Annex 2A, 2B and 2C

Contents

Annex 2A

Stationary combustion plants

This annex is a sector report for stationary combustion plants that includes more detailed documentation than included in the main report. Further it includes both greenhouse gases and pollutants reported to the LRTAP Convention.

Contents

Preface

The Danish National Environmental Research Institute (NERI) prepares the Danish atmospheric emission inventories and reports the results on an annual basis to the Climate Convention and to the UNECE Convention on Long-Range Transboundary Air Pollution. This report forms part of the documentation for the inventories and covers emissions from stationary combustion plants. The results of inventories up to 2005 are included. The report updates a similar report published in 2006.

Sammendrag

Opgørelser over de samlede danske luftemissioner rapporteres årligt til Klimakonventionen (*UN Framework Convention on Climate Change, UNFCCC*) og til UNECE Konventionen om langtransporteret grænseoverskridende luftforurening (*UNECE Convention on Long-Range Transboundary Air Pollution* der forkortes LRTAP Convention). Endvidere rapporteres drivhusgasemissionen til EU fordi EU – såvel som de enkelte medlemslande – har ratificeret klimakonventionen. De danske emissioner opgøres og rapporteres af Danmarks Miljøundersøgelser (DMU). Emissionsopgørelserne omfatter følgende stoffer af relevans for stationær forbrænding: CO_2, CH_4, N_2O, SO_2, NO_X, NMVOC, CO, partikler, tungmetaller, dioxin og PAH. Foruden de årlige opgørelser over total emission rapporteres også sektoropdelt emission og usikkerhed på opgørelserne. Hvert femte år rapporteres endvidere geografisk fordeling af emissionerne, fremskrivning af emissionerne samt de aktivitetsdata – fx brændselsforbrug – der ligger til grund for opgørelserne.

Emissionsopgørelserne for stationære forbrændingsanlæg (ikke mobile kilder) er baseret på den danske energistatistik og på et sæt af emissionsfaktorer for forskellige sektorer, teknologier og brændsler. Anlægsspecifikke emissionsdata for store anlæg, som fx kraftværker, indarbejdes i opgørelserne. Denne rapport giver detaljeret baggrundsinformation om den anvendte metode samt referencer for de data der ligger til grund for opgørelsen – energistatistikken og emissionsfaktorerne.

Emissionsfaktorerne stammer enten fra danske referencer eller fra internationale guidebøger (EMEP/Corinair 2004 og IPCC 1996) udarbejdet til brug for denne type emissionsopgørelser. De danske referencer omfatter miljølovgivning, danske rapporter samt middelværdier baseret på anlægsspecifikke emissionsdata fra et betydeligt antal større værker. Anlægsspecifikke emissionsfaktorer oplyses af anlægsejere, bl.a. i grønne regnskaber.

I emissionsopgørelsen for 2005 er 75 stationære forbrændingsanlæg defineret som punktkilder. Punktkilderne omfatter: kraftværker, decentrale kraftvarmeværker, affaldsforbrændingsanlæg, industrielle forbrændingsanlæg samt raffinaderier. Brændselsforbruget for disse anlæg svarer til 64 % af det samlede brændselsforbrug for alle stationære forbrændingsanlæg.

Variationen i årlig import/eksport af el medfører at det totale danske brændselsforbrug varierer. Siden 1990 er brændselsforbruget steget med 6,6 %, mens forbruget af fossile brændsler er faldet med 4,9%. Forbruget af kul er faldet, mens forbruget af naturgas og af biobrændsler er steget.

For følgende stoffer udgør emissionen fra stationær forbrænding over 50 % af den samlede danske emission: SO_2, CO_2, tungmetaller (dog ikke Cu), $PM_{2.5}$ og PAH. Endvidere udgør emissionen over 10 % for NO_X, CO, NMVOC, TSP, PM_{10} og Cu. Stationær forbrænding bidrager med mindre end 10 % af den samlede danske emission af CH_4 og N_2O.

Indenfor de stationære forbrændingsanlæg er kraftværker og decentrale kraftvarmeværker den betydeligste emissionskilde for SO_2, CO_2, NO_X, og tungmetaller. Gasmotorer installeret på decentrale kraftvarmeværker er den største CH_4 emissionskilde. Endvidere har gasmotorer en betydelig emission af NMVOC.

Emissioner fra kedler, brændeovne mv. i forbindelse med beboelse er den betydeligste emissionskilde for CO, NMVOC, partikler og PAH. Det er især forbrænding af træ, som bidrager til disse emissioner.

I rapporten vises tidsserier for emissioner fra stationær forbrænding.

Udviklingen i emissionen af drivhusgasser følger udviklingen i CO_2-emissionen ganske tæt. Både CO_2-emissionen og den samlede drivhus-gas-emission fra stationær forbrænding er lavere i 2005 end i basisåret 1990 – CO_2 er 15 % lavere og drivhusgasemissionen er 14 % lavere. Emissionerne fluktuerer dog betydeligt pga. variationerne i import/eksport af el samt varierende udetemperatur.

CH_4-emissionen fra stationær forbrænding er steget med en faktor 4,2 siden 1990. Denne stigning skyldes, at der i perioden er installeret et betydeligt antal gasmotorer på decentrale kraftvarmeværker.

SO_2-emissionen fra stationær forbrænding er faldet med 96 % siden 1980 og 85 % siden 1995. Den store reduktion skyldes primært, at emissionen fra el- og fjernvarmeproducerende anlæg er faldet, som følge af installering af afsvovlningsanlæg samt brug af brændsler med lavere svovlindhold.

NO_X-emissionen fra stationær forbrænding er faldet med 54 % siden 1985 og 38% siden 1995. Reduktionen skyldes primært at emissionen fra el og fjernvarmeproducerende anlæg er faldet som følge af at der benyttes lav-NO_X-brændere på flere anlæg og at der er idriftsat NO_X-røggasrensning på flere store kraftværker. Variationen i NO_X-emissionen følger variationen i import/eksport af el.

Forbrænding af træ i villakedler og brændeovne er forøget med 180 % siden 1990 og dette har medført en stigning i CO-emissionen. Stigningen i CO-emissionen er dog ikke helt så stor, idet CO-emissionen fra halmfyrede gård-anlæg samtidig er faldet betydeligt.

Emissionen af NMVOC fra stationær forbrænding er øget med 69 % siden 1985 og 37 % siden 1995. Stigningen skyldes primært idriftsættelsen af gasmotorer på decentrale kraftvarmeværker samt det forøgede træ-forbrug i husholdninger.

Tungmetalemissionerne er faldet betydeligt siden 1990. Emissionen af de enkelte tungmetaller er reduceret mellem mellem 46 % og 85 %[1]. Faldet skyldes den forbedrede røggasrensing på affaldsforbrændingsanlæg og på kraftværker.

Emissionen af de forskellige PAH'er er steget til ca det dobbelte siden 1990, hvilket hænger sammen med den øgede mængde træ, der for-

[1] Den beregnede Zn er lidt højere end for 1990, men det forventes at det alene skyldes utilstrækkelige data.

brændes i brændeovne eller små villakedler. Dioxinemissionen er faldet med 61%.

Summary

Danish emission inventories are prepared on an annual basis and are reported to the *UNECE Framework Convention on Climate Change* (UNFCCC or Climate Convention) and to the UNECE *Convention on Long-Range Transboundary Air Pollution* (LRTAP Convention). Furthermore, a greenhouse gas emission inventory is reported to the EU, due to the EU – as well as the individual member states – being party to the Climate Convention. The annual Danish emission inventories are prepared by the Danish National Environmental Research Institute (NERI). The inventories include the pollutants: CO_2, CH_4, N_2O, SO_2, NO_X, NMVOC, CO, particulate matter, heavy metals, dioxins and PAH. In addition to annual total emissions, the report includes sector specific emissions and uncertainty estimates. Every five years the reporting includes data on the geographical distribution of the emissions, a projection of emissions data and details of the activity data – e.g. fuel consumption – on which the inventories are based.

The inventories are based on the Danish energy statistics and on a set of emission factors for various sectors, technologies and fuels. Plant specific emissions for large combustion sources are incorporated into the inventories. This report provides detailed background information on the methodology and references for the input data in the inventory - energy statistics and emission factors.

The emission factors are based either on national references or on international guidebooks (EMEP/Corinair 2004 and IPCC 1996). The majority of the country-specific emission factors refer to: Danish legislation, Danish research reports or calculations based on plant-specific emissions from a considerable number of large point sources. The plant-specific emission factors are provided by plant operators, e.g. in annual environmental reports.

In the inventory for the year 2005, 75 stationary combustion plants are specified as large point sources. The point sources include large power plants, municipal waste incineration plants, industrial combustion plants and petroleum refining plants. The fuel consumption of these large point sources corresponds to 64% of the overall fuel consumption of stationary combustion.

The Danish fuel consumption rate fluctuates due to the import/export of electricity. Since 1990 fuel consumption has increased by 6.6%, fossil fuel consumption, however, decreased by 4.9%. The use of coal has decreased whereas the use of natural gas and renewable fuels has increased.

Stationary combustion plants account for more than 50% of the total Danish emission for the following pollutants: SO_2, CO_2, heavy metals (except Cu) $PM_{2.5}$ and PAH. Furthermore, emissions from stationary combustion plants account for more than 10% of the total Danish emission for the following pollutants: NO_X, CO, NMVOC, TSP, PM_{10} and Cu. Stationary combustion plants account for less than 10% of the total Danish CH_4 and N_2O emission.

Public power plants represent the most important stationary combustion emission source for SO_2, CO_2, NO_X and heavy metals.

Lean-burn gas engines installed in decentralised CHP plants are the largest emission source for CH_4. Furthermore, these plants also represent a considerable emission source for NMVOC.

Residential plants are the most important stationary combustion source for CO, NMVOC, particulate matter and PAH. Wood combustion in residential plants is the predominant emission source.

The report in hand includes time-series for stationary combustion plants for the range of pollutants.

The development in greenhouse gas (GHG) emission follows that of CO_2 emission very closely. Both CO_2 and the total GHG emission were lower in 2005 than in 1990: CO_2 by 15% and GHG by 14%. However, fluctuations in the GHG emission level are significant, the fluctuations in the time-series arising from electricity import/export and outdoor temperature variations from year to year.

The CH_4 emission from stationary combustion has increased by a factor of 4.2 since 1990. This is a result of the considerable number of lean-burn gas engines installed in CHP plants in Denmark during this period.

SO_2 emission from stationary combustion plants has decreased by 96% from 1980 and 85% from 1995. The large emission decrease is mainly a result of the reduced emission from electricity and district heat production made possible by installation of desulphurisation plants and due to the use of fuels with lower sulphur content.

The NO_X emission from stationary combustion plants has decreased by 54% since 1985 and 38% since 1995. The reduced emission is mainly a result of the reduced emission from electricity and district heat production plants in which the use of low NO_X burners has increased. Also, de-NO_X flue gas cleaning units have been put into operation in a greater number of the larger power plants. The fluctuations in the time-series follow fluctuations in fuel consumption in power plants, these occurring due to electricity import/export.

Wood consumption in residential plants has increased by 180% since 1990 causing an increase in the CO emission. The increase in CO from residential plants is less steep than the increase in wood consumption as the CO emission from straw-fired farmhouse boilers has decreased considerably.

The NMVOC emission from stationary combustion plants has increased by 69% from 1985 and 37% from 1995. The increased NMVOC emission results mainly from the increased use of lean-burn gas engines and the increased consumption of wood in the residential sector.

All heavy metal emissions have decreased considerably since 1990 – between 46% and 85%[2]. The decreases result from improvements in flue

[2] The estimated Zn emission is 2% higher in 2005 than in 1990. This is presumably due to insufficient emission factor update for resent years.

gas cleaning systems installed in municipal waste incineration plants and in power plants.

The PAH emission has doubled since 1990 due to increased combustion of wood in residential plants. Dioxin emission decreased by 61%.

1 Introduction

The Danish atmospheric emission inventories are prepared on an annual basis and the results are reported to the *UN Framework Convention on Climate Change* (UNFCCC or Climate Convention) and to the UNECE *Convention on Long-Range Transboundary Air Pollution* (LRTAP Convention). Furthermore, a greenhouse gas emission inventory is reported to the EU, due to the EU – as well as the individual member states – being party to the Climate Convention. The Danish atmospheric emission inventories are calculated by the Danish National Environmental Research Institute (NERI).

This report provides a summary of the emission inventories for stationary combustion and background documentation for the estimates. Stationary combustion plants include power plants, district heating plants, non-industrial and industrial combustion plants, industrial process burners, petroleum-refining plants, as well as combustion in oil/gas extraction and in pipeline compressors. Emissions from flaring in oil/gas production and from flaring carried out in refineries are not covered by this report.

This report presents detailed emission inventories and time-series for emissions from stationary combustion plants. Furthermore, emissions from stationary combustion plants are compared with total Danish emissions. The methodology and references for the emission inventories for stationary combustion plants are described. Furthermore, uncertainty estimates are provided.

2 Total Danish emissions, international conventions and reduction targets

2.1 Total Danish emissions

An overview of the Danish emission inventories for 2005 including all sectors is shown in Table 1-Table 4. The emission inventories reported to the LRTAP Convention and to the Climate Convention are organised in 6 main source categories and a number of sub categories. The emission source *1 Energy* covers combustion in stationary and mobile sources as well as fugitive emissions from the energy sector. Emissions from incineration of municipal waste in power plants or district heating plants are included in the source category *1 Energy*, rather than in the source category *6 Waste*.

Links to the latest emission inventories can be found on the NERI home page: *http://www2.dmu.dk/1_Viden/2_Miljoe-tilstand/3_luft/4_adaei/default_-en.asp* or via www.dmu.dk. Surveys of the latest inventories and the updated emission factors are also available on the NERI homepage.

Note that according to convention decisions emissions from certain specific sources are not included in the inventory totals. These emissions are reported as memo items and are thus estimated, but not included in the totals. The data for the total Danish emission included in this report does not include memo items.

- CO_2 emission from renewable fuels is not included in national totals, but reported as a memo item.
- Emissions from international bunkers and from international aviation are not included in national totals.

Further emission data for stationary combustion plants are provided in Chapters 5-9.

Table 1 Greenhouse gas emission for the year 2005 (Illerup et al. 2007a).

Pollutant	CO_2	CH_4	N_2O	HFCs, PFCs and SF6
Unit	Gg CO_2 equivalent			
1. Energy	48689	678	749	-
2. Industrial Processes	16591	-	-	841
3. Solvent and Other Product Use	116	-	-	-
4. Agriculture	-	3646	6.234	-
5. Land-Use Change and Forestry	-1453	-0.49	0.15	-
6. Waste	2	1312	61	-
Total Danish emission (gross)[1)]	63947			
Total Danish emission (net) [2)]	62494			

1) Not including Land-Use Change and Forestry

2) Including Land-Use Change and Forestry

Table 2 Emissions 2005 reported to the LRTAP Convention (Illerup et al. 2007b).

Pollutant	NO_x Gg	CO Gg	NMVOC Gg	SO_2 Gg	TSP Mg	PM_{10} Mg	$PM_{2.5}$ Mg
1. Energy	186	611	78	22	31972	28628	26121
2. Industrial Processes	0	0	1	-	-	-	-
3. Solvent and Other Product Use	-	-	37	-	-	-	-
4. Agriculture	-	-	2	-	14621	9512	1667
5. Land-Use Change and Forestry	-	-	-	-	-	-	-
6. Waste	0	0	0	0	0	0	0
Total Danish emission	186	611	118	22	46594	38140	27788

Table 3 Emissions 2005 reported to the LRTAP Convention (Illerup et al. 2007b).

Pollutant	Pb Mg	Cd Mg	Hg Mg	As Mg	Cr Mg	Cu Mg	Ni Mg	Se Mg	Zn Mg
1. Energy	5.21	0.62	1.23	0.57	1.20	9.20	9.47	1.62	24.61
2. Industrial Processes	0.37	0.00	0.06	-	-	0.05	0.04	-	1.60
3. Solvent and Other Product Use	-	-	-	-	-	-	-	-	-
4. Agriculture	-	-	-	-	-	-	-	-	-
5. Land-Use Change and Forestry	-	-	-	-	-	-	-	-	-
6. Waste	-	-	-	-	-	-	-	-	-
Total Danish emission	5.58	0.62	1.29	0.57	1.20	9.25	9.51	1.62	26.21

Table 4 Emissions 2005 reported to the LRTAP Convention (Illerup et al. 2007b).

Pollutant	Benzo(a)-pyrene Mg	Benzo(b)fluo-ranthene Mg	Benzo(k)-fluoranthene Mg	Indeno(1,2,3-c,d)pyrene Mg	Dioxin g I-Teq
1. Energy	3.88	4.20	2.33	2.81	18.98
2. Industrial Processes	-	-	-	-	0.19
3. Solvent and Other Product Use	-	-	-	-	-
4. Agriculture	-	-	-	-	-
5. Land-Use Change and Forestry	-	-	-	-	-
6. Waste	-	-	-	-	0.04
7. Other	-	-	-	-	6.10
Total Danish emission	3.88	4.20	2.33	2.81	25.31

2.2 International conventions and reduction targets

Denmark is a party to two international conventions relevant with regard to emissions from stationary combustion plants:

- The UNECE Convention on Long Range Transboundary Air Pollution (LRTAP Convention or the Geneva Convention)
- The UN Framework Convention on Climate Change under the Intergovernmental Panel on Climate Change (IPCC). The convention is also called UNFCCC or the Climate Convention.

The LRTAP Convention is a framework convention and has expanded to cover 8 protocols:

- *EMEP Protocol,* 1984 (Geneva).
- *Protocol on Reduction of Sulphur Emissions,* 1985 (Helsinki).
- *Protocol concerning the Control of Emissions of Nitrogen Oxides,* 1988 (Sofia).
- *Protocol concerning the Control of Emissions of Volatile Organic Compounds,* 1991 (Geneva).
- *Protocol on Further Reduction of Sulphur Emissions,* 1994 (Oslo).
- *Protocol on Heavy Metals,* 1988 (Aarhus).
- *Protocol on Persistent Organic Pollutants (POPs),* 1998 (Aarhus).
- *Protocol to Abate Acidification, Eutrophication and Ground-level Ozone,* 1999 (Gothenburg).

The reduction targets/emission ceilings included in the protocols of the LRTAP Convention are stated in Table 5.

Table 5 Danish reduction targets / emission ceiling, LRTAP Convention.

Pollutant	Reduction / emission ceiling	Reference	Comment
SO_2	55 Gg in 2010	Gothenburg protocol	The ceiling equals 250% of the 2005 emission
NO_X	127 Gg in 2010	Gothenburg protocol	The ceiling equals 68% of the 2005 emission
NMVOC	85 Gg in 2010	Gothenburg protocol	The ceiling equals 72% of the 2005 emission

The Climate Convention is a framework convention from 1992. The Kyoto protocol is a protocol to the Climate Convention.

The Kyoto protocol sets legally-binding emission targets and timetables for 6 greenhouse gases: CO_2, CH_4, N_2O, HFC, PFC and SF_6. The greenhouse gas emission of each of the 6 pollutants is translated to CO_2 equivalents, which can be totalled to produce total greenhouse gas (GHG) emission in CO_2 equivalent. Denmark is obliged to reduce the average 2008-2010 GHG emission by 21% compared to the 1990 emission level.

EU is a party to the Climate Convention and, thereby, EU countries are obliged to submit emission data to the EU Monitoring Mechanism for CO_2 and other Greenhouse Gases.

3 Methodology and references

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, prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections (EMEP/Corinair 2004). 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.

3.1 Emission source categories

In the Danish emission database all activity rates and emissions are defined in SNAP sector categories (Selected Nomenclature for Air Pollution) according the CORINAIR system. The emission inventories are prepared from a complete emission database based on the SNAP sectors. Aggregation to the sector codes used for both the Climate Convention and the LRTAP Convention is based on a correspondence list between SNAP and IPCC enclosed in Appendix 2A-3.

The sector codes applied in the reporting activity will be referred to as IPCC sectors. The IPCC sectors define 6 main source categories, listed in Table 6, and a number of subcategories. Stationary combustion is part of the IPCC sector 1, *Energy*. Table 7 presents subsectors in the IPCC energy sector. The table also presents the sector in which the NERI documentation is included. Though industrial combustion is part of the stationary combustion detailed documentation for some of the specific industries is discussed in the industry chapters/reports. Stationary combustion is defined as combustion activities in the SNAP sectors 01-03.

Table 6 IPCC main sectors.

1. Energy
2. Industrial Processes
3. Solvent and Other Product Use
4. Agriculture
5. Land-Use Change and Forestry
6. Waste

Table 7 IPCC source categories for the energy sector.

IPCC id	IPCC sector name	NERI documentation
1	Energy	Stationary combustion, Transport, Fugitive, Industry
1A	Fuel Combustion Activities	Stationary combustion, Transport, Industry
1A1	Energy Industries	Stationary combustion
1A1a	Electricity and Heat Production	Stationary combustion
1A1b	Petroleum Refining	Stationary combustion
1A1c	Solid Fuel Transf./Other Energy Industries	Stationary combustion
1A2	Fuel Combustion Activities/Industry (ISIC)	Stationary combustion, Transport, Industry
1A2a	Iron and Steel	Stationary combustion, Industry
1A2b	Non-Ferrous Metals	Stationary combustion, Industry
1A2c	Chemicals	Stationary combustion, Industry
1A2d	Pulp, Paper and Print	Stationary combustion, Industry
1A2e	Food Processing, Beverages and Tobacco	Stationary combustion, Industry
1A2f	Other (please specify)	Stationary combustion, Transport, Industry
1A3	Transport	Transport
1A3a	Civil Aviation	Transport
1A3b	Road Transportation	Transport
1A3c	Railways	Transport
1A3d	Navigation	Transport
1A3e	Other (please specify)	Transport
1A4	Other Sectors	Stationary combustion, Transport
1A4a	Commercial/Institutional	Stationary combustion
1A4b	Residential	Stationary combustion, Transport
1A4c	Agriculture/Forestry/Fishing	Stationary combustion, Transport
1A5	Other (please specify)	Stationary combustion, Transport
1A5a	Stationary	Stationary combustion
1A5b	Mobile	Transport
1B	Fugitive Emissions from Fuels	Fugitive
1B1	Solid Fuels	Fugitive
1B1a	Coal Mining	Fugitive
1B1a1	Underground Mines	Fugitive
1B1a2	Surface Mines	Fugitive
1B1b	Solid Fuel Transformation	Fugitive
1B1c	Other (please specify)	Fugitive
1B2	Oil and Natural Gas	Fugitive
1B2a	Oil	Fugitive
1B2a2	Production	Fugitive
1B2a3	Transport	Fugitive
1B2a4	Refining/Storage	Fugitive
1B2a5	Distribution of oil products	Fugitive
1B2a6	Other	Fugitive
1B2b	Natural Gas	Fugitive
1B2b1	Production/processing	Fugitive
1B2b2	Transmission/distribution	Fugitive
1B2c	Venting and Flaring	Fugitive
1B2c1	Venting and Flaring Oil	Fugitive
1B2c2	Venting and Flaring Gas	Fugitive
1B2d	Other	Fugitive

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 sources *1A2* and *1A4,* however also include emission from transport subsectors. The emission source *1A2* includes emissions from some off-road machinery in the industry. The emission source *1A4* includes off-road machinery in agriculture, forestry and household/gardening. Further emissions from national fishing are included in subsector *1A4*.

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

The CO_2 from calcination is not part of the energy sector. This emission is included in the IPCC sector 2 Industrial processes.

3.2 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 2005, 75 stationary combustion plants are specified as large point sources. These point sources include:

- Power plants and decentralised CHP plants (combined heat and power plants)
- Municipal 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 or above and a significant fuel consumption
- All waste incineration plants included in the Danish law "Bekendtgørelse om visse listevirksomheders pligt til at udarbejde grønt regnskab”.
- Industrial plants
  - With an installed effect of 50 MW or above and significant fuel consumption.
  - With a significant process related emission.

The fuel consumption of stationary combustion plants registered as large point sources is 341 PJ (2005). This corresponds to 64% of the overall fuel consumption for stationary combustion.

A list of the large point sources for 2005 and the fuel consumption rates is provided in Appendix 2A-8. The number of large point sources registered in the databases increased from 1990 to 2005.

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. Appendix 2A-8 shows which of the emission data for large point sources are plant-specific and which are based on emission factors.

SO_2 and NO_X emissions from large point sources are often plant-specific based on emission measurements. Emissions of CO and NMVOC are also plant-specific for some plants. Plant-specific emission data are obtained from:

- Annual environmental reports
- Annual plant-specific reporting of SO_2 and NO_X from power plants >25MW$_e$ prepared for the Danish Energy Authority due to Danish legislatory requirement
- Emission data reported by Elsam and E2, the two major electricity suppliers
- 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. Emissions of the greenhouse gases (CO_2, CH_4 and N_2O) from the large point sources are all based on the area source emission factors.

3.3 Area sources

Fuels not combusted in large point sources are included as sector 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.

3.4 Activity rates, fuel consumption

The fuel consumption rates are based on the official Danish energy statistics prepared by the Danish Energy Authority. The Danish Energy Authority aggregates fuel consumption rates to SNAP sector categories (DEA 2006a). Some fuel types in the official Danish energy statistics are added to obtain a less detailed fuel aggregation level, see Appendix 2A-

10. The calorific values on which the energy statistics are based are also enclosed in Appendix 2A-10.

The fuel consumption of the IPCC sector *1A2 Manufacturing industries and construction* (corresponding to SNAP sector *03 Combustion in manufacturing industries)* is not disaggregated into specific industries in the NERI emission database. So far disaggregation into specific industries is only estimated for the reportings to the Climate Convention. The disaggregation of fuel consumption and emissions from the industrial sector is discussed in chapter 3.6.

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) is added to the apparent consumption of petroleum coke and the emissions are included in the inventory.

The Danish Energy Authority (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 large point sources specified in the Danish emission database refers to the DEA database (DEA 2006c).

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

Emissions from non-energy use of fuels have not been included in the Danish inventory, to date, but the non-energy use of fuels is, however, included in the reference approach for Climate Convention reporting. The Danish energy statistics include three fuels used for non-energy purposes: Bitumen, white spirit and lube oil. The fuels used for non-energy purposes add up to about 2% of the total fuel consumption in Denmark.

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

Fuel consumption data are presented in Chapter 4.

3.5 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/Corinair Guidebook (EMEP/Corinair 2004) and IPCC Reference Manual (IPCC 1996).

A complete list of emission factors including time-series and references, is provided in Appendix 2A-6.

A considerable part of the emission data for municipal waste incineration plants and large power plants are plant-specific. The area source emission factors do not, therefore, 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 municipal waste incineration plants, implied emission factors have been calculated for these two plant categories. The implied emission factors are presented in Appendix 2A-7. The implied emission factors are calculated as total emission divided by total fuel consumption.

3.5.1 CO_2

The CO_2 emission factors applied for 2005 are presented in Table 8. For municipal waste and natural gas, time-series have been estimated. For all other fuels the same emission factor is applied for 1990-2005.

In reporting for the Climate Convention, the CO_2 emission is aggregated to five fuel types: Solid fuel, Liquid fuel, Gas, Biomass and Other fuels. The correspondence list between the NERI fuel categories and the IPCC fuel categories is also provided in Table 8.

Only emissions from fossil fuels are included in the national total CO_2 emission. The biomass emission factors are also included in the table, because emissions from biomass are reported to the Climate Convention as a memo item.

The CO_2 emission from incineration of municipal waste (94,5 + 17,6 kg/GJ) is divided into two parts: The emission from combustion of the plastic content of the waste, which is included in the national total, and the emission from combustion of the rest of the waste – the biomass part, which is reported as a memo item. In the IPCC reporting, the CO_2 emission from combustion of the plastic content of the waste is reported in the fuel category, *Other fuels*. However, this split is not applied in either fuel consumption or other emissions, because it is only relevant for CO_2. Thus, the full consumption of municipal waste is included in the fuel category, *Biomass,* and the full amount of non-CO_2 emissions from municipal waste combustion is also included in the *Biomass*-category.

The CO_2 emission factors have been confirmed by the two major power plant operators, both directly (Christiansen, 1996 and Andersen, 1996) and indirectly, by applying the NERI emission factors in the annual environmental reports for the large power plants and by accepting use of the NERI factors in Danish legislation.

In just adapted legislation (Law no. 493 2004), operators of large power plants are obliged to verify the applied emission factors, the input from the large power plants has not given reason to change the CO_2 emission factors.

Table 8 CO_2 emission factors 2005.

Fuel	Emission factor		Unit	Reference type	IPCC fuel
	Biomass	Fossil fuel			Category
Coal		95	kg/GJ	Country specific	Solid
Brown coal briquettes		94,6	kg/GJ	IPCC reference manual	Solid
Coke oven coke		108	kg/GJ	IPCC reference manual	Solid
Petroleum coke		92	kg/GJ	Country specific	Liquid
Wood	102		kg/GJ	Corinair	Biomass
Municipal waste	94,5	17,6	kg/GJ	Country specific	Biomass / Other fuels
Straw	102		kg/GJ	Country specific	Biomass
Residual oil		78	kg/GJ	Corinair	Liquid
Gas oil		74	kg/GJ	Corinair	Liquid
Kerosene		72	kg/GJ	Corinair	Liquid
Fish & rape oil	74		kg/GJ	Country specific	Biomass
Orimulsion		80	kg/GJ	Country specific	Liquid
Natural gas		56,96	kg/GJ	Country specific	Gas
LPG		65	kg/GJ	Corinair	Liquid
Refinery gas		56,9	kg/GJ	Country specific	Liquid
Biogas	83,6		kg/GJ	Country specific	Biomass

Coal

The emission factor 95 kg/GJ is based on Fenhann & Kilde 1994. The CO_2 emission factors have been confirmed by the two major power plant operators in 1996 (Christiansen 1996 and Andersen 1996). Elsam reconfirmed the factor in 2001 (Christiansen 2001). The same emission factor is applied for 1990-2005.

Brown coal briquettes

The emission factor 94,6 kg/GJ is based on a default value from the IPCC guidelines assuming full oxidation. The default value in the IPCC guidelines is 25,8 t C/TJ, corresponding to 25,8·(12+2·16)/12 = 94,6 kg CO_2/GJ assuming full oxidation. The same emission factor is applied for 1990-2005.

Coke oven coke

The emission factor 108 kg/GJ is based on a default value from the IPCC guidelines assuming full oxidation. The default value in the IPCC guidelines is 29,5 t C/TJ, corresponding to 29,5·(12+2·16)/12 = 108 kg CO_2/GJ assuming full oxidation. The same emission factor is applied for 1990-2005.

Petroleum coke

The emission factor 92 kg/GJ has been estimated by SK Energy (a former major power plant operator in eastern Denmark) in 1999 based on a fuel analysis carried out by dk-Teknik in 1993 (Bech 1999). The emission factor level was confirmed by a new fuel analysis, which, however, is considered confidential. The same emission factor is applied for 1990-2005.

Wood

The emission factor for wood, 102 kg/GJ, refers to Fenhann & Kilde 1994. The factor is based on the interval stated in a former edition of the EMEP/Corinair Guidebook and the actual value is the default value from the Collector database. The same emission factor is applied for 1990-2005.

Municipal waste

The CO_2 emission from incineration of municipal waste is divided into two parts: The emission from combustion of the plastic content of the waste, which is included in the national total, and the emission from combustion of the rest of the waste – the biomass part, which is reported as a memo item.

The plastic content of waste was estimated to be 6,6 w/w% in 2003 (Hulgaard 2003). The weight share, lower heating values and CO_2 emission factors for different plastic types are estimated by Hulgaard in 2003 (Table 9). The total weight share for plastic and for the various plastic types is assumed to be the same for all years (NERI assumption).

Table 9 Data for plastic waste in Danish municipal waste (Hulgaard 2003)[1)2)].

Plastic type	Mass share of plastic in municipal waste in Denmark		Lower heating value of plastic	Energy content of plastic	CO_2 emission factor for plastic	CO_2 emission factor
	kg plastic/ kg municipal waste	% of plastic	MJ/kg plastic	MJ/kg municipal waste	g/MJ plastic	g/kg municipal waste
PE	0,032	48	41	1,312	72,5	95
PS/EPS	0,02	30	37	0,74	86	64
PVC	0,007	11	18	0,126	79	10
Other (PET, PUR, PC, POM, ABS, PA etc.)	0,007	11	24	0,168	95	16
Total	0,066	100	35,5	2,346	78,7	185

Hulgaard 2003 refers to:
1) TNO report 2000/119, Eco-efficiency of recovery scenarios of plastic packaging, Appendices, July 2001 by P.G. Eggels, A.M.M. Ansems, B.L. van der Ven, for Association of Plastic Manufacturers in Europe
2) Kost, Thomas, Brennstofftechnische Charakterisierung von Haushaltabfällen, Technische Universität Dresden, Eigenverlag des Forums für Abfallwirtschaft und Altlasten e.V., 2001

Based on emission measurements on 5 municipal waste incineration plants (Jørgensen & Johansen, 2003) the total CO_2 emission factor for municipal waste incineration has been determined to be 112,1 kg/GJ. The CO_2 emission from the biomass part is the total CO_2 emission minus the CO_2 emission from the plastic part.

Thus, in 2003 the CO_2 emission factor for the plastic content of waste was estimated to be 185g/kg municipal waste (Table 9). The CO_2 emission per GJ of waste is calculated based on the lower heating values for waste listed in Table 10 (DEA 2005b). It has been assumed that the plastic content in weight per cent is constant, resulting in a decreasing energy per cent since the lower heating value (LHV) is increasing. However, the increasing LHV may be a result of increasing plastic content in the municipal waste. Time-series for the CO_2 emission factor for plastic content in waste are included in Table 10.

Emission data from four waste incineration plants (Jørgensen & Johansen 2003) demonstrate the fraction of the carbon content of the waste not oxidised to be approximately 0,3%. The unoxidised fraction of the carbon content is assumed to originate from the biomass content, and all carbon originating from plastic are assumed to be oxidised.

Table 10 CO_2 emission factor for municipal waste, plastic content and biomass content.

Year	Lower heating value of municipal waste 1) [GJ/Mg]	Plastic content [% of energy]	CO_2 emission factor for plastic 3) [g/kg waste]	CO_2 emission factor for plastic [kg/GJ waste]	CO_2 emission factor for municipal waste, total 2) [kg/GJ waste]	CO_2 emission factor for biomass content of waste [kg/GJ waste]
1990	8,20	28,6	185	22,5	112,1	89,6
1991	8,20	28,6	185	22,5	112,1	89,6
1992	9,00	26,1	185	20,5	112,1	91,6
1993	9,40	25,0	185	19,6	112,1	92,5
1994	9,40	25,0	185	19,6	112,1	92,5
1995	10,00	23,5	185	18,5	112,1	93,6
1996	10,50	22,3	185	17,6	112,1	94,5
1997	10,50	22,3	185	17,6	112,1	94,5
1998	10,50	22,3	185	17,6	112,1	94,5
1999	10,50	22,3	185	17,6	112,1	94,5
2000	10,50	22,3	185	17,6	112,1	94,5
2001	10,50	22,3	185	17,6	112,1	94,5
2002	10,50	22,3	185	17,6	112,1	94,5
2003	10,50	22,3	185	17,6	112,1	94,5
2004	10,50	22,3	185	17,6	112,1	94,5
2005	10,50	22,3	185	17,6	112,1	94,5

1) DEA 2006b

2) Based on data from Jørgensen & Johansen 2003

3) From Table 2A-4

Straw

The emission factor for straw, 102 kg/GJ refers to Fenhann & Kilde 1994. The factor is based on the interval stated in the EMEP/Corinair Guidebook (EMEP/Corinair, 2004) and the actual value is the default value from the Collecter database. The same emission factor is applied for 1990-2005.

Residual oil

The emission factor 78 kg/GJ refers to Fenhann & Kilde 1994. The factor is based on the interval stated in the EMEP/Corinair Guidebook (EMEP/Corinair; 2004). The factor is slightly higher than the IPCC default emission factor for residual fuel oil (77,4 kg/GJ assuming full oxidation). The CO_2 emission factors have been confirmed by the two major power plant operators in 1996 (Christiansen 1996 and Andersen 1996). The same emission factor is applied for 1990-2005.

Gas oil

The emission factor 74 kg/GJ refers to Fenhann & Kilde 1994. The factor is based on the interval stated in the EMEP/Corinair Guidebook (EMEP/Corinair, 2004). The factor agrees with the IPCC default emission factor for gas oil (74,1 kg/GJ assuming full oxidation). The CO_2 emission factors have been confirmed by the two major power plant operators in 1996 (Christiansen 1996 and Andersen 1996). The same emission factor is applied for 1990-2005.

Kerosene

The emission factor 72 kg/GJ refers to Fenhann & Kilde 1994. The factor agrees with the IPCC default emission factor for other kerosene (71,9 kg/GJ assuming full oxidation). The same emission factor is applied for 1990-2005.

Fish & rape oil

The emission factor is assumed to be the same as for gas oil – 74 kg/GJ. The consumption of fish and rape oil is relatively low.

Orimulsion

The emission factor 80 kg/GJ refers to the Danish Energy Authority (DEA 2004). The IPCC default emission factor is almost the same: 80,7 kg/GJ assuming full oxidation. The CO_2 emission factors have been confirmed by the only major power plant operator using orimulsion (Andersen 1996). The same emission factor is applied for 1990-2005.

Natural gas

The 2005 emission factor for natural gas is estimated by the Danish gas transmission company, Energinet.dk. The calculation is based on gas analysis carried out daily by Energinet.dk. Only natural gas from the Danish gas fields is utilised in Denmark. The emission factors for 2000-2004 have been estimated the same way by the former gas transmission companies DONG and Gastra. For 2000-2002 the Danish Gas Technology Centre have calculated emission factors based on the gas analysis, after that Gastra and now Energinet.dk have publish the CO_2 emission factors on their home page.

The emission factor applied for 1990-1999 refers to Fenhann & Kilde 1994. This emission factor was confirmed by the two major power plant operators in 1996 (Christiansen 1996 and Andersen 1996). Time-series for the CO_2 emission factors is provided in Table 11.

Table 11 CO_2 emission factor for natural gas.

Year	CO_2 emission factor
1990-1999	56,9 kg/GJ
2000	57,1 kg/GJ
2001	57,25 kg/GJ
2002	57,28 kg/GJ
2003	57,19 kg/GJ
2004	57,12 kg/GJ
2005	56,96 kg/GJ

LPG

The emission factor 65 kg/GJ refers to Fenhann & Kilde 1994. The emission factor is based on the EMEP/Corinair Guidebook (EMEP/Corinair, 2004). The emission factor is somewhat higher than the IPCC default emission factor (63 kg/GJ assuming full oxidation). The same emission factor is applied for 1990-2005.

Refinery gas

The emission factor applied for refinery gas is the same as the emission factor for natural gas 1990-1999. The emission factor is within the interval of the emission factor for refinery gas stated in the EMEP/Corinair

Guidebook (EMEP/Corinair, 2004). The same emission factor is applied for 1990-2005.

Biogas

The emission factor 83,6 kg/GJ is based on a biogas with 65% (vol.) CH_4 and 35% (vol.) CO_2. Danish Gas Technology Centre has stated that this is a typical manure-based biogas as utilised in stationary combustion plants (Kristensen 2001). The same emission factor is applied for 1990-2005.

3.5.2 CH_4

The CH_4 emission factors applied for 2005 are presented in Table 12. In general, the same emission factors have been applied for 1990-2005. However, time-series have been estimated for both natural gas fuelled engines and biogas fuelled engines.

Emission factors for gas engines, gas turbines and CHP plants combusting wood, straw or municipal waste all refer to emission measurements carried out on Danish plants (Nielsen & Illerup 2003). Other emission factors refer to the EMEP/Corinair Guidebook (EMEP/Corinair, 2004).

Gas engines, combusting natural gas or biogas, contribute much more to the total CH_4 emission than other stationary combustion plants. The relatively high emission factor for gas engines is well-documented and further discussed below.

Table 12 CH_4 emission factors 1990-2005.

Fuel	ipcc_id	SNAP_id	Emission factor [g/GJ]	Reference
COAL	1A1a	010101, 010102, 010103	1.5	EMEP/Corinair 2004
COAL	1A1a, 1A2f, 1A4b, 1A4c	010202, 010203, 0301, 0202, 0203	15	EMEP/Corinair 2004
BROWN COAL BRI.	all	all	15	EMEP/Corinair 2004, assuming same emission factor as for coal
COKE OVEN COKE	all	all	15	EMEP/Corinair 2004, assuming same emission factor as for coal
PETROLEUM COKE	all	all	15	EMEP/Corinair 2004
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	2	Nielsen & Illerup 2003
WOOD AND SIMIL.	1A4a, 1A4b, 1A4c	0201, 0202, 0203	200	EMEP/Corinair 2004
WOOD AND SIMIL.	1A1a, 1A2f	010105, 010202, 010203, 0301, 030102, 030103	32	EMEP/Corinair 2004
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	0.59	Nielsen & Illerup 2003
MUNICIP. WASTES	1A1a, 1A2f, 1A4a	all other	6	EMEP/Corinair 2004
STRAW	1A1a	010102, 010103	0.5	Nielsen & Illerup 2003
STRAW	1A1a, 1A2f, 1A4c	010202, 010203, 020302, 030105	32	EMEP/Corinair 2004
STRAW	1A4b, 1A4c	0202, 0203	200	EMEP/Corinair 2004
RESIDUAL OIL	all	all	3	EMEP/Corinair 2004
GAS OIL	all	all	1.5	EMEP/Corinair 2004
KEROSENE	all	all	7	EMEP/Corinair 2004
FISH & RAPE OIL	all	all	1.5	EMEP/Corinair 2004, assuming same emission factor as gas oil
ORIMULSION	1A1a	010101	3	EMEP/Corinair 2004, assuming same emission factor as residual oil
NATURAL GAS	1A1a	0101, 010101, 010102, 010202	6	DGC 2001
NATURAL GAS	1A1a	010103, 010203	15	Gruijthuijsen & Jensen 2000
NATURAL GAS	1A1a, 1Ac, 1A2f, 1A4a, 1A4c	Gas turbines: 010104, 010504, 030104, 020104, 020303	1.5	Nielsen & Illerup 2003
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	Gas engines: 010105, 010205, 010505, 030105, 020105, 020204, 020304	1) 520	Nielsen & Illerup 2003
NATURAL GAS	1A1c, 1A2f, 1A4a, 1A4b, 1A4c	010502, 0301, 0201, 0202, 0203	6	DGC 2001
NATURAL GAS	1A2f, 1A4a, 1A4b	030103, 030106, 020103, 020202	15	Gruijthuijsen & Jensen 2000
LPG	all	all	1	EMEP/Corinair 2004
REFINERY GAS	1A1b	010304	1.5	EMEP/Corinair 2004
BIOGAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas engines: 010105, 010505, 030105, 020105, 020304	1) 323	Nielsen & Illerup 2003
BIOGAS	1A1a, 1A2f, 1A4a, 1A4c	all other	4	EMEP/Corinair 2004

1) 2005 emission factor. Time-series is shown below

CHP plants

A considerable portion of the electricity production in Denmark is based on decentralised CHP plants, and well-documented emission factors for these plants are, therefore, of importance. In a project carried out for the electricity transmission company in Western Denmark, Eltra, emission factors for CHP plants <25MW$_e$ have been estimated (Nielsen & Illerup 2003).

The work included municipal waste incineration plants, CHP plants combusting wood and straw, natural gas and biogas-fuelled (reciprocating) engines, and natural gas fuelled gas turbines. CH_4 emission factors for these plants all refer to Nielsen & Illerup 2003. The estimated emission factors were based on existing emission measurements as well as on emission measurements carried out within the project. The number of emission data sets was comprehensive. Emission factors for subgroups of each plant type were estimated, e.g. the CH_4 emission factor for different gas engine types has been determined.

Gas engines, natural gas

SNAP 010105, 010205, 010505, 030105, 020105, 020204 and 020304

The emission factor for natural gas engines was determined as 520 g/GJ in 2000 and the same emission factor has been applied for 2001 - 2005. The emission factor for natural gas engines was based on 291 emission measurements on 114 different plants. The plants from which emission measurements were available represented 44% of the total gas consumption in gas engines (year 2000). The emission factor was estimated based on fuel consumption of each gas engine type and the emission factor for each engine type. The majority of emission measurements that were not performed within the project related solely to emission of total unburned hydrocarbon (CH_4 + NMVOC). A constant disaggregation factor was estimated based on a number of emission measurements including both CH_4 and NMVOC.

The emission factor for lean-burn gas engines is relatively high, especially for prechamber engines, which account for more than half the gas consumption in Danish gas engines. However, the emission factors for different prechamber engine types differ considerably.

The installation of natural gas engines in decentralised CHP plants in Denmark has taken place since 1990. The first engines installed were relatively small open-chamber engines and in later years mainly prechamber engines were installed. As mentioned above, prechamber engines have a higher emission factor than open-chamber engines; therefore, the emission factor has changed during the period 1990-2005. A time-series for the emission factor has been estimated and is presented below (Nielsen & Illerup 2003). The time-series was based on:

- Emission factors for different engine types
- Data for year of installation for each engine and fuel consumption of each engine 1994-2002 from the Danish Energy Authority (DEA 2003)
- Research concerning the CH_4 emission from gas engines carried out in 1997 (Nielsen & Wit 1997)

Table 13 Time-series for the CH_4 emission factor for natural gas fuelled engines.

Year	Emission factor [g/GJ]
1990	257
1991	299
1992	347
1993	545
1994	604
1995	612
1996	596
1997	534
1998	525
1999	524
2000	520
2001	520
2002	520
2003	520
2004	520
2005	520

As mentioned in the chapter Future Improvements new emission factors will be estimated in 2007 and applied in the 2008 reporting.

Gas engines, biogas
SNAP 010105, 010505, 020105, 020304 and 030105

The emission factor for biogas engines was estimated to 323 g/GJ in 2000 and the same emission factor has been applied for 2001 - 2005. The emission factor for biogas engines was based on 18 emission measurements on 13 different plants. The plants from which emission measurements were available represented 18% of the total gas consumption in gas engines (year 2000).

The emission factor is lower than the factor for natural gas, mainly because most engines are lean-burn open-chamber engines - not prechamber engines. A time-series for the emission factor has been estimated (Nielsen & Illerup 2003).

Table 14 Time-series for the CH_4 emission factor for biogas fuelled engines.

Year	Emission factor [g/GJ]
1990	239
1991	251
1992	264
1993	276
1994	289
1995	301
1996	305
1997	310
1998	314
1999	318
2000	323
2001	323
2002	323
2003	323
2004	323
2005	323

Gas turbines, natural gas
SNAP 010104, 010504, 020104, 020303 and 030104

The emission factor for gas turbines was estimated to be below 1,5g/GJ and the emission factor 1,5 g/GJ has been applied for all years. The emission factor was based on emission measurements on 9 plants.

CHP, wood
SNAP 010102 and, 010103 and 010104

The emission factor for CHP plants combusting wood was estimated to be below 2,1 g/GJ and the emission factor 2 g/GJ has been applied for all years. The emission factor was based on emission measurements on 3 plants.

CHP, straw
SNAP 010102 and 010103

The emission factor for CHP plants combusting straw was estimated to be below 0,5 g/GJ and the emission factor 0,5 g/GJ has been applied for all years. The emission factor was based on emission measurements on 4 plants.

CHP, municipal waste
SNAP 010102, 010103, 010104 and 010105

The emission factor for CHP plants combusting municipal waste was estimated to be below 0,59 g/GJ and the emission factor 0,59 g/GJ has been applied for all years. The emission factor was based on emission measurements on 16 plants.

Other stationary combustion plants
Emission factors for other plants refer to the EMEP/Corinair Guidebook (EMEP/Corinair 2004), the Danish Gas Technology Centre (DGC 2001)

or Gruijthuijsen & Jensen 2000. The same emission factors are applied for 1990-2005.

3.5.3 N_2O

The N_2O emission factors applied for the 2005 inventory are listed in Table 15. The same emission factors have been applied for 1990-2005.

Emission factors for gas engines, gas turbines and CHP plants combusting wood, straw or municipal waste all refer to emission measurements carried out on Danish plants (Nielsen & Illerup 2003). For Coal powered plants in the Public power sector research conducted by Elsam has led to a new emission factor being implemented for the entire time series. Other emission factors refer to the EMEP/Corinair Guidebook (EMEP/Corinair 2004).

Table 15 N_2O emission factors 1990-2005.

Fuel	ipcc_id	SNAP_id	Emission factor [g/GJ]	Reference
COAL	1A1a	0101**	0.8	Elsam 2005
COAL	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	All except 0101**	3	EMEP/Corinair 2004
BROWN COAL BRI.	all	all	3	EMEP/Corinair 2004
COKE OVEN COKE	all	all	3	EMEP/Corinair 2004
PETROLEUM COKE	all	all	3	EMEP/Corinair 2004
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	0.8	Nielsen & Illerup 2003
WOOD AND SIMIL.	1A1a	010105, 010202, 010203	4	EMEP/Corinair 2004
WOOD AND SIMIL.	1A2f, 1A4a, 1A4b, 1A4c	all	4	EMEP/Corinair 2004
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	1.2	Nielsen & Illerup 2003
MUNICIP. WASTES	1A1a	010203	4	EMEP/Corinair 2004
MUNICIP. WASTES	1A2f, 1A4a	030102, 0201, 020103	4	EMEP/Corinair 2004
STRAW	1A1a	010102, 010103	1.4	Nielsen & Illerup 2003
STRAW	1A1a	010202, 010203	4	EMEP/Corinair 2004
STRAW	1A2f, 1A4b, 1A4c	all	4	EMEP/Corinair 2004
RESIDUAL OIL	all	all	2	EMEP/Corinair 2004
GAS OIL	all	all	2	EMEP/Corinair 2004
KEROSENE	all	all	2	EMEP/Corinair 2004
FISH & RAPE OIL	all	all	2	EMEP/Corinair 2004, assuming same emission factor as gas oil
ORIMULSION	1A1a	010101	2	EMEP/Corinair 2004, assuming same emission factor as residual oil
NATURAL GAS	1A1a	0101, 010101, 010102, 010103, 010202, 010203	1	EMEP/Corinair 2004
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas turbines: 010104, 010504, 030104, 020104, 020303	2.2	Nielsen & Illerup 2003
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	Gas engines: 010105, 010205, 010505, 030105, 020105, 020204, 020304	1.3	Nielsen & Illerup 2003
NATURAL GAS	1A1c, 1A2f, 1A4a, 1A4b, 1A4c	010502, 0301, 030103, 030106, 0201, 020103, 0202, 020202, 0203	1	EMEP/Corinair 2004
LPG	all	all	2	EMEP/Corinair 2004
REFINERY GAS	all	all	2.2	EMEP/Corinair 2004
BIOGAS	1A1a	010102, 010103, 010203	2	EMEP/Corinair 2004
BIOGAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas engines: 010105, 010505, 030105, 020105, 020304	0.5	Nielsen & Illerup 2003
BIOGAS	1A2f, 1A4a, 1A4c	0301, 030102, 0201, 020103, 0203	2	EMEP/Corinair 2004

3.5.4 SO_2, NO_X, NMVOC and CO

Emission factors for SO_2, NO_X, NMVOC and CO are listed in Appendix 2A-6. The appendix includes references and time-series.

The emission factors refer to:

- The EMEP/Corinair Guidebook (EMEP/Corinair 2004)
- The IPCC Guidelines, Reference Manual (IPCC 1996)
- Danish legislation:
  - Miljøstyrelsen 2001 (Danish Environmental Protection Agency)
  - Miljøstyrelsen 1990 (Danish Environmental Protection Agency)
  - Miljøstyrelsen 1998 (Danish Environmental Protection Agency)
- Danish research reports including:
  - An emission measurement program for decentralised CHP plants (Nielsen & Illerup 2003)
  - Research and emission measurements programs for biomass fuels:
    - Nikolaisen et al., 1998
    - Jensen & Nielsen, 1990
    - Dyrnum et al., 1990
    - Hansen et al., 1994
    - Serup et al., 1999
  - Research and environmental data from the gas sector:
    - Gruijthuijsen & Jensen 2000
    - Danish Gas Technology Centre 2001
- Calculations based on plant-specific emissions from a considerable number of power plants (Nielsen 2003).
- Calculations based on plant-specific emission data from a considerable number of municipal 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.
- Additional personal communication.

Emission factor time-series have been estimated for a considerable number of the emission factors. These are provided in Appendix 2A-6.

A detailed documentation for the SO_2 and NO_X emission factors is given in Appendix 2A-4.

3.5.5 Particulate matter (PM)

Emission factors for PM are listed in Appendix 2A-6. The appendix includes references. The emission factors are based on:

- The TNO/CEPMEIP emission factor database (TNO CEPMEIP 2001),
- A Nordic project where improved emission factors for residential wood combustion have been estimated (Sternhufvud et al. 2004))

and a considerable number of country-specific factors (Nielsen et al. 2003) referring to:

- Danish legislation:
  - Miljøstyrelsen 2001 (Danish Environmental Protection Agency).
  - Miljøstyrelsen 1990 (Danish Environmental Protection Agency).

- Calculations based on plant-specific emission data from a considerable number of municipal waste incineration plants.
- Danish research reports including:
  - An emission measurement program for decentralised CHP plants (Nielsen & Illerup 2003).
  - An emission measurement program for large power plants (Livbjerg et al. 2001).
  - Additional personal communication concerning wood and straw combustion in residential plants.

Emission factor time series have been estimated for residential wood combustion. All other emission factors are considered constant in 2000-2005.

3.5.6 Heavy metals

Emission factors for 2005 for heavy metals (HM) are presented in Appendix 2A-6. The appendix includes references and time-series. The emission factors refer to:

- Research concerning heavy metal emission factors representative for Denmark (Illerup et al. 1999).
- Emission measurement program carried out on Danish decentralised CHP plants (Nielsen & Illerup 2003).

Time-series have been estimated for municipal waste incineration. For all other sources the same emission factors have been applied for 1990-2005.

3.5.7 PAH

Emission factors 2005 for PAHs are shown in Appendix 2A-6. 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).
- An emission measurement program carried out on Danish decentralised CHP plants (Nielsen & Illerup 2003).
- Additional information from the gas sector and the electricity production sector (Sander 2003 and Jensen 2001).

Emission factor time series have been estimated for residential wood combustion. All other emission factors are considered constant in 2000-2005. In general, emission factors for PAH are uncertain.

3.6 Disaggregation to specific industrial subsectors

The national statistics, on which the emission inventories are based, does not include a direct disaggregation to specific industrial subsectors. However, separate national statistics from Statistics Denmark includes a disaggregation to industrial subsectors. This part of the energy statistics is also included in the official energy statistics from the Danish Energy Authority.

Every other year Statistics Denmark collects fuel consumption data for all industrial companies of a considerable size. The deviation between the total fuel consumption from the Danish Energy Authority and the data collected by Statistics Denmark is rather small. Thus the disaggregation to industrial subsectors available from Statistics Denmark can be applied for estimating disaggregation keys for fuel consumption and emissions.

The industrial fuel consumption is considered in three aspects:

- Fuel consumption for transport. This part of the fuel consumption is not disaggregated to subsectors.
- Fuel consumption applied in power or district heating plants. Disaggregation of fuel and emissions is plant specific.
- Fuel consumption for other purposes. The total fuel comsumption and the total emissions are disaggregated to subsectors.

4 Fuel consumption data

In 2005 total fuel consumption for stationary combustion plants was 531 PJ of which 424 PJ was fossil fuels. The fuel consumption rates are shown in Appendix 2A-5.

Fuel consumption distributed on the stationary combustion subsectors is shown in Figure 1 and Figure 2. The majority - 57% - of all fuels is combusted in the sector, *Public electricity and heat production.* Other sectors with high fuel consumption are *Residential* and *Industry*. The energy consumption in category 1A1c is mainly natural gas used in gas turbines in the off-shore industry.

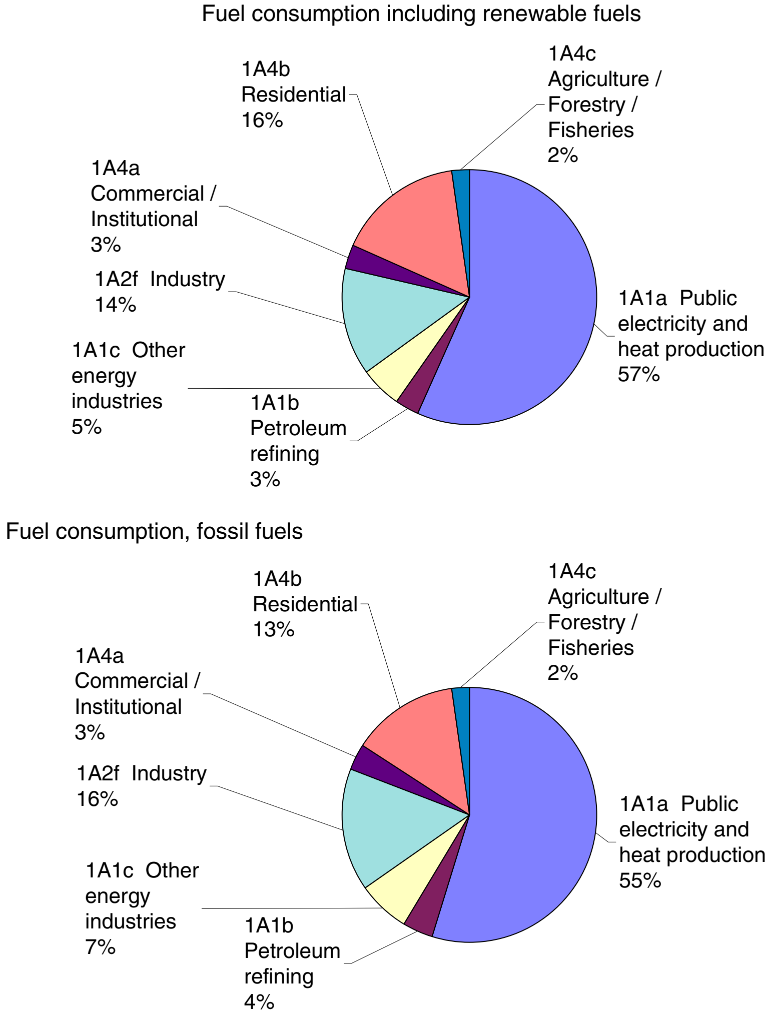


Figure 1 Fuel consumption rate of stationary combustion, 2005 (based on DEA 2006a).

Coal and natural gas 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 CHP plants, as well as in industry, district heating and households.

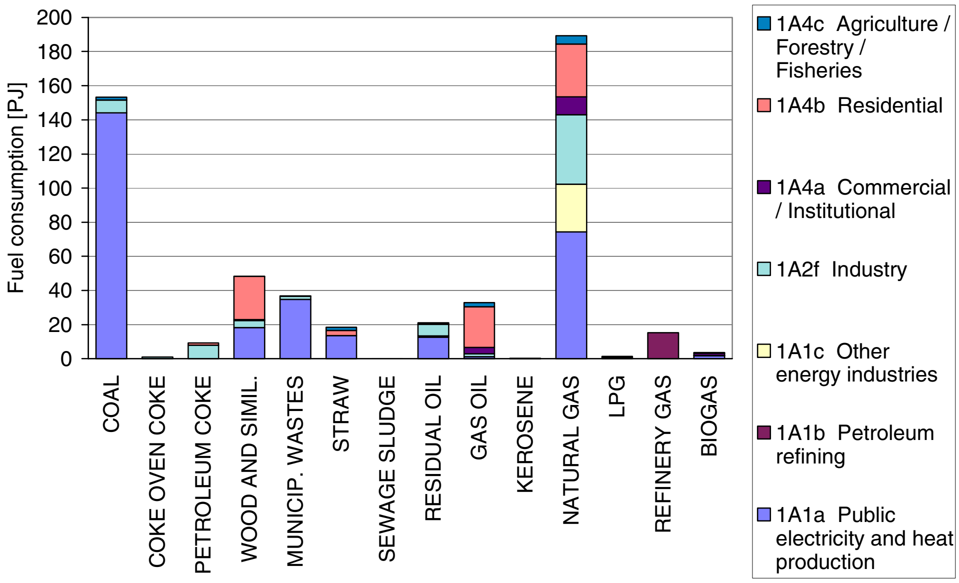


Figure 2 Fuel consumption of stationary combustion plants 2005 (based on DEA 2006a).

Fuel consumption time-series for stationary combustion plants are presented in Figure 3. The total fuel consumption has increased by 6.6% from 1990 to 2005, while the fossil fuel consumption decreased by 4.9%. The consumption of natural gas and renewable fuels has increased since 1990 whereas coal consumption has decreased.

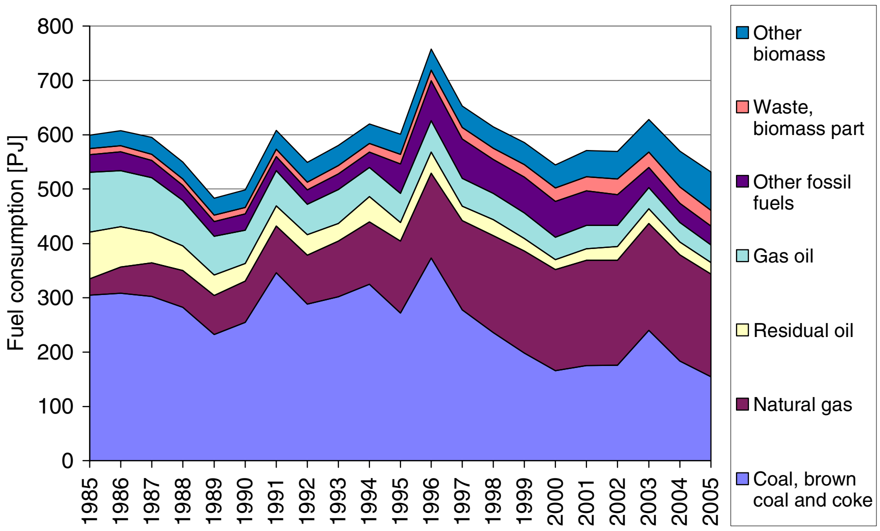


Figure 3 Fuel consumption time-series, stationary combustion (based on DEA 2006a).

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 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 2005 the net electricity import was 4932 TJ in previous years there had been a net export. The electricity import in 2005 is a result of high rainfall in Norway and Sweden causing large 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 Authority produces a correction of the actual fuel consumption without random variations in electricity imports/exports and ambient temperature. This fuel consumption trend is also illustrated in Figure 4. The corrections are included here to explain the fluctuations in the emission time-series.

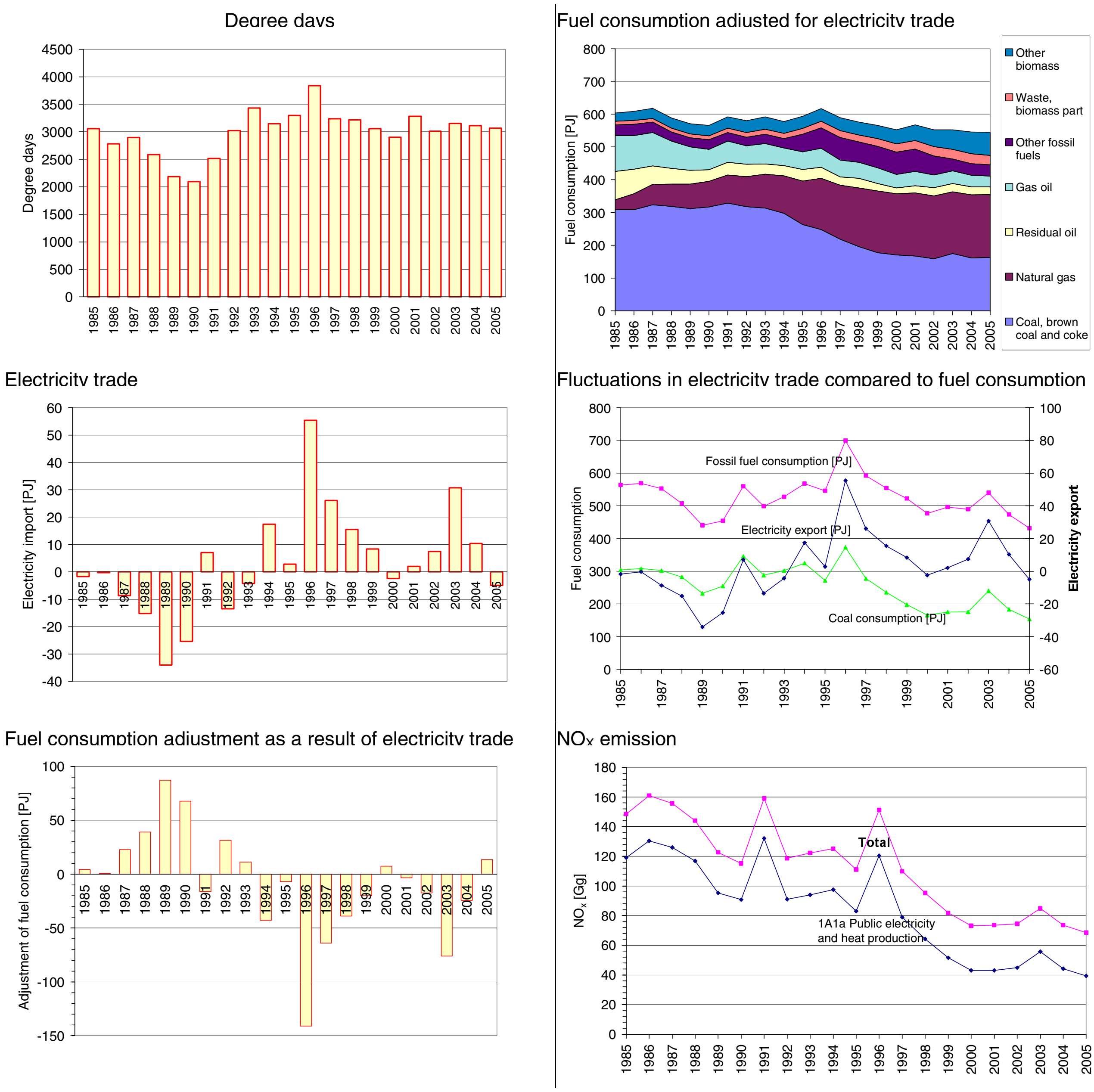


Figure 4 Comparison of time-series fluctuations for electricity trade, fuel consumption and NO_X emission (DEA 2006b).

5 Greenhouse gas emission

The total Danish greenhouse gas (GHG) emission in the year 2005 was 63947 Gg CO_2 equivalent not including land-use change and forestry or 62494 Gg CO_2 equivalent including land-use change and forestry. The greenhouse gas pollutants HFCs, PFCs and SF_6 are not emitted from combustion plants and, as such, only the pollutants CO_2, CH_4 and N_2O are considered below.

The global warming potentials of CH_4 and N_2O applied in greenhouse gas inventories refer to the second IPCC assessment report (IPCC 1995):

- 1 g CH_4 equals 21 g CO_2
- 1 g N_2O equals 310 g CO_2

The GHG emissions from stationary combustion are listed in Table 16. The emission from stationary combustion accounts for 52% of the total Danish GHG emission.

The CO_2 emission from stationary combustion plants accounts for 64% of the total Danish CO_2 emission (not including land-use change and forestry). CH_4 accounts for 9% of the total Danish CH_4 emission and N_2O for only 4% of the total Danish N_2O emission.

Table 16 Greenhouse gas emission for the year 2005 [1].

	CO_2	CH_4	N_2O
	Gg CO_2 equivalent		
1A1 Fuel consumption, Energy industries	22130	292	142
1A2 Fuel consumption, Manufacturing Industries and Construction[1]	4621	27	43
1A4 Fuel consumption, Other sectors [1]	5306	196	77
Total emission from stationary combustion plants	32058	515	262
Total Danish emission (gross)	50426	5636	7044
	%		
Emission share for stationary combustion	64	9	4

1) Only stationary combustion sources of the sector is included

CO_2 is the most important GHG pollutant and accounts for 97,7% of the GHG emission (CO_2 eq.). This is a much higher share than for the total Danish GHG emissions where CO_2 only accounts for 81% of the GHG emission (CO_2 eq.).

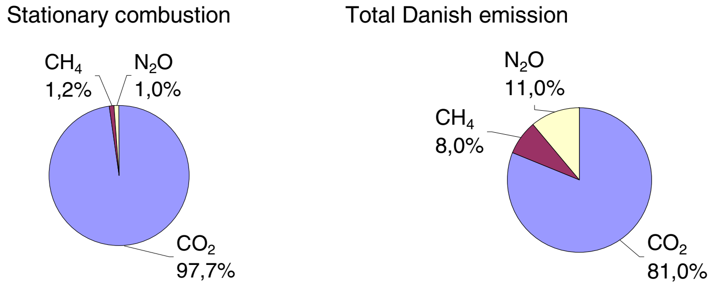


Figure 5 GHG emission (CO_2 equivalent), contribution from each pollutant.

Figure 6 depicts the time-series of GHG emission (CO_2 eq.) from stationary combustion and it can be seen that the GHG emission development follows the CO_2 emission development very closely. Both the CO_2 and the total GHG emission is lower in 2005 than in 1990, CO_2 by 15% and GHG by 14%. However, fluctuations in the GHG emission level are large.

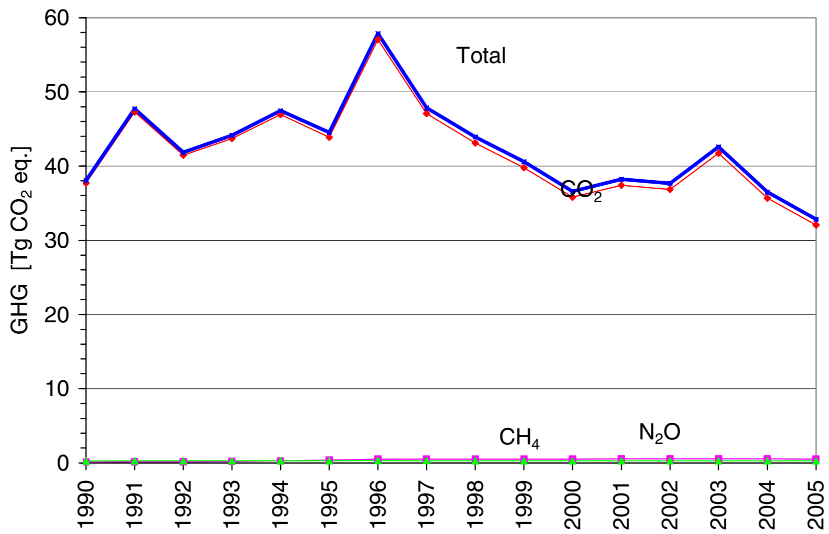


Figure 6 GHG emission time-series for stationary combustion.

The fluctuations in the time-series are mainly a result of electricity import/export activity, but also of outdoor temperature variations from year to year. The fluctuations follow the fluctuations in fuel consumption discussed in Chapter 4.

Figure 7 shows the corresponding time-series for degree days, electricity trade and CO_2 emission. As mentioned in Chapter 4, the Danish Energy Authority estimates a correction of the actual emissions without random variations in electricity imports/exports and in ambient temperature. This emission trend, which is smoothly decreasing, is also illustrated in Figure 7. The corrections are included here to explain the fluctuations in the emission time-series. The GHG emission corrected for electricity import/export and ambient temperature has decreased by 23% since 1990, and the CO_2 emission by 25%.

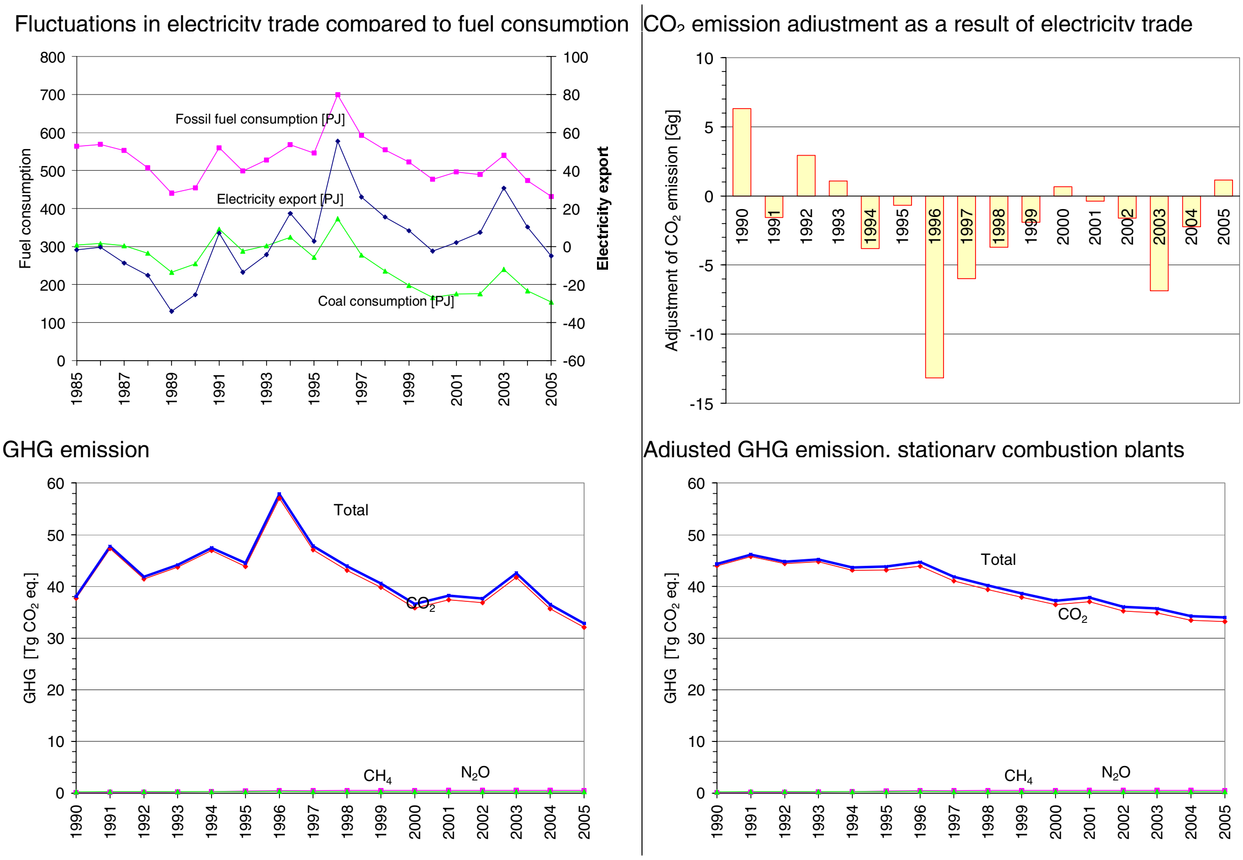


Figure 7 GHG emission time-series for stationary combustion, adjusted for electricity import/export (DEA 2006b).

5.1 CO_2

The CO_2 emission from stationary combustion plants is one of the most important GHG emission sources. Thus the CO_2 emission from stationary combustion plants accounts for 64% of the total Danish CO_2 emission. Table 17 lists the CO_2 emission inventory for stationary combustion plants for 2005. Figure 8 reveals that *Electricity and heat production* accounts for 61% of the CO_2 emission from stationary combustion. This share is somewhat higher than the fossil fuel consumption share for this sector, which is 55% (Figure 1). Other large CO_2 emission sources are industrial plants and residential plants. These are the sectors, which also account for a considerable share of fuel consumption.

Table 17 CO_2 emission from stationary combustion plants 2005 1)

CO_2	2005	
1A1a Public electricity and heat production	19606	Gg
1A1b Petroleum refining	932	Gg
1A1c Other energy industries	1593	Gg
1A2 Industry	4621	Gg
1A4a Commercial / Institutional	911	Gg
1A4b Residential	3712	Gg
1A4c Agriculture / Forestry / Fisheries	683	Gg
Total	32058	Gg

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

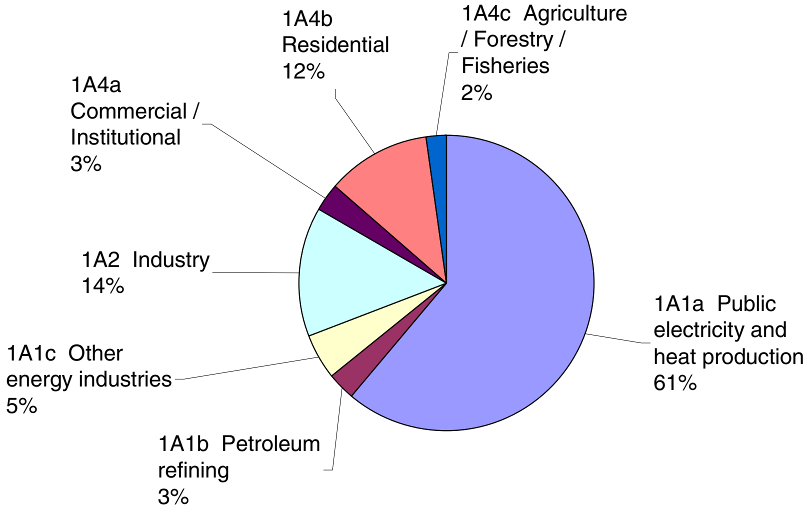


Figure 8 CO_2 emission sources, stationary combustion plants, 2005.

The sector *Electricity and heat production* consists of the SNAP source sectors: *Public power* and *District heating*. The CO_2 emissions from each of these subsectors are listed in Table 18. The most important subsector is power plant boilers >300MW.

Table 18 CO_2 emission from subsectors to *1A1a Electricity and heat production*.

SNAP source	SNAP name	2005	
0101	Public power	-	Gg
010101	Combustion plants ≥ 300MW (boilers)	14820	Gg
010102	Combustion plants ≥ 50MW and < 300 MW (boilers)	949	Gg
010103	Combustion plants <50 MW (boilers)	176	Gg
010104	Gas turbines	2039	Gg
010105	Stationary engines	1344	Gg
0102	District heating plants	-	Gg
010201	Combustion plants ≥ 300MW (boilers)	4	Gg
010202	Combustion plants ≥ 50MW and < 300 MW (boilers)	34	Gg
010203	Combustion plants <50 MW (boilers)	208	Gg
010204	Gas turbines	-	Gg
010205	Stationary engines	32	Gg

CO_2 emission from combustion of biomass fuels is not included in the total CO_2 emission data, because biomass fuels are considered CO_2 neutral. The CO_2 emission from biomass combustion is reported as a memo item in Climate Convention reporting. In 2005 the CO_2 emission from biomass combustion was 10615 Gg.

In Figure 9 the fuel consumption share (fossil fuels) is compared to the CO_2 emission share disaggregated to fuel origin. Due to the higher CO_2 emission factor for coal than oil and gas, the CO_2 emission share from coal combustion is higher than the fuel consumption share. Coal accounts for 35% of the fossil fuel consumption and for 45% of the CO_2 emission. Natural gas accounts for 44% of the fossil fuel consumption but only 34% of the CO_2 emission.

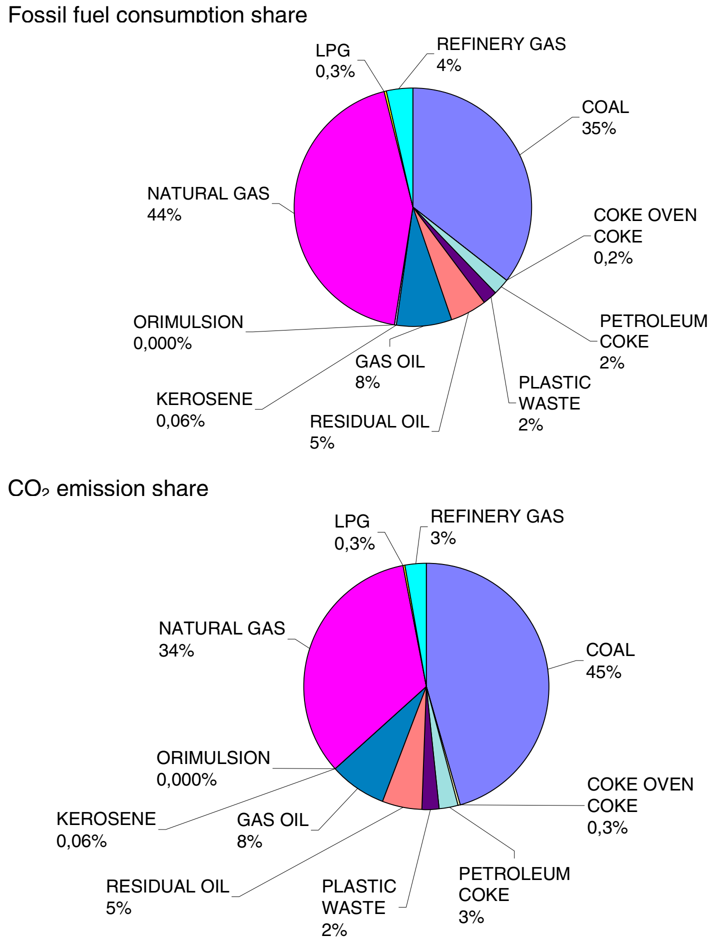


Figure 9 CO_2 emission, fuel origin.

Time-series for CO_2 emission are provided in Figure 10. Despite an increase in fuel consumption of 6.6% since 1990 CO_2 emission from stationary combustion has decreased by 15% because of the change of fuel type used.

The fluctuations in total CO_2 emission follow the fluctuations in CO_2 emission from *Electricity and heat production* (Figure 10) and in coal consumption (Figure 11). The fluctuations are a result of electricity import/export activity as discussed in Chapter 5.

Figure 11 compares time-series for fossil fuel consumption and the CO_2 emission. As mentioned above, the consumption of coal has decreased whereas the consumption of natural gas, with a lower CO_2 emission factor, has increased. Total fossil fuel use decreased by 4.9% between 1990 and 2005.

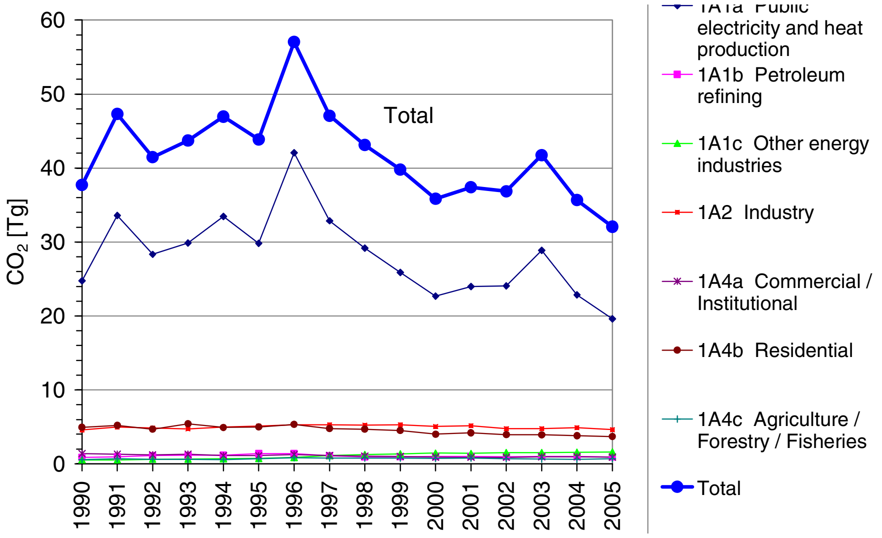
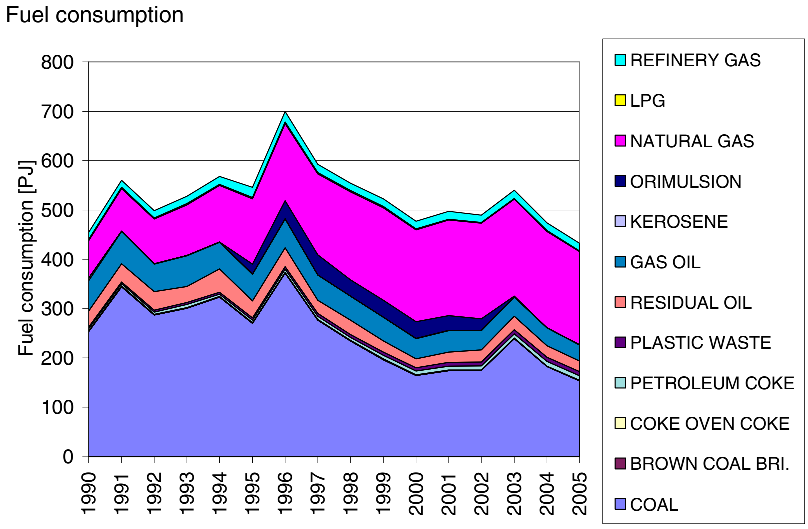


Figure 10 CO_2 emission time-series for stationary combustion plants.



