1.41	1.47	1.50	1.63	1.75	1.66
Cu	kg	3.54	3.48	3.37	3.80	3.28	3.41	3.49	3.79	4.07	3.85
Hg	kg	1.00	0.99	0.96	1.08	0.93	0.97	0.99	1.08	1.16	1.09
Pb	kg	0.50	0.49	0.47	0.53	0.46	0.48	0.49	0.53	0.57	0.54
PCDD/F	g I-TEQ	6.1	6.0	5.8	6.6	5.7	5.9	6.1	7.1	7.1	6.6
Benzo(b)fluoranthene	kg	20.3	20.2	19.7	22.2	19.2	20.0	20.5	23.7	23.6	22.3
Benzo(k)fluoranthene	kg	7.2	7.1	6.9	7.8	6.8	7.0	7.2	8.4	8.3	7.9
Benzo(a)pyrene	kg	12.8	12.8	12.4	14.0	12.1	12.6	13.0	15.0	14.9	14.1
Indeno(1,2,3-cd)pyrene	kg	13.9	13.8	13.4	15.2	13.2	13.7	14.0	16.2	16.1	15.3

Table 2D-15d National emissions from building fires, 2010-2012.

	unit	2010	2011	2012
SO_2	Mg	543.0	598.2	536.3
NO_x	Mg	31.5	33.7	30.1
NMVOC	Mg	149.1	158.0	142.3
CO	Mg	441.3	471.6	421.9
TSP	Mg	168.8	173.0	154.5
PM_{10}	Mg	168.8	173.0	154.5
$PM_{2.5}$	Mg	168.8	173.0	154.5
As	kg	1.58	1.62	1.45
Cd	kg	1.00	1.02	0.91
Cr	kg	1.51	1.55	1.38
Cu	kg	3.51	3.60	3.21
Hg	kg	1.00	1.02	0.91
Pb	kg	0.49	0.51	0.45
PCDD/F	g I-TEQ	5.9	6.3	5.6
Benzo(b)fluoranthene	kg	20.0	21.3	19.1
Benzo(k)fluoranthene	kg	7.0	7.5	6.7
Benzo(a)pyrene	kg	12.6	13.5	12.1
Indeno(1,2,3-cd)pyrene	kg	13.7	14.6	13.1

Annex 2D-16 Full scale vehicle fires, 1980-2012

Table 2D-16a Number of nationally registered vehicles and full scale equivalent vehicle fires.

	Passenger Cars		Buses		Light Duty Vehicles		Heavy Duty Vehicles	
	Registered	FSE	Registered	FSE fires	Registered	FSE fires	Registered	FSE fires
1980	1475109	429	8070	12	99168	10	47428	60
1981	1496849	435	8070	12	109874	11	47428	60
1982	1518590	442	8070	12	120579	12	47428	60
1983	1540331	448	8070	12	131285	13	47428	60
1984	1562072	454	8070	12	141991	14	47428	60
1985	1564319	455	8010	11	147874	14	46962	60
1986	1617699	471	8105	12	165544	16	48431	61
1987	1644923	478	8110	12	179325	17	48382	61
1988	1653993	481	8093	12	187217	18	46980	60
1989	1654871	481	8031	12	190565	19	46386	59
1990	1645454	479	8109	12	192317	19	45664	58
1991	1649168	480	9989	14	197435	19	45494	58
1992	1659795	483	11259	16	202802	20	45510	58
1993	1678919	488	13513	19	211755	21	46228	59
1994	1672022	486	14261	20	219639	21	47329	60
1995	1733242	504	14371	21	228074	22	48077	61
1996	1792971	522	14594	21	234404	23	48319	61
1997	1840845	535	14690	21	240762	23	48785	62
1998	1877740	546	14894	21	249462	24	49697	63
1999	1905855	554	14953	21	259214	25	50443	64
2000	1916364	557	15051	22	272386	27	50227	64
2001	1932440	562	15005	22	283031	28	49885	63
2002	1946073	566	14971	21	295581	29	49208	62
2003	1948717	567	14989	22	309614	30	48653	62
2004	1967432	572	14997	22	336038	33	48318	61
2005	2012216	585	15131	22	372674	36	49311	63
2006	2093809	609	15243	22	414625	40	50777	64
2007	2155940	518	15052	16	402558	19	51832	46
2008	2187104	666	14854	24	398717	44	50606	71
2009	2201550	729	14794	23	373687	48	46585	67
2010	2246675	646	14577	23	362385	38	44813	60
2011	2281539	584	13915	13	343355	43	43640	54
2012	2326778	514	13177	11	318668	32	42326	53

Table 2D-16b Number of nationally registered vehicles and full scale equivalent vehicle fires.

	Motorcycles/Mopeds		Caravans		Train		Ship	
	Registered	FSE fires	Registered	FSE fires	Registered	FSE fires	Registered	FSE fires
1980	220273	78			7284	9	2222	25
1981	214104	76			7284	9	2222	25
1982	207934	73			7284	9	2222	25
1983	201764	71			7284	9	2222	25
1984	195594	69			7284	9	2222	25
1985	191478	68			7284	9	2222	25
1986	179940	64			7284	9	2222	25
1987	174515	62			7284	9	2222	25
1988	168509	60			7284	9	2222	25
1989	166296	59			7284	9	2222	25
1990	163133	58	86257	24	7156	9	2324	26
1991	162357	57	88278	24	7212	9	2312	26
1992	157912	56	90299	25	7438	9	2307	26
1993	155325	55	93150	26	7496	9	2140	24
1994	153365	54	94551	26	7117	8	2027	22
1995	165272	58	95831	26	6854	8	1911	21
1996	178188	63	97592	27	6631	8	1841	20
1997	191772	68	99931	27	6428	8	1761	19
1998	205129	72	102302	28	5861	7	1696	19
1999	219577	78	104852	29	5525	7	1695	19
2000	233309	82	106935	29	4907	6	1759	19
2001	243020	86	108924	30	4561	5	1797	20
2002	253375	89	110995	30	4169	5	1878	21
2003	256438	91	113338	31	4048	5	1838	20
2004	263472	93	116930	32	3273	4	1783	20
2005	273904	97	121350	33	3195	4	1792	20
2006	287840	102	126011	35	3002	4	1789	20
2007	302900	99	131708	36	2617	2	1755	20
2008	308538	122	136905	45	2588	3	1728	20
2009	307335	128	140366	34	2489	5	1742	22
2010	301562	83	142354	37	2740	2	1773	16
2011	295488	91	142764	34	2943	3	1768	21
2012	295798	82	142654	33	3055	2	1772	14

Table 2D-16c Number of nationally registered vehicles and full scale equivalent vehicle fires.