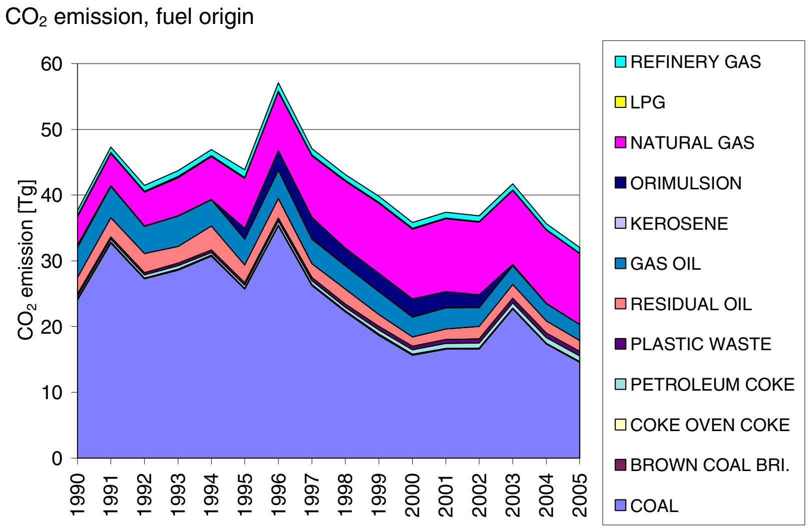


Figure 11 Fossil fuel consumption and CO_2 emission time-series for stationary combustion.

5.2 CH_4

CH_4 emission from stationary combustion plants accounts for 9% of the total Danish CH_4 emission. Table 19 lists the CH_4 emission inventory for stationary combustion plants in 2005. Figure 12 reveals that *Electricity and heat production* accounts for 57% of the CH_4 emission from stationary combustion, this being closely aligned with fuel consumption share.

Table 19 CH_4 emission from stationary combustion plants 2005 [1)].

CH_4	2005	
1A1a Public electricity and heat production	13842	Mg
1A1b Petroleum refining	2	Mg
1A1c Other energy industries	80	Mg
1A2 Industry	1280	Mg
1A4a Commercial / Institutional	834	Mg
1A4b Residential	6603	Mg
1A4c Agriculture / Forestry / Fisheries	1885	Mg
Total	24527	Mg

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

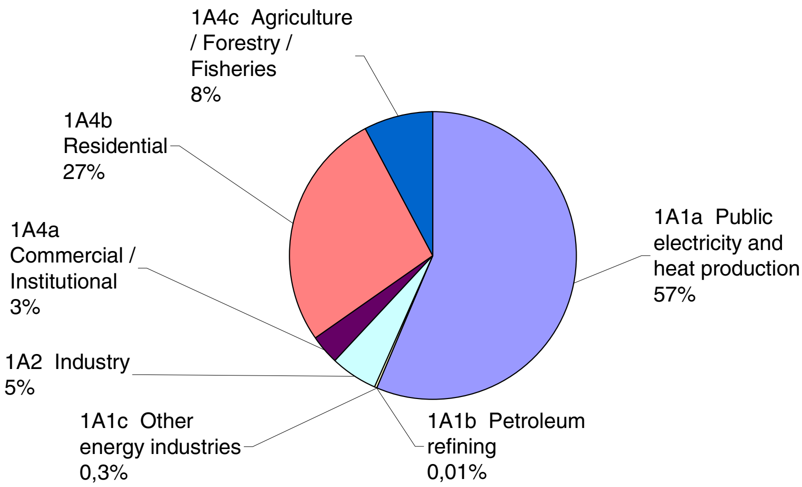


Figure 12 CH_4 emission sources, stationary combustion plants, 2005.

The CH_4 emission factor for reciprocating gas engines is much higher than for other combustion plants due to the continuous ignition/burn-out of the gas. Lean-burn gas engines have an especially high emission factor as discussed in Chapter 3.5.2. A considerable number of lean-burn gas engines are in operation in Denmark and these plants account for 67% of the CH_4 emission from stationary combustion plants (Figure 13). The engines are installed in CHP plants and the fuel used is either natural gas or biogas.

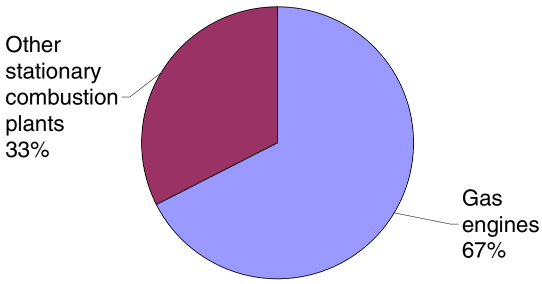


Figure 13 Gas engine CH_4 emission share, 2005.

The CH_4 emission from stationary combustion increased by a factor of 4.2 since 1990 (Figure 14). This results from the considerable number of lean-burn gas engines installed in CHP plants in Denmark in this period. Figure 15 provides time-series for the fuel consumption rate in gas engines and the corresponding increase of CH_4 emission.

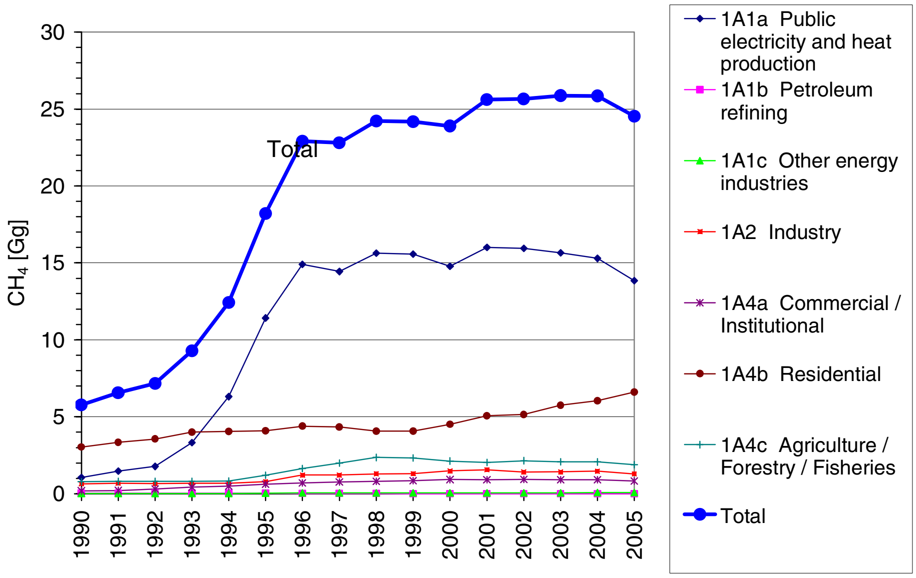


Figure 14 CH_4 emission time-series for stationary combustion plants.

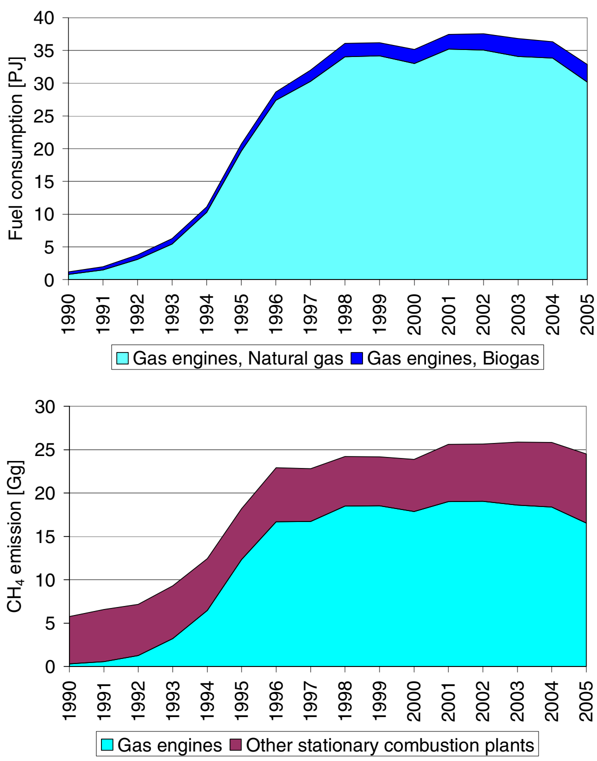


Figure 15 Fuel consumption and CH_4 emission from gas engines, time-series.

5.3 N_2O

The N_2O emission from stationary combustion plants accounts for 4% of the total Danish N_2O emission. Table 20 lists the N_2O emission inventory for stationary combustion plants in the year 2005. Figure 16 reveals that *Electricity and heat production* accounts for 43% of the N_2O emission from stationary combustion.

Table 20 N_2O emission from stationary combustion plants 2005 [1)].

N_2O	2005	
1A1a Public electricity and heat production	364	Mg
1A1b Petroleum refining	33	Mg
1A1c Other energy industries	61	Mg
1A2 Industry	140	Mg
1A4a Commercial / Institutional	24	Mg
1A4b Residential	197	Mg
1A4c Agriculture / Forestry / Fisheries	26	Mg
Total	846	Mg

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

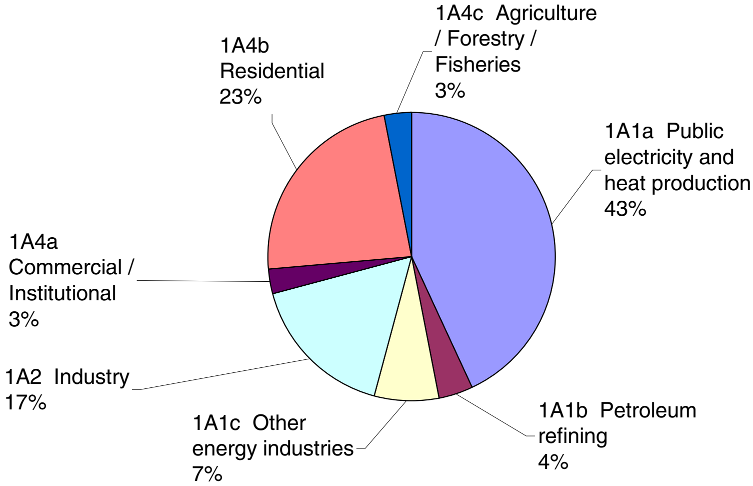


Figure 16 N_2O emission sources, stationary combustion plants, 2005.

Figure 17 shows time-series for N_2O emission. The N_2O emission from stationary combustion increased by 9% from 1990 to 2005, but again fluctuations in emission level due to electricity import/export are considerable.

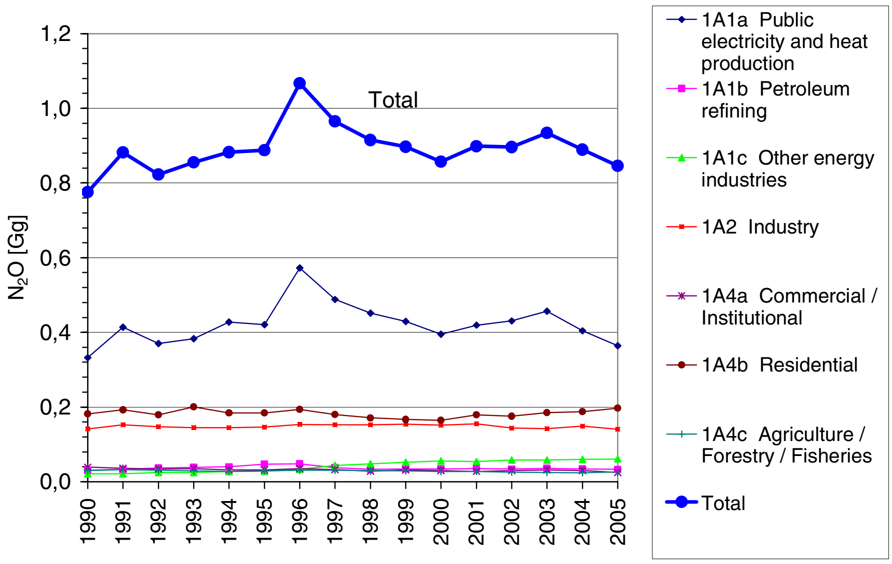


Figure 17 N_2O emission time-series for stationary combustion plants.

6 SO_2, NO_X, NMVOC and CO

The emissions of SO_2, NO_X, NMVOC and CO from Danish stationary combustion plants 2005 are presented in Table 21. The emissions of these pollutants are also included in the report to the Climate Convention.

SO_2 from stationary combustion plants accounts for 84% of the total Danish emission. NO_X, CO and NMVOC account for 37%, 45% and 20% of total Danish emissions, respectively.

Table 21 SO_2, NO_X, NMVOC and CO emission from stationary combustion 2005 [1)].

Pollutant	NO_X Gg	CO Gg	NMVOC Gg	SO_2 Gg
1A1 Fuel consumption, Energy industries	47.9	11.2	3.8	8.1
1A2 Fuel consumption, Manufacturing Industries and Construction (Stationary combustion)	12.5	12.4	0.6	6.0
1A4 Fuel consumption, Other sectors (Stationary combustion)	8.1	250.4	19.3	4.3
Total emission from stationary combustion plants	68.5	274.0	23.6	18.3
Total Danish emission	185.8	611.2	118.3	21.9
	%			
Emission share for stationary combustion	37	45	20	84

1) Only emissions from stationary combustion plants in the sectors are included

6.1 SO_2

Stationary combustion is the most important emission source for SO_2 accounting for 84% of the total Danish emission. Table 22 and Figure 18 present the SO_2 emission inventory for the stationary combustion subsectors.

Electricity and heat production is the largest emission source accounting for 42% of the emission. However, the SO_2 emission share is lower than the fuel consumption share for this sector, which is 57%. This is possibly due to effective flue gas desulphurisation equipment installed in power plants combusting coal. Figure 19 shows the SO_2 emission from *Electricity and heat production* on a disaggregated level. Power plants >300MW$_{th}$ represent the main emission source, accounting for 66% of the emission.

The fuel origin of the SO_2 emission is shown in Figure 3A-20. Disaggregation of total emissions from point sources using several fuels is based on emission factors. As expected the emission from natural gas is negligible and the emission from coal combustion is considerable (49%). Most remarkably is the emission share from residual oil combustion, which is 26%. This emission is very high compared to the fuel consumption share of 4%. The emission factor for residual oil combusted in the industrial sector is uncertain because knowledge of the applied flue gas cleaning technology in this sector is insufficient.

The SO_2 emission from *Industry* is 33%, a remarkably high emission share compared with fuel consumption. The main emission sources in the industrial sector are combustion of coal and residual oil, but emissions from the cement industry is also a considerable emission source. Some years ago, SO_2 emission from the industrial sector only accounted for a small portion of the total emission, but as a result of reduced emissions from power plants the share has now increased.

Time-series for SO_2 emission from stationary combustion are shown in Figure 21. The SO_2 emission from stationary combustion plants has decreased by 96% from 1980 and 85% from 1995. The large emission decrease is mainly a result of the reduced emission from *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 electricity and heat production plants, these still account for 42% of the total emission from stationary combustion, as mentioned above. The emission from other sectors also decreased considerably since 1980.

Table 22 SO_2 emission from stationary combustion plants 2005 [1)].

SO_2	2005	
1A1a Public electricity and heat production	7716	Mg
1A1b Petroleum refining	325	Mg
1A1c Other energy industries	10	Mg
1A2 Industry	6045	Mg
1A4a Commercial / Institutional	260	Mg
1A4b Residential	2381	Mg
1A4c Agriculture / Forestry / Fisheries	1612	Mg
Total	18350	Mg

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

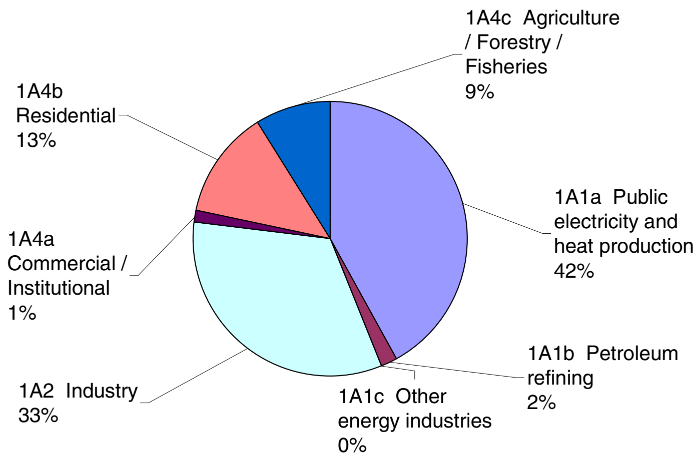


Figure 18 SO_2 emission sources, stationary combustion plants, 2005.

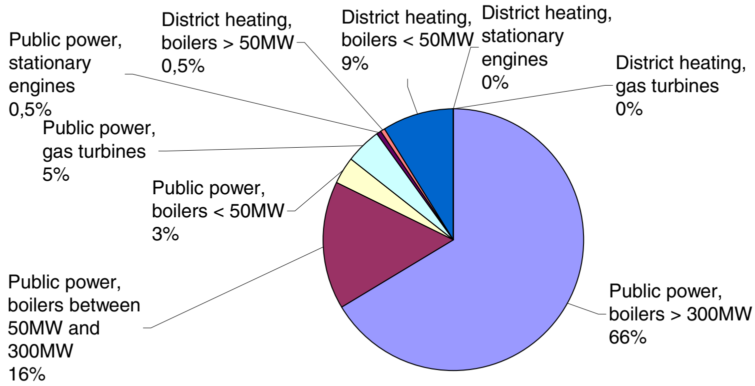
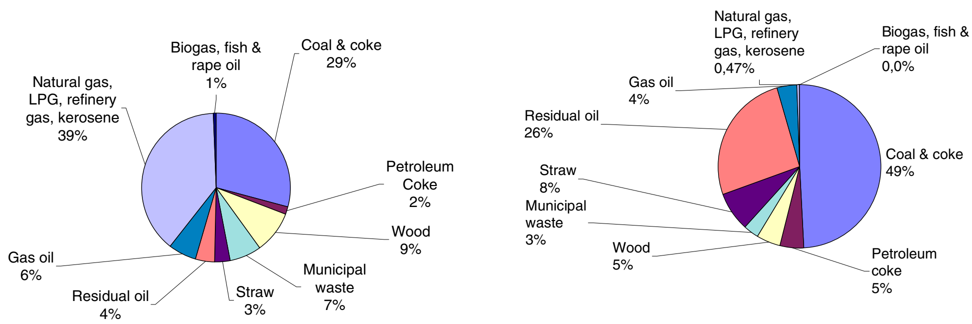


Figure 19 Disaggregated SO_2 emissions from *Energy and heat production.*

Figure 20 Fuel origin of the SO_2 emission from



stationary combustion plants.

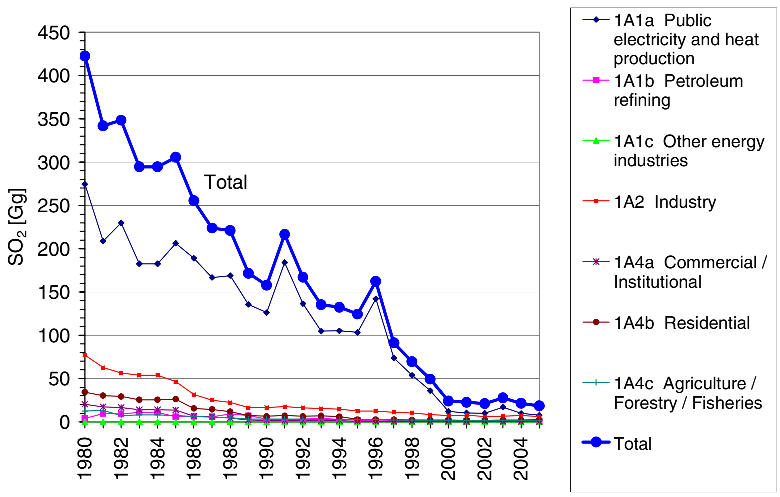


Figure 21 SO_2 emission time-series for stationary combustion.

6.2 NO_X

Stationary combustion accounts for 37% of the total Danish NO_X emission. Table 23 and Figure 22 show the NO_X emission inventory for stationary combustion subsectors.

Electricity and heat production is the largest emission source accounting for 58% of the emission from stationary combustion plants.

Figure 23 shows fuel origin of the NO_X emission from sector 1A1a Electricity and heat production. The fuel origin of the NO_X emission is almost the same as the fuel consumption in this plant category. The emission from coal combustion is, however, somewhat higher than the fuel consumption share.

Industrial combustion plants are also an important emission source accounting for 18% of the emission. The main industrial emission source is cement production, accounting for 67% of the emission.

Residential plants accounts for 8% of the NO_X emission. The fuel origin of this emission is mainly wood, gas oil and natural gas accounting for 51%, 22% and 20% of the residential plant emission, respectively.

Time-series for NO_X emission from stationary combustion are shown in Figure 24. NO_X emission from stationary combustion plants has decreased by 54% from 1985 and 38% from 1995. The reduced emission is mainly a result of the reduced emission from *Electricity and heat production* due to installation of low NO_X burners and selective catalytic reduction (SCR) units. The fluctuations in the time-series follow the fluctuations in *Electricity and heat production*, which, in turn, result from electricity trade fluctuations.

Table 23 NO_X emission from stationary combustion plants 2005 [1)].

	2005	
1A1a Public electricity and heat production	39367	Mg
1A1b Petroleum refining	1513	Mg
1A1c Other energy industries	6998	Mg
1A2 Industry	12482	Mg
1A4a Commercial / Institutional	1075	Mg
1A4b Residential	5762	Mg
1A4c Agriculture / Forestry / Fisheries	1309	Mg
Total	68506	Mg

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

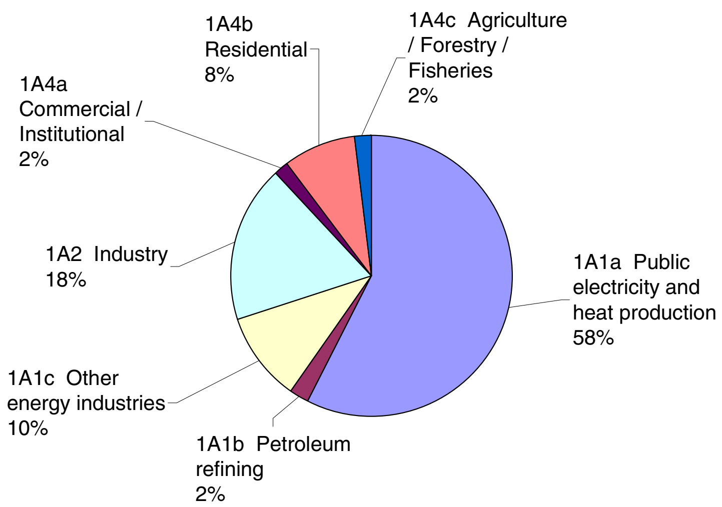


Figure 22 NO_X emission sources, stationary combustion plants, 2005.

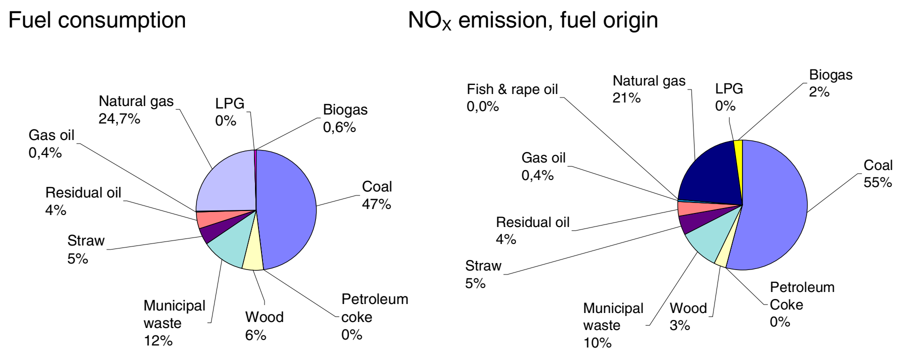


Figure 23 NO_X emissions from 1A1a Electricity and heat production, fuel origin.

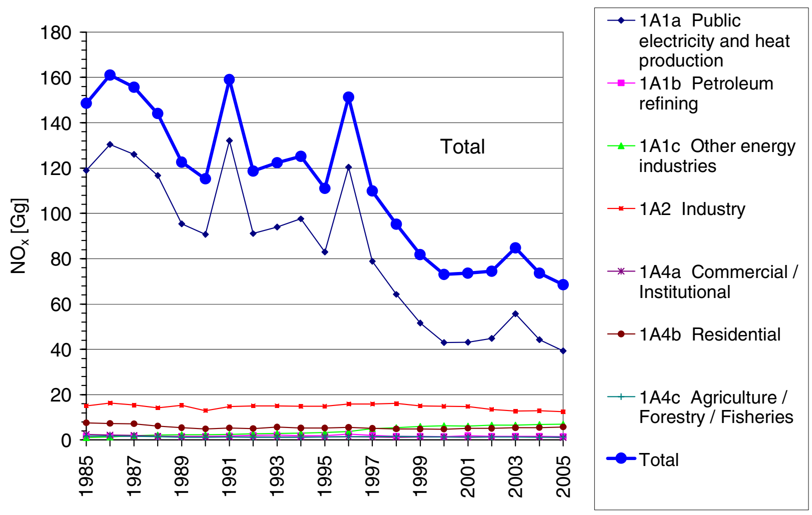


Figure 24 NO_X emission time-series for stationary combustion.

6.3 NMVOC

Stationary combustion plants account for 20% of the total Danish NMVOC emission. Table 24 and Figure 25 present the NMVOC emission inventory for the stationary combustion subsectors.

Residential plants are the largest emission source accounting for 72% of the total emission from stationary combustion plants. For residential plants NMVOC is mainly emitted from wood and straw combustion, see Figure 3A-26.

Electricity and heat production is also a considerable emission source, accounting for 16% of the total emission. Lean-burn gas engines have a relatively high NMVOC emission factor and are the most important emission source in this subsector (see Figure 26). The gas engines are either natural gas or biogas fuelled.

Time-series for NMVOC emission from stationary combustion are shown in Figure 27. The emission has increased by 69% from 1985 and 37% from 1995. The increased emission is mainly a result of the increased use of lean-burn gas engines in CHP plants as discussed in Chapter 7.2.

The emission from residential plants is 79% higher in 2005 than in 1990, but the NMVOC emission from wood combustion increased by 138% since 1990 due to increased wood consumption. However the emission from straw combustion in farmhouse boilers has decreased over this period.

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

Table 24 NMVOC emission from stationary combustion plants 2005 [1)].

	2005	
1A1a Public electricity and heat production	3709	Mg
1A1b Petroleum refining	2	Mg
1A1c Other energy industries	42	Mg
1A2 Industry	600	Mg
1A4a Commercial / Institutional	569	Mg
1A4b Residential	17125	Mg
1A4c Agriculture / Forestry / Fisheries	1567	Mg
Total	23614	Mg

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

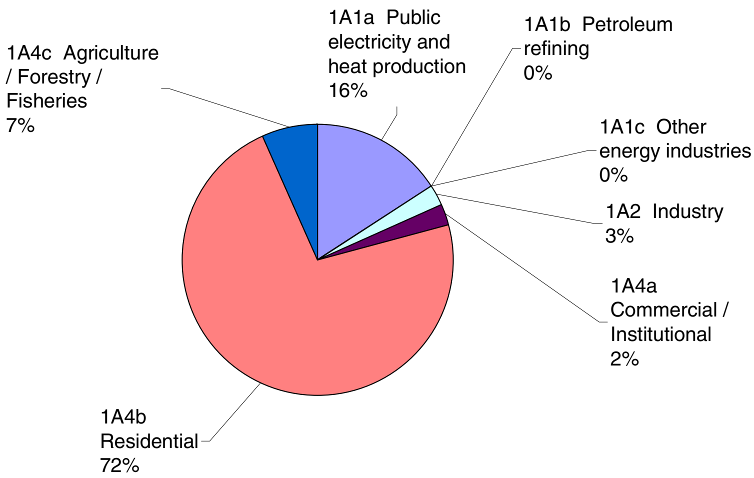


Figure 25 NMVOC emission sources, stationary combustion plants, 2005.

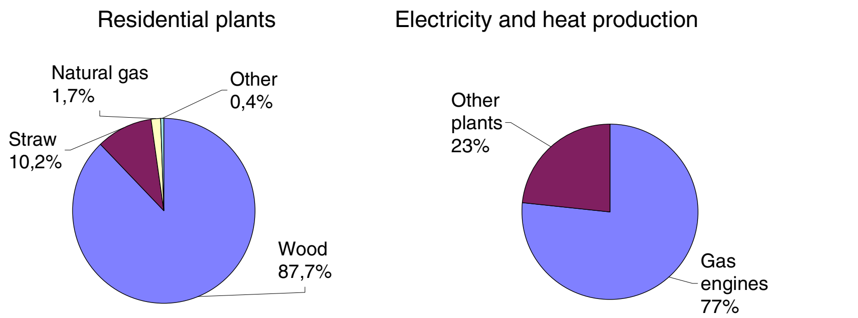


Figure 26 NMVOC emission from residential plants and from electricity and heat production, 2005.

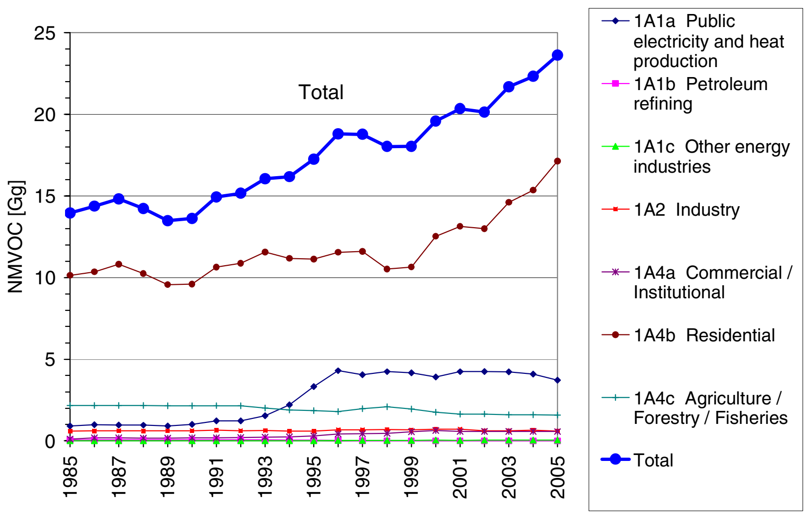


Figure 27 NMVOC emission time-series for stationary combustion.

6.4 CO

Stationary combustion accounts for 45% of the total Danish CO emission. Table 25 and Figure 28 present the CO emission inventory for stationary combustion subsectors.

Residential plants are the largest emission source, accounting for 88% of the emission. Wood combustion accounts for 94% of the emission from residential plants, see Figure 29. This is in spite of the fact that the fuel consumption share is only 30%. Combustion of straw is also a considerable emission source whereas the emission from other fuels used in residential plants is almost negligible.

Time-series for CO emission from stationary combustion are shown in Figure 30. The emission has increased by 52% from 1985 and increased 45% from 1995. The time-series for CO from stationary combustion plants follows the time-series for CO emission from residential plants.

The consumption of wood in residential plants has increased by 180% since 1990 leading to an increase in the CO emission. The increase in CO emission from residential plants is lower than the increase in wood consumption, because CO emission from straw-fired farmhouse boilers has decreased considerably. Both the annual straw consumption in residential plants and the CO emission factor for farmhouse boilers have decreased.

Table 25 CO emission from stationary combustion plants 2005 [1)].

	2005	
1A1a Public electricity and heat production	10789	Mg
1A1b Petroleum refining	223	Mg
1A1c Other energy industries	209	Mg
1A2 Industry	12373	Mg
1A4a Commercial / Institutional	952	Mg
1A4b Residential	240970	Mg
1A4c Agriculture / Forestry / Fisheries	8494	Mg
Total	274010	Mg

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

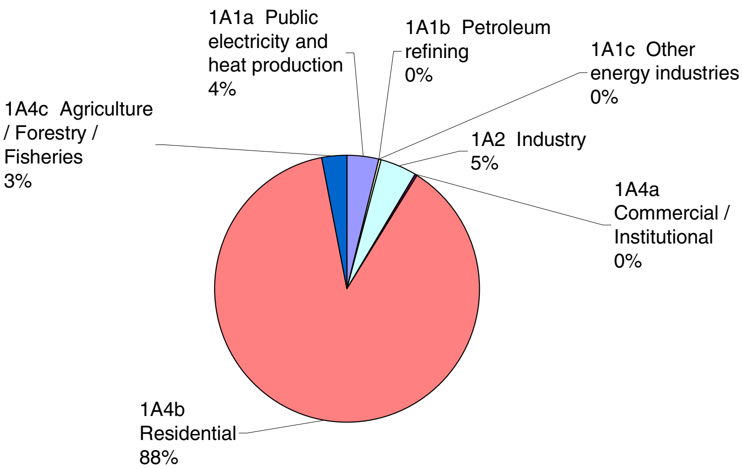


Figure 28 CO emission sources, stationary combustion plants, 2005.

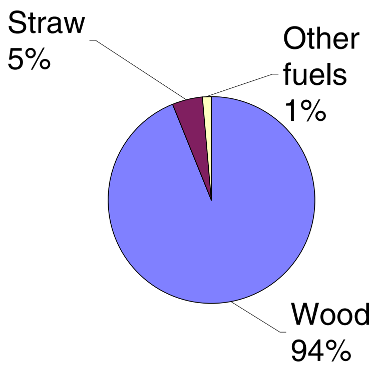


Figure 29 CO emission sources, residential plants, 2005.

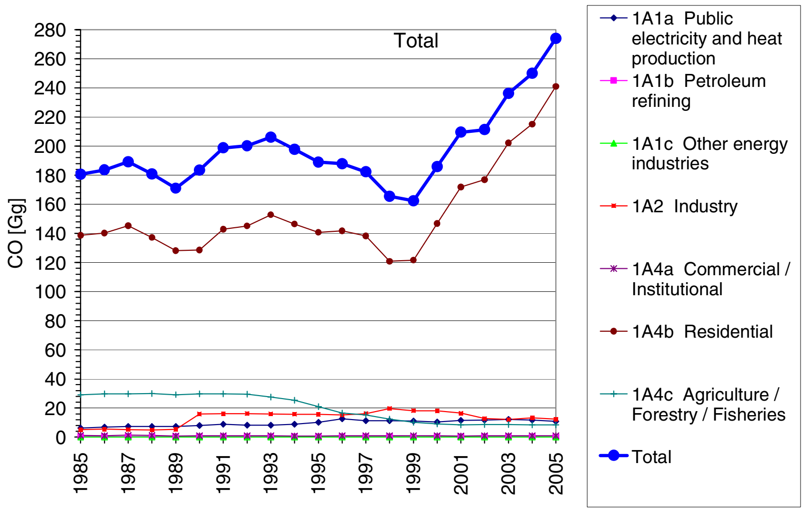


Figure 30 CO emission time-series for stationary combustion.

7 Particulate matter (PM)

The emission of total suspended particulates (TSP), PM_{10} and $PM_{2.5}$ from Danish stationary combustion plants 2005 is presented in Table 26. The PM emission is reported to the LRTAP Convention.

To date, PM emissions from stationary combustion, transport, agriculture and the industrial sector have been included in the Danish inventory. TSP from stationary combustion accounts for 48% of the total Danish emission. The emission shares for PM_{10} and $PM_{2.5}$ are 44% and 41%, respectively.

Table 26 Danish PM emissions 2005.

Pollutant	TSP Mg	PM_{10} Mg	$PM_{2.5}$ Mg
1A1 Fuel combustion, Energy industries	1253	734	609
1A2 Fuel combustion, Manufacturing Industries and Construction (Stationary combustion) 1)	900	596	350
1A4 Fuel combustion, Other sectors (Stationary combustion) 1)	20369	19297	18244
Total emission from stationary combustion plants	22522	20627	19203
Total Danish emission (gross)	46594	46594	46594
	%		
Emission share for stationary combustion	48%	44%	41%

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

Table 27 and Figure 31 show the PM emission inventory for the stationary combustion subsectors. Residential plants are the largest emission source accounting for 91% 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

Furthermore, there are considerable emissions from:

- Residential boilers using gas oil
- Refineries

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 overall Danish 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 extremely high.

In Figure 32 the fuel consumption and the $PM_{2.5}$ emission of residential plants is shown. Wood combustion accounts for 96% of the $PM_{2.5}$ emission from residential plants in spite of the limited wood consumption share.

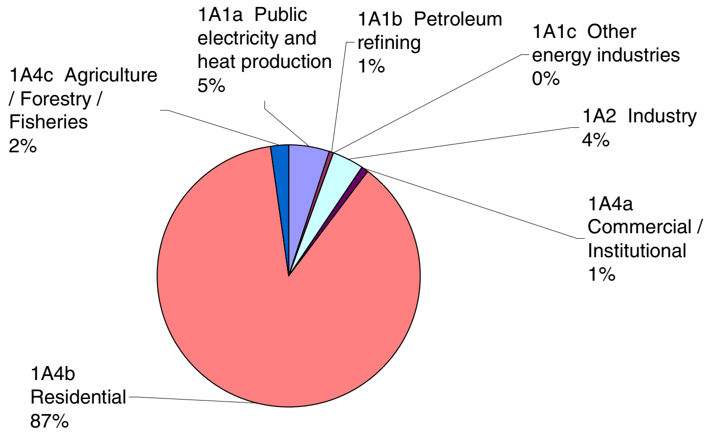
Emission inventories for PM have only been reported for the years 2000-2005 and the short time-series for TSP, PM_{10} and $PM_{2.5}$ emission is shown in Figure 33.

Table 27 PM emission from stationary combustion plants, 2005 [1].

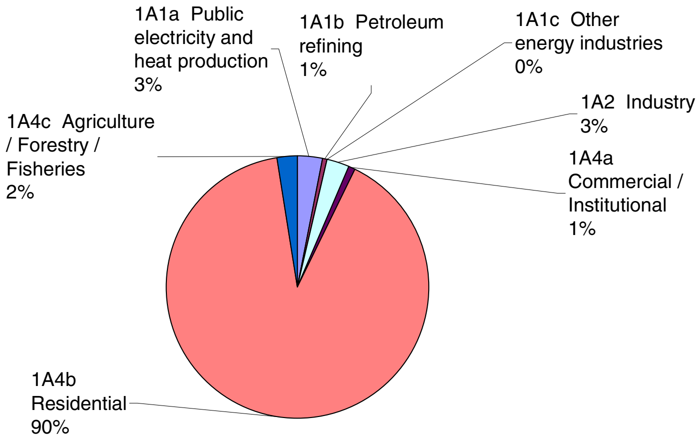
	TSP	PM_{10}	$PM_{2.5}$	
1A1a Public electricity and heat production	1135	626	505	Mg
1A1b Petroleum refining	114	107	103	Mg
1A1c Other energy industries	3	2	1	Mg
1A2 Industry	900	596	350	Mg
1A4a Commercial / Institutional	139	133	124	Mg
1A4b Residential	19705	18676	17666	Mg
1A4c Agriculture / Forestry / Fisheries	525	488	454	Mg
Total	22522	20627	19203	Mg

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

TSP



PM_{10}



$PM_{2.5}$

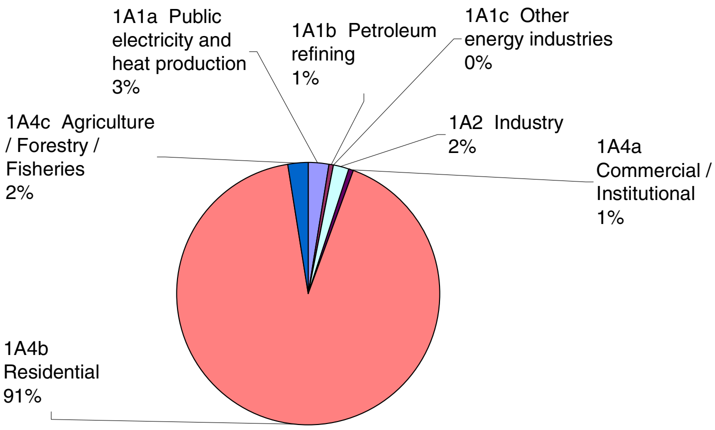


Figure 31 PM emission sources, stationary combustion plants, 2005.

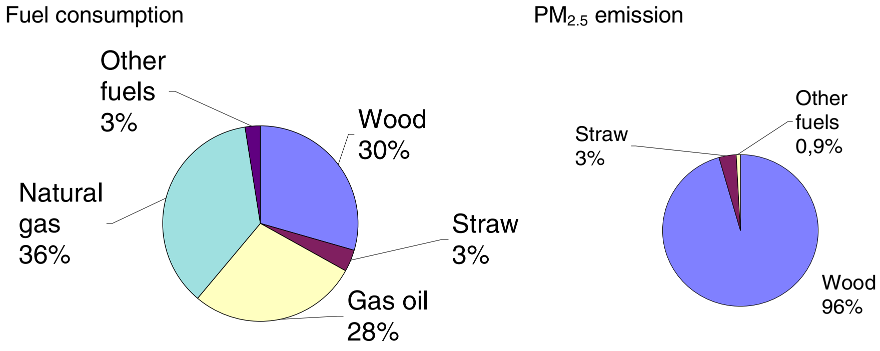


Figure 32 Fuel consumption and $PM_{2.5}$ emission from residential plants.

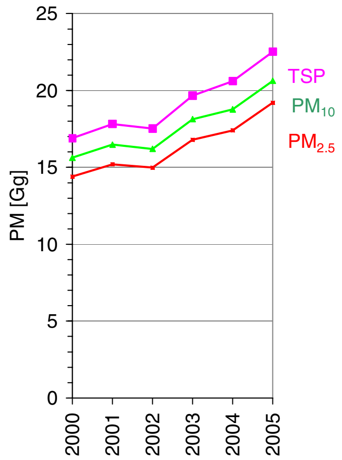


Figure 33 PM emission time-series for stationary combustion.

8 Heavy metals

Emission inventories for 9 heavy metals are reported to the LRTAP Convention. Three of the metals are considered priority metals: Pb, Cd and Hg. The 2005 emissions are presented in Table 28.

Stationary combustion plants are the most important emission sources for heavy metals. For Cu the emission share from stationary combustion plants is 11%, but for all other heavy metals the emission share is more than 68%, see Table 28.

Table 28 The emission of heavy metals in 2005, reported to the LRTAP Convention in 2007.

Pollutant	Pb	Cd	Hg	As	Cr	Cu	Ni	Se	Zn
	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg	Mg
1A1 Fuel combustion, Energy industries	2,55	0,23	0,72	0,29	0,53	0,65	3,29	0,71	14,41
1A2 Fuel combustion, Manufacturing Industries and Construction (Stationary combustion)	1,00	0,14	0,23	0,18	0,34	0,15	4,08	0,65	1,25
1A4 Fuel combustion, Other sectors (Stationary combustion)	0,22	0,20	0,26	0,06	0,07	0,24	0,64	0,15	4,02
Total emission from stationary combustion plants	3,77	0,57	1,21	0,54	0,94	1,04	8,01	1,51	19,67
Total Danish emission	5,58	0,62	1,29	0,57	1,20	9,25	9,51	1,62	26,21
Emission share for stationary combustion	68%	91%	94%	95%	79%	11%	84%	93%	75%

Table 29 and Figure 34 present the heavy metal emission inventory for the stationary combustion subsectors. The sectors *Electricity and heat production* and *Industry* have the highest emission shares. *Electricity and heat production* accounts for 67%, 38% and 59% of the emission of the priority metals Pb, Cd and Hg, respectively.

Table 30 presents the emission share for the two most important emission source categories: Power plants >25MW$_e$ and municipal waste incineration plants.

Table 29 Heavy metal emission from stationary combustion plants, 2005 [1)].

	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn	
1A1a Public electricity and heat production	283	215	510	641	719	2808	2533	700	14405	kg
1A1b Petroleum refining	11	10	25	10	3	479	18	9	2	kg
1A1c Other energy industries	0	0	0	0	0	0	0	0	0	kg
1A2 Industry	183	142	337	151	227	4081	1000	647	1246	kg
1A4a Commercial / Institutional	8	8	10	13	21	83	16	19	204	kg
1A4b Residential	33	179	29	207	221	54	160	113	3735	kg
1A4c Agriculture / Forestry / Fisheries	19	13	33	21	23	502	41	21	80	kg
Total	537	568	944	1043	1214	8008	3768	1510	19672	kg

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

Table 30 Heavy metal emission share for large power plants and municipal waste incineration plants, 2005.

Pollutant	Emission share of plant category	
	Municipal waste incineration, CHP and district heating	Power plants >25MW$_e$
As	26%	17%
Cd	20%	3%
Cr	20%	18%
Cu	33%	12%
Hg	21%	16%
Ni	4%	26%
Pb	42%	7%
Se	0,3%	42%
Zn	51%	13%

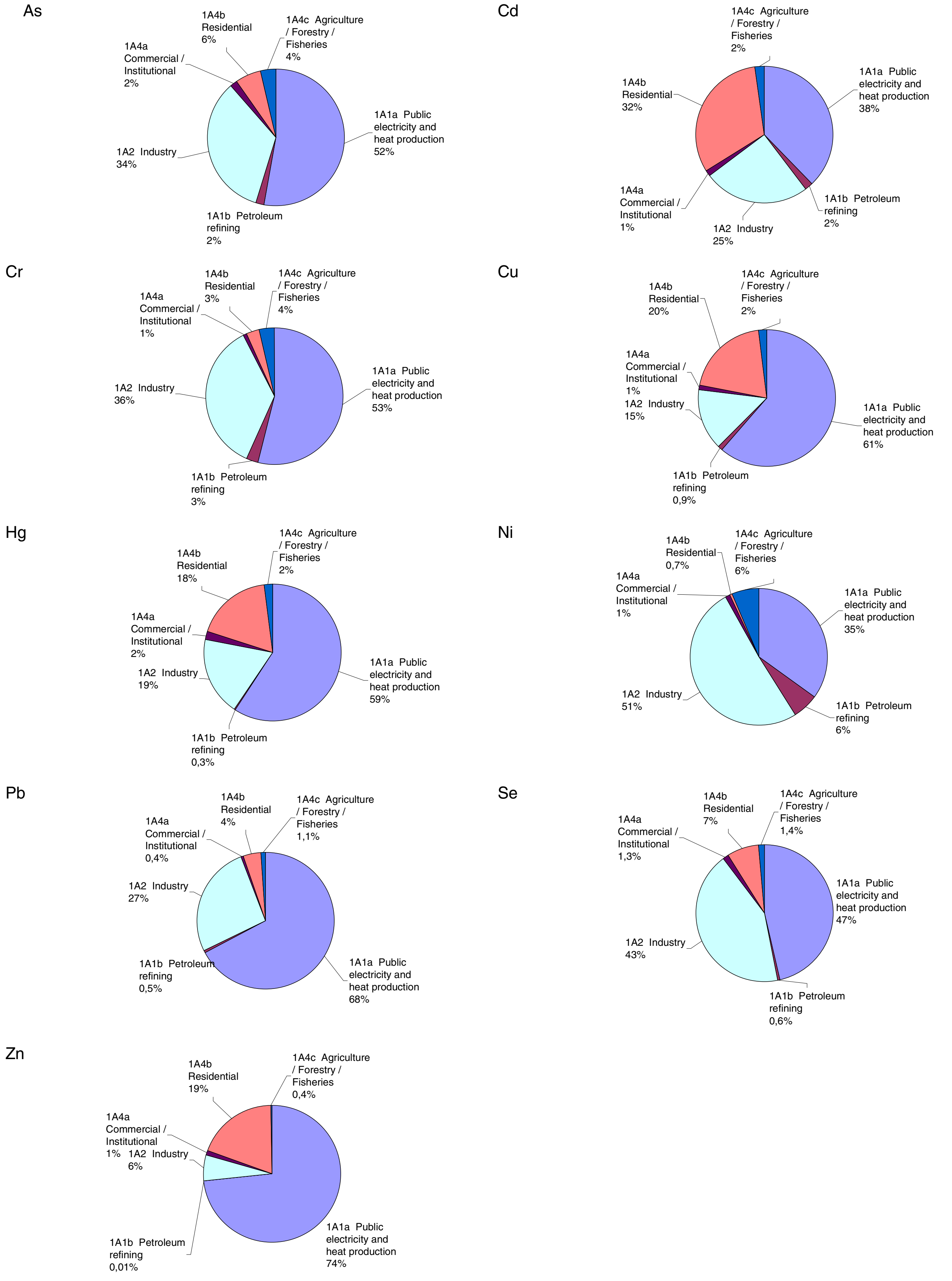


Figure 34 Heavy metal emission sources, stationary combustion plants, 2005.

Time-series for heavy metal emissions are provided in Figure 35. Emissions of all heavy metals, except Zn, have decreased considerably since 1990, see Table 31. Emissions have decreased despite increased incineration of municipal 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 a further important emission source.

The increasing Zn emission estimated in resent years might be a result of insufficient data for resent years. Emission from MSW incineration plants is the most important source of emission. For Se and Zn the same emission factor has been applied since 1995 whereas a time series have been estimated for all other heavy metal emission factors (Nielsen & Illerup 2003). A time series for Se and Zn will be estimated for future inventories.

The estimated As emission level decreased remarkably from 1994 to 1995. Plant-specific emission data for power plants are available for all power plants from 1995 onwards and the general point source emission factor for power plants has potentially been overestimated.

Table 31 Decrease in heavy metal emission 1990-2005.

Pollutant	Decrease since 1990
As	63%
Cd	46%
Cr	85%
Cu	71%
Hg	61%
Ni	63%
Pb	75%
Se	65%
Zn	-2%

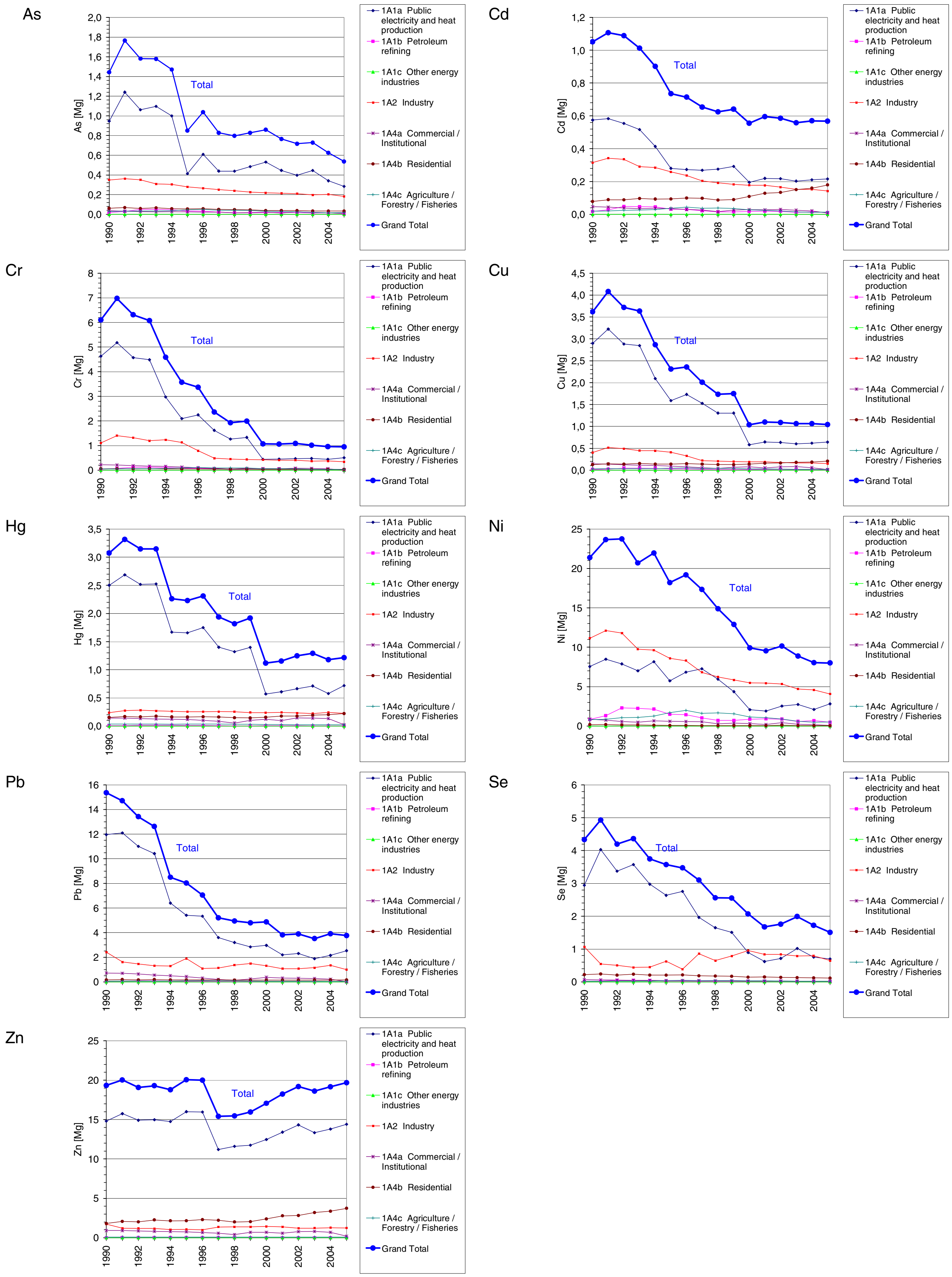


Figure 35 Heavy metal emission time-series, stationary combustion plants.

9 PAH and dioxin

Emission inventories for 4 PAHs and for dioxin are reported to the LRTAP Convention. The emission data for 2005 are presented in Table 32. Stationary combustion plants account for more than 95% of the PAH emissions and for 73% of the dioxin emission in 2005.

Table 32 The emission for the year 2005

Pollutant	Benzo(a)-pyrene Mg	Benzo(b)fluo-ranthene Mg	Benzo(k)fluo-ranthene Mg	Indeno(1,2,3-c,d)pyrene Mg	Dioxin [g I-Tec]
1A1 Fuel combustion, Energy industries	0,01	0,03	0,01	0,01	2,2
1A2 Fuel combustion, Manufacturing Industries and Construction (Stationary combustion)	0,03	0,09	0,01	0,01	0,2
1A4 Fuel combustion, Other sectors (Stationary combustion)	3,79	3,99	2,21	2,72	16,2
Total emission from stationary combustion plants	3,82	4,11	2,24	2,74	18,6
Total Danish emission (gross)	3,88	4,20	2,33	2,81	25,3
Emission share for stationary combustion	98%	98%	96%	97%	73%

Table 33 and Figure 37 present the PAH and dioxin emission inventory for the stationary combustion subsectors. Residential combustion is the largest emission source for both PAH and dioxin. Combustion of wood is the predominant source, accounting for more than 98% of the PAH emission in residential plants. See Figure 36. The residential sector accounts for 77% of the dioxin emission from stationary combustion plants.

Time-series for PAH and dioxin emission are presented in Figure 38.

The increasing 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 38.

Dioxin emission decreased 61% since 1990 mainly due to installation of dioxin filters in MSW incineration plants. The emission from residential plants is increasing due to increased wood consumption in this sector.

Table 33 PAH emission from stationary combustion plants, 2005.

	Benzo(a)-pyrene kg	Benzo(b)-fluoranthene kg	Benzo(k)-fluoranthene kg	Indeno(1,2,3-c,d)pyrene kg	Dioxin [g I-Tec]
1A1a Public electricity and heat production	7	28	14	6	2,2
1A1b Petroleum refining	0	0	0	0	0,0
1A1c Other energy industries	0	0	0	0	0,0
1A2 Industry	26	91	14	7	0,2
1A4a Commercial / Institutional	120	158	52	85	0,4
1A4b Residential	3517	3666	2131	2402	14,4
1A4c Agriculture / Forestry / Fisheries	151	164	25	235	1,4
Total	3822	4106	2237	2736	18,6

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

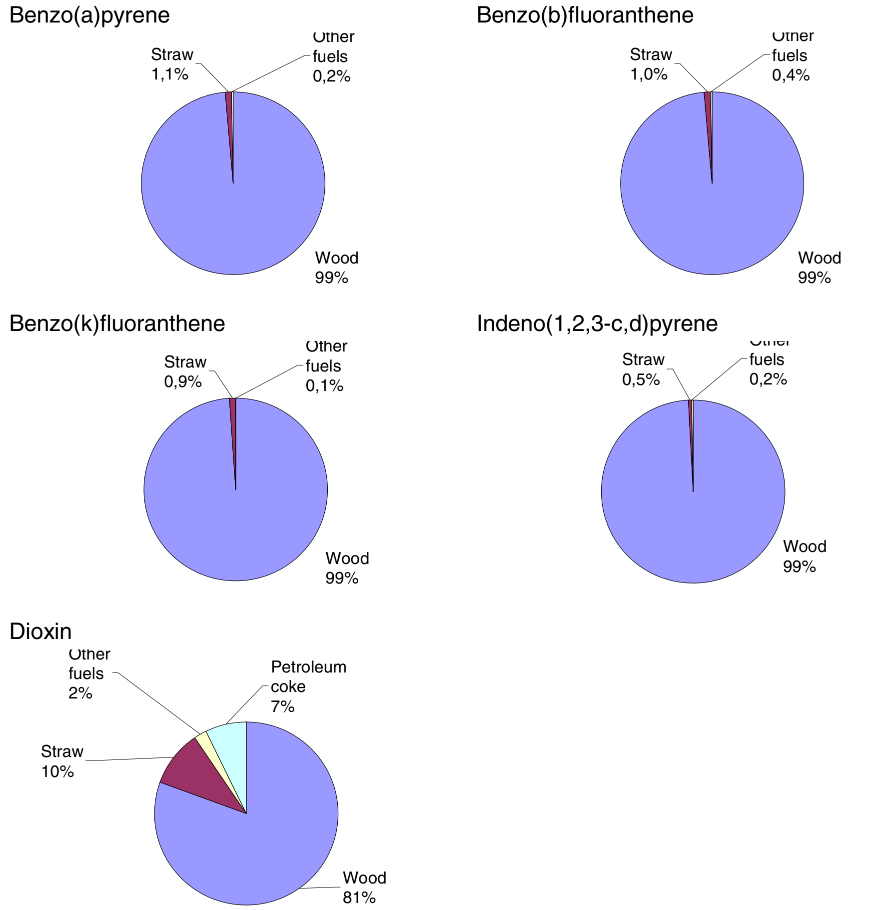


Figure 36 PAH and dioxin emission from residential combustion plants (stationary), fuel origin.

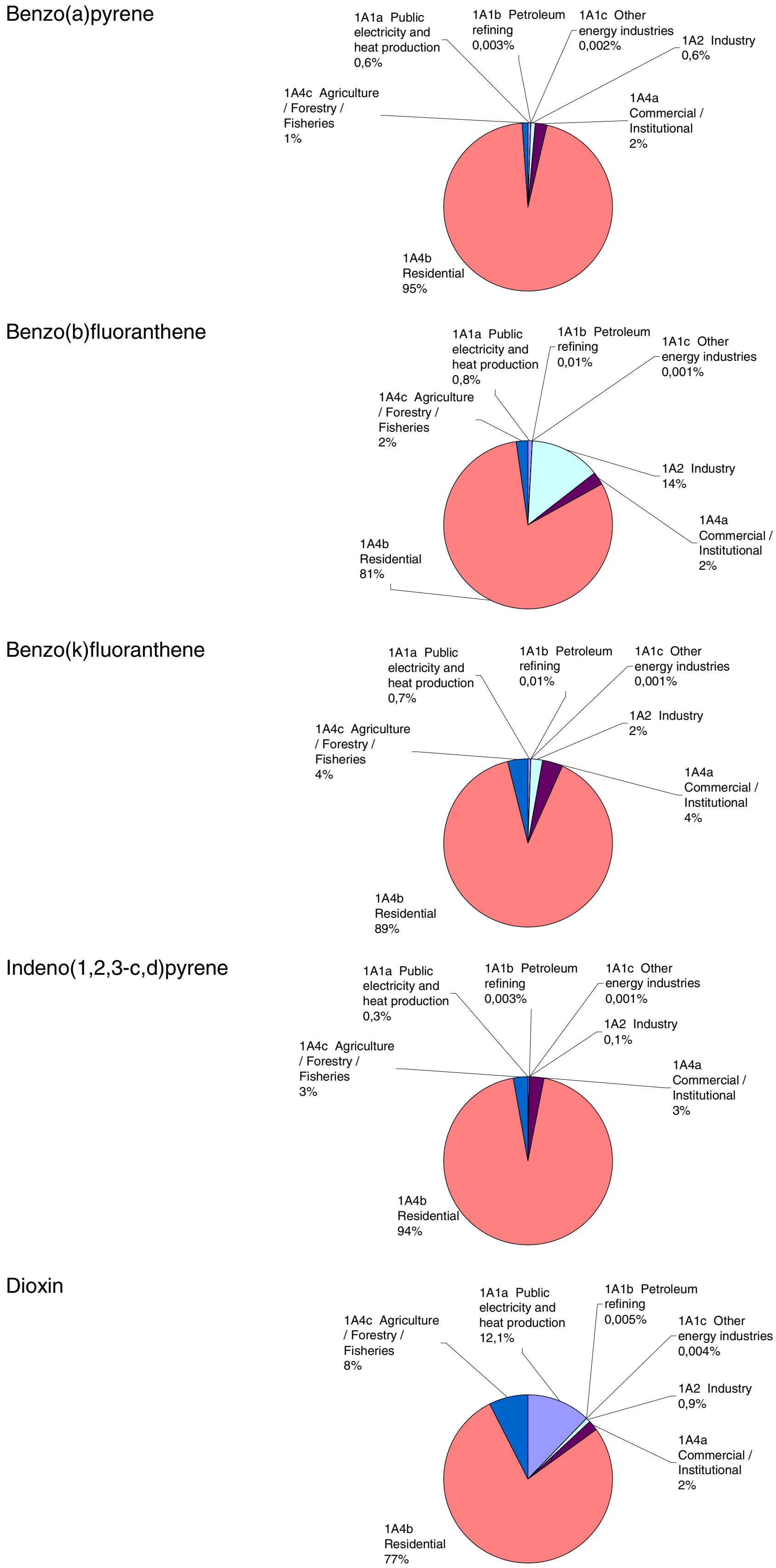
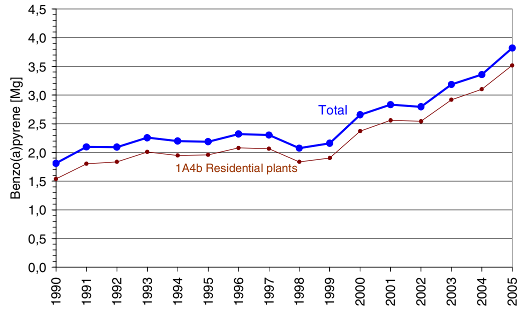
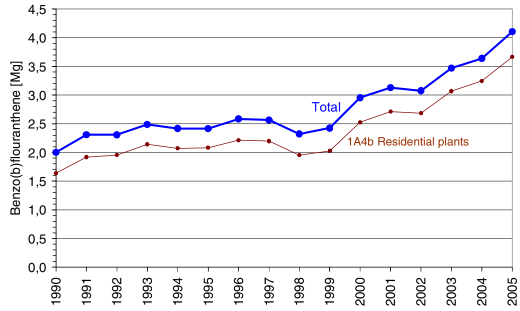


Figure 37 PAH and dioxin emission sources, stationary combustion plants, 2005.

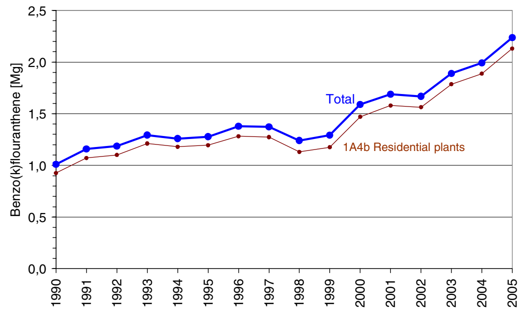
Benzo(a)pyrene



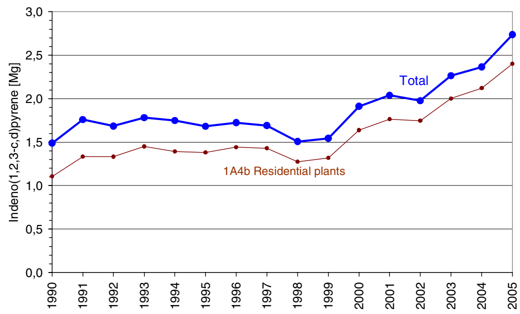
Benzo(b)fluoranthene



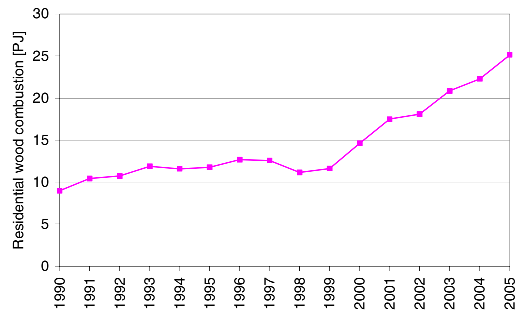
Benzo(k)fluoranthene



Indeno(1,2,3-c,d)pyrene



Combustion of wood in residential plants



Dioxin

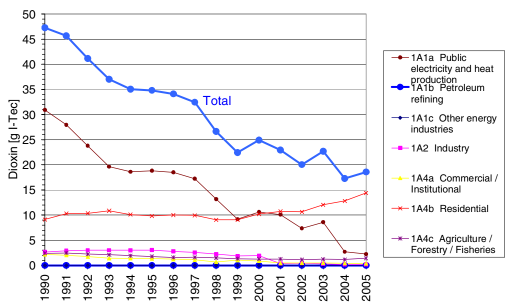


Figure 38 PAH and dioxin emission time-series, stationary combustion plants. Comparison with wood consumption in residential plants.

10 QA/QC and validation

A QA/QC plan is implemented. A thorough description can be found in Denmark's National Inventory Report (Illerup et al. 2007a)

The QC includes:

- Checking of time-series in the IPCC and SNAP source categories. Considerable changes are controlled and explained.
- Comparison with the inventory of the previous year. Any major changes are verified.
- Total emission, when aggregated to IPCC and LRTAP reporting tables, is compared with totals based on SNAP source categories (control of data transfer).
- A manual log table in the emission databases is applied to collect information about recalculations.
- The IPCC reference approach validates the fuel consumption rates and CO_2 emissions of fuel combustion. Fuel consumption rates and CO_2 emissions differ by less than 1.6% (1990-2005). The reference approach is further discussed below.
- 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 factor 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
- Most emission factor references are now incorporated in the emission database, itself.
- 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 work from companies that have implemented some QA/QC work. The two major power plant owners / operators in Denmark: E2 and Elsam both obtained the ISO 14001 certification for an environmental management system. Danish Gas Technology Centre and dk-Teknik[3] both run accredited laboratories for emission measurements.
- The sectoral report for stationary combustion has twice been in external review.

10.1 Reference approach

In addition to the sector-specific CO_2 emission inventories (the national approach), the CO_2 emission is also estimated using the reference approach described in the IPCC Reference Manual (IPCC 1996). The reference approach is based on data for fuel production, import, export and

[3] Now FORCE

stock change. The CO_2 emission inventory based on the reference approach is reported to the Climate Convention and used for verification of the official data in the national approach.

Data for import, export and stock change used in the reference approach originate from the annual "basic data" table prepared by the Danish Energy Authority and published on their home page (DEA 2006b). The fraction of carbon oxidised has been assumed to be 1.00. The carbon emission factors are default factors originating from the IPCC Reference Manual (IPCC 1996). The country-specific emission factors are not used in the reference approach, the approach being for the purpose of verification.

The Climate Convention reporting tables include a comparison of the national approach and the reference approach estimates. To make results comparable, the CO_2 emission from incineration of the plastic content of municipal waste is added in the reference approach. Further consumption for non-energy purposes is subtracted in the reference approach, because non-energy use of fuels is not, as yet, included in the Danish national approach.

Three fuels are used for non-energy purposes: lube oil, bitumen and white spirit. The total consumption for non-energy purposes is relatively low – 12 PJ in 2005.

In 2005 the fuel consumption rates in the two approaches differ by -1.27% and the CO_2 emission differs by -1.15%. In the period 1990-2005 fuel consumption and the CO_2 emission differs by less than 1.6. The differences are below 1% for all years except 1998 and 2005. According to IPCC Good Practice Guidance (IPCC 2000) the difference should be within 2%. The reference approach for 2005 and the comparison with the Danish national approach are provided in Appendix 2A-14. The appendix also includes a correspondence list for the fuel categories (Danish Energy Authority/IPCC reference approach).

A comparison of the national approach and the reference approach is illustrated in Figure 39.

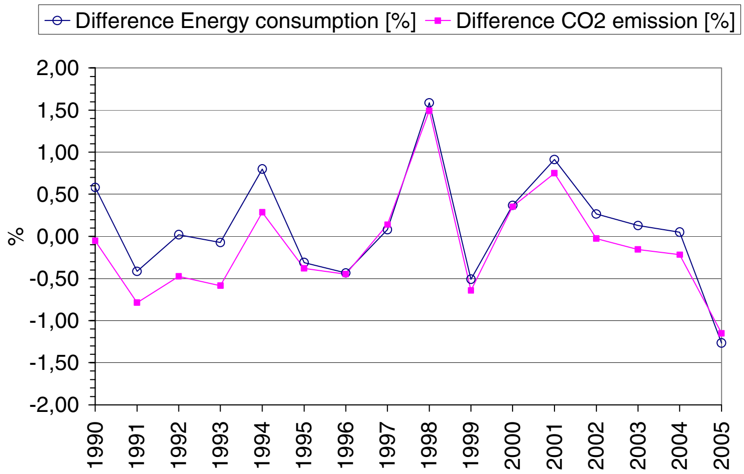


Figure 39 Comparison of the reference approach and the national approach.

10.2 Key source analysis

As part of the reporting for the Climate Convention a key source analysis for the Danish emission inventory has been performed. A key source has a significant influence on a country's total inventory of greenhouse gases in terms of the absolute level of emission, the trend in emissions, or both.

Stationary combustion key sources for greenhouse gases are shown in Table 33b. The CO_2 emission from eight different fuels is the key source in the Danish inventory. Further CH_4 emission is a trend key source due to the increased electricity production based on gas engines.

The key source analysis will be considered in the future QC for stationary combustion.

Table 33b Key sources, stationary combustion

Source		Pollutant	Key source	Level or trend
CO_2 Emission from stationary Combustion	Coal	CO_2	Yes	Level, Trend
CO_2 Emission from stationary Combustion	Petroleum coke	CO_2	Yes	Level, Trend
CO_2 Emission from stationary Combustion	Plastic waste	CO_2	Yes	Level, Trend
CO_2 Emission from stationary Combustion	Residual oil	CO_2	Yes	Level, Trend
CO_2 Emission from stationary Combustion	Gas oil	CO_2	Yes	Level, Trend
CO_2 Emission from stationary Combustion	Kerosene	CO_2	Yes	Trend
CO_2 Emission from stationary Combustion	Natural gas	CO_2	Yes	Level, Trend
CO_2 Emission from stationary Combustion	Refinery gas	CO_2	Yes	Level
Non-CO_2 Emission from stationary Combustion		CH_4	Yes	Level, Trend

11 Uncertainty

According to the IPCC Good Practice Guidance (IPCC 2000) uncertainty estimates should be included in the annual National Inventory Report.

Uncertainty estimates include uncertainty with regard to the total emission inventory as well as uncertainty with regard to trends. The GHG emission from stationary combustion plants has been estimated with an uncertainty interval of ±8.4% and the decrease in the GHG emission since 1990 has been estimated to be 13,7% ± 2.2 %-age-points.

11.1 Methodology

The Danish uncertainty estimates for GHGs are based on a methodology included in IPCC Good Practice Guidance (IPCC 2000). The estimates are based on uncertainties for emission factors and fuel consumption rates, respectively. The input data required for the uncertainty calculations are:

- Emission data for the base year and the last year
- Uncertainty for activity rates
- Uncertainty for emission factors

11.1.1 Greenhouse gases

The Danish uncertainty estimates for GHGs are based on the tier 1 approach in IPCC Good Practice Guidance (IPCC 2000). The uncertainty levels have been estimated for the following emission source subcategories within stationary combustion:

- CO_2 emission from each of the applied fuel categories
- CH_4 emission from gas engines
- CH_4 emission from all other stationary combustion plants
- N_2O emission from all stationary combustion plants

The separate uncertainty estimation for gas engine CH_4 emission and CH_4 emission from other plants does not follow the recommendations in the IPCC Good Practice Guidance. Disaggregation is applied, because in Denmark the CH_4 emission from gas engines is much larger than the emission from other stationary combustion plants, and the CH_4 emission factor for gas engines is estimated with a much smaller uncertainty level than for other stationary combustion plants.

Most of the applied uncertainty estimates for activity rates and emission factors are default values from the IPCC Reference Manual. A few of the uncertainty estimates are, however, based on national estimates.

Table 34 Uncertainty rates for activity rates and emission factors.

IPCC Source category	Gas	Activity data uncertainty %		Emission factor uncertainty %	
Stationary Combustion, Coal	CO_2	1	1)	5	3)
Stationary Combustion, BKB	CO_2	3	1)	5	1)
Stationary Combustion, Coke oven coke	CO_2	3	1)	5	1)
Stationary Combustion, Petroleum coke	CO_2	3	1)	5	1)
Stationary Combustion, Plastic waste	CO_2	5	4)	5	4)
Stationary Combustion, Residual oil	CO_2	2	1)	2	3)
Stationary Combustion, Gas oil	CO_2	4	1)	5	1)
Stationary Combustion, Kerosene	CO_2	4	1)	5	1)
Stationary Combustion, Orimulsion	CO_2	1	1)	2	3)
Stationary Combustion, Natural gas	CO_2	3	1)	1	3)
Stationary Combustion, LPG	CO_2	4	1)	5	1)
Stationary Combustion, Refinery gas	CO_2	3	1)	5	1)
Stationary combustion plants, gas engines	CH_4	2,2	1)	40	2)
Stationary combustion plants, other	CH_4	2,2	1)	100	1)
Stationary combustion plants	N_2O	2,2	1)	1000	1)

1) IPCC Good Practice Guidance (default value)

2) Kristensen (2001)

3) Jensen & Lindroth (2002)

4) NERI assumption

11.1.2 Other pollutants

With regard to other pollutants, IPCC methodologies for uncertainty estimates have been adopted for the LRTAP Convention reporting activities (Pulles & Aardenne 2003). 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 2005 as well as on uncertainties for fuel consumption and emission factors for each of the main SNAP sectors. 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 2003. The uncertainty for PM is, however, estimated by NERI. 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 35. The uncertainty for fuel consumption in stationary combustion plants was assumed to be 2%.

Table 35 Uncertainty rates for emission factors [%].

SNAP sector	SO_2	NO_X	NMVOC	CO	PM	HM	PAH
01	10	20	50	20	50	100	100
02	20	50	50	50	500	1000	1000
03	10	20	50	20	50	100	100

11.2 Results

The uncertainty estimates for stationary combustion emission inventories are shown in Table 36. Detailed calculation sheets are provided in Appendix 2A-9.

The uncertainty interval for GHG is estimated to be ±8.4% and the uncertainty for the trend in GHG emission is ±2.2%-age points. The main sources of uncertainty for GHG emission are N_2O emission (all plants) and CO_2 emission from coal combustion. The main source of uncertainty in the trend in GHG emission is CO_2 emission from the combustion of coal and natural gas.

The total emission uncertainty is 7% for SO_2, 16% for NO_X, 42% for NMVOC and 46% for CO. For PM, heavy metals, except Pb, and PAH the uncertainty estimate is greater than 100%.

Table 36 Danish uncertainty estimates, 2005.

Pollutant	Uncertainty Total emission [%]	Trend 1990-2005 [%]	Uncertainty Trend [%-age points]
GHG	8.4	-14	± 2.2
CO_2	2.6	-15	± 1,6
CH_4	42	+325	± 282
N_2O	1000	+9.1	± 3.4
SO_2	7	-88	±0.7
NO_X	16	-41	±2.6
NMVOC	42	+73	±10
CO	46	+49	±5
TSP [1)]	452	+33	±27
PM_{10} [1)]	468	+32	±33
$PM_{2.5}$ [1)]	475	+33	±27
As	130	-63	±11
Cd	356	-46	±116
Cr	101	-85	±5
Cu	239	-71	±43
Hg	227	-61	±45
Ni	103	-63	±3
Pb	93	-75	±4
Se	120	-65	±14
Zn	217	+2	±60
Benzo(b)fluoranthene	971	+66	±7
Benzo(k)fluoranthene	987	+186	±86
Benzo(a)pyrene	991	+101	±6
Indeno(1,2,3-c,d)	995	+74	±14

1. The base year for PM is year 2000

12 Geographical distribution of the emissions

Geographical distribution of emissions has been reported to the LRTAP Convention for the years 1990, 1995, 2000 and 2005 (Jensen et al., 2007). The emissions are disaggregated to a grid of 50x50 km^2. Gridded data are reported for SO_2, NO_X, NMVOC, CO, PM, heavy metals, dioxin and PAH. The assumptions and methodology will not be discussed here, but gridded emission data for SO_2 are illustrated in Figure 40. The gridded emission data are available on the EU EIONET (European Environment Information and Observation Network) homepage, which can be linked from the NERI home page, www.dmu.dk.

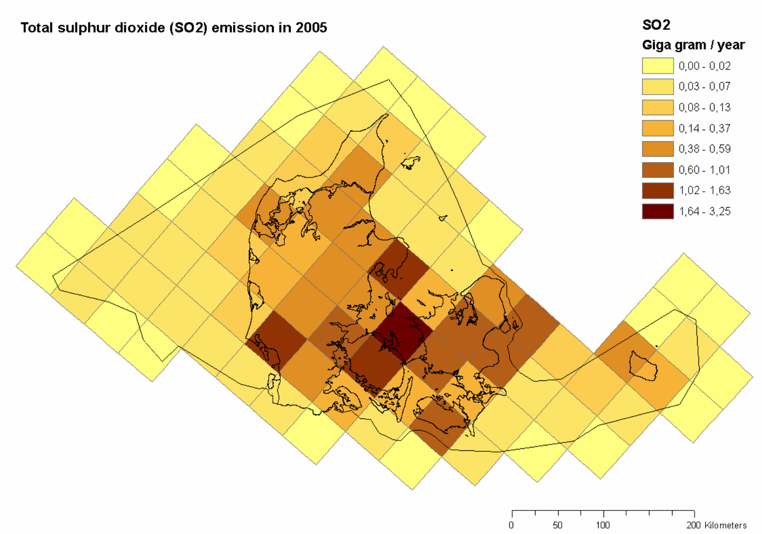


Figure 40 Gridded SO_2 emission from stationary combustion, 2005 (Jensen et al., 2007).

13 Improvements/recalculations since reporting in 2006

Improvements and recalculations since the 2006 emission inventory include:

Update of fuel rates according to the latest energy statistics. The update included the years 1980-2004.

Emission factors for NMVOC, TSP, PM10, PM2.5 & PAH for residential wood combustion has been updated based on new research

14 Future improvements

Some planned improvements of the emission inventories are discussed below.

1) Improved documentation for emission factors

Reporting of and references for the applied emission factors have been improved in the current year and will be further developed in future inventories.

2) QA/QC and validation

The QA/QC and validation of the inventories for stationary combustion will be further expanded as part of the ongoing work that for the Danish inventory as a whole. The work is documented in Denmark's National Inventory Report (Illerup et al. 2007a)

3) Uncertainty estimates

Uncertainty estimates are based mainly on default uncertainty levels for activity rates and emission factors. More country-specific uncertainty estimates will be incorporated in future inventories.

4) Other improvements

- HM emission factors should be compared to new Danish legislation and updated if relevant.
- A time series for Zn will be estimated

15 Conclusion

The annual Danish emission inventories are prepared and reported by NERI. The inventories are based on the Danish energy statistics and on a set of emission factors for various sectors, technologies and fuels. Plant-specific emissions for large combustion sources are incorporated in the inventories.

Since 1990 fuel consumption has increased by 6.6% - fossil fuel consumption, however decreased by 4.9%. The use of coal has decreased whereas the use of natural gas and renewable fuels has increased. The Danish fuel consumption fluctuates due to variation in the import/export of electricity from year to year.

Stationary combustion plants account for more than 50% of the total Danish emission for the following pollutants: SO_2, CO_2, heavy metals (except Cu), $PM_{2.5}$ and PAH. Furthermore, the emission from stationary combustion plants accounts for more than 10% of the total Danish emission for the following pollutants: NO_X, CO, NMVOC, TSP, PM_{10} and Cu. Stationary combustion plants account for less than 10% of the total Danish CH_4 and N_2O emission.

Public power plants are the most important stationary combustion emission source for SO_2, CO_2, NO_X and heavy metals.

Lean-burn gas engines installed in decentralised CHP plants are the largest stationary combustion emission source for CH_4. Furthermore, these plants are also a considerable emission source for NMVOC.

Residential plants represent the most important stationary combustion source for CO, NMVOC, particulate matter and PAH. Wood combustion in residential plants is the predominant emission source.

The greenhouse gas emission (GHG) development follows the CO_2 emission development closely. Both the CO_2 and the total GHG emission were lower in 2005 than in 1990: CO_2 by 15% and GHG by 14%. However fluctuations in the GHG emission level are great. The fluctuations in the time-series are a result of electricity import/export and of outdoor temperature variations from year to year.

The CH_4 emission from stationary combustion has increased by a factor of 4.2 since 1990. This is a result of the considerable number of lean-burn gas engines installed in CHP plants in Denmark during this period.

SO_2 emission from stationary combustion plants has decreased by 96% from 1980 and by 85% from 1995. The considerable emission decrease is mainly a result of the reduced emission from electricity and heat production due to installation of desulphurisation technology and the use of fuels with lower sulphur content.

The NO_X emission from stationary combustion plants has decreased by 54% since 1985 and 38% since 1995. The reduced emission is mainly a result of the reduced emission from electricity and heat production. The fluctuations in the emission time-series follow fluctuations in electricity import/export.

Wood consumption in residential plants has increased by 180% from 1990 to 2005 leading to an increased CO emission. The increase in CO emission from residential plants is less than the increase in wood consumption, because CO emission from straw-fired farmhouse boilers has decreased considerably.

The NMVOC emission from stationary combustion plants has increased by 69% from 1985 and 37% from 1995. The increased NMVOC emission is mainly a result of the increased use of lean-burn gas engines. The emission from residential plants is relatively constant, but the emission from wood combustion increased considerably and the emission from straw combustion decreased.

All the heavy metal emissions decreased considerably since 1990 – between 46% and 85%[4]. This is a result of the installation and improved performance of gas cleaning devices in municipal waste incineration plants and large power plants.

The PAH emission has doubled since 1990 due to the increased consumption of wood in residential plants. Dioxin emission decreased 61%.

The uncertainty level of the Danish greenhouse gas emission from stationary combustion is estimated to be within a range of ±8.4% and the trend uncertainty within a range of ±2.2%-age points. The sources contributing the most to the uncertainty estimates are the N_2O emission (all plants) and the CO_2 emission from coal combustion.

[4] The estimated Zn emission is 2% higher in 2005 than in 1990. This is presumably due to insufficient emission factor update for resent years.