	Airplane		Tractor		Combined Harvester		Bicycle	Other	Machine
	Registered	FSE	Regis-	FSE	Regis-	FSE	FSE	FSE	FSE
1980	1060	1	139600	87	38781	64			
1981	1060	1	133429	83	38362	64			
1982	1060	1	131305	82	37177	62			
1983	1060	1	129406	80	36308	60			
1984	1060	1	127508	79	35439	59			
1985	1060	1	128700	80	35708	59			
1986	1060	1	132279	82	34824	58			
1987	1060	1	128500	80	33863	56			
1988	1060	1	133249	83	34896	58			
1989	1060	1	133308	83	32981	55			
1990	1055	1	131880	82	33594	56			
1991	1059	1	131637	82	32542	54			
1992	1066	1	128205	80	31460	52			
1993	1059	1	129747	81	31502	52			
1994	1063	1	123596	77	29775	49			
1995	1058	1	130028	81	27986	46			
1996	1088	1	120480	75	28609	47			
1997	1094	1	124067	77	25418	42			
1998	1091	1	115509	72	25452	42			
1999	1087	1	115978	72	22961	38			
2000	1070	1	111736	69	23272	39			
2001	1089	1	110300	69	22811	38			
2002	1149	1	108865	68	22349	37			
2003	1083	1	107430	67	21888	36			
2004	1055	1	105994	66	21426	36			
2005	1073	1	104551	65	20965	35			
2006	1039	1	102619	64	20504	34			
2007	1058	1	102619	52	20042	19	2	85	75
2008	1077	1	102619	62	19581	34	4	97	135
2009	1122	1	102619	64	19119	43	3	93	111
2010	1152	1	102619	77	18889	32	4	58	94
2011	1132	0	102619	59	18889	21	3	50	111
2012	1111	0	102619	68	18889	18	2	50	115

Annex 2D-17 Average vehicle weight, 1980-2012

Table 2D-17a Average weight of different vehicle categories, kg.

	Cars	Buses	Vans	Trucks	Motorcycles/ Mopeds	Caravans	Train	Ship
1980	850	10000	2000	15000	75		15000	10000
1981	850	10000	2000	15000	75		15000	10000
1982	850	10000	2000	15000	75		15000	10000
1983	850	10000	2000	15000	75		15000	10000
1984	850	10000	2000	15000	75		15000	10000
1985	850	10000	2000	15000	75		15000	10000
1986	850	10000	2000	15000	78		15000	10000
1987	850	10000	2000	15000	80		15000	10000
1988	850	10000	2000	15000	82		15000	10000
1989	850	10000	2000	15000	84		15000	10000
1990	850	10000	2000	15000	86	1275	15000	10000
1991	850	10000	2000	15000	88	1275	15000	10000
1992	850	10000	2000	15000	91	1275	15000	10000
1993	901	10068	2297	14732	93	1351	14732	10068
1994	908	10512	2382	14674	96	1362	14674	10512
1995	923	10807	2492	14801	97	1385	14801	10807
1996	935	10899	2638	14928	98	1402	14928	10899
1997	948	10950	2746	14987	99	1423	14987	10950
1998	964	10960	2848	15111	100	1446	15111	10960
1999	982	11140	2964	15223	102	1473	15223	11140
2000	999	11195	3103	15214	103	1498	15214	11195
2001	1012	11312	3238	14888	105	1518	14888	11312
2002	1024	11387	3333	14486	107	1536	14486	11387
2003	1039	11479	3442	14026	109	1558	14026	11479
2004	1052	11572	3561	13599	112	1578	13599	11572
2005	1068	11560	3793	13258	116	1603	13258	11560
2006	1086	11684	4120	13179	120	1629	13179	11684
2007	1105	11753	4505	13268	124	1657	13268	11753
2008	1122	11700	4710	13246	127	1683	13246	11700
2009	1134	11642	4682	12802	130	1701	12802	11642
2010	1144	11804	4498	11883	133	1716	11883	11804
2011	1154	11907	4296	11291	135	1730	11291	11907
2012	1160	11625	4150	10844	136	1741	10844	11625

Table 2D-17b Average weight of different vehicle categories, kg.

	Airplane	Tractor	Combined Harvester	Bicycles	Other Transport	Machine
1980	15000	2000	8000			
1981	15000	2000	8150			
1982	15000	2000	8300			
1983	15000	2000	8450			
1984	15000	2000	8600			
1985	15000	2000	8750			
1986	15000	2000	8900			
1987	15000	2000	9050			
1988	15000	2000	9200			
1989	15000	2000	9350			
1990	15000	2000	9500			
1991	15000	2000	9650			
1992	15000	2000	9800			
1993	14732	2297	9950			
1994	14674	2382	10100			
1995	14801	2492	10250			
1996	14928	2638	10400			
1997	14987	2746	10550			
1998	15111	2848	10700			
1999	15223	2964	10850			
2000	15214	3103	11000			
2001	14888	3238	11150			
2002	14486	3333	11300			
2003	14026	3442	11450			
2004	13599	3561	11600			
2005	13258	3793	11750			
2006	13179	4120	11900			
2007	13268	4505	12050	12	552	442
2008	13246	4710	12200	12	561	449
2009	12802	4682	12350	12	567	454
2010	11883	4498	12500	12	572	458
2011	11291	4296	12650	12	577	461
2012	10844	4150	12800	12	580	464

Annex 2D-18 Accidental vehicle fires activity data, 1980-2012

Table 2D-18a Burnt mass of different vehicle categories, Mg, 1980-1989.

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Passenger cars	365	370	375	381	386	387	400	407	409	409
Buses	116	116	116	116	116	115	116	116	116	115
Light duty vehicles	19	21	23	26	28	29	32	35	36	37
Heavy duty vehicles	902	902	902	902	902	893	921	920	894	882
Motorcycle, moped	6	6	6	5	5	5	5	5	5	5
Other transport	-	-	-	-	-	-	-	-	-	-
Caravan	-	-	-	-	-	-	-	-	-	-
Train	130	130	130	130	130	130	130	130	130	130
Ship	246	246	246	246	246	246	246	246	246	246
Airplane	12	12	12	12	12	12	12	12	12	12
Bicycle	-	-	-	-	-	-	-	-	-	-
Tractor	174	166	163	161	159	160	165	160	166	166
Combine harvester	515	519	512	509	506	518	514	509	533	512
Machine	-	-	-	-	-	-	-	-	-	-
Total	2484	2487	2485	2487	2489	2495	2541	2539	2546	2514

Table 2D-18b Burnt mass of different vehicle categories, Mg, 1990-1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Passenger cars	407	408	410	440	442	466	488	508	527	544
Buses	116	143	162	195	215	223	228	231	234	239
Light duty vehicles	37	38	40	47	51	55	60	64	69	75
Heavy duty vehicles	869	865	866	864	881	902	915	927	952	974
Motorcycle, moped	5	5	5	5	5	6	6	7	7	8
Other transport	-	-	-	-	-	-	-	-	-	-
Caravan	30	31	32	35	35	36	38	39	41	42
Train	128	129	133	132	125	121	118	115	106	100
Ship	257	256	255	238	236	228	222	213	205	209
Airplane	12	12	12	11	11	11	12	12	12	12
Bicycle	-	-	-	-	-	-	-	-	-	-
Tractor	164	164	159	185	183	202	198	212	205	214
Combine harvester	530	521	512	520	499	476	494	445	452	413
Machine	-	-	-	-	-	-	-	-	-	-
Total	2555	2572	2585	2673	2683	2727	2778	2774	2811	2832