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Appendix

Appendix 2A-1: The Danish emission inventory for the year 2005 reported to the Climate Convention in 2007

Appendix 2A-2: Emission inventory for the year 2005 reported to the LRTAP Convention in 2007

Appendix 2A-3: IPCC/SNAP source correspondence list

Appendix 2A-4: Emission factors, references

Appendix 2A-5: Fuel rate

Appendix 2A-6: Emission factors

Appendix 2A-7: Implied emission factors for power plants and municipal waste incineration plants

Appendix 2A-8: Large point sources

Appendix 2A-9: Uncertainty estimates

Appendix 2A-10: Lower Calorific Value (LCV) of fuels

Appendix 2A-11: Adjustment of CO_2 emission

Appendix 2A-12: Reference approach

Appendix 2A-13: Emission inventory 2005 based on SNAP sectors

Appendix 2A-1 The Danish emission inventory for the year 2005 reported to the Climate Convention

Table 37 The Danish emission inventory for the year 2005 reported to the Climate Convention in 2007 (Illerup et al. 2007a).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 (1)	CH_4	N_2O	HFCs (2)	PFCs (2)	SF_6 (2)	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions)	48.973,31	5.635,22	7.044,41	805,14	13,90	21,75	62.493,74
1. Energy	48.648,63	677,53	749,20				50.075,35
A. Fuel Combustion (Sectoral Approach)	48.214,10	576,82	746,83				49.537,75
1. Energy Industries	22.130,22	292,42	142,11				22.564,75
2. Manufacturing Industries and Construction	5.571,49	31,69	55,89				5.659,07
3. Transport	13.065,44	48,95	443,17				13.557,55
4. Other Sectors	7.176,16	203,45	101,67				7.481,27
5. Other	270,80	0,31	4,00				275,11
B. Fugitive Emissions from Fuels	434,53	100,71	2,36				537,60
1. Solid Fuels	NA,NO	NA,NO	NA,NO				NA,NO
2. Oil and Natural Gas	434,53	100,71	2,36				537,60
2. Industrial Processes	1.659,41	IE,NA,NO	IE,NA,NO	805,14	13,90	21,75	2.500,20
A. Mineral Products	1.640,82	IE,NA	IE,NA				1.640,82
B. Chemical Industry	3,01	NA,NO	NA,NO	NA	NA	NA	3,01
C. Metal Production	15,58	NA,NO	NA	NA	NA,NO	NA,NO	15,58
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NA,NO	NA,NO	NA,NO	NA,NO
F. Consumption of Halocarbons and SF_6				805,14	13,90	21,75	840,80
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	116,20		NA				116,20
4. Agriculture		3.646,20	6.234,07				9.880,27
A. Enteric Fermentation		2.630,04					2.630,04
B. Manure Management		1.016,17	557,38				1.573,55
C. Rice Cultivation		NA,NO					NA,NO
D. Agricultural Soils(3)		NE,NO	5.676,68				5.676,68
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		NA,NO	NA,NO				NA,NO
G. Other		NA	NA				NA
5. Land Use, Land-Use Change and Forestry	-1.452,76	-0,49	0,15				-1.453,11
A. Forest Land	-1.823,36	NE,NO	IE,NE,NO				-1.823,36
B. Cropland	308,07	NA,NO	NA,NO				308,07
C. Grassland	75,54	NO	NO				75,54
D. Wetlands	-13,01	-0,49	0,15				-13,36
E. Settlements	NE,NO	NE,NO	NE,NO				NE,NO
F. Other Land	NE,NO	NE,NO	NE,NO				NE,NO
G. Other	NO	NO	NO				NO
6. Waste	1,84	1.311,98	61,00				1.374,82
A. Solid Waste Disposal on Land	NA,NE,NO	1.058,76					1.058,76
B. Waste-water Handling		253,22	60,99				314,20
C. Waste Incineration	IE	IE	IE				IE
D. Other	1,84	0,00	0,01				1,86
7. Other *(as specified in Summary 1.A)*	NA	NA	NA	NA	NA	NA	NA

Memo Items:							
International Bunkers	5.211,34	2,33	78,94				5.292,61
Aviation	2.575,38	1,03	27,52				2.603,93
Marine	2.635,96	1,30	51,42				2.688,68
Multilateral Operations	NO	NO	NO				NO
CO_2 Emissions from Biomass	10.615,13						10.615,13

Appendix 2A-2 Emission inventory for the year 2005 reported to the LRTAP Convention in 2007

Table 38a Emission inventory for the year 2005 reported to the LRTAP in 2007 (a) (Illerup et al. 2007b).

	NOx	CO	NMVOC	SOx	TSP	PM10	PM2.5
	Gg NO2	Gg	Gg	Gg SO2	Mg	Mg	Mg
1 A 1 a Public Electricity and Heat Production	39,37	10,79	3,71	7,72	1135,46	625,76	504,81
1 A 1 b Petroleum refining	1,51	0,22	0,00	0,33	114,07	106,60	102,87
1 A 1 c Manufacture of Solid Fuels and Other Energy Industries	7,00	0,21	0,04	0,01	3,07	1,77	1,46
1 A 2 Manufacturing Industries and Construction	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 A 2 a Iron and Steel	IE	IE	IE	IE	174,52	52,36	7,85
1 A 2 b Non-ferrous Metals	IE	IE	IE	IE	30,48	27,38	12,72
1 A 2 c Chemicals	IE	IE	IE	IE	IE	IE	IE
1 A 2 d Pulp, Paper and Print	IE	IE	IE	IE	IE	IE	IE
1 A 2 e Food Processing, Beverages and Tobacco	IE	IE	IE	IE	IE	IE	IE
1 A 2 f Other (Please specify in a covering note)	23,15	19,87	2,22	6,07	1697,57	1518,72	1331,81
1 A 3 a ii Civil Aviation (Domestic, LTO)	0,17	0,73	0,13	0,01	1,35	1,35	1,35
1 A 3 a ii Civil Aviation (Domestic, Cruise)	0,41	0,13	0,03	0,03	1,65	1,65	1,65
1 A 3 b Road Transportation	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 A 3 b i R.T., Passenger cars	22,26	151,47	13,33	0,04	726,78	726,78	726,78
1 A 3 b ii R.T., Light duty vehicles	10,23	13,29	1,67	0,01	1321,45	1321,45	1321,45
1 A 3 b iii R.T., Heavy duty vehicles	35,45	8,01	1,65	0,02	1018,58	1018,58	1018,58
1 A 3 b iv R.T., Mopeds & Motorcycles	0,16	15,31	3,27	0,00	57,02	57,02	57,02
1 A 3 b v R.T., Gasoline evaporation	NA	NA	4,40	NA	NA	NA	NA
1 A 3 b vi R.T., Automobile tyre and brake wear	NA	NA	NA	NA	1505,86	1128,86	614,67
1 A 3 b vii R.T., Automobile road abrasion	NA	NA	NA	NA	1049,23	524,62	283,29
1 A 3 c Railways	3,72	0,65	0,24	0,00	123,76	123,76	123,76
1 A 3 d ii National Navigation	9,65	7,80	1,39	1,97	433,04	430,18	428,75
1 A 3 e Other (Please specify in a covering note)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 A 3 e i Pipeline compressors	IE	IE	IE	IE	IE	IE	IE
1 A 3 e ii Other mobile sources and machinery	NO	NO	NO	NO	NO	NO	NO
1 A 4 a Commercial / Institutional	1,08	0,95	0,57	0,26	139,17	133,46	124,26
1 A 4 b Residential	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 A 4 b i Residential plants	5,76	240,97	17,13	2,38	19705,1	18675,5	17665,6
1 A 4 b ii Household and gardening (mobile)	0,33	115,09	8,73	0,00	87,32	87,32	87,32
1 A 4 c Agriculture / Forestry / Fishing	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 A 4 c i Stationary	1,31	8,49	1,57	1,61	525,12	487,93	453,94
1 A 4 c ii Off-road Vehicles and Other Machinery	12,15	14,72	2,12	0,03	998,56	998,56	998,56
1A 4 c iii National Fishing	8,56	1,18	0,36	0,59	171,38	169,66	168,81
1 A 5 a Other, Stationary (including Military)	NO	NO	NO	NO	NO	NO	NO
1 A 5 b Other, Mobile (Including military)	1,33	0,82	0,11	0,06	44,77	44,77	44,77
1B1 Fugitive Emissions from Solid Fuels	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 B 1 a Coal Mining and Handling	NA	NA	NA	NA	904,78	361,91	36,19
1 B 1 b Solid fuel transformation	NO	NO	NO	NO	NO	NO	NO
1 B 1 c Other (Please specify in a covering note)	NO	NO	NO	NO	NO	NO	NO
1 B 2 Oil and natural gas	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 B 2 a Oil	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 B 2 a i Exploration Production, Transport	NA	NA	10,87	IE	NA	NA	NA
1 B 2 a iv Refining / Storage	NA	NA	3,55	0,26	NA	NA	NA
1 B 2 a v Distribution of oil products	NA	NA	1,00	NA	NA	NA	NA
1 B 2 a vi Other	NO	NO	NO	NO	NO	NO	NO
1 B 2 b Natural gas	NA	NA	0,08	NA	NA	NA	NA
1 B 2 c Venting and flaring	2,22	0,19	0,05	0,05	2,32	2,32	2,32
2 A MINERAL PRODUCTS (b)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2 A 1 Cement Production	IE	IE	IE	IE	IE	IE	IE
2 A 2 Lime Production	IE	IE	IE	IE	IE	IE	IE
2 A 3 Limestone and Dolomite Use	IE	IE	IE	IE	IE	IE	IE
2 A 4 Soda Ash Production and use	IE	IE	IE	IE	IE	IE	IE
2 A 5 Asphalt Roofing	NE	0,00	0,01	NE	NE	NE	NE
2 A 6 Road Paving with Asphalt	NE	0,27	0,55	NE	NE	NE	NE
2 A 7 Other including Non Fuel Mining & Construction (Please specify in a covering note)	NE	NE	0,01	NE	0,00	0,00	0,00
2 B CHEMICAL INDUSTRY	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2 B 1 Ammonia Production	NO	NO	NO	NO	NO	NO	NO
2 B 2 Nitric Acid Production	0,00	NA	NA	NA	0,00	0,00	0,00
2 B 3 Adipic Acid Production	NO	NO	NO	NO	NO	NO	NO
2 B 4 Carbide Production	NO	NO	NO	NO	NO	NO	NO
2 B 5 Other (Please specify in a covering note)	0,03	NE	0,03	0,40	NE	NE	NE
2 C METAL PRODUCTION	NA	NE	NE	NA	NE	NE	NE
2 D OTHER PRODUCTION (b)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2 D 1 Pulp and Paper	NE	NE	NE	NE	NE	NE	NE

2 D 2 Food and Drink	NE	NE	0,53	NE	NE	NE	NE
2 G OTHER (Please specify in a covering note)	NO	NO	NO	NO	NO	NO	NO
3 A PAINT APPLICATION	NA	NA	13,79	NA	NA	NA	NA
3 B DEGREASING AND DRY CLEANING	NA	NA	4,88	NA	NA	NA	NA
3 C CHEMICAL PRODUCTS, MANUFACTURE AND PROCESSING	NA	NA	2,58	NA	NA	NA	NA
3 D OTHER including products containing HMs and POPs (Please specify in a covering note)	NA	NA	16,03	NA	NA	NA	NA
4 B MANURE MANAGEMENT (c)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
4 B 1 Cattle	IE	IE	IE	IE	IE	IE	IE
4 B 1 a Dairy	NA	NA	NA	NA	643,39	295,96	190,11
4 B 1 b Non-Dairy	NA	NA	NA	NA	340,51	156,64	100,76
4 B 2 Buffalo	NO	NO	NO	NO	NO	NO	NO
4 B 3 Sheep	NA	NA	NA	NA	NE	NE	NE
4 B 4 Goats	NA	NA	NA	NA	NE	NE	NE
4 B 5 Camels and Llamas	NO	NO	NO	NO	NO	NO	NO
4 B 6 Horses	NA	NA	NA	NA	30,52	14,04	9,36
4 B 7 Mules and Asses	NO	NO	NO	NO	NO	NO	NO
4 B 8 Swine	NA	NA	NA	NA	8293,45	3732,05	608,88
4 B 9 Poultry	NA	NA	NA	NA	5313,40	5313,40	758,19
4 B 13 Other	NA	NA	NA	NA	NE	NE	NE
4 C RICE CULTIVATION	NO	NO	NO	NO	NO	NO	NO
4 D AGRICULTURAL SOILS	0,00	0,00	0,00	0,00	0,00	0,00	0,00
4 D 1 Direct Soil Emission	NA	NA	1,67	NA	NE	NE	NE
4 F FIELD BURNING OF AGRICULTURAL WASTES	NO	NO	NO	NO	NO	NO	NO
4 G OTHER (d)	NO	NO	NO	NO	NO	NO	NO
5 B FOREST AND GRASSLAND CONVERSION	NO	NO	NO	NO	NO	NO	NO
6 A SOLID WASTE DISPOSAL ON LAND	NA	NA	NE	NA	NA	NA	NA
6 B WASTE-WATER HANDLING	NA	NA	NE	NA	NA	NA	NA
6 C WASTE INCINERATION (e)	NO	NO	NO	NO	NO	NO	NO
6 D OTHER WASTE (f)	0,00	0,00	0,00	0,00	0,03	0,03	0,03
7 OTHER	NA	NA	NA	NA	NA	NA	NA
National Total	**185,8**	**611,2**	**118,3**	**21,9**	**465934**	**38140**	**27788**
Memo Items							
International Aviation (LTO)	1,03	0,71	0,13	0,07	3,64	3,64	3,64
International Aviation (Cruise)	10,01	1,21	0,34	0,75	37,93	37,93	37,93
International Navigation	62,83	6,61	2,01	36,54	5843,61	5785,18	5755,96
5 E Other	NO	NO	NO	NO	NO	NO	NO
X (11 08 Volcanoes)	NO	NO	NO	NO	NO	NO	NO

Table 38b Emission inventory for the year 2005 reported to the LRTAP in 2007 (b) (Illerup et al. 2007b).

	Pb Mg	Cd Mg	Hg Mg	As Mg	Cr Mg	Cu Mg	Ni Mg	Se Mg	Zn Mg
1 A 1 a Public Electricity and Heat Production	2,53	0,22	0,72	0,28	0,51	0,64	2,81	0,70	14,41
1 A 1 b Petroleum refining	0,02	0,01	0,00	0,01	0,02	0,01	0,48	0,01	0,00
1 A 1 c Manufacture of Solid Fuels and Other Energy Industries	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
1 A 2 Manufacturing Industries and Construction	-	-	-	-	-	-	-	-	-
1 A 2 a Iron and Steel	0,63	0,01	NE	0,03	0,10	NE	0,11	0,44	0,44
1 A 2 b Non-ferrous Metals	0,01	0,00	NE	NE	NE	0,00	NE	NE	-
1 A 2 c Chemicals	IE	IE	IE	IE	IE	IE	IE	IE	IE
1 A 2 d Pulp, Paper and Print	IE	IE	IE	IE	IE	IE	IE	IE	IE
1 A 2 e Food Processing, Beverages and Tobacco	IE	IE	IE	IE	IE	IE	IE	IE	IE
1 A 2 f Other (Please specify in a covering note)	0,36	0,13	0,23	0,16	0,26	0,62	3,99	0,21	1,09
1 A 3 a ii Civil Aviation (Domestic, LTO)	1,30	0,00	NE	NE	0,00	0,02	0,00	0,00	0,01
1 A 3 a ii Civil Aviation (Domestic, Cruise)	-	0,00	-	-	0,00	0,06	0,00	0,00	0,03
1 A 3 b Road Transportation	-	-	-	-	-	-	-	-	-
1 A 3 b i R.T., Passenger cars	0,05	0,02	NE	NE	0,10	3,47	0,14	0,02	2,04
1 A 3 b ii R.T., Light duty vehicles	0,00	0,01	NE	NE	0,04	1,26	0,05	0,01	0,74
1 A 3 b iii R.T., Heavy duty vehicles	0,00	0,01	NE	NE	0,05	1,74	0,07	0,01	1,02
1 A 3 b iv R.T., Mopeds & Motorcycles	0,00	0,00	NE	NE	0,00	0,04	0,00	0,00	0,03
1 A 3 b v R.T., Gasoline evaporation	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 A 3 b vi R.T., Automobile tyre and brake wear	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 A 3 b vii R.T., Automobile road abrasion	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 A 3 c Railways	NA	0,00	NA	NA	0,00	0,12	0,01	0,00	0,07
1 A 3 d ii National Navigation	0,02	0,00	0,01	0,02	0,01	0,08	1,11	0,04	0,12
1 A 3 e Other (Please specify in a covering note)	-	-	-	-	-	-	-	-	-
1 A 3 e i Pipeline compressors	IE	IE	IE	IE	IE	IE	IE	IE	IE
1 A 3 e ii Other mobile sources and machinery	NO	NO	NO	NO	NO	NO	NO	NO	NO
1 A 4 a Commercial / Institutional	0,02	0,01	0,02	0,01	0,01	0,01	0,08	0,02	0,20
1 A 4 b Residential	-	-	-	-	-	-	-	-	-
1 A 4 b i Residential plants	0,16	0,18	0,22	0,03	0,03	0,21	0,05	0,11	3,73
1 A 4 b ii Household and gardening (mobile)	0,00	0,00	NE	NE	0,00	0,16	0,01	0,00	0,09
1 A 4 c Agriculture / Forestry / Fishing	-	-	-	-	-	-	-	-	-
1 A 4 c i Stationary	0,04	0,01	0,02	0,02	0,03	0,02	0,50	0,02	0,08
1 A 4 c ii Off-road Vehicles and Other Machinery	0,00	0,00	NA	NA	0,02	0,59	0,02	0,00	0,35
1A 4 c iii National Fishing	0,01	0,00	0,01	0,01	0,01	0,01	0,01	0,03	0,07
1 A 5 a Other, Stationary (including Military)	NO	NO	NO	NO	NO	NO	NO	NO	NO
1 A 5 b Other, Mobile (Including military)	0,06	0,00	-	-	0,00	0,15	0,01	0,00	0,09
1B1 Fugitive Emissions from Solid Fuels	-	-	-	-	-	-	-	-	-
1 B 1 a Coal Mining and Handling	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 B 1 b Solid fuel transformation	NO	NO	NO	NO	NO	NO	NO	NO	NO
1 B 1 c Other (Please specify in a covering note)	NO	NO	NO	NO	NO	NO	NO	NO	NO
1 B 2 Oil and natural gas	-	-	-	-	-	-	-	-	-
1 B 2 a Oil	-	-	-	-	-	-	-	-	-
1 B 2 a i Exploration Production, Transport	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 B 2 a iv Refining / Storage	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 B 2 a v Distribution of oil products	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 B 2 a vi Other	NO	NO	NO	NO	NO	NO	NO	NO	NO
1 B 2 b Natural gas	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 B 2 c Venting and flaring	-	-	-	-	-	-	-	-	-
2 A MINERAL PRODUCTS (b)	-	-	-	-	-	-	-	-	-
2 A 1 Cement Production	IE	IE	IE	IE	IE	IE	IE	IE	IE
2 A 2 Lime Production	IE	IE	IE	IE	IE	IE	IE	IE	IE
2 A 3 Limestone and Dolomite Use	IE	IE	IE	IE	IE	IE	IE	IE	IE
2 A 4 Soda Ash Production and use	IE	IE	IE	IE	IE	IE	IE	IE	IE
2 A 5 Asphalt Roofing	NE	NE	NE	NE	NE	NE	NE	NE	NE
2 A 6 Road Paving with Asphalt	NE	NE	NE	NE	NE	NE	NE	NE	NE
2 A 7 Other including Non Fuel Mining & Construction (Please specify in a covering note)	NE	NE	NE	NE	NE	NE	NE	NE	NE
2 B CHEMICAL INDUSTRY	-	-	-	-	-	-	-	-	-
2 B 1 Ammonia Production	NO	NO	NO	NO	NO	NO	NO	NO	NO
2 B 2 Nitric Acid Production	NA	NA	NA	NA	NA	NA	NA	NA	NA
2 B 3 Adipic Acid Production	NO	NO	NO	NO	NO	NO	NO	NO	NO
2 B 4 Carbide Production	NO	NO	NO	NO	NO	NO	NO	NO	NO
2 B 5 Other (Please specify in a covering note)	NE	NE	NE	NE	NE	NE	NE	NE	NE
2 C METAL PRODUCTION	0,37	0,00	0,06	NE	-	0,05	0,04	NE	1,60
2 D OTHER PRODUCTION (b)	-	-	-	-	-	-	-	-	-
2 D 1 Pulp and Paper	NA	NA	NA	NA	NA	NA	NA	NA	NA
2 D 2 Food and Drink	NA	NA	NA	NA	NA	NA	NA	NA	NA
2 G OTHER (Please specify in a covering note)	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 A PAINT APPLICATION	NA	NA	NA	NA	NA	NA	NA	NA	NA
3 B DEGREASING AND DRY CLEANING	NA	NA	NA	NA	NA	NA	NA	NA	NA
3 C CHEMICAL PRODUCTS, MANUFACTURE AND PROC-	NA	NA	NA	NA	NA	NA	NA	NA	NA

ESSING									
3 D OTHER including products containing HMs and POPs (Please specify in a covering note)	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B MANURE MANAGEMENT (c)	-	-	-	-	-	-	-	-	-
4 B 1 Cattle	IE	IE	IE	IE	IE	IE	IE	IE	IE
4 B 1 a Dairy	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B 1 b Non-Dairy	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B 2 Buffalo	NO	NO	NO	NO	NO	NO	NO	NO	NO
4 B 3 Sheep	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B 4 Goats	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B 5 Camels and Llamas	NO	NO	NO	NO	NO	NO	NO	NO	NO
4 B 6 Horses	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B 7 Mules and Asses	NO	NO	NO	NO	NO	NO	NO	NO	NO
4 B 8 Swine	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B 9 Poultry	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 B 13 Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 C RICE CULTIVATION	NO	NO	NO	NO	NO	NO	NO	NO	NO
4 D AGRICULTURAL SOILS	-	-	-	-	-	-	-	-	-
4 D 1 Direct Soil Emission	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 F FIELD BURNING OF AGRICULTURAL WASTES	NO	NO	NO	NO	NO	NO	NO	NO	NO
4 G OTHER (d)	NO	NO	NO	NO	NO	NO	NO	NO	NO
5 B FOREST AND GRASSLAND CONVERSION	NO	NO	NO	NO	NO	NO	NO	NO	NO
6 A SOLID WASTE DISPOSAL ON LAND	NA	NA	NA	NA	NA	NA	NA	NA	NA
6 B WASTE-WATER HANDLING	NA	NA	NA	NA	NA	NA	NA	NA	NA
6 C WASTE INCINERATION (e)	NO	NO	NO	NO	NO	NO	NO	NO	NO
6 D OTHER WASTE (f)	NE	NE	NE	NE	NE	NE	NE	NE	NE
7 OTHER	NA	NA	NA	NA	NA	NA	NA	NA	NA
National Total	**5,58**	**0,62**	**1,29**	**0,57**	**1,20**	**9,25**	**9,51**	**1,62**	**26,21**
Memo Items									
International Aviation (LTO)	0,12	0,00	-	-	0,00	0,12	0,00	0,00	0,07
International Aviation (Cruise)	-	0,01	-	-	0,04	1,27	0,05	0,01	0,75
International Navigation	0,13	0,02	0,03	0,27	0,11	0,27	15,13	0,27	0,62
5 E Other	NO	NO	NO	NO	NO	NO	NO	NO	NO
X (11 08 Volcanoes)	NO	NO	NO	NO	NO	NO	NO	NO	NO

Table 38c Emission inventory for the year 2004 reported to the LRTAP in 2006 (c) (Illerup et al. 2006b).

	Dioxin g I-Teq	Benzo(a)-pyrene Mg	Benzo(b)-fluoranthene Mg	Benzo(k)-fluoranthene Mg	Indeno(1,3,3-c,d)pyrene Mg
1 A 1 a Public Electricity and Heat Production	2,248	0,007	0,028	0,014	0,006
1 A 1 b Petroleum refining	0,001	0,000	0,000	0,000	0,000
1 A 1 c Manufacture of Solid fuels and Other ENRrgy Industries	0,001	0,000	0,000	0,000	0,000
1 A 2 Manufacturing Industries and Construction	NA	NA	NA	NA	NA
1 A 2 a Iron and Steel	NA	NA	NA	NA	NA
1 A 2 b NAn-ferrous Metals	0,028	NA	NA	NA	NA
1 A 2 c Chemicals	NA	NA	NA	NA	NA
1 A 2 d Pulp, Paper and Print	NA	NA	NA	NA	NA
1 A 2 e Food Processing, Beverages & Tobacco	NA	NA	NA	NA	NA
1 A 2 f Other (Please specify in a covering NAte)	0,143	0,029	0,097	0,020	0,010
1 A 3 a ii Civil Aviation (Domestic, LTO)	0,000	0,000	0,000	0,000	0,000
1 A 3 a ii Civil Aviation (Domestic, Cruise)	-	-	-	-	-
1 A 3 b Road Transportation	-	-	-	-	-
1 A 3 b i R.T., Passenger cars	0,115	0,028	0,028	0,028	0,033
1 A 3 b ii R.T., Light duty vehicles	0,020	0,017	0,016	0,014	0,016
1 A 3 b iii R.T., Heavy duty vehicles	0,043	0,004	0,021	0,032	0,006
1 A 3 b iv R.T., Mopeds & Motorcycles	0,021	0,001	0,001	0,001	0,001
1 A 3 b v R.T., GasoliNR evaporation	NA	NA	NA	NA	NA
1 A 3 b vi R.T., Automobile tyre and brake wear	NA	NA	NA	NA	NA
1 A 3 b vii R.T., Automobile road abrasion	NA	NA	NA	NA	NA
1 A 3 c Railways	0,002	0,000	0,001	0,001	0,000
1 A 3 d ii National Navigation	0,075	0,001	0,004	0,002	0,006
1 A 3 e Other (Please specify in a covering NAte)	-	-	-	-	-
1 A 3 e i PipeliNR compressors	NA	NA	NA	NA	NA
1 A 3 e ii Other mobile sources and machiNRry	NO	NO	NO	NO	NO
1 A 4 a Commercial / Institutional	0,367	0,120	0,158	0,052	0,085
1 A 4 b Residential	NA	NA	NA	NA	NA
1 A 4 b i Residential plants	14,402	3,517	3,666	2,131	2,402
1 A 4 b ii Household and gardening (mobile)	0,021	0,000	0,001	0,000	0,001
1 A 4 c Agriculture / Forestry / Fishing	NA	NA	NA	NA	NA
1 A 4 c i Stationary	1,400	0,151	0,164	0,025	0,235
1 A 4 c ii Off-road Vehicles and Other MachiNRry	0,012	0,004	0,007	0,007	0,004
1A 4 c iii National Fishing	0,076	0,001	0,004	0,002	0,007
1 A 5 a Other, Stationary (including Military)	NO	NO	NO	NO	NO
1 A 5 b Other, Mobile (Including military)	0,001	0,000	0,001	0,001	0,000
1B1 Fugitive Emissions from Solid Fuels	-	-	-	-	-
1 B 1 a Coal Mining and Handling	NA	NA	NA	NA	NA
1 B 1 b Solid fuel transformation	NO	NO	NO	NO	NO
1 B 1 c Other (Please specify in a covering NAte)	NO	NO	NO	NO	NO
1 B 2 Oil and natural gas	-	-	-	-	-
1 B 2 a Oil	-	-	-	-	-
1 B 2 a i Exploration Production, Transport	NA	NA	NA	NA	NA
1 B 2 a iv Refining / Storage	NA	NA	NA	NA	NA
1 B 2 a v Distribution of oil products	NA	NA	NA	NA	NA
1 B 2 a vi Other	NA	NA	NA	NA	NA
1 B 2 b Natural gas	NA	NA	NA	NA	NA
1 B 2 c Venting and flaring	0,000	-	-	-	-
2 A MINRRAL PRODUCTS (a)	-	-	-	-	-
2 A 1 Cement Production	NA	NA	NA	NA	NA
2 A 2 Lime Production	0,014	NA	NA	NA	NA
2 A 3 LimestoNR and Dolomite Use	NA	NA	NA	NA	NA
2 A 4 Soda Ash Production and use	NA	NA	NA	NA	NA
2 A 5 Asphalt Roofing	NA	NA	NA	NA	NA
2 A 6 Road Paving with Asphalt	NA	NA	NA	NA	NA
2 A 7 Other including NAn Fuel Mining & Construction (Please specify in a covering NAte)	NA	NA	NA	NA	NA
2 B CHEMICAL INDUSTRY	-	-	-	-	-
2 B 1 Ammonia Production	NO	NO	NO	NO	NO
2 B 2 Nitric Acid Production	NA	NA	NA	NA	NA
2 B 3 Adipic Acid Production	NO	NO	NO	NO	NO
2 B 4 Carbide Production	NO	NO	NO	NO	NO
2 B 5 Other (Please specify in a covering NAte)	NA	NA	NA	NA	NA
2 C METAL PRODUCTION	0,180	NA	NA	NA	NA
2 D OTHER PRODUCTION (a)	NA	NA	NA	NA	NA
2 D 1 Pulp and Paper	NA	NA	NA	NA	NA
2 D 2 Food and Drink	NA	NA	NA	NA	NA

2 G OTHER (Please specify in a covering NAte)	NO	NO	NO	NO	NO
3 A PAINT APPLICATION	NA	NA	NA	NA	NA
3 B DEGREASING AND DRY CLEANING	NA	NA	NA	NA	NA
3 C CHEMICAL PRODUCTS, MANUFACTURE AND PROCESSING	NA	NA	NA	NA	NA
3 D OTHER including products containing HMs and POPs (Please specify in a covering NAte)	NA	NA	NA	NA	NA
4 B MANURE MANAGEMENT (b)	-	-	-	-	-
4 B 1 Cattle	NA	NA	NA	NA	NA
4 B 1 a Dairy	NA	NA	NA	NA	NA
4 B 1 b NAn-Dairy	NA	NA	NA	NA	NA
4 B 2 Buffalo	NO	NO	NO	NO	NO
4 B 3 Sheep	NA	NA	NA	NA	NA
4 B 4 Goats	NA	NA	NA	NA	NA
4 B 5 Camels and Llamas	NO	NO	NO	NO	NO
4 B 6 Horses	NA	NA	NA	NA	NA
4 B 7 Mules and Asses	NO	NO	NO	NO	NO
4 B 8 SwiNR	NA	NA	NA	NA	NA
4 B 9 Poultry	NA	NA	NA	NA	NA
4 B 13 Other	NA	NA	NA	NA	NA
4 C RICE CULTIVATION	NO	NO	NO	NO	NO
4 D AGRICULTURAL SOILS	-	-	-	-	-
4 D 1 Direct Soil Emission	NA	NA	NA	NA	NA
4 F FIELD BURNING OF AGRICULTURAL WASTES	NO	NO	NO	NO	NO
4 G OTHER (c)	NO	NO	NO	NO	NO
5 B FOREST AND GRASSLAND CONVERSION	NO	NO	NO	NO	NO
6 A SOLID WASTE DISPOSAL ON LAND	NA	NA	NA	NA	NA
6 B WASTEWATER HANDLING	NA	NA	NA	NA	NA
6 C WASTE INCINRRATION (d)	0,038	NO	NO	NO	NO
6 D OTHER WASTE (e)	0,000	NA	NA	NA	NA
7 OTHER	6,100	NA	NA	NA	NA
National Total	**25,308**	**3,881**	**4,196**	**2,331**	**2,813**
International Aviation (LTO)	0,000	0,000	0,000	0,000	0,000
International Aviation (Cruise)	-	-	-	-	-
International MariNR (b)	0,443	0,004	0,013	0,006	0,021
5 E Other	NO	NO	NO	NO	NO
X (11 08 VolcaNAes)	NO	NO	NO	NO	NO

Appendix 2A-3 IPCC/SNAP source correspondence list

Table 39 Correspondence list for IPCC source categories 1A1, 1A2 and 1A4 and SNAP (EMEP/Corinair 2004).

SNAP_id	SNAP_name	IPCC source
01	Combustion in energy and transformation industries	
0101	Public power	1A1a
010101	Combustion plants >= 300 MW (boilers)	1A1a
010102	Combustion plants >= 50 and < 300 MW (boilers)	1A1a
010103	Combustion plants < 50 MW (boilers)	1A1a
010104	Gas turbines	1A1a
010105	Stationary engines	1A1a
0102	District heating plants	1A1a
010201	Combustion plants >= 300 MW (boilers)	1A1a
010202	Combustion plants >= 50 and < 300 MW (boilers)	1A1a
010203	Combustion plants < 50 MW (boilers)	1A1a
010204	Gas turbines	1A1a
010205	Stationary engines	1A1a
0103	Petroleum refining plants	1A1b
010301	Combustion plants >= 300 MW (boilers)	1A1b
010302	Combustion plants >= 50 and < 300 MW (boilers)	1A1b
010303	Combustion plants < 50 MW (boilers)	1A1b
010304	Gas turbines	1A1b
010305	Stationary engines	1A1b
010306	Process furnaces	1A1b
0104	Solid fuel transformation plants	1A1c
010401	Combustion plants >= 300 MW (boilers)	1A1c
010402	Combustion plants >= 50 and < 300 MW (boilers)	1A1c
010403	Combustion plants < 50 MW (boilers)	1A1c
010404	Gas turbines	1A1c
010405	Stationary engines	1A1c
010406	Coke oven furnaces	1A1c
010407	Other (coal gasification, liquefaction, ...)	1A1c
0105	Coal mining, oil/gas extraction, pipeline compressors	
010501	Combustion plants >= 300 MW (boilers)	1A1c
010502	Combustion plants >= 50 and < 300 MW (boilers)	1A1c
010503	Combustion plants < 50 MW (boilers)	1A1c
010504	Gas turbines	1A1c
010505	Stationary engines	1A1c
02	Non-industrial combustion plants	
0201	Commercial and institutional plants (t)	1A4a
020101	Combustion plants >= 300 MW (boilers)	1A4a
020102	Combustion plants >= 50 and < 300 MW (boilers)	1A4a
020103	Combustion plants < 50 MW (boilers)	1A4a
020104	Stationary gas turbines	1A4a
020105	Stationary engines	1A4a
020106	Other stationary equipments (n)	1A4a
0202	Residential plants	1A4b
020201	Combustion plants >= 50 MW (boilers)	1A4b
020202	Combustion plants < 50 MW (boilers)	1A4b
020203	Gas turbines	1A4b
020204	Stationary engines	1A4b
020205 [2)]	Other equipments (stoves, fireplaces, cooking,...) [2)]	1A4b
0203	Plants in agriculture, forestry and aquaculture	1A4c
020301	Combustion plants >= 50 MW (boilers)	1A4c
020302	Combustion plants < 50 MW (boilers)	1A4c
020303	Stationary gas turbines	1A4c
020304	Stationary engines	1A4c
020305	Other stationary equipments (n)	1A4c
03	Combustion in manufacturing industry	
0301	Comb. in boilers, gas turbines and stationary	1A2f
030101	Combustion plants >= 300 MW (boilers)	1A2f
030102	Combustion plants >= 50 and < 300 MW (boilers)	1A2f
030103	Combustion plants < 50 MW (boilers)	1A2f
030104	Gas turbines	1A2f
030105	Stationary engines	1A2f
030106	Other stationary equipments (n)	1A2f
0302	Process furnaces without contact	
030203	Blast furnace cowpers	1A2a
030204	Plaster furnaces	1A2f

030205	Other furnaces	1A2f
0303	Processes with contact	
030301	Sinter and pelletizing plants	1A2a
030302	Reheating furnaces steel and iron	1A2a
030303	Gray iron foundries	1A2a
030304	Primary lead production	1A2b
030305	Primary zinc production	1A2b
030306	Primary copper production	1A2b
030307	Secondary lead production	1A2b
030308	Secondary zinc production	1A2b
030309	Secondary copper production	1A2b
030310	Secondary aluminium production	1A2b
030311	Cement (f)	1A2f
030312	Lime (includ. iron and steel and paper pulp industr.)(f)	1A2f
030313	Asphalt concrete plants	1A2f
030314	Flat glass (f)	1A2f
030315	Container glass (f)	1A2f
030316	Glass wool (except binding) (f)	1A2f
030317	Other glass (f)	1A2f
030318	Mineral wool (except binding)	1A2f
030319	Bricks and tiles	1A2f
030320	Fine ceramic materials	1A2f
030321	Paper-mill industry (drying processes)	1A2d
030322	Alumina production	1A2b
030323	Magnesium production (dolomite treatment)	1A2b
030324	Nickel production (thermal process)	1A2b
030325	Enamel production	1A2f
030326	Other	1A2f
08 1)	Other mobile sources and machinery	
0804 1)	Maritime activities	
080403 1)	National fishing	1A4c
0806 1)	Agriculture	1A4c
0807 1)	Forestry	1A4c
0808 1)	Industry	1A2f
0809 1)	Household and gardening	1A4b

1) Not stationary combustion. Included in a IPCC sector that also includes stationary combustion plants

2) Stoves, fireplaces and cooking is included in the sector 0202 or 020202 in the Danish inventory. It is not possible based on the Danish energy statistics to split the residential fuel consumption between stoves/fireplaces/cooking and residential boilers.

Appendix 2A-4 Emission factors, references

Contents

1 SO_2

1.1 Coal, large power plants

Sector 1A1a (SNAP 0101, 010101, 010102, 010103, 010104, 010105)

The SO_2 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 SO_2 emission factor for coal has been estimated as an average value based on the annual reporting from the electricity transmission companies in Denmark, Eltra and Elkraft System[5]. The total SO_2 emission from power plants >25MW$_e$ has been assumed to origin from coal or residual oil. This has lead to a conservative estimate of the emission factor because SO_2 is also emitted from other fuels, and furthermore the emission from residual oil is higher than for coal (Danish plants > 25MW$_e$). The calculated time-series for the SO_2 emission factor are shown below. From 2003 onwards the fuel consumption data were stated in TJ.

The emission factors for 1980-1982 refer to Fenhann & Kilde (1994). These emission factors were also estimated based on the plant specific data for plants > 25MW$_e$. In the inventories for 1980-1989 the power plants are not included as point sources, but the plant specific data are considered in the SO_2 emission factor.

Table 1 SO_2 emission factor for coal combusted in centralised power plants

Year	Total SO_2 emission [1000 ton]1)	Total fuel consumption [PJ]1)	Coal Consumption [Kton]1)	H_u of coal [GJ/ton] 2)	Oil consumption [Kton]1)	H_u of Residual oil [GJ/ton]2)	Fuel consumption coal and residual oil[TJ]	SO_2 emission factor [g/GJ]
1990	119	243	9153	25,3	84	40,4	234965	506
1991	175	323	11975	25,4	62	40,4	306670	571
1992	130	279	11083	25,8	9	40,4	286305	454
1993	100	298	9820	25,2	295	40,4	259382	386
1994	103	337	11303	24,5	585	40,4	300558	343
1995	97	301	12293	24,5	232	40,4	310551	312
1996	138	432	12524	24,7	470	40,7	328472	420
1997	71	345	12886	24,96	226	40,65	330821	215
1998	51	305	7375	25	227	40,65	193603	263
1999	34	277	6709	25	215	40,65	176465	193
2000	9,4	252	5745	24,8	103	40,65	146663	64
2001	7,8	240	6397	24,9	163	40,65	165918	47
2002	7,9	246	6481	24,9	287	40,65	173048	45
2003	14,9	301	226	24,9	17	40,65	243222	61
2004	7,8	257	171	24,9	13	40,65	184420	42
2005	6,3	229	144	24,9	12	40,65	156264	41

1) Eltra and Elkraft System, annual reporting of total SO_2 and NO_x emissions from Danish power plants > 25MW$_e$. From 2003 consumption data in TJ.

2) Danish Energy Authority, 2004

[5] Now part of the energy transmission company Energinet.dk

Table 2 SO_2 emission factor for coal combusted in centralised power plants, 1980-1989

Year	SO_2 emission factor 1) [g/GJ]
1980	714
1981	714
1982	714
1983	587
1984	508
1985	559
1986	549
1987	507
1988	560
1989	590

1980-1982 Fenhann & Kilde 1994, 1983-1989

1.2 Coal, other plants

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP 0102(xx), 03(xxxx), 02(xxxx))

1990-2005

According to Danish legislation the maximum sulphur content of coal used in plants that are not large power plants is 0,9% (Bek. 532, 2001). This value has been in force since 1989 (Bek. 901, 1994, Bek. 562, 1988). The average sulphur content from 1990 to 2005 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 (Other hard coal) was 26,5 GJ/ton during the period 1991-2005 (DEA, 2006b). In spite of the fact that the lower calorific value was 26,1 GJ/ton in 1990 (DEA, 2006b) the same emission factor has been applied for 1990 as for 1991 and onwards. The sulphur retention in ash has been assumed to be 0,05 referring to EMEP/CorinAir Guidebook (EMEP/CorinAir, 2005, page B111-22, Table 8). Based on these data the emission factor 574 g/GJ has been calculated (see below).

$$EMF_{SO2} = 10^6 \cdot ((2 \cdot C_s \cdot (1-\alpha_s)) \ / \ H_u)$$

$$EMF_{SO2} = 10^6 \cdot ((2 \cdot 0{,}8 \cdot 0{,}01 \cdot (1-0{,}05)) \ / \ 26{,}5) = 574 \ g/GJ$$

1980-1989

For the years 1980-1988 the sulphur content of coal has been assumed to be 0,9% and the average lower calorific value is 26,1 GJ/ton (DEA, 2006b). Based on the assumption that the sulphur retention in ash is 0,05 the estimated emission factor for 1980-1989 is 655 g/GJ. The emission factors that have been applied differ a little from this value. The difference is very small but the applied emission factor for 1980-1989 could be updated to ensure that the emission factors are referenced correctly.

Table 3 Emission factors for coal not applied in large power plants

Year	Sulphur content [%]	Sulphur retention in ash [kg/kg]	Lower heating value [GJ/ton]	Estimated emission factor [g/GJ]	Applied emission factor [g/GJ]
1980-1988	0,9	0,05	26,1 1)	655	649
1989	0,9	0,05	26,1 1)	655	584
1990-2004	0,8	0,05	26,5 2)	574	574

1. Average value for 1980-1989
2. The lower heating value for 1990 hasve been assumed to be 26,5 GJ/tonnes.

1.3 Brown coal briquettes and Coke oven coke

Sector 1A2f, 1A4a, 1A4b, 1A4c (SNAP 0301, 0201, 0202, 0203)

The emission factors for brown coal briquettes (BKB) and Coke oven coke have been assumed to be the same as for coal applied for other plants than power plants. This is a NERI assumption. The consumption of BKB and Coke oven coke has been very low in the considered time-series.

1.4 Petroleum coke

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP: All)

The emission factor for petroleum coke has been based on maximum sulphur content according to Danish legislation and on the lower heating values that is part of the Danish energy statistics.

The lower heating value for petroleum coke has been 31,4 GJ/ton all years since 1980 (DEA, 2006b).

According to Danish legislation the sulphur content of petroleum coke should be below 1% in 2001 and onwards (Bek. 532, 2001). In the years 1988 – 2000 the maximum sulphur content according to Danish legislation was 1,3% (Bek. 901, 1994; Bek 562, 1988). The same sulphur content has been assumed for 1980-1987.

The sulphur retention in ash has been assumed to be 0,05 referring to EMEP/CorinAir Guidebook value for coal (EMEP/CorinAir 2005, page B111-22, Table 8). It has been assumed that sulphur flue gas cleaning is not applied in plants combusting petroleum coke.

$EMF_{SO2} = 10^6 \cdot ((2 \cdot C_s \cdot (1-\alpha_s)) / H_u)$

1980-2000: $EMF_{SO2} = 10^6 \cdot ((2 \cdot 1{,}3 \cdot 0{,}01 \cdot (1-0{,}05)) / 31{,}4) = 787$ g/GJ

2001-2003: $EMF_{SO2} = 10^6 \cdot ((2 \cdot 1{,}0 \cdot 0{,}01 \cdot (1-0{,}05)) / 31{,}4) = 605$ g/GJ

1.5 Wood, CHP plants

Sector 1A1a (SNAP 0101, 010101, 010102, 010103, 010104)

The SO_2 emission factor for wood combusted in CHP plants refers to a Danish study (Nielsen & Illerup, 2003) that included emission measurements on two wood combusting plants. Despite the limited number of plants on which emission measurements were performed the fuel consumption of the plants represented 44% of the wood consumption in CHP plants in 2000. The emission factor 1,74 g/GJ has been applied for the inventories for 1992 and onwards. Before 1992 wood was not combusted in CHP plants.

1.6 Wood, other plants

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP 010105, 0102(xx), 0301(xx), 0201(xx), 0202, 0203(xx))

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. However, 15-20 g/GJ might be a better estimate.

1.7 Municipal waste, CHP plants

Sector 1A1a (SNAP 0101(xx))

The emission factor for the years 2000-2005 refers to a Danish study (Nielsen & Illerup, 2003) that included emission measurements on 16 CHP plants (19 combustion units) combusting municipal waste representing more than 70% of the consumption in CHP plants in 2000.

The flue gas cleaning systems in municipal waste CHP plants have been developed considerably during the last decade. Thus the emission factor applied for 2000 and onwards is not valid for the previous years. Power production based on municipal waste began in 1988 in Denmark.

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, have been based on knowledge of flue gas cleaning systems of the plants in 1990 and 1995 (Illerup et al., (1999). 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. Further emission factors for plants with different flue gas cleaning systems were applied (Nielsen & Illerup, 2003).

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 (NERI assumption). In 1988 and 1989 the emission factor has been assumed to be the same as in 1990.

The emission factor time-series are shown below.

Table 4 Emission factors for CHP plants combusting municipal waste

Year	Applied emission factor [g/GJ]
1988	138
1989	138
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	24
2005	24

1.8 Municipal waste, district heating and other plants

Sector 1A1a, 1A2f, 1A4a (SNAP 0102(xx), 0301(xx), 0102(xx))

The emission factor for the year 2000 was based on plant specific fuel consumption data in year 2000 (DEA, 2001) and on SO_2 emission data (annual environmental reports 2001) for each of the 5 non-power producing plants. Based on these data the emission factor 67 g/GJ has been estimated. The same emission factor has been applied for the following years.

The flue gas cleaning system applied in 1990 on plants that are not power producing refers to Illerup et al. (1999). The amount of municipal waste combusted in each flue gas cleaning category also refers to Illerup et al. (1999). For plants with no flue gas cleaning the sulphur content was assumed to be 0,24% and the sulphur retention in ash was assumed to be 63% (169 g/GJ). These assumptions refer to Risø (2005) and Blinksbjerg (1994) and the same assumptions have been applied for CHP plants with no sulphur flue gas cleaning. For plants with sulphur flue gas cleaning the emission factors refer to the emission factors estimated for CHP plants year 2000 (Nielsen & Illerup, 2003) with the same flue gas cleaning system. The estimated emission factor for 1990 is 138 g/GJ [6]. The emission factor time-series between 1990 and 2000 have been assumed linear (NERI assumption).

In 1980-1989 the emission factor has been assumed to be the same as in 1990 (NERI assumption).

[6] The emission factor is equal to the factor for CHP plants. This is, however, an accidental occurrence.

Time-series and emission factor estimates for 1990 and 2000 are shown below.

Table 5 Emission factors for non-power producing plants combusting municipal waste, 1990

Flue gas cleaning 1)	Municipal 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

Table 6 Emission factors for non- power producing plants combusting municipal waste, 2000

Fuel consumption [GJ]	SO_2 emission [ton]	SO_2 emission factor [g/GJ]
1440233	96,42	67

Table 7 Emission factors time-series for non- power producing plants combusting municipal waste

Year	Emission factor [g/GJ]
1980-1989	138
1990	138
1991	131
1992	124
1993	117
1994	110
1995	103
1996	95
1997	88
1998	81
1999	74
2000	67
2001	67
2002	67
2003	67
2004	67
2005	67

1.9 Straw, CHP plants and power plants

Sector 1A1a (SNAP 0101(xx))

The SO_2 emission factor for straw combusted in CHP plants < $25MW_e$ refers to a Danish study (Nielsen & Illerup, 2003) that included emission measurements on five straw combusting plants. Despite the limited number of plants on which emission measurements were performed, the fuel consumption of the plants represented 58% of the straw consumption in decentralised CHP plants in 2000. The emission factor 47.1 g/GJ has also been applied for combustion of straw in 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.

1.10 Straw, other plants

Sector 1A1a, 1A2f, 1A4b, 1A4c (SNAP 0102(xx), 0301(xx), 0202, 0203(xx))

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 an interval of 100-170 g/GJ. The emission factor for small farmhouse boilers and other plants has been assumed to be the same (NERI assumption).

1.11 Residual oil, large power plants

Sector 1A1a (SNAP 0101(xx))

The SO_2 emission and the fuel consumption for Danish power plants >$25MW_e$ are available for all plants for the years 1990 and onwards (Eltra & Elkraft System). 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. For 1990-2001 NERI hasve estimated the SO_2 emission factor for residual oil based on the sulphur content of the residual oil applied in power plants >$25MW_e$. This information was part of the reporting from the power plant owners (Eltra & Elkraft System) to the Danish Energy Authority at that time. The lower heating value for residual oil refers to DEA (2006b). There is no sulphur retention in ash and it has been assumed that there was no sulphur flue gas cleaning. The estimated emission factors are shown below.

The emission factors applied for 2002 onwards have been estimated based on the few large power plant blocks combusting primarily residual oil. This calculation, which is carried out by NERI, also refers to Eltra & Elkraft System.

Table 6 Emission factors time-series for residual oil applied in power plants

Year	Average sulphur content [%][1)]	Sulphur retention in ash [kg/kg]	Lower heating value [GJ/ton][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	1564
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 [3)]
2003				334 [3)]
2004				349 [3)]
2005				283 [3)]

1. Eltra & Elkraft System annual reportings
2. DEA 2006b
3. Estimated based on plant specific data from Energinet.dk (Previously Eltra & Elkraft System) annual reportings

The emission factors for 1980-1989 refer to Fenhann & Kilde (1994). These emission factors were also estimated based on the plant specific data for plants > $25MW_e$. In the inventories for 1980-1989 the power plants are not included as point sources, but the plant specific data are considered in the SO_2 emission factor.

1.12 Residual oil, refineries

Sector 1A1b (SNAP 010306)

For the years 1980-1993 the total SO_2 emission data from refinery furnaces (SNAP 030106) have been reported by Fenhann (1996). The data from Fenhann are not fuel specific and the SO_2 emission factors for residual oil have been estimated based on the assumption that the emission factors for gas oil (94 g/GJ), LPG (0,13 g/GJ) and refinery gas (190 g/GJ) applied in refinery furnaces are constant in the years 1980-1993. Thus the emission factor for residual oil combusted in refinery furnaces is used as a tool for making the estimated total SO_2 emission correct and too much should not be read into the emission factor time-series 1980-1993. Still the data from Fenhann (1996) are considered the best available data and preferred despite the methodology problems. As mentioned in Chapter 1.20 the emission factor for refinery gas (190 g/GJ) will be changed before the 2006 inventories and thus the emission factors for residual oil combusted in refinery furnaces will also be changed. The total emission from refinery furnaces will, however, be the same.

The refineries have been included in the Danish inventory as point sources from 1994 and onwards and as plant specific SO_2 emission data included in the inventories. Thus the emission factor has only been applied in the years in which a small amount of residual oil has been included as an area source.

The emission factor for 2003 has been estimated based on plant specific data from the two refineries in operation in Denmark (537 g/GJ). It has been assumed that all SO_2 originate from residual oil.

The main part of the fuel consumption has been included as part of point sources with plant specific SO_2 emission data. The emission factor estimated for 2003 will be applied for 1994-2002 in future inventories. This will not cause considerable changes of the estimated SO_2 emission from refinery furnaces.

1.13 Residual oil, other plants

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP 0102xx, 0301xx, 0201xx, 0202, 0203xx)

The emission factor for applied for 1997-2004 refers to Risø (2005) and to a note from the parlamential committee for environment (Miljø- og planlægningsudvalget, 1998).

According to Risø (2005) the average sulphur content of residual oil sold in Denmark has been 0,7% since 1997. Risø refers to the Danish Oil Forum. This is supported by Miljø- og planlægningsudvalget (1998). According to this reference the tax policy for fuel oil sold in Denmark has caused a sulphur content considerably under the legislative limit of 1% (Bek. 532, 2001; Bek. 580, 2000; Bek. 901, 1994; Bek. 562, 1988) that has been in force since 1988. The sulphur content of 0,7% has been confirmed by oil fact sheets from Shell (2005). The lower heating values refer to the Danish energy statistics (DEA, 2004b).

For the years 1988-1996 the legislative maximum sulphur content of 1% (Bek. 901, 1994; Bek. 562, 1988) has been assumed by NERI. The lower heating values refer to the Danish energy statistics (DEA, 2004b).

For the years 1980-1987 the emission factors refer to Risø (2005). These emission factors werebased on a sulphur content of 2,35% in 1980-1985 and 1,45% in 1986-1987.

1.14 Gas oil

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP <04)

For the years 1980-1988 the emission factors 234 g/GJ and 141 g/GJ were based on a sulphur content of 0,5% (1980-1985) and 0,3% (1986-1988) respectively. These legislative values refer to Cir. 122 (1986). The emission factors are confirmed by Risø (2005).

For the years 1989-1994 the emission factor 94 g/GJ refers to Danish legislation (Bek. 901, 1994; Bek 562, 1988) concerning sulphur content (0,2%)

and the lower heating values refer to the Danish energy statistics (DEA 2004b).

For the years 1995-2005 the emission factor 23 g/GJ was based on a sulphur content of 0,05%, which is below the Danish legislation – 0,2% (Bek. 901, 1994; Bek. 580, 2000; Bek. 532, 2001). The sulphur content has been lower than the 0,2% due to Danish tax laws (Bek. 688, 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 applied in Denmark refers to a note from the parlamential 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 lower heating value for gas oil refers to DEA (2006b). The sulphur content of 0,05% has been confirmed by product data sheets from Q8, Shell and Statoil.

1.15 Kerosene

Sector 1A2f, 1A4a, 1A4b, 1A4c (SNAP <04)

The emission factor 5 g/GJ has been based on a sulphur content of 0,01%.

According to a product sheet from Shell (2005) 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 (Bek. 688, 1998).

The actual sulphur content is somewhat lower (Tønder, 2004). According to Tønder (2004) the sulphur content was approximately 95-107 mg S/litre. According to the product sheet from Shell (2005) the density of kerosene is 775-840 g/litre and thus the actual sulphur content is approximately 0,012% sulphur.

The NERI estimate is based on a sulphur content of 0,01% sulphur (Tønder, 2004) and the lower heating value 43,1 GJ/ton that refers to the product data sheet from Shell (2005).

1.16 Fish & rape oil

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP <04)

The sulphur content of rape oil is below 0,001% and typically 0,0005% (Folkecenter for Vedvarende Energi, 2000). The lower heating value is 37,2 GJ/ton (DEA, 2006b). Based on these data the estimated emission factor is 0,2-0,6 g/GJ. However, NERI applies an emission factor that is somewhat higher – 1 g/GJ.

1.17 Orimulsion

Sector 1A1a (SNAP 010101)

Orimulsion has only been applied 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 that are stated in the area source emission factor time-series 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 refers to Eltra & Elkraft System (annual reporting) and the fuel consumption data refers to DEA (2006a) and the similar DEA data reported in former years. The use of orimulsion in Denmark ceased in 2005, the power plant that previously used orimulsion changed the fuel to coal.

1.18 Natural gas

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP <04)

This sulphur content refers to the Danish gas transmission company Gastra[7] (2005). The sulphur content originates from the H_2S content of natural gas and from the added odorant (THT, C_4H_8S). Natural gas data and estimates of the emission factor are shown below.

Table 7 SO_2 emission factor for natural gas

Data	Value	Reference
Hydrogen Sulphide	3,16 mg H_2S /m_n^3 natural gas	http://www.gastra.dk/dk/index.asp (23-05-2005)
THT	15 mg THT/m_n^3.	http://www.gastra.dk/dk/energi-service/gaskvalitet/datablad/datablad.htm (23-05-2005)
H_2S sulphur content	94% w/w (32/34)	Calculation
THT sulphur content	36% w/w (32/88)	Kristensen 2003
Sulphur content in 1 m_n^3	8,4 mg S/m_n^3	Calculation
Lower heating value	39,77 MJ/m_n^3	http://www.gastra.dk/dk/index.asp (23-05-2005)
SO_2 emission factor	0,42 g/GJ	Calculation

S content = $3{,}16 \cdot 0{,}94 + 15 \cdot 0{,}36 = 8{,}4$ mg S /m_n^3 mg/m_n^3

Emission factor = $2 \cdot (8{,}4/39{,}77) = 0{,}42$ g/GJ

The estimated emission factor 0,42 g/GJ has been based on average 2004 gas. The emission factor that has actually been 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 the latest environmental report from Danish Gas Technology Centre (Schmidt, 2004) and will be applied unchanged in future inventories.

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.

[7] Now part of the Danish energy transmission company Energinet.dk. Gastra is a former part of DONG.

1.19 LPG

Sector 1A1a, 1A1b, 1A2f, 1A4a, 1A4b, 1A4c (SNAP <04)

The main part of the sulphur content in LPG originates from odorant that is added (Krebs, 2003). The maximum sulphur content of LPG is 50 mg S / kg (Krebs, 2003). The odourant applied 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 odourant/m^3 is added (Augustesen, 2003). The S content in the odourant is 51,61% and thus it corresponds to a sulphur content of 12·0,5161=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%. NERI 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 (2006b) and the estimated emission factor is 0,13 g/GJ.

1.20 Refinery gas, refinery furnaces

Sector 1A1b (SNAP 030106)

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.

In 1980-1993 the consumption of refinery gas in refinery furnaces has been included as area sources and thus an emission factor applied. The emission factor 190 g/GJ has been based on plant specific emission data from the three refineries in operation in Denmark in 1994. The emission factor has been estimated based on the assumption that all SO_2 from refinery furnaces originate from refinery gas, and thus the emission share from residual oil has been assumed to be zero. This assumption is, however, considered inappropriate and the time-series will be changed before the 2008 reporting. Due to the way the emission factor for residual oil has been estimated the total SO_2 from refinery furnaces will, however, not change.

1.21 Refinery gas, gas turbines and other plants

The emission factor for gas turbines (1 g/GJ) has been based on plant specific emission data from a gas turbine only combusting refinery gas. The turbine is installed in a Danish refinery plant. Plant specific emission data for 1995-2002 have been included in the estimate. In the Danish energy statistics refinery gas also occurs in a few other non-furnace plants. For these plants the emission factor has been assumed to be the same as for the gas turbine (NERI assumption).

1.22 Biogas, gas engines

Sector 1A1a, 1A1c, 1A2f, 1A4a, 1A4c (SNAP 010105, 010205, 010505, 030105, 020105, 020304)

The SO_2 emission factor for biogas fuelled engines 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.

1.23 Biogas, other plants

Sector 1A1a, 1A2f, 1A4a, 1A4c (SNAP 0101, 010101, 010102, 010103, 010104, 0102, 010203, 0301, 030102, 030104, 0201, 020103, 020104, 0203)

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 biogas has been assumed to be a typical manure gas consisting of approximately 35% CO_2 and 65% CH_4. The sulphur content is 0,025% (w/w).

Table 8 SO_2 emission factor for biogas

Dato	Value
H_2S content	200 ppm
Density H_2S	1,521 kg/m^3
Lower heating value	23,48 MJ/m_n^3
SO_2 emission factor	24,4 g/GJ
200·1,521/23,48 = 12,96 mg H_2S/MJ	
12,96·32/34 = 12,19 mg S/MJ	
2·12,19=24,4 mg SO_2/MJ	

2 NO_x

2.1 Coal, large power plants

Sector 1A1a (SNAP 010101, 010102, 010103, 010104, 010105)

It has been assumed that the small fuel consumption of coal registered in plant category 010105 (engines) is actually combusted in another public power plant (SNAP 0101xx).

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 coal consumption has, however, been included as an area source. The NO_x emission factors for coal have been estimated as an average value based on the annual reporting from the electricity transmission companies in Denmark, Eltra and Elkraft System[8]. The implied emission factors have been estimated based on the assumption that all fuels contribute equally to the NO_x emission (total NO_x emission/total fuel consumption). The estimated emission factors have, however, only been applied for coal and residual oil.

The calculated time- series for the NO_x emission factor are shown below.

Table 9 NO_x emission factors for coal and residual oil, power plants

Year	NO_x emission [ton]	Total fuel consumption [TJ]	Estimated NO_x emission factor [g/GJ]
1990	83	243	342
1991	124	323	384
1992	82	279	294
1993	86	298	289
1994	90	337	267
1995	72	301	239
1996	108	432	250
1997	69	345	200
1998	54	305	177
1999	42	277	152
2000	32,5	252	129
2001	29	240	122
2002	32	246	130
2003	43	301	144
2004	34	257	131
2005	29	229	127

The emission factors for 1980-1982 refer to Fenhann & Kilde (1994). The emission factor for 1983-1989 has been estimated by NERI based on

[8] Both are now part of the energy transmission company Energinet.dk

emission data from Fenhann & Kilde (1994) and fuel consumption data from the Danish energy statistics (DEA, 2006a).

2.2 Coal, other plants

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP 0102(xx), 0301(xx), 02(xx))

The 2000-2005 emission factors for other plants refer to Danish legislation (Luftvejledningen, 2001). According to this legislation the NO_x emission from 5-50 MW boilers should be below 200 mg/m_n^3 (ref. 10% O_2). This equals the emission factor 95 g/GJ[9]. The NO_x emission limit applies for new plants (2001 and onwards), but NERI has also applied the emission factor for year 2000.

For 1980-1992 the applied emission factor 200 g/GJ refers to Fenhann and Kilde (1994). NERI has assumed the same emission factor for 1993-1999.

For comparison legislation concerning plants larger than 50MW (Bek. 689, 1990) has ensured that the emission limit, which was 650 g/m_n^3 (ref. 6% O_2) for plants installed before 1992 has been changed to 200 g/m_n^3 (ref. 6% O_2) for plants installed after 1992. These emission limits corresponds to 225 g/GJ and 69 g/GJ. However, in the inventories for 1990 and onwards plants larger than 50 MW have in general been included in the inventory as point sources with plant specific NO_x emission data.

2.3 Brown coal briquettes and Coke oven coke

Sector 1A2f, 1A4a, 1A4b & 1A4c (SNAP 0301(xx), 02(xx))

Emission factors for brown coal briquettes and coke oven coke have been assumed to be the same as for coal (NERI assumption). The consumption of these two fuels has been very low all years.

2.4 Petroleum coke, power plants, district heating and industry

Sector 1A1a & 1A2f (SNAP 0101(xx), 0102(xx), 0301(xx))

NERI 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.

2.5 Petroleum coke, residential and other plants

Sector 1A4a, 1A4b, 1A4c (SNAP 0201(xx), 0202(xx), 0203(xx))

The emission factor for petroleum coke combusted in residential plants or other plants refers to the EMEP/Corinair Guidebook

[9] The equation in the legislation is not correct. The constant 212 should have been 130.

(EMEP/CorinAir, 2004). The guidebook (page B112-15) suggests the NO_x emission factor 50 g/GJ for petroleum coke combusted in non-residential plants.

2.6 Wood, CHP plants and large power plants

Sector 1A1a (SNAP 010101, 010102, 010103, 010104)

The NO_x emission factor for wood combusted in CHP plants refers to a Danish study (Nielsen & Illerup, 2003) that included emission measurements on two wood combusting plants. Despite the limited number of plants on which emission measurements were performed the fuel consumption of the plants represented 44% of the wood consumption in CHP plants in year 2000. The emission factor 69 g/GJ has been applied for the inventories for 1992 and onwards. Wood was not combustion in CHP plants before 1992.

2.7 Wood, residential plants

Sector 1A4b (SNAP 0202)

The emission factor for wood combustion in residential plants 120 g/GJ refers to the IPCC Reference Manual (IPCC, 1996). The emission factor for conventional stoves has been applied (page 1.56). The default emission factor for residential wood combustion is 100 g/GJ (page 1.38).

2.8 Wood, other plants

Sector 1A1a, 1A2f, 1A4a, 1A4c (SNAP 010105, 0102(xx), 0301(xx), 0201(xx), 0203(xx))

The applied emission factor for wood combustion in district heating plants, industrial plants and other non-power producing and non-residential plants is 130 g/GJ. Several references have been considered:

According to Danish legislation (Luftvejledningen, 2001) the allowed NO_x emission for wood combustion is 300 mg/m_n^3 (ref. 10% O_2) that equals 143 g/GJ. This applies for 1-50 MW boilers and thus most district heating plants and industrial plants are included.

According to a Danish report from 1999 (Serup et al. 1999) the emission factor for district heating plants combusting wood is in the interval 40-140 g/GJ and a typical value is 90 g/GJ.

According to another Danish report from 1997 (Christensen, 1997) the emission factor is 55-230 g/GJ.

According to the IPCC Reference Manual (IPCC, 1996) the default emission factor for district heating and industry is 100 g/GJ (page 1.38). On the detailed level the following emission factors have been stated:

Industrial stoker boilers 65 g/GJ (page 1.54)

Commercial boilers 130 g/GJ (page 1.57)

Year	NO_x emission factor [g/GJ]
1985-1998	130
1999-2005	90

The applied emission factor 130 g/GJ is in the right level, but might be somewhat too high. From 1999 onwards an emission factor of 90 g/GJ will be applied

2.9 Municipal waste, CHP plants

Sector 1A1a (SNAP 0101(xx))

The NO_x emission factor for municipal waste combusted in CHP plants refers to a Danish study (Nielsen & Illerup, 2003) that included emission measurements on five municipal waste CHP plants. Including the existing emission measurements that were collected during the project, data was available from 15 plants (17 combustion lines). These plants represented 70% of the consumption of municipal waste in CHP plants in year 2000. The emission factor 124 g/GJ has been applied for the inventories from 1988, which was the first year that included municipal waste combustion in CHP plants.

The current legislation for municipal waste incineration plants (Bek. 162, 2003) states two emission limits: 400 mg/m_n^3 (ref. 11% O_2) corresponding to 210 g/GJ for existing plants with a capacity of less than 6 tonnes/hour and 200 mg/m_n^3 (ref. 11% O_2) corresponding to 105 g/GJ for other plants. These emission factors will, however, not be fully implemented for existing plants until 2010. The former legislation concerning waste incineration (Bek. 41, 1997 and Vejledning 60273, 1993) did not include legislation concerning NO_x emission.

2.10 Municipal waste, other plants

Sector 1A1a, 1A2f, 1A4a (SNAP 0102(xx),0301(xx), 0201(xx))

The NO_x emission factor 164 g/GJ applied for non-power producing plants (mainly district heating plants) has been estimated by NERI based on plant specific emission data from non-power producing plants in 2000. The same emission factor has been applied in 1985-2005. In recent years the main part of municipal waste has been applied in power producing plants.

The current legislation will not be fully implemented until 2010 (see Chapter 2.9).

2.11 Straw, CHP plants and large power plants

Sector 1A1a (SNAP 0101(xx))

The NO_x emission factor for wood combusted in CHP plants < $25MW_e$ refers to a Danish study (Nielsen & Illerup, 2003) that included emission measurements on five straw combusting plants. Despite the limited number of plants on which emission measurements were performed, the fuel consumption of the plants represented 58% of the straw consumption in decentralised CHP plants in 2000. The emission factor 131 g/GJ 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.

2.12 Straw, other plants

Sector 1A1a, 1A2f, 1A4b, 1A4c (SNAP 0102(xx), 0301(xx), 0202, 0203(xx))

The NO_x emission factor (153 g/GJ) for straw combusted in non-power producing plants refers to Danish legislation.

According to Luftvejledningen (2001) the NO_x emission from 1-50 MW boilers should be below 300 mg/m_n^3 (ref. 10% O_2) corresponding to 156 g/GJ. A considerable part of the boilers are below five MW and thus the legislation is only relevant for part of the straw consumption. For plants producing district heating more than half the consumption is covered by the legislation. However, small farmhouse boilers are not regulated by the legislation.

According to Bek. 689 (1990) the NO_x emission for large boilers (> 50MW) should be below 400 mg/m_n^3 (ref. 6% O_2) corresponding to 153 g/GJ. This is the present reference for the emission factor. However, the plant size is not typical for non-power producing boilers combusting straw. The reference should be altered in future inventories.

Due to lack of data from farmhouse boilers and other non district heating plants the emission factor has been assumed to be the same as for district heating plants (NERI assumption).

According to the EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) the emission factor for agricultural waste is 80-100 g/GJ. The reference has not been considered in the determination of the emission factor and it suggests that the present emission factor might be overestimated.

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. This reference has not been considered in the determination of the emission factor. However, the reference is considered relevant and it is suggested that the emission factor 90 g/GJ is applied for district heating plants in future inventories. The new emission factor meets the legislative emission limits in Luftvejledningen (2001). Due to lack of data from other non-power producing plants the emission factor 90 g/GJ will be applied for these as well.

2.13 Residual oil, power plants

Sector 1A1a (SNAP 0101(xx))

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 annual reporting from the electricity transmission companies in Denmark, Eltra and Elkraft System[10]. The implied emission factors have been estimated based on the assumption that all fuels contribute equally to the NO_x emission (total NO_x emission/total fuel consumption). The estimated emission factors have, however, only been applied for coal and residual oil. The calculated time-series for the NO_x emission factor are shown in Chapter 2.1.

For the years 1980-1989 the applied emission factor is 240 g/GJ. This emission factor refers to Fenhann & Kilde (1994).

2.14 Residual oil, industrial plants

Sector 1A2f (SNAP 0301(xx))

The NO_x emission factor for residual oil combusted in industrial plants refers to Danish legislation.

According to Luftvejledningen (2001) the NO_x emission from 2-50 MW boilers should be below 300 mg/m_n^3 (ref. 10% O_2) corresponding to 142 g/GJ. Residual oil should not be applied in boilers < 2 MW in Denmark.

According to Bek 689 (1990) the NO_x emission from boilers > 50 MW should be below 450 mg/m_n^3 (ref. 3% O_2) corresponding to 130 g/GJ. The emission from plants installed after 1992 should be below 225 mg/m_n^3 (ref. 3% O_2) corresponding to 65 g/GJ. A later update of the legislation (Bek. 518, 1995) confirms the same emission limits for residual oil.

The industrial plants combusting residual oil have been analysed based on the energy statistics (DEA, 2004a; DEA, 2004c). Considering the year 2003 the industrial consumption on plants that produce power and/or district heating added up to 10% of the overall residual oil consumption in the industrial sector. The remaining 90% has been assumed to be boilers < 50 MW. The plants producing power or district heating are almost all > 50MW. The data are insufficient to decide which share has been installed before 1992, but it is a very limited number of plants and they are rather old. Thus approximately 90% of the consumption should have an emission factor below 142 g/GJ and approximately 10% should have an emission factor below 130 g/GJ.

Based on these reflections NERI has assumed that the emission factor is 130 g/GJ. The same emission factor has been assumed for all years. The emission factor has been assumed to be the same independent of plant

[10] Both are now part of the energy transmission company Energinet.dk

type (engine, gas turbine or boiler) and independent of boiler capacity (NERI assumption).

For comparison the EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) suggests the emission factor 165 g/GJ for industrial plants (unknown plant type, page B112-15). IPCC suggests the emission factor 170 g/GJ for industrial boilers combusting residual oil (IPCC, 1996). Both references suggest emission factors above Danish legislation.

2.15 Residual oil, other plants

Sector 1A1a, 1A1b, 1A4a, 1A4b, 1A4c (SNAP 0102(xx), 010306, 0201(xx), 0202, 0203(xx))

Residual oil combusted in plants that are not either power plants or industrial plants has been assumed to be boilers < 50MW. Thus the plants have to meet Danish legislation of 142 g/GJ (Luftvejledningen, 2001).

The EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) does not include a default emission factor for residual oil combusted in non-industrial plants. The IPCC Reference Manual (IPCC, 1996) suggests 130-200 g/GJ for utility boilers and 170 g/GJ for commercial boilers. Thus the legislative emission limit seems to be a reasonable choice.

The emission factor for refinery furnaces has been assumed to be the same (NERI assumption).

2.16 Gas oil, power plants

Sector 1A1a (SNAP 0101, 010101, 010102)

The emission factor applied for 2003 (249 g/GJ) has been estimated by NERI based on plant specific emission data 2003 (Eltra & Elkraft System, 2004) from two power plant boilers that only apply gas oil. Gas oil consumption ads up to less than 1% of the fuel consumption in power plants. This emission factor has also been utilized in 2004 and 2005.

According to former sector reports for stationary combustion the emission factor applied for 1985-2002 (220 g/GJ) has been based on plant specific emission data for year 2000. However, the assumptions and the estimate itself have not been properly archived and therefore the 2003 emission factor (249 g/GJ) will be applied for 1985-2002 in future inventories.

2.17 Gas oil, gas turbines

Sector 1A1a, 1A2f (SNAP 010104, 030104)

The emission factor for gas turbines combusting gas oil (350 g/GJ) hasve been estimated by NERI based on plant specific emission data from power plant turbines for the year 2000 (Eltra & Elkraft System, 2001). The emission factor has been applied for all years. Almost all gas oil fuelled gas turbines in operation in Denmark in 2004 were installed in centralised power plants.

The IPCC Reference Manual (IPCC, 1996) recommends 300 g/GJ for gas oil combustion in gas turbines. The EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) states the interval 100-531 g/GJ (page B112-15).

Legislation for plants > 50 MW (Bek. 689, 1990 and Bek. 518, 1995) states the emission limits 225 mg/m_n^3 (ref. 3% O_2) for "new plants" corresponding to 65 g/GJ or 450 mg/m_n^3 (ref. 3% O_2) for old plants corresponding to 130 g/GJ. However, the legislation excepts reciprocating engines and gas turbines. The new legislation for plants > 50 MW (Bek. 808, 2003) excludes gas turbine plants installed before 2003. Gas oil fuelled gas turbines have not been installed in Denmark since the 2003 legislation came into force.

2.18 Gas oil, stationary engines

Sector 1A1a, 1A1c, 1A2f, 1A4a, 1A4c (SNAP 010105, 010205, 010505, 030105, 020105, 020304)

The emission factor for gas oil combusted in stationary engines (700 g/GJ) refers to the EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) that states an interval of 80-1493 g/GJ. The emission is not regulated in Danish legislation.

2.19 Gas oil, small power plant boilers, district heating plants and industrial boilers

Sector 1A1a, 1A1b, 1A2f (SNAP 010103, 0201, 020101, 020102, 020103, 010306,0301, 030102, 030103, 030106)

According to the Danish energy statistics (DEA, 2004c) 81% of the district heating boilers in operation in Denmark in 2003 were applied in boilers < 50MW. Industrial boilers were all > 50MW. Small power plant boilers (SNAP 010103) are all < 50MW. However, both power plant boilers and district heating boilers are usually installed in plants that are > 50 MW and thus the plants should meet the emission limit for plants > 50MW.

The applied emission factor 65 g/GJ (1997-2005) has been based on Danish legislation for large boilers (Bek. 689, 1990). The emission factor corresponds to the emission limit 225 mg/m_n^3 (ref. 3% O_2) that applies for boilers > 50 MW installed after 1987. Plants installed before 1987 have to meet a somewhat higher emission limit (130 g/GJ). The emission limit for 1987 and onwards has been confirmed in the 1995 legislation for large boilers (Bek. 518, 1995). In the 2003 legislation (Bek. 808, 2003) for large boilers the emission limit is 450 mg/m_n^3 (ref. 3% O_2) for plants installed before 2003. This corresponds to 130 g/GJ. For plants installed after 2003 the emission limit is 400 mg/m_n^3 (ref. 3% O2) corresponding to 116 g/GJ.

The EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) states the emission factor 70 g/GJ and the IPCC guidelines (IPCC, 1996) recommend the emission factor 65 g/GJ for industrial boilers. Thus these two references confirm the emission factor level.

For the years 1985-1990 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 (NERI assumption). For small power plant boilers (SNAP 010103) the applied emission factors for 1994-1995 are not correct. The error will be corrected in the next inventory.

2.20 Gas oil, residential plants, commercial and institutional plants and plants in agriculture, forestry and aquaculture

Sector 1A4a, 1A4b, 1A4c (SNAP 0201, 020102, 020103, 0202, 0203, 020302)

Residential plants, commercial and institutional plants and plants in agriculture, forestry and aquaculture are all small plants. 120 kW - 50 MW boilers have to meet the Danish legislation in Luftvejledningen (2001). The emission limit is 110 mg/m_n^3 (ref. 10% O_2) for plants installed before 2001 and 250 mg/m_n^3 (ref. 10% O_2) for plants installed after 2001 corresponding to 52 g/GJ and 118 g/GJ. NERI is not acquainted with the year of installation for small boilers.

The EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) states the emission factor 47 g/GJ for residential gas oil combustion. IPCC Guidelines (IPCC, 1996) recommends the emission factor 65 g/GJ for residential combustion of gas oil.

NERI has assumed the same emission factor for residential plants, commercial and institutional plants and plants in agriculture, forestry and aquaculture. The applied emission factor 52 g/GJ refers to Luftvejledningen (2001).

2.21 Kerosene

Sector 1A2f, 1A4a, 1A4b, 1A4c (SNAP 0301, 0201, 0202, 0203)

The emission factor for kerosene 50 g/GJ refers to the EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004).

2.22 Fish & rape oil

Sector 1A1a, 1A2f, 1A4c (SNAP 010103, 0102(xx), 030105, 020304)

The emission factors for fish & rape oil have been assumed to be the same as for gas oil.

2.23 Orimulsion

Sector 1A1a (SNAP 010101)

Orimulsion has only been applied 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 the plant specific data from the power plant boiler combusting orimulsion. The plant specific NO_x emission data refer to Eltra & Elkraft System (annual reporting) and the fuel consumption data refer to DEA (2006a) and the similar DEA data reported in former years. The use of orimulsion in Denmark ceased in 2005, the power plant that previously used orimulsion changed the fuel to coal.

2.24 Natural gas, power plants

Sector 1A1a (SNAP 0101, 010101, 010102)

Natural gas fuelled power plants have been included in the inventory as point sources with plant specific emission data (1990 and onwards). However, an area source emission factor has been estimated but only applied if small inconsistencies occur between plant specific fuel consumption data and total fuel consumption data.

The emission factor applied for 1985-1989 (240 g/GJ) refers to Fenhann & Kilde (1994).

The emission factor applied for 1990 and onwards 115 g/GJ has been based on plant specific emission data from power plants > 25 MW_e year 2000. Gas turbine plants were not included in the estimate.

In the new Danish legislation (Bek. 808, 2003) for existing large power plants combusting gas the emission limit is 350 mg/m_n^3 (ref. 3% O_2) corresponding to 97 g/GJ. This emission factor is applied from 2004 and onwards.

2.25 Natural gas, gas turbines (and combined cycle plants)

Sector 1A1a, 1A2f, 1A4a, 1A4c (SNAP 010104, 030104, 020104, 020303)

Gas turbines > 25MW_e have been included in the inventory as point sources with plant specific NO_x emission data.

The NO_x emission factor for gas turbines applied for the years 2000 and onwards (124 g/GJ) refers to a Danish study (Nielsen & Illerup, 2003). This study included emission measurements on 17 gas turbine plants < 25MW_e. The emission measurements included in the estimate represented 67% of the natural gas consumption in gas turbines < 25MW_e in 2000. Time-series have been estimated based on the 1990 and 1995 emission factors (161 g/GJ and 141 g/GJ) also estimated in Nielsen & Illerup (2003). The decline rates in 1990-1995 and in 1995-2000 have been assumed constant.

The Danish legislation (Bek. 720, 1998) for gas turbines sets the emission limit to 200 mg/m_n^3 (ref. 5% O_2) corresponding to 62 g/GJ. Gas turbines installed before 1998 have to meet this emission limit in 2006. For 2005 it is still too soon to apply the lower emission factor.

2.26 Natural gas, gas engines

Sector 1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c (SNAP 010105, 010205, 010505, 030105, 020105, 020204, 020304)

The NO_x emission factor for gas engines applied for the years 2000 and onwards (168 g/GJ) refers to a Danish study (Nielsen & Illerup, 2003). This study included emission measurements on 157 gas engines. The emission measurements included in the estimate represented 54% of the natural gas consumption in gas engines in 2000. Time-series have been estimated based on the 1990 and 1995 emission factors (276 g/GJ and 194 g/GJ) also estimated in Nielsen & Illerup (2003). The decline rates in 1990-1995 and in 1995-2000 have been assumed constant.

The Danish legislation (Bek. 720, 1998) for gas engines sets the emission limit to 550 mg/m_n^3 (ref. 5% O_2) corresponding to 172 g/GJ. Gas engines installed before 1998 have to meet this emission limit in 2006. For 2005 it is still too soon to apply the lower emission factor.

2.27 Natural gas, small boilers

Sector 1A4a, 1A4b, 1A4c (SNAP 0201, 020103, 0202, 020202, 0203)

NERI has assumed that small natural gas fuelled boilers are the boilers applied in residential plants, commercial & institutional plants and plants in agriculture, forestry and aquaculture.

The applied emission factor for 1985-1989 (50 g/GJ) refers to Fenhann & Kilde (1994).

The emission factor applied for 1990 and onwards is 30 g/GJ. Several references have been taken into account. The first two are the primary references for the applied emission factor.

According to the environmental report from Danish Gas Technology Centre (Gruijthuijsen & Jensen, 2000) the emission factor for residential plants is 20 g/GJ for condensing boilers and 50 g/GJ for conventional boilers.

According to Danish legislation (Luftvejledningen, 2001) for 120 kW – 50 MW boilers new boilers have to meet the emission limit at 65 mg/m_n^3 (ref. 10% O_2) and for boilers installed before 2001 the emission limit is 125 mg/m_n^3 (ref. 10% O_2) corresponding to 29 g/GJ and 57 g/GJ, respectively.

The IPCC Guidelines (IPCC, 1996) states the emission factor to 47 g/GJ for residential boilers and to 45 g/GJ for commercial boilers

The EMEP/CorinAir Guidebook (EMEP/CorinAir, 2004) states the emission factors to 38 g/GJ for small consumers and to 30-46 g/GJ for residential boilers.

2.28 Natural gas, district heating boilers and industrial boilers

Sector 1A1a (SNAP 010103, 010202, 010203, 0301, 030102, 030103, 030106)

Boilers in district heating plants, industry and smaller boilers installed at power producing plants are considered large boilers – however, not larger than 50 MW.

The emission factor applied for 1985-1989 is 100 g/GJ. This emission factor has been applied for industrial boilers in Fenhann & Kilde (1994). However, Fenhann & Kilde (1994) states other emission factors for district heating plants and boilers installed in public power plants[11].

The emission factor for 1990 and onwards – 42 g/GJ – refers to a report from Danish Gas Technology Centre (Wit & Andersen, 2003). The emission factor is the average of the stated NO_x emission interval 30-55 g/GJ for ordinary gas-blower burners.

Regarding Danish legislation (Luftvejledningen, 2001) for 120 kW – 50 MW boilers new boilers have to meet the emission limit at 65 mg/m_n^3 (ref. 10% O_2) and for boilers installed before 2001 the emission limit is 125 mg/m_n^3 (ref. 10% O_2) corresponding to 29 g/GJ and 57 g/GJ respectively. Almost all boilers in operation are installed before 2001 (Kristensen, 2005 and Wit, 2005).

2.29 LPG

Sector 1A1a, 1A2f, 1A4a, 1A4b, 1A4c (SNAP: All)

The emission factors applied for LPG refer to the IPCC Guidelines (IPCC, 1996). The emission-applied factors are:

- 96 g/GJ for combustion in energy and transformation industry or in industrial plants (SNAP 01 and 03)
- 71 g/GJ for combustion in commercial and institutional plants and in agriculture, forestry and aquaculture (SNAP 0201 and 0203)
- 47 g/GJ for residential plants (SNAP 0202)

The same emission factors have been applied for all years.

2.30 Refinery gas, gas turbine

Sector 1A1b (SNAP 010304)

The applied emission factor for refinery gas combusted in gas turbines refers to plant specific emission data in 2000. The only refinery- fuelled

[11] All boiler capacities

gas turbine in operation in Denmark has, however, been included as a point source with plant specific emission data since 1994.

2.31 Refinery gas, other

Sector 1A1b (SNAP 0103, 010306)

The refineries have been included as point sources with plant specific emission factors in the Danish inventory since 1994. The emission factor 100 g/GJ for refinery gas not applied in gas turbines refers to Fenhann & Kilde (1994).

2.32 Biogas, gas engines

Sector 1A1a, 1A1c, 1A2f, 1A4a, 1A4c (SNAP 010105, 010205, 010505, 030105, 020105, 020304)

The NO_x emission factor for gas engines applied for the years 2000 and onwards (540 g/GJ) refers to a 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 2000. Time-series have been estimated based on the 1990 and 1995 emission factors (711 g/GJ and 635 g/GJ) also estimated in Nielsen & Illerup (2003). The decline rates in 1990-1995 and in 1995-2000 have been assumed constant.

2.33 Biogas, industrial boilers > 50 MW

Sector 1A2f (SNAP 030102)

For industrial boilers > 50 MW the applied emission factor refers to Danish legislation for large boilers (Bek. 689, 1990 and Bek. 518, 1995). According to the legislation the emission limit for gas fuelled boilers > 50MW installed after 1987 is 225 mg/m_n^3 (ref. 5% O_2) corresponding to 59 g/GJ. In the new legislation for boilers > 50 MW (Bek. 808, 2003) the emission limit is somewhat higher, but this has not been taken into consideration.

2.34 Biogas, other boilers

Sector 1A1a, 1A2f, 1A4a, 1A4c (SNAP 0101, 010101, 010102, 010103, 010104, 0102, 010203, 0301, 0201, 020103, 0203)

All boilers not registered as industrial boilers > 50 MW have been assumed < 50 MW. For boilers < 50 MW the emission factor 28 g/GJ refers to Danish legislation (Luftvejledningen, 2001).