Table 2D-18c Burnt mass of different vehicle categories, Mg, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Passenger cars	557	569	580	589	602	625	662	572	748	827
Buses	242	244	245	247	249	251	256	182	283	264
Light duty vehicles	82	89	96	104	117	138	166	86	207	223
Heavy duty vehicles	969	942	904	865	833	829	849	608	936	863
Motorcycle, moped	8	9	10	10	10	11	12	12	16	17
Other transport	-	-	-	-	-	-	-	47	54	53
Caravan	44	45	47	48	51	53	56	59	75	57
Train	89	81	72	68	53	51	47	33	39	63
Ship	218	225	236	233	228	229	231	234	230	253
Airplane	12	12	12	11	10	10	10	8	13	13
Bicycle	-	-	-	-	-	-	-	0	0	0
Tractor	216	222	226	230	235	247	263	235	290	301
Combine harvester	425	422	419	416	412	409	405	231	415	533
Machine	-	-	-	-	-	-	-	33	61	50
Total	2863	2863	2849	2824	2805	2858	2963	2367	3397	3537

Table 2D-18d Burnt mass of different vehicle categories, Mg, 2010-2012.

	2010	2011	2012
Passenger cars	739	674	592
Buses	266	160	130
Light duty vehicles	171	185	133
Heavy duty vehicles	715	606	579
Motorcycle, moped	11	12	11
Other transport	33	29	29
Caravan	63	59	57
Train	24	28	23
Ship	189	249	160
Airplane	7	3	5
Bicycle	0	0	0
Tractor	347	254	283
Combine harvester	398	271	236
Machine	43	51	53
Total	3025	2624	2319

Annex 2D-19 Emissions from accidental vehicle fires, 1980-2012

Table 2D-19a National emissions from vehicle fires – 1980 to 1989.

	unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
SO_2	Mg	12.42	12.44	12.43	12.44	12.44	12.47	12.71	12.70	12.73	12.57
NO_X	Mg	4.97	4.97	4.97	4.97	4.98	4.99	5.08	5.08	5.09	5.03
NMVOC	Mg	21.11	21.14	21.13	21.14	21.16	21.21	21.60	21.58	21.64	21.37
CO	Mg	156.48	156.71	156.57	156.70	156.80	157.18	160.09	159.97	160.40	158.37
TSP	Mg	94.39	94.52	94.44	94.52	94.58	94.81	96.56	96.49	96.75	95.53
PM_{10}	Mg	94.39	94.52	94.44	94.52	94.58	94.81	96.56	96.49	96.75	95.53
$PM_{2.5}$	Mg	94.39	94.52	94.44	94.52	94.58	94.81	96.56	96.49	96.75	95.53
As	kg	0.65	0.65	0.65	0.65	0.65	0.65	0.66	0.66	0.66	0.65
Cd	kg	4.22	4.23	4.23	4.23	4.23	4.24	4.32	4.32	4.33	4.27
Cr	kg	9.44	9.45	9.44	9.45	9.46	9.48	9.66	9.65	9.68	9.55
Cu	kg	67.06	67.16	67.10	67.16	67.20	67.36	68.61	68.56	68.74	67.87
Ni	kg	6.95	6.96	6.96	6.96	6.97	6.99	7.11	7.11	7.13	7.04
Pb	kg	2.04	2.04	2.04	2.04	2.04	2.05	2.08	2.08	2.09	2.06
Zn	kg	7.95	7.96	7.95	7.96	7.96	7.98	8.13	8.13	8.15	8.04
PCDD/F	g I-TEQ	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Benzo(b)fluoranthene	kg	40.11	40.17	40.14	40.17	40.20	40.29	41.04	41.01	41.12	40.60
Benzo(k)fluoranthene	kg	40.11	40.17	40.14	40.17	40.20	40.29	41.04	41.01	41.12	40.60
Benzo(a)pyrene	kg	36.51	36.57	36.53	36.56	36.59	36.68	37.35	37.33	37.43	36.95
Indeno(1.2.3-cd)pyrene	kg	57.87	57.96	57.91	57.95	57.99	58.13	59.21	59.16	59.32	58.57

Table 2D-19b National emissions from vehicle fires – 1990 to 1999.

	unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Mg	12.77	12.86	12.92	13.36	13.42	13.64	13.89	13.87	14.06	14.16
NO_X	Mg	5.11	5.14	5.17	5.35	5.37	5.45	5.56	5.55	5.62	5.66
NMVOC	Mg	21.72	21.86	21.97	22.72	22.81	23.18	23.62	23.58	23.89	24.07
CO	Mg	160.95	162.05	162.85	168.40	169.04	171.80	175.03	174.75	177.10	178.43
TSP	Mg	97.08	97.74	98.23	101.57	101.96	103.63	105.58	105.40	106.82	107.63
PM_{10}	Mg	97.08	97.74	98.23	101.57	101.96	103.63	105.58	105.40	106.82	107.63
$PM_{2.5}$	Mg	97.08	97.74	98.23	101.57	101.96	103.63	105.58	105.40	106.82	107.63
As	kg	0.66	0.67	0.67	0.69	0.70	0.71	0.72	0.72	0.73	0.74
Cd	kg	4.34	4.37	4.39	4.54	4.56	4.64	4.72	4.72	4.78	4.81
Cr	kg	9.71	9.77	9.82	10.16	10.20	10.36	10.56	10.54	10.68	10.76
Cu	kg	68.98	69.45	69.79	72.17	72.45	73.63	75.01	74.89	75.90	76.47
Ni	kg	7.15	7.20	7.24	7.48	7.51	7.64	7.78	7.77	7.87	7.93
Pb	kg	2.09	2.11	2.12	2.19	2.20	2.24	2.28	2.27	2.31	2.32
Zn	kg	8.18	8.23	8.27	8.55	8.59	8.73	8.89	8.88	9.00	9.06
PCDD/F	g I-TEQ	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Benzo(b)fluoranthene	kg	41.26	41.54	41.75	43.17	43.33	44.04	44.87	44.80	45.40	45.74
Benzo(k)fluoranthene	kg	41.26	41.54	41.75	43.17	43.33	44.04	44.87	44.80	45.40	45.74
Benzo(a)pyrene	kg	37.56	37.81	38.00	39.29	39.44	40.09	40.84	40.77	41.32	41.63
Indeno(1.2.3-cd)pyrene	kg	59.53	59.93	60.23	62.28	62.52	63.54	64.73	64.63	65.50	65.99

Table 2D-19c National emissions from vehicle fires – 2000 to 2009.

	unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	Mg	14.32	14.31	14.25	14.12	14.02	14.29	14.81	11.83	16.98	17.68
NO_X	Mg	5.73	5.73	5.70	5.65	5.61	5.72	5.93	4.73	6.79	7.07
NMVOC	Mg	24.34	24.33	24.22	24.01	23.84	24.29	25.18	20.12	28.87	30.06
CO	Mg	180.40	180.35	179.49	177.94	176.70	180.04	186.66	149.11	213.98	222.83
TSP	Mg	108.81	108.78	108.26	107.33	106.58	108.60	112.59	89.94	129.07	134.40
PM_{10}	Mg	108.81	108.78	108.26	107.33	106.58	108.60	112.59	89.94	129.07	134.40
$PM_{2.5}$	Mg	108.81	108.78	108.26	107.33	106.58	108.60	112.59	89.94	129.07	134.40
As	kg	0.74	0.74	0.74	0.73	0.73	0.74	0.77	0.62	0.88	0.92
Cd	kg	4.87	4.87	4.84	4.80	4.77	4.86	5.04	4.02	5.77	6.01
Cr	kg	10.88	10.88	10.83	10.73	10.66	10.86	11.26	8.99	12.91	13.44
Cu	kg	77.31	77.29	76.92	76.26	75.73	77.16	80.00	63.90	91.71	95.50
Ni	kg	8.02	8.02	7.98	7.91	7.85	8.00	8.30	6.63	9.51	9.90
Pb	kg	2.35	2.35	2.34	2.32	2.30	2.34	2.43	1.94	2.79	2.90
Zn	kg	9.16	9.16	9.12	9.04	8.98	9.14	9.48	7.57	10.87	11.32
PCDD/F	g I-TEQ	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.09	0.14	0.14
Benzo(b)fluoranthene	kg	46.25	46.23	46.01	45.62	45.30	46.15	47.85	38.22	54.85	57.12
Benzo(k)fluoranthene	kg	46.25	46.23	46.01	45.62	45.30	46.15	47.85	38.22	54.85	57.12
Benzo(a)pyrene	kg	42.09	42.08	41.88	41.52	41.23	42.01	43.55	34.79	49.93	51.99
Indeno(1.2.3-cd)pyrene	kg	66.72	66.70	66.38	65.81	65.35	66.59	69.04	55.15	79.14	82.41

Table 2D-19d National emissions from vehicle fires – 2010 to 2012.

	unit	2010	2011	2012
SO_2	Mg	15.12	13.12	11.59
NO_X	Mg	6.05	5.25	4.64
NMVOC	Mg	25.71	22.30	19.71
CO	Mg	190.57	165.31	146.07
TSP	Mg	114.95	99.71	88.11
PM_{10}	Mg	114.95	99.71	88.11
$PM_{2.5}$	Mg	114.95	99.71	88.11
As	kg	0.79	0.68	0.60
Cd	kg	5.14	4.46	3.94
Cr	kg	11.49	9.97	8.81
Cu	kg	81.67	70.85	62.60
Ni	kg	8.47	7.35	6.49
Pb	kg	2.48	2.15	1.90
Zn	kg	9.68	8.40	7.42
PCDD/F	g I-TEQ	0.12	0.10	0.09
Benzo(b)fluoranthene	kg	48.85	42.38	37.44
Benzo(k)fluoranthene	kg	48.85	42.38	37.44
Benzo(a)pyrene	kg	44.47	38.57	34.08
Indeno(1.2.3-cd)pyrene	kg	70.48	61.14	54.02

Annex 2E - Solvents and Other Product Use

Annex 2E-1:	NMVOC emissions, 1985-2012
Annex 2E-2:	Activity data for NMVOC use, 1985-2012
Annex 2E-3:	Emissions from use of fireworks, 1985-2012
Annex 2E-4:	Emissions from tobacco smoking, 1985-2012
Annex 2E-5:	Emissions from barbequing, 1985-2012
Annex 2E-6:	Emissions from use of candles, 1985-2012
Annex 2E-7:	Activity data for other product use, 1985-2012

Annex 2E-1 NMVOC emissions, 1985-2012

Table 2E-1a NMVOC emissions (Gg per year), 1985-1998.

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Paint application (3A)	5,11	5,11	5,83	6,37	5,74	6,38	5,90	7,13	6,05	5,95
Degreasing and dry cleaning (3B)	7,1E-05	7,1E-05	6,6E-05	6,3E-05	7,3E-05	9,4E-05	7,7E-05	7,4E-05	4,5E-05	5,5E-05
Chemical products, manufacturing and processing (3C)	8,14	8,14	9,32	9,13	7,15	9,25	9,32	9,48	8,04	7,66
Other (3D)	24,7	24,7	27,7	30,0	26,6	31,4	30,0	32,8	30,6	27,9
Other (3D3)*	0,080	0,083	0,076	0,087	0,077	0,073	0,079	0,084	0,094	0,084
Total NMVOC	38,0	38,0	43,0	45,5	39,5	47,1	45,3	49,5	44,8	41,6

Table 2E-1b NMVOC emissions (Gg per year), 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Paint application (3A)	6,43	6,40	5,25	5,18	4,99	4,66	4,32	3,73	3,23	3,38
Degreasing and dry cleaning (3B)	3,5E-05	2,9E-05	1,3E-05	3,0E-05	2,9E-05	2,4E-05	1,8E-05	1,5E-05	2,2E-05	1,5E-05
Chemical products, manufacturing	7,31	6,96	6,28	6,58	4,96	6,06	6,25	6,02	6,12	5,91
Other (3D)	26,9	27,8	24,8	24,4	22,4	21,4	20,8	20,8	18,0	18,4
Other (3D3)*	0,087	0,095	0,085	0,10	0,11	0,10	0,095	0,11	0,084	0,078
Total NMVOC	40,8	41,2	36,4	36,2	32,5	32,3	31,5	30,7	27,5	27,8

Table 2E-1c NMVOC emissions (Gg per year), 2009-2012.

	2009	2010	2011	2012
Paint application (3A)	2,85	2,75	2,87	2,86
Degreasing and dry cleaning (3B)	1,3E-05	1,2E-05	1,1E-05	2,7E-06
Chemical products, manufacturing and processing (3C)	4,99	5,05	4,81	4,87
Other (3D)	19,7	19,4	19,2	19,1
Other (3D3)*	0,080	0,068	0,060	0,082
Total NMVOC	27,6	27,3	27,0	27,0

*Fireworks, tobacco, barbequing, candles.

Annex 2E-2 Activity data for NMVOC use, 1985-2012

Table 2E-2a Activity data for NMVOC use (Gg per year), 1985-1999.

	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Paint application (3A)	83,2	83,2	96,6	103	90,4	95,7	92,1	110	95,5	97,6	101
Degreasing and dry cleaning (3B)	1,41	1,41	1,31	1,25	1,45	1,88	1,53	1,48	0,892	1,10	0,689
Chemical products, manufacturing and processing (3C)	406	406	455	569	388	466	504	523	519	528	488
Other (3D)	197	197	224	234	202	239	247	260	249	234	226
Other (3D3)*	28,0	28,6	28,5	33,1	29,5	30,5	31,4	32,5	35,5	38,6	45,1
Total NMVOC	716	716	708	837	622	737	785	817	805	801	760

Table 2E-2b Activity data for NMVOC use (Gg per year), 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Paint application (3A)	105	86,4	86,7	79,8	77,6	75,2	64,7	57,3	58,1	48,7
Degreasing and dry cleaning (3B)	0,58	0,25	0,59	0,57	0,48	0,36	0,29	0,43	0,29	0,26
Chemical products, manufacturing and processing (3C)	567	551	540	513	633	740	749	814	771	683
Other (3D)	230	206	218	185	182	204	180	162	169	179
Other (3D3)*	46,5	42,0	56,3	61,8	61,4	63,4	63,6	58,5	51,2	52,2
Total NMVOC	844	800	815	761	878	1008	993	1035	991	914

Table 2E-2c Activity data for NMVOC use (Gg per year), 2010-2012.