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Appendix 2A-5 Fuel rate

Table 40 Fuel consumption rate of stationary combustion plants [TJ].

fuel	fuel	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
102	COAL	253444	344300	286838	300799	323397	270346	371908	276277	234285	196472	164708	174113	174654	238978	182497	153346
106	BROWN COAL BRI.	116	167	95	128	92	75	56	54	48	38	26	33	19	3	0	0
107	COKE OVEN COKE	1276	1450	1181	1155	1226	1273	1226	1253	1346	1423	1187	1110	1068	995	1143	980
110	PETROLEUM COKE	4460	4404	4814	6179	4309	4850	6381	6523	5798	7284	7292	8313	8282	8717	9381	9341
111	WOOD AND SIMIL.	18247	20042	21031	22220	21940	21845	23389	23459	22938	24403	27522	30867	31630	38991	43768	48295
114	MUNICIP. WASTES	15499	16744	17797	19410	20312	22906	24952	26770	26591	29138	31643	33507	36797	36964	38512	36932
117	STRAW	12481	13306	13880	13366	12662	13053	13546	13912	13904	13668	12220	13698	15651	16719	17939	18483
118	SEWAGE SLUDGE	0	0	0	0	0	0	0	0	0	0	40	375	65	55	58	58
203	RESIDUAL OIL	32116	37020	37332	32498	46701	34069	38485	26693	29480	22987	18050	20750	24751	27202	23489	21113
204	GAS OIL	61449	64998	56102	62025	53930	53698	58019	51071	48425	47555	41273	43678	38686	38965	35942	32835
206	KEROSENE	5086	943	784	771	650	581	540	437	417	256	170	287	256	338	215	280
210	NAPHTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
215	RAPE & FISH OIL	744	744	744	800	245	251	60	14	14	27	49	191	127	259	650	0
225	ORIMULSION	0	0	0	0	0	19913	36767	40488	32580	34191	34148	30244	23846	1921	19	0
301	NATURAL GAS	76092	86107	90467	102475	114586	132699	156277	164489	178707	187877	186122	193827	193609	196438	195334	189179
303	LPG	2596	2549	2315	2371	2398	2638	2870	2363	2413	2177	1722	1432	1243	1329	1441	1454
308	REFINERY GAS	14169	14537	14865	15405	16360	20838	21476	16945	15225	15724	15556	15755	15197	16555	15891	15347
309	BIOGAS	752	910	899	1077	1279	1754	1985	2390	2635	2613	2877	3028	3345	3565	3469	3686
Total		498527	608220	549145	580680	620089	600788	757936	653139	614805	585831	544604	571209	569225	627994	569746	531330

Table 41 Detailed fuel consumption data for stationary combustion plants [TJ]

ipcc_id	fuel	fuel_gr_abbr	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1A1a	102	COAL	010100	8523	12892	10176	8221												
1A1a	102	COAL	010101	219781	303105	252745	269459	295430	244510	347252	252648	211429	176641	146911	158990	161608	225397	167931	140019
1A1a	102	COAL	010102	2119	2654	2250	2269	8605	8381	9033	8671	9023	8238	6225	4971	4685	4578	4512	4048
1A1a	102	COAL	010103					837	526	149	39	24	34	35	24	15	34	24	0
1A1a	102	COAL	010104					272	270	301	74								
1A1a	102	COAL	010105					20											
1A1a	102	COAL	010200	6017	6635	5173	3581	0	0	0	0								
1A1a	102	COAL	010201					153	20										
1A1a	102	COAL	010202					1112	790	200	65	18	0	0	1	0	0	1	4
1A1a	102	COAL	010203					378	317	228	49	48	7	4	0	0	0	0	0
1A1a	110	PETROLEUM COKE	010100				1239												
1A1a	110	PETROLEUM COKE	010102															7	2
1A1a	111	WOOD AND SI-MIL.	010100			172	515												
1A1a	111	WOOD AND SI-MIL.	010101					43				264	0		1	66	305	231	1247
1A1a	111	WOOD AND SI-MIL.	010102			0	0	1053	865	862	1001	1372	2377	2275	2187	3176	5855	5627	5966
1A1a	111	WOOD AND SI-MIL.	010103					624	672	578	645	575	732	670	747	780	446	1062	1079
1A1a	111	WOOD AND SI-MIL.	010104					79	4							120	1657	4488	4479
1A1a	111	WOOD AND SI-MIL.	010105										2	53	60	62	0	0	0
1A1a	111	WOOD AND SI-MIL.	010200	3217	3648	4096	3751	0	0	0	0								
1A1a	111	WOOD AND SI-MIL.	010201					9											
1A1a	111	WOOD AND SI-MIL.	010202					0	44	165	191	207	194	180	250	164	196	620	417
1A1a	111	WOOD AND SI-MIL.	010203					3338	3491	3857	3795	3972	3928	3882	4298	4651	5066	4798	5018
1A1a	114	MUNICIP. WASTES	010100	990	3563	5578	8433												

1A1a	114	MUNICIP. WASTES	010101									1288	1278	1231	2809	3502	143	0	0
1A1a	114	MUNICIP. WASTES	010102		0	0	0	5110	6527	7153	10832	11715	16938	18306	17902	19003	22524	24720	24848
1A1a	114	MUNICIP. WASTES	010103					2910	3755	5003	3074	1957	4039	8361	8343	8321	7848	7885	8133
1A1a	114	MUNICIP. WASTES	010104					1665	2028	3192	3025	2806	2453	417	0	0	625	0	0
1A1a	114	MUNICIP. WASTES	010105											0	0	0	0	0	0
1A1a	114	MUNICIP. WASTES	010200	13567	12142	11111	9839	0	0	0	0								
1A1a	114	MUNICIP. WASTES	010201					7											
1A1a	114	MUNICIP. WASTES	010202					3472	3703	4646	4649	4618							
1A1a	114	MUNICIP. WASTES	010203					5909	5559	3699	3978	3458	2915	1396	2195	2430	2570	2507	1847
1A1a	117	STRAW	010100	479	985	1487	1643												
1A1a	117	STRAW	010101					100	82	610	740	1014	1340	1120	1588	2643	3192	4366	4088
1A1a	117	STRAW	010102	0	0	0	0	622	1287	1704	1845	1752	1819	1827	1746	1641	1712	1815	1765
1A1a	117	STRAW	010103					1127	1297	1362	1174	1181	1058	640	1905	1754	1928	1336	1394
1A1a	117	STRAW	010104												102	1216	1707	2477	3118
1A1a	117	STRAW	010200	3524	3843	3915	3806	0	0	0	0								
1A1a	117	STRAW	010201					22											
1A1a	117	STRAW	010202					57	180	114	96	136	142	151	98	0	0	95	96
1A1a	117	STRAW	010203					3378	3409	3700	3564	3526	3565	3291	3418	3556	3339	3007	3180
1A1a	203	RESIDUAL OIL	010100	775	364	1742	741							0	0	0	0	0	0
1A1a	203	RESIDUAL OIL	010101	7172	10053	8691	8420	22142	11174	16072	7736	11557	7214	4046	5951	5018	7329	5578	5461
1A1a	203	RESIDUAL OIL	010102	42	17	27	24	180	254	443	421	510	763	513	254	279	334	596	591
1A1a	203	RESIDUAL OIL	010103					252	173	201	159	116	102	109	117	120	106	17	0
1A1a	203	RESIDUAL OIL	010104					320	347	237	302	355	118	117	1768	6695	9359	7484	6336
1A1a	203	RESIDUAL OIL	010105	9	9	9	9	12	4	5	2	6	4	17	1	1	6	2	0
1A1a	203	RESIDUAL OIL	010200	2006	2236	1141	879	0	0	0	0								
1A1a	203	RESIDUAL OIL	010202					134	173	171	141	102	136	59	87	123	84	34	27
1A1a	203	RESIDUAL OIL	010203					859	939	1201	875	779	962	625	612	548	323	208	260
1A1a	204	GAS OIL	010100	239	416	641	245							0	0	0	0	0	0
1A1a	204	GAS OIL	010101					12	51	42	195	109	258	136	123	92	957	220	186

1A1a	204	GAS OIL	010102	0	0	0	0	43	30	153	114	82	159	279	367	279	115	139	116
1A1a	204	GAS OIL	010103					59	40	78	42	44	61	0	34	37	17	15	22
1A1a	204	GAS OIL	010104	44	44	44	44	44	76	81	54	147	60	103	40	75	79	81	126
1A1a	204	GAS OIL	010105	17	33	35	35	116	137	99	100	134	108	69	85	66	64	107	73
1A1a	204	GAS OIL	010200	1941	813	744	947	0	0	0	0								
1A1a	204	GAS OIL	010201					27	7									93	53
1A1a	204	GAS OIL	010202					174	361	800	515	418	258	694	830	167	256	419	178
1A1a	204	GAS OIL	010203					844	444	555	510	652	296	233	355	307	1126	493	367
1A1a	204	GAS OIL	010204																8
1A1a	204	GAS OIL	010205					1					1	0	0	0	0	5	1
1A1a	215	RAPE & FISH OIL	010102															1	0
1A1a	215	RAPE & FISH OIL	010103					34	24	22	0	5	7				2	55	0
1A1a	215	RAPE & FISH OIL	010105															2	0
1A1a	215	RAPE & FISH OIL	010200	744	744	744	800												
1A1a	215	RAPE & FISH OIL	010202														19	5	0
1A1a	215	RAPE & FISH OIL	010203					212	227	39	14	8	20	49	191	126	238	589	0
1A1a	225	ORIMULSION	010101						19913	36767	40488	32580	34191	34148	30244	23846	1921	19	0
1A1a	301	NATURAL GAS	010100								6	21	17	15	11	0	1	2	0
1A1a	301	NATURAL GAS	010101	4005	4395	3279	4422	8438	10454	12217	14600	20809	21308	23542	20515	19247	20165	19287	18925
1A1a	301	NATURAL GAS	010102	0	0	0	0	295	300	1346	5620	5987	2416	1590	4250	2893	1877	1582	1272
1A1a	301	NATURAL GAS	010103					2487	1775	1558	1138	959	717	684	734	657	1058	837	550
1A1a	301	NATURAL GAS	010104	1859	2397	4806	7327	7777	8548	14500	12220	13003	21614	22974	25003	30031	29928	30713	26953
1A1a	301	NATURAL GAS	010105	678	1291	2199	4169	8358	16420	22162	24109	26701	26834	25640	27865	27702	27012	26392	23502
1A1a	301	NATURAL GAS	010200	11033	13655	12350	11420	0	0	0	0	0							
1A1a	301	NATURAL GAS	010202					1072	1017	844	661	539	282	218	287	291	278	428	320
1A1a	301	NATURAL GAS	010203					6160	5525	3803	2420	1989	1874	1427	1768	1482	1850	1612	2256
1A1a	301	NATURAL GAS	010205					132	339	377	230	236	226	203	228	207	172	474	552
1A1a	303	LPG	010100		1	1	3												
1A1a	303	LPG	010102																0
1A1a	303	LPG	010103						1	0									
1A1a	303	LPG	010200	9	13	10	0	0	0		0								
1A1a	303	LPG	010203					3					0	0	0	0	0	0	0
1A1a	308	REFINERY GAS	010101							35	40								
1A1a	309	BIOGAS	010100	141	219	29	42												
1A1a	309	BIOGAS	010101					17	0	24	20								
1A1a	309	BIOGAS	010102	0	0	0	0	10	0	94	41	50	30	26	23	20	22	17	17
1A1a	309	BIOGAS	010103					54	118	79	111	87	104	135	124	90	97	78	70

1A1a	309	BIOGAS	010104			79	89	200	169	7									
1A1a	309	BIOGAS	010105	95	175	251	406	415	599	826	1230	1549	1500	1549	1589	1686	1705	1435	1536
1A1a	309	BIOGAS	010200	30	30	53	53	0	0	0	0								
1A1a	309	BIOGAS	010203					46	44	54	34	31	25	22	11	13	17	23	41
1A1a	309	BIOGAS	010205					41										36	110
1A1b	203	RESIDUAL OIL	010306	1309	2038	3569	3490	3337	2334	2244	1622	1106	1090	1323	1443	1363	907	1072	746
1A1b	204	GAS OIL	010306		40	44	29	49	33	22	87						3	9	2
1A1b	303	LPG	010306		0	5		8	15	21	18								
1A1b	308	REFINERY GAS	010300	458	926	1526	16												
1A1b	308	REFINERY GAS	010304				2067	2355	2290	5070	4082	2996	4173	3908	3979	3855	3804	3797	1996
1A1b	308	REFINERY GAS	010306	13520	13486	13237	13214	14005	18548	16337	12771	12203	11551	11649	11777	11342	12750	12094	13351
1A1c	204	GAS OIL	010505													0	0	0	0
1A1c	301	NATURAL GAS	010502	0	0	0	0	0	399	391	417	413	409	341	353	379	323	361	325
1A1c	301	NATURAL GAS	010504	9482	9703	11119	11235	12268	12506	14850	19455	21637	23562	25016	24413	26180	26247	27069	27625
1A1c	301	NATURAL GAS	010505	2	4	4	4	3	4	8	5	15	14	14	12	11	12	12	9
1A1c	309	BIOGAS	010505	7	7	7	7	6	52	60	57	31	29	33	29	31	32	61	100
1A2f	102	COAL	030100	8850	8977	6751	7699	5867	4833	4461	4494	4676	3715	3667	3359	2127	2826	3736	2062
1A2f	102	COAL	030102	0	0	0	0	615	1051	1450	1467	1406	1412	1063	997	998	1570	1499	1499
1A2f	102	COAL	030103					190	183	193	192	0							
1A2f	102	COAL	030106																1
1A2f	102	COAL	030311	5019	6049	6577	6602	6914	7225	7068	7209	6628	5638	5708	4523	4349	3369	3754	3917
1A2f	106	BROWN COAL BRI.	030100	4	7	4	18	3	2	1	1								
1A2f	107	COKE OVEN COKE	030100	1169	1351	1078	1073	1163	287	304	295	319	381	238	223	279	276	302	241
1A2f	107	COKE OVEN COKE	030318						937	886	931	1007	1030	944	883	786	693	814	739
1A2f	110	PETROLEUM COKE	030100	300	0	56	123	0	98	110	34	26	39	285	128	224	230	181	163
1A2f	110	PETROLEUM COKE	030311	2499	2991	3234	3231	3469	3707	4966	5230	4775	6399	6475	7657	7543	7714	8188	7796
1A2f	111	WOOD AND SI-MIL.	030100	5784	5690	5751	5822	4465	4254	4098	4166	4274	4250	4450	4596	3313	3523	3531	3618
1A2f	111	WOOD AND SI-MIL.	030102									2	1	1	1	0	0	0	0
1A2f	111	WOOD AND SI-MIL.	030103					481	413	624	524	412	414	440	431	411	295	342	527
1A2f	114	MUNICIP.	030100	28	28	37	39	26	29	28	24	29	35						0

		WASTES																	
1A2f	114	MUNICIP. WASTES	030102									0				0	5	0	0
1A2f	114	MUNICIP. WASTES	030311											505	1062	1788	1406	1927	1932
1A2f	117	STRAW	030100									0	0						
1A2f	117	STRAW	030103						3										
1A2f	117	STRAW	030105											0	0	0	0	0	0
1A2f	118	SEWAGE SLUDGE	030311											40	375	65	55	58	58
1A2f	203	RESIDUAL OIL	030100	16529	17770	17383	14202	13060	11278	11329	9336	8615	7974	7363	7288	7208	5382	5112	4711
1A2f	203	RESIDUAL OIL	030102					742	911	789	790	663	696	714	792	809	1645	1690	1346
1A2f	203	RESIDUAL OIL	030103					200	207	166	123	122	136	140	90	0	0	0	0
1A2f	203	RESIDUAL OIL	030104								54		0	0	0	0	0	0	0
1A2f	203	RESIDUAL OIL	030105												0	0	1	0	5
1A2f	203	RESIDUAL OIL	030311	1763	2153	2367	2397	2619	2840	1771	1864	2539	886	859	502	592	587	817	694
1A2f	204	GAS OIL	030100	538	1370	1431	952	813	1460	2252	1895	1799	2478	2186	3013	2370	2667	2564	1636
1A2f	204	GAS OIL	030102						3			0	1	3	5	0	4	3	3
1A2f	204	GAS OIL	030103					2	1	11	1	2	0	82	0	0	0	0	0
1A2f	204	GAS OIL	030104								0	0	7	0	0	1	0	0	2
1A2f	204	GAS OIL	030105			1	2	2						0	1	0	0	0	0
1A2f	204	GAS OIL	030106	6	7	9	3	9	7	7	8	16	70	8	10	7	7	9	9
1A2f	204	GAS OIL	030315								1	1	5	2	2	1	1	4	7
1A2f	206	KEROSENE	030100	70	46	38	35	30	24	31	28	16	9	8	26	65	48	20	13
1A2f	215	RAPE & FISH OIL	030100																0
1A2f	215	RAPE & FISH OIL	030105													0	0	0	0
1A2f	301	NATURAL GAS	030100	22280	23781	23888	25535	29248	30318	29252	29423	29114	31167	28608	30958	29348	28486	27524	29684
1A2f	301	NATURAL GAS	030102					863	2662	2465	2972	2962	3100	2690	2869	1190	2274	2296	2200
1A2f	301	NATURAL GAS	030103					300	64	147	170	132	127	116	118	15	119	124	190
1A2f	301	NATURAL GAS	030104	506	609	664	730	761	910	2563	3366	5106	6501	6756	6139	6724	6526	6633	5965
1A2f	301	NATURAL GAS	030105	0	0	0	0	11	173	873	960	1157	1160	1556	1642	1545	1544	1570	1256
1A2f	301	NATURAL GAS	030106	136	24	38	70	53	24	15	5	32	39	51	54	26	17	22	2
1A2f	301	NATURAL GAS	030315								924	903	1005	1101	1089	1016	946	911	874
1A2f	301	NATURAL GAS	030318						625	590	621	671	687	629	589	524	552	607	557
1A2f	303	LPG	030100	1576	1689	1589	1451	1558	1738	1920	1597	1624	1355	855	584	443	505	522	516
1A2f	308	REFINERY GAS	030100	191	125	102	108	0	0	35	53	27							
1A2f	309	BIOGAS	030100	0	0	0	0	13	126	96	117	74	33	33	28	38	34	46	53

1A2f	309	BIOGAS	030102					7	16	16	19	16	16	16	59	72	96	113	48
1A2f	309	BIOGAS	030104						1	1	1								
1A2f	309	BIOGAS	030105									0	0	1	24	18	14	17	
1A4a	102	COAL	020100	88	9	96	76	90	66	41	43	2						1	0
1A4a	106	BROWN COAL BRI.	020100	1	2		8	1	1	0	0								
1A4a	110	PETROLEUM COKE	020100	62	104	90	96	92	70	91	98	71	50	12	12	5	9	0	65
1A4a	111	WOOD AND SIMIL.	020100	204	204	204	204	216	273	449	471	493	642	776	665	672	681	681	707
1A4a	111	WOOD AND SIMIL.	020105									2	2		0	1	0	0	0
1A4a	114	MUNICIP. WASTES	020100	914	1011	1071	1099	1182	1275	1222	1180	710	1473	1414	1183	1740	1767	1396	0
1A4a	114	MUNICIP. WASTES	020103					31	31	10	8	10	7	14	13	13	75	76	173
1A4a	203	RESIDUAL OIL	020100	1070	865	601	517	719	677	718	729	384	450	343	173	478	171	108	121
1A4a	203	RESIDUAL OIL	020103					88	78										
1A4a	204	GAS OIL	020100	11795	10623	9062	9007	7157	6556	6620	6093	5442	5781	4969	4694	4043	4297	4416	3755
1A4a	204	GAS OIL	020102					191		0		0							
1A4a	204	GAS OIL	020103					0		58	58	54	39	71	44	44	30	19	48
1A4a	204	GAS OIL	020105			1	1	1	20	2	0	0	0	1	1	1	1	1	2
1A4a	206	KEROSENE	020100	569	210	207	189	155	124	103	96	128	117	63	80	70	74	77	101
1A4a	301	NATURAL GAS	020100	6376	6934	7382	8909	7343	8437	11247	9107	8662	7525	7234	7323	7624	9215	9200	9442
1A4a	301	NATURAL GAS	020103					2			2	49	11	43	67	165	11	50	36
1A4a	301	NATURAL GAS	020104		0			12	26	31	26	23	31	23	31	43	34	22	13
1A4a	301	NATURAL GAS	020105	46	89	278	350	474	609	681	866	959	986	1033	1045	1080	1023	1033	862
1A4a	303	LPG	020100	83	77	77	122	125	131	138	128	116	110	122	119	137	170	215	218
1A4a	303	LPG	020103									0							
1A4a	303	LPG	020105									1	1					0	0
1A4a	309	BIOGAS	020100	199	179	84	64	113	170	173	272	225	293	317	363	438	342	444	330
1A4a	309	BIOGAS	020103							14	39	71	74	87	85	74	85	101	355
1A4a	309	BIOGAS	020104						27										
1A4a	309	BIOGAS	020105	270	290	387	406	349	411	390	405	439	437	507	504	528	531	517	544
1A4b	102	COAL	020200	589	1125	866	786	619	377	86	86	127	79	14	13	15	0	0	8
1A4b	106	BROWN COAL BRI.	020200	51	67	39	80	76	62	47	49	44	38	26	33	19	3	0	0
1A4b	107	COKE OVEN	020200	107	99	103	81	63	49	37	27	20	11	5	3	3	26	27	0

		COKE																	
1A4b	110	PETROLEUM COKE	020200	761	697	961	990	748	734	929	839	726	706	513	513	509	762	1005	1315
1A4b	111	WOOD AND SIMIL.	020200	8954	10412	10720	11860	11564	11761	12669	12569	11134	11615	14625	17484	18067	20855	22274	25127
1A4b	117	STRAW	020200	5087	5087	5087	4750	4414	4077	3633	3892	3773	3443	3112	2901	2901	2901	2901	2901
1A4b	203	RESIDUAL OIL	020200	217	219	168	130	95	63	66	46	43	50	36	27	149	47	44	49
1A4b	204	GAS OIL	020200	46463	50638	42914	49967	43679	43288	45296	39595	37850	35675	30276	31506	28998	27027	25291	23863
1A4b	206	KEROSENE	020200	4405	660	512	521	438	411	383	287	252	119	91	159	110	205	111	158
1A4b	301	NATURAL GAS	020200	17362	20433	21440	24904	24737	26947	30412	28362	29138	28982	27569	29262	28082	30023	29858	29522
1A4b	301	NATURAL GAS	020202							26	25	18	31	55	69	30	63	64	18
1A4b	301	NATURAL GAS	020204	0	8	499	776	1023	1095	1448	1488	1576	1554	1439	1450	1392	1451	1476	1467
1A4b	303	LPG	020200	670	522	442	673	589	628	653	510	546	624	651	649	608	596	651	667
1A4c	102	COAL	020300	2458	2854	2204	2106	2295	1798	1446	1239	904	708	1079	1234	856	1203	1040	1787
1A4c	102	COAL	020304																3
1A4c	106	BROWN COAL BRI.	020300	60	92	52	22	12	10	7	4	4							
1A4c	110	PETROLEUM COKE	020300	837	611	473	500	0	240	286	323	201	89	6	3	0	1	0	0
1A4c	111	WOOD AND SIMIL.	020300	87	87	87	68	68	68	87	97	230	231	170	147	147	112	112	112
1A4c	111	WOOD AND SIMIL.	020304									1	14	0	0				
1A4c	117	STRAW	020300	3391	3391	3391	3167	2942	2718	2422	2595	2515	2295	2074	1934	1934	1934	1934	1934
1A4c	117	STRAW	020302								6	6	6	6	6	6	6	6	6
1A4c	203	RESIDUAL OIL	020300	1224	1296	1634	1687	1942	2617	3071	2492	2563	2396	1779	1640	1365	911	720	759
1A4c	203	RESIDUAL OIL	020302									9	1	3	2	2	6	5	7
1A4c	203	RESIDUAL OIL	020304									9	11	4	5	3	3	0	0
1A4c	204	GAS OIL	020300	406	1014	1176	794	708	1182	1940	1799	1675	2297	2156	2567	2193	2309	2055	2375
1A4c	204	GAS OIL	020302								0								
1A4c	204	GAS OIL	020304							4	2			5	3	5	6	0	2
1A4c	206	KEROSENE	020300	43	28	26	26	27	21	23	25	21	11	8	23	11	11	7	8
1A4c	215	RAPE & FISH OIL	020304											0	1	0	0	0	0
1A4c	301	NATURAL GAS	020300	2222	2680	2385	2463	2485	2560	2666	2645	2476	2242	2384	2687	2543	2320	2258	2248
1A4c	301	NATURAL GAS	020303						0	6	26	66	77	62	60	64	54	54	58
1A4c	301	NATURAL GAS	020304	104	104	136	161	282	961	1796	2620	3354	3379	3109	2935	3116	2856	2864	2494
1A4c	303	LPG	020300	259	247	192	122	116	125	137	109	126	87	93	80	55	58	53	53
1A4c	309	BIOGAS	020300					3	4	132	26	35	30	76	80	96	135	169	74

1A4c	309	BIOGAS	020304	10	10	10	10	7	16	17	18	26	41	77	109	239	456	411	409
Total				498527	608220	549145	580680	620089	600788	757936	653139	614805	585831	544604	571209	569225	627994	569746	531330

Appendix 2A-6 Emission factors

Table 42 CO_2 emission factors.

Fuel	Emission factor Biomass	Emission factor Fossil fuel	Unit	Reference type	IPCC fuel Category
Coal		95	kg/GJ	Country specific	Solid
Brown coal briquettes		94,6	kg/GJ	IPCC reference manual	Solid
Coke oven coke		108	kg/GJ	IPCC reference manual	Solid
Petroleum coke		92	kg/GJ	Country specific	Liquid
Wood	102		kg/GJ	Corinair	Biomass
Municipal waste	94,5	17,6	kg/GJ	Country specific	Biomass / Other fuels
Straw	102		kg/GJ	Country specific	Biomass
Residual oil		78	kg/GJ	Corinair	Liquid
Gas oil		74	kg/GJ	Corinair	Liquid
Kerosene		72	kg/GJ	Corinair	Liquid
Fish & rape oil	74		kg/GJ	Country specific	Biomass
Orimulsion		80	kg/GJ	Country specific	Liquid
Natural gas		56,96	kg/GJ	Country specific	Gas
LPG		65	kg/GJ	Corinair	Liquid
Refinery gas		56,9	kg/GJ	Country specific	Liquid
Biogas	83,6		kg/GJ	Country specific	Biomass

Time-series for natural gas and municipal waste are shown below. All other emission factors are the same for 1990-2004.

Table 43 CO_2 emission factors, time-series.

Year	Natural gas [kg/GJ]	Municipal waste plastic [kg/GJ]	Municipal waste biomass [kg/GJ]
1990	56,9	22,5	+89,6
1991	56,9	22,5	+89,6
1992	56,9	20,5	+91,6
1993	56,9	19,6	+92,5
1994	56,9	19,6	+92,5
1995	56,9	18,5	+93,6
1996	56,9	17,6	+94,5
1997	56,9	17,6	+94,5
1998	56,9	17,6	+94,5
1999	56,9	17,6	+94,5
2000	57,1	17,6	+94,5
2001	57,25	17,6	+94,5
2002	57,28	17,6	+94,5
2003	57,19	17,6	+94,5
2004	57,12	17,6	+94,5
2005	56,96	17,6	+94,5

Table 44 CH_4 emission factors and references 2005.

Fuel	ipcc_id	SNAP_id	Emission factor [g/GJ]	Reference
COAL	1A1a	010101, 010102, 010103	1,5	EMEP/Corinair 2004
COAL	1A1a, 1A2f, 1A4b, 1A4c	010202, 010203, 0301, 0202, 0203	15	EMEP/Corinair 2004
BROWN COAL BRI.	all	all	15	EMEP/Corinair 2004, assuming same emission factor as for coal
COKE OVEN COKE	all	all	15	EMEP/Corinair 2004, assuming same emission factor as for coal
PETROLEUM COKE	all	all	15	EMEP/Corinair 2004
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	2	Nielsen & Illerup 2003
WOOD AND SIMIL.	1A4a, 1A4b, 1A4c	0201, 0202, 0203	200	EMEP/Corinair 2004
WOOD AND SIMIL.	1A1a, 1A2f	010105, 010202, 010203, 0301, 030102, 030103	32	EMEP/Corinair 2004
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	0,59	Nielsen & Illerup 2003
MUNICIP. WASTES	1A1a, 1A2f, 1A4a	all other	6	EMEP/Corinair 2004
STRAW	1A1a	010102, 010103	0,5	Nielsen & Illerup 2003
STRAW	1A1a, 1A2f, 1A4c	010202, 010203, 020302, 030105	32	EMEP/Corinair 2004
STRAW	1A4b, 1A4c	0202, 0203	200	EMEP/Corinair 2004
RESIDUAL OIL	all	all	3	EMEP/Corinair 2004
GAS OIL	all	all	1,5	EMEP/Corinair 2004
KEROSENE	all	all	7	EMEP/Corinair 2004
FISH & RAPE OIL	all	all	1,5	EMEP/Corinair 2004, assuming same emission factor as gas oil
ORIMULSION	1A1a	010101	3	EMEP/Corinair 2004, assuming same emission factor as residual oil
NATURAL GAS	1A1a	0101, 010101, 010102, 010202	6	DGC 2001
NATURAL GAS	1A1a	010103, 010203	15	Gruijthuijsen & Jensen 2000
NATURAL GAS	1A1a, 1Ac, 1A2f, 1A4a, 1A4c	Gas turbines: 010104, 010504, 030104, 020104, 020303	1,5	Nielsen & Illerup 2003
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	Gas engines: 010105, 010205, 010505, 030105, 020105, 020204, 020304	1) 520	Nielsen & Illerup 2003
NATURAL GAS	1A1c, 1A2f, 1A4a, 1A4b, 1A4c	010502, 0301, 0201, 0202, 0203	6	DGC 2001
NATURAL GAS	1A2f, 1A4a, 1A4b	030103, 030106, 020103, 020202	15	Gruijthuijsen & Jensen 2000
LPG	all	all	1	EMEP/Corinair 2004
REFINERY GAS	1A1b	010304	1,5	EMEP/Corinair 2004
BIOGAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas engines: 010105, 010505, 030105, 020105, 020304	1) 323	Nielsen & Illerup 2003
BIOGAS	1A1a, 1A2f, 1A4a, 1A4c	all other	4	EMEP/Corinair 2004

1) 2004 emission factor. Time-series is shown below

Time-series for CH_4 emission factors for gas engines are shown below. All other CH_4 emission factors are the same for 1990-2005.

Table 45 CH_4 emission factors, time-series.

Year	Natural gas fuelled engines Emission factor [g/GJ]	Biogas fuelled engines Emission factor [g/GJ]
1990	257	239
1991	299	251
1992	347	264
1993	545	276
1994	604	289
1995	612	301
1996	596	305
1997	534	310
1998	525	314
1999	524	318
2000	520	323
2001	520	323
2002	520	323
2003	520	323
2004	520	323
2005	520	323

Table 46 N_2O emission factors and references 2005.

Fuel	ipcc_id	SNAP_id	Emission factor [g/GJ]	Reference
COAL	1A1a	0101**	0,8	Elsam 2005
COAL	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	All except 0101**	3	EMEP/Corinair 2004
BROWN COAL BRI.	all	all	3	EMEP/Corinair 2004
COKE OVEN COKE	all	all	3	EMEP/Corinair 2004
PETROLEUM COKE	all	all	3	EMEP/Corinair 2004
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	0,8	Nielsen & Illerup 2003
WOOD AND SIMIL.	1A1a	010105, 010202, 010203	4	EMEP/Corinair 2004
WOOD AND SIMIL.	1A2f, 1A4a, 1A4b, 1A4c	all	4	EMEP/Corinair 2004
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	1,2	Nielsen & Illerup 2003
MUNICIP. WASTES	1A1a	010203	4	EMEP/Corinair 2004
MUNICIP. WASTES	1A2f, 1A4a	030102, 0201, 020103	4	EMEP/Corinair 2004
STRAW	1A1a	010102, 010103	1,4	Nielsen & Illerup 2003
STRAW	1A1a	010202, 010203	4	EMEP/Corinair 2004
STRAW	1A2f, 1A4b, 1A4c	all	4	EMEP/Corinair 2004
RESIDUAL OIL	all	all	2	EMEP/Corinair 2004
GAS OIL	all	all	2	EMEP/Corinair 2004
KEROSENE	all	all	2	EMEP/Corinair 2004
FISH & RAPE OIL	all	all	2	EMEP/Corinair 2004, assuming same emission factor as gas oil
ORIMULSION	1A1a	010101	2	EMEP/Corinair 2004, assuming same emission factor as residual oil
NATURAL GAS	1A1a	0101, 010101, 010102, 010103, 010202, 010203	1	EMEP/Corinair 2004
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas turbines: 010104, 010504, 030104, 020104, 020303	2,2	Nielsen & Illerup 2003
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	Gas engines: 010105, 010205, 010505, 030105, 020105, 020204, 020304	1,3	Nielsen & Illerup 2003
NATURAL GAS	1A1c, 1A2f, 1A4a, 1A4b, 1A4c	010502, 0301, 030103, 030106, 0201, 020103, 0202, 020202, 0203	1	EMEP/Corinair 2004
LPG	all	all	2	EMEP/Corinair 2004
REFINERY GAS	all	all	2,2	EMEP/Corinair 2004
BIOGAS	1A1a	010102, 010103, 010203	2	EMEP/Corinair 2004
BIOGAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas engines: 010105, 010505, 030105, 020105, 020304	0,5	Nielsen & Illerup 2003
BIOGAS	1A2f, 1A4a, 1A4c	0301, 030102, 0201, 020103, 0203	2	EMEP/Corinair 2004

The same N_2O emission factors are applied for 1990-2005

Table 47 SO_2, NO_X, NMVOC and CO emission factors and references 2005.

Fuel	IPCC sector	SNAP	SO_2 [g/GJ]	Ref.	NO_X [g/GJ]	Ref.	NMVOC [g/GJ]	Ref.	CO [g/GJ]	Ref.
COAL	1A1a	010101, 010102, 010103	**41**	18	**127**	18	**1,5**	1	**10**	3
COAL	1A1a, 1A2f, 1A4c	010202, 010203, 0301, 0203	**574**	19	**95**	4	**15**	1	**10**	1
COAL	1A4b	0202	**574**	19	**95**	4	**15**	1	**2000**	32
BROWN COAL BRI.	1A4b	0202	**574**	29	**95**	29	**15**	29	**2000**	29
COKE OVEN COKE	1A2f	0301	**574**	29	**95**	29	**15**	29	**10**	29
COKE OVEN COKE	1A4b	0202	**574**	29	**95**	29	**15**	29	**2000**	29
PETROLEUM COKE	1A2f	0301	**605**	20	**95**	29	**1,5**	1	**61**	4
PETROLEUM COKE	1A4a, 1A4b, 1A4c	0201, 0202, 0203	**605**	20	**50**	1	**1,5**	1	**1000**	1
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	**1,74**	31	**69**	31	**3,3**	31	**79**	31
WOOD AND SIMIL.	1A1a	010105	**25**	22, 21	**90**	22, 21, 4	**48**	1	**50**	3
WOOD AND SIMIL.	1A1a, 1A2f	010202, 010203, 0301, 030102, 030103	**25**	22, 21	**90**	22, 21, 4	**48**	1	**240**	4
WOOD AND SIMIL.	1A4a, 1A4c	0201, 020105, 0203	**25**	22, 21	**90**	22, 21, 4	**600**	1	**240**	4
WOOD AND SIMIL.	1A4b	0202	**25**	22, 21	**120**	22	**598**	39	**9000**	12, 13
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	**23,9**	31	**124**	31	**0,98**	31	**7,4**	31
MUNICIP. WASTES	1A1a, 1A2f, 1A4a	010203, 030102, 0201, 020103	**67**	9	**164**	9	**9**	1	**10**	9
STRAW	1A1a	010102, 010103	**47,1**	31	**131**	31	**0,8**	31	**63**	31
STRAW	1A1a, 1A2f, 1A4c	010202, 010203, 030105, 020302	**130**	5	**90**	4, 28	**50**	1	**325**	4, 5
STRAW	1A4b, 1A4c	0201, 0203	**130**	5	**90**	4, 28	**600**	1	**4000**	1,6,7
RESIDUAL OIL	1A1a	0101, 010101, 010102, 010103, 010104, 010105	**283**	18	**127**	18	**3**	1	**15**	3
RESIDUAL OIL	1A1a, 1A4a, 1A4b, 1A4c	010202, 010203, 0201, 0202, 0203, 020302	**344**	25, 10, 24	**142**	4	**3**	1	**30**	1
RESIDUAL OIL	1A1b	010306	**537**	33	**142**	4	**3**	1	**30**	1
RESIDUAL OIL	1A2f	0301, 030102, 030103	**344**	25, 10, 24	**130**	28	**3**	1	**30**	1
RESIDUAL OIL	1A2f	030104	**344**	25, 10, 24	**130**	28	**3**	1	**15**	1
RESIDUAL OIL	1A2f	030105	**344**	25, 10, 24	**130**	28	**3**	1	**100**	1
RESIDUAL OIL	1A4c	020304	**344**	25, 10, 24	**142**	4	**3**	1	**100**	1
GAS OIL	1A1a	0101, 010101, 010102	**23**	27	**249**	18	**1,5**	1	**15**	3
GAS OIL	1A1a, 1A2f	Gas turbines: 010104, 030104	**23**	27	**350**	9	**2**	1	**15**	3
GAS OIL	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Engines: 010105, 010205, 010505, 030105, 020105, 020304	**23**	27	**700**	1	**100**	1	**100**	1
GAS OIL	1A1a	010103	**23**	27	**65**	28	**1,5**	1	**15**	3
GAS OIL	1A1a, 1A1b, 1A2f	010202, 010203, 010306, 0301, 030102, 030103, 030106	**23**	27	**65**	28	**1,5**	1	**30**	1
GAS OIL	1A4a, 1A4c	0201, 020103, 0203	**23**	27	**52**	4	**3**	1	**30**	1
GAS OIL	1A4b	0202	**23**	27	**52**	4	**3**	1	**43**	1
KEROSENE	all	all	**5**	30	**50**	1	**3**	1	**20**	1
FISH & RAPE OIL	1A1a	010103	**1**	37	**220**	38	**1,5**	15	**15**	15
FISH & RAPE OIL	1A1a	010202, 010203	**1**	37	**65**	15	**1,5**	15	**15**	15
FISH & RAPE OIL	1A2f, 1A4c	030105, 020304	**1**	37	**700**	15	**100**	15	**100**	15
ORIMULSION	1A1a	010101	**12**	34	**86**	34	**3**	16	**15**	16
NATURAL GAS	1A1a	0101, 010101, 010102	**0,3**	17	**97**	9	**2**	14	**15**	3
NATURAL GAS	1A1a, 1A2f, 1A4a, 1A4c	Gas turbines: 010104, 030104, 020104, 020303	**0,3**	17	**124**	31	**1,4**	31	**6,2**	31
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	Gas engines: 010105, 010205, 010505, 030105, 020105, 020204, 020304	**0,3**	17	**168**	31	**117**	31	**175**	31
NATURAL GAS	1A1a, 1A2f	010103, 010202, 010203, 0301, 030103, 030106	**0,3**	17	**42**	36	**2**	14	**28**	4
NATURAL GAS	1A1c	010504	**0,3**	17	**250**	1, 8, 32	**1,4**	31	**6,2**	31
NATURAL GAS	1A4a, 1A4c	0201, 020103, 0203	**0,3**	17	**30**	1, 4, 11	**2**	14	**28**	4
NATURAL GAS	1A4b	0202, 020202	**0,3**	17	**30**	1, 4, 11	**4**	11	**20**	11
LPG	1A1a, 1A2f	010203, 0301	**0,13**	23	**96**	32	**2**	1	**25**	1
LPG	1A4a, 1A4c	0201, 0203	**0,13**	23	**71**	32	**2**	1	**25**	1
LPG	1A4b	0202	**0,13**	23	**47**	32	**2**	1	**25**	1
REFINERY GAS	1A1b	010304	**1**	2	**170**	9	**1,4**	35	**6,2**	35
BIOGAS	1A1a, 1A2f, 1A4a, 1A4c	010102, 010103, 010203, 0301, 0201, 020103, 0203	**25**	26	**28**	4	**4**	1	**36**	4
BIOGAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas engines: 010105, 010505, 030105, 020105, 020304	**19,2**	31	**540**	31	**14**	31	**273**	31
BIOGAS	1A2f	030102	**25**	26	**59**	4	**4**	1	**36**	4

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Time-series for emission factors for SO_2, NO_X, NMVOC and CO that are not the same in 1990-2005 are shown below. All other factors are constant in 1990-2005.

Table 48 SO_2, NO_X, NMVOC and CO emission factors time-series [g/GJ].

pol.	fuel	snap_id	ipcc_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SO2	COAL	0101	1A1a	506	571	454	386												
SO2	COAL	010101	1A1a	506	571	454	386	343	312	420	215	263	193	64	47	45	61	42	41
SO2	COAL	010102	1A1a	506	571	454	386	343	312	420	215	263	193	64	47	45	61	42	41
SO2	COAL	010103	1A1a					343	312	420	215	263	193	64	47	45	61	42	41
SO2	COAL	010104	1A1a					343	312	420	215								
SO2	PETROLEUM COKE	0201	1A4a	787	787	787	787	787	787	787	787	787	787	787	605	605	605	605	605
SO2	PETROLEUM COKE	0202	1A4b	787	787	787	787	787	787	787	787	787	787	787	605	605	605	605	605
SO2	PETROLEUM COKE	0203	1A4c	787	787	787	787	787	787	787	787	787	787	787	605	605	605	605	605
SO2	PETROLEUM COKE	0301	1A2f	787	787	787	787	787	787	787	787	787	787	787	605	605	605	605	605
SO2	MUNICIP. WASTES	0101	1A1a	138	116	95	73												
SO2	MUNICIP. WASTES	010102	1A1a		116	95	73	52	30			26	25	23,9	23,9	23,9	23,9	23,9	23,9
SO2	MUNICIP. WASTES	010103	1A1a					52	30	29	28	26	25	23,9	23,9	23,9	23,9	23,9	23,9
SO2	MUNICIP. WASTES	010104	1A1a					52	30	29	28	26	25	23,9	23,9	23,9	23,9	23,9	23,9
SO2	MUNICIP. WASTES	010105	1A1a											23,9	23,9	23,9	23,9	23,9	23,9
SO2	MUNICIP. WASTES	0102	1A1a	138	131	124	117	110	103	95	88								
SO2	MUNICIP. WASTES	010202	1A1a					110	103										
SO2	MUNICIP. WASTES	010203	1A1a					110	103	95	88	81	74	67	67	67	67	67	67
SO2	MUNICIP. WASTES	0201	1A4a	138	131	124	117	110	103	95	88	81	74	67	67	67	67	67	67
SO2	MUNICIP. WASTES	020103	1A4a					110	103	95	88	81	74	67	67	67	67	67	67
SO2	MUNICIP. WASTES	0301	1A2f	138	131	124	117	110	103	95	88	81	74						
SO2	RESIDUAL OIL	0101	1A1a	446	470	490	475							403	315	290	334	349	283
SO2	RESIDUAL OIL	010101	1A1a						351	408	344	369	369	403	315	290	334	349	283
SO2	RESIDUAL OIL	010102	1A1a	446	470	490	475	1564	351	408	344	369	369	403	315	290	334	349	283
SO2	RESIDUAL OIL	010103	1A1a					1564	351	408	344	369	369	403	315	290	334	349	283
SO2	RESIDUAL OIL	010104	1A1a					1564	351	408	344	369	369	403	315	290	334	349	283
SO2	RESIDUAL OIL	010105	1A1a	446	470	490	475	1564	351	408	344	369	369	403	315	290	334	349	283
SO2	RESIDUAL OIL	0102	1A1a	495	495	495	495	495	495	495	344								
SO2	RESIDUAL OIL	010202	1A1a					495	495	495	344	344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	010203	1A1a					495	495	495	344	344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	010306	1A1b	643	38	222	389				537	537	537	537	537	537	537	537	537
SO2	RESIDUAL OIL	0201	1A4a	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	020103	1A4a					495	495										
SO2	RESIDUAL OIL	0202	1A4b	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344

SO2	RESIDUAL OIL	0203	1A4c	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	020302	1A4c									344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	020304	1A4c									344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	0301	1A2f	495	495	495	495	495	495	495	344	344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	030102	1A2f					495	495	495	344	344	344	344	344	344	344	344	344
SO2	RESIDUAL OIL	030103	1A2f					495	495	495	344	344	344	344	344	344	344	344	344
SO2	GAS OIL	0101	1A1a	94	94	94	94							23	23	23	23	23	23
SO2	GAS OIL	010101	1A1a					94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	010102	1A1a	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	010103	1A1a					94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	010104	1A1a	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	010105	1A1a	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	0102	1A1a	94	94	94	94	94	23	23	23								
SO2	GAS OIL	010201	1A1a					94	23									23	23
SO2	GAS OIL	010202	1A1a					94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	010203	1A1a					94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	010205	1A1a					94					23	23	23	23	23	23	23
SO2	GAS OIL	010306	1A1b		94	94	94	94	23	23	23						23	23	23
SO2	GAS OIL	010505	1A1c													23	23	23	23
SO2	GAS OIL	0201	1A4a	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	020102	1A4a					94		23		23							
SO2	GAS OIL	020103	1A4a					94		23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	020105	1A4a			94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	0202	1A4b	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	0203	1A4c	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	0301	1A2f	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	030103	1A2f					94	23	23	23	23	23	23	23	23	23	23	23
SO2	GAS OIL	030105	1A2f			94	94	94						23	23	23	23	23	23
SO2	GAS OIL	030106	1A2f	94	94	94	94	94	23	23	23	23	23	23	23	23	23	23	23
SO2	ORIMULSION	010101	1A1a							147	149				10	12	12	12	12
NOX	COAL	0101	1A1a	342	384	294	289												
NOX	COAL	010101	1A1a	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127
NOX	COAL	010102	1A1a	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127
NOX	COAL	010103	1A1a					267	239	250	200	177	152	129	122	130	144	131	127
NOX	COAL	010104	1A1a					267	239	250	200								
NOX	COAL	010202	1A1a					200	200	200	200	200	200	95	95	95	95	95	95
NOX	COAL	010203	1A1a					200	200	200	200	200	200	95	95	95	95	95	95
NOX	COAL	0201	1A4a	200	200	200	200	200	200	200	200	200						95	95
NOX	COAL	0202	1A4b	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95
NOX	COAL	0203	1A4c	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95
NOX	COAL	0301	1A2f	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95
NOX	BROWN COAL BRI.	0202	1A4b	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95
NOX	COKE OVEN COKE	0202	1A4b	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95
NOX	COKE OVEN COKE	0301	1A2f	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95
NOX	PETROLEUM COKE	0301	1A2f	200	200	200	200	200	200	200	200	200	200	95	95	95	95	95	95
NOX	WOOD AND SIMIL.	010202	1A1a					130	130	130	130	130	90	90	90	90	90	90	90
NOX	WOOD AND SIMIL.	010203	1A1a					130	130	130	130	130	90	90	90	90	90	90	90
NOX	WOOD AND SIMIL.	0201	1A4a	130	130	130	130	130	130	130	130	130	90	90	90	90	90	90	90
NOX	WOOD AND SIMIL.	020105	1A4a									130	90		90	90	90	90	90
NOX	WOOD AND SIMIL.	0203	1A4c	130	130	130	130	130	130	130	130	130	90	90	90	90	90	90	90
NOX	WOOD AND SIMIL.	020304	1A4c									130	90	90	90				
NOX	WOOD AND SIMIL.	0301	1A2f	130	130	130	130	130	130	130	130	130	90	90	90	90	90	90	90
NOX	WOOD AND SIMIL.	030102	1A2f									130	90	90	90	90	90	90	90
NOX	WOOD AND SIMIL.	030103	1A2f					130	130	130	130	130	90	90	90	90	90	90	90
NOX	RESIDUAL OIL	0101	1A1a	342	384	294	289							129	122	130	144	131	127
NOX	RESIDUAL OIL	010101	1A1a						239	250	200	177	152	129	122	130	144	131	127
NOX	RESIDUAL OIL	010102	1A1a	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127
NOX	RESIDUAL OIL	010103	1A1a					267	239	250	200	177	152	129	122	130	144	131	127
NOX	RESIDUAL OIL	010104	1A1a					267	239	250	200	177	152	129	122	130	144	131	127
NOX	RESIDUAL OIL	010105	1A1a	342	384	294	289	267	239	250	200	177	152	129	122	130	144	131	127
NOX	GAS OIL	010103	1A1a					80	75	65	65	65	65	65	65	65	65	65	65
NOX	GAS OIL	0102	1A1a	100	95	90	85	80	75	70	65								
NOX	GAS OIL	010201	1A1a					80	75									65	65
NOX	GAS OIL	010202	1A1a					80	75	70	65	65	65	65	65	65	65	65	65
NOX	GAS OIL	010203	1A1a					80	75	70	65	65	65	65	65	65	65	65	65
NOX	GAS OIL	010306	1A1b		95	90	85	80	75	70	65						65	65	65
NOX	GAS OIL	0301	1A2f	100	95	90	85	80	75	70	65	65	65	65	65	65	65	65	65
NOX	GAS OIL	030102	1A2f						75			65	65	65	65	65	65	65	65
NOX	GAS OIL	030103	1A2f					80	75	70	65	65	65	65	65	65	65	65	65
NOX	GAS OIL	030106	1A2f	100	95	90	85	80	75	70	65	65	65	65	65	65	65	65	65
NOX	FISH & RAPE OIL	0102	1A1a	100	95	90	85												
NOX	FISH & RAPE OIL	010203	1A1a					80	75	70	65	65	65	65	65	65	65	65	65
NOX	ORIMULSION	010101	1A1a							139	138				88	86	86	86	86
NOX	NATURAL GAS	0101	1A1a								115	115	115	115	115	115	115	97	97
NOX	NATURAL GAS	010101	1A1a					115			115				115	115	115	97	97
NOX	NATURAL GAS	010102	1A1a	115	115	115	115	115	115			115	115	115	115	115	115	97	97
NOX	NATURAL GAS	010104	1A1a	161	157	153	149	145	141	138	134	131	127	124	124	124	124	124	124
NOX	NATURAL GAS	010105	1A1a	276	241	235	214	199	194	193	170	167	167	168	168	168	168	168	168
NOX	NATURAL GAS	010205	1A1a					199	194	193	170	167	167	168	168	168	168	168	168
NOX	NATURAL GAS	010505	1A1c	276	241	235	214	199	194	193	170	167	167	168	168	168	168	168	168
NOX	NATURAL GAS	020104	1A4a		157			145	141	138	134	131	127	124	124	124	124	124	124
NOX	NATURAL GAS	020105	1A4a	276	241	235	214	199	194	193	170	167	167	168	168	168	168	168	168
NOX	NATURAL GAS	020204	1A4b	276	241	235	214	199	194	193	170	167	167	168	168	168	168	168	168
NOX	NATURAL GAS	020303	1A4c						141	138	134	131	127	124	124	124	124	124	124
NOX	NATURAL GAS	020304	1A4c	276	241	235	214	199	194	193	170	167	167	168	168	168	168	168	168
NOX	NATURAL GAS	030104	1A2f	161				145	141	138	134	131	127	124	124	124	124	124	124
NOX	NATURAL GAS	030105	1A2f	276	241	235	214	199	194	193	170	167	167	168	168	168	168	168	168
NOX	BIOGAS	010105	1A1a	711	696	681	665	650	635	616	597	578	559	540	540	540	540	540	540
NOX	BIOGAS	010505	1A1c	711	696	681	665	650	635	616	597	578	559	540	540	540	540	540	540
NOX	BIOGAS	020105	1A4a	711	696	681	665	650	635	616	597	578	559	540	540	540	540	540	540
NOX	BIOGAS	020304	1A4c	711	696	681	665	650	635	616	597	578	559	540	540	540	540	540	540
NOX	BIOGAS	030105	1A2f									578	559	540	540	540	540	540	540
NMVOC	WOOD AND SIMIL.	0202	1A4b	704	704	704	704	704	704	704	704	704	704	704	630	602	599	594	598
NMVOC	NATURAL GAS	010105	1A1a	58	67	78	122	136	137	134	120	118	118	117	117	117	117	117	117
NMVOC	NATURAL GAS	010205	1A1a					136	137	134	120	118	118	117	117	117	117	117	117

NMVOC	NATURAL GAS	010505	1A1c	58	67	78	122	136	137	134	120	118	118	117	117	117	117	117	117
NMVOC	NATURAL GAS	020105	1A4a	58	67	78	122	136	137	134	120	118	118	117	117	117	117	117	117
NMVOC	NATURAL GAS	020204	1A4b	58	67	78	122	136	137	134	120	118	118	117	117	117	117	117	117
NMVOC	NATURAL GAS	020304	1A4c	58	67	78	122	136	137	134	120	118	118	117	117	117	117	117	117
NMVOC	NATURAL GAS	030105	1A2f	58	67	78	122	136	137	134	120	118	118	117	117	117	117	117	117
CO	WOOD AND SIMIL.	0102	1A1a	400	373	347	320	293	267	240	240								
CO	WOOD AND SIMIL.	010202	1A1a					293	267	240	240	240	240	240	240	240	240	240	240
CO	WOOD AND SIMIL.	010203	1A1a					293	267	240	240	240	240	240	240	240	240	240	240
CO	WOOD AND SIMIL.	0201	1A4a	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240
CO	WOOD AND SIMIL.	0203	1A4c	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240
CO	WOOD AND SIMIL.	0301	1A2f	400	373	347	320	293	267	240	240	240	240	240	240	240	240	240	240
CO	WOOD AND SIMIL.	030103	1A2f					293	267	240	240	240	240	240	240	240	240	240	240
CO	MUNICIP. WASTES	0102	1A1a	100	85	70	55	40	25	10	10								
CO	MUNICIP. WASTES	010201	1A1a					40											
CO	MUNICIP. WASTES	010202	1A1a					40	25										
CO	MUNICIP. WASTES	010203	1A1a					40	25	10	10	10	10	10	10	10	10	10	10
CO	MUNICIP. WASTES	0201	1A4a	100	85	70	55	40	25	10	10	10	10	10	10	10	10	10	10
CO	MUNICIP. WASTES	020103	1A4a					40	25	10	10	10	10	10	10	10	10	10	10
CO	MUNICIP. WASTES	0301	1A2f	100	85	70	55	40	25	10	10	10	10						
CO	STRAW	0102	1A1a	600	554	508	463	417	371	325	325								
CO	STRAW	010202	1A1a					417	371	325	325	325	325	325	325	325	325	325	325
CO	STRAW	010203	1A1a					417	371	325	325	325	325	325	325	325	325	325	325
CO	STRAW	0202	1A4b	8500	8500	8500	8500	8500	7500	6500	5500	4500	4000	4000	4000	4000	4000	4000	4000
CO	STRAW	0203	1A4c	8500	8500	8500	8500	8500	7500	6500	5500	4500	4000	4000	4000	4000	4000	4000	4000
CO	NATURAL GAS	010105	1A1a	181	202	203	217	216	212	211	174	174	174	175	175	175	175	175	175
CO	NATURAL GAS	010205	1A1a					216	212	211	174	174	174	175	175	175	175	175	175
CO	NATURAL GAS	010505	1A1c	181	202	203	217	216	212	211	174	174	174	175	175	175	175	175	175
CO	NATURAL GAS	020105	1A4a	181	202	203	217	216	212	211	174	174	174	175	175	175	175	175	175
CO	NATURAL GAS	020204	1A4b	181	202	203	217	216	212	211	174	174	174	175	175	175	175	175	175
CO	NATURAL GAS	020304	1A4c	181	202	203	217	216	212	211	174	174	174	175	175	175	175	175	175
CO	NATURAL GAS	030105	1A2f	181	202	203	217	216	212	211	174	174	174	175	175	175	175	175	175
CO	BIOGAS	010105	1A1a	230	234	239	243	248	252	256	260	265	269	273	273	273	273	273	273
CO	BIOGAS	010505	1A1c	230	234	239	243	248	252	256	260	265	269	273	273	273	273	273	273
CO	BIOGAS	020105	1A4a	230	234	239	243	248	252	256	260	265	269	273	273	273	273	273	273
CO	BIOGAS	020304	1A4c	230	234	239	243	248	252	256	260	265	269	273	273	273	273	273	273
CO	BIOGAS	030105	1A2f									265	269	273	273	273	273	273	273

Table 49a PM emission factors and references 2005.

Fuel	IPCC sector	SNAP	TSP [g/GJ]	Reference	PM_{10} [g/GJ]	Reference	$PM_{2.5}$ [g/GJ]	Reference
COAL	1A1a	010101, 010102, 010103	3	12	2,6	12	2,1	12
COAL	1A1a	010202, 010203	6	9	6	9	5	9
COAL	1A2f, 1A4b, 1A4c	0301, 0202, 0203	17	6	12	14	7	14
BROWN COAL BRI.	1A4b	0202	17	16	12	16	7	16
COKE OV.COKE	1A2f, 1A4b	0301, 0202	17	16	12	16	7	16
PETROLEUM COKE	1A2f	0301	10	9	7	9	3	9
PETROLEUM COKE	1A4a, 1A4b, 1A4c	0201, 0202, 0203	100	9	60	9	30	9
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	7,9	3	1,94	3	1,23	3
WOOD AND SIMIL.	1A1a, 1A2f	010105, 010202, 010203, 0301, 030102, 030103	19	1	13	2	10	2
WOOD AND SIMIL.	1A4a, 1A4c	0201, 020105, 0203	143	1	143	9	135	9
WOOD AND SIMIL.	1A4b	0202	747	17	710	17	672	17
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	2,02	3	1,126	3	1,084	3
MUNICIP. WASTES	1A1a, 1A2f, 1A4a	010203, 030102, 0201, 020103	6	10	5	11	4	11
STRAW	1A1a	010102, 010103	3,97	3	0,133	3	0,102	3
STRAW	1A1a, 1A2f, 1A4c	010202, 010203, 030105, 020302	21	1	15	2	12	2
STRAW	1A4b, 1A4c	0202, 0203	234	4	222	5	211	5
RESIDUAL OIL	1A1a	0101, 010101, 010102, 010103, 010104, 010105, 010202, 010203	3	9	3	9	2,5	9
RESIDUAL OIL	1A1b	010306	50	9	40	9	35	9
RESIDUAL OIL	1A2f, 1A4a, 1A4b, 1A4c	0301, 030102, 030103, 030104, 030105, 0201, 0202, 0203, 020302	14	6	10,5	13	7	13
RESIDUAL OIL	1A4c	Engines: 020304	60	9	50	9	40	9
GAS OIL	all	all	5	9	5	9	5	9
KEROSENE	all	all	5	9	5	9	5	9
FISH & RAPE OIL	all	all	3	15	3	15	3	15
ORIMULSION	1A1a	010101	1,9	12	1,8	12	1,6	12
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	0101, 010101, 010102, 010103, 010202, 010203, 010502, 0301, 030103, 030106, 0201, 020103, 0202, 020202, 0203	0,1	9	0,1	9	0,1	9
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas turbines: 010104, 010504, 030104, 020104, 020303	0,1	3	0,061	3	0,051	3
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	Gas engines: 010105, 010205, 010505, 030105, 020105, 020204, 020304	0,76	3	0,189	3	0,161	3
LPG	all	all	0,2	9	0,2	9	0,2	9
REFINERY GAS	1A1b	010304	5	9	5	9	5	9
BIOGAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas engines: 010105, 010505, 030105, 020105, 020304	2,63	3	0,451	3	0,206	3
BIOGAS	1A1a, 1A2f, 1A4a, 1A4c	010102, 010103, 010203, 0301, 030102, 0201, 020103, 0203	1,5	6	1,5	7	1,5	7

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 on the internet at: http://www.air.sk/tno/cepmeip/
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, whith an english summary). Available on the Internet at :http://www.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/FR442.pdf
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 on the internet at: http://www.air.sk/tno/cepmeip/

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. -
9. The TNO CEPMEIP emission factor database 2001. Available on the internet at: http://www.air.sk/tno/cepmeip/
10. Implied emission factor calculation based on annual environmental reports of a large number of municipal waste incineration plants, 2000
11. Particulate size distribution is unknown. The PM_{10} fraction is assumed to equal 85% of TSP and the $PM_{2.5}$ 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 Forbrændingsaerosoler, 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 on the internet at: http://www.air.sk/tno/cepmeip/
14. Particulate size distribution for coal combustion refers to the TNO CEPMEIP emission factor database 2001. Available on the internet at: http://www.air.sk/tno/cepmeip/
15. Assuming same emission factors as for gas oil (NERI assumption).
16. Same emission factor as for coal is assumed (NERI assumption)
17. Illerup, J. B., Henriksen, T. C., Lundhede, T., Breugel C. v., Jensen, N. Z. (2007) "Brændeovne og små kedler - partikelemissioner og reduktionstiltag". Miljøprojekt nr. 1164 2007. Miljøstyrelsen. http://www2.mst.dk/common/Udgivramme/Frame.asp?pg=http://www2.mst.dk/Udgiv/publikationer/2007/978-87-7052-451-3/html/default.htm

Time series have been estimated for the PM emission factors for residential wood combustion. All other emission factors are constant in 2000-2005. The time series for residential wood combustion are shown below.

Table 49b PM emission factors, time-series

	2000	2001	2002	2003	2004	2005
TSP	883	791	756	750	744	747
PM$_{10}$	839	751	718	713	707	710
PM$_{2.5}$	795	712	681	675	670	672

Table 50 HM emission factors and references 2005.

Fuel	IPCC sector	SNAP	As [mg/GJ]	Refer-ence	Cd [mg/GJ]	Refer-ence	Cr [mg/GJ]	Refer-ence	Cu [mg/GJ]	Refer-ence	Hg [mg/GJ]	Refer-ence	Ni [mg/GJ]	Refer-ence	Pb [mg/GJ]	Refer-ence	Se [mg/GJ]	Refer-ence	Zn [mg/GJ]	Refer-ence
COAL	all	all	3,2	1	0,1	1	2,3	1	3,1	1	1,7	1	4,4	1	6	1	0,5	1	10,5	1
BROWN COAL BRI.	1A4b	0202	3,2	1	0,1	1	2,3	1	3,1	1	1,7	1	4,4	1	6	1	0,5	1	10,5	1
COKE OV.COKE	all	all	3,2	1	0,1	1	2,3	1	3,1	1	1,7	1	4,4	1	6	1	0,5	1	10,5	1
PETROLEUM COKE	all	all	3,2	1	0,1	1	2,3	1	3,1	1	1,7	1	4,4	1	6	1	0,5	1	10,5	1
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	2,34	2	0,9	2	2,34	2	2,6	2	0,72	2	2,34	2	3,62	2			136	1
WOOD AND SIMIL.	1A1a 1A2f 1A4a 1A4b 1A4c	010105 010202 010203 0301 030102 030103 0201 020105 0202 0203			6,8	1			6,8	1	6,8	1			3,4	1			136	1
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	6,74	2	4,73	2	2,43	2	10,03	2	7,39	2	4,71	2	123	2			359,5	1
MUNICIP. WASTES	1A1a 1A2f 1A4a	010203, 030102, 0201, 020103	3,53	1	9,21	1	32,97	1	31,8	1	58,7	1	55,4	1	137,57	1			359,5	1
STRAW	1A1a	010102, 010103	2	2	0,72	2	1,52	2	1,66	2	0,53	2	1,62	2	6,12	2			8,39	1
STRAW	1A1a, 1A2f, 1A4b, 1A4c	010202, 010203, 030105, 0202, 0203, 020302			0,62	1	0,62	1	1,06	1	6,8	1	0,53	1	3,22	1			8,39	1
RESIDUAL OIL	all	all	14,07	1	13,5	1	33,33	1	12,96	1	4,3	1	642	1	23,46	1	12,3	1	2,72	1
GAS OIL	all	all	1,17	1	0,23	1	0,94	1	1,17	1	1,17	1	0,64	1	2,34	1	4,68	1	11,7	1
FISH & RAPE OIL	all	all	1,17	3	0,23	3	0,94	3	1,17	3	1,17	3	0,64	3	2,34	3	4,68	3	11,7	3
ORIMULSION	1A1a	010101	14,07	4	13,5	4	33,33	4	12,96	4	4,3	4	642	4	23,46	4	12,3	4	2,72	4

1. Illerup, J.B., Geertinger, A., Hoffmann, L. & Christiansen, K., 1999. Emissionsfaktorer for tungmetaller 1990-1996. Danmarks Miljøundersøgelser. 66 s. – Faglig rapport fra DMU nr. 301. (In Danish) Available on the internet at: http://www.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/fr301.pdf
2. 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, whith an english summary). Available on the Internet at :http://www.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/FR442.pdf
3. Assumed same emission factors as for gas oil (NERI assumption)
4. Assumed same emission factors as for residual oil (NERI assumption)

For large power plants combusting coal or residual oil other emission factors are applied for point sources than for area sources. The emission inventories are however mainly based on plants specific emission data from each plant. The large point source emission factors that differ from the area source emission factors are shown below.

Table 51 HM emission factors [mg/GJ] 2005 for large point sources. Only emission factors that differ from the area source emission factors are included.

Fuel	SNAP	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Coal	010102	3,3	0,1	8,02	4,41	2,2	6,81	6	13	10,5
Residual oil	010101, 010102	1,48	4,43	1,33	1,48	0,15	191	1,48	0,59	11,7

Time-series for emission factors for heavy metals is not constant for municipal waste. Time series are shown in Table 52. All other factors are constant in 1990-2005.

Table 52 HM emission factors time-series for municipal waste [mg/GJ].

pollutant	snap_id	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
As	0101	7,82	7,21	6,74	6,74												
As	010102		7,21	6,74	6,74	6,74	6,74			6,74	6,74	6,74	6,74	6,74	6,74	6,74	6,74
As	0102	7,82	7,21	6,59	5,98	5,37	4,76	4,14	3,53								
As	0201	7,82	7,21	6,59	5,98	5,37	4,76	4,14	3,53	3,53	3,53	3,53	3,53	3,53	3,53	3,53	3,53
As	0301	7,82	7,21	6,59	5,98	5,37	4,76	4,14	3,53	3,53	3,53						
Cd	0101	31,3	28,2	25	21,8												
Cd	010102		28,2	25	21,8	18,7	15,5			9,21	9,21	4,73	4,73	4,73	4,73	4,73	4,73
Cd	010103					18,7	15,5	12,4	9,21	9,21	9,21	4,73	4,73	4,73	4,73	4,73	4,73
Cd	0102	31,3	28,2	25	21,8	18,7	15,5	12,4	9,21								
Cd	0201	31,3	28,2	25	21,8	18,7	15,5	12,4	9,21	9,21	9,21	9,21	9,21	9,21	9,21	9,21	9,21
Cd	0301	31,3	28,2	25	21,8	18,7	15,5	12,4	9,21	9,21	9,21						
Cr	0101	186	164	142	120												
Cr	010102		164	142	120	98,6	76,7			33	33	2,43	2,43	2,43	2,43	2,43	2,43
Cr	010103					98,6	76,7	54,8	33	33	33	2,43	2,43	2,43	2,43	2,43	2,43
Cr	0102	186	164	142	120	98,6	76,7	54,8	33								
Cr	0201	186	164	142	120	98,6	76,7	54,8	33	33	33	33	33	33	33	33	33
Cr	0301	186	164	142	120	98,6	76,7	54,8	33	33	33						
Cu	0101	123	110	97,3	84,2												
Cu	010102		110	97,3	84,2	71,1	58			31,8	31,8	10	10	10	10	10	10
Cu	010103					71,1	58	44,9	31,8	31,8	31,8	10	10	10	10	10	10
Cu	0102	123	110	97,3	84,2	71,1	58	44,9	31,8								
Cu	0201	123	110	97,3	84,2	71,1	58	44,9	31,8	31,8	31,8	31,8	31,8	31,8	31,8	31,8	31,8
Cu	0301	123	110	97,3	84,2	71,1	58	44,9	31,8	31,8	31,8						
Hg	0101	132	122	111	101												
Hg	010102		122	111	101	90,3	79,8			58,7	58,7	7,39	7,39	7,39	7,39	7,39	7,39
Hg	010103					7,39	79,8	69,2	58,7	58,7	58,7	7,39	7,39	7,39	7,39	7,39	7,39
Hg	0102	132	122	111	101	90,3	79,8	69,2	58,7								
Hg	0201	132	122	111	101	90,3	79,8	69,2	58,7	58,7	58,7	58,7	58,7	58,7	58,7	58,7	58,7
Hg	0301	132	122	111	101	90,3	79,8	69,2	58,7	58,7	58,7						
Ni	0101	192	172	153	133												
Ni	010102		172	153	133	114	94,4			55,4	55,4	4,71	4,71	4,71	4,71	4,71	4,71
Ni	010103					114	94,4	74,9	55,4	55,4	55,4	4,71	4,71	4,71	4,71	4,71	4,71
Ni	0102	192	172	153	133	114	94,4	74,9	55,4								
Ni	0201	192	172	153	133	114	94,4	74,9	55,4	55,4	55,4	55,4	55,4	55,4	55,4	55,4	55,4
Ni	0301	192	172	153	133	114	94,4	74,9	55,4	55,4	55,4						
Pb	0101	639	639	555	472												
Pb	010102		639	555	472	388	305			138	138	123	123	123	123	123	123
Pb	010103					388	305	221	138	138	138	123	123	123	123	123	123
Pb	0102	723	639	555	472	388	305	221	138								
Pb	0201	723	639	555	472	388	305	221	138	138	138	138	138	138	138	138	138
Pb	0301	723	639	555	472	388	305	221	138	138	138						
Zn	0101	805	741	678	614												
Zn	010102		741	678	614	550	487			360	360	360	360	360	360	360	360
Zn	010103					550	487	423	360	360	360	360	360	360	360	360	360
Zn	010104					550	487	423	360	360	360	360	360	360	360	360	
Zn	0102	805	741	678	614	550	487	423	360								
Zn	010202					550	487										
Zn	010203					550	487	423	360	360	360	360	360	360	360	360	360
Zn	0201	805	741	678	614	550	487	423	360	360	360	360	360	360	360	360	360
Zn	020103					550	487	423	360	360	360	360	360	360	360	360	360
Zn	0301	805	741	678	614	550	487	423	360	360	360						

Table 53 PAH emission factors 2005.

Fuel	IPCC id	SNAP	Benzo(a)-pyrene [µg/GJ]	Benzo(a)-pyrene Reference	Benzo(b)-fluoranthene [µg/GJ]	Benzo(b)-fluoranthene Reference	Benzo(k)-fluoranthene [µg/GJ]	Benzo(k)-fluoranthene Reference	Indeno(1,2,3-c,d)-pyrene [µg/GJ]	Indeno(1,2,3-c,d)-pyrene Reference
COAL	1A1a	010101, 010102, 010103, 010202, 010203	0,14	4	0,29	4	0,29	4	0,28	4
COAL	1A2f	0301	23	4	929	4	929	4	698	4
COAL	1A4b, 1A4c	0202, 0203	59524	4	63492	4	1984	4	119048	4
BROWN COAL BRI.	1A4b	0202	59524	4 (9)	63492	4 (9)	1984	4 (9)	119048	4 (9)
COKE OV.COKE	1A2f	0301	23	4 (9)	929	4 (9)	929	4 (9)	698	4 (9)
COKE OV.COKE	1A4b	0202	59524	4 (9)	63492	4 (9)	1984	4 (9)	119048	4 (9)
PETROLEUM COKE	all	all	3184	5	9554	5				
WOOD AND SIMIL.	1A1a	010102, 010103, 010104	3	8	2	8	2	8	2	8
WOOD AND SIMIL.	1A1a, 1A2f	010105, 010202, 010203, 0301, 030102, 030103	6,46	4	1292,52	4	1292,52	4	11,56	4
WOOD AND SIMIL.	1A4a, 1A4c	0201, 020105, 0203	168707	4	221769	4	73469	4	119728	4
WOOD AND SIMIL.	1A4b	0202	138232	10	143857	10	83962	10	94917	10
MUNICIP. WASTES	1A1a	010102, 010103, 010104, 010105	0,8	8	1,7	8	0,8	8	0,9	8
MUNICIP. WASTES	1A1a, 1A2f, 1A4a	010203, 030102, 0201, 020103	67	5	571	5	1	5	1	5
STRAW	1A1a	010102	1,6	1	1,4	1	1	1	1,6	1
STRAW	1A1a	010103	21	8	157	8	90	8	23	8
STRAW	1A1a, 1A2f	010202, 010203, 030105	1529	2	3452	2	1400	2	1029	2
STRAW	1A4b, 1A4c	0202, 0203, 020302	12956	2	12828	2	6912	2	4222	2
RESIDUAL OIL	1A1a, 1A1b	0101, 010101, 010102, 010103, 010104, 010105, 010202, 010203, 010306	109,6	4	475,41	4	93,21	4	177,28	4
RESIDUAL OIL	1A2f 1A4a 1A4b 1A4c	0301, 030102, 030103, 030104, 030105, 0201, 0202, 0203, 020302, 020304	80	4	42	4	66	4	160	4
GAS OIL	1A1a, 1A1b 1A1c	0101, 010101, 010102, 010103, 010104, 010105, 010202, 010203, 010205, 010306, 010505	109,6	4	475,41	4	93,21	4	177,28	4
GAS OIL	1A2f 1A4a 1A4b 1A4c	0301, 030102, 030103, 030104, 030105, 030106, 0201, 020103, 020105, 0202, 0203, 020304	80	4	42	4	66	4	160	4
FISH & RAPE OIL	1A1a	010103, 010202, 010203	109,6	3	475,41	3	93,21	3	177,28	3
FISH & RAPE OIL	1A2f, 1A4c	030105, 020304	80	3	42	3	66	3	160	3
ORIMULSION	1A1a	010101	109,6	4 (7)	475,41	4 (7)	93,21	4 (7)	177,28	4 (7)
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4c	Gas turbines: 010104, 010504, 030104, 020104, 020303	1	8	1	8	2	8	3	8
NATURAL GAS	1A1a, 1A1c, 1A2f, 1A4a, 1A4b, 1A4c	Gas engines: 010105, 010205, 010505, 030105, 020105, 020204, 020304	3	8	42	8	24	8	6	8
NATURAL GAS	1A4b	020202	0,133	6	0,663	6	0,265	6	2,653	6
BIOGAS	all	all	1	8	1	8	0,4	8	1,1	8

1. Sander, B. 2003. Personal communication, e-mail 11-10-2003
2. Jensen, L. & Nielsen, P.B. 1996 Emissioner fra halm- og flisfyr, Arbejds rapport fra Miljøstyrelsen nr 5 1996, Bilagsrapport (In Danish)
3. Same emission factors as for gas oil is assumed (NERI assumption)
4. Berdowski J.J.M., Veldt C., Baas J., Bloos J.P.J., Klein A.E. 1995, Technical Paper to the OSPARCOM-HELCOM-UNECE Emission Inventory of heavy Metals and Persistent Organic Pollutants, TNO-report, TNO-MEP – R 95/247
5. Finstad A., Haakonsen G., Kvingedal E. & Rypdal K. 2001. Utslipp til luft av noen miljøgifter i Norge, Dokumentasjon av metode og resultater, Statistics Norway Report 2001/17 (In Norwegian)
6. Jensen, J. 2001, Danish Gas Technology centre, personal communication, e-mail 11-10-2001
7. Same emission factors as for residual oil is assumed (NERI assumption)
8. 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 English summary). Available at :http://www.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/FR442.pdf
9. Same emission factor as for coal is assumed (NERI assumption)
10. Aggregated emission factor based on the technology distribution and guidebook emission factors

Time series have been estimated for the PAH emission factors for residential wood combustion. All other emission factors are constant in 1990-2005. The time series for residential wood combustion are shown below.

pol_abbr	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Benzo(a)	159007	159007	159007	159007	159007	159007	159007	159007	159007	159007	159007	143838	138379	137894	137250	138232
Benzo(b)	169323	169323	169323	169323	169323	169323	169323	169323	169323	169323	169323	152440	145973	144794	143470	143857
Benzo(k)	98938	98938	98938	98938	98938	98938	98938	98938	98938	98938	98938	89090	85295	84572	83770	83962
Indeno	110485	110485	110485	110485	110485	110485	110485	110485	110485	110485	110485	99585	95554	95029	94401	94917

Appendix 2A-7 Implied emission factors for municipal waste incineration plants and power plants combustion coal

Table 54 Implied emission factors for municipal waste incineration plants 2005.

Pollutant	Implied Emission factor	Unit
SO_2	16	g/GJ
NO_x	129	g/GJ
TSP	2,0	g/GJ
PM_{10}	1,67	g/GJ
$PM_{2.5}$	1,41	g/GJ
As	5,1	mg/GJ
Cd	4,1	mg/GJ
Cr	6,7	mg/GJ
Cu	12,1	mg/GJ
Hg	9,3	mg/GJ
Ni	12,7	mg/GJ
Pb	56,8	mg/GJ
Zn	359,6	mg/GJ

Table 55 Implied emission factors for power plants combusting coal, 2005.