	2010	2011	2012
Paint application (3A)	45,8	43,8	43,3
Degreasing and dry cleaning (3B)	0,24	0,22	0,05
Chemical products, manufacturing and processing (3C)	641	640	516
Other (3D)	170	169	169
Other (3D3)*	57,7	50,0	53,6
Total NMVOC	869	859	738,

*Fireworks, tobacco, barbequing, candles.

Annex 2E-3 Emissions from use of fireworks, 1985-2012

Table 2E-3a Emissions from use of fireworks, 1985-1999.

	Unit	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Mg	1.9	2.5	3.3	3.5	3.1	3.8	5.8	5.3	4.2	6.8	12.9
CO	Mg	6.9	8.8	11.7	12.6	11.2	13.5	20.7	19.0	14.9	24.3	46.0
TSP	Mg	39.7	50.7	67.1	72.6	64.1	77.8	118.9	109.1	85.8	139.7	264.
PM_{10}	Mg	19.8	25.4	33.6	36.3	32.1	38.9	59.4	54.5	42.9	69.9	132.
$PM_{2.5}$	Mg	13.9	17.8	23.5	25.4	22.4	27.2	41.6	38.2	30.0	48.9	92.6
As	kg	1.3	1.7	2.3	2.4	2.2	2.6	4.0	3.7	2.9	4.7	8.9
Cd	kg	0.7	0.9	1.1	1.2	1.1	1.3	2.0	1.8	1.4	2.3	4.4
Cr	kg	15.6	19.9	26.3	28.5	25.2	30.5	46.6	42.8	33.7	54.8	103.
Cu	kg	444	568	752	813	718	872	1332	1222	962	1566	2966
Hg	kg	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.4
Ni	kg	30.0	38.4	50.8	54.9	48.5	58.9	89.9	82.5	64.9	105.7	200.
Pb	kg	220	2814	3724	4025	3557	4318	6595	6050	4762	7753	1468
Zn	kg	260	333	440	476	420	510	779	715	563	916	1735

Table 2E-3b Emissions from use of fireworks, 2000-2009.

	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	Mg	9.4	7.4	9.2	11.7	16.7	7.1	8.1	8.7	8.5	10.4
CO	Mg	33.5	26.4	32.7	41.8	59.6	25.4	29.0	30.9	30.1	37.1
TSP	Mg	192.5	151.9	187.9	240.0	342.7	146.1	166.9	177.4	173.2	213.4
PM_{10}	Mg	96.3	76.0	93.9	120.0	171.4	73.0	83.5	88.7	86.6	106.7
$PM_{2.5}$	Mg	67.4	53.2	65.8	84.0	119.9	51.1	58.4	62.1	60.6	74.7
As	kg	6.5	5.1	6.3	8.1	11.5	4.9	5.6	6.0	5.8	7.2
Cd	kg	3.2	2.6	3.2	4.0	5.8	2.5	2.8	3.0	2.9	3.6
Cr	kg	75.5	59.6	73.7	94.2	134.5	57.3	65.5	69.6	68.0	83.7
Cu	kg	2157	1703	2106	2690	3840	1637	1871	1988	1941	2390
Hg	kg	0.3	0.2	0.3	NO	NO	NO	NO	NO	NO	NO
Ni	kg	145.6	114.9	142.1	181.6	259.3	110.5	126.3	134.2	131.1	161.4
Pb	kg	3237	2554	3159	4035	5762	2456	2807	NO	NO	NO
Zn	kg	1262	996	1232	1574	2247	958	1095	1163	1136	1399

Table 2E-3c Emissions from use of fireworks, 2010-2012.

	Unit	2010	2011	2012
SO_2	Mg	10.5	9.2	6.7
CO	Mg	37.4	32.6	24.0
TSP	Mg	215.0	187.6	138.1
PM_{10}	Mg	107.5	93.8	69.1
$PM_{2.5}$	Mg	75.3	65.7	48.3
As	kg	7.2	6.3	4.6
Cd	kg	3.6	3.2	2.3
Cr	kg	84.4	73.6	54.2
Cu	kg	2410	2102	1548
Hg	kg	NO	NO	NO
Ni	kg	162.7	141.9	104.5
Pb	kg	NO	NO	NO
Zn	kg	1410	1230	906

Annex 2E-4 Emissions from tobacco smoking, 1985-2012

Table 2E-4a Emission from tobacco smoking, 1985-1999.

	Unit	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Mg	5.54	5.13	4.82	4.87	4.65	4.60	4.60	4.44	4.50	4.47	4.52
NO_X	Mg	24.78	22.94	21.52	21.75	20.77	20.55	20.55	19.85	20.10	19.99	20.20
CO	Mg	758.02	701.93	658.51	665.29	635.53	628.65	628.81	607.16	615.09	611.46	618.01
NH_3	Mg	57.06	52.84	49.57	50.08	47.84	47.32	47.34	45.71	46.30	46.03	46.52
TSP	Mg	188.11	174.19	163.42	165.10	157.72	156.01	156.05	150.67	152.64	151.74	153.37
PM_{10}	Mg	188.11	174.19	163.42	165.10	157.72	156.01	156.05	150.67	152.64	151.74	153.37
$PM_{2.5}$	Mg	188.11	174.19	163.42	165.10	157.72	156.01	156.05	150.67	152.64	151.74	153.37
As	kg	2.19	2.03	1.90	1.92	1.83	1.81	1.81	1.75	1.77	1.76	1.78
Cd	kg	0.22	0.20	0.19	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Cr	kg	4.87	4.51	4.23	4.27	4.08	4.04	4.04	3.90	3.95	3.93	3.97
Cu	kg	2.09	1.94	1.82	1.84	1.75	1.73	1.73	1.67	1.70	1.69	1.70
Hg	kg	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Ni	kg	0.44	0.41	0.38	0.39	0.37	0.37	0.37	0.35	0.36	0.36	0.36
Pb	kg	8.86	8.20	7.70	7.78	7.43	7.35	7.35	7.10	7.19	7.15	7.22
Se	kg	0.11	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Zn	kg	22.15	20.51	19.24	19.44	18.57	18.37	18.37	17.74	17.97	17.87	18.06
PCDD/Fs	mg	1.38	1.27	1.20	1.21	1.15	1.14	1.14	1.10	1.12	1.11	1.12
Benzo[b]fluoranthene	kg	0.62	0.57	0.54	0.54	0.52	0.51	0.51	0.50	0.50	0.50	0.50
Benzo[k]fluoranthene	kg	0.62	0.57	0.54	0.54	0.52	0.51	0.51	0.50	0.50	0.50	0.50
Benzo[a]pyrene	kg	1.53	1.41	1.33	1.34	1.28	1.27	1.27	1.22	1.24	1.23	1.24
Indeno[1,2,3-cd]pyrene	kg	0.62	0.57	0.54	0.54	0.52	0.51	0.51	0.50	0.50	0.50	0.50

Table 2E-4b Emission from tobacco smoking, 2000-2009.