Pollutant	Implied Emission factor	Unit
SO_2	29,3	g/GJ
NO_x	137,2	g/GJ
TSP	4,5	g/GJ
PM_{10}	1,7	g/GJ
$PM_{2.5}$	1,4	g/GJ
As	0,57	mg/GJ
Cd	0,05	mg/GJ
Cr	1,0	mg/GJ
Cu	0,65	mg/GJ
Hg	1,2	mg/GJ
Ni	1,3	mg/GJ
Pb	1,1	mg/GJ
Se	4,3	mg/GJ
Zn	3,0	mg/GJ

Appendix 2A-8 Large point sources

Table 56 Large point sources, fuel consumption in 2005 (1A1, 1A2 and 1A4).

lps_id	lps_name	part_id	snap_id	Fuel_id	Fuel	Fuel consumption	IPCC source
001	Amagervaerket	02	010101	111	WOOD AND SIMIL.	1072478	1A1a
001	Amagervaerket	02	010101	117	STRAW	746528	1A1a
001	Amagervaerket	02	010101	203	RESIDUAL OIL	36759	1A1a
001	Amagervaerket	03	010101	102	COAL	13263320	1A1a
001	Amagervaerket	03	010101	203	RESIDUAL OIL	72487	1A1a
002	Svanemoellevaerket	05	010101	204	GAS OIL	14625	1A1a
002	Svanemoellevaerket	05	010101	301	NATURAL GAS	2836392	1A1a
002	Svanemoellevaerket	07	010104	204	GAS OIL	11113	1A1a
002	Svanemoellevaerket	07	010104	301	NATURAL GAS	3513239	1A1a
003	H.C.Oerstedsvaerket	03	010101	203	RESIDUAL OIL	842527	1A1a
003	H.C.Oerstedsvaerket	03	010101	301	NATURAL GAS	700258	1A1a
003	H.C.Oerstedsvaerket	07	010101	203	RESIDUAL OIL	1032402	1A1a
003	H.C.Oerstedsvaerket	07	010101	301	NATURAL GAS	1689736	1A1a
003	H.C.Oerstedsvaerket	08	010101	301	NATURAL GAS	1753273	1A1a
004	Kyndbyvaerket	21	010101	203	RESIDUAL OIL	344440	1A1a
004	Kyndbyvaerket	21	010101	204	GAS OIL	0,23	1A1a
004	Kyndbyvaerket	22	010101	203	RESIDUAL OIL	328010	1A1a
004	Kyndbyvaerket	26	010101	203	RESIDUAL OIL	268030	1A1a
004	Kyndbyvaerket	28	010101	203	RESIDUAL OIL	12750	1A1a
004	Kyndbyvaerket	41	010105	204	GAS OIL	1850	1A1a
004	Kyndbyvaerket	51	010104	204	GAS OIL	18570	1A1a
004	Kyndbyvaerket	52	010104	204	GAS OIL	19010	1A1a
005	Masnedoevaerket	12	010102	111	WOOD AND SIMIL.	85808	1A1a
005	Masnedoevaerket	12	010102	117	STRAW	472274	1A1a
005	Masnedoevaerket	12	010102	204	GAS OIL	1700	1A1a
005	Masnedoevaerket	31	010104	204	GAS OIL	28230	1A1a
007	Stigsnaesvaerket	01	010101	102	COAL	846401	1A1a
007	Stigsnaesvaerket	01	010101	203	RESIDUAL OIL	77449	1A1a
007	Stigsnaesvaerket	02	010101	102	COAL	5375686	1A1a
007	Stigsnaesvaerket	02	010101	203	RESIDUAL OIL	166914	1A1a
007	Stigsnaesvaerket	03	010101	203	RESIDUAL OIL	103300	1A1a
007	Stigsnaesvaerket	03	010101	204	GAS OIL	20200	1A1a

008	Asnaesvaerket	01	010101	203	RESIDUAL OIL	60495	1A1a
008	Asnaesvaerket	01	010101	204	GAS OIL	1829	1A1a
008	Asnaesvaerket	02	010101	102	COAL	5353439	1A1a
008	Asnaesvaerket	02	010101	203	RESIDUAL OIL	100663	1A1a
008	Asnaesvaerket	05	010101	102	COAL	20104140	1A1a
008	Asnaesvaerket	05	010101	203	RESIDUAL OIL	834785	1A1a
009	Statoil Raffinaderi	01	010306	203	RESIDUAL OIL	84893	1A1b
009	Statoil Raffinaderi	01	010306	308	REFINERY GAS	7886864	1A1b
010	Avedoerevaerket	01	010101	102	COAL	9384428	1A1a
010	Avedoerevaerket	01	010101	203	RESIDUAL OIL	76080	1A1a
010	Avedoerevaerket	01	010101	204	GAS OIL	10630	1A1a
010	Avedoerevaerket	02	010104	111	WOOD AND SIMIL.	4478887	1A1a
010	Avedoerevaerket	02	010104	117	STRAW	2445106	1A1a
010	Avedoerevaerket	02	010104	203	RESIDUAL OIL	6336347	1A1a
010	Avedoerevaerket	02	010104	301	NATURAL GAS	6652682	1A1a
011	Fynsvaerket+Odense kraftvarmevaerk	03	010101	102	COAL	1217710	1A1a
011	Fynsvaerket+Odense kraftvarmevaerk	03	010101	203	RESIDUAL OIL	91990	1A1a
011	Fynsvaerket+Odense kraftvarmevaerk	03	010101	301	NATURAL GAS	816310	1A1a
011	Fynsvaerket+Odense kraftvarmevaerk	07	010101	102	COAL	16648630	1A1a
011	Fynsvaerket+Odense kraftvarmevaerk	07	010101	203	RESIDUAL OIL	153700	1A1a
011	Fynsvaerket+Odense kraftvarmevaerk	08	010102	114	MUNICIP. WASTES	2813900	1A1a
011	Fynsvaerket+Odense kraftvarmevaerk	08	010102	204	GAS OIL	20116	1A1a
012	Studstrupvaerket	03	010101	102	COAL	10688620	1A1a
012	Studstrupvaerket	03	010101	117	STRAW	637310	1A1a
012	Studstrupvaerket	03	010101	203	RESIDUAL OIL	171650	1A1a
012	Studstrupvaerket	04	010101	102	COAL	12328300	1A1a
012	Studstrupvaerket	04	010101	117	STRAW	1212950	1A1a
012	Studstrupvaerket	04	010101	203	RESIDUAL OIL	153160	1A1a
014	Nordjyllandsvaerket	02	010101	102	COAL	667530	1A1a
014	Nordjyllandsvaerket	02	010101	203	RESIDUAL OIL	45770	1A1a
014	Nordjyllandsvaerket	03	010101	102	COAL	18684900	1A1a
014	Nordjyllandsvaerket	03	010101	203	RESIDUAL OIL	147310	1A1a
014	Nordjyllandsvaerket	03	010101	204	GAS OIL	21000	1A1a
016	Kemira Danmark	03	030104	301	NATURAL GAS	0,12	1A2f
017	Shell Raffinaderi	01	010306	203	RESIDUAL OIL	661487	1A1b

017	Shell Raffinaderi	01	010306	308	REFINERY GAS	4114274	1A1b
017	Shell Raffinaderi	05	010304	308	REFINERY GAS	1995597	1A1b
018	Skaerbaekvaerket	03	010101	204	GAS OIL	99690	1A1a
018	Skaerbaekvaerket	03	010101	301	NATURAL GAS	11129070	1A1a
019	Enstedvaerket	03	010101	102	COAL	9650410	1A1a
019	Enstedvaerket	03	010101	203	RESIDUAL OIL	206680	1A1a
019	Enstedvaerket	04	010101	111	WOOD AND SIMIL.	174290	1A1a
019	Enstedvaerket	04	010101	117	STRAW	1482090	1A1a
019	Enstedvaerket	04	010101	204	GAS OIL	18500	1A1a
020	Esbjergvaerket	03	010101	102	COAL	15805340	1A1a
020	Esbjergvaerket	03	010101	117	STRAW	185	1A1a
020	Esbjergvaerket	03	010101	203	RESIDUAL OIL	133570	1A1a
022	Oestkraft	05	010102	203	RESIDUAL OIL	41355	1A1a
022	Oestkraft	06	010102	102	COAL	618747	1A1a
022	Oestkraft	06	010102	111	WOOD AND SIMIL.	28653	1A1a
022	Oestkraft	06	010102	203	RESIDUAL OIL	40098	1A1a
023	Danisco Grindsted	01	030102	102	COAL	549464	1A2f
023	Danisco Grindsted	01	030102	301	NATURAL GAS	12787	1A2f
024	Nybro Gasbehandlingsanlaeg	01	010502	301	NATURAL GAS	324727	1A1c
025	Horsens Kraftvarmevaerk	01	010102	114	MUNICIP. WASTES	916535	1A1a
025	Horsens Kraftvarmevaerk	02	010104	301	NATURAL GAS	829458	1A1a
026	Herningvaerket	01	010102	111	WOOD AND SIMIL.	2382370	1A1a
026	Herningvaerket	01	010102	203	RESIDUAL OIL	203300	1A1a
026	Herningvaerket	01	010102	301	NATURAL GAS	1046680	1A1a
027	I/S Vestforbraending	01	010102	114	MUNICIP. WASTES	2125463	1A1a
027	I/S Vestforbraending	01	010102	204	GAS OIL	8321	1A1a
027	I/S Vestforbraending	02	010102	114	MUNICIP. WASTES	411538	1A1a
027	I/S Vestforbraending	03	010102	114	MUNICIP. WASTES	2713011	1A1a
027	I/S Vestforbraending	03	010102	301	NATURAL GAS	32149	1A1a
028	Amagerforbraending	01	010102	114	MUNICIP. WASTES	3993963	1A1a
029	Energi Randers Produktion	01	010102	102	COAL	2335582	1A1a
029	Energi Randers Produktion	01	010102	110	PETROLEUM COKE	1840	1A1a
029	Energi Randers Produktion	01	010102	111	WOOD AND SIMIL.	781452	1A1a
029	Energi Randers Produktion	01	010102	309	BIOGAS	17439	1A1a
029	Energi Randers Produktion	02	010102	204	GAS OIL	62703	1A1a

030	Grenaa Kraftvarmevaerk	01	010102	102	COAL	1093822	1A1a
030	Grenaa Kraftvarmevaerk	01	010102	111	WOOD AND SIMIL.	121091	1A1a
030	Grenaa Kraftvarmevaerk	01	010102	117	STRAW	926837	1A1a
030	Grenaa Kraftvarmevaerk	01	010102	203	RESIDUAL OIL	84929	1A1a
030	Grenaa Kraftvarmevaerk	01	010102	204	GAS OIL	3602	1A1a
031	Hilleroed Kraftvarmevaerk	01	010104	301	NATURAL GAS	2449813	1A1a
032	Helsingoer Kraftvarmevaerk	01	010104	301	NATURAL GAS	1658723	1A1a
032	Helsingoer Kraftvarmevaerk	02	010105	301	NATURAL GAS	13466	1A1a
033	DanSteel	01	030102	301	NATURAL GAS	1171802	1A2f
034	Dalum Papir	01	030102	301	NATURAL GAS	1015228	1A2f
035	Danisco Sugar Assens	01	030102	102	COAL	278585	1A2f
035	Danisco Sugar Assens	01	030102	203	RESIDUAL OIL	417614	1A2f
035	Danisco Sugar Assens	01	030102	309	BIOGAS	9456	1A2f
036	Kolding Forbraendingsanlaeg	01	010103	114	MUNICIP. WASTES	697011	1A1a
036	Kolding Forbraendingsanlaeg	02	010103	114	MUNICIP. WASTES	301991	1A1a
037	Maabjergvaerket	02	010102	111	WOOD AND SIMIL.	297460	1A1a
037	Maabjergvaerket	02	010102	114	MUNICIP. WASTES	1860730	1A1a
037	Maabjergvaerket	02	010102	117	STRAW	362360	1A1a
037	Maabjergvaerket	02	010102	301	NATURAL GAS	179920	1A1a
038	Soenderborg Kraftvarmevaerk	01	010102	114	MUNICIP. WASTES	662350	1A1a
038	Soenderborg Kraftvarmevaerk	02	010104	301	NATURAL GAS	1048789	1A1a
039	I/S Kara Affaldsforbraendingsanlaeg	01	010102	114	MUNICIP. WASTES	2023319	1A1a
039	I/S Kara Affaldsforbraendingsanlaeg	01	010102	301	NATURAL GAS	9984	1A1a
040	Viborg Kraftvarme	01	010104	301	NATURAL GAS	2240434	1A1a
042	I/S Nordforbraending	01	010102	114	MUNICIP. WASTES	1154381	1A1a
045	Aalborg Portland	01	030311	102	COAL	3916553	1A2f
045	Aalborg Portland	01	030311	110	PETROLEUM COKE	7796337	1A2f
045	Aalborg Portland	01	030311	114	MUNICIP. WASTES	1932000	1A2f
045	Aalborg Portland	01	030311	118	SEWAGE SLUDGE	58000	1A2f
045	Aalborg Portland	01	030311	203	RESIDUAL OIL	694301	1A2f
046	Affaldscenter aarhus - Forbraendsanlaegget	01	010102	114	MUNICIP. WASTES	2373557	1A1a
047	I/S Reno Nord	01	010103	114	MUNICIP. WASTES	1613819	1A1a
048	Silkeborg Kraftvarmevaerk	01	010104	301	NATURAL GAS	3240939	1A1a
049	Rensningsanlaegget Lynetten	01	020103	114	MUNICIP. WASTES	172620	1A4a
049	Rensningsanlaegget Lynetten	01	020103	204	GAS OIL	47991	1A4a

049	Rensningsanlaegget Lynetten	01	020103	309	BIOGAS	106145	1A4a
050	Fasan+Naestved Kraftvarmevaerk	01	010203	114	MUNICIP. WASTES	593345	1A1a
051	AVV Forbraendingsanlaeg	01	010103	114	MUNICIP. WASTES	657962	1A1a
052	Affaldsforbraendingsanlaeg I/S REFA	01	010103	114	MUNICIP. WASTES	1179909	1A1a
053	Svendborg Kraftvarmevaerk	01	010102	114	MUNICIP. WASTES	466024	1A1a
053	Svendborg Kraftvarmevaerk	01	010102	301	NATURAL GAS	3273	1A1a
054	Kommunekemi	01	010102	114	MUNICIP. WASTES	497183	1A1a
054	Kommunekemi	01	010102	203	RESIDUAL OIL	69027	1A1a
054	Kommunekemi	01	010102	204	GAS OIL	5308	1A1a
054	Kommunekemi	02	010102	114	MUNICIP. WASTES	410017	1A1a
054	Kommunekemi	02	010102	203	RESIDUAL OIL	69923	1A1a
054	Kommunekemi	02	010102	204	GAS OIL	5308	1A1a
054	Kommunekemi	03	010102	114	MUNICIP. WASTES	433597	1A1a
054	Kommunekemi	03	010102	203	RESIDUAL OIL	64754	1A1a
054	Kommunekemi	03	010102	204	GAS OIL	9003	1A1a
055	I/S Faelles Forbraending	01	010203	114	MUNICIP. WASTES	270072	1A1a
056	Vestfyns Forbraendingsanlaeg	01	010203	114	MUNICIP. WASTES	233200	1A1a
058	I/S Reno Syd	01	010103	114	MUNICIP. WASTES	632557	1A1a
059	I/S Kraftvarmevaerk Thisted	01	010103	114	MUNICIP. WASTES	537663	1A1a
059	I/S Kraftvarmevaerk Thisted	01	010103	117	STRAW	5220	1A1a
060	Knudmosevaerket	01	010103	114	MUNICIP. WASTES	394506	1A1a
060	Knudmosevaerket	01	010103	301	NATURAL GAS	4043	1A1a
061	Kavo I/S Energien+Slagelse Kraftvarmevaerk	01	010103	114	MUNICIP. WASTES	679277	1A1a
062	VEGA (Vestforbraending Taastrup)	01	010203	114	MUNICIP. WASTES	223272	1A1a
065	Haderslev Kraftvarmevaerk	01	010103	114	MUNICIP. WASTES	652115	1A1a
065	Haderslev Kraftvarmevaerk	01	010103	301	NATURAL GAS	68	1A1a
066	Frederiskhavn Affaldskraftvarmevaerk	01	010103	114	MUNICIP. WASTES	411342	1A1a
066	Frederiskhavn Affaldskraftvarmevaerk	01	010103	204	GAS OIL	1428	1A1a
067	Vejen Kraftvarmevaerk	01	010103	114	MUNICIP. WASTES	375330	1A1a
068	Bofa I/S	01	010203	114	MUNICIP. WASTES	207936	1A1a
069	DTU	01	010104	301	NATURAL GAS	1138121	1A1a
070	Naestved Kraftvarmevaerk	01	010104	301	NATURAL GAS	232866	1A1a
071	Maricogen	01	030104	301	NATURAL GAS	2261296	1A2f
072	Hjoerring Varmeforsyning	01	010104	301	NATURAL GAS	422026	1A1a
075	Rockwool A/S Hedehusene	01	030318	301	NATURAL GAS	64800	1A2f

076	Rockwool A/S Vamdrup	01	030318	107	COKE OVEN COKE	384480	1A2f
076	Rockwool A/S Vamdrup	01	030318	301	NATURAL GAS	256320	1A2f
077	Rockwool A/S Doense	01	030318	107	COKE OVEN COKE	354240	1A2f
077	Rockwool A/S Doense	01	030318	301	NATURAL GAS	236160	1A2f
078	Rexam Glass Holmegaard A/S	01	030315	204	GAS OIL	6851	1A2f
078	Rexam Glass Holmegaard A/S	01	030315	301	NATURAL GAS	874446	1A2f
081	Haldor Topsoee	02	030100	301	NATURAL GAS	487300	1A2f
081	Haldor Topsoee	02	030100	303	LPG	200	1A2f
082	Danisco Sugar Nakskov	02	030102	102	COAL	670928	1A2f
082	Danisco Sugar Nakskov	02	030102	203	RESIDUAL OIL	641132	1A2f
082	Danisco Sugar Nakskov	02	030102	204	GAS OIL	3313	1A2f
082	Danisco Sugar Nakskov	02	030102	309	BIOGAS	38688	1A2f
083	Danisco Sugar Nykoebing	02	030102	203	RESIDUAL OIL	20651	1A2f
085	L90 Affaldsforbraending	01	010102	114	MUNICIP. WASTES	1992165	1A1a
085	L90 Affaldsforbraending	01	010102	203	RESIDUAL OIL	17942	1A1a
086	Hammel Fjernvarme	01	010203	114	MUNICIP. WASTES	318749	1A1a
086	Hammel Fjernvarme	01	010203	203	RESIDUAL OIL	11016	1A1a
086	Hammel Fjernvarme	01	010203	203	RESIDUAL OIL	20920	1A1a

Table 57 Large point sources, plant specific emissions (IPCC 1A1, 1A2 and 1A4)[1].

LPS_id	LPS name	LPS part	Sector (IPCC)	Sector (SNAP)	SO_2	NO_x	NMVOC	CO	TSP	PM_{10} 2)	$PM_{2.5}$ 2)	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
001	Amagervaerket	01	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
001	Amagervaerket	02	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
001	Amagervaerket	03	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
002	Svanemoellevaerket	05	1A1a	010101	x	x														
002	Svanemoellevaerket	07	1A1a	010104		x														
003	H.C.Oerstedsvaerket	03	1A1a	010101	x	x						x	x	x	x	x	x	x	x	x
003	H.C.Oerstedsvaerket	07	1A1a	010101	x	x						x	x	x	x	x	x	x	x	x
004	Kyndbyvaerket	21	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
004	Kyndbyvaerket	22	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
004	Kyndbyvaerket	26	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
004	Kyndbyvaerket	28	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
004	Kyndbyvaerket	41	1A1a	010105					x	x	x	x	x	x	x	x	x	x	x	x
004	Kyndbyvaerket	51	1A1a	010104	x	x			x	x	x	x	x	x	x	x	x	x	x	x
004	Kyndbyvaerket	52	1A1a	010104	x	x			x	x	x	x	x	x	x	x	x	x	x	x
005	Masnedoevaerket	12	1A1a	010102	x	x														
005	Masnedoevaerket	31	1A1a	010104	x	x														
007	Stigsnaesvaerket	01	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
007	Stigsnaesvaerket	02	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
008	Asnaesvaerket	02	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
008	Asnaesvaerket	03	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
008	Asnaesvaerket	04	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
008	Asnaesvaerket	05	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
009	Statoil Raffinaderi	01	1A1b	010306	x															
010	Avedoerevaerket	01	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
010	Avedoerevaerket	02	1A1a	010104	x	x			x	x	x	x	x	x	x	x	x	x	x	x
011	Fynsvaerket	03	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
011	Fynsvaerket	07	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
011	Fynsvaerket	08	1A1a	010102	x	x		x	x	x	x	x	x	x	x	x	x	x		
012	Studstrupvaerket	03	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
012	Studstrupvaerket	04	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
014	Vendsysselvaerket	02	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
014	Vendsysselvaerket	03	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
017	Shell Raffinaderi	01	1A1b	010306	x	x														
017	Shell Raffinaderi	05	1A1b	010304	x	x														
018	Skaerbaekvaerket	01	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	
018	Skaerbaekvaerket	03	1A1a	010101	x	x			x	x	x						x			
019	Enstedvaerket	03	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
019	Enstedvaerket	04	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
020	Esbjergvaerket	03	1A1a	010101	x	x			x	x	x	x	x	x	x	x	x	x	x	x
022	Oestkraft	05	1A1a	010102	x	x														
022	Oestkraft	06	1A1a	010102	x	x														
023	Danisco Ingredients	01	1A2f	030102	x															
024	Dansk Naturgas Behandlingsanlaeg	01	1A1c	010502		x														
025	Horsens Kraftvarmevaerk	01	1A1a	010102	x	x		x	x	x	x	x	x	x	x	x	x	x		
025	Horsens Kraftvarmevaerk	02	1A1a	010104		x														
026	Herningvaerket	01	1A1a	010102	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
027	Vestforbraendingen	01	1A1a	010102	x	x			x	x	x					x				
027	Vestforbraendingen	02	1A1a	010102	x	x			x	x	x					x				
028	Amagerforbraendingen	01	1A1a	010102	x	x	x	x	x	x	x		x			x		x		
029	Randersvaerket	01	1A1a	010102	x	x			x	x	x									
030	Grenaavaerket	01	1A1a	010102	x	x		x	x	x	x	x	x	x	x	x	x	x		
031	Hilleroedvaerket	01	1A1a	010104		x														
032	Helsingoervaerket	01	1A1a	010104		x														
032	Helsingoervaerket	02	1A1a	010105		x														
033	Staalvalsevaerket	01	1A2f	030102		x			x	x	x									
034	Stora Dalum	01	1A2f	030102		x														
035	Assens Sukkerfabrik	01	1A2f	030102	x				x	x	x									
036	Kolding Kraftvarmevaerk	01	1A1a	010103	x		x	x	x	x	x	x	x	x	x	x	x	x		
036	Kolding Kraftvarmevaerk	02	1A1a	010103	x		x	x	x	x	x	x	x	x	x	x	x	x		
037	Maabjergvaerket	02	1A1a	010102	x	x		x	x	x	x	x	x	x	x	x	x	x		

038	Soenderborg Kraft-varmevaerk	01	1A1a	010102	x	x		x	x	x	x	x	x	x	x	x	x	x		
038	Soenderborg Kraft-varmevaerk	02	1A1a	010104		x														
039	Kara Affaldsforbraen-dingsanlaeg	01	1A1a	010102	x			x	x	x	x							x		
040	Viborg Kraftvarme-vaerk	01	1A1a	010104		x														
042	Nordforbraendingen	01	1A1a	010102	x			x	x	x	x							x		
046	Aarhus Nord	01	1A1a	010102	x				x	x	x							x		
047	Reno Nord	01	1A1a	010103	x			x	x	x	x	x	x	x	x	x	x	x		
048	Silkeborg Kraftvarme-vaerk	01	1A1a	010104		x														
049	Rensningsanlægget Lynetten	01	1A4a	020103	x				x	x	x	x	x	x	x	x	x	x		
050	I/S Fasan	01	1A1a	010203	x	x		x	x	x	x	x						x		
051	AVV Forbrændingsan-læg	01	1A1a	010103	x			x	x	x	x							x		
052	I/S REFA Kraftvarme-værk	01	1A1a	010103					x	x	x							x		
053	Svendborg Kraftvar-meværk	01	1A1a	010102	x	x	x	x	x	x	x							x		
054	Kommunekemi	01	1A1a	010102	x			x	x	x	x					x				
054	Kommunekemi	02	1A1a	010102	x			x	x	x	x					x				
054	Kommunekemi	03	1A1a	010102	x			x	x	x	x					x				
056	Vestfyns Forbrænding	01	1A1a	010203	x	x		x	x	x	x									
058	I/S Reno Syd	01	1A1a	010103	x			x	x	x	x							x		
059	I/S Kraftvarmeværk Thisted	01	1A1a	010103	x			x	x	x	x		x			x		x		
060	Knudmoseværket	01	1A1a	010103	x			x	x	x	x					x		x		
061	Kavo I/S Energien	01	1A1a	010103	x		x	x	x	x	x	x	x	x	x	x	x	x		x
062	VEGA (Vestforbraen-ding Taastrup)	01	1A1a	010203	x	x		x	x	x	x							x		
065	Haderslev Kraftvarme-værk	01	1A1a	010103	x	x		x	x	x	x					x	x	x		
066	Frederiskhavn Affalds-kraftvarmeværk	01	1A1a	010103	x	x		x	x	x	x					x		x		
067	Vejen Kraftvarmeværk	01	1A1a	010103	x	x		x	x	x	x	x	x	x	x	x	x	x		
068	Bofa I/S	01	1A1a	010203	x			x	x	x	x							x		
069	DTU	01	1A1a	010104		x														
070	Næstved Kraftvarme-værk	01	1A1a	010104		x		x												
071	Maricogen	01	1A2f	030104		x														
072	Hjørring KVV	01	1A1a	010104		x														
075	Rockwool A/S Hede-husene	01	1A2f	030318	x		x	x	x	x	x									
076	Rockwool A/S Vam-drup	01	1A2f	030318	x		x	x	x	x	x									
077	Rockwool A/S Doense	01	1A2f	030318	x		x	x	x	x	x									
078	Rexam Glass Hol-megaard A/S	01	1A2f	030315		x		x	x	x	x							x	x	x
080	Saint-Gobain Isover A/S	01	1A2f	030316					x	x	x									
081	Haldor Topsøe	02	1A2f	0301					x	x	x									
082	Danisco Sugar Nak-skov	02	1A2f	030102					x	x	x									
083	Danisco Sugar Nykø-bing	02	1A2f	030102					x	x	x									
045	Aalborg Portland	01/03	1A2f	030311	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
085	L90 Affaldsforbræn-ding	01	1a1a	010102	x	x		x	x	x	x									
086	Hammel Fjernvarme	01	1a1a	010203	x	x		x	x	x	x									
	Total				**7944**	**31507**	**16**	**9570**	**1212**	**708**	**553**	**110**	**34**	**184**	**163**	**306**	**1972**	**1348**	**737**	**661**

1) Emission of the pollutants marked with “x” is 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

Appendix 2A-9 Uncertainty estimates

Table 58 Uncertainty estimation, GHG.

IPCC 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 CO_2 eq	Gg CO_2 eq	%	%	%	%	%	%	%	%	%
Stationary Combustion, Coal	CO_2	24077	14568	1	5	5,099	2,262	-0,162	0,383	-0,810	0,541	0,974
Stationary Combustion, BKB	CO_2	11	0	3	5	5,831	0,000	0,000	0,000	-0,001	0,000	0,001
Stationary Combustion, Coke	CO_2	138	106	3	5	5,831	0,019	0,000	0,003	-0,002	0,012	0,012
Stationary Combustion, Petroleum coke	CO_2	410	859	3	5	5,831	0,153	0,013	0,023	0,066	0,096	0,117
Stationary Combustion, Plastic waste	CO_2	349	685	5	5	7,071	0,148	0,010	0,018	0,050	0,127	0,137
Stationary Combustion, Residual oil	CO_2	2505	1647	2	2	2,828	0,142	-0,014	0,043	-0,027	0,122	0,125
Stationary Combustion, Gas oil	CO_2	4547	2430	4	5	6,403	0,474	-0,039	0,064	-0,196	0,361	0,411
Stationary Combustion, Kerosene	CO_2	366	20	4	5	6,403	0,004	-0,008	0,001	-0,039	0,003	0,039
Stationary Combustion, Natural gas	CO_2	4320	10776	3	1	3,162	1,038	0,185	0,283	0,185	1,201	1,215
Stationary Combustion, LPG	CO_2	169	95	4	5	6,403	0,018	-0,001	0,002	-0,007	0,014	0,016
Stationary Combustion, Refinery gas	CO_2	806	873	3	5	5,831	0,155	0,005	0,023	0,023	0,097	0,100
Stationary combustion plants, gas engines	CH_4	6	347	2,2	40	40,060	0,424	0,009	0,009	0,359	0,028	0,361
Stationary combustion plants, other	CH_4	115	168	2,2	100	100,024	0,511	0,002	0,004	0,180	0,014	0,181
Stationary combustion plants	N_2O	240	262	2,2	1000	1000,002	7,987	0,001	0,007	1,441	0,021	1,441
Total		38060	32835				70,740					4,895
Total uncertainties		Overall uncertainty in the year (%):					8,411		Trend uncertainty (%):		2,212	

Table 59 Uncertainty estimation, CO_2.

IPCC 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 CO_2	Gg CO_2	%	%	%	%	%	%	%	%	%
Stationary Combustion, Coal	CO_2	24077	14568	1	5	5,099	2,317	-0,156	0,386	-0,779	0,547	0,951
Stationary Combustion, BKB	CO_2	11	0	3	5	5,831	0,000	0,000	0,000	-0,001	0,000	0,001
Stationary Combustion, Coke	CO_2	138	106	3	5	5,831	0,019	0,000	0,003	-0,002	0,012	0,012
Stationary Combustion, Petroleum coke	CO_2	410	859	3	5	5,831	0,156	0,014	0,023	0,068	0,097	0,118
Stationary Combustion, Plastic waste	CO_2	349	685	5	5	7,071	0,151	0,010	0,018	0,052	0,128	0,138
Stationary Combustion, Residual oil	CO_2	2505	1647	2	2	2,828	0,145	-0,013	0,044	-0,026	0,124	0,126
Stationary Combustion, Gas oil	CO_2	4547	2430	4	5	6,403	0,485	-0,038	0,064	-0,190	0,365	0,411
Stationary Combustion, Kerosene	CO_2	366	20	4	5	6,403	0,004	-0,008	0,001	-0,039	0,003	0,039
Stationary Combustion, Natural gas	CO_2	4320	10776	3	1	3,162	1,063	0,188	0,286	0,188	1,213	1,227
Stationary Combustion, LPG	CO_2	169	95	4	5	6,403	0,019	-0,001	0,003	-0,006	0,014	0,016
Stationary Combustion, Refinery gas	CO_2	806	873	3	5	5,831	0,159	0,005	0,023	0,025	0,098	0,101
Total	CO_2	37698	32058				6,829					2,641
Total uncertainties		Overall uncertainty in the year (%):					2,613	Trend uncertainty (%):				1,625

Table 60 Uncertainty estimation, CH_4.

IPCC 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							
		Mg CH_4	Mg CH_4	%	%	%	%	%	%	%	%	%
Stationary combustion plants, gas engines	CH_4	305	16546	2,2	40	40,060	27,025	2,641	2,866	105,626	8,918	106,002
Stationary combustion plants, other	CH_4	5468	7981	2,2	100	100,024	32,546	-2,617	1,382	-261,725	4,301	261,761
Total	CH_4	5773	24527				1789,6					79755
Total uncertainties		Overall uncertainty in the year (%):					42,304		Trend uncertainty (%):			582,409

Table 61 Uncertainty estimation, N_2O.

IPCC 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 N_2O	Gg N_2O	%	%	%	%	%	%	%	%	%
Stationary combustion plants	N_2O	0,775	0,846	2,200	1000	1000,002	1000,002	0,000	1,091	0,000	3,394	3,394
Total	N_2O	0,775	0,846				1000005					11,520
Total uncertainties		Overall uncertainty in the year (%):					1000,002		Trend uncertainty (%):		3,394	

Table 62 Uncertainty estimation, SO_2.

SNAP	Gas	Base year emission	Year t emission	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in	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							
		Mg SO_2	Mg SO_2	%	%	%	%	%	%	%	%	%
01	SO_2	129601	8052	2	10	10,198	4,475	-0,044	0,051	-0,441	0,144	0,464
02	SO_2	11491	4252	2	20	20,100	4,658	0,018	0,027	0,369	0,076	0,377
03	SO_2	16707	6045	2	10	10,198	3,360	0,026	0,038	0,260	0,108	0,281
Total	SO_2	157599	18250				53,010					0,437
Total uncertainties				Overall uncertainty in the year (%):			7,281			Trend uncertainty (%):		0,661

Table 63 Uncertainty estimation, NO_X.

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 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							
		Mg NO_x	Mg NO_x	%	%	%	%	%	%	%	%	%
01	NO_x	94738	47877	2	20	20,100	14,047	-0,073	0,4156	-1,456	1,175	1,871
02	NO_x	7518	8147	2	50	50,040	5,951	0,032	0,0707	1,595	0,200	1,607
03	NO_x	12954	12482	2	20	20,100	3,662	0,041	0,1083	0,829	0,306	0,884
Total	NO_x	115209	68506				246,149					6,865
Total uncertainties				Overall uncertainty in the year (%):			15,689				Trend uncertainty (%):	2,620

Table 64 Uncertainty estimation, NMVOC.

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 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							
		Mg NMVOC	Mg NMVOC	%	%	%	%	%	%	%	%	%
01	NMVOC	1073	3753	2	50	50,040	7,952	0,139	0,2755	6,939	0,779	6,982
02	NMVOC	11923	19261	2	50	50,040	40,815	-0,102	1,4138	-5,116	3,999	6,494
03	NMVOC	627	600	2	50	50,040	1,272	-0,036	0,0441	-1,782	0,125	1,787
Total	NMVOC	13623	23614				1730,739					94,116
Total uncertainties				Overall uncertainty in the year (%):			41,602		Trend uncertainty (%):			9,701

Table 65 Uncertainty estimation, CO.

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 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							
		Mg CO	Mg CO	%	%	%	%	%	%	%	%	%
01	CO	8256	11221	2	20	20,100	0,823	-0,006	0,061	-0,121	0,173	0,211
02	CO	159292	250416	2	50	50,040	45,731	0,067	1,365	3,366	3,861	5,123
03	CO	15877	12373	2	20	20,100	0,908	-0,062	0,067	-1,236	0,191	1,250
Total	CO	183425	274010				2092,838					27,850
Total uncertainties				Overall uncertainty in the year (%):			45,748		Trend uncertainty (%):			5,277

Table 66 Uncertainty estimation, TSP.

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 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 TSP	kg TSP	%	%	%	%	%	%	%	%	%
01	TSP	1158	1253	2	50	50,040	2,783	-0,017	0,074	-0,862	0,210	0,887
02	TSP	14589	20369	2	500	500,004	452,207	0,054	1,206	26,954	3,411	27,169
03	TSP	1146	900	2	50	50,040	2,000	-0,037	0,053	-1,854	0,151	1,861
Total	TSP	16893	22522				204502,839					742,399
Total uncertainties				Overall uncertainty in the year (%):			452,220			Trend uncertainty (%):		27,247

Table 67 Uncertainty estimation, PM_{10}.

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 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 PM_{10}	kg PM_{10}	%	%	%	%	%	%	%	%	%
01	PM_{10}	941	734	2	50	50,040	1,781	-0,033	0,047	-1,626	0,133	1,632
02	PM_{10}	13839	19297	2	500	500,004	467,755	0,065	1,235	32,512	3,494	32,699
03	PM_{10}	843	596	2	50	50,040	1,447	-0,033	0,038	-1,652	0,108	1,655
Total	PM_{10}	15623	20627				218799,993					1074,613
Total uncertainties				Overall uncertainty in the year (%):			467,761			Trend uncertainty (%):		32,781

Table 68 Uncertainty estimation, $PM_{2.5}$.

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 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 $PM_{2.5}$	kg $PM_{2.5}$	%	%	%	%	%	%	%	%	%
01	$PM_{2.5}$	804	609	2	50	50,040	1,587	-0,032	0,042	-1,608	0,120	1,612
02	$PM_{2.5}$	13095	18244	2	500	500,004	475,025	0,054	1,267	26,842	3,584	27,080
03	$PM_{2.5}$	500	350	2	50	50,040	0,913	-0,022	0,024	-1,100	0,069	1,102
Total	$PM_{2.5}$	14399	19203				225651,730					737,125
Total uncertainties				Overall uncertainty in the year (%):			475,028			Trend uncertainty (%):		27,150

Table 69 Uncertainty estimation, As.

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 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 As	kg As	%	%	%	%	%	%	%	%	%
01	As	965	294	2	100	100,020	54,729	-0,045	0,204	-4,522	0,576	4,559
02	As	127	60	2	1000	1000,002	112,594	0,009	0,042	9,078	0,119	9,079
03	As	349	183	2	100	100,020	34,030	0,036	0,127	3,635	0,358	3,653
Total	As	1442	537				16830,705					116,548
Total uncertainties				Overall uncertainty in the year (%):			129,733			Trend uncertainty (%):		10,796

Table 70 Uncertainty estimation, Cd.

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 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 Cd	kg Cd	%	%	%	%	%	%	%	%	%
01	Cd	592	225	2	100	100,020	39,696	-0,089	0,214	-8,915	0,606	8,935
02	Cd	145	200	2	1000	1000,002	352,771	0,116	0,190	116,029	0,539	116,031
03	Cd	315	142	2	100	100,020	25,039	-0,026	0,135	-2,646	0,382	2,674
Total	Cd	1052	568				126650,297					13550,115
Total uncertainties				Overall uncertainty in the year (%):			355,880			Trend uncertainty (%):		116,405

Table 71 Uncertainty estimation, Cr.

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 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 Cr	kg Cr	%	%	%	%	%	%	%	%	%
01	Cr	4674	535	2	100	100,020	56,657	-0,031	0,088	-3,059	0,248	3,069
02	Cr	326	72	2	1000	1000,002	75,953	0,003	0,012	3,490	0,033	3,491
03	Cr	1103	337	2	100	100,020	35,766	0,027	0,055	2,729	0,156	2,733
Total	Cr	6103	944				10258,160					29,077
Total uncertainties				Overall uncertainty in the year (%):			101,283			Trend uncertainty (%):		5,392

Table 72 Uncertainty estimation, Cu.

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 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 Cu	kg Cu	%	%	%	%	%	%	%	%	%
01	Cu	2915	651	2	100	100,020	62,416	-0,052	0,180	-5,165	0,508	5,190
02	Cu	301	241	2	1000	1000,002	230,748	0,042	0,066	42,439	0,188	42,439
03	Cu	405	151	2	100	100,020	14,524	0,010	0,042	0,958	0,118	0,965
Total	Cu	3622	1043				57351,396					1828,940
Total uncertainties				Overall uncertainty in the year (%):			239,482			Trend uncertainty (%):		42,766

Table 73 Uncertainty estimation, Hg.

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 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 Hg	kg Hg	%	%	%	%	%	%	%	%	%
01	Hg	2509	723	2	100	100,020	59,530	-0,086	0,235	-8,629	0,664	8,654
02	Hg	330	265	2	1000	1000,002	218,185	0,044	0,086	43,784	0,244	43,785
03	Hg	238	227	2	100	100,020	18,667	0,043	0,074	4,313	0,208	4,318
Total	Hg	3076	1214				51497,013					2010,668
Total uncertainties				Overall uncertainty in the year (%):			226,930			Trend uncertainty (%):		44,840

Table 74 Uncertainty estimation, Ni.

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 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 Ni	kg Ni	%	%	%	%	%	%	%	%	%
01	Ni	8384	3287	2	100	100,020	41,059	0,007	0,154	0,683	0,435	0,810
02	Ni	1852	639	2	1000	1000,002	79,827	-0,003	0,030	-2,545	0,085	2,546
03	Ni	11140	4081	2	100	100,020	50,977	-0,004	0,191	-0,429	0,540	0,690
Total	Ni	21376	8008				10656,821					7,614
Total uncertainties				Overall uncertainty in the year (%):			103,232			Trend uncertainty (%):		2,759

Table 75 Uncertainty estimation, Pb.

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 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 Pb	kg Pb	%	%	%	%	%	%	%	%	%
01	Pb	11994	2551	2	100	100,020	67,706	-0,025	0,166	-2,529	0,470	2,572
02	Pb	945	217	2	1000	1000,002	57,584	-0,001	0,014	-0,972	0,040	0,973
03	Pb	2421	1000	2	100	100,020	26,554	0,026	0,065	2,642	0,184	2,648
Total	Pb	15361	3768				8605,210					14,576
Total uncertainties				Overall uncertainty in the year (%):			92,764			Trend uncertainty (%):		3,818

Table 76 Uncertainty estimation, Se.

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 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 Se	kg Se	%	%	%	%	%	%	%	%	%
01	Se	2961	709	2	100	100,020	46,992	-0,074	0,164	-7,382	0,463	7,396
02	Se	308	154	2	1000	1000,002	101,786	0,011	0,035	10,700	0,100	10,701
03	Se	1065	647	2	100	100,020	42,848	0,063	0,149	6,346	0,422	6,360
Total	Se	4334	1510				14404,501					209,6549469
Total uncertainties				Overall uncertainty in the year (%):			120,019			Trend uncertainty (%):		14,479

Table 77 Uncertainty estimation, Zn.

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 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 Zn	kg Zn	%	%	%	%	%	%	%	%	%
01	Zn	14801	14407	2	100	100,020	73,254	-0,033	0,745	-3,322	2,107	3,934
02	Zn	2810	4019	2	1000	1000,002	204,289	0,060	0,208	59,912	0,588	59,915
03	Zn	1729	1246	2	100	100,020	6,333	-0,026	0,064	-2,650	0,182	2,656
Total	Zn	19340	19672				47140,182					3612,361
Total uncertainties				Overall uncertainty in the year (%):			217,118			Trend uncertainty (%):		60,103

Table 78 Uncertainty estimation, Benzo(b)fluoranthene.

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 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	%	%	%	%	%	%	%	%	%
01		31	28	2	100	100,020	0,688	-0,009	0,011	-0,941	0,032	0,941
02		2391	3987	2	1000	1000,002	971,014	0,006	1,614	5,562	4,564	7,195
03		49	91	2	100	100,020	2,212	0,004	0,037	0,379	0,104	0,393
Total		2471	4106				942873,193					52,805
Total uncertainties				Overall uncertainty in the year (%):			971,017			Trend uncertainty (%):		7,267

Table 79 Uncertainty estimation, Benzo(k)fluoranthene.

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 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	%	%	%	%	%	%	%	%	%
01		11	14	2	100	100,020	0,633	-0,020	0,018	-2,048	0,051	2,049
02		749	2209	2	1000	1000,002	987,496	0,085	2,825	85,054	7,992	85,428
03		23	14	2	100	100,020	0,618	-0,065	0,018	-6,537	0,050	6,537
Total		782	2237				975149,481					7344,912
Total uncertainties				Overall uncertainty in the year (%):			987,497			Trend uncertainty (%):		85,702

Table 80 Uncertainty estimation, Benzo(a)pyrene.

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 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	%	%	%	%	%	%	%	%	%
01		8	7	2	100	100,020	0,185	-0,005	0,004	-0,468	0,011	0,468
02		1880	3788	2	1000	1000,002	991,245	0,002	1,996	2,222	5,644	6,066
03		11	26	2	100	100,020	0,690	0,002	0,014	0,244	0,039	0,247
Total		1898	3822				982567,169					37,077
Total uncertainties				Overall uncertainty in the year (%):			991,245			Trend uncertainty (%):		6,089

Table 81 Uncertainty estimation, Indeno(1,2,3-c,d)pyrene.

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 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	%	%	%	%	%	%	%	%	%
01		6	7	2	100	100,020	0,239	-0,003	0,004	-0,284	0,012	0,284
02		1552	2722	2	1000	1000,002	994,937	0,013	1,732	13,097	4,899	13,983
03		14	7	2	100	100,020	0,268	-0,010	0,005	-1,038	0,013	1,038
Total		1572	2736				989900,011					196,682

Total uncertainties	Overall uncertainty in the year (%):	994,937	Trend uncertainty (%):	14,024

Appendix 2A-10 Lower Calorific Value (LCV) of fuels

Table 82 Time-series for calorific values of fuels (Danish Energy Authority, DEA 2006b).

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Crude Oil, Average	GJ / ton	42.40	42.40	42.40	42.70	42.70	42.70	42.70	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Crude Oil, Golf	GJ / ton	41.80	41.80	41.80	41.80	41.80	41.80	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 / ton	42.70	42.70	42.70	42.70	42.70	42.70	42.70	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
Refinery Feedstocks	GJ / ton	41.60	41.60	41.60	41.60	41.60	41.60	41.60	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70
Refinery Gas	GJ / ton	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
LPG	GJ / ton	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00	46.00
Naphtha (LVN)	GJ / ton	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50	44.50
Motor Gasoline	GJ / ton	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
Aviation Gasoline	GJ / ton	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
JP4	GJ / ton	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80	43.80
Other Kerosene	GJ / ton	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
JP1	GJ / ton	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
Gas/Diesel Oil	GJ / ton	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70	42.70
Fuel Oil	GJ / ton	40.40	40.40	40.40	40.40	40.40	40.40	40.70	40.65	40.65	40.65	40.65	40.65	40.65	40.65	40.65	40.65
Orimulsion	GJ / ton	27.60	27.60	27.60	27.60	27.60	28.13	28.02	27.72	27.84	27.58	27.62	27.64	27.71	27.65	27.65	27.65
Petroleum Coke	GJ / ton	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40	31.40
Waste Oil	GJ / ton	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90
White Spirit	GJ / ton	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50	43.50
Bitumen	GJ / ton	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80	39.80
Lubricants	GJ / ton	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90
Natural Gas	GJ / 1000 Nm3	39.00	39.00	39.00	39.30	39.30	39.30	39.30	39.60	39.90	40.00	40.15	39.99	40.06	39.94	39.77	39.67
Town Gas	GJ / 1000 m3							17.00	17.00	17.00	17.00	17.01	16.88	17.39	16.88	17.58	17.51
Electricity Plant Coal	GJ / ton	25.30	25.40	25.80	25.20	24.50	24.50	24.70	24.96	25.00	25.00	24.80	24.90	25.15	24.73	24.60	24.40
Other Hard Coal	GJ / ton	26.10	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50
Gas Plant Coal	GJ / ton																
Coke	GJ / ton	31.80	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30
Brown Coal Briquettes	GJ / ton	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30	18.30
Straw	GJ / ton	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50
Wood Chips	GJ/Rummeter	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Firewood, Hardwood	GJ / m3	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40	10.40
Firewood, Conifer	GJ / m3	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60	7.60
Wood Pellets	GJ / ton	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50
Wood Waste	GJ / ton	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70	14.70
Wood Waste	GJ/Rummeter	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Biogas	GJ / 1000 m3								23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00
Waste Combustion	GJ / ton	8.20	8.20	9.00	9.40	9.40	10.00	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50
Liquid Biofuels											37.60	37.60	37.60	37.60	37.60	37.60	37.60
Fish Oil	GJ / ton	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20	37.20

Table 83 Fuel category correspondence list, Danish Energy Authority, NERI and Climate convention reportings (IPCC).

Danish Energy Authority	NERI 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
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	Municip. wastes	Biomass 1)
Fish Oil	Fish & Rape oil	Biomass
Biogas	Biogas	Biomass
Biogas, other	Biogas	Biomass
Biogas, landfill	Biogas	Biomass
Biogas, sewage sludge	Biogas	Biomass

1) CO_2 from plastic part included in Other fuels

Appendix 2A-11 Adjustment of CO_2 emission

Table 84 Adjustment of CO_2 emission (ref. Danish Energy Authority).

Degree Days		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Actual Degree Days	Degree days	2093	2515	3022	3434	3148	3297	3837	3236	3217	3056	2902	3279	3011	3150	3113	3068
Normal Degree Days	Degree days	2857	3284	3022	3434	3148	3297	3837	3236	3217	3056	2902	3279	3011	3150	3113	3068
Net electricity import	TJ	25373	-7 099	13486	4 266	-17424	-2 858	-55444	-26107	-15552	-8 327	2 394	-2 071	-7 453	-30760	-10340	4932
Actual CO_2 emission	1.000.000 tonnes	52,7	62,8	56,7	58,9	62,7	59,6	73,0	63,2	59,4	56,5	52,5	53,9	53,1	58,2	52,8	49,4
Adjusted CO_2 emission	1.000.000 tonnes	60,8	61,5	60,8	59,7	59,6	59,1	58,5	57,7	56,2	55,4	54,2	53,6	52,2	51,7	50,9	50,9

Appendix 2A-12 Reference approach

TABLE 1.A(b) SECTORAL BACKGROUND DATA FOR ENERGY
CO_2 from Fuel Combustion Activities - Reference Approach (IPCC Worksheet 1-1)
(Sheet 1 of 1)

Inventory 2005
Submission 2007 v1.1
DENMARK

FUEL TYPES			Unit	Production	Imports	Exports	International bunkers	Stock change	Apparent consumption	Conversion factor (TJ/Unit)	NCV/ GCV[1]	Apparent consumption (TJ)	Carbon emission factor (t C/TJ)	Carbon content (Gg C)	Carbon stored (Gg C)	Net carbon emissions (Gg C)	Fraction of carbon oxidized	Actual CO_2 emissions (Gg CO_2)
Liquid Fossil	Primary Fuels	Crude Oil	TJ	796.527,52	116.941,73	585.939,63		-4.756,66	332.286,27	1,00	NCV	332.286,27	20,00	6.645,73	NA	6.645,73	1,00	24.367,66
		Orimulsion	TJ	NA	NA	NA		NA	NA	1,00	NCV	NA	22,00	NA	NA	NA	1,00	NA
		Natural Gas Liquids	TJ	NA	NA	NA		NA	NA	1,00	NCV	NA	17,20	NA	NA	NA	1,00	NA
	Secondary Fuels	Gasoline	TJ		45.421,36	46.462,79	25,38	1.381,10	-2.447,91	1,00	NCV	-2.447,91	18,90	-46,27	NA	-46,27	1,00	-169,64
		Jet Kerosene	TJ		42.218,32	16.476,55	35.748,73	9.482,13	-19.489,09	1,00	NCV	-19.489,09	19,50	-380,04	NA	-380,04	1,00	-1.393,47
		Other Kerosene	TJ		NA	NA	NA	NA	NA	1,00	NCV	NA	19,60	NA	NA	NA	1,00	NA
		Shale Oil	TJ		NA	NA		NA	NA	1,00	NCV	NA	20,00	NA	NA	NA	1,00	NA
		Gas / Diesel Oil	TJ		89.897,26	41.335,79	13.917,43	12.616,46	22.027,58	1,00	NCV	22.027,58	20,20	444,96	NA	444,96	1,00	1.631,51
		Residual Fuel Oil	TJ		48.749,59	62.797,91	20.590,61	3.665,29	-38.304,21	1,00	NCV	-38.304,21	21,10	-808,22	NA	-808,22	1,00	-2.963,47
		Liquefied Petroleum Gas (LPG)	TJ		270,48	3.982,17		85,33	-3.797,02	1,00	NCV	-3.797,02	17,20	-65,31	NA	-65,31	1,00	-239,47
		Ethane	TJ		NA	NA		NA	NA	1,00	NCV	NA	16,80	NA	NA	NA	1,00	NA
		Naphtha	TJ		NA	126,65		10,15	-136,79	1,00	NCV	-136,79	20,00	-2,74	NA	-2,74	1,00	-10,03
		Bitumen	TJ		9.040,89	36,14		480,94	8.523,81	1,00	NCV	8.523,81	22,00	187,52	190,63	-3,11	1,00	-11,39
		Lubricants	TJ		2.615,59	79,02	83,38	-65,91	2.519,09	1,00	NCV	2.519,09	20,00	50,38	25,50	24,88	1,00	91,23
		Petroleum Coke	TJ		9.972,45	634,25		855,59	8.482,62	1,00	NCV	8.482,62	27,50	233,27	NA	233,27	1,00	855,33
		Refinery Feedstocks	TJ		2.743,82	5.700,92		37,23	-2.994,34	1,00	NCV	-2.994,34	20,00	-59,89	NA	-59,89	1,00	-219,58
		Other Oil	TJ		NA	NA		NA	NA	1,00	NCV	NA	20,00	NA	NA	NA	1,00	NA
Other Liquid Fossil												736,02		14,72	11,04	3,68		13,49
White Spirit				NA	905,24	169,22	NA	NA	736,02	1,00	NCV	736,02	20,00	14,72	11,04	3,68	1,00	13,49
Liquid Fossil Totals												307.406,02		6.214,13	227,17	5.986,96		21.952,17
Solid Fossil	Primary Fuels	Anthracite [2]	TJ	NA	NA	NA		NA	NA	1,00	NCV	NA	26,80	NA	NA	NA	1,00	NA
		Coking Coal	TJ	NA	NA	NA		NA	NA	1,00	NCV	NA	25,80	NA	NA	NA	1,00	NA
		Other Bituminous Coal	TJ	NA	148.049,41	2.342,52	NA	-8.799,69	154.506,58	1,00	NCV	154.506,58	25,80	3.986,27	NA	3.986,27	1,00	14.616,32
		Sub-bituminous Coal	TJ	NA	NA	NA	NA	NA	NA	1,00	NCV	NA	26,20	NA	NA	NA	1,00	NA
		Lignite	TJ	NA	NA	NA		NA	NA	1,00	NCV	NA	27,60	NA	NA	NA	1,00	NA
		Oil Shale	TJ	NA	NA	NA		NA	NA	1,00	NCV	NA	29,10	NA	NA	NA	1,00	NA
		Peat	TJ	NA	NA	NA		NA	NA	1,00	NCV	NA	28,90	NA	NA	NA	1,00	NA
	Secondary Fuels	BKB[3] and Patent Fuel	TJ		0,02	-5,78		NA	5,80	1,00	NCV	5,80	25,80	0,15	NA	0,15	1,00	0,55
		Coke Oven/Gas Coke	TJ		1.049,91	NA		47,85	1.002,06	1,00	NCV	1.002,06	29,50	29,56	NA	29,56	1,00	108,39
Other Solid Fossil												8.240,01		176,86	NA	176,86		648,49
Plastic part of municipal waste				8.240,01	NA	NA	NA	NA	8.240,01	1,00	NCV	8.240,01	21,46	176,86	NA	176,86	1,00	648,49
Solid Fossil Totals												163.754,45		4.192,84	NA	4.192,84		15.373,75
Gaseous Fossil		Natural Gas (Dry)	TJ	392.868,34	NA	209.777,32		-1.103,34	184.194,36	1,00	NCV	184.194,36	15,30	2.818,17	NA	2.818,17	1,00	10.333,30
Other Gaseous Fossil												NA		NA	NA	NA		NA
Gaseous Fossil Totals												184.194,36		2.818,17	NA	2.818,17		10.333,30
Total												655.354,83		13.225,14	227,17	12.997,97		47.659,22
Biomass total												99.959,26		2.961,59	NA	2.961,59		10.859,16
		Solid Biomass	TJ	82.366,88	13.762,26	NA		NA	96.129,14	1,00	NCV	96.129,14	29,90	2.874,26	NA	2.874,26	1,00	10.538,96
		Liquid Biomass	TJ	2.669,60	NA	2.669,60		NA	NA	1,00	NCV	NA	20,00	NA	NA	NA	1,00	NA
		Gas Biomass	TJ	3.830,11	NA	NA		NA	3.830,11	1,00	NCV	3.830,11	22,80	87,33	NA	87,33	1,00	320,20

(1) To convert quantities in previous columns to energy units, use net calorific values (NCV) and write NCV in this column. If gross calorific values (GCV) are used, write GCV in this column.
(2) If data for Anthracite are not available separately, include with Other Bituminous Coal.
(3) BKB: Brown coal/peat briquettes.

TABLE 1.A(c) COMPARISON OF CO2 EMISSIONS FROM FUEL COMBUSTION
(Sheet 1 of 1)

FUEL TYPES	REFERENCE APPROACH			SECTORAL APPROACH [1]		DIFFERENCE [2]	
	Apparent energy consumption [3] (PJ)	Apparent energy consumption (excluding non-energy use and feedstocks) [4] (PJ)	CO_2 emissions (Gg)	Energy consumption (PJ)	CO_2 emissions (Gg)	Energy consumption (%)	CO_2 emissions (%)
Liquid Fuels (excluding international bunkers)	307,41	295,63	21.952,17	299,96	22.079,84	-1,45	-0,58
Solid Fuels (excluding international bunkers) [5]	163,75	155,50	15.373,75	154,33	14.673,62	0,76	4,77
Gaseous Fuels	184,19	184,19	10.333,30	189,18	10.775,61	-2,63	-4,10
Other [5]	NA,NO	NO	NA,NO	IE,NA,NO	685,03		-100,00
Total [5]	***655,35***	***635,32***	***47.659,22***	***643,47***	***48.214,10***	***-1,27***	***-1,15***

[1] "Sectoral approach" is used to indicate the approach (if different from the Reference approach) used by the Party to estimate CO_2 emissions from fuel combustion as reported in table 1.A(a), sheets 1-4.

[2] Difference in CO_2 emissions estimated by the Reference approach (RA) and the Sectoral approach (SA) (difference = 100% x ((RA-SA)/SA)). For calculating the difference in energy consumption between the two approaches, data as reported in the column "Apparent energy consumption (excluding non-energy use and feedstocks)" are used for the Reference approach.

[3] Apparent energy consumption data shown in this column are as in table 1.A(b).

[4] For the purposes of comparing apparent energy consumption from the Reference approach with energy consumption from the Sectoral approach, Parties should, in this column, subtract from the apparent energy consumption (Reference approach) the energy content corresponding to the fuel quantities used as feedstocks and/or for non-energy purposes, in accordance with the accounting of energy use in the Sectoral approach

[5] Emissions from biomass are not included.

Note: The Reporting Instructions of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories require that estimates of CO_2 emissions from fuel combustion, derived using a detailed Sectoral approach, be compared to those from the Reference approach (Worksheet 1-1 of the IPCC Guidelines, Volume 2, Workbook). This comparison is to assist in verifying the Sectoral data.

Documentation Box:

Parties should provide detailed explanations on the fuel combustion sub-sector, including information related to the comparison of CO_2 emissions calculated using the Sectoral approach with those calculated using the Reference approach, in the corresponding part of Chapter 3: Energy (CRF sub-sector 1.A) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

If the CO_2 emission estimates from the two approaches differ by more than 2 per cent, Parties should briefly explain the cause of this difference in this documentation box and provide a reference to relevant section of the NIR where this difference is explained in more detail.

1.AC Difference - Reference and Sectoral Approach:Non-energy use of fuels is not included in the Danish National Approach. Fuel consumption for non-energy is subtracted in Reference Approach to ma
CO2 emission from plastic part of municipal wastes is included in the Danish National Approach.
CO2 emission from the plastic part of municipal wastes is added in Reference Approach to make results comparable. (Other fuels of sources 1A1, 1A2 and 1A4)

Table 85 Fuel category correspondence list for the reference approach.

Reference approach		Danish energy statistics
Biomass	Gas Biomass	Biogas, other
Biomass	Gas Biomass	Biogas, landfill
Biomass	Gas Biomass	Biogas, sewage sludge
Biomass	Liquid Biomass	Liquid biofuels
Biomass	Solid Biomass	Fish oil
Biomass	Solid Biomass	Waste combustion, plastic
Biomass	Solid Biomass	Waste combustion, other
Biomass	Solid Biomass	Firewood
Biomass	Solid Biomass	Straw
Biomass	Solid Biomass	Wood Chips
Biomass	Solid Biomass	Firewood
Biomass	Solid Biomass	Wood Pellets
Liquid fossil	Bitumen	Bitumen
Liquid fossil	Crude oil	Crude Oil
Liquid fossil	Crude oil	Waste Oil
Liquid fossil	Ethane	-
Liquid fossil	Gas/diesel oil	Gas/Diesel Oil
Liquid fossil	Gasoline	Aviation Gasoline
Liquid fossil	Gasoline	Motor Gasoline
Liquid fossil	Jet Kerosene	JP1
Liquid fossil	Jet Kerosene	JP4
Liquid fossil	LPG	LPG
Liquid fossil	Lubricants	Lubricants
Liquid fossil	Other Oil	White Spirit
Liquid fossil	Naphtha	Naphtha (LVN)
Gaseous fossil	Natural gas	Natural Gas
Liquid fossil	Natural gas liquids	-
Liquid fossil	Orimulsion	Orimulsion
Liquid fossil	Other kerosene	Other Kerosene
Liquid fossil	Petroleum coke	Petroleum Coke
Liquid fossil	Refinery feedstocks	Refinery Feedstocks
Liquid fossil	Residual fuel oil	Fuel Oil
Liquid fossil	Shale oil	-
Solid fossil	Anthracite	-
Solid fossil	BKB & Patent fuel	Brown Coal Briquettes
Solid fossil	Coke oven/gas coke	Coke
Solid fossil	Coking Coal	-
Solid fossil	Lignite	-
Solid fossil	Oil Shale	-
Solid fossil	Other Bit. Coal	Other Hard Coal
Solid fossil	Other Bit. Coal	Electricity Plant Coal
Solid fossil	Peat	-
Solid fossil	Sub-bit. coal	-

Appendix 2A-13 Emission inventory 2005 based on SNAP sectors

Table 86 Emission inventory 2005 based on SNAP sectors.

SNAP 2)	SO_2 [Mg]	NO_X [Mg]	NMVOC [Mg]	CH_4 [Mg]	CO [Mg]	CO_2 1) [Gg]	N_2O [Mg]	TSP [Mg]	PM_{10} [Mg]	$PM_{2,5}$ [Mg]	As [kg]	Cd [kg]	Cr [kg]	Cu [kg]	Hg [kg]	Ni [kg]	Pb [kg]	Se [kg]
Total 01	8052	47877	3753	13925	11221	28826	458	1253	734	609	294	225	535	651	723	3287	2551	709
010100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010101	5113	23114	272	345	1933	15364	149	686	297	237	81	10	154	95	179	1995	158	625
010102	1236	5015	56	43	741	4087	43	106	74	61	135	105	251	347	318	461	1654	62
010103	245	1342	14	16	258	1203	13	34	18	16	54	38	24	89	52	37	549	0
010104	351	3606	74	70	695	2814	80	107	104	87	3	2	8	6	2	26	10	6
010105	38	4826	2779	12717	4539	1472	31	22	5	4	0	0	0	0	0	0	0	0
010200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010201	1	3	0	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0
010202	38	75	26	19	146	86	3	11	8	6	1	3	1	4	4	17	3	1
010203	691	1229	422	309	2347	1223	44	168	118	93	9	57	72	100	166	271	159	5
010204	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
010205	2	153	66	323	127	41	1	1	0	0	0	0	0	0	0	0	0	0
010300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010304	0	299	0	0	12	114	4	10	10	10	0	0	0	0	0	0	0	0
010305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010306	325	1214	2	2	211	818	28	104	97	93	11	10	25	10	3	479	18	9
010400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010401	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010402	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010403	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010404	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010406	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010407	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010502	0	36	1	2	9	19	0	0	0	0	0	0	0	0	0	0	0	0
010503	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
010504	8	6906	39	41	171	1574	61	3	2	1	0	0	0	0	0	0	0	0
010505	2	56	2	37	29	9	0	0	0	0	0	0	0	0	0	0	0	0
010506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total 02	4252	8147	19261	9322	250416	8606	247	19428	20235	18244	60	200	72	241	265	639	217	154
020100	197	592	457	207	635	952	22	130	127	119	6	7	8	11	10	80	14	19
020101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
020102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
020103	52	42	3	3	17	55	2	7	6	5	2	1	2	2	11	3	2	0
020104	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
020105	11	439	109	624	299	95	1	2	0	0	0	0	0	0	0	0	0	0
020106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
020200	2381	5516	16953	5840	240713	6487	195	18763	19614	17665	33	179	29	207	221	54	160	113
020201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
020202	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
020203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

020204	0	246	172	763	257	84	2	1	0	0	0	0	0	0	0	0	0	0
020205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
020300	1598	659	1269	456	7943	752	22	522	487	453	19	13	33	21	23	498	41	21
020301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
020302	3	2	0	0	2	1	0	0	0	0	0	0	0	0	0	5	0	0
020303	0	7	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
020304	10	642	298	1429	548	177	3	3	1	1	0	0	0	0	0	0	0	0
020305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total 03	6045	12482	600	1280	12373	5241	140	900	596	350	183	142	337	151	227	4081	1000	647
030100	3179	2577	286	348	1938	2858	65	210	155	111	76	89	164	95	51	3036	141	67
030101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030102	1022	419	31	40	119	377	9	106	33	10	24	18	48	22	8	871	41	17
030103	13	55	26	20	132	65	2	10	7	5	0	4	0	4	4	0	2	0
030104	2	558	8	9	37	340	13	1	0	0	0	0	0	0	0	0	0	0
030105	2	212	147	653	220	72	2	1	0	0	0	0	0	0	0	3	0	0
030106	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
030200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030303	0	0	0	0	0	0	0	175	52	8	26	12	96	0	0	113	628	436
030304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030306	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030307	0	0	0	0	0	0	0	2	1	1	0	0	0	1	0	0	9	0
030308	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
030309	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030310	0	0	0	0	0	0	0	28	25	11	0	0	0	0	0	0	0	0
030311	1348	8349	90	190	1409	1367	44	135	122	54	54	19	27	27	162	54	27	19
030312	0	0	0	0	0	0	0	26	13	3	0	0	0	0	0	0	0	0
030313	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030314	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030315	0	218	2	5	4	50	1	7	6	6	0	0	0	0	0	0	148	107
030316	0	0	0	0	0	0	0	85	77	60	0	0	0	0	0	0	0	0
030317	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030318	478	94	10	14	8514	112	3	115	104	81	2	0	2	2	1	3	4	0
030319	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030321	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030323	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030324	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030325	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
030327	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
2) SNAP sector codes are shown in Appendix 2A-3

Annex 2B

Transport

List of content

Annex 2B Transport

Annex 2B-1: Fleet data 1990-2005 for road transport (No. vehicles)

Sector	Subsector	Tech 2	FYear	LYear	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	80570	70965	61916	53661	49471	46208	44014	42804	36466	39959
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	333715	319741	297372	247513	217970	187911	161642	139010	119424	80741
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	104223	81798	75344	97293	92422	86056	79240	72588	65797	49614
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	345946	374459	359057	308508	306990	301692	295677	288944	280769	262502
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990		46574	114381	206105	245261	282011	280181	278685	278152	275859
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996							39608	73527	101489	139813
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000										
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005										
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	61592	54869	48157	41737	38477	35940	34233	33292	28362	31079
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	218180	211819	199591	168672	148281	127631	109640	94188	80844	54600
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	60836	50077	46439	62263	59148	55062	50674	46402	42040	31712
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	210574	222174	211066	178826	177842	174545	170749	166595	161591	150612
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990		31049	74328	131279	159911	190297	188949	187872	187524	186044
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996							35647	75763	119562	201007
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000										
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005										
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	5923	5243	4586	3975	3665	3423	3260	3171	2701	2960
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	18532	17532	16673	14345	12566	10781	9234	7914	6781	4567
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	8730	6326	4456	4966	4718	4392	4043	3702	3354	2531
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	31066	33256	31914	25237	25111	24667	24157	23595	22912	21429
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990		4085	9932	19410	22964	25679	25524	25389	25338	25120
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996							3961	8129	12434	20068
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000										
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005										
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996							4042	8018	11872	18305
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000										
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005										
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	75828	78431	79759	80201	80187	79714	75794	72294	68535	62144

Passenger Cars	Diesel >2,0 l	Euro I	1991	1996							213	437	668	1078
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000										
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005										
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	3451	3568	3629	3649	3707	3703	3556	3425	3281	3040
Passenger Cars	LPG	Conventional	0	1990	287	287	287	287	287	286	286	288	289	289
Passenger Cars	2-Stroke	Conventional	0	9999	4823	5402	5997	6026	5853	5417	4804	4308	3747	3029
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	33049	36810	39724	41321	41967	42333	43215	44179	45486	47261
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998										
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001										
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006										
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	1994	121431	135248	145954	151822	154198	155543	158781	162324	167129	173650
Light Duty Vehicles	Diesel <3,5 t	Euro I	1995	1998										
Light Duty Vehicles	Diesel <3,5 t	Euro II	1999	2001										
Light Duty Vehicles	Diesel <3,5 t	Euro III	2002	2006										
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	9999	251	261	262	255	254	250	255	260	268	279
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	1993	5140	5338	5353	5228	5194	5108	5214	5330	5488	5205
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	1994	1996										497
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	2002	2006										
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	1993	10350	10750	10779	10528	10460	10286	10500	10734	11052	10482
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	1994	1996										1001
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	2002	2006										
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	1993	13115	13623	13659	13342	13255	13034	13306	13602	14005	13283
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	1994	1996										1268
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	2002	2006										
Heavy Duty Vehicles	Diesel >32t	Conventional	0	1993	11517	11962	11994	11715	11640	11446	11684	11944	12298	11664
Heavy Duty Vehicles	Diesel >32t	Euro I	1994	1996										1114
Heavy Duty Vehicles	Diesel >32t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel >32t	Euro III	2002	2006										
Buses	Urban Buses	Conventional	0	1993	4712	4768	4771	4761	4724	4753	4561	4522	4490	4083
Buses	Urban Buses	Euro I	1994	1996										390
Buses	Urban Buses	Euro II	1997	2001										
Buses	Urban Buses	Euro III	2002	2006										
Buses	Coaches	Conventional	0	1993	3298	3337	3339	3332	3307	3327	2868	3007	3086	2927
Buses	Coaches	Euro I	1994	1996										280
Buses	Coaches	Euro II	1997	2001										

Buses	Coaches	Euro III	2002	2006										
Mopeds	<50 cm³	Conventional	0	1999	151000	139000	133000	127000	124000	120000	118000	113000	109000	105000
Mopeds	<50 cm³	Euro I	2000	2003										
Mopeds	<50 cm³	Euro II	2004	9999										
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	6209	6280	6368	6368	6488	6617	6804	6904	7111	7406
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	7037	7118	7218	7217	7353	7499	7712	7824	8059	8394
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003										
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006										
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	19352	19573	19848	19845	20222	20622	21207	21516	22162	23083
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003										
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006										
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	8796	8897	9022	9021	9192	9374	9639	9780	10074	10492
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003										
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006										

Sector	Subsector	Tech 2	FYear	LYear	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	37597	37130	3434	2761	2103	1744	1614	1475	1392	1313	1313
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	67991	53302	44338	31104	22511	17980	15837	14155	13149	12404	12335
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	42976	34748	25889	17458	10806	7298	5510	4178	3128	2433	2882
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	250449	233656	215509	183239	147178	118979	97964	79041	60723	45824	25489
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990	272989	269953	275188	264791	254032	235890	219216	194543	171430	142490	133653
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996	169133	205235	210861	208281	206803	204184	201708	197423	192152	185488	183896
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000			38465	74495	108508	135030	132812	130153	128898	126400	133689
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005							21858	47428	70311	99658	126777
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	29242	28879	2671	2148	1635	1356	1255	1147	1083	1021	1021
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	45991	36078	30465	21520	15647	12537	11077	9923	9230	8707	8852
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	27445	22173	16509	11141	6870	4642	3500	2659	1987	1545	1858
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	143385	133412	122642	103931	83270	67222	55300	44572	34238	25810	14529
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	184194	182297	186155	179510	172582	160800	149915	133745	118448	99092	86463
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	288096	375253	383870	378063	375137	370803	367136	359959	351645	340424	286124
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000			95358	196046	274022	326268	320971	314678	311808	305621	334798
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005							49700	105323	147067	195430	250309
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	2785	2750	254	205	156	129	120	109	103	97	97
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	3849	3022	2619	1881	1366	1110	986	885	825	778	807
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	2191	1770	1318	888	549	371	280	212	159	123	147
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	20432	19053	17571	14934	12016	9722	8009	6459	4964	3744	2045
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	24844	24546	24977	23975	22975	21251	19699	17377	15265	12607	12107
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	27915	35770	36617	36081	35808	35388	35024	34329	33516	32431	27636
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000			12432	27315	44923	61899	60799	59506	58896	57815	48867
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005							15179	30712	45080	65819	82828
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996	24557	31177	31314	31730	35118	39314	43578	48670	53462	59968	62042
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000			7046	14640	23084	31541	34764	38842	43327	49262	61839
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005							5482	13338	21371	33648	49775
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	58848	55004	48251	43893	43004	42604	42641	42100	40525	38619	38012
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	1499	1921	1928	1952	2161	2420	2683	2998	3295	3698	3647
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000			655	1478	2711	4232	4658	5196	5790	6592	6450
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005							1163	2682	4432	7505	10932
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	2906	2747	2461	2266	2237	2228	2229	2187	2096	1978	2005
Passenger Cars	LPG	Conventional	0	1990	301	311	172	97	44	32	63	21	15	15	15
Passenger Cars	2-Stroke	Conventional	0	9999	2443	1824	1248	761	400	300	200	150	100	50	
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	44601	41519	37209	34454	31489	28488	25423	21615	18838	14576	12300
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	4259	8524	12645	17212	16632	15979	15527	15049	13949	14793	14462

Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001					4705	9299	14017	13917	13805	14126	14061
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006								5140	10719	16724	23033
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	1994	163877	152553	142109	131572	122992	115695	105397	92990	82927	66760	59477
Light Duty Vehicles	Diesel <3,5 t	Euro I	1995	1998	15648	31318	48292	65727	64964	64894	64370	64743	61406	67753	69932
Light Duty Vehicles	Diesel <3,5 t	Euro II	1999	2001					18376	37766	58112	59870	60771	64697	67990
Light Duty Vehicles	Diesel <3,5 t	Euro III	2002	2006								22112	47186	76596	111375
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	9999	288	295	261	274	253	257	249	249	247	233	252
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	1993	4891	4532	3999	3692	3079	2406	1979	1739	1407	1069	835
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	1994	1996	1004	1506	1440	1435	1269	1057	951	956	813	903	837
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	1997	2001			529	1087	1487	1703	1990	2064	1872	2036	1936
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	2002	2006								484	941	1541	2036
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	1993	9850	9126	7800	6603	5613	5085	4210	3136	2571	1639	1281
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	1994	1996	2022	3033	2808	2566	2314	2235	2024	1724	1486	1384	1284
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	1997	2001			1032	1945	2710	3600	4234	3724	3421	3123	2970
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	2002	2006								872	1720	2364	3123
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	1993	12481	11564	10720	9832	8982	7933	6814	5525	4571	3110	2431
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	1994	1996	2562	3844	3859	3821	3702	3486	3276	3037	2642	2627	2436
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	1997	2001			1419	2896	4336	5616	6853	6560	6082	5926	5634
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	2002	2006								1537	3058	4484	5925
Heavy Duty Vehicles	Diesel >32t	Conventional	0	1993	10960	10154	9337	8720	8180	7361	6527	5486	4716	3282	2565
Heavy Duty Vehicles	Diesel >32t	Euro I	1994	1996	2250	3376	3362	3389	3371	3234	3138	3016	2726	2772	2570
Heavy Duty Vehicles	Diesel >32t	Euro II	1997	2001			1236	2568	3949	5211	6564	6514	6275	6253	5946
Heavy Duty Vehicles	Diesel >32t	Euro III	2002	2006								1526	3156	4732	6252
Buses	Urban Buses	Conventional	0	1993	3635	3261	2946	2792	2542	2319	2159	1977	1859	1711	1551
Buses	Urban Buses	Euro I	1994	1996	746	1084	1060	972	913	852	792	752	713	663	643
Buses	Urban Buses	Euro II	1997	2001			390	729	1053	1345	1596	1525	1447	1345	1317
Buses	Urban Buses	Euro III	2002	2006								346	670	951	1275
Buses	Coaches	Conventional	0	1993	4507	4156	3662	3369	3007	2724	2444	2165	1962	1773	1542
Buses	Coaches	Euro I	1994	1996	925	1381	1318	1173	1080	1001	896	823	752	687	639
Buses	Coaches	Euro II	1997	2001			485	879	1246	1579	1807	1670	1527	1394	1309
Buses	Coaches	Euro III	2002	2006								379	706	986	1267
Mopeds	<50 cm³	Conventional	0	1999	114167	123333	132500	141667	150833	143607	136249	128209	120305	112262	98369
Mopeds	<50 cm³	Euro I	2000	2003						16393	28751	42791	48695	46069	45882
Mopeds	<50 cm³	Euro II	2004	9999										10669	24749
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	7672	8214	8980	9598	10385	11054	11367	11582	11850	12326	13158
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	8695	9310	10177	10878	11769	11670	12487	12882	13380	14078	14943
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003						858	918	1348	1806	1816	2292
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006										604	1187

Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	23911	25602	27986	29914	32365	32093	34338	35424	36794	38714	41092
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003						2360	2525	3707	4967	4993	6302
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006										1661	3263
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	10869	11637	12721	13597	14712	14588	15608	16102	16725	17597	18678
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003						1073	1148	1685	2258	2270	2865
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006										755	1483

Annex 2B-2: Mileage data 1990-2005 for road transport (km)

Sector	Subsector	Tech 2	FYear	LYear	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	9559	9371	9307	9515	9604	10456	11279	11997	12039	12029
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	12108	11492	11058	10730	10119	10456	11279	11997	12039	12029
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	16043	14937	13889	13613	13257	13355	12274	11997	12039	12029
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	18790	17755	16996	16620	15799	16550	17085	17146	16218	15254
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990		20401	19861	19623	19393	20253	20768	21138	20111	19007
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996							24554	25651	24972	24634
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000										
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005										
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	9559	9371	9307	9515	9604	10456	11279	11997	12039	12029
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	12027	11426	11002	10681	10091	10456	11279	11997	12039	12029
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	16036	14949	13889	13611	13255	13349	12263	11997	12039	12029
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	18873	17819	17012	16583	15762	16512	17050	17110	16158	15185
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990		20401	19868	19645	19442	20398	20924	21277	20258	19118
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996							24554	25709	25194	25020
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000										
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005										
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	9559	9371	9307	9515	9604	10456	11279	11997	12039	12029
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	12046	11335	10900	10587	10058	10456	11279	11997	12039	12029
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	16041	15017	13932	13614	13258	13359	12279	11997	12039	12029
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	18824	17812	17069	16660	15828	16579	17112	17189	16288	15291
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990		20401	19863	19558	19355	20097	20632	21033	19956	18905
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996							24554	25695	25145	24947
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000										
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005										
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996							47308	47199	46544	46195
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000										
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005										
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	28218	28621	29557	30661	31336	31927	31704	31088	30490	29662
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996							47308	47226	46641	46353
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000										
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005										
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	29507	29925	30901	32053	32775	33153	32894	32193	31379	30315
Passenger Cars	LPG	Conventional	0	1990	18822	17780	17003	16606	15785	16535	17072	17133	16196	15227
Passenger Cars	2-Stroke	Conventional	0	9999	18822	17780	17003	16606	15785	16535	17072	17133	16196	15227
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	18134	16830	15889	15636	15168	15764	16217	16835	16460	16067

Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998										
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001										
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006										
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	1994	30282	30896	29379	29298	30218	32787	33120	31978	31890	33794
Light Duty Vehicles	Diesel <3,5 t	Euro I	1995	1998										
Light Duty Vehicles	Diesel <3,5 t	Euro II	1999	2001										
Light Duty Vehicles	Diesel <3,5 t	Euro III	2002	2006										
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	9999	34269	34148	33051	32578	32145	34092	34706	35551	32463	31208
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	1993	35561	38954	37973	37931	39795	47498	47480	45236	42132	43972
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	1994	1996										43972
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	2002	2006										
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	1993	49547	54274	52907	52849	55446	57416	57394	54682	50929	53153
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	1994	1996										53153
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	2002	2006										
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	1993	68875	75447	73547	73466	77076	79814	79784	76013	70797	73888
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	1994	1996										73888
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	2002	2006										
Heavy Duty Vehicles	Diesel >32t	Conventional	0	1993	68875	75447	73547	73466	77076	79814	79784	76013	70797	73888
Heavy Duty Vehicles	Diesel >32t	Euro I	1994	1996										73888
Heavy Duty Vehicles	Diesel >32t	Euro II	1997	2001										
Heavy Duty Vehicles	Diesel >32t	Euro III	2002	2006										
Buses	Urban Buses	Conventional	0	1993	91725	98800	97766	99989	103693	110987	116410	112571	115226	126059
Buses	Urban Buses	Euro I	1994	1996										126059
Buses	Urban Buses	Euro II	1997	2001										
Buses	Urban Buses	Euro III	2002	2006										
Buses	Coaches	Conventional	0	1993	57493	62340	60347	59645	62810	71523	83821	76514	78644	84964
Buses	Coaches	Euro I	1994	1996										84964
Buses	Coaches	Euro II	1997	2001										
Buses	Coaches	Euro III	2002	2006										
Mopeds	<50 cm^3	Conventional	0	1999	2097	2027	1950	1922	1865	1960	2054	2153	2134	2130
Mopeds	<50 cm^3	Euro I	2000	2003										
Mopeds	<50 cm^3	Euro II	2004	9999										
Motorcycles	2-stroke >50 cm^3	Conventional	0	1999	6021	5905	5641	5722	5526	5814	5844	6141	6088	6064
Motorcycles	4-stroke <250 cm^3	Conventional	0	1999	6021	5905	5641	5722	5526	5814	5844	6141	6088	6064
Motorcycles	4-stroke <250 cm^3	Euro I	2000	2003										

Motorcycles	4-stroke <250 cm³	Euro II	2004	2006										
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	6021	5905	5641	5722	5526	5814	5844	6141	6088	6064
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003										
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006										
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	6021	5905	5641	5722	5526	5814	5844	6141	6088	6064
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003										
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006										

Sector	Subsector	Tech 2	FYear	LYear	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	14401	12945	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990	18598	17536	16456	14957	13674	12791	11911	11574	11543	11572	11037
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996	24268	23283	22276	20931	19603	18409	17365	16625	15295	14389	12828
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000			26204	25651	24536	23812	22089	21129	20143	19046	17465
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005							24959	24817	25660	23846	21983
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	14356	12927	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	18721	17649	16566	15129	13860	12952	11994	11574	11543	11572	11037
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	25012	24059	22977	21624	20205	18941	17880	17161	16005	15173	13691
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000			26204	25677	24521	23706	22001	21001	20036	18998	17475
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005							24959	24808	25405	23704	21861
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	12261	12048	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	14423	12953	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	18497	17434	16335	14766	13537	12683	11839	11574	11543	11572	11037
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	24890	23927	22856	21505	20097	18852	17792	17067	15887	15043	13587
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000			26204	25704	24718	24071	22431	21446	20406	19252	17764
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005							24959	24790	25587	23872	22039
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996	44670	43065	40439	37858	36199	34247	32896	31617	29919	29266	26472
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000			46623	45459	44409	43350	40942	39195	38111	37351	34638
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005							46392	46224	45722	46664	43419
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	28309	26794	25399	24165	23461	22686	21900	21562	21922	22736	21880
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	44946	43323	40666	38084	36392	34428	33071	31797	30171	29553	26935
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000			46623	45520	44759	43959	41694	39954	38754	37823	35215
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005							46392	46185	45735	46900	43691
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	28786	27105	25503	24046	23304	22518	21782	21562	21922	22736	21880
Passenger Cars	LPG	Conventional	0	1990	14383	12937	12037	11988	11782	11669	11465	11574	11543	11572	11037
Passenger Cars	2-Stroke	Conventional	0	9999	14383	12937	12037	11988	11782	11669	11465	11574	11543	11572	
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	16095	15884	15993	16003	15622	15635	15543	15541	15291	14932	14797

Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	16095	15884	15993	16003	15622	15635	15543	15541	15291	14932	14797
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001					15622	15635	15543	15541	15291	14932	14797
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006								15541	15291	14932	14797
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	1994	32410	32420	32158	31625	30822	29931	29279	29299	31158	31506	31047
Light Duty Vehicles	Diesel <3,5 t	Euro I	1995	1998	32410	32420	32158	31625	30822	29931	29279	29299	31158	31506	31047
Light Duty Vehicles	Diesel <3,5 t	Euro II	1999	2001					30822	29931	29279	29299	31158	31506	31047
Light Duty Vehicles	Diesel <3,5 t	Euro III	2002	2006								29299	31158	31506	31047
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	9999	32192	31875	29331	29603	30134	30780	35428	35707	35510	35023	34709
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	1993	43425	43581	35992	36671	39352	40129	52039	52552	57979	57022	56191
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	1994	1996	43425	43581	35992	36671	39352	40129	52039	52552	57979	57022	56191
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	1997	2001			35992	36671	39352	40129	52039	52552	57979	57022	56191
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	2002	2006								52552	57979	57022	56191
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	1993	52492	52681	50475	48822	45884	43998	24716	21495	23439	24101	23749
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	1994	1996	52492	52681	50475	48822	45884	43998	24716	21495	23439	24101	23749
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	1997	2001			50475	48822	45884	43998	24716	21495	23439	24101	23749
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	2002	2006								21495	23439	24101	23749
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	1993	72970	73232	75618	75688	78321	75100	80542	80360	85205	88318	87030
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	1994	1996	72970	73232	75618	75688	78321	75100	80542	80360	85205	88318	87030
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	1997	2001			75618	75688	78321	75100	80542	80360	85205	88318	87030
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	2002	2006								80360	85205	88318	87030
Heavy Duty Vehicles	Diesel >32t	Conventional	0	1993	72970	73232	75618	75688	78321	75100	80542	80360	85205	88318	87030
Heavy Duty Vehicles	Diesel >32t	Euro I	1994	1996	72970	73232	75618	75688	78321	75100	80542	80360	85205	88318	87030
Heavy Duty Vehicles	Diesel >32t	Euro II	1997	2001			75618	75688	78321	75100	80542	80360	85205	88318	87030
Heavy Duty Vehicles	Diesel >32t	Euro III	2002	2006								80360	85205	88318	87030
Buses	Urban Buses	Conventional	0	1993	124661	124538	122236	118910	116579	113912	109404	108663	115629	116764	115061
Buses	Urban Buses	Euro I	1994	1996	124661	124538	122236	118910	116579	113912	109404	108663	115629	116764	115061
Buses	Urban Buses	Euro II	1997	2001			122236	118910	116579	113912	109404	108663	115629	116764	115061
Buses	Urban Buses	Euro III	2002	2006								108663	115629	116764	115061
Buses	Coaches	Conventional	0	1993	61696	73083	73600	72183	71708	69476	69062	70719	75639	81367	80181
Buses	Coaches	Euro I	1994	1996	61696	73083	73600	72183	71708	69476	69062	70719	75639	81367	80181
Buses	Coaches	Euro II	1997	2001			73600	72183	71708	69476	69062	70719	75639	81367	80181
Buses	Coaches	Euro III	2002	2006								70719	75639	81367	80181
Mopeds	<50 cm³	Conventional	0	1999	2192	2186	2223	2235	1902	1704	1339	1347	1332	1302	1291
Mopeds	<50 cm³	Euro I	2000	2003						1704	1339	1347	1332	1302	1291
Mopeds	<50 cm³	Euro II	2004	9999										1302	1291
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	6328	6301	6339	6414	6330	6365	6343	6417	6395	6292	6267
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	6328	6301	6339	6414	6330	6365	6343	6417	6395	6292	6267
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003						6365	6343	6417	6395	6292	6267

Motorcycles	4-stroke <250 cm³	Euro II	2004	2006										6292	6267
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	6328	6301	6339	6414	6330	6365	6343	6417	6395	6292	6267
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003						6365	6343	6417	6395	6292	6267
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006										6292	6267
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	6328	6301	6339	6414	6330	6365	6343	6417	6395	6292	6267
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003						6365	6343	6417	6395	6292	6267
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006										6292	6267

Annex 2B-3: EU directive emission limits for road transportation vehicles

Private cars and light duty vehicles I (<1305 kg)

g/km		EURO 1	EURO 2	EURO 3[1)]	EURO 4
Normal temp.					
CO	Gasoline	2,72	2,2	2,3	1,0
	Diesel	2,72	1,0	0,64	0,5
HC	Gasoline	-	-	0,20	0,10
NO_x	Gasoline	-	-	0,15	0,08
	Diesel	-	-	0,5	0,25
$HC+NO_x$	Gasoline	0,97	0,5	-	-
	Diesel	0,97	0,7/0,9[2)]	0,56	0,30
Particulates	Diesel	0,14	0,08/0,10[2)]	0,05	0,025
Low temp.					
CO	Gasoline	-	-	-	15
HC	Gasoline	-	-	-	1,8
Evaporation					
HC[3)]	Gasoline	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

Light duty vehicles II (1305-1760 kg)

g/km		EURO 1	EURO 2	EURO 3[1)]	EURO 4
Normal temp.					
CO	Gasoline	5,17	4,0	4,17	1,81
	Diesel	5,17	1,25	0,80	0,63
HC	Gasoline	-	-	0,25	0,13
NO_x	Gasoline	-	-	0,18	0,10
	Diesel	-	-	0,65	0,33
$HC+NO_x$	Gasoline	1,4	0,6	-	-
	Diesel	1,4	1,0/1,3[2)]	0,72	0,39
Particulates	Diesel	0,19	0,12/0,14[2)]	0,07	0,04
Low temp.					
CO	Gasoline	-	-	-	24
HC	Gasoline	-	-		2,7
Evaporation					
HC[3)]	Gasoline	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

Light duty vehicles III (>1760 kg)

g/km		EURO 1	EURO 2	EURO 3[1)]	EURO 4
Normal temp.					
CO	Gasoline	6,9	5,0	5,22	2,27
	Diesel	6,9	1,5	0,95	0,74
HC	Gasoline	-	-	0,29	0,16
NO_x	Gasoline	-	-	0,21	0,11
	Diesel	-	-	0,78	0,39
$HC+NO_x$	Gasoline	1,7	0,7	-	-
	Diesel	1,7	1,2/1,6[2)]	0,86	0,46
Particulates	Diesel	0,25	0,17/0,20[2)]	0,10	0,06
Low temp.					
CO	Gasoline	-	-	-	30
HC	Gasoline	-	-	-	3,2
Evaporation					
HC[3)]	Gasoline	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

Heavy duty diesel vehicles

(g/kWh)		EURO 1	EURO 2	EURO 3	EURO 4	EURO 5	EEV[2)
	Test[1)	1993	1996	2001	2006	2009	2000
CO	ECE/ESC	4,5	4,0	2,1	1,5	1,5	1,5
	ETC	-	-	(5,45)	4,0	4,0	3,0
HC	ECE/ESC	1,1	1,1	0,66	0,46	0,46	0,25
	ETC	-	-	(0,78)	0,55	0,55	0,40
NO_x	ECE/ESC	8,0	7,0	5,0	3,5	2,0	2,0
	ETC	-	-	(5,0)	3,5	2,0	2,0
Particulates[3)	ECE/ESC	0,36/0,61	0,15/0,25	0,10/0,13	0,02	0,02	0,02
	ETC	-	-	(0,16/0,21)	0,03	0,03	0,02
	ELR	-	-	0,8	0,5	0,5	0,15

[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/km)