	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	Mg	4.58	4.40	4.38	4.55	4.46	4.18	4.17	3.94	3.86	3.79
NO_X	Mg	20.47	19.66	19.57	20.34	19.94	18.69	18.63	17.62	17.27	16.93
CO	Mg	626.22	601.43	598.62	622.15	610.13	571.84	569.91	539.22	528.25	518.06
NH_3	Mg	47.14	45.28	45.06	46.84	45.93	43.05	42.90	40.59	39.77	39.00
TSP	Mg	155.41	149.25	148.55	154.39	151.41	141.91	141.43	133.81	131.09	128.56
PM_{10}	Mg	155.41	149.25	148.55	154.39	151.41	141.91	141.43	133.81	131.09	128.56
$PM_{2.5}$	Mg	155.41	149.25	148.55	154.39	151.41	141.91	141.43	133.81	131.09	128.56
As	kg	1.81	1.74	1.73	1.80	1.76	1.65	1.64	1.56	1.52	1.49
Cd	kg	0.18	0.17	0.17	0.18	0.18	0.17	0.17	0.16	0.15	0.15
Cr	kg	4.02	3.86	3.85	4.00	3.92	3.67	3.66	3.46	3.39	3.33
Cu	kg	1.73	1.66	1.65	1.72	1.68	1.58	1.57	1.49	1.46	1.43
Hg	kg	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06
Ni	kg	0.36	0.35	0.35	0.36	0.35	0.33	0.33	0.31	0.31	0.30
Pb	kg	7.32	7.03	7.00	7.27	7.13	6.68	6.66	6.30	6.17	6.05
Se	kg	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08
Zn	kg	18.30	17.57	17.49	18.18	17.83	16.71	16.65	15.76	15.44	15.14
PCDD/Fs	mg	1.14	1.09	1.09	1.13	1.11	1.04	1.03	0.98	0.96	0.94
Benzo[b]fluoranthene	kg	0.51	0.49	0.49	0.51	0.50	0.47	0.47	0.44	0.43	0.42
Benzo[k]fluoranthene	kg	0.51	0.49	0.49	0.51	0.50	0.47	0.47	0.44	0.43	0.42
Benzo[a]pyrene	kg	1.26	1.21	1.21	1.25	1.23	1.15	1.15	1.09	1.06	1.04
Indeno[1,2,3-cd]pyrene	kg	0.51	0.49	0.49	0.51	0.50	0.47	0.47	0.44	0.43	0.42

Table 2E-4c Emission from tobacco smoking, 2010-2012.

	Unit	2010	2011	2012
SO_2	Mg	3.69	3.33	3.29
NO_X	Mg	16.48	14.87	14.72
CO	Mg	504.28	454.80	450.29
NH_3	Mg	37.96	34.24	33.90
TSP	Mg	125.14	112.87	111.74
PM_{10}	Mg	125.14	112.87	111.74
$PM_{2.5}$	Mg	125.14	112.87	111.74
As	kg	1.46	1.31	1.30
Cd	kg	0.15	0.13	0.13
Cr	kg	3.24	2.92	2.89
Cu	kg	1.39	1.25	1.24
Hg	kg	0.05	0.05	0.05
Ni	kg	0.29	0.26	0.26
Pb	kg	5.89	5.32	5.26
Se	kg	0.07	0.07	0.07
Zn	kg	14.73	13.29	13.16
PCDD/Fs	mg	0.92	0.83	0.82
Benzo[b]fluoranthene	kg	0.41	0.37	0.37
Benzo[k]fluoranthene	kg	0.41	0.37	0.37
Benzo[a]pyrene	kg	1.02	0.92	0.91
Indeno[1,2,3-cd]pyrene	kg	0.41	0.37	0.37

Annex 2E-5 Emissions from barbequing 1985-2012

Table 2E-5a Emissions from barbequing, 1985-1999.

	Unit	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
SO_2	Mg	13.73	22.23	19.22	29.58	21.89	18.59	24.47	31.48	41.81	31.72	33.98
NO_X	Mg	13.29	21.52	18.60	28.63	21.18	17.99	23.69	30.46	40.47	30.70	32.88
CO	Mg	0.93	1.51	1.30	2.00	1.48	1.26	1.66	2.13	2.83	2.15	2.30
NH_3	Mg	0.42	0.68	0.59	0.91	0.67	0.57	0.75	0.96	1.28	0.97	1.04
TSP	Mg	13.73	22.23	19.22	29.58	21.89	18.59	24.47	31.48	41.81	31.72	33.98
PM_{10}	Mg	13.73	22.23	19.22	29.58	21.89	18.59	24.47	31.48	41.81	31.72	33.98
$PM_{2.5}$	Mg	13.73	22.23	19.22	29.58	21.89	18.59	24.47	31.48	41.81	31.72	33.98
As	kg	0.42	0.68	0.59	0.91	0.67	0.57	0.75	0.96	1.28	0.97	1.04
Cd	kg	0.16	0.25	0.22	0.34	0.25	0.21	0.28	0.36	0.48	0.36	0.39
Cr	kg	0.17	0.27	0.24	0.36	0.27	0.23	0.30	0.39	0.51	0.39	0.42
Cu	kg	0.67	1.09	0.94	1.45	1.07	0.91	1.20	1.54	2.05	1.56	1.67
Hg	kg	0.29	0.47	0.40	0.62	0.46	0.39	0.51	0.66	0.88	0.67	0.71
Ni	kg	0.58	0.93	0.81	1.24	0.92	0.78	1.03	1.32	1.75	1.33	1.42
Pb	kg	19.71	31.92	27.59	42.46	31.42	26.69	35.13	45.18	60.02	45.54	48.78
Se	kg	2.88	4.66	4.03	6.20	4.59	3.90	5.13	6.60	8.77	6.65	7.12
Zn	kg	8.42	13.63	11.78	18.13	13.42	11.39	15.00	19.29	25.63	19.44	20.83
HCB	g	0.42	0.68	0.59	0.91	0.67	0.57	0.75	0.96	1.28	0.97	1.04
PCDD/Fs	g	0.05	0.08	0.07	0.10	0.07	0.06	0.08	0.11	0.14	0.11	0.12
Benzo[b]fluoranthene	kg	9.48	15.35	13.27	20.42	15.11	12.83	16.90	21.73	28.87	21.90	23.46
Benzo[k]fluoranthene	kg	5.54	8.97	7.75	11.93	8.83	7.50	9.87	12.69	16.86	12.79	13.70
Benzo[a]pyrene	kg	9.57	15.49	13.39	20.61	15.25	12.95	17.05	21.93	29.13	22.10	23.68
Indeno[1.2.3-cd]pyrene	kg	6.47	10.47	9.05	13.93	10.31	8.76	11.53	14.82	19.69	14.94	16.00
PCBs	g	0.59	0.96	0.83	1.28	0.95	0.80	1.06	1.36	1.81	1.37	1.47

Table 2E-5b Emissions from barbequing, 2000-2009.