Sector	Subsector	Tech 2	FCu	FCr	FCh	COu	COr	COh	PMu	PMr	PMh	NOxu	NOxr	NOxh
Passenger Cars	Gasoline <1,4 l	PRE ECE	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 <1,4 l	ECE 15/00-01	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 <1,4 l	ECE 15/02	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 <1,4 l	ECE 15/03	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 <1,4 l	ECE 15/04	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 <1,4 l	Impr. Conv.	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline <1,4 l	Open Loop	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline <1,4 l	Euro I	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 <1,4 l	Euro II	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 <1,4 l	Euro III	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 <1,4 l	Euro IV	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 <1,4 l	Euro V	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 1,4 - 2,0 l	PRE ECE	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	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	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	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	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	Impr. Conv.	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline 1,4 - 2,0 l	Open Loop	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	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	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 III	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 IV	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 V	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 >2,0 l	PRE ECE	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	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	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	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	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	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	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 III	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 IV	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 V	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	Diesel <2,0 l	Euro I	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 <2,0 l	Euro II	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 <2,0 l	Euro III	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 <2,0 l	Euro IV	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 <2,0 l	Euro V	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 <2,0 l	Conventional	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 >2,0 l	Euro I	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	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 III	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 IV	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 V	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	Conventional	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	LPG	Euro I	0,000	0,000	0,000	0,000	0,000	0,000	0,040	0,030	0,025	0,000	0,000	0,000
Passenger Cars	LPG	Euro II	0,000	0,000	0,000	0,000	0,000	0,000	0,040	0,030	0,025	0,000	0,000	0,000
Passenger Cars	LPG	Euro III	0,000	0,000	0,000	0,000	0,000	0,000	0,040	0,030	0,025	0,000	0,000	0,000
Passenger Cars	LPG	Euro IV	0,000	0,000	0,000	0,000	0,000	0,000	0,040	0,030	0,025	0,000	0,000	0,000
Passenger Cars	LPG	Euro V	0,000	0,000	0,000	0,000	0,000	0,000	0,040	0,030	0,025	0,000	0,000	0,000
Passenger Cars	LPG	Conventional	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	2-Stroke	Conventional	111,500	66,000	56,900	20,700	7,500	8,700	0,120	0,120	0,120	0,300	1,020	0,720
Light Duty Vehicles	Gasoline <3,5t	Conventional	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	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	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 III	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 IV	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 V	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	Diesel <3,5 t	Conventional	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 <3,5 t	Euro I	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 <3,5 t	Euro II	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 <3,5 t	Euro III	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 <3,5 t	Euro IV	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 <3,5 t	Euro V	68,860	58,185	63,660	0,393	0,328	0,423	0,070	0,066	0,090	1,138	0,975	1,022
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	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 3,5 - 7,5 t	Conventional	95,822	87,060	109,160	1,612	1,216	1,267	0,288	0,220	0,231	3,363	3,435	4,412
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	95,822	87,060	109,160	1,612	1,216	1,267	0,288	0,220	0,231	3,363	3,435	4,412

Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	95,822	87,060	109,160	1,612	1,216	1,267	0,288	0,220	0,231	3,363	3,435	4,412
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	95,822	87,060	109,160	1,612	1,216	1,267	0,288	0,220	0,231	3,363	3,435	4,412
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro IV	95,822	87,060	109,160	1,612	1,216	1,267	0,288	0,220	0,231	3,363	3,435	4,412
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro V	95,822	87,060	109,160	1,612	1,216	1,267	0,288	0,220	0,231	3,363	3,435	4,412
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	186,796	147,006	169,108	2,513	1,722	1,825	0,396	0,272	0,287	8,575	7,259	8,446
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	186,796	147,006	169,108	2,513	1,722	1,825	0,396	0,272	0,287	8,575	7,259	8,446
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	186,796	147,006	169,108	2,513	1,722	1,825	0,396	0,272	0,287	8,575	7,259	8,446
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	186,796	147,006	169,108	2,513	1,722	1,825	0,396	0,272	0,287	8,575	7,259	8,446
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro IV	186,796	147,006	169,108	2,513	1,722	1,825	0,396	0,272	0,287	8,575	7,259	8,446
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro V	186,796	147,006	169,108	2,513	1,722	1,825	0,396	0,272	0,287	8,575	7,259	8,446
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	295,313	227,040	230,740	2,803	1,927	1,895	0,549	0,384	0,376	12,512	10,087	10,251
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	295,313	227,040	230,740	2,803	1,927	1,895	0,549	0,384	0,376	12,512	10,087	10,251
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	295,313	227,040	230,740	2,803	1,927	1,895	0,549	0,384	0,376	12,512	10,087	10,251
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	295,313	227,040	230,740	2,803	1,927	1,895	0,549	0,384	0,376	12,512	10,087	10,251
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro IV	295,313	227,040	230,740	2,803	1,927	1,895	0,549	0,384	0,376	12,512	10,087	10,251
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro V	295,313	227,040	230,740	2,803	1,927	1,895	0,549	0,384	0,376	12,512	10,087	10,251
Heavy Duty Vehicles	Diesel >32t	Conventional	392,838	311,460	297,380	3,143	2,293	2,190	0,683	0,506	0,478	16,482	13,628	12,693
Heavy Duty Vehicles	Diesel >32t	Euro I	392,838	311,460	297,380	3,143	2,293	2,190	0,683	0,506	0,478	16,482	13,628	12,693
Heavy Duty Vehicles	Diesel >32t	Euro II	392,838	311,460	297,380	3,143	2,293	2,190	0,683	0,506	0,478	16,482	13,628	12,693
Heavy Duty Vehicles	Diesel >32t	Euro III	392,838	311,460	297,380	3,143	2,293	2,190	0,683	0,506	0,478	16,482	13,628	12,693
Heavy Duty Vehicles	Diesel >32t	Euro IV	392,838	311,460	297,380	3,143	2,293	2,190	0,683	0,506	0,478	16,482	13,628	12,693
Heavy Duty Vehicles	Diesel >32t	Euro V	392,838	311,460	297,380	3,143	2,293	2,190	0,683	0,506	0,478	16,482	13,628	12,693
Buses	Urban Buses	Conventional	315,796	253,287	219,035	4,741	3,178	2,375	0,751	0,498	0,374	14,511	12,324	10,937
Buses	Urban Buses	Euro I	315,796	253,287	219,035	4,741	3,178	2,375	0,751	0,498	0,374	14,511	12,324	10,937
Buses	Urban Buses	Euro II	315,796	253,287	219,035	4,741	3,178	2,375	0,751	0,498	0,374	14,511	12,324	10,937
Buses	Urban Buses	Euro III	315,796	253,287	219,035	4,741	3,178	2,375	0,751	0,498	0,374	14,511	12,324	10,937
Buses	Urban Buses	Euro IV	315,796	253,287	219,035	4,741	3,178	2,375	0,751	0,498	0,374	14,511	12,324	10,937
Buses	Urban Buses	Euro V	315,796	253,287	219,035	4,741	3,178	2,375	0,751	0,498	0,374	14,511	12,324	10,937
Buses	Coaches	Conventional	281,771	214,600	198,320	2,640	1,684	1,409	0,538	0,364	0,312	10,938	8,865	8,559
Buses	Coaches	Euro I	281,771	214,600	198,320	2,640	1,684	1,409	0,538	0,364	0,312	10,938	8,865	8,559
Buses	Coaches	Euro II	281,771	214,600	198,320	2,640	1,684	1,409	0,538	0,364	0,312	10,938	8,865	8,559
Buses	Coaches	Euro III	281,771	214,600	198,320	2,640	1,684	1,409	0,538	0,364	0,312	10,938	8,865	8,559
Buses	Coaches	Euro IV	281,771	214,600	198,320	2,640	1,684	1,409	0,538	0,364	0,312	10,938	8,865	8,559
Buses	Coaches	Euro V	281,771	214,600	198,320	2,640	1,684	1,409	0,538	0,364	0,312	10,938	8,865	8,559
Mopeds	<50 cm³	Conventional	25,000	25,000	0,000	13,800	13,800	0,000	0,188	0,188	0,000	0,020	0,020	0,000
Mopeds	<50 cm³	Euro I	25,000	25,000	0,000	13,800	13,800	0,000	0,188	0,188	0,000	0,020	0,020	0,000

Mopeds	<50 cm³	Euro II	25,000	25,000	0,000	13,800	13,800	0,000	0,188	0,188	0,000	0,020	0,020	0,000
Motorcycles	2-stroke >50 cm³	Conventional	30,368	32,375	36,950	23,380	25,490	27,500	0,200	0,200	0,200	0,032	0,088	0,133
Motorcycles	2-stroke >50 cm³	Euro I	30,368	32,375	36,950	23,380	25,490	27,500	0,200	0,200	0,200	0,032	0,088	0,133
Motorcycles	2-stroke >50 cm³	Euro II	30,368	32,375	36,950	23,380	25,490	27,500	0,200	0,200	0,200	0,032	0,088	0,133
Motorcycles	2-stroke >50 cm³	Euro III	30,368	32,375	36,950	23,380	25,490	27,500	0,200	0,200	0,200	0,032	0,088	0,133
Motorcycles	4-stroke <250 cm³	Conventional	23,340	26,690	35,600	22,380	26,300	38,600	0,020	0,020	0,020	0,130	0,242	0,362
Motorcycles	4-stroke <250 cm³	Euro I	23,340	26,690	35,600	22,380	26,300	38,600	0,020	0,020	0,020	0,130	0,242	0,362
Motorcycles	4-stroke <250 cm³	Euro II	23,340	26,690	35,600	22,380	26,300	38,600	0,020	0,020	0,020	0,130	0,242	0,362
Motorcycles	4-stroke <250 cm³	Euro III	23,340	26,690	35,600	22,380	26,300	38,600	0,020	0,020	0,020	0,130	0,242	0,362
Motorcycles	4-stroke 250 - 750 cm³	Conventional	28,580	28,640	34,700	20,440	21,517	25,810	0,020	0,020	0,020	0,136	0,251	0,374
Motorcycles	4-stroke 250 - 750 cm³	Euro I	28,580	28,640	34,700	20,440	21,517	25,810	0,020	0,020	0,020	0,136	0,251	0,374
Motorcycles	4-stroke 250 - 750 cm³	Euro II	28,580	28,640	34,700	20,440	21,517	25,810	0,020	0,020	0,020	0,136	0,251	0,374
Motorcycles	4-stroke 250 - 750 cm³	Euro III	28,580	28,640	34,700	20,440	21,517	25,810	0,020	0,020	0,020	0,136	0,251	0,374
Motorcycles	4-stroke >750 cm³	Conventional	37,520	34,340	38,600	14,880	18,030	24,300	0,020	0,020	0,020	0,148	0,266	0,392
Motorcycles	4-stroke >750 cm³	Euro I	37,520	34,340	38,600	14,880	18,030	24,300	0,020	0,020	0,020	0,148	0,266	0,392
Motorcycles	4-stroke >750 cm³	Euro II	37,520	34,340	38,600	14,880	18,030	24,300	0,020	0,020	0,020	0,148	0,266	0,392
Motorcycles	4-stroke >750 cm³	Euro III	37,520	34,340	38,600	14,880	18,030	24,300	0,020	0,020	0,020	0,148	0,266	0,392

Sector	Subsector	Tech 2	NH3u	NH3r	NH3h	CH4u	CH4r	CH4h	N2Ou	N2Or	N2Oh	VOCu	VOCr	VOCh
Passenger Cars	Gasoline <1,4 l	PRE ECE	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	2,354	1,597	1,247
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,862	1,256	1,121
Passenger Cars	Gasoline <1,4 l	ECE 15/02	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,849	1,061	0,950
Passenger Cars	Gasoline <1,4 l	ECE 15/03	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,849	1,061	0,950
Passenger Cars	Gasoline <1,4 l	ECE 15/04	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,480	0,895	0,698
Passenger Cars	Gasoline <1,4 l	Impr. Conv.	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline <1,4 l	Open Loop	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline <1,4 l	Euro I	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline <1,4 l	Euro II	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline <1,4 l	Euro III	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline <1,4 l	Euro IV	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline <1,4 l	Euro V	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	2,354	1,597	1,247
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,862	1,256	1,121
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,849	1,061	0,950
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,849	1,061	0,950
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,480	0,895	0,698
Passenger Cars	Gasoline 1,4 - 2,0 l	Impr. Conv.	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline 1,4 - 2,0 l	Open Loop	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline >2,0 l	PRE ECE	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	2,354	1,597	1,247
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,862	1,256	1,121
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,849	1,061	0,950
Passenger Cars	Gasoline >2,0 l	ECE 15/03	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,849	1,061	0,950
Passenger Cars	Gasoline >2,0 l	ECE 15/04	0,002	0,002	0,002	0,092	0,029	0,026	0,005	0,005	0,005	1,480	0,895	0,698
Passenger Cars	Gasoline >2,0 l	Euro I	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline >2,0 l	Euro II	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline >2,0 l	Euro III	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline >2,0 l	Euro IV	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111
Passenger Cars	Gasoline >2,0 l	Euro V	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,177	0,121	0,111

Passenger Cars	Diesel <2,0 l	Euro I	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,053	0,031	0,026
Passenger Cars	Diesel <2,0 l	Euro II	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,053	0,031	0,026
Passenger Cars	Diesel <2,0 l	Euro III	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,053	0,031	0,026
Passenger Cars	Diesel <2,0 l	Euro IV	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,053	0,031	0,026
Passenger Cars	Diesel <2,0 l	Euro V	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,053	0,031	0,026
Passenger Cars	Diesel <2,0 l	Conventional	0,001	0,001	0,001	0,028	0,012	0,008	0,027	0,027	0,027	0,145	0,086	0,062
Passenger Cars	Diesel >2,0 l	Euro I	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,080	0,046	0,034
Passenger Cars	Diesel >2,0 l	Euro II	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,080	0,046	0,034
Passenger Cars	Diesel >2,0 l	Euro III	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,080	0,046	0,034
Passenger Cars	Diesel >2,0 l	Euro IV	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,080	0,046	0,034
Passenger Cars	Diesel >2,0 l	Euro V	0,001	0,001	0,001	0,011	0,009	0,003	0,027	0,027	0,027	0,080	0,046	0,034
Passenger Cars	Diesel >2,0 l	Conventional	0,001	0,001	0,001	0,028	0,012	0,008	0,027	0,027	0,027	0,145	0,086	0,062
Passenger Cars	LPG	Euro I	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	LPG	Euro II	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	LPG	Euro III	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	LPG	Euro IV	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	LPG	Euro V	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Passenger Cars	LPG	Conventional	0,000	0,000	0,000	0,080	0,035	0,025	0,015	0,015	0,015	1,082	0,667	0,490
Passenger Cars	2-Stroke	Conventional	0,002	0,002	0,002	0,150	0,040	0,025	0,005	0,005	0,005	15,400	7,200	5,900
Light Duty Vehicles	Gasoline <3,5t	Conventional	0,002	0,002	0,002	0,150	0,040	0,025	0,006	0,006	0,006	1,877	0,729	0,446
Light Duty Vehicles	Gasoline <3,5t	Euro I	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,220	0,109	0,078
Light Duty Vehicles	Gasoline <3,5t	Euro II	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,220	0,109	0,078
Light Duty Vehicles	Gasoline <3,5t	Euro III	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,220	0,109	0,078
Light Duty Vehicles	Gasoline <3,5t	Euro IV	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,220	0,109	0,078
Light Duty Vehicles	Gasoline <3,5t	Euro V	0,070	0,100	0,100	0,026	0,016	0,014	0,053	0,016	0,035	0,220	0,109	0,078
Light Duty Vehicles	Diesel <3,5 t	Conventional	0,001	0,001	0,001	0,028	0,012	0,008	0,017	0,017	0,017	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5 t	Euro I	0,001	0,001	0,001	0,011	0,009	0,003	0,017	0,017	0,017	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5 t	Euro II	0,001	0,001	0,001	0,011	0,009	0,003	0,017	0,017	0,017	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5 t	Euro III	0,001	0,001	0,001	0,011	0,009	0,003	0,017	0,017	0,017	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5 t	Euro IV	0,001	0,001	0,001	0,011	0,009	0,003	0,017	0,017	0,017	0,131	0,106	0,101
Light Duty Vehicles	Diesel <3,5 t	Euro V	0,001	0,001	0,001	0,011	0,009	0,003	0,017	0,017	0,017	0,131	0,106	0,101
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0,002	0,002	0,002	0,140	0,110	0,070	0,006	0,006	0,006	7,000	5,500	3,500
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,432	0,865	0,648
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,432	0,865	0,648
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,432	0,865	0,648
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,432	0,865	0,648

Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro IV	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,432	0,865	0,648
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro V	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,432	0,865	0,648
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,317	0,833	0,680
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,317	0,833	0,680
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,317	0,833	0,680
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,317	0,833	0,680
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro IV	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,317	0,833	0,680
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro V	0,003	0,003	0,003	0,085	0,023	0,020	0,030	0,030	0,030	1,317	0,833	0,680
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,094	0,690	0,561
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,094	0,690	0,561
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,094	0,690	0,561
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,094	0,690	0,561
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro IV	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,094	0,690	0,561
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro V	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,094	0,690	0,561
Heavy Duty Vehicles	Diesel >32t	Conventional	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	0,958	0,593	0,482
Heavy Duty Vehicles	Diesel >32t	Euro I	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	0,958	0,593	0,482
Heavy Duty Vehicles	Diesel >32t	Euro II	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	0,958	0,593	0,482
Heavy Duty Vehicles	Diesel >32t	Euro III	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	0,958	0,593	0,482
Heavy Duty Vehicles	Diesel >32t	Euro IV	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	0,958	0,593	0,482
Heavy Duty Vehicles	Diesel >32t	Euro V	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	0,958	0,593	0,482
Buses	Urban Buses	Conventional	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,830	1,116	0,865
Buses	Urban Buses	Euro I	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,830	1,116	0,865
Buses	Urban Buses	Euro II	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,830	1,116	0,865
Buses	Urban Buses	Euro III	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,830	1,116	0,865
Buses	Urban Buses	Euro IV	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,830	1,116	0,865
Buses	Urban Buses	Euro V	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,830	1,116	0,865
Buses	Coaches	Conventional	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,008	0,577	0,422
Buses	Coaches	Euro I	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,008	0,577	0,422
Buses	Coaches	Euro II	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,008	0,577	0,422
Buses	Coaches	Euro III	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,008	0,577	0,422
Buses	Coaches	Euro IV	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,008	0,577	0,422
Buses	Coaches	Euro V	0,003	0,003	0,003	0,175	0,080	0,070	0,030	0,030	0,030	1,008	0,577	0,422
Mopeds	<50 cm³	Conventional	0,001	0,001	0,000	0,219	0,219	0,000	0,001	0,001	0,000	13,910	13,910	0,000
Mopeds	<50 cm³	Euro I	0,001	0,001	0,000	0,219	0,219	0,000	0,001	0,001	0,000	13,910	13,910	0,000
Mopeds	<50 cm³	Euro II	0,001	0,001	0,000	0,219	0,219	0,000	0,001	0,001	0,000	13,910	13,910	0,000
Motorcycles	2-stroke >50 cm³	Conventional	0,002	0,002	0,002	0,150	0,150	0,150	0,002	0,002	0,002	9,340	8,402	8,360

Motorcycles	2-stroke >50 cm³	Euro I	0,002	0,002	0,002	0,150	0,150	0,150	0,002	0,002	0,002	9,340	8,402	8,360
Motorcycles	2-stroke >50 cm³	Euro II	0,002	0,002	0,002	0,150	0,150	0,150	0,002	0,002	0,002	9,340	8,402	8,360
Motorcycles	2-stroke >50 cm³	Euro III	0,002	0,002	0,002	0,150	0,150	0,150	0,002	0,002	0,002	9,340	8,402	8,360
Motorcycles	4-stroke <250 cm³	Conventional	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,550	0,960	1,320
Motorcycles	4-stroke <250 cm³	Euro I	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,550	0,960	1,320
Motorcycles	4-stroke <250 cm³	Euro II	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,550	0,960	1,320
Motorcycles	4-stroke <250 cm³	Euro III	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,550	0,960	1,320
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,350	0,944	1,010
Motorcycles	4-stroke 250 - 750 cm³	Euro I	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,350	0,944	1,010
Motorcycles	4-stroke 250 - 750 cm³	Euro II	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,350	0,944	1,010
Motorcycles	4-stroke 250 - 750 cm³	Euro III	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	1,350	0,944	1,010
Motorcycles	4-stroke >750 cm³	Conventional	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	2,520	1,610	1,190
Motorcycles	4-stroke >750 cm³	Euro I	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	2,520	1,610	1,190
Motorcycles	4-stroke >750 cm³	Euro II	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	2,520	1,610	1,190
Motorcycles	4-stroke >750 cm³	Euro III	0,002	0,002	0,002	0,200	0,200	0,200	0,002	0,002	0,002	2,520	1,610	1,190

Annex 2B-5: Reduction factors for road transport emission factors

Sector	Subsector	Tech 2	FCuR	FCrR	FChR	COuR	COrR	COhR	PMuR	PMrR	PMhR	NOxuR	NOxrR	NOxhR	VOCuR	VOCrR	VOChR	CH4uR	CH4rR	CH4hR
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Impr. Conv.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Open Loop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Euro II	2	6	4	63	58	58	0	0	0	44	45	60	60	61	62	35	19	21
Passenger Cars	Gasoline <1,4 l	Euro III	-3	-1	2	71	50	35	60	55	37	72	78	89	92	88	77	88	88	71
Passenger Cars	Gasoline <1,4 l	Euro IV	-6	-5	-5	89	79	70	60	55	37	80	89	96	93	89	85	92	88	100
Passenger Cars	Gasoline <1,4 l	Euro V	-6	-5	-5	89	79	70	60	55	37	85	92	97	93	89	85	92	88	100
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Impr. Conv.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Open Loop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	2	2	5	63	58	58	0	0	0	44	45	60	60	61	62	35	19	21
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	-1	-3	-3	71	50	35	60	55	37	72	78	89	92	88	77	88	88	71
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	-5	-9	-7	89	79	70	60	55	37	80	89	96	93	89	85	92	88	100
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	-5	-9	-7	89	79	70	60	55	37	85	92	97	93	89	85	92	88	100
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	Euro II	-3	-5	-3	63	58	58	0	0	0	44	45	60	60	61	62	35	19	21
Passenger Cars	Gasoline >2,0 l	Euro III	5	7	13	71	50	35	60	55	37	72	78	89	92	88	77	88	88	71

Passenger Cars	Gasoline >2,0 l	Euro IV	-15	-10	-1	89	79	70	60	55	37	80	89	96	93	89	85	92	88	100
Passenger Cars	Gasoline >2,0 l	Euro V	-15	-10	-1	89	79	70	60	55	37	85	92	97	93	89	85	92	88	100
Passenger Cars	Diesel <2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Diesel <2,0 l	Euro II	-5	-3	-1	18	49	83	18	37	53	-8	1	0	35	33	42	36	67	33
Passenger Cars	Diesel <2,0 l	Euro III	-2	-1	6	76	81	94	49	52	58	-19	-18	-13	66	63	66	73	100	100
Passenger Cars	Diesel <2,0 l	Euro IV	-2	-1	6	76	81	94	74	76	79	60	61	62	66	63	66	100	100	100
Passenger Cars	Diesel <2,0 l	Euro V	-2	-1	6	76	81	94	95	95	96	72	72	73	66	63	66	100	100	100
Passenger Cars	Diesel <2,0 l	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Diesel >2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Diesel >2,0 l	Euro II	0	0	0	18	49	83	18	37	53	-8	1	0	-22	-25	-12	36	67	33
Passenger Cars	Diesel >2,0 l	Euro III	0	0	0	76	81	94	49	52	58	-19	-18	-13	52	63	64	73	100	100
Passenger Cars	Diesel >2,0 l	Euro IV	0	0	0	76	81	94	74	76	79	60	61	62	52	63	64	100	100	100
Passenger Cars	Diesel >2,0 l	Euro V	0	0	0	76	81	94	95	95	96	72	72	73	52	63	64	100	100	100
Passenger Cars	Diesel >2,0 l	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	LPG	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	LPG	Euro II	0	0	0	32	32	32	0	0	0	64	64	64	79	79	79	0	0	0
Passenger Cars	LPG	Euro III	0	0	0	44	44	44	0	0	0	76	76	76	85	85	85	0	0	0
Passenger Cars	LPG	Euro IV	0	0	0	66	66	66	0	0	0	87	87	87	97	97	97	0	0	0
Passenger Cars	LPG	Euro V	0	0	0	100	100	100	0	0	0	100	100	100	100	100	100	0	0	0
Passenger Cars	LPG	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	2-Stroke	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Gasoline <3,5t	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Gasoline <3,5t	Euro II	0	0	0	39	39	39	0	0	0	66	66	66	76	76	76	35	19	21
Light Duty Vehicles	Gasoline <3,5t	Euro III	0	0	0	48	48	48	60	55	37	79	79	79	86	86	86	88	88	71
Light Duty Vehicles	Gasoline <3,5t	Euro IV	0	0	0	72	72	72	60	55	37	90	90	90	94	94	94	92	88	100
Light Duty Vehicles	Gasoline <3,5t	Euro V	0	0	0	72	72	72	60	55	37	93	93	93	94	94	94	92	88	100
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Diesel <3,5 t	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Diesel <3,5 t	Euro II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	67	33
Light Duty Vehicles	Diesel <3,5 t	Euro III	0	0	0	18	18	18	33	33	33	35	35	35	38	38	38	73	100	100
Light Duty Vehicles	Diesel <3,5 t	Euro IV	0	0	0	35	35	35	65	65	65	72	72	72	77	77	77	100	100	100
Light Duty Vehicles	Diesel <3,5 t	Euro V	0	0	0	35	35	35	96	96	96	78	78	78	77	77	77	100	100	100
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	19	14	12	67	66	61	62	61	61	30	27	27	80	79	76	0	0	0

Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	24	17	14	73	70	67	84	80	77	26	25	27	87	86	85	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	19	13	11	67	69	70	82	83	84	42	45	47	88	88	87	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro IV	24	18	17	97	98	98	97	97	97	65	65	66	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro V	23	17	16	97	98	98	97	97	97	79	80	80	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	16	14	12	53	52	52	41	41	41	40	40	41	58	56	55	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	19	17	14	61	58	56	75	71	65	36	37	39	73	72	72	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	15	13	11	54	55	55	74	74	74	48	51	54	76	75	75	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro IV	20	19	17	97	97	97	95	95	95	69	70	71	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro V	19	18	16	97	97	97	95	95	95	82	82	83	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	13	12	12	30	28	28	29	31	32	32	32	33	30	27	25	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	17	15	14	43	38	35	69	68	59	29	29	31	55	54	54	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	13	12	12	33	33	33	69	70	70	43	45	46	60	59	58	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro IV	19	18	18	95	95	95	94	95	95	65	66	66	98	98	98	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro V	18	17	17	95	95	95	94	95	95	79	80	80	98	98	98	0	0	0
Heavy Duty Vehicles	Diesel >32t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro I	12	11	11	15	12	13	23	26	28	29	30	30	7	3	2	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro II	14	13	13	31	25	21	65	65	53	27	27	28	41	39	40	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro III	12	11	12	21	20	20	68	69	70	42	43	43	49	47	46	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro IV	18	18	18	95	95	95	94	95	95	64	65	64	97	97	97	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro V	16	16	17	95	95	95	94	95	95	79	79	79	97	97	97	0	0	0
Buses	Urban Buses	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	Urban Buses	Euro I	15	13	13	52	52	55	46	42	44	39	39	42	59	56	54	0	0	0
Buses	Urban Buses	Euro II	18	15	13	58	57	62	75	72	69	35	37	38	73	72	70	0	0	0
Buses	Urban Buses	Euro III	14	11	11	53	54	58	77	74	73	45	50	55	76	75	73	0	0	0
Buses	Urban Buses	Euro IV	18	17	16	96	96	97	95	95	95	68	69	72	99	99	99	0	0	0
Buses	Urban Buses	Euro V	17	15	14	96	96	97	95	95	95	80	81	84	99	99	99	0	0	0
Buses	Coaches	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	Coaches	Euro I	8	8	8	19	17	16	21	24	27	23	24	25	7	3	-4	0	0	0
Buses	Coaches	Euro II	8	7	8	32	28	24	66	63	62	14	17	18	38	34	31	0	0	0
Buses	Coaches	Euro III	2	1	0	17	14	13	62	62	62	26	32	35	43	39	32	0	0	0
Buses	Coaches	Euro IV	7	6	6	94	93	93	92	93	93	56	59	60	97	97	97	0	0	0
Buses	Coaches	Euro V	4	4	3	93	93	93	92	93	93	73	75	76	97	97	96	0	0	0
Mopeds	<50 cm^3	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mopeds	<50 cm^3	Euro I	40	40	0	59	59	0	60	60	0	0	0	0	80	80	0	0	0	0

Mopeds	<50 cm³	Euro II	52	52	0	91	91	0	80	80	0	-1200	-1200	0	89	89	0	0	0	0
Motorcycles	2-stroke >50 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	2-stroke >50 cm³	Euro I	21	18	22	50	47	47	60	60	60	25	58	56	34	29	35	0	0	0
Motorcycles	2-stroke >50 cm³	Euro II	28	25	29	66	63	63	80	80	80	-178	-56	-61	80	79	80	0	0	0
Motorcycles	2-stroke >50 cm³	Euro III	45	42	45	92	91	91	94	94	94	-650	-320	-336	92	91	92	0	0	0
Motorcycles	4-stroke <250 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	4-stroke <250 cm³	Euro I	5	-10	-46	42	44	60	0	0	0	-89	-72	-100	29	9	34	0	0	0
Motorcycles	4-stroke <250 cm³	Euro II	5	-10	-46	71	77	76	75	75	75	-50	-10	-47	32	42	54	0	0	0
Motorcycles	4-stroke <250 cm³	Euro III	5	-10	-46	79	94	94	75	75	75	3	38	9	59	80	86	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Euro I	-1	-2	-19	53	38	23	0	0	0	-115	-90	-102	26	20	22	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Euro II	-1	-2	-19	68	72	64	75	75	75	-43	-6	-42	22	41	39	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Euro III	-1	-2	-19	77	93	91	75	75	75	7	40	12	53	80	82	0	0	0
Motorcycles	4-stroke >750 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	4-stroke >750 cm³	Euro I	-20	-6	-6	47	62	56	0	0	0	-42	-96	-179	54	54	23	0	0	0
Motorcycles	4-stroke >750 cm³	Euro II	-20	-6	-6	57	67	62	75	75	75	-32	0	-35	58	65	49	0	0	0
Motorcycles	4-stroke >750 cm³	Euro III	-20	-6	-6	68	91	91	75	75	75	15	44	16	75	88	85	0	0	0

Sector	Subsector	Tech 2	FCuR	FCrR	FChR	COuR	COrR	COhR	PMuR	PMrR	PMhR	NOxuR	NOxrR	NOxhR	VOCuR	VOCrR	VOChR	CH4uR	CH4rR	CH4hR
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	ECE 15/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Impr. Conv.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Open Loop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline <1,4 l	Euro II	2	6	4	63	58	58	0	0	0	44	45	60	60	61	62	35	19	21
Passenger Cars	Gasoline <1,4 l	Euro III	-3	-1	2	71	50	35	60	55	37	72	78	89	92	88	77	88	88	71
Passenger Cars	Gasoline <1,4 l	Euro IV	-6	-5	-5	89	79	70	60	55	37	80	89	96	93	89	85	92	88	100
Passenger Cars	Gasoline <1,4 l	Euro V	-6	-5	-5	89	79	70	60	55	37	85	92	97	93	89	85	92	88	100
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Impr. Conv.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Open Loop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	2	2	5	63	58	58	0	0	0	44	45	60	60	61	62	35	19	21
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	-1	-3	-3	71	50	35	60	55	37	72	78	89	92	88	77	88	88	71
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	-5	-9	-7	89	79	70	60	55	37	80	89	96	93	89	85	92	88	100
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	-5	-9	-7	89	79	70	60	55	37	85	92	97	93	89	85	92	88	100
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	Euro II	-3	-5	-3	63	58	58	0	0	0	44	45	60	60	61	62	35	19	21
Passenger Cars	Gasoline >2,0 l	Euro III	5	7	13	71	50	35	60	55	37	72	78	89	92	88	77	88	88	71
Passenger Cars	Gasoline >2,0 l	Euro IV	-15	-10	-1	89	79	70	60	55	37	80	89	96	93	89	85	92	88	100
Passenger Cars	Gasoline >2,0 l	Euro V	-15	-10	-1	89	79	70	60	55	37	85	92	97	93	89	85	92	88	100
Passenger Cars	Diesel <2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Diesel <2,0 l	Euro II	-5	-3	-1	18	49	83	18	37	53	-8	1	0	35	33	42	36	67	33
Passenger Cars	Diesel <2,0 l	Euro III	-2	-1	6	76	81	94	49	52	58	-19	-18	-13	66	63	66	73	100	100
Passenger Cars	Diesel <2,0 l	Euro IV	-2	-1	6	76	81	94	74	76	79	60	61	62	66	63	66	100	100	100
Passenger Cars	Diesel <2,0 l	Euro V	-2	-1	6	76	81	94	95	95	96	72	72	73	66	63	66	100	100	100
Passenger Cars	Diesel <2,0 l	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Diesel >2,0 l	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Diesel >2,0 l	Euro II	0	0	0	18	49	83	18	37	53	-8	1	0	-22	-25	-12	36	67	33
Passenger Cars	Diesel >2,0 l	Euro III	0	0	0	76	81	94	49	52	58	-19	-18	-13	52	63	64	73	100	100
Passenger Cars	Diesel >2,0 l	Euro IV	0	0	0	76	81	94	74	76	79	60	61	62	52	63	64	100	100	100
Passenger Cars	Diesel >2,0 l	Euro V	0	0	0	76	81	94	95	95	96	72	72	73	52	63	64	100	100	100
Passenger Cars	Diesel >2,0 l	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	LPG	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	LPG	Euro II	0	0	0	32	32	32	0	0	0	64	64	64	79	79	79	0	0	0
Passenger Cars	LPG	Euro III	0	0	0	44	44	44	0	0	0	76	76	76	85	85	85	0	0	0
Passenger Cars	LPG	Euro IV	0	0	0	66	66	66	0	0	0	87	87	87	97	97	97	0	0	0
Passenger Cars	LPG	Euro V	0	0	0	100	100	100	0	0	0	100	100	100	100	100	100	0	0	0
Passenger Cars	LPG	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger Cars	2-Stroke	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Gasoline <3,5t	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Gasoline <3,5t	Euro II	0	0	0	39	39	39	0	0	0	66	66	66	76	76	76	35	19	21
Light Duty Vehicles	Gasoline <3,5t	Euro III	0	0	0	48	48	48	60	55	37	79	79	79	86	86	86	88	88	71
Light Duty Vehicles	Gasoline <3,5t	Euro IV	0	0	0	72	72	72	60	55	37	90	90	90	94	94	94	92	88	100
Light Duty Vehicles	Gasoline <3,5t	Euro V	0	0	0	72	72	72	60	55	37	93	93	93	94	94	94	92	88	100
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Diesel <3,5 t	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Vehicles	Diesel <3,5 t	Euro II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	67	33
Light Duty Vehicles	Diesel <3,5 t	Euro III	0	0	0	18	18	18	33	33	33	35	35	35	38	38	38	73	100	100
Light Duty Vehicles	Diesel <3,5 t	Euro IV	0	0	0	35	35	35	65	65	65	72	72	72	77	77	77	100	100	100
Light Duty Vehicles	Diesel <3,5 t	Euro V	0	0	0	35	35	35	96	96	96	78	78	78	77	77	77	100	100	100
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	19	14	12	67	66	61	62	61	61	30	27	27	80	79	76	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	24	17	14	73	70	67	84	80	77	26	25	27	87	86	85	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	19	13	11	67	69	70	82	83	84	42	45	47	88	88	87	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro IV	24	18	17	97	98	98	97	97	97	65	65	66	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro V	23	17	16	97	98	98	97	97	97	79	80	80	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	16	14	12	53	52	52	41	41	41	40	40	41	58	56	55	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	19	17	14	61	58	56	75	71	65	36	37	39	73	72	72	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	15	13	11	54	55	55	74	74	74	48	51	54	76	75	75	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro IV	20	19	17	97	97	97	95	95	95	69	70	71	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro V	19	18	16	97	97	97	95	95	95	82	82	83	99	99	99	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	13	12	12	30	28	28	29	31	32	32	32	33	30	27	25	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	17	15	14	43	38	35	69	68	59	29	29	31	55	54	54	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	13	12	12	33	33	33	69	70	70	43	45	46	60	59	58	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro IV	19	18	18	95	95	95	94	95	95	65	66	66	98	98	98	0	0	0
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro V	18	17	17	95	95	95	94	95	95	79	80	80	98	98	98	0	0	0
Heavy Duty Vehicles	Diesel >32t	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro I	12	11	11	15	12	13	23	26	28	29	30	30	7	3	2	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro II	14	13	13	31	25	21	65	65	53	27	27	28	41	39	40	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro III	12	11	12	21	20	20	68	69	70	42	43	43	49	47	46	0	0	0

Heavy Duty Vehicles	Diesel >32t	Euro IV	18	18	18	95	95	95	94	95	95	64	65	64	97	97	97	0	0	0
Heavy Duty Vehicles	Diesel >32t	Euro V	16	16	17	95	95	95	94	95	95	79	79	79	97	97	97	0	0	0
Buses	Urban Buses	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	Urban Buses	Euro I	15	13	13	52	52	55	46	42	44	39	39	42	59	56	54	0	0	0
Buses	Urban Buses	Euro II	18	15	13	58	57	62	75	72	69	35	37	38	73	72	70	0	0	0
Buses	Urban Buses	Euro III	14	11	11	53	54	58	77	74	73	45	50	55	76	75	73	0	0	0
Buses	Urban Buses	Euro IV	18	17	16	96	96	97	95	95	95	68	69	72	99	99	99	0	0	0
Buses	Urban Buses	Euro V	17	15	14	96	96	97	95	95	95	80	81	84	99	99	99	0	0	0
Buses	Coaches	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buses	Coaches	Euro I	8	8	8	19	17	16	21	24	27	23	24	25	7	3	-4	0	0	0
Buses	Coaches	Euro II	8	7	8	32	28	24	66	63	62	14	17	18	38	34	31	0	0	0
Buses	Coaches	Euro III	2	1	0	17	14	13	62	62	62	26	32	35	43	39	32	0	0	0
Buses	Coaches	Euro IV	7	6	6	94	93	93	92	93	93	56	59	60	97	97	97	0	0	0
Buses	Coaches	Euro V	4	4	3	93	93	93	92	93	93	73	75	76	97	97	96	0	0	0
Mopeds	<50 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mopeds	<50 cm³	Euro I	40	40	0	59	59	0	60	60	0	0	0	0	80	80	0	0	0	0
Mopeds	<50 cm³	Euro II	52	52	0	91	91	0	80	80	0	-1200	-1200	0	89	89	0	0	0	0
Motorcycles	2-stroke >50 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	2-stroke >50 cm³	Euro I	21	18	22	50	47	47	60	60	60	25	58	56	34	29	35	0	0	0
Motorcycles	2-stroke >50 cm³	Euro II	28	25	29	66	63	63	80	80	80	-178	-56	-61	80	79	80	0	0	0
Motorcycles	2-stroke >50 cm³	Euro III	45	42	45	92	91	91	94	94	94	-650	-320	-336	92	91	92	0	0	0
Motorcycles	4-stroke <250 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	4-stroke <250 cm³	Euro I	5	-10	-46	42	44	60	0	0	0	-89	-72	-100	29	9	34	0	0	0
Motorcycles	4-stroke <250 cm³	Euro II	5	-10	-46	71	77	76	75	75	75	-50	-10	-47	32	42	54	0	0	0
Motorcycles	4-stroke <250 cm³	Euro III	5	-10	-46	79	94	94	75	75	75	3	38	9	59	80	86	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Euro I	-1	-2	-19	53	38	23	0	0	0	-115	-90	-102	26	20	22	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Euro II	-1	-2	-19	68	72	64	75	75	75	-43	-6	-42	22	41	39	0	0	0
Motorcycles	4-stroke 250 - 750 cm³	Euro III	-1	-2	-19	77	93	91	75	75	75	7	40	12	53	80	82	0	0	0
Motorcycles	4-stroke >750 cm³	Conventional	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motorcycles	4-stroke >750 cm³	Euro I	-20	-6	-6	47	62	56	0	0	0	-42	-96	-179	54	54	23	0	0	0
Motorcycles	4-stroke >750 cm³	Euro II	-20	-6	-6	57	67	62	75	75	75	-32	0	-35	58	65	49	0	0	0
Motorcycles	4-stroke >750 cm³	Euro III	-20	-6	-6	68	91	91	75	75	75	15	44	16	75	88	85	0	0	0

Annex 2B-6: Fuel use factors (MJ/km) and emission factors (g/km)

Sector	ForecastYear	FCu (MJ)	FCr (MJ)	FCh (MJ)	CO2u	CO2r	CO2h	CH4u	CH4r	CH4h	N2Ou	N2Or	N2Oh	SO2u	SO2r	SO2h	NOxu	NOxr	NOxh
Passenger Cars	1985	3,879	2,056	1,649	283	150	121	0,190	0,027	0,017	0,008	0,007	0,005	0,082	0,041	0,035	2,231	2,154	1,928
Passenger Cars	1986	3,840	2,046	1,637	281	150	120	0,187	0,027	0,017	0,008	0,007	0,005	0,054	0,027	0,023	2,221	2,152	1,933
Passenger Cars	1987	3,825	2,034	1,621	280	149	118	0,188	0,027	0,017	0,009	0,007	0,005	0,055	0,028	0,023	2,218	2,144	1,927
Passenger Cars	1988	3,739	2,022	1,604	273	148	117	0,178	0,027	0,017	0,009	0,007	0,005	0,055	0,028	0,024	2,191	2,134	1,921
Passenger Cars	1989	3,704	2,017	1,597	271	147	117	0,174	0,027	0,017	0,009	0,007	0,005	0,040	0,021	0,017	2,179	2,130	1,924
Passenger Cars	1990	3,688	2,015	1,591	270	147	116	0,174	0,027	0,017	0,009	0,007	0,005	0,038	0,020	0,017	2,185	2,142	1,939
Passenger Cars	1991	3,621	2,057	1,583	265	150	116	0,179	0,027	0,016	0,012	0,008	0,006	0,036	0,020	0,016	2,039	2,056	1,825
Passenger Cars	1992	3,437	2,055	1,818	251	150	133	0,172	0,026	0,018	0,015	0,008	0,009	0,024	0,014	0,013	1,848	1,931	1,984
Passenger Cars	1993	3,448	2,051	1,809	252	150	132	0,182	0,025	0,017	0,018	0,009	0,010	0,014	0,008	0,007	1,772	1,813	1,872
Passenger Cars	1994	3,334	2,098	1,801	244	153	132	0,177	0,024	0,016	0,023	0,010	0,012	0,013	0,008	0,007	1,589	1,657	1,687
Passenger Cars	1995	3,195	2,100	2,034	233	153	149	0,179	0,023	0,018	0,025	0,011	0,016	0,013	0,008	0,008	1,428	1,511	1,756
Passenger Cars	1996	3,147	2,056	2,264	230	150	165	0,190	0,022	0,019	0,028	0,012	0,020	0,012	0,008	0,009	1,318	1,341	1,792
Passenger Cars	1997	3,076	2,043	2,231	225	149	163	0,171	0,020	0,018	0,032	0,013	0,022	0,012	0,008	0,009	1,194	1,177	1,590
Passenger Cars	1998	3,072	2,046	2,219	225	149	162	0,167	0,019	0,016	0,035	0,013	0,024	0,012	0,008	0,009	1,096	1,036	1,405
Passenger Cars	1999	3,052	2,047	2,211	223	150	162	0,153	0,018	0,015	0,037	0,014	0,026	0,010	0,007	0,007	1,012	0,919	1,247
Passenger Cars	2000	3,037	2,050	2,208	222	150	161	0,146	0,017	0,015	0,039	0,015	0,027	0,007	0,005	0,005	0,952	0,835	1,131
Passenger Cars	2001	3,065	2,054	2,208	224	150	161	0,144	0,016	0,013	0,040	0,015	0,028	0,007	0,005	0,005	0,904	0,771	1,038
Passenger Cars	2002	3,036	2,057	2,208	222	150	161	0,128	0,014	0,012	0,042	0,016	0,029	0,007	0,005	0,005	0,839	0,699	0,936
Passenger Cars	2003	3,047	2,060	2,207	223	151	161	0,121	0,013	0,011	0,042	0,016	0,030	0,007	0,005	0,005	0,785	0,637	0,846
Passenger Cars	2004	2,998	2,062	2,206	219	151	161	0,103	0,011	0,010	0,043	0,017	0,030	0,007	0,005	0,005	0,727	0,577	0,759
Passenger Cars	2005	3,016	2,056	2,196	221	150	161	0,102	0,010	0,009	0,043	0,017	0,031	0,001	0,001	0,001	0,679	0,522	0,674
Light Duty Vehicles	1985	4,605	2,621	2,396	340	194	177	0,100	0,015	0,008	0,018	0,015	0,012	0,908	0,534	0,497	2,374	1,092	0,953
Light Duty Vehicles	1986	4,581	2,623	2,402	338	194	177	0,096	0,015	0,008	0,018	0,015	0,012	0,550	0,325	0,302	2,352	1,068	0,931
Light Duty Vehicles	1987	4,591	2,623	2,402	339	194	177	0,096	0,015	0,008	0,018	0,015	0,012	0,552	0,325	0,302	2,357	1,066	0,929
Light Duty Vehicles	1988	4,531	2,624	2,403	335	194	178	0,090	0,015	0,008	0,018	0,015	0,012	0,546	0,325	0,303	2,319	1,063	0,926
Light Duty Vehicles	1989	4,506	2,625	2,406	333	194	178	0,086	0,014	0,008	0,018	0,015	0,013	0,366	0,219	0,204	2,299	1,049	0,913
Light Duty Vehicles	1990	4,497	2,626	2,408	332	194	178	0,085	0,014	0,008	0,018	0,015	0,013	0,367	0,220	0,205	2,291	1,039	0,903
Light Duty Vehicles	1991	4,534	2,625	2,407	335	194	178	0,089	0,014	0,008	0,018	0,015	0,013	0,369	0,219	0,204	2,315	1,044	0,907
Light Duty Vehicles	1992	4,423	2,624	2,604	327	194	192	0,087	0,015	0,009	0,018	0,015	0,014	0,232	0,142	0,143	2,259	1,060	1,000
Light Duty Vehicles	1993	4,457	2,624	2,605	329	194	193	0,090	0,015	0,009	0,018	0,015	0,014	0,091	0,055	0,055	2,278	1,055	0,995
Light Duty Vehicles	1994	4,048	2,793	2,810	299	206	208	0,081	0,015	0,009	0,016	0,016	0,015	0,084	0,059	0,060	2,050	1,103	1,051
Light Duty Vehicles	1995	4,041	2,772	2,786	299	205	206	0,079	0,015	0,009	0,017	0,016	0,015	0,083	0,058	0,059	1,998	1,099	1,050

Light Duty Vehicles	1996	3,965	2,752	2,963	293	203	219	0,078	0,014	0,009	0,017	0,016	0,016	0,081	0,058	0,063	1,911	1,083	1,111
Light Duty Vehicles	1997	3,893	2,732	2,942	288	202	217	0,069	0,014	0,009	0,017	0,016	0,017	0,080	0,057	0,063	1,821	1,065	1,095
Light Duty Vehicles	1998	3,877	2,713	2,920	286	200	216	0,066	0,013	0,008	0,018	0,016	0,017	0,079	0,057	0,062	1,766	1,056	1,088
Light Duty Vehicles	1999	3,841	2,696	2,902	284	199	214	0,060	0,013	0,008	0,018	0,016	0,017	0,044	0,031	0,034	1,699	1,037	1,069
Light Duty Vehicles	2000	3,809	2,680	2,884	281	198	213	0,055	0,012	0,007	0,018	0,016	0,017	0,009	0,006	0,007	1,638	1,021	1,055
Light Duty Vehicles	2001	3,824	2,664	2,866	282	197	212	0,053	0,011	0,007	0,019	0,016	0,018	0,009	0,006	0,007	1,601	1,005	1,041
Light Duty Vehicles	2002	3,771	2,645	2,846	278	195	210	0,045	0,010	0,006	0,019	0,016	0,018	0,009	0,006	0,007	1,486	0,957	0,992
Light Duty Vehicles	2003	3,756	2,627	2,830	277	194	209	0,040	0,008	0,005	0,019	0,017	0,018	0,009	0,006	0,007	1,403	0,910	0,944
Light Duty Vehicles	2004	3,676	2,603	2,806	272	192	207	0,031	0,007	0,004	0,019	0,017	0,018	0,009	0,006	0,007	1,277	0,865	0,899
Light Duty Vehicles	2005	3,695	2,588	2,791	273	191	206	0,029	0,006	0,003	0,019	0,017	0,018	0,002	0,001	0,001	1,220	0,829	0,863
Heavy Duty Vehicles	1985	13,246	9,673	9,166	980	716	678	0,160	0,063	0,055	0,035	0,030	0,026	3,089	2,260	2,144	13,204	10,128	9,436
Heavy Duty Vehicles	1986	13,247	9,674	9,167	980	716	678	0,160	0,063	0,055	0,035	0,030	0,026	1,854	1,356	1,287	13,207	10,128	9,437
Heavy Duty Vehicles	1987	13,247	9,674	9,167	980	716	678	0,160	0,063	0,055	0,035	0,030	0,026	1,854	1,356	1,287	13,208	10,128	9,437
Heavy Duty Vehicles	1988	13,247	9,674	9,167	980	716	678	0,160	0,063	0,055	0,035	0,030	0,026	1,854	1,356	1,287	13,208	10,129	9,437
Heavy Duty Vehicles	1989	13,248	9,675	9,167	980	716	678	0,160	0,063	0,055	0,035	0,030	0,026	1,237	0,904	0,858	13,210	10,129	9,438
Heavy Duty Vehicles	1990	13,111	9,605	9,122	970	711	675	0,159	0,063	0,054	0,035	0,030	0,026	1,224	0,898	0,854	13,060	10,050	9,390
Heavy Duty Vehicles	1991	13,464	9,816	8,626	996	726	638	0,163	0,064	0,051	0,035	0,031	0,025	1,257	0,918	0,807	13,405	10,271	8,884
Heavy Duty Vehicles	1992	13,464	9,815	8,625	996	726	638	0,163	0,064	0,051	0,035	0,031	0,025	0,817	0,596	0,525	13,402	10,270	8,883
Heavy Duty Vehicles	1993	13,201	9,320	9,494	977	690	703	0,160	0,061	0,056	0,035	0,029	0,027	0,308	0,218	0,222	13,150	9,748	9,781
Heavy Duty Vehicles	1994	10,755	9,713	10,014	796	719	741	0,132	0,064	0,060	0,029	0,031	0,029	0,251	0,227	0,234	10,535	9,983	10,136
Heavy Duty Vehicles	1995	10,632	9,542	10,039	787	706	743	0,132	0,064	0,060	0,029	0,030	0,030	0,248	0,223	0,235	10,237	9,632	9,989
Heavy Duty Vehicles	1996	10,945	9,280	9,946	810	687	736	0,137	0,063	0,060	0,030	0,030	0,030	0,255	0,217	0,233	10,360	9,206	9,722
Heavy Duty Vehicles	1997	11,148	9,393	9,962	825	695	737	0,141	0,065	0,061	0,030	0,030	0,030	0,260	0,220	0,233	10,432	9,183	9,585
Heavy Duty Vehicles	1998	11,114	9,367	9,901	822	693	733	0,143	0,066	0,062	0,030	0,030	0,030	0,260	0,219	0,232	10,270	9,026	9,381
Heavy Duty Vehicles	1999	11,210	9,424	9,893	830	697	732	0,146	0,067	0,063	0,030	0,030	0,030	0,144	0,121	0,127	10,248	8,964	9,244
Heavy Duty Vehicles	2000	11,134	9,363	9,822	824	693	727	0,146	0,067	0,063	0,030	0,030	0,030	0,026	0,022	0,023	10,086	8,810	9,068
Heavy Duty Vehicles	2001	11,400	9,536	9,870	844	706	730	0,153	0,071	0,065	0,030	0,030	0,030	0,027	0,022	0,023	10,184	8,837	8,973
Heavy Duty Vehicles	2002	11,355	9,507	9,815	840	703	726	0,154	0,071	0,065	0,030	0,030	0,030	0,027	0,022	0,023	9,825	8,513	8,618
Heavy Duty Vehicles	2003	11,310	9,476	9,775	837	701	723	0,154	0,071	0,065	0,030	0,030	0,030	0,026	0,022	0,023	9,510	8,226	8,313
Heavy Duty Vehicles	2004	11,173	9,381	9,674	827	694	716	0,154	0,071	0,065	0,030	0,030	0,030	0,026	0,022	0,023	9,045	7,814	7,886
Heavy Duty Vehicles	2005	11,109	9,331	9,620	822	690	712	0,154	0,071	0,065	0,030	0,030	0,030	0,005	0,004	0,005	8,746	7,542	7,605
Buses	1985	13,991	10,503	5,954	1035	777	441	0,186	0,082	0,047	0,032	0,031	0,020	3,277	2,460	1,394	14,555	11,430	6,449
Buses	1986	13,991	10,501	5,955	1035	777	441	0,186	0,082	0,047	0,032	0,031	0,020	1,966	1,476	0,837	14,552	11,425	6,448
Buses	1987	13,992	10,509	5,954	1035	778	441	0,186	0,082	0,047	0,032	0,031	0,020	1,966	1,477	0,837	14,561	11,442	6,452
Buses	1988	13,992	10,522	5,952	1035	779	440	0,186	0,082	0,047	0,032	0,031	0,020	1,966	1,479	0,836	14,575	11,469	6,458
Buses	1989	13,992	10,516	5,953	1035	778	440	0,186	0,082	0,047	0,032	0,031	0,020	1,311	0,985	0,558	14,569	11,457	6,455

Buses	1990	13,991	10,493	5,956	1035	776	441	0,186	0,082	0,047	0,032	0,031	0,020	1,311	0,983	0,558	14,544	11,408	6,444
Buses	1991	13,496	10,905	5,956	999	807	441	0,180	0,085	0,047	0,031	0,032	0,020	1,264	1,022	0,558	14,023	11,865	6,443
Buses	1992	13,908	10,558	5,956	1029	781	441	0,185	0,082	0,047	0,032	0,031	0,020	0,847	0,643	0,363	14,467	11,471	6,444
Buses	1993	13,871	10,273	6,927	1026	760	513	0,185	0,080	0,055	0,032	0,030	0,023	0,325	0,241	0,162	14,385	11,178	7,500
Buses	1994	13,194	10,262	7,822	976	759	579	0,178	0,081	0,062	0,030	0,030	0,027	0,309	0,240	0,183	13,459	10,885	8,301
Buses	1995	12,975	9,788	8,658	960	724	641	0,177	0,079	0,070	0,030	0,030	0,030	0,304	0,229	0,203	12,890	10,097	8,947
Buses	1996	12,605	9,778	8,555	933	724	633	0,175	0,080	0,070	0,030	0,030	0,030	0,295	0,229	0,200	12,202	9,832	8,623
Buses	1997	12,445	9,683	8,486	921	717	628	0,175	0,080	0,070	0,030	0,030	0,030	0,291	0,227	0,199	11,889	9,585	8,429
Buses	1998	12,349	9,632	8,447	914	713	625	0,175	0,080	0,070	0,030	0,030	0,030	0,289	0,226	0,198	11,726	9,459	8,328
Buses	1999	12,234	9,566	8,398	905	708	621	0,175	0,080	0,070	0,030	0,030	0,030	0,158	0,123	0,108	11,511	9,289	8,194
Buses	2000	12,134	9,511	8,357	898	704	618	0,175	0,080	0,070	0,030	0,030	0,030	0,028	0,022	0,020	11,327	9,147	8,080
Buses	2001	12,054	9,465	8,324	892	700	616	0,175	0,080	0,070	0,030	0,030	0,030	0,028	0,022	0,019	11,184	9,033	7,991
Buses	2002	12,011	9,449	8,323	889	699	616	0,175	0,080	0,070	0,030	0,030	0,030	0,028	0,022	0,019	10,907	8,781	7,766
Buses	2003	11,991	9,451	8,332	887	699	617	0,175	0,080	0,070	0,030	0,030	0,030	0,028	0,022	0,020	10,698	8,589	7,587
Buses	2004	11,961	9,432	8,332	885	698	617	0,175	0,080	0,070	0,030	0,030	0,030	0,028	0,022	0,020	10,485	8,387	7,413
Buses	2005	11,921	9,423	8,331	882	697	617	0,175	0,080	0,070	0,030	0,030	0,030	0,006	0,004	0,004	10,245	8,175	7,218
Mopeds	1985	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1986	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1987	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1988	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1989	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1990	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1991	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1992	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1993	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1994	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1995	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1996	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1997	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1998	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	1999	1,095	1,095		80	80		0,219	0,219		0,001	0,001		0,003	0,003		0,020	0,020	
Mopeds	2000	1,050	1,050		77	77		0,219	0,219		0,001	0,001		0,002	0,002		0,020	0,020	
Mopeds	2001	1,019	1,019		74	74		0,219	0,219		0,001	0,001		0,002	0,002		0,020	0,020	
Mopeds	2002	0,985	0,985		72	72		0,219	0,219		0,001	0,001		0,002	0,002		0,020	0,020	
Mopeds	2003	0,969	0,969		71	71		0,219	0,219		0,001	0,001		0,002	0,002		0,020	0,020	
Mopeds	2004	0,940	0,940		69	69		0,219	0,219		0,001	0,001		0,002	0,002		0,035	0,035	

Mopeds	2005	0,893	0,893		65	65		0,219	0,219		0,001	0,001		0,000	0,000		0,055	0,055	
Motorcycles	1985	1,252	1,284	1,916	91	94	140	0,184	0,188	0,234	0,002	0,002	0,002	0,003	0,003	0,004	0,117	0,222	0,412
Motorcycles	1986	1,252	1,284	1,916	91	94	140	0,184	0,188	0,234	0,002	0,002	0,002	0,003	0,003	0,004	0,117	0,222	0,412
Motorcycles	1987	1,252	1,284	1,916	91	94	140	0,184	0,188	0,234	0,002	0,002	0,002	0,003	0,003	0,004	0,117	0,222	0,412
Motorcycles	1988	1,252	1,284	1,916	91	94	140	0,184	0,188	0,234	0,002	0,002	0,002	0,003	0,003	0,004	0,117	0,222	0,412
Motorcycles	1989	1,252	1,284	1,916	91	94	140	0,184	0,188	0,234	0,002	0,002	0,002	0,003	0,003	0,004	0,117	0,222	0,412
Motorcycles	1990	1,252	1,284	1,916	91	94	140	0,184	0,188	0,234	0,002	0,002	0,002	0,003	0,003	0,004	0,117	0,222	0,412
Motorcycles	1991	1,447	1,149	1,578	106	84	115	0,213	0,168	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,135	0,199	0,340
Motorcycles	1992	1,252	1,351	1,690	91	99	123	0,184	0,197	0,206	0,002	0,002	0,002	0,003	0,003	0,004	0,117	0,234	0,364
Motorcycles	1993	1,475	1,149	1,465	108	84	107	0,217	0,168	0,179	0,002	0,002	0,002	0,003	0,003	0,003	0,137	0,199	0,315
Motorcycles	1994	1,308	1,318	1,578	95	96	115	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,122	0,228	0,340
Motorcycles	1995	1,224	1,250	2,141	89	91	156	0,180	0,183	0,261	0,002	0,002	0,003	0,003	0,003	0,005	0,114	0,217	0,461
Motorcycles	1996	1,308	1,318	1,578	95	96	115	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,122	0,228	0,340
Motorcycles	1997	1,308	1,318	1,578	95	96	115	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,122	0,228	0,340
Motorcycles	1998	1,308	1,318	1,578	95	96	115	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,122	0,228	0,340
Motorcycles	1999	1,308	1,318	1,578	95	96	115	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,122	0,228	0,340
Motorcycles	2000	1,312	1,321	1,597	96	96	117	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,129	0,241	0,366
Motorcycles	2001	1,312	1,321	1,597	96	96	117	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,130	0,242	0,368
Motorcycles	2002	1,314	1,321	1,604	96	96	117	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,133	0,248	0,379
Motorcycles	2003	1,316	1,322	1,611	96	97	118	0,193	0,193	0,193	0,002	0,002	0,002	0,003	0,003	0,004	0,136	0,254	0,390
Motorcycles	2004	1,317	1,323	1,618	96	97	118	0,194	0,194	0,194	0,002	0,002	0,002	0,003	0,003	0,004	0,138	0,253	0,393
Motorcycles	2005	1,320	1,325	1,630	96	97	119	0,194	0,194	0,194	0,002	0,002	0,002	0,001	0,001	0,001	0,141	0,257	0,404

Sector	ForecastYear	NMVOCu (exh)	NMVOCr (exh)	NMVOCh (exh)	NMVOCu (tot)	NMVOCr (tot)	NMVOCh (tot)	COu	COr	COh
Passenger Cars	1985	3,720	1,030	0,635	5,982	1,412	0,686	44,336	9,945	7,243
Passenger Cars	1986	3,598	1,007	0,617	5,867	1,391	0,669	41,746	9,442	6,802
Passenger Cars	1987	3,542	0,982	0,596	5,780	1,360	0,646	39,875	8,857	6,325
Passenger Cars	1988	3,258	0,949	0,568	5,573	1,340	0,621	34,696	8,089	5,682
Passenger Cars	1989	3,137	0,929	0,552	5,476	1,325	0,606	32,586	7,689	5,314
Passenger Cars	1990	3,090	0,919	0,543	5,432	1,315	0,596	31,527	7,408	5,039
Passenger Cars	1991	2,999	0,876	0,506	5,141	1,239	0,555	30,874	7,068	4,687
Passenger Cars	1992	2,724	0,818	0,544	4,743	1,159	0,590	27,989	6,617	5,059
Passenger Cars	1993	2,688	0,760	0,506	4,490	1,064	0,547	27,731	6,164	4,730
Passenger Cars	1994	2,383	0,685	0,445	4,010	0,960	0,482	24,316	5,598	4,181
Passenger Cars	1995	2,211	0,617	0,454	3,647	0,860	0,487	22,570	5,127	4,391
Passenger Cars	1996	2,142	0,540	0,454	3,361	0,746	0,481	21,920	4,570	4,522
Passenger Cars	1997	1,794	0,452	0,381	2,863	0,632	0,406	17,835	3,784	3,874
Passenger Cars	1998	1,635	0,388	0,327	2,503	0,534	0,347	16,393	3,325	3,448
Passenger Cars	1999	1,426	0,333	0,281	2,178	0,460	0,298	14,228	2,927	3,084
Passenger Cars	2000	1,296	0,293	0,248	1,800	0,378	0,259	12,978	2,647	2,834
Passenger Cars	2001	1,240	0,262	0,222	1,674	0,335	0,232	12,690	2,450	2,680
Passenger Cars	2002	1,077	0,229	0,196	1,454	0,293	0,204	11,130	2,229	2,494
Passenger Cars	2003	0,993	0,200	0,172	1,313	0,255	0,179	10,490	2,016	2,303
Passenger Cars	2004	0,827	0,171	0,148	1,098	0,217	0,154	8,799	1,797	2,099
Passenger Cars	2005	0,780	0,144	0,124	1,023	0,185	0,130	8,685	1,572	1,879
Light Duty Vehicles	1985	0,725	0,166	0,111	1,019	0,212	0,120	7,207	1,616	1,558
Light Duty Vehicles	1986	0,676	0,160	0,108	0,949	0,203	0,116	6,683	1,563	1,502
Light Duty Vehicles	1987	0,679	0,160	0,108	0,949	0,202	0,116	6,717	1,560	1,498
Light Duty Vehicles	1988	0,636	0,159	0,108	0,914	0,202	0,116	6,290	1,553	1,490
Light Duty Vehicles	1989	0,601	0,155	0,106	0,869	0,197	0,114	5,930	1,521	1,457
Light Duty Vehicles	1990	0,583	0,153	0,105	0,841	0,193	0,112	5,745	1,500	1,434
Light Duty Vehicles	1991	0,611	0,154	0,105	0,868	0,194	0,113	6,019	1,509	1,443
Light Duty Vehicles	1992	0,614	0,158	0,116	0,892	0,201	0,124	6,080	1,545	1,606
Light Duty Vehicles	1993	0,630	0,157	0,116	0,892	0,198	0,123	6,223	1,535	1,594
Light Duty Vehicles	1994	0,553	0,162	0,122	0,808	0,201	0,129	5,464	1,590	1,666
Light Duty Vehicles	1995	0,558	0,159	0,121	0,799	0,197	0,128	5,512	1,520	1,602
Light Duty Vehicles	1996	0,554	0,153	0,126	0,764	0,186	0,132	5,447	1,425	1,616
Light Duty Vehicles	1997	0,502	0,147	0,123	0,696	0,177	0,128	4,926	1,326	1,511

Light Duty Vehicles	1998	0,493	0,143	0,121	0,664	0,170	0,126	4,847	1,250	1,433
Light Duty Vehicles	1999	0,458	0,138	0,117	0,614	0,162	0,122	4,447	1,158	1,333
Light Duty Vehicles	2000	0,430	0,133	0,114	0,539	0,149	0,117	4,159	1,078	1,247
Light Duty Vehicles	2001	0,429	0,128	0,111	0,523	0,142	0,114	4,091	0,998	1,161
Light Duty Vehicles	2002	0,377	0,119	0,105	0,456	0,131	0,107	3,568	0,887	1,039
Light Duty Vehicles	2003	0,344	0,110	0,098	0,406	0,119	0,100	3,158	0,781	0,918
Light Duty Vehicles	2004	0,288	0,101	0,092	0,333	0,107	0,093	2,576	0,661	0,787
Light Duty Vehicles	2005	0,282	0,094	0,087	0,319	0,100	0,088	2,462	0,589	0,707
Heavy Duty Vehicles	1985	1,216	0,664	0,431	1,216	0,664	0,431	3,495	2,156	1,825
Heavy Duty Vehicles	1986	1,213	0,662	0,430	1,213	0,662	0,430	3,460	2,138	1,817
Heavy Duty Vehicles	1987	1,213	0,662	0,430	1,213	0,662	0,430	3,457	2,137	1,816
Heavy Duty Vehicles	1988	1,213	0,662	0,430	1,213	0,662	0,430	3,453	2,134	1,815
Heavy Duty Vehicles	1989	1,211	0,661	0,430	1,211	0,661	0,430	3,432	2,124	1,810
Heavy Duty Vehicles	1990	1,217	0,664	0,430	1,217	0,664	0,430	3,415	2,117	1,805
Heavy Duty Vehicles	1991	1,226	0,678	0,410	1,226	0,678	0,410	3,472	2,166	1,716
Heavy Duty Vehicles	1992	1,229	0,680	0,410	1,229	0,680	0,410	3,497	2,180	1,722
Heavy Duty Vehicles	1993	1,237	0,639	0,454	1,237	0,639	0,454	3,478	2,055	1,899
Heavy Duty Vehicles	1994	0,984	0,657	0,474	0,984	0,657	0,474	2,780	2,111	1,981
Heavy Duty Vehicles	1995	0,945	0,626	0,475	0,945	0,626	0,475	2,719	2,045	1,984
Heavy Duty Vehicles	1996	0,932	0,599	0,463	0,932	0,599	0,463	2,730	1,967	1,942
Heavy Duty Vehicles	1997	0,858	0,557	0,434	0,858	0,557	0,434	2,620	1,900	1,881
Heavy Duty Vehicles	1998	0,799	0,524	0,409	0,799	0,524	0,409	2,545	1,857	1,839
Heavy Duty Vehicles	1999	0,743	0,492	0,386	0,743	0,492	0,386	2,465	1,811	1,797
Heavy Duty Vehicles	2000	0,700	0,467	0,366	0,700	0,467	0,366	2,411	1,778	1,765
Heavy Duty Vehicles	2001	0,649	0,438	0,344	0,649	0,438	0,344	2,408	1,777	1,749
Heavy Duty Vehicles	2002	0,594	0,406	0,320	0,594	0,406	0,320	2,360	1,745	1,715
Heavy Duty Vehicles	2003	0,549	0,379	0,299	0,549	0,379	0,299	2,302	1,707	1,681
Heavy Duty Vehicles	2004	0,485	0,343	0,273	0,485	0,343	0,273	2,200	1,643	1,625
Heavy Duty Vehicles	2005	0,450	0,322	0,256	0,450	0,322	0,256	2,184	1,626	1,605
Buses	1985	1,557	0,876	0,366	1,557	0,876	0,366	4,522	2,742	1,229
Buses	1986	1,556	0,875	0,365	1,556	0,875	0,365	4,520	2,739	1,228
Buses	1987	1,559	0,878	0,367	1,559	0,878	0,367	4,527	2,747	1,231
Buses	1988	1,563	0,882	0,369	1,563	0,882	0,369	4,537	2,758	1,235
Buses	1989	1,561	0,880	0,368	1,561	0,880	0,368	4,533	2,753	1,233
Buses	1990	1,553	0,873	0,364	1,553	0,873	0,364	4,513	2,732	1,226
Buses	1991	1,496	0,909	0,364	1,496	0,909	0,364	4,349	2,845	1,225

Buses	1992	1,547	0,876	0,364	1,547	0,876	0,364	4,494	2,744	1,225
Buses	1993	1,529	0,857	0,425	1,529	0,857	0,425	4,447	2,681	1,428
Buses	1994	1,414	0,816	0,470	1,414	0,816	0,470	4,145	2,570	1,575
Buses	1995	1,312	0,736	0,493	1,312	0,736	0,493	3,891	2,335	1,669
Buses	1996	1,204	0,701	0,465	1,204	0,701	0,465	3,611	2,235	1,587
Buses	1997	1,118	0,658	0,441	1,118	0,658	0,441	3,436	2,137	1,528
Buses	1998	1,063	0,630	0,424	1,063	0,630	0,424	3,332	2,080	1,492
Buses	1999	1,000	0,598	0,406	1,000	0,598	0,406	3,206	2,009	1,450
Buses	2000	0,945	0,570	0,390	0,945	0,570	0,390	3,098	1,949	1,413
Buses	2001	0,901	0,547	0,376	0,901	0,547	0,376	3,011	1,900	1,384
Buses	2002	0,847	0,519	0,360	0,847	0,519	0,360	2,932	1,856	1,359
Buses	2003	0,807	0,499	0,349	0,807	0,499	0,349	2,882	1,830	1,345
Buses	2004	0,768	0,477	0,337	0,768	0,477	0,337	2,822	1,794	1,327
Buses	2005	0,720	0,453	0,323	0,720	0,453	0,323	2,753	1,758	1,305
Mopeds	1985	13,691	13,691		14,014	14,014		13,800	13,800	
Mopeds	1986	13,691	13,691		14,022	14,022		13,800	13,800	
Mopeds	1987	13,691	13,691		14,020	14,020		13,800	13,800	
Mopeds	1988	13,691	13,691		14,043	14,043		13,800	13,800	
Mopeds	1989	13,691	13,691		14,057	14,057		13,800	13,800	
Mopeds	1990	13,691	13,691		14,049	14,049		13,800	13,800	
Mopeds	1991	13,691	13,691		14,032	14,032		13,800	13,800	
Mopeds	1992	13,691	13,691		14,035	14,035		13,800	13,800	
Mopeds	1993	13,691	13,691		14,017	14,017		13,800	13,800	
Mopeds	1994	13,691	13,691		14,034	14,034		13,800	13,800	
Mopeds	1995	13,691	13,691		14,029	14,029		13,800	13,800	
Mopeds	1996	13,691	13,691		14,013	14,013		13,800	13,800	
Mopeds	1997	13,691	13,691		14,031	14,031		13,800	13,800	
Mopeds	1998	13,691	13,691		14,015	14,015		13,800	13,800	
Mopeds	1999	13,691	13,691		14,053	14,053		13,800	13,800	
Mopeds	2000	12,546	12,546		12,847	12,847		12,960	12,960	
Mopeds	2001	11,743	11,743		12,075	12,075		12,371	12,371	
Mopeds	2002	10,893	10,893		11,236	11,236		11,748	11,748	
Mopeds	2003	10,470	10,470		10,812	10,812		11,437	11,437	
Mopeds	2004	9,864	9,864		10,207	10,207		10,776	10,776	
Mopeds	2005	8,847	8,847		9,221	9,221		9,743	9,743	
Motorcycles	1985	2,526	1,963	2,442	3,360	2,186	2,476	19,177	21,616	33,899

Motorcycles	1986	2,526	1,963	2,442	3,369	2,188	2,477	19,177	21,616	33,899
Motorcycles	1987	2,526	1,963	2,442	3,364	2,187	2,477	19,177	21,616	33,899
Motorcycles	1988	2,526	1,963	2,442	3,401	2,197	2,478	19,177	21,616	33,899
Motorcycles	1989	2,526	1,963	2,442	3,422	2,203	2,479	19,177	21,616	33,899
Motorcycles	1990	2,526	1,963	2,442	3,414	2,200	2,479	19,177	21,616	33,899
Motorcycles	1991	2,919	1,756	2,011	3,788	1,989	2,047	22,160	19,341	27,917
Motorcycles	1992	2,526	2,066	2,155	3,404	2,301	2,191	19,177	22,754	29,911
Motorcycles	1993	2,975	1,756	1,867	3,817	1,981	1,902	22,586	19,341	25,923
Motorcycles	1994	2,639	2,014	2,011	3,515	2,249	2,047	20,029	22,185	27,917
Motorcycles	1995	2,470	1,911	2,729	3,336	2,143	2,765	18,751	21,047	37,887
Motorcycles	1996	2,639	2,014	2,011	3,474	2,238	2,046	20,029	22,185	27,917
Motorcycles	1997	2,639	2,014	2,011	3,513	2,249	2,047	20,029	22,185	27,917
Motorcycles	1998	2,639	2,014	2,011	3,482	2,240	2,046	20,029	22,185	27,917
Motorcycles	1999	2,639	2,014	2,011	3,513	2,249	2,047	20,029	22,185	27,917
Motorcycles	2000	2,603	1,995	1,995	3,293	2,180	2,023	19,468	21,623	27,259
Motorcycles	2001	2,564	1,958	1,958	3,245	2,140	1,986	19,445	21,600	27,257
Motorcycles	2002	2,511	1,913	1,915	3,206	2,099	1,944	19,204	21,360	27,001
Motorcycles	2003	2,459	1,869	1,873	3,150	2,054	1,902	18,978	21,134	26,761
Motorcycles	2004	2,405	1,817	1,822	3,108	2,005	1,851	18,614	20,684	26,249
Motorcycles	2005	2,343	1,763	1,770	3,089	1,962	1,801	18,150	20,155	25,645

Annex 2B-7: Fuel use (GJ) and emissions (tons) per vehicle category and as totals

Year	Sector	FC (PJ)	SO_2	NO_X	NMVOC	CH_4	CO	CO_2	N_2O	NH_3	TSP
1985	Passenger Cars	64	1329	52346	70371	2008	525727	4682	172	47	1498
1986	Passenger Cars	65	886	53162	70241	2015	504281	4725	176	47	1485
1987	Passenger Cars	65	925	53748	69964	2052	485545	4765	181	48	1484
1988	Passenger Cars	66	955	54929	69784	2023	440400	4832	187	49	1458
1989	Passenger Cars	65	692	54535	68330	1978	412698	4780	187	49	1422
1990	Passenger Cars	69	707	58055	71779	2094	422023	5048	196	52	1451
1991	Passenger Cars	73	726	58482	72150	2274	435812	5357	261	222	1432
1992	Passenger Cars	77	535	58941	71073	2332	425441	5618	329	408	1374
1993	Passenger Cars	77	306	55712	66647	2414	413704	5610	381	564	1302
1994	Passenger Cars	78	309	51350	60681	2385	372221	5665	469	837	1161
1995	Passenger Cars	82	322	50589	58396	2536	367057	5974	560	1110	1100
1996	Passenger Cars	83	328	47804	54270	2694	358224	6099	638	1347	1023
1997	Passenger Cars	85	333	44196	47989	2544	305436	6248	742	1658	879
1998	Passenger Cars	87	344	40359	42539	2519	283713	6380	825	1902	793
1999	Passenger Cars	88	283	36670	37264	2336	249998	6424	889	2068	748
2000	Passenger Cars	88	200	33649	30804	2221	227374	6401	927	2159	718
2001	Passenger Cars	87	199	30903	27919	2136	216357	6343	943	2186	709
2002	Passenger Cars	88	201	28718	24703	1936	195291	6429	988	2275	696
2003	Passenger Cars	89	204	26640	22332	1845	184148	6508	1020	2328	703
2004	Passenger Cars	90	206	24677	19083	1612	160029	6573	1058	2363	710
2005	Passenger Cars	89	41	22265	17197	1548	151465	6507	1062	2323	727
1985	Light Duty Vehicles	14	2819	6499	2055	187	15242	1037	66	5	1505
1986	Light Duty Vehicles	16	1920	7182	2164	202	16054	1161	75	5	1688
1987	Light Duty Vehicles	16	1973	7367	2216	208	16506	1191	77	6	1745
1988	Light Duty Vehicles	17	2034	7551	2234	204	16308	1226	79	6	1735
1989	Light Duty Vehicles	17	1419	7765	2223	205	16176	1272	83	6	1789
1990	Light Duty Vehicles	19	1552	8403	2350	219	17160	1384	91	6	1949
1991	Light Duty Vehicles	19	1606	8749	2488	235	18340	1436	94	7	2063
1992	Light Duty Vehicles	19	1030	8728	2561	232	18644	1425	93	7	2009
1993	Light Duty Vehicles	20	412	8962	2611	244	19359	1465	95	7	2115
1994	Light Duty Vehicles	21	449	9456	2669	247	19600	1584	104	7	2292
1995	Light Duty Vehicles	21	442	9290	2622	241	19348	1570	105	13	2144
1996	Light Duty Vehicles	22	451	9302	2569	242	19331	1601	110	19	2109

1997	Light Duty Vehicles	22	456	9235	2434	225	18089	1621	114	25	1940
1998	Light Duty Vehicles	22	461	9251	2377	221	17923	1645	118	32	1829
1999	Light Duty Vehicles	22	259	9149	2258	205	16780	1660	122	37	1710
2000	Light Duty Vehicles	23	53	9159	2073	193	16090	1692	126	43	1611
2001	Light Duty Vehicles	23	54	9175	2042	189	15842	1724	130	49	1553
2002	Light Duty Vehicles	24	57	9053	1902	170	14579	1789	138	55	1425
2003	Light Duty Vehicles	27	62	9500	1892	166	14274	1971	154	61	1450
2004	Light Duty Vehicles	29	67	9726	1766	145	12946	2132	171	70	1306
2005	Light Duty Vehicles	32	15	10228	1841	144	13292	2339	188	78	1321
1985	Heavy Duty Vehicles	32	7471	33089	2418	276	7751	2366	90	9	1365
1986	Heavy Duty Vehicles	36	5054	37292	2713	310	8668	2667	102	10	1537
1987	Heavy Duty Vehicles	35	4947	36512	2659	304	8488	2610	100	10	1505
1988	Heavy Duty Vehicles	35	4866	35925	2623	299	8362	2567	98	10	1482
1989	Heavy Duty Vehicles	36	3375	37364	2723	311	8661	2670	102	10	1541
1990	Heavy Duty Vehicles	37	3506	38800	2860	325	9042	2774	107	11	1606
1991	Heavy Duty Vehicles	38	3569	39502	2907	331	9197	2825	109	11	1634
1992	Heavy Duty Vehicles	37	2253	38354	2828	322	8972	2743	105	11	1587
1993	Heavy Duty Vehicles	36	844	37335	2753	314	8739	2670	103	10	1546
1994	Heavy Duty Vehicles	38	899	39150	2819	328	9061	2846	112	11	1609
1995	Heavy Duty Vehicles	39	914	39001	2766	337	9014	2892	115	11	1600
1996	Heavy Duty Vehicles	40	939	39314	2755	352	9060	2972	119	12	1612
1997	Heavy Duty Vehicles	41	952	39266	2575	361	8772	3011	120	12	1545
1998	Heavy Duty Vehicles	41	960	39105	2452	367	8646	3037	122	12	1481
1999	Heavy Duty Vehicles	42	543	39718	2353	380	8602	3123	125	13	1444
2000	Heavy Duty Vehicles	41	95	37785	2158	368	8142	3002	121	12	1322
2001	Heavy Duty Vehicles	41	96	37669	2019	377	8045	3033	121	12	1266
2002	Heavy Duty Vehicles	40	95	36030	1862	376	7811	2994	120	12	1168
2003	Heavy Duty Vehicles	43	100	37118	1859	400	8137	3173	128	13	1163
2004	Heavy Duty Vehicles	44	103	36622	1756	412	8112	3245	132	13	1093
2005	Heavy Duty Vehicles	44	20	35452	1647	412	8006	3231	132	13	1019
1985	2-wheelers	1	2	56	5131	117	9901	50	1	1	71
1986	2-wheelers	1	1	55	4640	109	9375	47	1	1	65
1987	2-wheelers	1	1	53	4301	103	8893	44	1	1	60
1988	2-wheelers	1	1	53	4108	100	8758	44	1	1	57
1989	2-wheelers	1	1	52	3924	97	8495	42	1	1	55
1990	2-wheelers	1	1	56	4026	101	8937	44	1	1	56
1991	2-wheelers	1	1	55	4155	104	9141	45	1	1	58

1992	2-wheelers	1	1	61	4208	108	9597	47	1	1	59
1993	2-wheelers	1	1	58	4077	106	9497	47	1	1	57
1994	2-wheelers	1	1	63	3982	107	9666	47	1	1	56
1995	2-wheelers	1	2	71	4413	117	10678	52	1	1	62
1996	2-wheelers	1	2	72	4741	125	11303	56	1	1	67
1997	2-wheelers	1	2	79	5200	138	12403	61	1	1	73
1998	2-wheelers	1	2	86	5586	148	13389	66	1	1	79
1999	2-wheelers	1	2	91	5265	147	13588	66	1	1	75
2000	2-wheelers	1	2	102	4760	150	13572	67	1	1	70
2001	2-wheelers	1	2	107	3979	144	13364	66	1	1	60
2002	2-wheelers	1	2	117	3966	153	13927	69	1	1	61
2003	2-wheelers	1	2	127	3863	158	14310	72	1	1	60
2004	2-wheelers	1	2	80	5507	142	12709	63	1	1	77
2005	2-wheelers	1	2	85	5179	142	12977	63	1	1	73
1985	Total	111	11620	91991	79975	2589	558621	8135	329	61	4440
1986	Total	117	7862	97690	79758	2636	538378	8600	354	64	4775
1987	Total	117	7846	97680	79141	2667	519432	8611	358	64	4793
1988	Total	118	7857	98458	78749	2626	473828	8669	365	66	4732
1989	Total	119	5487	99716	77199	2591	446031	8764	373	66	4807
1990	Total	126	5766	105313	81015	2739	457162	9250	394	70	5062
1991	Total	132	5902	106787	81701	2944	472489	9663	464	241	5187
1992	Total	134	3819	106083	80670	2994	462655	9833	528	426	5030
1993	Total	133	1562	102067	76088	3078	451299	9793	579	582	5020
1994	Total	138	1659	100019	70151	3068	410548	10142	686	856	5119
1995	Total	143	1679	98950	68198	3232	406097	10488	781	1136	4906
1996	Total	146	1720	96492	64334	3414	397918	10729	868	1380	4810
1997	Total	149	1743	92777	58199	3267	344700	10941	978	1697	4436
1998	Total	152	1766	88801	52954	3255	323670	11128	1066	1948	4182
1999	Total	153	1087	85628	47138	3068	288968	11273	1137	2119	3977
2000	Total	152	351	80695	39795	2933	265177	11162	1176	2215	3721
2001	Total	152	351	77854	35959	2846	253608	11165	1196	2247	3589
2002	Total	154	355	73918	32434	2634	231607	11280	1247	2344	3349
2003	Total	160	369	73385	29946	2568	220869	11723	1303	2404	3375
2004	Total	163	378	71105	28112	2311	193795	12012	1362	2447	3187
2005	Total	165	78	68031	25863	2246	185740	12140	1384	2415	3140

Annex 2B-8: COPERT IV:DEA statistics fuel use ratios and mileage adjustment factors