	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SO_2	Mg	41.41	33.78	50.83	62.12	50.25	46.27	61.28	37.67	32.19	36.10
NO_X	Mg	40.07	32.69	49.19	60.11	48.63	44.77	59.30	36.45	31.15	34.93
CO	Mg	2.81	2.29	3.44	4.21	3.40	3.13	4.15	2.55	2.18	2.45
NH_3	Mg	1.27	1.04	1.56	1.90	1.54	1.42	1.88	1.15	0.99	1.11
TSP	Mg	41.41	33.78	50.83	62.12	50.25	46.27	61.28	37.67	32.19	36.10
PM_{10}	Mg	41.41	33.78	50.83	62.12	50.25	46.27	61.28	37.67	32.19	36.10
$PM_{2.5}$	Mg	41.41	33.78	50.83	62.12	50.25	46.27	61.28	37.67	32.19	36.10
As	kg	1.27	1.04	1.56	1.90	1.54	1.42	1.88	1.15	0.99	1.11
Cd	kg	0.47	0.39	0.58	0.71	0.58	0.53	0.70	0.43	0.37	0.41
Cr	kg	0.51	0.41	0.62	0.76	0.62	0.57	0.75	0.46	0.39	0.44
Cu	kg	2.03	1.66	2.49	3.05	2.46	2.27	3.00	1.85	1.58	1.77
Hg	kg	0.87	0.71	1.07	1.30	1.05	0.97	1.28	0.79	0.67	0.76
Ni	kg	1.74	1.42	2.13	2.60	2.11	1.94	2.57	1.58	1.35	1.51
Pb	kg	59.44	48.49	72.97	89.17	72.14	66.42	87.96	54.07	46.21	51.82
Se	kg	8.68	7.08	10.66	13.02	10.54	9.70	12.85	7.90	6.75	7.57
Zn	kg	25.38	20.70	31.15	38.07	30.80	28.36	37.56	23.09	19.73	22.12
HCB	g	1.27	1.04	1.56	1.90	1.54	1.42	1.88	1.15	0.99	1.11
PCDD/Fs	g	0.14	0.11	0.17	0.21	0.17	0.16	0.21	0.13	0.11	0.12
Benzo[b]fluoranthene	kg	28.59	23.32	35.09	42.88	34.69	31.94	42.30	26.00	22.22	24.92
Benzo[k]fluoranthene	kg	16.70	13.62	20.50	25.05	20.26	18.66	24.71	15.19	12.98	14.56
Benzo[a]pyrene	kg	28.85	23.54	35.42	43.28	35.02	32.24	42.70	26.25	22.43	25.15
Indeno[1.2.3-cd]pyrene	kg	19.50	15.91	23.94	29.25	23.67	21.79	28.86	17.74	15.16	17.00
PCBs	g	1.79	1.46	2.20	2.68	2.17	2.00	2.65	1.63	1.39	1.56

Table 2E-5c Emissions from barbequing, 2010-2012.

	Unit	2010	2011	2012
SO_2	Mg	24.29	20.83	43.53
NO_X	Mg	23.50	20.16	42.12
CO	Mg	1.65	1.41	2.95
NH_3	Mg	0.74	0.64	1.33
TSP	Mg	24.29	20.83	43.53
PM_{10}	Mg	24.29	20.83	43.53
$PM_{2.5}$	Mg	24.29	20.83	43.53
As	kg	0.74	0.64	1.33
Cd	kg	0.28	0.24	0.50
Cr	kg	0.30	0.26	0.53
Cu	kg	1.19	1.02	2.13
Hg	kg	0.51	0.44	0.91
Ni	kg	1.02	0.87	1.83
Pb	kg	34.86	29.90	62.48
Se	kg	5.09	4.37	9.13
Zn	kg	14.89	12.77	26.68
HCB	g	0.74	0.64	1.33
PCDD/Fs	g	0.08	0.07	0.15
Benzo[b]fluoranthene	kg	16.77	14.38	30.05
Benzo[k]fluoranthene	kg	9.79	8.40	17.55
Benzo[a]pyrene	kg	16.92	14.51	30.33
Indeno[1.2.3-cd]pyrene	kg	11.44	9.81	20.50
PCBs	g	1.05	0.90	1.88

Annex 2E-6 Emissions from use of candles, 1985-2012

Table 2E-6a Emissions from use of candles, 1985-1999.

	Unit	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
CO	Mg	88.32	74.44	86.33	96.07	93.00	111.37	90.94	85.45	86.87	137.40	162.57
TSP	Mg	11.84	9.98	11.57	12.87	12.46	14.92	12.19	11.45	11.64	18.41	21.78
PM_{10}	Mg	11.84	9.98	11.57	12.87	12.46	14.92	12.19	11.45	11.64	18.41	21.78
$PM_{2.5}$	Mg	11.84	9.98	11.57	12.87	12.46	14.92	12.19	11.45	11.64	18.41	21.78
PCDD/Fs	mg	0.24	0.20	0.23	0.26	0.25	0.30	0.25	0.23	0.23	0.37	0.44
Benzo[k]fluoranthene	g	40.98	34.54	40.06	44.58	43.15	51.68	42.20	39.65	40.31	63.75	75.43
Benzo[a]pyrene	g	32.77	27.62	32.03	35.64	34.50	41.32	33.74	31.70	32.23	50.98	60.31
Indeno[1.2.3-cd]pyrene	g	8.21	6.92	8.03	8.93	8.65	10.36	8.46	7.95	8.08	12.78	15.12

Table 2E-6b Emissions from use of candles, 2000-2009.

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CO	Mg	169.27	163.38	243.32	244.41	254.96	344.33	292.41	321.12	268.48	257.80
TSP	Mg	22.68	21.89	32.61	32.75	34.16	46.14	39.18	43.03	35.98	34.55
PM_{10}	Mg	22.68	21.89	32.61	32.75	34.16	46.14	39.18	43.03	35.98	34.55
$PM_{2.5}$	Mg	22.68	21.89	32.61	32.75	34.16	46.14	39.18	43.03	35.98	34.55
PCDD/Fs	mg	0.46	0.44	0.66	0.66	0.69	0.93	0.79	0.87	0.72	0.70
Benzo[k]fluoranthene	g	78.54	75.81	112.90	113.40	118.30	159.77	135.68	149.00	124.58	119.62
Benzo[a]pyrene	g	62.80	60.61	90.27	90.67	94.59	127.75	108.48	119.13	99.61	95.64
Indeno[1.2.3-cd]pyrene	g	15.74	15.19	22.63	22.73	23.71	32.02	27.19	29.86	24.97	23.98

Table 2E-6c Emissions from use of candles, 2010-2012.

		2010	2011	2012
CO	Mg	352.94	301.71	278.69
TSP	Mg	47.29	40.43	37.34
PM_{10}	Mg	47.29	40.43	37.34
$PM_{2.5}$	Mg	47.29	40.43	37.34
PCDD/Fs	mg	0.95	0.81	0.75
Benzo[k]fluoranthene	g	163.76	139.99	129.31
Benzo[a]pyrene	g	130.94	111.93	103.39
Indeno[1.2.3-cd]pyrene	g	32.82	28.06	25.92

Annex 2E-7 Activity data for other product use, 1985-2012

Table 2E-7 Activity data for the national use of fireworks, tobacco, charcoal for BBQs and use of candles.

		1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fireworks	Gg	1.0	1.3	1.7	1.8	1.6	2.0	3.0	2.8	2.2	3.5
BBQ	Gg	4.4	7.2	6.2	9.5	7.1	6.0	7.9	10.2	13.5	10.2
Tobacco	Gg	13.8	12.7	12.0	12.1	11.5	11.4	11.4	11.0	11.2	11.1
Candles	Gg	8.8	7.4	8.6	9.6	9.3	11.1	9.1	8.5	8.7	13.7
Continued		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Fireworks	Gg	6.7	4.9	3.8	4.7	6.1	8.6	3.7	4.2	4.5	4.4
BBQ	Gg	11.0	13.4	10.9	16.4	20.0	16.2	14.9	19.8	12.2	10.4
Tobacco	Gg	11.2	11.4	10.9	10.9	11.3	11.1	10.4	10.3	9.8	9.6
Candles	Gg	16.3	16.9	16.3	24.3	24.4	25.5	34.4	29.2	32.1	26.8
Continued		2009	2010	2011	2012						
Fireworks	Gg	5.4	5.4	4.7	3.5						
BBQ	Gg	11.6	7.8	6.7	14.0						
Tobacco	Gg	9.4	9.2	8.3	8.2						
Candles	Gg	25.8	35.3	30.2	27.9						

Annex 3 – Completeness and use of notation keys

Not estimated categories

The Danish air emission inventory is generally complete. However, some categories and/or pollutants are reported as NE (Not estimated).

Stationary combustion

NH_3 emissions from combustion for all sources except biomass and solid fuel appliances in sector 1A4b and waste incineration plants in sector 1A1a are not estimated, due to lack of available emission factors.

Mobile combustion

Mercury and PAH emissions from tire and brake wear are not estimated, due to lack of emission factors.

Arsenic and selenium from road abrasion are not estimated, due to lack of emission factors.

Industrial processes

- Emissions from quarrying and mining of minerals other than coal have not been estimated.
- Emissions from construction and demolition are not estimated.
- Emissions from storage, handling and transport of mineral products are not estimated
- Emissions from storage, handling and transport of chemical products have not been estimated.
- Emissions from storage, handling and transport of metal products have not been estimated.
- Emissions from pulp and paper production have not been estimated.
- Emissions from wood processing have not been estimated.
- Emissions from production of POPs have not been estimated due to lack of emission factors.
- Emissions from consumption of POPs and heavy metals have not been estimated.

Solvent and other product use

Emissions of POPs and heavy metals from solvent use. (Only NMVOC emissions are estimated from use of solvents).

Emissions from some product uses are not estimated, e.g. use of shoes.

Agriculture

NMVOC from animal husbandry and manure management has not been estimated, due to lack of resources.

NO_x emissions from agriculture have not been estimated, due to lack of resources.

PM emissions from agricultural field operations have not been estimated, due to lack of resources.

Waste

Emissions from solid waste disposal on land have not been estimated due to lack of resources.

Emissions from wastewater handling have not been estimated due to lack of resources.

Emissions from small scale waste burning have not been estimated due to lack of resources.

The emission of selenium and HCB from accidental fires has not been estimated due to lack of available emission factors.

Categories reported as IE (Included Elsewhere)

The table below indicates the categories where the notation key IE has been used in the reporting for some or all pollutants.

Table A3.1 List of categories reported as included elsewhere.

Category reported as IE	Emissions where emissions are included
1 A 5 a Other stationary (including military)	1 A 4 a i Commercial / institutional: Stationary
2 A 1 Cement production	1 A 2 f i Manufacturing industries and construction, Other
2 A 2 Lime production	1 A 2 f i Manufacturing industries and construction, Other
2 A 3 Limestone and dolomite use	1 A 2 f i Manufacturing industries and construction, Other
2 A 4 Soda ash production and use	1 A 2 f i Manufacturing industries and construction, Other
6 C a Clinical waste incineration (d)	1 A 1 a Public electricity and heat production
6 C b Industrial waste incineration (d)	1 A 1 a Public electricity and heat production
6 C c Municipal waste incineration (d)	1 A 1 a Public electricity and heat production

Emissions from other stationary combustion including military (1A5a) have been reported as included elsewhere. Stationary fuel consumption is not available as an independent category in the Danish energy statistics. Fuel consumption and therefore also emissions are reported under commercial and institutional plants (1A4a i).

Emissions from cement production (2A1), lime production (2A2), limestone and dolomite use (2A3), and soda ash production and use (2A4) are included in manufacturing industries and construction (1A2f i). It is not possible to separate the process emissions from the energy related emissions.

Emissions from clinical, industrial and municipal waste incineration (6Ca, 6Cb and 6Cc) are reported under public electricity and heat production (1A1a). All incineration of these waste fractions in Denmark is done with energy recovery and therefore emissions and waste consumption are reported in the energy sector in accordance with the guidelines.

Annex 4 – Information on the energy balance

The official Danish energy balance is prepared by the Danish Energy Agency (DEA). The DEA is responsible for reporting of energy data to Eurostat and the IEA. DCE uses the energy balance as published by the DEA. However, some reallocations between sectors are made in connection with the bottom-up modelling done at DCE for different subsectors within transport and mobile sources. For a more in-depth discussion of the energy statistics please see Annex 2A-9. For information on the reallocation of fuels please see Chapter 3.3.

ANNUAL DANISH INFORMATIVE INVENTORY REPORT TO UNECE

Emission inventories from the base year of the protocols to year 2012

This report is a documentation report on the emission inventories for Denmark as reported to the UNECE Secretariat under the Convention on Long Range Transboundary Air Pollution due by 15 February 2014. The report contains information on Denmark's emission inventories regarding emissions of (1) SO_X for the years 1980-2012, (2) NO_X, CO, NMVOC and NH_3 for the years 1985-2012, (3) Particulate matter: TSP, PM_{10}, $PM_{2.5}$ for the years 2000-2012, (4) Heavy Metals: Pb, Cd, Hg, As, Cr, Cu, Ni, Se and Zn for the years 1990-2012, (5) Polyaromatic hydrocarbons (PAH): Benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene, PCDD/F and HCB for the years 1990-2012. Further, the report contains information on background data for emissions inventory.

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