Sales			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Fuel ratio	Gasoline	DEA:COPERT IV	0,93	0,90	0,86	0,85	0,83	0,87	0,91	0,95	0,95	0,94	0,97	0,97	0,99	0,99	0,97	0,97	0,96	0,97	0,95	0,93	0,93
	Diesel (fuel ratio)	DEA:COPERT IV	1,20	1,27	1,23	1,23	1,27	1,37	1,41	1,38	1,39	1,49	1,47	1,48	1,49	1,47	1,44	1,39	1,35	1,35	1,41	1,42	1,40
Mileage factor	Gasoline	DEA:COPERT IV	0,93	0,90	0,86	0,85	0,83	0,87	0,91	0,95	0,95	0,94	0,97	0,97	0,99	0,99	0,97	0,97	0,96	0,97	0,95	0,93	0,93
	Diesel (mileage factor)	DEA:COPERT IV	1,23	1,31	1,27	1,27	1,31	1,43	1,47	1,44	1,45	1,58	1,55	1,57	1,57	1,55	1,52	1,47	1,43	1,44	1,53	1,56	1,54
Consumption																							
Fuel ratio	Gasoline	DEA:COPERT IV	0,97	0,97	0,95	0,97	0,96	0,96	0,95	0,96	0,96	0,97	0,98	0,97	1,00	1,00	1,01	1,02	1,00	0,99	0,97	0,95	0,95
	Diesel (fuel ratio)	DEA:COPERT IV	1,12	1,15	1,12	1,11	1,15	1,25	1,34	1,32	1,32	1,38	1,35	1,35	1,36	1,34	1,32	1,29	1,26	1,24	1,27	1,27	1,30
Mileage factor	Gasoline	DEA:COPERT IV	0,97	0,97	0,95	0,97	0,96	0,96	0,95	0,96	0,96	0,97	0,98	0,97	1,00	1,00	1,01	1,02	1,00	0,99	0,97	0,95	0,95
	Diesel (mileage factor)	DEA:COPERT IV	1,14	1,17	1,13	1,13	1,17	1,30	1,40	1,37	1,38	1,44	1,40	1,42	1,42	1,40	1,38	1,35	1,32	1,30	1,35	1,36	1,40

Annex 2B-9: Basis fuel use and emission factors, deterioration factors, transient factors and specific operational 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/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/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/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 use and emission factors LPG fork lifts

NO_x [g/kWh]	VOC [g/kWh]	CO [g/kWh]	NH_3 [g/kWh]	N_2O [g/kWh]	TSP [g/kWh]	FC [g/kWh]
19	2.2	1.5	0.003	0.05	0.07	311

Fuel use and emission factors for All Terrain Vehicles (ATV's)

ATV type	NO_x [g/GJ]	VOC [g/GJ]	CO [g/GJ]	NH_3 [g/GJ]	N_2O [g/GJ]	TSP [g/GJ]	Fuel [kg/hour]
Professional	108	1077	16306	2	2	32	1.125
Private	128	1527	22043	2	2	39	0.75

Fuel use 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/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/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/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 tons)	0.5	10	1200	20
Wheel loaders (> 5,1 tons)	0.5	10	1200	120
Wheel type excavators	0.6	10	1200	100
Track type excavators (0-5 tons)	0.6	10	1100	20
Track type excavators (>5,1 tons)	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

Annex 2B-10: Stock data for non-road working machinery and equipment

Stock data for diesel tractors 1985-2004

Size (kW)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
37	<1981	3882	3792	3542	3543	3403	3234	3106	2922	2861	2610	2605	2273	2193	1918	1796	1601	1449	1298	1148	993	833
37	1981-1990	635	731	760	835	855	879	889	883	915	887	945	883	918	869	888	871	876	882	892	900	906
37	1991-Stage I							25	107	153	201	278	354	445	496	554	568	572	576	582	587	592
37	Stage I																	33	56	83	84	84
37	Stage II																				23	53
45	<1981	25988	25387	23709	23718	22781	21650	20796	19563	19154	17475	17441	15219	14684	12840	12025	10715	9700	8690	7685	6646	5577
45	1981-1990	5740	6808	7263	8075	8476	8770	8867	8805	9128	8848	9419	8807	9151	8668	8856	8681	8731	8800	8894	8974	9037
45	1991-Stage I							203	202	209	203	216	202	210	199	203	199	200	202	204	206	207
49	1991-Stage I								154	281	485	602	618	702	749	765	750	754	760	768	775	780
52	1991-Stage I															247	358	360	363	367	370	373
52	Stage I																	132	242	377	381	383
52	Stage II																				68	147
56	1991-Stage I								201	338	428	747	943	1181	1280	1307	1281	1289	1299	1313	1325	1334
60	<1981	54651	53387	49857	49877	47907	45529	43732	41140	40278	36747	36676	32004	30879	27001	25287	22533	20397	18273	16162	13976	11729
60	1981-1990	11751	14613	15795	17797	19395	20542	20770	20624	21380	20725	22063	20628	21434	20304	20744	20333	20451	20612	20834	21019	21167
60	1991-Stage I							863	857	888	861	917	857	891	844	862	845	850	856	866	873	879
63	1991-Stage I								468	855	1325	2014	2384	2837	3011	3076	3015	3033	3057	3090	3117	3139
67	1991-Stage I															671	1343	1351	1361	1376	1388	1398
67	Stage I																	533	835	1113	1123	1131
67	Stage II																				375	729
71	1991-Stage I								411	715	1179	1949	2507	3344	3594	3672	3600	3620	3649	3688	3721	3747
78	<1981	14558	14221	13281	13286	12761	12128	11649	10959	10729	9789	9770	8525	8226	7192	6736	6002	5433	4868	4305	3723	3124
78	1981-1990	4592	6152	7196	8559	10026	11323	11448	11368	11785	11424	12162	11371	11815	11192	11434	11208	11273	11361	11484	11586	11667
78	1991-Stage I							1233	1503	1713	1945	2429	2561	2946	2994	3287	3436	3727	3756	3797	3830	3857
78	Stage I																		325	329	332	334
78	Stage II																			227	310	400
86	1991-Stage I								108	193	333	589	880	1364	1532	1718	1876	2023	2039	2061	2079	2094
86	Stage I																		134	136	137	138
86	Stage II																			91	343	530
93	1991-Stage I															149	245	325	327	331	334	336
93	Stage I																		114	115	116	117

93	Stage II																			107	186	313
97	1991-Stage I								71	175	443	962	1556	2327	2638	2695	2642	2657	2678	2707	2731	2750
101	<1981	4659	4551	4250	4252	4084	3881	3728	3507	3433	3132	3126	2728	2632	2302	2156	1921	1739	1558	1378	1191	1000
101	1981-1990	1158	1434	1618	1921	2156	2377	2403	2387	2474	2398	2553	2387	2480	2350	2400	2353	2367	2385	2411	2432	2449
101	1991-Stage I							266	264	274	266	283	264	275	260	696	1116	1567	1579	1596	1611	1622
101	Stage I																		232	234	236	238
101	Stage II																			136	357	635
112	1991-Stage I								63	114	166	252	422	690	790	978	1265	1626	1639	1656	1671	1683
112	Stage I																		465	470	474	478
112	Stage II																			337	732	1170
127	1991-Stage I								12	36	81	193	279	408	457	590	707	847	854	863	871	877
127	Stage I																		152	154	155	156
127	Stage II																			78	268	453
131	<1981	798	780	728	728	700	665	639	601	588	537	536	467	451	394	369	329	298	267	236	204	171
131	1981-1990	288	421	500	651	753	887	897	890	923	895	952	890	925	876	895	878	883	890	899	907	914
131	1991-Stage I							97	97	100	97	103	97	100	95	97	95	96	96	97	98	99
157	1981-1990		2	3	6	11	15	15	15	16	15	16	15	16	15	15	15	15	15	15	16	16
157	1991-Stage I							9	23	39	102	232	357	545	648	784	900	905	912	922	930	937
157	Stage I																	89	89	90	91	92
157	Stage II																		149	415	695	1089
186	1991-Stage I															23	53	54	54	55	55	56
186	Stage I																	47	48	48	49	49
186	Stage II																		68	207	320	481

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	2000	2001	2002	2003	2004	2005
Certified	<1981	13176	12541	11906	11270	10635	10000	9053	8148	7285	6465	5687	4951	4258	3607	2998	2432	1908	1427	987	591	236
Non certified	<1981	26352	25082	23811	22541	21270	20000	19042	18041	16998	15913	14785	13616	12403	11149	9852	8512	7131	5707	4240	2732	1180

Stock data for harvesters 1985-2005

Size Group	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
0<S<=50	<1981	26601	24394	22599	22144	19842	18915	17241	15607	14575	12673	10700	9491	6966	5446	3589	2873	1828	1236	718	251	
0<S<=50	1981-1990	519	534	550	582	566	591	594	601	635	636	633	683	641	686	672	715	748	754	777	826	840
50<S<=60	<1981	2703	2648	2634	2785	2711	2828	2847	2876	3040	3044	3029	3271	3068	2930	2235	1999	1549	1222	854	366	
50<S<=60	1981-1990	853	1102	1164	1275	1258	1333	1341	1355	1432	1434	1427	1541	1446	1548	1516	1612	1687	1702	1752	1863	1894
50<S<=60	1991-Stage I							8	8	8	8	8	9	9	9	9	10	10	10	10	11	11
60<S<=70	<1981	1786	1750	1741	1841	1792	1869	1881	1901	2009	2012	2002	2162	2028	2171	2127	2073	1626	1299	934	451	
60<S<=70	1981-1990	1138	1679	1943	2237	2213	2348	2363	2388	2524	2527	2515	2716	2547	2727	2671	2841	2973	2999	3087	3282	3338
60<S<=70	1991-Stage I							8	16	18	21	22	24	23	24	24	25	26	27	27	29	30
70<S<=80	<1981	929	910	905	958	932	972	979	989	1045	1046	1041	1125	1055	1129	1106	1176	1231	1071	699	202	
70<S<=80	1981-1990	383	699	1026	1165	1318	1493	1502	1518	1604	1606	1598	1726	1619	1733	1698	1806	1890	1906	1963	2086	2122
70<S<=80	1991-Stage I							72	77	83	86	87	96	91	98	96	102	107	108	111	118	120
70<S<=80	Stage I															1	1	1	1	1	1	1
80<S<=90	<1981	323	317	315	333	324	338	340	344	363	364	362	391	367	393	385	409	428	432	445	202	
80<S<=90	1981-1990	383	562	645	967	1107	1466	1475	1491	1575	1577	1570	1695	1590	1702	1667	1773	1856	1872	1927	2049	2083
80<S<=90	1991-Stage I							61	158	181	200	200	217	207	222	217	231	242	244	251	267	272
80<S<=90	Stage I															1	1	1	1	1	1	1
90<S<=100	1981-1990	89	175	235	387	515	670	674	681	720	721	717	775	726	778	762	810	848	855	881	936	952
90<S<=100	1991-Stage I							180	257	320	329	351	382	367	393	385	410	429	433	445	473	481
90<S<=100	Stage I															1	1	1	1	1	1	1
100<S<=120	1981-1990		54	106	219	334	589	592	599	633	634	630	681	639	684	670	712	745	752	774	823	837
100<S<=120	1991-Stage I							129	253	316	375	440	567	586	673	660	702	734	740	762	811	824
100<S<=120	Stage I															2	2	2	2	2	3	3
120<S<=140	1981-1990				4	69	183	184	186	197	197	196	212	199	213	208	222	232	234	241	256	260
120<S<=140	1991-Stage I							70	148	189	215	319	484	626	804	860	918	964	972	1001	1064	1082
120<S<=140	Stage I															21	26	30	31	32	34	34
120<S<=140	Stage II																				3	3
140<S<=160	1991-Stage I								8	36	69	112	271	354	554	632	715	784	791	814	866	880
140<S<=160	Stage II																		22	38	50	57
160<S<=180	1991-Stage I											26	69	200	374	440	534	594	599	617	655	666

160<S<=180	Stage II																			44	76	95	107
180<S<=200	1991-Stage I													20	67	117	193	249	296	299	308	327	333
180<S<=200	Stage II																			66	99	120	132
200<S<=220	1991-Stage I															45	92	143	185	186	192	204	207
200<S<=220	Stage II																			44	76	95	107
220<S<=240	1991-Stage I																3	48	149	150	154	164	167
220<S<=240	Stage II																			78	124	170	220
240<S<=260	1991-Stage I																3	71	140	141	145	154	157
240<S<=260	Stage II																			78	137	207	295
260<S<=280	1991-Stage I																14	61	129	130	134	142	145
260<S<=280	Stage II																			78	137	207	295
280<S<=300	1991-Stage I																		33	33	34	36	37
280<S<=300	Stage II																			78	137	207	295
300<S<=320	Stage II																				28	61	104

Stock data for fork lifts 1985-2005

Fuel type	Size (kW)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Diesel	35	<1981	387	361	336	311	285	260	234	209	183	158	133	107	84	58	30						
Diesel	35	1981-1990	120	162	202	239	270	297	297	297	297	297	297	297	297	297	297	297	277	249	232	198	177
Diesel	35	1991-Stage I							26	49	65	93	131	168	218	247	275	304	304	304	304	304	304
Diesel	35	Stage II																	23	53	75	89	117
Diesel	45	<1981	1612	1506	1400	1294	1188	1082	976	870	764	658	552	446	349	243	126						
Diesel	45	1981-1990	499	674	839	994	1122	1233	1233	1233	1233	1233	1233	1233	1233	1233	1233	1233	1151	1036	964	820	734
Diesel	45	1991-Stage I							108	203	270	386	544	699	905	1063	1063	1063	1063	1063	1063	1063	1063
Diesel	45	Stage I															151	303	422	524	664	664	664
Diesel	45	Stage II																				104	232
Diesel	50	<1981	2173	2031	1888	1745	1602	1459	1316	1174	1031	888	745	602	471	328	170						
Diesel	50	1981-1990	673	909	1131	1340	1512	1662	1662	1662	1662	1662	1662	1662	1662	1662	1662	1662	1551	1396	1299	1105	989
Diesel	50	1991-Stage I							145	273	363	519	732	940	1217	1469	1469	1469	1469	1469	1469	1469	1469
Diesel	50	Stage I															240	461	682	897	1135	1135	1135
Diesel	50	Stage II																				187	447
Diesel	75	<1981	497	465	432	399	367	334	301	269	236	203	170	138	108	75	39						
Diesel	75	1981-1990	154	208	259	307	347	382	382	382	382	382	382	382	382	382	382	382	357	321	299	255	228
Diesel	75	1991-Stage I							33	63	84	120	169	217	281	354	354	354	354	354	354	354	354
Diesel	75	Stage I															70	162	234	311	311	311	311
Diesel	75	Stage II																			58	129	208
Diesel	120	<1981	111	103	96	89	81	74	67	60	52	45	38	31	24	17	9						
Diesel	120	1981-1990	34	46	57	68	77	85	85	85	85	85	85	85	85	85	85	85	80	72	67	57	51
Diesel	120	1991-Stage I							7	14	19	27	38	49	63	97	97	97	97	97	97	97	97
Diesel	120	Stage I															32	71	89	118	118	118	118
Diesel	120	Stage II																			16	38	58
LPG	33		5420	5427	5390	5323	5265	5215	5156	5068	4947	4863	4835	4792	4732	4765	4712	4718	4677	4655	4595	4494	4345
LPG	40		4917	4923	4889	4828	4775	4730	4676	4596	4486	4410	4384	4344	4289	4295	4223	4218	4214	4244	4224	4166	4116
LPG	50		2149	2151	2137	2110	2087	2067	2044	2008	1960	1926	1915	1897	1874	1926	1941	1897	1938	2003	2020	2018	2029
LPG	78		97	97	96	95	94	93	92	91	89	88	88	87	86	90	92	88	95	98	99	104	104
LPG	120															1	2	2	2	3	3	3	3

Stock data for construction machinery 1985-2005

EquipmentName (Eng)	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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	206	201	177	154	132	128
Track type dozers	Stage II																		20	38	56	86
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	91	91	81	71	62	61
Track type loaders	Stage II																		9	18	26	40
Wheel loaders (0-5 tons)	1981-1990							186	331	434	496	517	496	434	331	186						
Wheel loaders (0-5 tons)	1991-Stage I							21	83	186	331	517	744	1013	1323	1674	2067	2046	1984	1881	1736	1444
Wheel loaders (0-5 tons)	Stage II																	227	496	806	1158	1444
Wheel loaders (> 5,1 tons)	<1981	1250	1000	750	500	250																
Wheel loaders (> 5,1 tons)	1981-1990	1250	1500	1750	2000	2250	2500	2228	1960	1698	1441	1188	941	698	460	228						
Wheel loaders (> 5,1 tons)	1991-Stage I							248	490	728	960	1188	1411	1629	1841	1822	1802	1559	1322	1089	861	677
Wheel loaders (> 5,1 tons)	Stage I															228	450	668	881	871	861	902
Wheel loaders (> 5,1 tons)	Stage II																			218	431	677
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	459	372	293	223	162	118
Wheel type excavators	Stage I															62	115	160	196	179	162	157
Wheel type excavators	Stage II																			45	81	118
Track type excavators (0-5 t)	1981-1990							459	816	1071	1224	1275	1224	1071	816	459						
Track type excavators (0-5 t)	1991-Stage I							51	204	459	816	1275	1837	2500	3265	4132	5101	5050	4897	4642	4285	3889
Track type excavators (0-5 t)	Stage II																	561	1224	1990	2857	3889
Track type excavators (> 5,1 t)	<1981	1000	800	600	400	200																
Track type excavators (> 5,1 t)	1981-1990	1000	1200	1400	1600	1800	2000	1798	1596	1394	1194	993	794	594	396	198						
Track type excavators (> 5,1 t)	1991-Stage I							200	399	598	796	993	1190	1387	1583	1581	1579	1380	1181	983	785	683
Track type excavators (> 5,1 t)	Stage I															198	395	591	787	786	785	910
Track type excavators (> 5,1 t)	Stage II																			197	393	683
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	3599	3170	2735	2295	1848	1370
Excavators/Loaders	Stage I															447	900	1359	1824	2295	2310	2283
Excavators/Loaders	Stage II																				462	913
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	745	682	611	530	442	385
Dump trucks	Stage I															89	186	292	407	530	552	642
Dump trucks	Stage II																				110	257
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	1273	990	684	354		
Mini loaders	1991-Stage I							212	447	706	989	1296	1626	1980	2357	2758	3183	3301	3419	3537	3656	2756
Mini loaders	Stage II																	330	684	1061	1462	1531
Telescopic loaders	1981-1990											149	265	348	398	414	398	348	265	149		
Telescopic loaders	1991-Stage I											83	199	348	530	746	994	1160	1326	1491	1657	1740
Telescopic loaders	Stage II																	116	265	447	663	966

Stock data for machine pools 1985-2004

Name	FuelCode	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Tractors	205B	<1981	1236	627																		
Tractors	205B	1981-1990	3091	3763	4575	4515	4370	4100	3643	2808	2368	1786	1214	604								
Tractors	205B	1991-Stage I							607	1123	1776	2382	3035	3624	4324	4210	4336	3956	4069	3323	2566	2053
Tractors	205B	Stage I																		554	513	513
Tractors	205B	Stage II																			513	1027
Harvesters	205B	<1981	969	776	661	472	287	139														
Harvesters	205B	1981-1990	807	932	1157	1257	1294	1385	1385	1197	927	794	712	512	421	282	162	78				
Harvesters	205B	1991-Stage I							139	266	348	454	593	615	737	751	729	778	779	651	531	472
Harvesters	205B	Stage II																		65	118	177
Self-propelled vehicles	205B	1981-1990									72	61	38									
Self-propelled vehicles	205B	1991-Stage I									72	122	190	263	278	277	295	289	314	237	203	153
Self-propelled vehicles	205B	Stage II																		47	102	153

Stock data for household and gardening 1985-2004

Name	Emission Level	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Lawn movers (private)	<1981	253125	168750	84375																	
Lawn movers (private)	1981-1990	421875	506250	590625	675000	675000	675000	590625	506250	421875	337500	253125	168750	84375							
Lawn movers (private)	1991-Stage I							84375	168750	253125	337500	421875	506250	590625	675000	675000	675000	675000	675000	675000	675000
Lawn movers (professional)	1981-1990	25000	25000	25000	25000	25000	25000	18750	12500	6250											
Lawn movers (professional)	1991-Stage I							6250	12500	18750	25000	25000	25000	25000	25000	25000	25000	25000	25000	25000	25000
Cultivators (private-large)	1981-1990	110000	110000	110000	110000	110000	110000	88000	66000	44000	22000										
Cultivators (private-large)	1991-Stage I							22000	44000	66000	88000	110000	110000	110000	110000	110000	110000	110000	110000	110000	110000
Cultivators (private-small)	<1981	6667	6000	5333	4667	4000	3333	2667	2000	1333	667										
Cultivators (private-small)	1981-1990	3333	4000	4667	5333	6000	6667	6667	6667	6667	6667	6667	6000	5333	4667	4000	3333	2667	2000	1333	667
Cultivators (private-small)	1991-Stage I							667	1333	2000	2667	3333	4000	4667	5333	6000	6667	7333	8000	8667	9333
Cultivators (professional)	<1981	3750	2500	1250																	
Cultivators (professional)	1981-1990	6250	7500	8750	10000	10000	10000	8750	7500	6250	5000	3750	2500	1250							
Cultivators (professional)	1991-Stage I							1250	2500	3750	5000	6250	7500	8750	10000	10000	10000	10000	10000	10000	10000
Chain saws (private)	<1981	125000	100000	75000	50000	25000															
Chain saws (private)	1981-1990	125000	150000	175000	200000	225000	250000	227250	204000	180250	156000	131250	106000	80250	54000	27250					
Chain saws (private)	1991-Stage I							25250	51000	77250	104000	131250	159000	187250	216000	245250	275000	277003	279006	281009	298000
Chain saws (professional)	1981-1990	10000	10000	10000	10000	10000	10000	7333	4000												
Chain saws (professional)	1991-Stage I							3667	8000	13000	14000	15000	16000	17000	18000	19000	20000	27500	35000	42500	50000
Chain saws (forestry)	1981-1990	8000	8000	8000	8000	8000	8000	5048	2381												
Chain saws (forestry)	1991-Stage I							2524	4762	6714	6286	5857	5429	5000	4571	4143	3714	3286	2857	2429	2000
Riders (private)	<1981	40950	35100	29250	23400	17550	11700	6205													
Riders (private)	1981-1990	29250	35100	40950	46800	52650	58500	62050	65600	62235	58160	53375	47880	41675	34760	27135	18800	10696			
Riders (private)	1991-Stage I							6205	13120	20745	29080	38125	47880	58345	69520	81405	94000	117654	143900	159450	175000
Riders (professional)	1981-1990	4800	4800	4800	4800	4800	4800	4032	3168	2208	1152										
Riders (professional)	1991-Stage I							1008	2112	3312	4608	6000	6240	6480	6720	6960	7200	11650	16100	20550	25000
Shrub clearers (private)	<1981	24000	19200	14400	9600	4800															
Shrub clearers (private)	1981-1990	24000	28800	33600	38400	43200	48000	47520	46080	43680	40320	36000	30720	24480	17280	9120					
Shrub clearers (private)	1991-Stage I							5280	11520	18720	26880	36000	46080	57120	69120	82080	96000	107000	118000	129000	140000
Shrub clearers (profes-sional)	1981-1990	2000	2000	2000	2000	2000	2000	1650	1200	650											
Shrub clearers (profes-sional)	1991-Stage I							550	1200	1950	2800	3000	3200	3400	3600	3800	4000	5500	7000	8500	10000
Hedge cutters (private)	<1981	6850	5480	4110	2740	1370															
Hedge cutters (private)	1981-1990	6850	8220	9590	10960	12330	13700	15237	16128	16373	15972	14925	13232	10893	7908	4277					
Hedge cutters (private)	1991-Stage I							1693	4032	7017	10648	14925	19848	25417	31632	38493	46000	52900	59800	66700	73600
Hedge cutters (profes-sional)	1981-1990	1300	1300	1300	1300	1300	1300	1178	920	528											

Hedge cutters (professional)	1991-Stage I							393	920	1583	2380	2650	2920	3190	3460	3730	4000	4600	5200	5800	6400
Trimmers (private)	<1981	25500	20400	15300	10200	5100															
Trimmers (private)	1981-1990	25500	30600	35700	40800	45900	51000	48086	44686	40800	36429	31571	26229	20400	14086	7286					
Trimmers (private)	1991-Stage I							5343	11171	17486	24286	31571	39343	47600	56343	65571	75286	77714	80143	82571	85000
Trimmers (professional)	1981-1990	9000	9000	9000	9000	9000	9000	7071	4929	2571											
Trimmers (professional)	1991-Stage I							2357	4929	7714	10714	11143	11571	12000	12429	12857	13286	13714	14143	14571	15000

Stock data for small boats and pleasure crafts 1985-2004

Motortype	Boat type	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Diesel	Motor boats (27-34 ft)	1550	1550	1719	1889	2058	2228	2397	2567	2736	2906	3075	3244	3414	3583	3753	3922	4092	4261	4431	4600
Diesel	Motor boats (> 34 ft)	450	450	503	556	608	661	714	767	819	872	925	978	1031	1083	1136	1189	1242	1294	1347	1400
Diesel	Motor boats <(27 ft)	3000	3000	3000	3000	3000	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	4667	4750	4833	4917	5000
Diesel	Sailing boats (> 26 ft)	7500	7500	7917	8333	8750	9167	9583	10000	10417	10833	11250	11667	12083	12500	12917	13333	13750	14167	14583	15000
2-takt	Other boats (< 20 ft)	4000	4000	4056	4111	4167	4222	4278	4333	4389	4444	4500	4556	4564,89	4526,99	4438,68	4300,2	4108,05	3862,31	3559,68	3200
2-takt	Yawls and cabin boats	4000	4000	4056	4111	4167	4222	4278	4333	4389	4444	4500	4556	4564,89	4526,99	4438,68	4300,2	4108,05	3862,31	3559,68	3200
2-takt	Sailing boats (< 26 ft)	19000	19000	18778	18556	18333	18111	17889	17667	17444	17222	17000	16778	16390,44	15843,01	15144,34	14300,1	13316,95	12200,76	10959,84	9600
2-takt	Speed boats	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	2970	2910	2820	2700	2550	2370	2160	1920
2-takt	Water scooters	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	990	970	940	900	850	790	720	640
4-takt	Other boats (< 20 ft)													46,11	140,01	283,32	477,8	724,95	1026,69	1384,32	1800
4-takt	Yawls and cabin boats													46,11	140,01	283,32	477,8	724,95	1026,69	1384,32	1800
4-takt	Sailing boats (< 26 ft)													165,56	489,99	966,66	1588,9	2350,05	3243,24	4262,16	5400
4-takt	Speed boats (in board eng.)	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
4-takt	Speed boats (out board eng.)													30	90	180	300	450	630	840	1080
4-takt	Water scooters													10	30	60	100	150	210	280	360
4-takt	Speed boats (out board eng.)													30	90	180	300	450	630	840	1080
4-takt	Water scooters													10	30	60	100	150	210	280	360

Engine sizes (kW) for recreational craft 1985-2004

Motor-type	Boat type	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Diesel	Motor boats (27-34 ft)	70	70	74	79	83	88	92	97	101	106	110	114	119	123	128	132	137	141	146	150
Diesel	Motor boats (> 34 ft)	120	120	127	134	142	149	156	163	171	178	185	192	199	207	214	221	228	236	243	250
Diesel	Motor boats <(27 ft)	20	20	21,1	22,2	23,3	24,4	25,6	26,7	27,8	28,9	30	31,1	32,2	33,3	34,4	35,6	36,7	37,8	38,9	40
Diesel	Motor sailors	20	20	21	21	22	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	30	30	30	30
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	45	47,5	50	52,5	55	57,5	60	62,5	65	67,5	70	72,5	75	77,5	80	82,5	85	87,5	90
4-takt	Speed boats (out board eng.)													40,3	41,7	43,1	44,4	45,8	47,2	48,6	50
4-takt	Water scooters													45	45	45	45	45	45	45	45

Annex 2B-11: 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

Ferry route	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Ferryboats	176891	179850	181834	178419	202445	209129	182750	197489	200027	202054	201833	200130	208396	208501	206297	205564
Halsskov-Knudshoved	10601	10582	11701	11767	12420	12970	13539	13612	5732	0	0	0	0	0	0	0
Korsør-Nyborg, DSB	9305	9167	9237	8959	8813	8789	8746	3258	0	0	0	0	0	0	0	0
Tårs-Spodsbjerg	7656	8835	9488	9535	9402	9562	9000	9129	7052	6442	6477	6498	6468	6516	6497	6494
Korsør-Nyborg, Vognmands-ruten	7512	7363	7468	7496	7502	7828	7917	8302	3576	0	0	0	0	0	0	0
Sjællands Odde-Ebeltoft	3908	3978	4008	3988	4325	4569	5712	8153	7851	7720	4775	4226	3597	3191	2906	2889
Kalundborg-Århus	1907	2400	3162	2921	2913	3540	4962	4888	4483	1454	1870	1804	2037	1800	1750	1725
Hundested-Grenaa	1026	1025	1032	1030	718	602	67	0	0	0	0	0	0	0	0	0
Kalundborg-Samsø	873	873	860	881	826	811	813	823	824	850	828	817	833	831	841	867
København-Rønne	558	545	484	412	427	426	437	465	458	506	491	430	413	397	293	0
Kalundborg-Juelsminde	0	1326	1733	1542	1541	1508	856	0	0	0	0	0	0	0	0	0
Køge-Rønne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154	488
Sjællands Odde-Århus	0	0	0	0	0	0	0	0	0	2339	1799	1817	1825	2359	2863	2795

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)	Aux engine (kW)
Halsskov-Knudshoved	ARVEPRINS KNUD	1963	8238	Slow speed (2-stroke)	220	1666
Halsskov-Knudshoved	DRONNING MARGRETHE II	1973	8826	Medium speed (4-stroke)	230	1692
Halsskov-Knudshoved	HEIMDAL	1983	8309	Medium speed (4-stroke)	220	740
Halsskov-Knudshoved	KNUDSHOVED	1961	6400	Slow speed (2-stroke)	220	1840
Halsskov-Knudshoved	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	225	1426
Halsskov-Knudshoved	KRAKA	1982	8309	Medium speed (4-stroke)	220	740
Halsskov-Knudshoved	LODBROG	1982	8309	Medium speed (4-stroke)	220	740
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE	1960	8238	Slow speed (2-stroke)	220	1360
Halsskov-Knudshoved	PRINSESSE ELISABETH	1964	8238	Slow speed (2-stroke)	220	1360
Halsskov-Knudshoved	ROMSØ	1973	8826	Medium speed (4-stroke)	230	1728
Halsskov-Knudshoved	SPROGØ	1962	6400	Slow speed (2-stroke)	220	1840
Hundested-Grenaa	DJURSLAND	1974	9856	Medium speed (4-stroke)	230	900
Hundested-Grenaa	KATTEGAT	1995	23200	High speed (4-stroke)	205	1223
Hundested-Grenaa	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	235	1375
Hundested-Grenaa	PRINSESSE ANNE-MARIE	1960	8238	Slow speed (2-stroke)	220	1360
Kalundborg-Juelsminde	Mercandia I	1989	2950	High speed (4-stroke)	220	0
Kalundborg-Juelsminde	Mercandia II	1989	2950	High speed (4-stroke)	220	0
Kalundborg-Juelsminde	Mercandia III	1989	2950	High speed (4-stroke)	220	0
Kalundborg-Juelsminde	Mercandia IV	1989	2950	High speed (4-stroke)	220	0
Kalundborg-Samsø	HOLGER DANSKE	1976	2354	High speed (4-stroke)	225	600
Kalundborg-Samsø	KALUNDBORG	1952	3825	Slow speed (2-stroke)	235	570
Kalundborg-Samsø	KYHOLM	1998	2940	High speed (4-stroke)	195	864
Kalundborg-Samsø	VESBORG	1995	1770	High speed (4-stroke)	200	494
Kalundborg-Århus	ASK	1984	8826	Medium speed (4-stroke)	215	2220
Kalundborg-Århus	ASK	1984	8826	Medium speed (4-stroke)	215	3000
Kalundborg-Århus	ASK	1984	9840	Medium speed (4-stroke)	215	3000
Kalundborg-Århus	CAT-LINK I	1995	17280	High speed (4-stroke)	205	1160
Kalundborg-Århus	CAT-LINK II	1995	17280	High speed (4-stroke)	205	1160
Kalundborg-Århus	CAT-LINK III	1995	22000	High speed (4-stroke)	205	800
Kalundborg-Århus	CAT-LINK III	1995	22000	High speed (4-stroke)	205	801
Kalundborg-Århus	CAT-LINK III	1995	22000	High speed (4-stroke)	205	802
Kalundborg-Århus	CAT-LINK IV	1998	28320	High speed (4-stroke)	205	920
Kalundborg-Århus	CAT-LINK V	1998	28320	High speed (4-stroke)	205	920
Kalundborg-Århus	KATTEGAT SYD	1979	7650	Medium speed (4-stroke)	225	1366
Kalundborg-Århus	KNUDSHOVED	1961	6400	Slow speed (2-stroke)	220	1840

Kalundborg-Århus	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	225	1426
Kalundborg-Århus	KRAKA	1982	8309	Medium speed (4-stroke)	220	740
Kalundborg-Århus	MAREN MOLS	1996	11700	Slow speed (2-stroke)	180	2530
Kalundborg-Århus	METTE MOLS	1996	11700	Slow speed (2-stroke)	180	2530
Kalundborg-Århus	NIELS KLIM	1986	12474	Slow speed (2-stroke)	215	4440
Kalundborg-Århus	PEDER PAARS	1985	12474	Slow speed (2-stroke)	215	4440
Kalundborg-Århus	PRINSESSE ELISABETH	1964	8238	Slow speed (2-stroke)	220	1360
Kalundborg-Århus	ROSTOCK LINK	1975	8385	Medium speed (4-stroke)	230	2500
Kalundborg-Århus	SØLØVEN/SØBJØRNEN	1992	4000	High speed (4-stroke)	210	272
Kalundborg-Århus	URD	1981	8826	Medium speed (4-stroke)	215	2220
Kalundborg-Århus	URD	1981	8826	Medium speed (4-stroke)	215	3000
Kalundborg-Århus	URD	1981	9840	Medium speed (4-stroke)	215	3000
Korsør-Nyborg, DSB	ASA-THOR	1965	6472	Slow speed (2-stroke)	220	1305
Korsør-Nyborg, DSB	DRONNING INGRID	1980	18720	Medium speed (4-stroke)	220	2932
Korsør-Nyborg, DSB	DRONNING MARGRETHE II	1973	8826	Medium speed (4-stroke)	230	1692
Korsør-Nyborg, DSB	KONG FREDERIK IX	1954	6767	Slow speed (2-stroke)	225	1426
Korsør-Nyborg, DSB	KRONPRINS FREDERIK	1981	18720	Medium speed (4-stroke)	220	2932
Korsør-Nyborg, DSB	PRINS JOACHIM	1980	18720	Medium speed (4-stroke)	220	2932
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED	1962	6400	Slow speed (2-stroke)	220	1840
Korsør-Nyborg, Vognmandsruten	Superflex Alfa	1989	2950	High speed (4-stroke)	220	0
Korsør-Nyborg, Vognmandsruten	Superflex Bravo	1989	2950	High speed (4-stroke)	220	0
Korsør-Nyborg, Vognmandsruten	Superflex Charlie	1988	2950	High speed (4-stroke)	220	0

Ferry service	Ferry name	Engine year	Main engine MCR (kW)	Engine type	Sfc (g/kWh)	Aux engine (kW)
København-Rønne	JENS KOFOED	1979	12950	Medium speed (4-stroke)	106	2889
København-Rønne	JENS KOFOED	1979	12950	Medium speed (4-stroke)	109	2889
København-Rønne	POVL ANKER	1979	12950	Medium speed (4-stroke)	106	2889
København-Rønne	POVL ANKER	1979	12950	Medium speed (4-stroke)	109	2889
Køge-Rønne	DUEODDE	2005	8640	Medium speed (4-stroke)	183	1545
Køge-Rønne	HAMMERODDE	2005	8640	Medium speed (4-stroke)	183	1545
Køge-Rønne	JENS KOFOED	1979	12950	Medium speed (4-stroke)	108	2889
Køge-Rønne	POVL ANKER	1979	12950	Medium speed (4-stroke)	108	2889
Sjællands Odde-Ebeltoft	MAI MOLS	1996	24800	Gas turbine	240	752
Sjællands Odde-Ebeltoft	MAREN MOLS	1975	12062	Medium speed (4-stroke)	230	1986
Sjællands Odde-Ebeltoft	MAREN MOLS 2	1996	11700	Slow speed (2-stroke)	180	2530
Sjællands Odde-Ebeltoft	METTE MOLS	1975	12062	Medium speed (4-stroke)	230	1986
Sjællands Odde-Ebeltoft	METTE MOLS 2	1996	11700	Slow speed (2-stroke)	180	2530
Sjællands Odde-Ebeltoft	MIE MOLS	1971	5884	Medium speed (4-stroke)	230	
Sjællands Odde-Ebeltoft	MIE MOLS 2	1996	24800	Gas turbine	240	752
Sjællands Odde-Århus	MADS MOLS	1998	28320	High speed (4-stroke)	205	920
Sjællands Odde-Århus	MAI MOLS	1996	24800	Gas turbine	240	752
Sjællands Odde-Århus	MAX MOLS	1998	28320	High speed (4-stroke)	205	920
Sjællands Odde-Århus	MIE MOLS	1996	24800	Gas turbine	240	752
Tårs-Spodsbjerg	FRIGG SYDFYEN	1984	1300	Medium speed (4-stroke)	220	780
Tårs-Spodsbjerg	ODIN SYDFYEN	1982	1180	Medium speed (4-stroke)	220	780
Tårs-Spodsbjerg	SPODSBJERG	1972	1530	Medium speed (4-stroke)	225	300
Tårs-Spodsbjerg	THOR SYDFYEN	1978	1176	Medium speed (4-stroke)	225	300

Ferry data: Sailing time (single trip)

Ferry service	Ferry name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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							
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	110	110	110	110	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						
Kalundborg-Århus	KNUDSHOVED		190														
Kalundborg-Århus	KONG FREDERIK IX		190	190	190	190	190	190									
Kalundborg-Århus	KRAKA									195							
Kalundborg-Århus	MAREN MOLS											160	160	155	155	155	155
Kalundborg-Århus	METTE MOLS											160	160	155	155	155	155
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	420	420	420	420	420	420
København-Rønne	POVL ANKER	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420
Køge-Rønne	DUEODDE																375
Køge-Rønne	HAMMERODDE																375
Køge-Rønne	JENS KOFOED															375	375
Køge-Rønne	POVL ANKER															375	375
Sjællands Odde-Ebeltoft	MAI MOLS							45	45	45	45	45	45	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	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	45	45	45	45	45	45
Sjællands Odde-Århus	MADS MOLS										60	65	65	65	65	65	65
Sjællands Odde-Århus	MAI MOLS													65	65	65	65
Sjællands Odde-Århus	MAX MOLS										60	65	65	65	65	65	65
Sjællands Odde-Århus	MIE MOLS													65	65	65	65
Tårs-Spodsbjerg	FRIGG SYDFYEN	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	ODIN SYDFYEN	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	SPODSBJERG	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Tårs-Spodsbjerg	THOR SYDFYEN	45	45	45	45	45	17	45	45	45	45	45	45	45	45	45	45

Ferry data: Load factor (% MCR)

Ferry service	Ferry name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
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							
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	85	85	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						
Kalundborg-Århus	KNUDSHOVED		85														
Kalundborg-Århus	KONG FREDERIK IX		85	85	85	85	85	85									
Kalundborg-Århus	KRAKA									85							
Kalundborg-Århus	MAREN MOLS											85	85	85	85	85	85
Kalundborg-Århus	METTE MOLS											85	85	85	85	85	85
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							
København-Rønne	JENS KOFOED	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
København-Rønne	POVL ANKER	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Køge-Rønne	DUEODDE																80
Køge-Rønne	HAMMERODDE																80
Køge-Rønne	JENS KOFOED															80	80
Køge-Rønne	POVL ANKER															80	80
Sjællands Odde-Ebeltoft	MAI MOLS							80	80	80	80	80	80	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	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									
Sjællands Odde-Ebeltoft	MIE MOLS 2							80	80	80	80	80	80	80	80	80	80
Sjællands Odde-Århus	MADS MOLS										90	85	85	85	85	85	85
Sjællands Odde-Århus	MAI MOLS													75	75	75	75
Sjællands Odde-Århus	MAX MOLS										90	85	85	85	85	85	85
Sjællands Odde-Århus	MIE MOLS													75	75	75	75
Tårs-Spodsbjerg	FRIGG SYDFYEN	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Tårs-Spodsbjerg	ODIN SYDFYEN	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Tårs-Spodsbjerg	SPODSBJERG	75	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Tårs-Spodsbjerg	THOR SYDFYEN	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80

Ferry data: Round trip shares (%)

Ferry service	Ferry name	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Halsskov-Knudshoved	ARVEPRINS KNUD	21.1	20.2	19.7	19.8	20.6	18.6	18.8	17.6	20.0							
Halsskov-Knudshoved	DRONNING MARGRETHE II	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
Halsskov-Knudshoved	HEIMDAL	22.5	23.8	22.3	24.3	23.4	21.3	21.1	19.3	21.5							
Halsskov-Knudshoved	KNUDSHOVED	0.0	0.0	0.0	0.0	0.0	0.0	2.4	4.6	0.0							
Halsskov-Knudshoved	KONG FREDERIK IX	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0							
Halsskov-Knudshoved	KRAKA	24.3	25.4	22.7	23.4	21.1	20.4	20.3	19.9	21.0							
Halsskov-Knudshoved	LODBROG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	14.0							
Halsskov-Knudshoved	PRINSESSE ANNE-MARIE	0.0	0.0	0.0	0.0	0.0	5.5	2.4	0.0	0.0							
Halsskov-Knudshoved	PRINSESSE ELISABETH	0.0	0.0	0.0	2.5	0.1	0.0	0.0	0.0	0.0							
Halsskov-Knudshoved	ROMSØ	20.6	21.6	20.5	16.2	20.1	19.0	21.1	20.5	22.9							
Halsskov-Knudshoved	SPROGØ	9.1	9.0	14.8	13.8	14.7	14.9	13.9	11.0	0.6							
Hundested-Grenaa	DJURSLAND	100.0	100.0	100.0	100.0	50.0											
Hundested-Grenaa	KATTEGAT						100.0	100.0									
Hundested-Grenaa	KONG FREDERIK IX					5.0											
Hundested-Grenaa	PRINSESSE ANNE-MARIE					45.0											
Kalundborg-Juelsminde	Mercandia I	25.0	25.0	25.0	25.0	25.0	25.0	25.0									
Kalundborg-Juelsminde	Mercandia II	25.0	25.0	25.0	25.0	25.0	25.0	25.0									
Kalundborg-Juelsminde	Mercandia III	25.0	25.0	25.0	25.0	25.0	25.0	25.0									
Kalundborg-Juelsminde	Mercandia IV	25.0	25.0	25.0	25.0	25.0	25.0	25.0									
Kalundborg-Samsø	HOLGER DANSKE			95.0	100.0	100.0	100.0	100.0	100.0	92.0							
Kalundborg-Samsø	KALUNDBORG	100.0	100.0	5.0													
Kalundborg-Samsø	KYHOLM									6.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Kalundborg-Samsø	VESBORG									2.0							
Kalundborg-Århus	ASK		15.8	31.8	26.3	32.8	26.8	18.5	10.7	11.8	2.4						
Kalundborg-Århus	CAT-LINK I						17.2	25.4	27.5	11.4							
Kalundborg-Århus	CAT-LINK II						0.9	22.6	27.5	7.6							
Kalundborg-Århus	CAT-LINK III							8.5	23.6	19.1							
Kalundborg-Århus	CAT-LINK IV									22.9	25.8						
Kalundborg-Århus	CAT-LINK V									15.3	25.8						
Kalundborg-Århus	KATTEGAT SYD										2.4						
Kalundborg-Århus	KNUDSHOVED		4.0														
Kalundborg-Århus	KONG FREDERIK IX		4.0	0.0	6.6	0.0	0.0	1.5									
Kalundborg-Århus	KRAKA									2.4							
Kalundborg-Århus	MAREN MOLS											50.0	50.0	50.0	50.0	50.0	50.0
Kalundborg-Århus	METTE MOLS											50.0	50.0	50.0	50.0	50.0	50.0
Kalundborg-Århus	NIELS KLIM	50.0	19.8														

Kalundborg-Århus	PEDER PAARS	50.0	15.8														
Kalundborg-Århus	PRINSESSE ELISABETH		4.0														
Kalundborg-Århus	ROSTOCK LINK										21.8						
Kalundborg-Århus	SØLØVEN/SØBJØRNEN		20.8	36.4	34.2	34.3	28.2	5.0									
Kalundborg-Århus	URD		15.8	31.8	32.9	32.8	26.8	18.5	10.7	9.5	21.8						
Korsør-Nyborg, DSB	ASA-THOR	12.6	13.4	13.1	11.1	9.3	8.9	9.2	6.3								
Korsør-Nyborg, DSB	DRONNING INGRID	26.2	27.6	25.9	28.3	28.0	28.8	28.2	31.0								
Korsør-Nyborg, DSB	DRONNING MARGRETHE II	3.0	0.0	3.4	0.9	2.8	0.5	2.3	0.0								
Korsør-Nyborg, DSB	KONG FREDERIK IX	0.1	0.0	0.0	0.2	3.4	4.4	0.7	0.0								
Korsør-Nyborg, DSB	KRONPRINS FREDERIK	26.8	28.1	26.9	28.8	28.2	29.3	28.6	31.9								
Korsør-Nyborg, DSB	PRINS JOACHIM	25.2	26.6	25.4	26.9	26.9	27.4	27.1	27.8								
Korsør-Nyborg, DSB	SPROGØ/KNUDSHOVED	6.1	4.3	5.3	3.8	1.4	0.7	3.9	3.0								
Korsør-Nyborg, Vognmandsruten	Superflex Alfa	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0							
Korsør-Nyborg, Vognmandsruten	Superflex Bravo	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0							
Korsør-Nyborg, Vognmandsruten	Superflex Charlie	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0							
København-Rønne	JENS KOFOED	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
København-Rønne	POVL ANKER	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Køge-Rønne	DUEODDE																25.0
Køge-Rønne	HAMMERODDE																35.0
Køge-Rønne	JENS KOFOED															50.0	20.0
Køge-Rønne	POVL ANKER															50.0	20.0
Sjællands Odde-Ebeltoft	MAI MOLS							21.0	35.0	35.0	35.0	50.0	50.0	50.0	50.0	50.0	50.0
Sjællands Odde-Ebeltoft	MAREN MOLS	40.0	40.0	40.0	40.0	40.0	40.0	15.0									
Sjællands Odde-Ebeltoft	MAREN MOLS 2							18.0	15.0	15.0	15.0						
Sjællands Odde-Ebeltoft	METTE MOLS	40.0	40.0	40.0	40.0	40.0	40.0	17.0									
Sjællands Odde-Ebeltoft	METTE MOLS 2							15.0	15.0	15.0	15.0						
Sjællands Odde-Ebeltoft	MIE MOLS	20.0	20.0	20.0	20.0	20.0	20.0	5.0									
Sjællands Odde-Ebeltoft	MIE MOLS 2							9.0	35.0	35.0	35.0	50.0	50.0	50.0	50.0	50.0	50.0
Sjællands Odde-Århus	MADS MOLS										50.0	95.0	90.0	95.0	60.0	60.0	35.0
Sjællands Odde-Århus	MAI MOLS													1.0	10.0	15.0	15.0
Sjællands Odde-Århus	MAX MOLS										50.0	5.0	10.0	3.0	20.0	10.0	35.0
Sjællands Odde-Århus	MIE MOLS													1.0	10.0	15.0	15.0
Tårs-Spodsbjerg	FRIGG SYDFYEN	41.0	40.0	39.0	38.0	36.0	36.0	36.0	32.0	33.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Tårs-Spodsbjerg	ODIN SYDFYEN	41.0	40.0	39.0	38.0	36.0	36.0	36.0	32.0	33.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Tårs-Spodsbjerg	SPODSBJERG	4.0	2.0	8.0	8.0	9.0	8.0	8.0	19.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Tårs-Spodsbjerg	THOR SYDFYEN	14.0	18.0	14.0	16.0	19.0	20.0	20.0	17.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Annex 2B-12: Fuel use 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/kWh) per engine year for diesel ship engines

Year	High speed 4-stroke sfc (g/kWh)	Medium speed 4-stroke sfc (g/kWh)	Slow speed 2-stroke sfc (g/kWh)	High speed 4-stroke NO_X (g/kWh)	Medium speed 4-stroke NO_X (g/kWh)	Slow speed 2-stroke NO_X (g/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	199.9	189.9	169.9	11.0	12.0	16.0

CO, VOC, NMVOC and CH_4 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

	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

FuelType	Year	Category	S [%]	SO_2 [g/kg]	TSP [g/kg]	PM_{10} [g/kg]	$PM_{2.5}$ [g/kg]
Heavy fuel	1990	National sea	2.64	52.8	6.10	6.04	6.01
Heavy fuel	1991	National sea	2.35	47.0	4.92	4.87	4.84
Heavy fuel	1992	National sea	1.8	36.0	3.26	3.23	3.22
Heavy fuel	1993	National sea	2.39	47.8	5.07	5.02	4.99
Heavy fuel	1994	National sea	2.62	52.4	6.01	5.95	5.92
Heavy fuel	1995	National sea	2.95	59.0	7.69	7.61	7.57
Heavy fuel	1996	National sea	2.57	51.4	5.79	5.74	5.71
Heavy fuel	1997	National sea	2.74	54.8	6.58	6.51	6.48
Heavy fuel	1998	National sea	1.97	39.4	3.71	3.67	3.65
Heavy fuel	1999	National sea	1.97	39.4	3.71	3.67	3.65
Heavy fuel	2000	National sea	1.81	36.2	3.29	3.26	3.24
Heavy fuel	2001	National sea	1.7	34.0	3.03	3.00	2.98
Heavy fuel	2002	National sea	1.51	30.2	2.63	2.60	2.59
Heavy fuel	2003	National sea	1.62	32.4	2.86	2.83	2.81
Heavy fuel	2004	National sea	1.98	39.6	3.73	3.70	3.68
Heavy fuel	2005	National sea	2	40.0	3.79	3.75	3.73
Heavy fuel	2006	National sea	2	40.0	3.79	3.75	3.73
Heavy fuel	2007	National sea	1.25	25.0	2.17	2.15	2.13
Heavy fuel	2008	National sea	1.25	25.0	2.17	2.15	2.13
Heavy fuel	1990	International sea	2.96	59.2	7.75	7.67	7.63
Heavy fuel	1991	International sea	2.89	57.8	7.35	7.28	7.24
Heavy fuel	1992	International sea	2.88	57.6	7.30	7.23	7.19
Heavy fuel	1993	International sea	3.2	64.0	9.26	9.17	9.13
Heavy fuel	1994	International sea	3.03	60.6	8.16	8.08	8.04
Heavy fuel	1995	International sea	3.3	66.0	9.98	9.88	9.83
Heavy fuel	1996	International sea	3.42	68.4	10.91	10.81	10.75
Heavy fuel	1997	International sea	3.45	69.0	11.16	11.05	10.99
Heavy fuel	1998	International sea	3.42	68.4	10.91	10.81	10.75
Heavy fuel	1999	International sea	3.45	69.0	11.16	11.05	10.99
Heavy fuel	2000	International sea	3.36	67.2	10.44	10.33	10.28
Heavy fuel	2001	International sea	3.42	68.4	10.91	10.81	10.75
Heavy fuel	2002	International sea	3.44	68.8	11.08	10.97	10.91
Heavy fuel	2003	International sea	3.11	62.2	8.66	8.58	8.53
Heavy fuel	2004	International sea	3.2	64.0	9.26	9.17	9.13
Heavy fuel	2005	International sea	3.5	70.0	11.58	11.47	11.41

Heavy fuel	2006	International sea	3.5	70.0	11.58	11.47	11.41
Heavy fuel	2007	International sea	1.5	30.0	2.61	2.58	2.57
Heavy fuel	2008	International sea	1.5	30.0	2.61	2.58	2.57
Gas oil	1990	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1991	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1992	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1993	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1994	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1995	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1996	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1997	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1998	-	0.2	4.0	0.99	0.98	0.98
Gas oil	1999	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2000	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2001	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2002	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2003	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2004	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2005	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2006	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2007	-	0.2	4.0	0.99	0.98	0.98
Gas oil	2008	-	0.1	2.0	0.92	0.91	0.91

FuelType	Year	Category	S [%]	SO_2 [g/GJ]	TSP [g/GJ]	PM_{10} [g/GJ]	$PM_{2.5}$ [g/GJ]
Heavy fuel	1990	National sea	2.64	1.291	0.149	0.148	0.147
Heavy fuel	1991	National sea	2.35	1.149	0.120	0.119	0.118
Heavy fuel	1992	National sea	1.8	0.880	0.080	0.079	0.079
Heavy fuel	1993	National sea	2.39	1.169	0.124	0.123	0.122
Heavy fuel	1994	National sea	2.62	1.281	0.147	0.146	0.145
Heavy fuel	1995	National sea	2.95	1.443	0.188	0.186	0.185
Heavy fuel	1996	National sea	2.57	1.257	0.142	0.140	0.140
Heavy fuel	1997	National sea	2.74	1.340	0.161	0.159	0.158
Heavy fuel	1998	National sea	1.97	0.963	0.091	0.090	0.089
Heavy fuel	1999	National sea	1.97	0.963	0.091	0.090	0.089
Heavy fuel	2000	National sea	1.81	0.885	0.080	0.080	0.079
Heavy fuel	2001	National sea	1.7	0.831	0.074	0.073	0.073
Heavy fuel	2002	National sea	1.51	0.738	0.064	0.064	0.063
Heavy fuel	2003	National sea	1.62	0.792	0.070	0.069	0.069
Heavy fuel	2004	National sea	1.98	0.968	0.091	0.090	0.090
Heavy fuel	2005	National sea	2	0.978	0.093	0.092	0.091
Heavy fuel	2006	National sea	2	0.978	0.093	0.092	0.091
Heavy fuel	2007	National sea	1.25	0.611	0.053	0.052	0.052
Heavy fuel	2008	National sea	1.25	0.611	0.053	0.052	0.052
Heavy fuel	1990	International sea	2.96	1.447	0.189	0.188	0.187
Heavy fuel	1991	International sea	2.89	1.413	0.180	0.178	0.177
Heavy fuel	1992	International sea	2.88	1.408	0.178	0.177	0.176
Heavy fuel	1993	International sea	3.2	1.565	0.227	0.224	0.223
Heavy fuel	1994	International sea	3.03	1.482	0.200	0.198	0.197
Heavy fuel	1995	International sea	3.3	1.614	0.244	0.242	0.240
Heavy fuel	1996	International sea	3.42	1.672	0.267	0.264	0.263
Heavy fuel	1997	International sea	3.45	1.687	0.273	0.270	0.269
Heavy fuel	1998	International sea	3.42	1.672	0.267	0.264	0.263
Heavy fuel	1999	International sea	3.45	1.687	0.273	0.270	0.269
Heavy fuel	2000	International sea	3.36	1.643	0.255	0.253	0.251
Heavy fuel	2001	International sea	3.42	1.672	0.267	0.264	0.263
Heavy fuel	2002	International sea	3.44	1.682	0.271	0.268	0.267
Heavy fuel	2003	International sea	3.11	1.521	0.212	0.210	0.209
Heavy fuel	2004	International sea	3.2	1.565	0.227	0.224	0.223
Heavy fuel	2005	International sea	3.5	1.711	0.283	0.280	0.279

Heavy fuel	2006	International sea	3.5	1.711	0.283	0.280	0.279
Heavy fuel	2007	International sea	1.5	0.733	0.061	0.061	0.060
Heavy fuel	2008	International sea	1.5	0.733	0.061	0.061	0.060
Gas oil	1990	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1991	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1992	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1993	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1994	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1995	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1996	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1997	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1998	-	0.2	0.094	0.023	0.023	0.023
Gas oil	1999	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2000	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2001	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2002	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2003	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2004	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2005	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2006	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2007	-	0.2	0.094	0.023	0.023	0.023
Gas oil	2008	-	0.1	0.047	0.022	0.021	0.021

Annex 2B-13: Emission factors and total emissions for 1990 and 2005 in CollectER format

SO_2, NO_x; NMVOC, CH_4, CO, CO_2 and N_2O

Year	SNAP ID	Category	Fuel type	Mode	Fuel	SO_2	NO_X	NMVOC	CH_4	CO	CO_2	N_2O
					[GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[kg/GJ]	[g/GJ]
1990	070101	Passenger cars	Diesel	Highway driving	741768,62	93,68	254,03	25,07	3,74	179,70	74	12,62
1990	070101	Passenger cars	Gasoline 2-stroke	Highway driving	29020,00	2,28	288,90	2357,34	10,03	3490,86	73	2,01
1990	070101	Passenger cars	Gasoline conventional	Highway driving	7513712,27	2,28	1317,10	364,60	11,09	3459,92	73	2,13
1990	070101	Passenger cars	LPG	Highway driving	1527,11	0,00	1151,70	187,09	10,06	3914,25	65	6,04
1990	070102	Passenger cars	Diesel	Rural driving	2112454,27	93,68	253,60	42,09	6,82	268,08	74	15,34
1990	070102	Passenger cars	Gasoline 2-stroke	Rural driving	116519,40	2,28	352,84	2476,82	13,84	2594,44	73	1,73
1990	070102	Passenger cars	Gasoline conventional	Rural driving	23172348,43	2,28	1140,07	483,50	13,92	3992,26	73	2,39
1990	070102	Passenger cars	LPG	Rural driving	4405,12	0,00	1248,46	305,18	16,91	1146,38	65	7,25
1990	070103	Passenger cars	Diesel	Urban driving	3155682,02	93,68	208,50	71,21	16,98	310,69	74	9,59
1990	070103	Passenger cars	Gasoline 2-stroke	Urban driving	222763,26	2,28	53,06	4352,69	42,81	7114,48	73	0,84
1990	070103	Passenger cars	Gasoline conventional	Urban driving	31991323,03	2,28	634,09	889,09	50,17	9372,17	73	1,62
1990	070103	Passenger cars	LPG	Urban driving	6535,99	0,00	642,80	421,67	33,67	1249,98	65	4,56
1990	070201	Light duty vehicles	Diesel	Highway driving	1885171,89	93,68	270,67	30,19	2,60	344,14	74	5,52
1990	070201	Light duty vehicles	Gasoline conventional	Highway driving	198076,09	2,28	1369,26	170,29	10,11	2987,40	73	2,43
1990	070202	Light duty vehicles	Diesel	Rural driving	6748238,98	93,68	299,25	33,22	4,26	358,42	74	6,04
1990	070202	Light duty vehicles	Gasoline conventional	Rural driving	822679,72	2,28	1188,86	262,59	15,25	2316,18	73	2,29
1990	070203	Light duty vehicles	Diesel	Urban driving	7877500,29	93,68	489,77	46,99	12,82	403,83	74	4,51
1990	070203	Light duty vehicles	Gasoline conventional	Urban driving	1200572,50	2,28	638,11	671,68	58,35	7008,46	73	1,37
1990	070301	Heavy duty vehicles	Diesel	Highway driving	8568645,22	93,68	1032,66	47,58	6,07	190,41	74	2,91
1990	070301	Heavy duty vehicles	Gasoline	Highway driving	9222,83	2,28	1037,78	474,61	9,69	7610,35	73	0,83
1990	070302	Heavy duty vehicles	Diesel	Rural driving	15660737,99	93,68	1055,19	70,91	6,79	215,24	74	3,09
1990	070302	Heavy duty vehicles	Gasoline	Rural driving	26830,06	2,28	1141,55	820,40	16,74	8371,39	73	0,91
1990	070303	Heavy duty vehicles	Diesel	Urban driving	13196715,02	93,68	1013,26	98,07	12,56	267,09	74	2,51
1990	070303	Heavy duty vehicles	Gasoline	Urban driving	31022,26	2,28	456,62	696,09	14,21	7102,99	73	0,61
1990	0704	Mopeds	Gasoline	Mopeds and Motorcycles < 50 cm3	257602,97	2,28	18,26	12503,20	200,00	12602,74	73	0,91
1990	070501	Motorcycles	Gasoline	Highway driving	68784,37	2,28	215,28	1274,65	122,02	17695,34	73	1,27
1990	070502	Motorcycles	Gasoline	Rural driving	128400,77	2,28	173,21	1528,99	146,11	16838,71	73	1,52
1990	070503	Motorcycles	Gasoline	Urban driving	150927,04	2,28	93,24	2017,69	147,20	15315,93	73	1,53

Year	SNAP ID	Category	Fuel type	Mode	Fuel	SO_2	NO_X	NMVOC	CH_4	CO	CO_2	N_2O
					[GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[kg/GJ]	[g/GJ]
1990	0801	Military	Diesel		146162,10	93,68	775,94	63,32	8,83	274,51	74	4,43
1990	0801	Military	Jet fuel	< 3000 ft	149678,28	22,99	250,57	24,94	2,65	229,89	72	2,30
1990	0801	Military	Jet fuel	> 3000 ft	1347104,52	22,99	250,57	24,94	2,65	229,89	72	2,30
1990	0801	Military	Gasoline		985,50	2,28	891,52	1170,99	33,50	6683,18	73	1,95
1990	0801	Military	Aviation gasoline		4913,48	22,83	859,00	1242,60	21,90	6972,00	73	2,00
1990	0802	Railways	Diesel		4010006,53	93,68	1225,13	79,94	3,07	223,21	74	2,04
1990	0802	Railways	Kerosene		69,60	5,00	50,00	3,00	7,00	20,00	72	2,00
1990	0802	Railways	Gasoline		0,00	2,28	871,06	1129,29	33,78	6687,29	73	2,24
1990	0803	Inland waterways	Diesel		342622,52	93,68	983,64	171,79	2,79	453,65	74	2,96
1990	0803	Inland waterways	Gasoline		309135,73	2,28	291,33	3606,55	50,38	13853,27	73	0,78
1990	080402	Maritime activities	Residual oil		3845231,60	1290,95	1736,71	59,64	1,84	196,76	78	4,89
1990	080402	Maritime activities	Diesel		2782388,36	93,68	1089,20	50,80	1,57	167,58	74	4,68
1990	080402	Maritime activities	Kerosene		452,40	2,30	50,00	3,00	7,00	20,00	72	0,00
1990	080402	Maritime activities	LPG		1794,00		1249,00	384,94	20,26	443,00	65	0,00
1990	080403	Maritime activities	Residual oil		0,00	1466,99	1393,64	56,92	1,76	180,93	78	4,89
1990	080403	Maritime activities	Diesel		10079757,45	93,68	1052,12	49,13	1,52	162,08	74	4,68
1990	080403	Maritime activities	Kerosene		25786,80	2,30	50,00	3,00	7,00	20,00	72	0,00
1990	080403	Maritime activities	Gasoline		0,00	2,28	64,34	10809,58	108,10	18485,08	73	0,52
1990	080403	Maritime activities	LPG		42320,00		1249,00	384,94	20,26	443,00	65	0,00
1990	080404	Maritime activities	Residual oil		28543367,60	1447,43	1689,57	53,98	1,67	178,09	78	4,89
1990	080404	Maritime activities	Diesel		11632673,89	93,68	1208,60	49,46	1,53	163,17	74	4,68
1990	080501	Air traffic	Jet fuel	Dom. < 3000 ft	422173,05	22,99	314,51	14,93	1,59	90,41	72	5,70
1990	080501	Air traffic	Aviation gasoline		104947,19	22,83	859,00	1242,60	21,90	6972,00	73	2,00
1990	080502	Air traffic	Jet fuel	Int. < 3000 ft	132339,29	22,99	309,25	16,47	1,75	168,98	72	7,10
1990	080502	Air traffic	Aviation gasoline		30659,59	22,83	859,00	1242,60	21,90	6972,00	73	2,00
1990	080503	Air traffic	Jet fuel	Dom. > 3000 ft	1026021,25	22,99	330,11	12,36	1,31	90,75	72	2,30
1990	080504	Air traffic	Jet fuel	Int. > 3000 ft	1611914,81	22,99	244,20	6,48	0,69	54,10	72	2,30
1990	0806	Agriculture	Diesel		16496272,63	93,68	758,87	156,85	2,55	635,53	74	2,93
1990	0806	Agriculture	Gasoline		708864,21	2,28	31,60	949,55	88,42	47524,17	73	1,28
1990	0807	Forestry	Diesel		145345,57	93,68	857,48	156,47	2,54	645,65	74	2,97
1990	0807	Forestry	Gasoline		341429,76	2,28	40,39	7206,91	60,42	18057,40	73	0,37
1990	0808	Industry	Diesel		10158405,86	93,68	933,58	178,23	2,90	655,80	74	2,94
1990	0808	Industry	Gasoline		175227,11	2,28	136,27	1610,77	120,61	14797,46	73	1,33
1990	0808	Industry	LPG		1184855,79	0,00	1328,11	146,09	7,69	104,85	65	3,50

1990	0809	Household and gardening	Gasoline		1883802,80	2,28	65,27	2420,87	96,45	32167,96	73	1,14
1990	80501,00	Air traffic, Copenhagen airport	Jet fuel	Dom. < 3000 ft	502153,07	22,99	283,87	20,73	2,20	129,70	72	4,58
1990	80501,00	Air traffic, Copenhagen airport	Aviation gasoline		8642,20	22,83	859,00	1242,60	21,90	6972,00	73	2,00
1990	80502,00	Air traffic, Copenhagen airport	Jet fuel	Int. < 3000 ft	2001203,83	22,99	324,87	34,25	3,64	157,15	72	3,79
1990	80502,00	Air traffic, Copenhagen airport	Aviation gasoline		5612,28	22,83	859,00	1242,60	21,90	6972,00	73	2,00
1990	80503,00	Air traffic, Copenhagen airport	Jet fuel	Dom. > 3000 ft	1305208,09	22,99	314,86	11,78	1,25	84,05	72	2,30
1990	80504,00	Air traffic, Copenhagen airport	Jet fuel	Int. > 3000 ft	20330315,02	22,99	290,20	10,08	1,07	37,65	72	2,30

Year	SNAP ID	Category	Fuel type	Mode	Fuel	SO_2	NO_X	NMVOC	CH_4	CO	CO_2	N_2O
					[GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[g/GJ]	[kg/GJ]	[g/GJ]
2005	70101	Passenger cars	Diesel	Highway driving	3066818,71	0,47	321,22	9,19	1,05	50,32	74	12,75
2005	70101	Passenger cars	Gasoline 2-stroke	Highway driving	0,00	2,28	288,90	2357,34	10,03	3490,86	73	2,01
2005	70101	Passenger cars	Gasoline conventional	Highway driving	1438639,87	0,46	1351,18	330,14	11,51	2630,65	73	2,21
2005	70101	Passenger cars	Gasoline catalyst	Highway driving	10831630,21	0,46	164,23	33,78	4,09	848,06	73	15,83
2005	70101	Passenger cars	LPG	Highway driving	78,13	0,00	1151,70	187,09	10,06	3914,25	65	6,04
2005	70102	Passenger cars	Diesel	Rural driving	6708814,39	0,47	304,48	12,88	2,28	79,29	74	14,11
2005	70102	Passenger cars	Gasoline 2-stroke	Rural driving	0,00	2,28	352,84	2476,82	13,84	2594,44	73	1,73
2005	70102	Passenger cars	Gasoline conventional	Rural driving	3157916,61	0,46	1160,77	450,72	14,20	3096,86	73	2,44
2005	70102	Passenger cars	Gasoline catalyst	Rural driving	24898700,25	0,46	125,17	37,05	4,51	653,39	73	7,62
2005	70102	Passenger cars	LPG	Rural driving	157,64	0,00	1248,46	305,18	16,91	1146,38	65	7,25
2005	70103	Passenger cars	Diesel	Urban driving	6974148,58	0,47	280,04	29,26	6,50	170,54	74	10,33
2005	70103	Passenger cars	Gasoline 2-stroke	Urban driving	0,00	2,28	51,89	4470,04	43,97	7400,54	73	0,82
2005	70103	Passenger cars	Gasoline conventional	Urban driving	3693783,76	0,46	633,21	875,52	54,28	8102,10	73	1,59
2005	70103	Passenger cars	Gasoline catalyst	Urban driving	28136211,08	0,46	157,79	234,40	37,88	2866,15	73	17,00
2005	70103	Passenger cars	LPG	Urban driving	198,36	0,00	614,22	437,11	34,90	1353,61	65	4,38
2005	70201	Light duty vehicles	Diesel	Highway driving	4009082,46	0,47	307,36	30,31	0,95	185,94	74	6,10
2005	70201	Light duty vehicles	Gasoline conventional	Highway driving	67527,58	0,46	1369,26	170,29	10,11	2987,40	73	2,43
2005	70201	Light duty vehicles	Gasoline catalyst	Highway driving	333063,35	0,46	117,75	13,47	2,99	509,98	73	12,03
2005	70202	Light duty vehicles	Diesel	Rural driving	12214157,08	0,47	324,37	33,77	1,97	171,90	74	6,67
2005	70202	Light duty vehicles	Gasoline conventional	Rural driving	238694,31	0,46	1188,86	262,59	15,25	2316,18	73	2,29
2005	70202	Light duty vehicles	Gasoline catalyst	Rural driving	1175996,82	0,46	103,60	18,94	2,90	381,80	73	5,19
2005	70203	Light duty vehicles	Diesel	Urban driving	11907722,76	0,47	348,65	54,67	5,62	204,97	74	4,79
2005	70203	Light duty vehicles	Gasoline conventional	Urban driving	289559,72	0,46	622,77	707,71	61,48	7534,54	73	1,32

2005	70203	Light duty vehicles	Gasoline catalyst	Urban driving	1422876,91	0,46	115,90	128,04	16,10	3128,39	73	9,95
2005	70301	Heavy duty vehicles	Diesel	Highway driving	12269508,12	0,47	796,69	27,19	6,92	157,94	74	3,16
2005	70301	Heavy duty vehicles	Gasoline	Highway driving	13274,43	0,46	1037,78	474,61	9,69	7610,35	73	0,83
2005	70302	Heavy duty vehicles	Diesel	Rural driving	18456927,47	0,47	820,04	36,16	7,79	164,80	74	3,21
2005	70302	Heavy duty vehicles	Gasoline	Rural driving	27008,58	0,46	1141,55	820,40	16,74	8371,39	73	0,91
2005	70303	Heavy duty vehicles	Diesel	Urban driving	12866451,81	0,47	814,89	46,50	14,18	194,58	74	2,63
2005	70303	Heavy duty vehicles	Gasoline	Urban driving	27583,23	0,46	456,62	696,09	14,21	7102,99	73	0,61
2005	704	Mopeds	Gasoline		194816,40	0,46	61,74	9904,83	245,18	10908,04	73	1,12
2005	70501	Motorcycles	Gasoline	Highway driving	150589,30	0,46	247,99	1085,51	118,83	15729,27	73	1,23
2005	70502	Motorcycles	Gasoline	Rural driving	340920,70	0,46	194,21	1330,24	146,22	15210,83	73	1,51
2005	70503	Motorcycles	Gasoline	Urban driving	409358,09	0,46	107,05	1774,84	146,76	13748,14	73	1,51

Year	SNAP ID	Category	Fuel type	Mode	Fuel [GJ]	SO_2 [g/GJ]	NO_X [g/GJ]	NMVOC [g/GJ]	CH_4 [g/GJ]	CO [g/GJ]	CO_2 [kg/GJ]	N_2O [g/GJ]
2005	801	Military	Diesel		1270767,00	0,47	562,00	35,07	6,44	165,53	74	5,66
2005	801	Military	Jet fuel	< 3000 ft	244275,12	22,99	250,57	24,94	2,65	229,89	72	2,30
2005	801	Military	Jet fuel	> 3000 ft	2198476,08	22,99	250,57	24,94	2,65	229,89	72	2,30
2005	801	Military	Gasoline		7456,95	0,46	239,21	276,15	22,26	2256,73	73	11,50
2005	801	Military	Aviation gasoline		4602,50	22,99	859,00	1242,60	21,90	6972,00	73	2,00
2005	802	Railways	Diesel		3136764,20	0,47	1187,26	75,00	2,88	206,64	74	2,04
2005	803	Inland waterways	Diesel		1002147,65	93,68	877,17	170,01	2,76	452,68	74	2,97
2005	803	Inland waterways	Gasoline		393435,14	0,46	420,56	2306,60	55,94	16339,79	73	1,13
2005	80402	National sea traffic	Residual oil		1505594,70	978,00	2002,19	65,05	2,01	214,58	78	4,89
2005	80402	National sea traffic	Diesel		4358141,34	93,68	1281,79	50,12	1,55	136,78	74	4,68
2005	80402	National sea traffic	Kerosene		696,00	2,30	50,00	3,00	7,00	20,00	72	0,00
2005	80402	National sea traffic	LPG		92,00	0,00	1249,00	384,94	20,26	443,00	65	0,00
2005	80403	Fishing	Residual oil		0,00	1101,71	1393,60	56,90	1,76	180,90	78	4,90
2005	80403	Fishing	Diesel		6338274,42	93,68	1346,81	55,98	1,73	184,67	74	4,68
2005	80403	Fishing	Kerosene		591,60	2,30	50,00	3,00	7,00	20,00	72	0,00
2005	80403	Fishing	Gasoline		0,00	2,28	64,34	10809,60	108,10	18485,10	73	0,52
2005	80403	Fishing	LPG		20378,00	0,00	1249,00	384,94	20,26	443,00	65	0,00
2005	80404	International sea traffic	Residual oil		20590607,10	1711,49	2037,06	60,25	1,86	198,78	78	4,89
2005	80404	International sea traffic	Diesel		13917429,62	93,68	1500,33	54,93	1,70	181,21	74	4,68
2005	80501	Air traffic, other airports	Jet fuel	Dom. < 3000 ft	145250,14	22,99	277,22	31,65	3,36	153,11	72	18,05

2005	80501	Air traffic, other airports	Aviation gasoline		95260,75	22,83	859,00	1242,60	21,90	6972,00	73	2,00
2005	80502	Air traffic, other airports	Jet fuel	Int. < 3000 ft	252579,04	22,99	296,77	16,90	1,79	168,56	72	8,48
2005	80502	Air traffic, other airports	Aviation gasoline		7580,33	22,83	859,00	1242,60	21,90	6972,00	73	2,00
2005	80503	Air traffic, other airports	Jet fuel	Dom. > 3000 ft	511172,93	22,99	286,83	24,68	2,62	128,13	72	2,30
2005	80504	Air traffic, other airports	Jet fuel	Int. > 3000 ft	2828808,74	22,99	242,86	6,72	0,71	57,51	72	2,30
2005	806	Agriculture	Diesel		14384937,86	2,34	834,38	92,05	1,50	447,88	74	3,13
2005	806	Agriculture	Gasoline		279468,09	0,46	93,75	1031,99	132,74	25002,51	73	1,57
2005	807	Forestry	Diesel		159064,89	2,34	742,84	58,00	0,94	329,20	74	3,21
2005	807	Forestry	Gasoline		76480,64	0,46	60,50	6513,81	54,12	16171,60	73	0,42
2005	808	Industry	Diesel		11753296,03	2,34	786,04	104,04	1,69	448,00	74	3,08
2005	808	Industry	Gasoline		165191,50	0,46	194,14	1474,91	103,02	12842,90	73	1,41
2005	808	Industry	LPG		1049390,00	0,00	1328,11	146,09	7,69	104,85	65	3,50
2005	809	Household and gardening	Gasoline		4069061,99	0,46	80,39	2144,69	71,57	28283,73	73	1,17
2005	80501	Air traffic, Copenhagen airport	Jet fuel	Dom. < 3000 ft	191198,45	22,99	268,26	43,78	4,65	198,45	72	9,84
2005	80501	Air traffic, Copenhagen airport	Aviation gasoline		763,00	22,83	859,00	1242,60	21,90	6972,00	73	2,00
2005	80502	Air traffic, Copenhagen airport	Jet fuel	Int. < 3000 ft	2809012,62	22,99	335,97	39,34	4,18	214,91	72	4,07
2005	80502	Air traffic, Copenhagen airport	Aviation gasoline		1104,00	22,83	859,00	1242,60	21,90	6972,00	73	2,00
2005	80503	Air traffic, Copenhagen airport	Jet fuel	Dom. > 3000 ft	908590,42	22,99	284,42	21,69	2,30	68,68	72	2,30
2005	80504	Air traffic, Copenhagen airport	Jet fuel	Int. > 3000 ft	29870014,67	22,99	312,14	10,85	1,15	34,98	72	2,30

	Category	Mode		SO_2 [tons]	NO_X [tons]	NMVOC [tons]	CH_4 [tons]	CO [tons]	CO_2 [ktons]	N_2O [tons]
1990	Passenger cars	Highway driving	70101	87	10095	2827	86	26237	606	25
1990	Passenger cars	Rural driving	70102	251	27001	11583	339	93384	1857	88
1990	Passenger cars	Urban driving	70103	369	20959	29640	1668	302402	2586	82
1990	Light duty vehicles	Highway driving	70201	177	781	91	7	1240	154	11
1990	Light duty vehicles	Rural driving	70202	634	2997	440	41	4324	559	43
1990	Light duty vehicles	Urban driving	70203	741	4624	1177	171	11595	671	37
1990	Heavy duty vehicles	Highway driving	70301	803	8858	412	52	1702	635	25
1990	Heavy duty vehicles	Rural driving	70302	1467	16556	1133	107	3595	1161	48
1990	Heavy duty vehicles	Urban driving	70303	1236	13386	1316	166	3745	979	33
1990	Mopeds		704	1	5	3221	52	3247	19	0
1990	Motorcycles	Highway driving	70501	0	15	88	8	1217	5	0

1990	Motorcycles	Rural driving	70502	0	22	196	19	2162	9	0
1990	Motorcycles	Urban driving	70503	0	14	305	22	2312	11	0
1990	Evaporation		706			28588				
1990	Tyre and brake wear		707							
1990	Road abrasion		708							
1990	Military		801	48	494	54	5	425	119	4
1990	Railways		802	376	4913	321	12	895	297	8
1990	Inland waterways		803	33	427	1174	17	4438	48	1
1990	National sea traffic		80402	5225	9711	371	12	1224	506	32
1990	Fishing		80403	944	10659	512	16	1653	751	47
1990	International sea traffic		80404	42404	62285	2116	65	6981	3087	194
1990	Air traffic, Dom. < 3000 ft.		80501	24	373	158	4	895	75	5
1990	Air traffic, Int. < 3000 ft.		80502	50	722	116	8	590	156	9
1990	Air traffic, Dom. > 3000 ft.		80503	54	750	28	3	203	168	5
1990	Air traffic, Int. > 3000 ft.		80504	504	6293	215	23	853	1580	50
1990	Agriculture		806	1547	12541	3260	105	44172	1272	49
1990	Forestry		807	14	138	2483	21	6259	36	1
1990	Industry		808	952	11081	2266	60	9379	842	34
1990	Household and gardening		809	4	123	4560	182	60598	138	2

	Category	Mode		SO_2	NO_X	NMVOC	CH_4	CO	CO_2	N_2O
				[tons]	[tons]	[tons]	[tons]	[tons]	[ktons]	[tons]
2005	Passenger cars	Highway driving	70101	7	4708	869	64	13125	1123	214
2005	Passenger cars	Rural driving	70102	16	8825	2432	173	26580	2545	292
2005	Passenger cars	Urban driving	70103	18	8732	10033	1312	111760	2840	556
2005	Light duty vehicles	Highway driving	70201	2	1364	137	6	1117	326	29
2005	Light duty vehicles	Rural driving	70202	6	4368	497	31	3101	1007	88
2005	Light duty vehicles	Urban driving	70203	6	4497	1038	108	9074	1006	72
2005	Heavy duty vehicles	Highway driving	70301	6	9789	340	85	2039	909	39
2005	Heavy duty vehicles	Rural driving	70302	9	15166	690	144	3268	1368	59
2005	Heavy duty vehicles	Urban driving	70303	6	10497	618	183	2700	954	34
2005	Mopeds		704	0	12	1930	48	2125	14	0
2005	Motorcycles	Highway driving	70501	0	37	163	18	2369	11	0
2005	Motorcycles	Rural driving	70502	0	66	454	50	5186	25	1
2005	Motorcycles	Urban driving	70503	0	44	727	60	5628	30	1

2005	Evaporation	706			4397					
2005	Tyre and brake wear	707								
2005	Road abrasion	708								
2005	Military	801	57	1332	113	15	821	271	13	
2005	Railways	802	1	3724	235	9	648	232	6	
2005	Inland waterways	803	94	1045	1078	25	6882	103	3	
2005	National sea traffic	80402	1881	8601	316	10	919	440	28	
2005	Fishing	80403	594	8562	363	11	1180	470	30	
2005	International sea traffic	80404	36544	62825	2005	62	6615	2636	166	
2005	Air traffic, Dom. < 3000 ft.	80501	10	174	132	3	730	31	5	
2005	Air traffic, Int. < 3000 ft.	80502	71	1026	126	12	707	221	14	
2005	Air traffic, Dom. > 3000 ft.	80503	33	405	32	3	128	102	3	
2005	Air traffic, Int. > 3000 ft.	80504	752	10011	343	36	1207	2354	75	
2005	Agriculture	806	34	12029	1612	59	13430	1085	46	
2005	Forestry	807	0	123	507	4	1289	17	1	
2005	Industry	808	28	10664	1620	45	7497	950	40	
2005	Household and gardening	809	2	327	8727	291	115088	297	5	

Non-exhaust emission factors and total non-exhaust emissions of TSP, PM_{10} and $PM_{2.5}$ in 2005

Year	Source	Category	Mileage [kmkveh]	TSP [mg/km]	PM_{10} [mg/km]	$PM_{2.5}$ [mg/km]	TSP [tons]	PM_{10} [tons]	$PM_{2.5}$ [tons]
2005	Brake wear	1	36764955	7.6	7.5	7.5	280	274	109
2005	Brake wear	2	10531269	13.7	13.4	13.4	144	141	56
2005	Brake wear	3	3469494	34.8	34.1	34.1	121	118	47
2005	Brake wear	4	932102	47.3	46.4	46.4	44	43	17
2005	Brake wear	5	218107	6.2	6.1	6.1	1	1	1
2005	Brake wear	6	659726	4.2	4.2	4.2	3	3	1
2005	Road abrasion	1	36764955	15.0	7.5	7.5	551	276	149
2005	Road abrasion	2	10531269	15.0	7.5	7.5	158	79	43
2005	Road abrasion	3	3469494	76.0	38.0	38.0	264	132	71
2005	Road abrasion	4	932102	76.0	38.0	38.0	71	35	19
2005	Road abrasion	5	218107	6.0	3.0	3.0	1	1	0
2005	Road abrasion	6	659726	6.0	3.0	3.0	4	2	1
2005	Tyre wear	1	36764955	12.4	7.5	7.5	458	275	192
2005	Tyre wear	2	10531269	20.5	12.3	12.3	215	129	90
2005	Tyre wear	3	3469494	59.8	35.9	35.9	207	124	87
2005	Tyre wear	4	932102	29.4	17.6	17.6	27	16	12
2005	Tyre wear	5	218107	6.4	3.8	3.8	1	1	1
2005	Tyre wear	6	659726	5.6	3.3	3.3	4	2	2
2004	Total	Passenger cars					1289	825	450
2004	Total	Light duty vehicles					518	350	189
2004	Total	Heavy duty vehicles					592	374	205
2004	Total	Buses					142	95	48
2004	Total	Mopeds					4	3	1
2004	Total	Motorcycles					10	7	4

Heavy metal emission factors and total emissions for 1990 and 2005 in CollectER format

SNAP ID	Category	Fuel type	Mode	Arsenic [g/GJ]	Cadmium [g/GJ]	Chromium [g/GJ]	Copper [g/GJ]	Mercury [g/GJ]	Nickel [g/GJ]	Lead [g/GJ]	Selenium [g/GJ]	Zinc [g/GJ]
070101	Passenger cars	Diesel	Highway driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070101	Passenger cars	Gasoline 2-stroke	Highway driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070101	Passenger cars	Gasoline conventional	Highway driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070101	Passenger cars	Gasoline catalyst	Highway driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070101	Passenger cars	LPG	Highway driving		0,000000	0,000000	0,000000		0,000000	0,000000	0,000000	0,000000
070102	Passenger cars	Diesel	Rural driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070102	Passenger cars	Gasoline 2-stroke	Rural driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070102	Passenger cars	Gasoline conventional	Rural driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070102	Passenger cars	Gasoline catalyst	Rural driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070102	Passenger cars	LPG	Rural driving		0,000000	0,000000	0,000000		0,000000	0,000000	0,000000	0,000000
070103	Passenger cars	Diesel	Urban driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070103	Passenger cars	Gasoline 2-stroke	Urban driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070103	Passenger cars	Gasoline conventional	Urban driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070103	Passenger cars	Gasoline catalyst	Urban driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070103	Passenger cars	LPG	Urban driving		0,000000	0,000000	0,000000		0,000000	0,000000	0,000000	0,000000
070201	Light duty vehicles	Diesel	Highway driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070201	Light duty vehicles	Gasoline conventional	Highway driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070201	Light duty vehicles	Gasoline catalyst	Highway driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070202	Light duty vehicles	Diesel	Rural driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070202	Light duty vehicles	Gasoline conventional	Rural driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070202	Light duty vehicles	Gasoline catalyst	Rural driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070203	Light duty vehicles	Diesel	Urban driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070203	Light duty vehicles	Gasoline conventional	Urban driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070203	Light duty vehicles	Gasoline catalyst	Urban driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070301	Heavy duty vehicles	Diesel	Highway driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070301	Heavy duty vehicles	Gasoline	Highway driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070302	Heavy duty vehicles	Diesel	Rural driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070302	Heavy duty vehicles	Gasoline	Rural driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070303	Heavy duty vehicles	Diesel	Urban driving		0,000234	0,001171	0,039812		0,001639	0,000000	0,000234	0,023419
070303	Heavy duty vehicles	Gasoline	Urban driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
0704	Mopeds	Gasoline			0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070501	Motorcycles	Gasoline	Highway driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070502	Motorcycles	Gasoline	Rural driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831
070503	Motorcycles	Gasoline	Urban driving		0,000228	0,001141	0,038813		0,001598	0,000685	0,000228	0,022831

SNAP ID	Category	Fuel type	Mode	Arsenic [mg/GJ]	Cadmium [mg/GJ]	Chromium [mg/GJ]	Copper [mg/GJ]	Mercury [mg/GJ]	Nickel [mg/GJ]	Lead [mg/GJ]	Selenium [mg/GJ]	Zinc [mg/GJ]
0801	Military	Diesel			0,23	1,17	39,81		1,64		0,23	23,42
0801	Military	Jet fuel	< 3000 ft	0,00	0,23	1,14	38,81	0,00	1,60	0,00	0,23	22,83
0801	Military	Jet fuel	> 3000 ft	0,00	0,23	1,14	38,81	0,00	1,60	0,00	0,23	22,83
0801	Military	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
0801	Military	Aviation gasoline		0,00	0,23	1,14	38,81	0,00	1,60	12785,39	0,23	22,83
0802	Railways	Diesel			0,23	1,17	39,81		1,64		0,23	23,42
0802	Railways	Kerosene										
0802	Railways	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
0803	Inland waterways	Diesel			0,23	1,17	39,81		1,64		0,23	23,42
0803	Inland waterways	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
080402	National sea traffic	Residual oil		12,22	0,73	4,89	12,22	0,49	733,50	4,89	9,78	22,00
080402	National sea traffic	Diesel		1,17	0,23	0,94	1,17	1,17	1,64	2,34	4,68	11,71
080402	National sea traffic	Kerosene										
080402	National sea traffic	LPG										
080403	Fishing	Residual oil		12,22	0,73	4,89	12,22	0,49	733,50	4,89	9,78	22,00
080403	Fishing	Diesel		1,17	0,23	0,94	1,17	1,17	1,64	2,34	4,68	11,71
080403	Fishing	Kerosene										
080403	Fishing	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
080403	Fishing	LPG										
080404	International sea traffic	Residual oil		12,22	0,73	4,89	12,22	0,49	733,50	4,89	9,78	22,00
080404	International sea traffic	Diesel		1,17	0,23	0,94	1,17	1,17	1,64	2,34	4,68	11,71
080501	Air traffic, other airports	Jet fuel	Dom. < 3000 ft		0,23	1,14	38,81		1,60	0,00	0,23	22,83
080501	Air traffic, other airports	Aviation gasoline			0,23	1,14	38,81		1,60	13505,69	0,23	22,83
080502	Air traffic, other airports	Jet fuel	Int. < 3000 ft		0,23	1,14	38,81		1,60	0,00	0,23	22,83
080502	Air traffic, other airports	Aviation gasoline			0,23	1,14	38,81		1,60	13505,69	0,23	22,83
080503	Air traffic, other airports	Jet fuel	Dom. > 3000 ft		0,23	1,14	38,81		1,60	0,00	0,23	22,83
080504	Air traffic, other airports	Jet fuel	Int. > 3000 ft		0,23	1,14	38,81		1,60	0,00	0,23	22,83
0806	Agriculture	Diesel			0,23	1,17	39,81		1,64		0,23	23,42
0806	Agriculture	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
0807	Forestry	Diesel			0,23	1,17	39,81		1,64		0,23	23,42
0807	Forestry	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
0808	Industry	Diesel			0,23	1,17	39,81		1,64		0,23	23,42
0808	Industry	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
0808	Industry	LPG										
0809	Household and gardening	Gasoline			0,23	1,14	38,81		1,60	0,68	0,23	22,83
080501	Air traffic, CPH. airport	Jet fuel	Dom. < 3000 ft		0,23	1,14	38,81		1,60		0,23	22,83
080501	Air traffic, CPH. airport	Aviation gasoline			0,23	1,14	38,81		1,60	13505,69	0,23	22,83
080502	Air traffic, CPH. airport	Jet fuel	Int. < 3000 ft	0,00	0,23	1,14	38,81	0,00	1,60	0,00	0,23	22,83
080502	Air traffic, CPH. airport	Aviation gasoline		0,00	0,23	1,14	38,81	0,00	1,60	13505,69	0,23	22,83
080503	Air traffic, CPH. airport	Jet fuel	Dom. > 3000 ft	0,00	0,23	1,14	38,81	0,00	1,60	0,00	0,23	22,83
080504	Air traffic, CPH. airport	Jet fuel	Int. > 3000 ft	0,00	0,23	1,14	38,81	0,00	1,60	0,00	0,23	22,83

Year	Category	Mode	SNAP ID	Arsenic [kg]	Cadmium [kg]	Chromium [kg]	Copper [kg]	Mercury [kg]	Nickel [kg]	Lead [kg]	Selenium [kg]	Zinc [kg]
1990	Passenger cars	Highway driving	70101		2	9	318		13	11097	2	187
1990	Passenger cars	Rural driving	70102		6	29	974		40	34263	6	573
1990	Passenger cars	Urban driving	70103		8	40	1363		56	47393	8	802
1990	Light duty vehicles	Highway driving	70201		0	3	85		4	291	0	50
1990	Light duty vehicles	Rural driving	70202		2	9	310		13	1210	2	182
1990	Light duty vehicles	Urban driving	70203		2	11	374		15	1766	2	220
1990	Heavy duty vehicles	Highway driving	70301		2	10	342		14	14	2	201
1990	Heavy duty vehicles	Rural driving	70302		4	18	625		26	39	4	368
1990	Heavy duty vehicles	Urban driving	70303		3	15	527		22	46	3	310
1990	Mopeds		704		0	0	13		1	379	0	8
1990	Motorcycles	Highway driving	70501		0	0	3		0	101	0	2
1990	Motorcycles	Rural driving	70502		0	0	6		0	189	0	4
1990	Motorcycles	Urban driving	70503		0	0	8		0	222	0	4
1990	Evaporation		706									
1990	Military		801									
1990	Railways		802									
1990	Inland waterways		803		0	2	64		3	64	0	38
1990	National sea traffic		80402		1	5	160		7	0	1	94
1990	Fishing		80403		0	1	26		1	455	0	15
1990	International sea traffic		80404	50	3	21	50	5	2825	25	51	117
1990	Air traffic, Dom. < 3000 ft.		80501	12	2	9	12	12	17	24	47	118
1990	Air traffic, Int. < 3000 ft.		80502	363	24	150	363	28	20956	167	334	764
1990	Air traffic, Dom. > 3000 ft.		80503		0	1	40		2	1534	0	24
1990	Air traffic, Int. > 3000 ft.		80504		0	2	84		3	490	0	50
1990	Agriculture		806		1	3	90		4		1	53
1990	Forestry		807		5	25	852		35		5	501
1990	Industry		808		4	20	684		28	1043	4	403
1990	Household and gardening		809		0	1	19		1	502	0	11

Year	Category	Mode	SNAP ID	Arsenic [kg]	Cadmium [kg]	Chromium [kg]	Copper [kg]	Mercury [kg]	Nickel [kg]	Lead [kg]	Selenium [kg]	Zinc [kg]
2005	Passenger cars	Highway driving	70101		4	18	598		25	8	4	352
2005	Passenger cars	Rural driving	70102		8	40	1356		56	19	8	798
2005	Passenger cars	Urban driving	70103		9	45	1513		62	22	9	890
2005	Light duty vehicles	Highway driving	70201		1	5	175		7	0	1	103
2005	Light duty vehicles	Rural driving	70202		3	16	541		22	1	3	318
2005	Light duty vehicles	Urban driving	70203		3	16	541		22	1	3	318
2005	Heavy duty vehicles	Highway driving	70301		3	14	489		20	0	3	288
2005	Heavy duty vehicles	Rural driving	70302		4	22	736		30	0	4	433
2005	Heavy duty vehicles	Urban driving	70303		3	15	513		21	0	3	302
2005	Mopeds		704		0	0	8		0	0	0	4
2005	Motorcycles	Highway driving	70501		0	0	6		0	0	0	3
2005	Motorcycles	Rural driving	70502		0	0	13		1	0	0	8
2005	Motorcycles	Urban driving	70503		0	0	16		1	0	0	9
2005	Evaporation		706									
2005	Military		801									
2005	Railways		802									
2005	Inland waterways		803	0	1	4	146	0	6	59	1	86
2005	National sea traffic		80402		1	4	125		5		1	73
2005	Fishing		80403		0	2	55		2	0	0	32
2005	International sea traffic		80404	23	2	11	23	6	1112	18	35	84
2005	Air traffic, Dom. < 3000 ft.		80501	7	1	6	7	7	10	15	30	74
2005	Air traffic, Int. < 3000 ft.		80502	268	18	114	268	26	15126	133	267	616
2005	Air traffic, Dom. > 3000 ft.		80503		0	0	17		1	1297	0	10
2005	Air traffic, Int. > 3000 ft.		80504	0	1	4	119	0	5	117	1	70
2005	Agriculture		806	0	0	2	55	0	2	0	0	32
2005	Forestry		807	0	8	37	1269	0	52	0	8	747
2005	Industry		808		3	17	584		24	0	3	343
2005	Household and gardening		809		0	0	9		0	0	0	5

PAH emission factors and total emissions for 1990 and 2005 in CollectER format

Year	SNAP ID	Category	Fuel type	Mode	Dioxins/ Furans [g/GJ]	Flouranthene [g/GJ]	Benzo(b) flouranthene [g/GJ]	Benzo(k) flouranthene [g/GJ]	Benzo(a) pyrene [g/GJ]	Benzo(g,h,i) perylene [g/GJ]	indeno(1,2,3-c,d) pyrene [g/GJ]
1990	070101	Passenger cars	Diesel	Highway driving	2,34E-04	2,34E-02	7,01E-10	1,22E-02	7,48E-04	6,78E-04	8,18E-04
1990	070101	Passenger cars	Gasoline 2-stroke	Highway driving	2,97E-04	2,97E-02					
1990	070101	Passenger cars	Gasoline conventional	Highway driving	2,25E-04	2,25E-02	1,34E-08	8,54E-03	5,55E-04	4,27E-04	4,69E-04
1990	070101	Passenger cars	Gasoline catalyst	Highway driving	0,00E+00	0,00E+00					
1990	070101	Passenger cars	LPG	Highway driving	2,34E-04	2,34E-02	8,52E-10	1,49E-02	9,09E-04	8,24E-04	9,94E-04
1990	070102	Passenger cars	Diesel	Rural driving	2,97E-04	2,97E-02					
1990	070102	Passenger cars	Gasoline 2-stroke	Rural driving	2,24E-04	2,24E-02	1,51E-08	9,58E-03	6,23E-04	4,79E-04	5,27E-04
1990	070102	Passenger cars	Gasoline conventional	Rural driving	0,00E+00	0,00E+00					
1990	070102	Passenger cars	Gasoline catalyst	Rural driving	2,34E-04	2,34E-02	5,33E-10	9,30E-03	5,68E-04	5,15E-04	6,21E-04
1990	070102	Passenger cars	LPG	Rural driving	2,97E-04	2,97E-02					
1990	070103	Passenger cars	Diesel	Urban driving	2,25E-04	2,25E-02	1,02E-08	6,47E-03	4,20E-04	3,23E-04	3,56E-04
1990	070103	Passenger cars	Gasoline 2-stroke	Urban driving	0,00E+00	0,00E+00					
1990	070103	Passenger cars	Gasoline conventional	Urban driving	2,34E-04	2,34E-02	4,87E-10	8,51E-03	5,19E-04	4,70E-04	5,68E-04
1990	070103	Passenger cars	Gasoline catalyst	Urban driving	2,97E-04	2,97E-02	1,27E-08	8,09E-03	5,26E-04	4,04E-04	4,45E-04
1990	070103	Passenger cars	LPG	Urban driving	2,34E-04	2,34E-02	5,33E-10	9,31E-03	5,68E-04	5,15E-04	6,22E-04
1990	070201	Light duty vehicles	Diesel	Highway driving	2,97E-04	2,97E-02	1,20E-08	7,63E-03	4,95E-04	3,81E-04	4,19E-04
1990	070201	Light duty vehicles	Gasoline conventional	Highway driving	2,34E-04	2,34E-02	3,98E-10	6,95E-03	4,25E-04	3,85E-04	4,64E-04
1990	070201	Light duty vehicles	Gasoline catalyst	Highway driving	2,97E-04	2,97E-02	7,18E-09	4,56E-03	2,96E-04	2,28E-04	2,51E-04
1990	070202	Light duty vehicles	Diesel	Rural driving	2,34E-04	2,34E-02	1,06E-09	2,09E-03	5,26E-04	7,80E-04	9,74E-05
1990	070202	Light duty vehicles	Gasoline conventional	Rural driving	2,97E-04	2,97E-02					
1990	070202	Light duty vehicles	Gasoline catalyst	Rural driving	2,34E-04	2,34E-02	1,12E-09	2,21E-03	5,57E-04	8,25E-04	1,03E-04
1990	070203	Light duty vehicles	Diesel	Urban driving	2,97E-04	2,97E-02					
1990	070203	Light duty vehicles	Gasoline conventional	Urban driving	2,34E-04	2,34E-02	9,11E-10	1,79E-03	4,51E-04	6,68E-04	8,34E-05
1990	070203	Light duty vehicles	Gasoline catalyst	Urban driving	2,97E-04	2,97E-02					
1990	070301	Heavy duty vehicles	Diesel	Highway driving	2,97E-04	2,97E-02					
1990	070301	Heavy duty vehicles	Gasoline	Highway driving	2,97E-04	2,97E-02	2,00E-08	1,27E-02	8,24E-04	6,34E-04	6,97E-04
1990	070302	Heavy duty vehicles	Diesel	Rural driving	2,97E-04	2,97E-02	2,39E-08	1,52E-02	9,86E-04	7,59E-04	8,34E-04
1990	070302	Heavy duty vehicles	Gasoline	Rural driving	2,97E-04	2,97E-02	2,41E-08	1,53E-02	9,94E-04	7,65E-04	8,41E-04
1990	070303	Heavy duty vehicles	Diesel	Urban driving	2,34E-04	2,34E-02	7,01E-10	1,22E-02	7,48E-04	6,78E-04	8,18E-04
1990	070303	Heavy duty vehicles	Gasoline	Urban driving	2,97E-04	2,97E-02					
1990	0704	Mopeds	Gasoline		2,25E-04	2,25E-02	1,34E-08	8,54E-03	5,55E-04	4,27E-04	4,69E-04
1990	070501	Motorcycles	Gasoline	Highway driving	0,00E+00	0,00E+00					
1990	070502	Motorcycles	Gasoline	Rural driving	2,34E-04	2,34E-02	8,52E-10	1,49E-02	9,09E-04	8,24E-04	9,94E-04
1990	070503	Motorcycles	Gasoline	Urban driving	2,97E-04	2,97E-02					

Year	SNAP ID	Category	Fuel type	Mode	Dioxins/ Furans [g/GJ]	Flouranthene [g/GJ]	Benzo(b) flouranthene [g/GJ]	Benzo(k) flouranthene [g/GJ]	Benzo(a) pyrene [g/GJ]	Benzo(g,h,i) perylene [g/GJ]	indeno(1,2,3-c,d) pyrene [g/GJ]
2005	070101	Passenger cars	Diesel	Highway driving	0,00E+00	1,28E-02	7,82E-04	7,09E-04	8,56E-04	1,66E-03	8,07E-04
2005	070101	Passenger cars	Gasoline 2-stroke	Highway driving							
2005	070101	Passenger cars	Gasoline conventional	Highway driving	1,39E-08	8,82E-03	5,73E-04	4,41E-04	4,85E-04	1,15E-03	4,41E-04
2005	070101	Passenger cars	Gasoline catalyst	Highway driving	0,00E+00	8,84E-04	1,96E-04	2,45E-04	1,96E-04	3,93E-04	2,95E-04
2005	070101	Passenger cars	LPG	Highway driving							
2005	070102	Passenger cars	Diesel	Rural driving	8,35E-10	1,46E-02	8,91E-04	8,07E-04	9,75E-04	1,89E-03	9,19E-04
2005	070102	Passenger cars	Gasoline 2-stroke	Rural driving							
2005	070102	Passenger cars	Gasoline conventional	Rural driving	1,53E-08	9,74E-03	6,33E-04	4,87E-04	5,36E-04	1,27E-03	4,87E-04
2005	070102	Passenger cars	Gasoline catalyst	Rural driving	0,00E+00	9,87E-04	2,19E-04	2,74E-04	2,19E-04	4,39E-04	3,29E-04
2005	070102	Passenger cars	LPG	Rural driving							
2005	070103	Passenger cars	Diesel	Urban driving	5,54E-10	9,68E-03	5,91E-04	5,36E-04	6,47E-04	1,26E-03	6,10E-04
2005	070103	Passenger cars	Gasoline 2-stroke	Urban driving							
2005	070103	Passenger cars	Gasoline conventional	Urban driving	9,99E-09	6,34E-03	4,12E-04	3,17E-04	3,49E-04	8,25E-04	3,17E-04
2005	070103	Passenger cars	Gasoline catalyst	Urban driving	0,00E+00	5,38E-04	1,19E-04	1,49E-04	1,19E-04	2,39E-04	1,79E-04
2005	070103	Passenger cars	LPG	Urban driving							
2005	070201	Light duty vehicles	Diesel	Highway driving	5,29E-10	9,23E-03	5,64E-04	5,11E-04	6,17E-04	1,20E-03	5,81E-04
2005	070201	Light duty vehicles	Gasoline conventional	Highway driving	1,27E-08	8,09E-03	5,26E-04	4,04E-04	4,45E-04	1,05E-03	4,04E-04
2005	070201	Light duty vehicles	Gasoline catalyst	Highway driving	0,00E+00	6,18E-04	1,37E-04	1,72E-04	1,37E-04	2,75E-04	2,06E-04
2005	070202	Light duty vehicles	Diesel	Rural driving	5,78E-10	1,01E-02	6,17E-04	5,59E-04	6,75E-04	1,31E-03	6,36E-04
2005	070202	Light duty vehicles	Gasoline conventional	Rural driving	1,20E-08	7,63E-03	4,95E-04	3,81E-04	4,19E-04	9,91E-04	3,81E-04
2005	070202	Light duty vehicles	Gasoline catalyst	Rural driving	0,00E+00	5,84E-04	1,30E-04	1,62E-04	1,30E-04	2,59E-04	1,95E-04
2005	070203	Light duty vehicles	Diesel	Urban driving	4,16E-10	7,26E-03	4,43E-04	4,02E-04	4,85E-04	9,42E-04	4,57E-04
2005	070203	Light duty vehicles	Gasoline conventional	Urban driving	6,92E-09	4,39E-03	2,85E-04	2,20E-04	2,42E-04	5,71E-04	2,20E-04
2005	070203	Light duty vehicles	Gasoline catalyst	Urban driving	0,00E+00	3,37E-04	7,49E-05	9,36E-05	7,49E-05	1,50E-04	1,12E-04
2005	070301	Heavy duty vehicles	Diesel	Highway driving	1,03E-09	2,03E-03	5,12E-04	7,59E-04	9,48E-05	7,59E-05	1,33E-04
2005	070301	Heavy duty vehicles	Gasoline	Highway driving							
2005	070302	Heavy duty vehicles	Diesel	Rural driving	1,05E-09	2,07E-03	5,21E-04	7,72E-04	9,65E-05	7,70E-05	1,35E-04
2005	070302	Heavy duty vehicles	Gasoline	Rural driving							
2005	070303	Heavy duty vehicles	Diesel	Urban driving	8,54E-10	1,68E-03	4,23E-04	6,26E-04	7,82E-05	6,25E-05	1,10E-04
2005	070303	Heavy duty vehicles	Gasoline	Urban driving							
2005	0704	Mopeds	Gasoline								
2005	070501	Motorcycles	Gasoline	Highway driving	2,02E-08	1,28E-02	8,32E-04	6,40E-04	7,04E-04	1,66E-03	6,40E-04
2005	070502	Motorcycles	Gasoline	Rural driving	2,41E-08	1,53E-02	9,96E-04	7,66E-04	8,43E-04	1,99E-03	7,66E-04
2005	070503	Motorcycles	Gasoline	Urban driving	2,44E-08	1,55E-02	1,01E-03	7,75E-04	8,52E-04	2,01E-03	7,75E-04

Year	SNAP ID	Category	Fuel type	Mode	Dioxins/ Furans [ng/GJ]	Flouranthene [microg/GJ]	Benzo(b) flouranthene [microg/GJ]	Benzo(k) flouranthene [microg/GJ]	Benzo(a) pyrene [microg/GJ]	Benzo(g,h,i) perylene [microg/GJ]	indeno(1,2,3-c,d) pyrene [microg/GJ]
1990	0801	Military	Diesel		0,23	23,42	0,71	4391,42	570,64	568,31	289,75
1990	0801	Military	Jet fuel	< 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	0801	Military	Jet fuel	> 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	0801	Military	Gasoline		0,23	22,83	6,27	5257,47	277,33	116,39	141,99
1990	0801	Military	Aviation gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	0802	Railways	Diesel		0,23	23,42	0,70	1365,92	348,03	388,90	57,47
1990	0802	Railways	Kerosene								
1990	0802	Railways	Gasoline		0,23	22,83	6,27	5257,47	277,33	116,39	141,99
1990	0803	Inland waterways	Diesel		0,23	23,42	0,71	4391,42	570,64	568,31	289,75
1990	0803	Inland waterways	Gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	080402	National sea traffic	Residual oil		9,78	22,00	13,42	5190,00	270,00	50,00	20,00
1990	080402	National sea traffic	Diesel		4,68	11,71	12,01	7420,00	640,00	300,00	150,00
1990	080402	National sea traffic	Kerosene								
1990	080402	National sea traffic	LPG								
1990	080403	Fishing	Residual oil		9,78	22,00	13,42	5190,00	270,00	50,00	20,00
1990	080403	Fishing	Diesel		4,68	11,71	12,01	7420,00	640,00	300,00	150,00
1990	080403	Fishing	Kerosene								
1990	080403	Fishing	Gasoline		0,23	22,83	11,42	3420,09	342,47	146,12	244,29
1990	080403	Fishing	LPG								
1990	080404	International sea traffic	Residual oil		9,78	22,00	13,42	4120,00	200,00	90,00	70,00
1990	080404	International sea traffic	Diesel		4,68	11,71	12,01	7420,00	640,00	300,00	150,00
1990	080501	Air traffic. other airports	Jet fuel	Dom. < 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	080501	Air traffic. other airports	Aviation gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	080502	Air traffic. other airports	Jet fuel	Int. < 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	080502	Air traffic. other airports	Aviation gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	080503	Air traffic. other airports	Jet fuel	Dom. > 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	080504	Air traffic. other airports	Jet fuel	Int. > 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	0806	Agriculture	Diesel		0,23	23,42	0,71	4391,42	570,64	568,31	289,75
1990	0806	Agriculture	Gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	0807	Forestry	Diesel		0,23	23,42	0,71	4391,42	570,64	568,31	289,75
1990	0807	Forestry	Gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	0808	Industry	Diesel		0,23	23,42	0,71	4391,42	570,64	568,31	289,75
1990	0808	Industry	Gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	0808	Industry	LPG								
1990	0809	Household and gardening	Gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	080501	Air traffic. CPH. airport	Jet fuel	Dom. < 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	080501	Air traffic. Copenhagen airport	Aviation gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	080502	Air traffic. Copenhagen airport	Jet fuel	Int. < 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	080502	Air traffic. Copenhagen airport	Aviation gasoline		0,23	22,83	5,11	4328,53	209,06	71,27	114,03
1990	080503	Air traffic. Copenhagen airport	Jet fuel	Dom. > 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00
1990	080504	Air traffic. Copenhagen airport	Jet fuel	Int. > 3000 ft	0,23	22,83	0,00	0,00	0,00	0,00	0,00

Year	SNAP ID	Category	Fuel type	Mode	Dioxins/ Furans [g/GJ]	Flouranthene [g/GJ]	Benzo(b) flouranthene [g/GJ]	Benzo(k) flouranthene [g/GJ]	Benzo(a) pyrene [g/GJ]	Benzo(g,h,i) perylene [g/GJ]	indeno(1,2,3-c,d) pyrene [g/GJ]
2005	801	Military	Diesel		0.71	0,71	4349,86	510,47	495,91	255,72	464,46
2005	801	Military	Jet fuel	< 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	801	Military	Jet fuel	> 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	801	Military	Gasoline		6.89	6,89	2151,74	179,80	115,04	118,07	357,51
2005	801	Military	Aviation gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	802	Railways	Diesel		0.72	0,72	1411,28	359,58	401,81	59,38	50,80
2005	803	Inland waterways	Diesel		0.71	0,71	4349,86	510,47	495,91	255,72	464,46
2005	803	Inland waterways	Gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	80402	National sea traffic	Residual oil		13.42	13,42	5190,00	270,00	50,00	20,00	70,00
2005	80402	National sea traffic	Diesel		12.01	12,01	7420,00	640,00	300,00	150,00	1430,00
2005	80402	National sea traffic	Kerosene								
2005	80402	National sea traffic	LPG								
2005	80403	Fishing	Residual oil		13.42	13,42	5190,00	270,00	50,00	20,00	70,00
2005	80403	Fishing	Diesel		12.01	12,01	7420,00	640,00	300,00	150,00	1430,00
2005	80403	Fishing	Kerosene								
2005	80403	Fishing	Gasoline		11.42	11,42	3420,00	342,00	146,00	244,00	489,00
2005	80403	Fishing	LPG								
2005	80404	International sea traffic	Residual oil		13.42	13,42	4120,00	200,00	90,00	70,00	260,00
2005	80404	International sea traffic	Diesel		12.01	12,01	7420,00	640,00	300,00	150,00	1430,00
2005	80501	Air traffic. other airports	Jet fuel	Dom. < 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	80501	Air traffic. other airports	Aviation gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	80502	Air traffic. other airports	Jet fuel	Int. < 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	80502	Air traffic. other airports	Aviation gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	80503	Air traffic. other airports	Jet fuel	Dom. > 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	80504	Air traffic. other airports	Jet fuel	Int. > 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	806	Agriculture	Diesel		0.71	0,71	4349,86	510,47	495,91	255,72	464,46
2005	806	Agriculture	Gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	807	Forestry	Diesel		0.71	0,71	4349,86	510,47	495,91	255,72	464,46
2005	807	Forestry	Gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	808	Industry	Diesel		0.71	0,71	4349,86	510,47	495,91	255,72	464,46
2005	808	Industry	Gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	808	Industry	LPG								
2005	809	Household and gardening	Gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95

2005	80501	Air traffic. Copenhagen airport	Jet fuel	Dom. < 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	80501	Air traffic. Copenhagen airport	Aviation gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	80502	Air traffic. Copenhagen airport	Jet fuel	Int. < 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	80502	Air traffic. Copenhagen airport	Aviation gasoline		5.11	5,11	4328,53	209,06	71,27	114,03	688,95
2005	80503	Air traffic. Copenhagen airport	Jet fuel	Dom. > 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00
2005	80504	Air traffic. Copenhagen airport	Jet fuel	Int. > 3000 ft	0.00	0,00	0,00	0,00	0,00	0,00	0,00

Year	Category	Mode	SNAP ID	Dioxins/ Furans [kg]	Flouranthene [kg]	Benzo(b) flouranthene [kg]	Benzo(k) flouranthene [kg]	Benzo(a) pyrene [kg]	Benzo(g,h,i) perylene [kg]	indeno(1,2,3-c,d) pyrene [kg]
1990	Passenger cars	Highway driving	70101	0,1	73,2	4,7	3,7	4,1	9,5	3,8
1990	Passenger cars	Rural driving	70102	0,4	253,5	16,4	12,8	14,3	33,0	13,1
1990	Passenger cars	Urban driving	70103	0,3	236,3	15,2	12,0	13,3	30,7	12,2
1990	Light duty vehicles	Highway driving	70201	0,0	17,6	1,1	1,0	1,2	2,3	1,1
1990	Light duty vehicles	Rural driving	70202	0,0	69,1	4,2	3,8	4,5	9,0	4,3
1990	Light duty vehicles	Urban driving	70203	0,0	60,3	3,7	3,3	4,0	7,8	3,7
1990	Heavy duty vehicles	Highway driving	70301	0,0	17,9	4,5	6,7	0,8	0,7	1,2
1990	Heavy duty vehicles	Rural driving	70302	0,0	34,6	8,7	12,9	1,6	1,3	2,3
1990	Heavy duty vehicles	Urban driving	70303	0,0	23,6	6,0	8,8	1,1	0,9	1,5
1990	Mopeds		704							
1990	Motorcycles	Highway driving	70501	0,0	0,9	0,1	0,0	0,0	0,1	0,0
1990	Motorcycles	Rural driving	70502	0,0	1,9	0,1	0,1	0,1	0,3	0,1
1990	Motorcycles	Urban driving	70503	0,0	2,3	0,2	0,1	0,1	0,3	0,1
1990	Evaporation		706							
1990	Military		801							
1990	Railways		802							
1990	Inland waterways		803	0,0	0,7	0,1	0,1	0,0	0,1	0,0
1990	National sea traffic		80402	0,0	5,5	1,4	1,6	0,2	0,2	0,4
1990	Fishing		80403	0,0	2,8	0,3	0,2	0,1	0,4	0,2
1990	International sea traffic		80404	0,1	40,6	2,8	1,0	0,5	4,2	3,4
1990	Air traffic. Dom. < 3000 ft.		80501	0,1	74,8	6,5	3,0	1,5	14,4	11,9
1990	Air traffic. Int. < 3000 ft.		80502	0,5	203,9	13,2	6,1	3,7	24,1	19,4
1990	Air traffic. Dom. > 3000 ft.		80503	0,0	0,5	0,0	0,0	0,0	0,1	0,0
1990	Air traffic. Int. > 3000 ft.		80504	0,0	0,2	0,0	0,0	0,0	0,0	0,0
1990	Agriculture		806	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1990	Forestry		807	0,0	0,0	0,0	0,0	0,0	0,0	0,0
1990	Industry		808	0,0	75,5	9,6	9,4	4,9	9,6	5,0
1990	Household and gardening		809	0,0	2,1	0,2	0,1	0,1	0,3	0,1

Year	Category	Mode	SNAP ID	Dioxins/ Furans [kg]	Flouranthene [kg]	Benzo(b) flouranthene [kg]	Benzo(k) flouranthene [kg]	Benzo(a) pyrene [kg]	Benzo(g,h,i) perylene [kg]	indeno(1,2,3-c,d) pyrene [kg]
2005	Passenger cars	Highway driving	70101	0,0	61,6	5,3	5,5	5,4	11,0	6,3
2005	Passenger cars	Rural driving	70102	0,1	153,2	13,4	13,8	13,7	27,6	15,9
2005	Passenger cars	Urban driving	70103	0,0	106,1	9,0	9,1	9,2	18,5	10,5
2005	Light duty vehicles	Highway driving	70201	0,0	37,8	2,3	2,1	2,5	5,0	2,4
2005	Light duty vehicles	Rural driving	70202	0,0	125,9	7,8	7,1	8,5	16,6	8,1
2005	Light duty vehicles	Urban driving	70203	0,0	88,2	5,5	5,0	5,9	11,6	5,7
2005	Heavy duty vehicles	Highway driving	70301	0,0	24,9	6,3	9,3	1,2	0,9	1,6
2005	Heavy duty vehicles	Rural driving	70302	0,0	38,1	9,6	14,3	1,8	1,4	2,5
2005	Heavy duty vehicles	Urban driving	70303	0,0	21,6	5,4	8,1	1,0	0,8	1,4
2005	Mopeds		704							
2005	Motorcycles	Highway driving	70501	0,0	1,9	0,1	0,1	0,1	0,3	0,1
2005	Motorcycles	Rural driving	70502	0,0	5,2	0,3	0,3	0,3	0,7	0,3
2005	Motorcycles	Urban driving	70503	0,0	6,3	0,4	0,3	0,3	0,8	0,3
2005	Evaporation		706							
2005	Military		801							
2005	Railways		802							
2005	Inland waterways		803	0,0	5,6	0,7	0,6	0,3	0,6	0,3
2005	National sea traffic		80402	0,0	4,4	1,1	1,3	0,2	0,2	0,3
2005	Fishing		80403	0,0	6,1	0,6	0,5	0,3	0,7	0,4
2005	International sea traffic		80404	0,1	40,2	3,2	1,4	0,7	6,3	5,2
2005	Air traffic. Dom. < 3000 ft.		80501	0,1	47,0	4,1	1,9	1,0	9,1	7,5
2005	Air traffic. Int. < 3000 ft.		80502	0,4	188,1	13,0	6,0	3,5	25,3	20,5
2005	Air traffic. Dom. > 3000 ft.		80503	0,0	0,4	0,0	0,0	0,0	0,1	0,0
2005	Air traffic. Int. > 3000 ft.		80504	0,0	0,0	0,0	0,0	0,0	0,0	0,0
2005	Agriculture		806	0,0	0,0	0,0	0,0	0,0	0,0	0,0
2005	Forestry		807	0,0	0,0	0,0	0,0	0,0	0,0	0,0
2005	Industry		808	0,0	63,8	7,4	7,2	3,7	6,9	3,9
2005	Household and gardening		809	0,0	1,0	0,1	0,1	0,0	0,1	0,1

Annex 2B-14: Fuel use and emissions in CRF format

Fuel

IPCC ID	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Industry-Other (1A2f)	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	12,0	12,1	12,3	12,4	12,5	13,0
Civil Aviation (1A3a)	3,6	3,3	3,7	3,8	3,6	3,4	2,8	2,7	2,6	2,7	2,8	2,8	2,9	2,7	2,4	2,1	2,2	1,9	1,9	1,8	1,9
Road (1A3b)	110,8	117,1	117,2	118,0	119,3	125,9	131,5	133,9	133,3	138,1	142,8	146,1	149,0	151,5	153,5	152,0	152,0	153,5	159,5	163,6	165,3
Railways (1A3c)	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	3,1	2,9	2,8	3,0	2,9	3,1
Navigation (1A3d)	6,1	7,0	7,5	6,6	7,5	7,3	8,4	7,9	8,6	8,0	8,5	9,1	8,1	6,5	6,0	6,1	6,0	7,1	7,1	6,6	7,3
Residential (1A4b)	1,9	1,9	1,9	1,9	1,9	1,9	1,9	2,0	2,0	2,0	2,1	2,1	2,2	2,2	2,3	2,3	2,8	3,2	3,6	4,1	4,1
Ag./for./fish. (1A4c)	26,3	27,9	25,7	27,2	27,6	27,8	28,0	27,2	25,1	24,1	24,0	23,6	23,8	23,4	23,3	23,0	22,6	22,5	22,0	21,1	21,3
Military (1A5)	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	1,5	1,3	1,2	1,3	3,3	3,7
Navigation int. (1A3d)	17,3	20,1	29,4	37,3	38,2	40,2	36,1	37,9	56,1	63,1	66,3	63,0	57,8	58,2	54,6	56,0	47,3	39,1	41,2	33,5	34,5
Civil Aviation int. (1A3a)	19,3	20,9	22,4	24,0	25,1	24,1	22,7	23,5	23,0	25,2	25,9	27,4	27,9	30,0	31,8	32,6	33,1	28,6	29,8	34,0	35,8

pol_name	IPCC ID	Unit	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
SO2	Industry-Other (1A2f)	[tons]	2402	1441	1440	1438	956	952	955	957	957	959	968
SO2	Civil Aviation (1A3a)	[tons]	82	77	85	86	83	77	64	62	61	63	63
SO2	Road (1A3b)	[tons]	11620	7862	7846	7857	5487	5766	5902	3819	1562	1659	1679
SO2	Railways (1A3c)	[tons]	1152	695	618	641	393	376	382	263	105	95	96
SO2	Navigation (1A3d)	[tons]	4191	5482	6216	4429	6483	5257	5437	3577	3778	3287	2915
SO2	Residential (1A4b)	[tons]	4	4	4	4	4	4	4	4	5	5	5
SO2	Ag./for./fish. (1A4c)	[tons]	5029	3751	3442	3233	2482	2506	2529	2465	2273	2185	2176
SO2	Military (1A5)	[tons]	408	260	193	72	70	48	206	82	76	80	80
SO2	Navigation int. (1A3d)	[tons]	18333	22047	36943	48034	48337	42404	34348	31152	59669	60081	66260
SO2	Civil Aviation int. (1A3a)	[tons]	444	480	515	551	578	554	521	541	530	580	596
NOx	Industry-Other (1A2f)	[tons]	10903	10964	11011	11044	11065	11081	11282	11440	11558	11677	11882
NOx	Civil Aviation (1A3a)	[tons]	1203	1132	1237	1252	1208	1123	920	902	900	940	958
NOx	Road (1A3b)	[tons]	91991	97690	97680	98458	99716	105313	106787	106083	102067	100019	98950
NOx	Railways (1A3c)	[tons]	6025	6063	5391	5589	5145	4913	4995	5284	5485	4971	5015
NOx	Navigation (1A3d)	[tons]	8058	9567	10400	8738	10606	10138	11507	10240	10434	9392	9839

NOx	Residential (1A4b)	[tons]	114	117	119	122	122	123	134	143	152	161	168
NOx	Ag./for./fish. (1A4c)	[tons]	19971	21784	20064	21885	22693	23339	24144	24065	22223	21888	22142
NOx	Military (1A5)	[tons]	2331	2011	1620	979	871	494	1851	1005	1287	1269	1754
NOx	Navigation int. (1A3d)	[tons]	23987	28474	43643	56580	58561	62285	55731	57636	89632	101094	106928
NOx	Civil Aviation int. (1A3a)	[tons]	5663	6129	6569	7035	7313	7016	6586	6846	6702	7317	7517
NMVOC	Industry-Other (1A2f)	[tons]	2422	2395	2368	2339	2304	2266	2231	2191	2147	2107	2088
NMVOC	Civil Aviation (1A3a)	[tons]	216	213	190	198	193	186	168	164	161	191	206
NMVOC	Road (1A3b)	[tons]	79975	79758	79141	78749	77199	81015	81701	80670	76088	70151	68198
NMVOC	Railways (1A3c)	[tons]	393	396	352	365	336	321	326	345	358	324	327
NMVOC	Navigation (1A3d)	[tons]	1361	1412	1469	1444	1529	1545	1634	1632	1696	1691	1745
NMVOC	Residential (1A4b)	[tons]	4667	4637	4606	4574	4567	4560	4600	4609	4592	4606	4699
NMVOC	Ag./for./fish. (1A4c)	[tons]	6446	6508	6308	6367	6318	6255	5889	5446	5010	4699	4547
NMVOC	Military (1A5)	[tons]	597	465	174	488	313	54	170	92	127	123	157
NMVOC	Navigation int. (1A3d)	[tons]	880	1029	1527	1948	2003	2116	1900	1990	2993	3378	3560
NMVOC	Civil Aviation int. (1A3a)	[tons]	261	288	313	342	361	331	309	316	309	308	343
CH4	Industry-Other (1A2f)	[tons]	63	63	62	61	61	60	58	57	56	54	53
CH4	Civil Aviation (1A3a)	[tons]	8	8	8	8	8	7	6	6	6	7	7
CH4	Road (1A3b)	[tons]	2589	2636	2667	2626	2591	2739	2944	2994	3078	3068	3232
CH4	Railways (1A3c)	[tons]	15	15	14	14	13	12	13	13	14	12	13
CH4	Navigation (1A3d)	[tons]	24	25	27	26	28	28	30	30	32	31	32
CH4	Residential (1A4b)	[tons]	192	189	186	183	182	182	181	178	176	174	173
CH4	Ag./for./fish. (1A4c)	[tons]	158	157	150	149	146	142	135	127	118	112	107
CH4	Military (1A5)	[tons]	34	28	18	19	14	5	21	11	14	14	20
CH4	Navigation int. (1A3d)	[tons]	27	32	47	60	62	65	59	62	93	104	110
CH4	Civil Aviation int. (1A3a)	[tons]	25	27	30	32	33	31	29	30	29	31	35
CO	Industry-Other (1A2f)	[tons]	9863	9784	9702	9611	9502	9379	9294	9188	9070	8956	8910
CO	Civil Aviation (1A3a)	[tons]	1256	1241	1118	1167	1140	1098	989	955	930	1098	1180
CO	Road (1A3b)	[tons]	558621	538378	519432	473828	446031	457162	472489	462655	451299	410548	####
CO	Railways (1A3c)	[tons]	1098	1105	982	1018	937	895	910	963	999	906	914
CO	Navigation (1A3d)	[tons]	4813	4983	5230	5210	5547	5662	6015	6067	6325	6380	6615
CO	Residential (1A4b)	[tons]	64155	63226	62266	61278	60942	60598	60675	60462	60379	60245	60312
CO	Ag./for./fish. (1A4c)	[tons]	61459	60007	57560	56042	54083	52084	49140	45916	42825	39936	37775
CO	Military (1A5)	[tons]	4170	3099	1315	3127	1948	425	1028	525	859	880	905
CO	Navigation int. (1A3d)	[tons]	2903	3396	5038	6427	6608	6981	6268	6566	9873	11143	11745

CO	Civil Aviation int. (1A3a)	[tons]	1103	1207	1289	1416	1564	1442	1357	1399	1388	1342	1421
CO2	Industry-Other (1A2f)	[ktons]	852	852	851	849	845	842	843	843	842	841	848
CO2	Civil Aviation (1A3a)	[ktons]	256	241	268	271	262	243	199	193	190	196	199
CO2	Road (1A3b)	[ktons]	8135	8600	8611	8669	8764	9250	9663	9833	9793	10142	10488
CO2	Railways (1A3c)	[ktons]	364	366	326	338	311	297	302	319	331	300	303
CO2	Navigation (1A3d)	[ktons]	462	528	570	499	572	554	642	598	645	603	638
CO2	Residential (1A4b)	[ktons]	139	139	138	138	138	138	140	143	146	149	152
CO2	Ag./for./fish. (1A4c)	[ktons]	1945	2062	1900	2014	2042	2059	2070	2014	1857	1784	1773
CO2	Military (1A5)	[ktons]	402	316	361	196	165	119	287	141	237	252	252
CO2	Navigation int. (1A3d)	[ktons]	1320	1537	2261	2869	2936	3087	2762	2887	4300	4829	5061
CO2	Civil Aviation int. (1A3a)	[ktons]	1391	1503	1613	1725	1809	1736	1632	1693	1659	1818	1867
N2O	Industry-Other (1A2f)	[tons]	34	34	34	34	34	34	34	35	35	35	35
N2O	Civil Aviation (1A3a)	[tons]	10	10	11	11	11	10	9	9	9	9	10
N2O	Road (1A3b)	[tons]	329	354	358	365	373	394	464	528	579	686	781
N2O	Railways (1A3c)	[tons]	10	10	9	9	9	8	8	9	9	8	8
N2O	Navigation (1A3d)	[tons]	28	32	34	30	34	33	39	36	39	36	38
N2O	Residential (1A4b)	[tons]	2	2	2	2	2	2	2	2	2	2	2
N2O	Ag./for./fish. (1A4c)	[tons]	89	96	87	93	96	97	99	97	87	84	83
N2O	Military (1A5)	[tons]	15	13	13	6	6	4	13	7	9	10	12
N2O	Navigation int. (1A3d)	[tons]	83	97	142	180	185	194	174	182	270	304	318
N2O	Civil Aviation int. (1A3a)	[tons]	47	50	54	58	61	59	56	58	57	63	64

pol_name	IPCC ID	Unit	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SO2	Industry-Other (1A2f)	[tons]	244	246	249	251	253	256	258	261	263	28
SO2	Civil Aviation (1A3a)	[tons]	65	68	62	56	49	52	45	44	40	43
SO2	Road (1A3b)	[tons]	1720	1743	1766	1087	351	351	355	369	378	77
SO2	Railways (1A3c)	[tons]	95	93	78	40	7	7	7	7	7	1
SO2	Navigation (1A3d)	[tons]	2422	2234	1767	1771	1725	1640	1965	1959	2069	1975
SO2	Residential (1A4b)	[tons]	5	5	5	5	5	6	7	8	9	2
SO2	Ag./for./fish. (1A4c)	[tons]	1112	1114	1132	1135	1129	1086	1079	1032	930	628
SO2	Military (1A5)	[tons]	56	54	65	47	27	12	19	17	46	57
SO2	Navigation int. (1A3d)	[tons]	62320	57078	48000	50568	56634	45358	31538	33060	28581	36544
SO2	Civil Aviation int. (1A3a)	[tons]	629	642	689	731	750	761	658	684	782	822
NOx	Industry-Other (1A2f)	[tons]	12080	12248	12425	12262	12096	11869	11617	11214	10744	10664

NOx	Civil Aviation (1A3a)	[tons]	971	998	911	815	723	747	636	590	546	579
NOx	Road (1A3b)	[tons]	96492	92777	88801	85628	80695	77854	73918	73385	71164	68105
NOx	Railways (1A3c)	[tons]	4977	4846	4089	3730	3727	3396	3396	3540	3478	3724
NOx	Navigation (1A3d)	[tons]	10915	9580	8110	7563	7994	7999	10116	9782	8903	9645
NOx	Residential (1A4b)	[tons]	174	180	186	190	194	225	256	287	317	327
NOx	Ag./for./fish. (1A4c)	[tons]	22818	23537	23739	24236	24271	24070	23807	22811	21047	20713
NOx	Military (1A5)	[tons]	961	1212	1407	1091	549	712	483	537	1305	1332
NOx	Navigation int. (1A3d)	[tons]	102221	94977	94125	91400	96911	81585	66095	71376	58906	62825
NOx	Civil Aviation int. (1A3a)	[tons]	7904	8058	8662	9204	9446	9610	8737	9097	10481	11037
NMVOC	Industry-Other (1A2f)	[tons]	2095	2083	2074	1997	1926	1873	1815	1754	1676	1620
NMVOC	Civil Aviation (1A3a)	[tons]	194	186	169	162	156	155	151	143	157	165
NMVOC	Road (1A3b)	[tons]	64334	58199	52954	47138	39795	35959	32434	29946	26344	24325
NMVOC	Railways (1A3c)	[tons]	325	316	267	276	253	248	243	223	217	235
NMVOC	Navigation (1A3d)	[tons]	1804	1765	1698	1665	1653	1620	1643	1579	1479	1394
NMVOC	Residential (1A4b)	[tons]	4798	4894	4985	5099	5209	6083	6955	7837	8731	8727
NMVOC	Ag./for./fish. (1A4c)	[tons]	4281	4111	3846	3678	3478	3304	3094	2858	2596	2483
NMVOC	Military (1A5)	[tons]	94	108	121	110	57	59	48	49	108	113
NMVOC	Navigation int. (1A3d)	[tons]	3398	3138	3158	3003	3126	2651	2190	2334	1914	2005
NMVOC	Civil Aviation int. (1A3a)	[tons]	360	365	386	395	407	406	391	399	451	469
CH4	Industry-Other (1A2f)	[tons]	53	53	53	51	50	49	48	47	46	45
CH4	Civil Aviation (1A3a)	[tons]	7	7	7	6	5	5	5	5	6	7
CH4	Road (1A3b)	[tons]	3414	3267	3255	3068	2933	2846	2634	2568	2333	2280
CH4	Railways (1A3c)	[tons]	12	12	10	11	10	10	9	9	8	9
CH4	Navigation (1A3d)	[tons]	34	32	31	30	31	31	34	34	34	35
CH4	Residential (1A4b)	[tons]	173	173	173	175	177	205	233	261	290	291
CH4	Ag./for./fish. (1A4c)	[tons]	103	99	94	92	90	88	86	83	79	74
CH4	Military (1A5)	[tons]	11	14	16	13	6	8	5	6	15	15
CH4	Navigation int. (1A3d)	[tons]	105	97	98	93	97	82	68	72	59	62
CH4	Civil Aviation int. (1A3a)	[tons]	37	38	40	41	42	42	41	42	47	49
CO	Industry-Other (1A2f)	[tons]	8963	8939	8907	8647	8395	8227	8030	7842	7600	7497
CO	Civil Aviation (1A3a)	[tons]	1117	1085	973	932	895	888	860	832	855	858
CO	Road (1A3b)	[tons]	397918	344700	323670	288968	265177	253608	231607	220869	195682	188071
CO	Railways (1A3c)	[tons]	907	883	745	717	694	637	627	611	599	648
CO	Navigation (1A3d)	[tons]	6823	6709	6644	6711	6883	7059	7452	7606	7701	7802

CO	Residential (1A4b)	[tons]	60886	61386	61815	62860	63852	76214	88416	101233	114073	115088
CO	Ag./for./fish. (1A4c)	[tons]	35100	32933	30332	28201	26081	24195	22133	20006	17819	15899
CO	Military (1A5)	[tons]	627	617	704	705	406	326	320	314	731	821
CO	Navigation int. (1A3d)	[tons]	11211	10351	10417	9905	10313	8745	7225	7701	6316	6615
CO	Civil Aviation int. (1A3a)	[tons]	1502	1564	1662	1743	1790	1797	1610	1670	1845	1914
CO2	Industry-Other (1A2f)	[ktons]	853	860	867	873	879	888	897	907	912	950
CO2	Civil Aviation (1A3a)	[ktons]	205	212	194	174	154	161	140	137	127	133
CO2	Road (1A3b)	[ktons]	10729	10941	11128	11273	11162	11165	11280	11723	12024	12157
CO2	Railways (1A3c)	[ktons]	301	293	247	232	228	211	210	218	216	232
CO2	Navigation (1A3d)	[ktons]	678	605	489	447	453	449	536	531	493	543
CO2	Residential (1A4b)	[ktons]	155	159	162	166	169	201	233	265	298	297
CO2	Ag./for./fish. (1A4c)	[ktons]	1748	1760	1727	1726	1700	1671	1666	1629	1558	1573
CO2	Military (1A5)	[ktons]	176	171	204	182	111	97	89	92	239	271
CO2	Navigation int. (1A3d)	[ktons]	4803	4403	4414	4155	4279	3605	2966	3130	2545	2636
CO2	Civil Aviation int. (1A3a)	[ktons]	1971	2010	2159	2290	2350	2385	2059	2142	2449	2575
N2O	Industry-Other (1A2f)	[tons]	36	36	36	37	37	38	38	38	39	40
N2O	Civil Aviation (1A3a)	[tons]	11	11	9	9	8	8	8	8	8	8
N2O	Road (1A3b)	[tons]	868	978	1066	1137	1176	1196	1247	1303	1362	1384
N2O	Railways (1A3c)	[tons]	8	8	7	6	6	6	6	6	6	6
N2O	Navigation (1A3d)	[tons]	40	36	28	25	26	25	31	30	28	31
N2O	Residential (1A4b)	[tons]	2	3	3	3	3	3	4	4	5	5
N2O	Ag./for./fish. (1A4c)	[tons]	84	84	84	84	83	82	82	79	75	76
N2O	Military (1A5)	[tons]	7	8	10	8	4	5	4	5	12	13
N2O	Navigation int. (1A3d)	[tons]	302	277	278	262	269	227	187	197	160	166
N2O	Civil Aviation int. (1A3a)	[tons]	69	70	75	80	82	82	72	75	85	89

TSP, PM_{10} and $PM_{2.5}$

pol_name	IPCC ID	Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
TSP	Industry-Other (1A2f)	[tons]	1577	1533	1484	1433	1383	1349	1317	1284	1249	1193	1135	1121	1098	1075	1037	1002
TSP	Civil Aviation (1A3a)	[tons]	5	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3
TSP	Road (1A3b)	[tons]	5062	5187	5030	5020	5119	4906	4810	4436	4182	3977	3721	3589	3349	3375	3168	3124
TSP	Railways (1A3c)	[tons]	202	205	217	225	204	206	204	199	168	146	141	125	124	119	115	124
TSP	Navigation (1A3d)	[tons]	799	800	556	639	601	596	526	501	397	390	385	375	421	423	435	433
TSP	Residential (1A4b)	[tons]	39	39	39	38	39	40	42	43	45	46	47	57	67	77	87	87
TSP	Ag./for./fish. (1A4c)	[tons]	2716	2627	2471	2362	2178	2131	1957	1879	1734	1659	1566	1496	1414	1328	1233	1170
TSP	Military (1A5)	[tons]	12	117	69	66	57	120	48	78	84	53	19	41	19	24	51	45
TSP	Navigation int. (1A3d)	[tons]	5938	4785	4410	8851	8650	10130	9823	9065	7697	8077	8779	7169	5093	4946	4334	5844
TSP	Civil Aviation int. (1A3a)	[tons]	28	27	28	27	29	30	32	32	35	37	38	38	33	35	40	42
PM10	Industry-Other (1A2f)	[tons]	1577	1533	1484	1433	1383	1349	1317	1284	1249	1193	1135	1121	1098	1075	1037	1002
PM10	Civil Aviation (1A3a)	[tons]	5	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3
PM10	Road (1A3b)	[tons]	5062	5187	5030	5020	5119	4906	4810	4436	4182	3977	3721	3589	3349	3375	3168	3124
PM10	Railways (1A3c)	[tons]	202	205	217	225	204	206	204	199	168	146	141	125	124	119	115	124
PM10	Navigation (1A3d)	[tons]	792	793	552	634	596	591	522	498	395	388	383	373	418	420	433	430
PM10	Residential (1A4b)	[tons]	39	39	39	38	39	40	42	43	45	46	47	57	67	77	87	87
PM10	Ag./for./fish. (1A4c)	[tons]	2714	2624	2468	2360	2176	2129	1955	1876	1732	1657	1564	1493	1412	1326	1231	1168
PM10	Military (1A5)	[tons]	12	117	69	66	57	120	48	78	84	53	19	41	19	24	51	45
PM10	Navigation int. (1A3d)	[tons]	5879	4737	4366	8762	8563	10028	9724	8974	7620	7996	8691	7097	5042	4896	4291	5785
PM10	Civil Aviation int. (1A3a)	[tons]	28	27	28	27	29	30	32	32	35	37	38	38	33	35	40	42
PM2.5	Industry-Other (1A2f)	[tons]	1577	1533	1484	1433	1383	1349	1317	1284	1249	1193	1135	1121	1098	1075	1037	1002
PM2.5	Civil Aviation (1A3a)	[tons]	5	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3
PM2.5	Road (1A3b)	[tons]	5062	5187	5030	5020	5119	4906	4810	4436	4182	3977	3721	3589	3349	3375	3168	3124
PM2.5	Railways (1A3c)	[tons]	202	205	217	225	204	206	204	199	168	146	141	125	124	119	115	124
PM2.5	Navigation (1A3d)	[tons]	788	789	550	631	593	588	520	496	394	387	382	372	417	419	431	429
PM2.5	Residential (1A4b)	[tons]	39	39	39	38	39	40	42	43	45	46	47	57	67	77	87	87
PM2.5	Ag./for./fish. (1A4c)	[tons]	2712	2622	2467	2359	2175	2128	1953	1875	1731	1656	1563	1492	1411	1325	1231	1167
PM2.5	Military (1A5)	[tons]	12	117	69	66	57	120	48	78	84	53	19	41	19	24	51	45
PM2.5	Navigation int. (1A3d)	[tons]	5849	4713	4344	8718	8520	9978	9675	8929	7582	7956	8647	7062	5017	4872	4269	5756
PM2.5	Civil Aviation int. (1A3a)	[tons]	28	27	28	27	29	30	32	32	35	37	38	38	33	35	40	42

Heavy metals

Arsenic	Civil Aviation (1A3a)	[kg]										0	0	0	0	0	0	0
Arsenic	Navigation (1A3d)	[kg]	50	58	49	40	32	27	25	22	22	22	22	22	30	28	25	23
Arsenic	Ag./for./fish. (1A4c)	[kg]	12	12	12	10	10	9	10	10	10	10	10	9	9	9	7	7
Arsenic	Military (1A5)	[kg]					0					0	0	0	0	0	0	0
Arsenic	Navigation int. (1A3d)	[kg]	363	302	276	475	505	514	332	426	366	379	432	342	240	274	230	268
Arsenic	Civil Aviation int. (1A3a)	[kg]										0	0	0	0	0	0	0
Cadmium	Industry-Other (1A2f)	[kg]	2	2	2	2	2	2	2	2	3	2	3	3	3	3	3	3
Cadmium	Civil Aviation (1A3a)	[kg]	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0
Cadmium	Road (1A3b)	[kg]	29	30	31	31	32	33	34	34	35	35	35	35	35	37	38	38
Cadmium	Railways (1A3c)	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cadmium	Navigation (1A3d)	[kg]	4	4	4	3	3	3	3	3	2	2	2	2	3	3	2	2
Cadmium	Residential (1A4b)	[kg]	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Cadmium	Ag./for./fish. (1A4c)	[kg]	6	7	6	6	6	6	6	6	5	5	5	5	5	5	5	5
Cadmium	Military (1A5)	[kg]	0	1	0	1	1	1	1	1	1	1	0	0	0	0	1	1
Cadmium	Navigation int. (1A3d)	[kg]	24	20	19	32	34	35	20	30	27	27	29	24	18	20	16	18
Cadmium	Civil Aviation int. (1A3a)	[kg]	6	5	5	5	6	6	6	6	7	7	8	8	7	7	8	8
Chromium	Industry-Other (1A2f)	[kg]	12	12	12	12	12	12	12	12	13	13	13	13	13	13	13	14
Chromium	Civil Aviation (1A3a)	[kg]	4	3	3	3	3	3	3	3	3	3	2	3	2	2	2	2
Chromium	Road (1A3b)	[kg]	146	152	155	154	159	165	169	172	175	177	175	176	177	184	189	191
Chromium	Railways (1A3c)	[kg]	5	5	5	5	5	5	5	5	4	4	4	3	3	3	3	4
Chromium	Navigation (1A3d)	[kg]	22	26	22	19	16	14	14	13	12	12	12	12	15	14	13	13
Chromium	Residential (1A4b)	[kg]	2	2	2	2	2	2	2	2	3	3	3	3	4	4	5	5
Chromium	Ag./for./fish. (1A4c)	[kg]	30	30	29	27	26	26	26	26	25	25	25	25	24	24	23	23
Chromium	Military (1A5)	[kg]	2	5	2	4	4	4	3	3	3	3	2	2	1	1	4	4
Chromium	Navigation int. (1A3d)	[kg]	150	127	118	199	213	218	133	182	161	164	184	147	106	120	100	114
Chromium	Civil Aviation int. (1A3a)	[kg]	28	26	27	26	29	30	31	32	34	36	37	38	33	34	39	41
Copper	Industry-Other (1A2f)	[kg]	411	413	413	413	414	418	421	425	429	432	435	440	445	450	454	474
Copper	Civil Aviation (1A3a)	[kg]	131	107	104	102	106	107	110	114	104	94	83	87	75	74	68	72
Copper	Road (1A3b)	[kg]	4948	5167	5256	5234	5422	5606	5735	5848	5948	6026	5967	5970	6033	6270	6432	6505
Copper	Railways (1A3c)	[kg]	160	162	172	178	162	163	162	157	133	125	123	114	113	117	116	125
Copper	Navigation (1A3d)	[kg]	76	85	78	71	66	62	62	61	63	66	69	71	81	81	80	79
Copper	Residential (1A4b)	[kg]	73	75	76	78	79	81	83	84	86	88	90	107	124	141	158	158
Copper	Ag./for./fish. (1A4c)	[kg]	715	709	678	674	638	654	624	633	600	597	582	586	586	586	592	600
Copper	Military (1A5)	[kg]	64	154	76	128	136	136	95	92	110	98	60	52	48	50	129	146

Copper	Navigation int. (1A3d)	[kg]	363	302	276	475	505	514	332	426	366	379	432	342	240	274	230	268
Copper	Civil Aviation int. (1A3a)	[kg]	936	880	913	894	980	1006	1063	1084	1164	1234	1267	1286	1110	1155	1320	1388
Mercury	Civil Aviation (1A3a)	[kg]										0	0	0	0	0	0	0
Mercury	Navigation (1A3d)	[kg]	5	6	6	7	7	8	9	7	5	5	5	5	5	5	5	6
Mercury	Ag./for./fish. (1A4c)	[kg]	12	12	12	10	10	9	10	10	10	10	10	9	9	9	7	7
Mercury	Military (1A5)	[kg]					0					0	0	0	0	0	0	0
Mercury	Navigation int. (1A3d)	[kg]	28	26	30	40	47	51	14	46	50	44	43	38	34	34	27	26
Mercury	Civil Aviation int. (1A3a)	[kg]										0	0	0	0	0	0	0
Nickel	Industry-Other (1A2f)	[kg]	17	17	17	17	17	17	17	17	18	18	18	18	18	19	19	20
Nickel	Civil Aviation (1A3a)	[kg]	5	4	4	4	4	4	5	5	4	4	3	4	3	3	3	3
Nickel	Road (1A3b)	[kg]	204	213	216	215	223	231	236	241	245	248	246	246	248	258	265	268
Nickel	Railways (1A3c)	[kg]	7	7	7	7	7	7	7	6	5	5	5	5	5	5	5	5
Nickel	Navigation (1A3d)	[kg]	2826	3256	2681	2061	1594	1179	1024	899	1011	1060	1114	1117	1525	1407	1258	1114
Nickel	Residential (1A4b)	[kg]	3	3	3	3	3	3	3	3	4	4	4	4	5	6	7	7
Nickel	Ag./for./fish. (1A4c)	[kg]	45	46	45	41	39	39	39	39	38	38	38	37	37	36	34	35
Nickel	Military (1A5)	[kg]	3	6	3	5	6	6	4	4	5	4	2	2	2	2	5	6
Nickel	Navigation int. (1A3d)	[kg]	20956	17236	15429	27162	28664	29023	19856	23826	19820	20967	24364	19050	12906	15043	12715	15126
Nickel	Civil Aviation int. (1A3a)	[kg]	39	36	38	37	40	41	44	45	48	51	52	53	46	48	54	57
Lead	Industry-Other (1A2f)	[kg]	258	187	160	67	12	12	12	0	0	0	0	0	0	0	0	0
Lead	Civil Aviation (1A3a)	[kg]	1534	1423	1378	1328	1639	1788	1640	1559	1399	1387	1369	1343	1328	1252	1304	1297
Lead	Road (1A3b)	[kg]	97011	75457	68403	28779	51	54	55	57	58	58	57	56	55	55	54	53
Lead	Railways (1A3c)	[kg]	0	0	0	0		0	0	0	0	0	0	0	0			
Lead	Navigation (1A3d)	[kg]	480	372	330	157	46	46	48	20	17	15	16	15	19	19	17	18
Lead	Residential (1A4b)	[kg]	2771	2066	1814	779	140	143	146	1	2	2	2	2	2	2	3	3
Lead	Ag./for./fish. (1A4c)	[kg]	1569	1074	866	349	74	69	66	19	20	20	20	19	19	18	15	15
Lead	Military (1A5)	[kg]	64	80	62	120	86	102	98	123	116	78	114	88	106	78	82	59
Lead	Navigation int. (1A3d)	[kg]	167	144	142	226	247	256	134	218	205	201	216	177	136	149	122	133
Lead	Civil Aviation int. (1A3a)	[kg]	490	465	452	456	153	175	126	145	145	124	118	114	113	106	111	117
Selenium	Industry-Other (1A2f)	[kg]	2	2	2	2	2	2	2	2	3	2	3	3	3	3	3	3
Selenium	Civil Aviation (1A3a)	[kg]	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0
Selenium	Road (1A3b)	[kg]	29	30	31	31	32	33	34	34	35	35	35	35	35	37	38	38
Selenium	Railways (1A3c)	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Selenium	Navigation (1A3d)	[kg]	51	59	52	51	45	44	45	40	33	30	31	30	38	37	33	35
Selenium	Residential (1A4b)	[kg]	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Selenium	Ag./for./fish. (1A4c)	[kg]	51	53	53	43	43	40	42	42	43	43	43	41	41	38	33	33

Selenium	Military (1A5)	[kg]	0	1	0	1	1	1	1	1	1	1	0	0	0	0	1	1
Selenium	Navigation int. (1A3d)	[kg]	334	289	284	451	495	512	269	436	410	401	431	354	273	297	245	267
Selenium	Civil Aviation int. (1A3a)	[kg]	6	5	5	5	6	6	6	6	7	7	8	8	7	7	8	8
Zinc	Industry-Other (1A2f)	[kg]	242	243	243	243	243	246	248	250	252	254	256	259	262	265	267	279
Zinc	Civil Aviation (1A3a)	[kg]	77	63	61	60	62	63	65	67	61	55	49	51	44	43	40	42
Zinc	Road (1A3b)	[kg]	2911	3039	3092	3079	3189	3298	3373	3440	3499	3545	3510	3512	3549	3688	3784	3826
Zinc	Railways (1A3c)	[kg]	94	95	101	105	95	96	95	93	78	73	72	67	67	69	68	73
Zinc	Navigation (1A3d)	[kg]	132	152	138	138	126	127	132	119	103	97	100	100	120	118	111	117
Zinc	Residential (1A4b)	[kg]	43	44	45	46	47	48	49	50	51	52	53	63	73	83	93	93
Zinc	Ag./for./fish. (1A4c)	[kg]	532	532	514	489	467	470	457	462	447	445	437	434	433	427	418	423
Zinc	Military (1A5)	[kg]	38	91	45	75	80	80	56	54	65	58	35	31	28	29	76	86
Zinc	Navigation int. (1A3d)	[kg]	764	664	660	1038	1141	1183	607	1010	959	933	997	821	639	693	570	616
Zinc	Civil Aviation int. (1A3a)	[kg]	551	518	537	526	576	592	625	638	685	726	745	756	653	679	776	817

Dioxins and PAH

Dioxins/furans	Industry-Other (1A2f)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Civil Aviation (1A3a)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Road (1A3b)	[g]	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Dioxins/furans	Railways (1A3c)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Navigation (1A3d)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Residential (1A4b)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Ag./for./fish. (1A4c)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Military (1A5)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/furans	Navigation int. (1A3d)	[g]	1	0	0	1	1	1	1	1	1	1	1	1	0	1	0	0
Dioxins/furans	Civil Aviation int. (1A3a)	[g]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flouranthene	Industry-Other (1A2f)	[kg]	45	44	45	46	45	46	46	46	46	46	48	48	49	49	50	52
Flouranthene	Civil Aviation (1A3a)	[kg]	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
Flouranthene	Road (1A3b)	[kg]	791	798	791	759	735	716	686	653	624	603	587	577	583	610	642	671
Flouranthene	Railways (1A3c)	[kg]	5	5	6	6	6	6	6	6	5	4	4	4	4	4	4	4
Flouranthene	Navigation (1A3d)	[kg]	43	51	48	55	52	57	61	54	42	38	38	37	44	44	41	46
Flouranthene	Residential (1A4b)	[kg]	8	8	8	9	9	9	9	9	10	10	10	12	14	16	18	18
Flouranthene	Ag./for./fish. (1A4c)	[kg]	152	152	150	136	130	128	128	128	126	126	127	123	122	119	111	112
Flouranthene	Military (1A5)	[kg]	1	7	4	4	3	8	3	6	6	4	2	4	2	3	6	6
Flouranthene	Navigation int. (1A3d)	[kg]	204	190	212	294	340	361	349	322	343	311	306	266	232	238	191	188

Flouranthene	Civil Aviation int. (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Industry-Other (1A2f)	[kg]	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Benzo(b) flouranthene	Civil Aviation (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(b) flouranthene	Road (1A3b)	[kg]	65	66	66	64	64	64	63	62	61	61	59	59	59	62	64	66
Benzo(b) flouranthene	Railways (1A3c)	[kg]	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(b) flouranthene	Navigation (1A3d)	[kg]	3	4	4	4	4	5	5	5	3	3	3	3	4	4	3	4
Benzo(b) flouranthene	Residential (1A4b)	[kg]	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Benzo(b) flouranthene	Ag./for./fish. (1A4c)	[kg]	16	16	16	15	14	14	14	14	13	13	13	12	12	12	11	12
Benzo(b) flouranthene	Military (1A5)	[kg]	0	1	1	1	0	1	0	1	1	1	0	0	0	0	1	1
Benzo(b) flouranthene	Navigation int. (1A3d)	[kg]	13	13	15	20	23	25	25	23	25	22	21	19	17	17	14	13
Benzo(b) flouranthene	Civil Aviation int. (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Industry-Other (1A2f)	[kg]	6	6	6	6	6	6	6	6	6	6	6	5	5	6	6	6
Benzo(k) flouranthene	Civil Aviation (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Road (1A3b)	[kg]	65	67	67	65	67	68	69	68	68	69	67	67	67	71	73	75
Benzo(k) flouranthene	Railways (1A3c)	[kg]	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Benzo(k) flouranthene	Navigation (1A3d)	[kg]	1	1	1	2	2	2	2	2	2	2	2	1	2	2	2	2
Benzo(k) flouranthene	Residential (1A4b)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(k) flouranthene	Ag./for./fish. (1A4c)	[kg]	13	12	12	12	11	11	11	11	10	10	10	9	9	9	9	9
Benzo(k) flouranthene	Military (1A5)	[kg]	0	1	1	1	0	1	0	1	1	1	0	0	0	0	1	1
Benzo(k) flouranthene	Navigation int. (1A3d)	[kg]	6	6	7	9	11	12	11	11	12	10	10	9	8	8	6	6
Benzo(k) flouranthene	Civil Aviation int. (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Industry-Other (1A2f)	[kg]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Benzo(a) pyrene	Civil Aviation (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Road (1A3b)	[kg]	45	46	47	45	45	45	44	44	43	43	43	42	43	46	48	50
Benzo(a) pyrene	Railways (1A3c)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Navigation (1A3d)	[kg]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Benzo(a) pyrene	Residential (1A4b)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Ag./for./fish. (1A4c)	[kg]	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5
Benzo(a) pyrene	Military (1A5)	[kg]	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Benzo(a) pyrene	Navigation int. (1A3d)	[kg]	4	4	4	5	6	7	7	6	7	6	6	5	4	5	4	4
Benzo(a) pyrene	Civil Aviation int. (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Industry-Other (1A2f)	[kg]	6	6	6	6	5	6	5	5	5	5	5	5	5	5	5	6
Benzo(g,h,i) perylene	Civil Aviation (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo(g,h,i) perylene	Road (1A3b)	[kg]	96	98	98	95	93	93	90	88	86	84	83	82	84	87	92	95
Benzo(g,h,i) perylene	Railways (1A3c)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Benzo(g,h,i) perylene	Navigation (1A3d)	[kg]	5	5	6	8	8	9	10	9	7	6	6	5	6	6	6	7
Benzo(g,h,i) perylene	Residential (1A4b)	[kg]	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3
Benzo(g,h,i) perylene	Ag./for./fish. (1A4c)	[kg]	24	24	24	21	20	20	20	20	19	19	19	18	18	18	16	16
Benzo(g,h,i) perylene	Military (1A5)	[kg]	0	1	1	1	0	1	0	1	1	0	0	0	0	0	1	1
Benzo(g,h,i) perylene	Navigation int. (1A3d)	[kg]	24	24	30	37	45	49	48	45	52	45	41	37	35	35	28	25
Benzo(g,h,i) perylene	Civil Aviation int. (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Industry-Other (1A2f)	[kg]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
indeno(1,2,3-c,d) pyrene	Civil Aviation (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Road (1A3b)	[kg]	43	45	45	45	46	46	46	47	47	47	47	47	48	51	53	55
indeno(1,2,3-c,d) pyrene	Railways (1A3c)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Navigation (1A3d)	[kg]	4	4	4	6	6	7	8	7	5	4	4	4	5	5	5	6
indeno(1,2,3-c,d) pyrene	Residential (1A4b)	[kg]	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
indeno(1,2,3-c,d) pyrene	Ag./for./fish. (1A4c)	[kg]	17	17	17	15	14	14	14	14	14	14	14	13	13	13	11	11
indeno(1,2,3-c,d) pyrene	Military (1A5)	[kg]	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
indeno(1,2,3-c,d) pyrene	Navigation int. (1A3d)	[kg]	19	20	24	30	36	39	39	36	42	36	34	30	29	29	23	21
indeno(1,2,3-c,d) pyrene	Civil Aviation int. (1A3a)	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Annex 2B-15: Uncertainty estimates

Uncertainty estimation, SO_2

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 SO2	Input data Gg SO2	Input data %	Input data %	%	%	%	%	%	%	%
Road Transportation	SO2	5766	77	2	50	50,040	1,363	-0,066766697	0,0051	-3,338335	0,01444329	3,3383661
Other mobile sources	SO2	9221	2733	10	50	50,990	49,601	0,06661374	0,1824	3,330687	2,57905393	4,2124809
Total	SO2	14986,88	2809,637				2462,147					28,889683
Total uncertainties					**Overall uncertainty in the year (%):**		**49,620**			**Trend uncertainty (%):**		**5,375**

Uncertainty estimation, NO_x

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 Nox	Input data Gg Nox	Input data %	Input data %	%	%	%	%	%	%	%
Road Transportation	Nox	105313	68105	2	50	50,040	29,611	-0,059218668	0,4351	-2,960933	1,23067865	3,2065085
Other mobile sources	Nox	51210	46985	10	100	100,499	41,029	0,059422696	0,3002	5,9422696	4,2452268	7,3029117
Total	Nox	156522,9	115090,3				2560,163					63,614215
Total uncertainties					**Overall uncertainty i the year (%):**		**50,598**			**Trend uncertainty (%):**		**7,976**

Uncertainty estimation, NMVOC

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	81015	24325	2	50	50,040	31,161	-0,088340676	0,2528	-4,417034	0,71516458	4,4745556
Other mobile sources	NMVOC	15187	14737	10	100	100,499	37,915	0,088944209	0,1532	8,8944209	2,16634625	9,1544404
Total	NMVOC	96202,4	39061,32				2408,591					103,82543
Total uncertainties					**Overall uncertainty i the year (%):**		**49,077**			**Trend uncertainty (%):**		**10,189**

Uncertainty estimation, CO

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	457162	188071	2	50	50,040	27,952	-0,125037158	0,3202	-6,251858	0,90574052	6,317127
Other mobile sources	CO	130141	148612	10	100	100,499	44,360	0,125731849	0,2530	12,573185	3,57855079	13,072529
Total	CO	587303,4	336683,1				2749,163					210,7971
Total uncertainties					**Overall uncertainty i the year (%):**		**52,432**			**Trend uncertainty (%):**		**14,519**

Uncertainty estimation, NH_3

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 NH3	Input data Gg NH3	Input data %	Input data %	%	%	%	%	%	%	%
Road Transportation	NH3	70	2415	2	1000	1000,002	997,013	2,446032873	31,7320	2446,0329	89,7515243	2447,6789
Other mobile sources	NH3	6	7	10	1000	1000,050	2,989	-2,466536143	0,0951	-2466,536	1,34547568	2466,5365
Total	NH3	76,12158	2422,729				994043,326					12074935
Total uncertainties					**Overall uncertainty i the year (%):**		**997,017**			**Trend uncertainty (%):**		**3474,901**

Uncertainty estimation, TSP

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 TSP	Input data Gg TSP	Input data %	Input data %	%	%	%	%	%	%	%
Road Transportation	TSP	6934	5679	2	50	50,040	33,264	0,069339758	0,4623	3,4669879	1,30758827	3,7053734
Other mobile sources	TSP	5350	2864	10	100	100,499	33,692	-0,069428797	0,2331	-6,94288	3,29721748	7,6860407
Total	TSP	12284	8542,917				2241,657					72,805014
Total uncertainties					**Overall uncertainty i the year (%):**		**47,346**			**Trend uncertainty (%):**		**8,533**

Uncertainty estimation, Arsenic

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	0	0	2	1000	1000,002	0,000	0	0,0000	0	0	0
Other mobile sources	Arsenic	62	31	10	1000	1000,050	1000,050	0	0,4980	0	7,04344891	7,0434489
Total	Arsenic	62,06878	30,91317				1000100,000					49,610173
Total uncertainties					**Overall uncertainty i the year (%):**		**1000,050**			**Trend uncertainty (%):**		**7,043**

Uncertainty estimation, Cadmium

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	29	38	2	1000	1000,002	746,485	0,100951375	0,8664	100,95138	2,4505535	100,98111
Other mobile sources	Cadmium	15	13	10	1000	1000,050	253,530	-0,101271171	0,2942	-101,2712	4,16122432	101,35663
Total	Cadmium	44,14174	51,23287				621516,493					20470,351
Total uncertainties					**Overall uncertainty i the year (%):**		**788,363**			**Trend uncertainty (%):**		**143,075**

Uncertainty estimation, Chromium

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	Chromium	146	191	2	1000	1000,002	746,090	0,10535548	0,8598	105,35548	2,43198986	105,38355
Other mobile sources	Chromium	77	65	10	1000	1000,050	253,924	-0,105679009	0,2926	-105,679	4,13832286	105,76
Total	Chromium	222,49	256,4113				621127,524					22290,87

Total uncertainties	Overall uncertainty i the year (%):	Trend uncertainty (%):

Uncertainty estimation, Copper

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	Copper	4948	6505	2	1000	1000,002	797,308	0,055488276	0,9889	55,488276	2,79690418	55,558721
Other mobile sources	Copper	1630	1654	10	1000	1000,050	202,704	-0,0557675	0,2514	-55,7675	3,55519487	55,880708
Total	Copper	6578,378	8158,801				676788,385					6209,4249

Total uncertainties	Overall uncertainty i the year (%):	Trend uncertainty (%):

Uncertainty estimation, Mercury

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	0	0	2	1000	1000,002	0,000	0	0,0000	0	0	0
Other mobile sources	Mercury	17	13	10	1000	1000,050	1000,050	0	0,7827	0	11,0683708	11,068371
Total	Mercury	16,93287	13,25255				1000100,000					122,50883
Total uncertainties					**Overall uncertainty i the year (%):**		**1000,050**			**Trend uncertainty (%):**		

Uncertainty estimation, Nickel

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	204	268	2	1000	1000,002	183,877	0,055402354	0,0861	55,402354	0,24359704	55,40289
Other mobile sources	Nickel	2906	1189	10	1000	1000,050	816,164	-0,054925382	0,3823	-54,92538	5,40592367	55,190774
Total	Nickel	3109,849	1456,594				699934,107					6115,5018
Total uncertainties					**Overall uncertainty i the year (%):**		**836,621**			**Trend uncertainty (%):**		

Uncertainty estimation, Lead

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	97011	53	2	1000	1000,002	36,447	-0,012407462	0,0005	-12,40746	0,00143582	12,407462
Other mobile sources	Lead	6677	1392	10	1000	1000,050	963,601	0,012515489	0,0134	12,515489	0,18979292	12,516928
Total	Lead	103687,2	1444,158				929854,993					310,61861
Total uncertainties					**Overall uncertainty i the year (%):**		**964,290**		**Trend uncertainty (%):**			**17,624**

Uncertainty estimation, Selenium

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	29	38	2	1000	1000,002	340,080	0,104223275	0,2809	104,22327	0,79444848	104,2263
Other mobile sources	Selenium	107	74	10	1000	1000,050	659,954	-0,103630983	0,5450	-103,631	7,70810382	103,91725
Total	Selenium	136,1595	112,4575				551193,359					21661,918
Total uncertainties					**Overall uncertainty i the year (%):**		**742,424**		**Trend uncertainty (%):**			**147,180**

Uncertainty estimation, Zinc

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	Zinc	2911	3826	2	1000	1000,002	774,665	0,071338118	0,9406	71,338118	2,66028765	71,387703
Other mobile sources	Zinc	1157	1113	10	1000	1000,050	225,348	-0,071644694	0,2736	-71,64469	3,86917093	71,749095
Total	Zinc	4068,333	4939,547				650887,174					10244,137
Total uncertainties					**Overall uncertainty i the year (%):**		**806,776**		**Trend uncertainty (%):**			

Uncertainty estimation, Dioxins

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 dioxins	g dioxins	%	%	%	%	%	%	%	%	%
Road Transportation	Dioxins	1	0	2	1000	1000,002	502,273	-0,097857985	0,1806	-97,85798	0,51068983	97,859317
Other mobile sources	Dioxins	0	0	10	1000	1000,050	497,753	0,098398143	0,1789	98,398143	2,53035111	98,430673
Total	Dioxins	1,102454	0,396309				500036,104					19265,043
Total uncertainties					**Overall uncertainty i the year (%):**		**707,132**		**Trend uncertainty (%):**			

Uncertainty estimation, Flouranthene

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	791	671	2	1000	1000,002	738,224	-0,014891698	0,6407	-14,8917	1,81213279	15,00155
Other mobile sources	Flouranthene	256	238	10	1000	1000,050	261,790	0,014967613	0,2272	14,967613	3,2129541	15,308576
Total	Flouranthene	1047,176	908,8185				613509,180					459,39901

Total uncertainties	Overall uncertainty i the year (%):	Trend uncertainty (%):

Uncertainty estimation, Benzo(b) flouranthene

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	65	66	2	1000	1000,002	731,995	0,024957367	0,7146	24,957367	2,02123584	25,039081
Other mobile sources	Benzo(b) flouranthene	27	24	10	1000	1000,050	268,020	-0,025060014	0,2616	-25,06001	3,70020322	25,331715
Total	Benzo(b) flouranthene	91,83732	89,65698				607651,093					1268,6514

Total uncertainties	Overall uncertainty i the year (%):	Trend uncertainty (%):

Uncertainty estimation, Benzo(k) flouranthene

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(k) flouranthene	65	75	2	1000	1000,002	796,961	0,047003363	0,8644	47,003363	2,44480058	47,066901
Other mobile sources	Benzo(k) flouranthene	21	19	10	1000	1000,050	203,050	-0,047240892	0,2202	-47,24089	3,11429055	47,343433
Total	Benzo(k) flouranthene	86,62581	93,95271				676376,879					4456,6939
Total uncertainties					**Overall uncertainty i the year (%):**				**Trend uncertainty (%):**			

Uncertainty estimation, Benzo(a) pyrene

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(a) pyrene	45	50	2	1000	1000,002	837,363	0,027906167	0,8954	27,906167	2,53248724	28,020843
Other mobile sources	Benzo(a) pyrene	11	10	10	1000	1000,050	162,647	-0,028079445	0,1739	-28,07944	2,45940235	28,186945
Total	Benzo(a) pyrene	55,8202	59,68717				727630,192					1579,6715
Total uncertainties					**Overall uncertainty i the year (%):**		**853,012**			**Trend uncertainty (%):**		

Uncertainty estimation, Benzo(g,h,i) perylene

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(g,h,i) perylene	96	95	2	1000	1000,002	746,446	0,020498656	0,7209	20,498656	2,03894385	20,59981
Other mobile sources	Benzo(g,h,i) perylene	36	32	10	1000	1000,050	253,568	-0,020590673	0,2449	-20,59067	3,46298704	20,879849
Total	Benzo(g,h,i) perylene	132,0525	127,5291				621478,405					860,32027
Total uncertainties					**Overall uncertainty i the year (%):**		**788,339**			**Trend uncertainty (%):**		

Uncertainty estimation, indeno(1,2,3-c,d) pyrene

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	indeno(1,2,3-c,d) pyrene	43	55	2	1000	1000,002	716,757	0,086902871	0,8120	86,902871	2,29676477	86,933217
Other mobile sources	indeno(1,2,3-c,d) pyrene	24	22	10	1000	1000,050	283,259	-0,08714456	0,3209	-87,14456	4,53813161	87,262644
Total	indeno(1,2,3-c,d) pyrene	67,78977	76,80061				593975,926					15172,153
Total uncertainties					**Overall uncertainty i the year (%):**		**770,698**			**Trend uncertainty (%):**		

Annex 2C

Agriculture

Annex 2C.1 Background information - NH_3 from Manure Management

1. N-excretion

In Table 2C.1 is given the average N-excretion for each NFR livestock category from 1990 to 2005. Notice that each livestock category is an aggregated average of different subcategories (see table 6.2 in chapter 6). The N-excretion is based on information from the Danish Institute of Agricultural Science.

Table 2C.1 Nitrogen excretion rates in average, 1990 – 2005 [kg N/hd/yr]

Livestock categories:	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Dairy cattle	129.49	128.63	127.76	126.89	126.06	125.22	125.09	124.94	124.82	124.60	125.31	125.31	127.16	129.79	131.56	133.30
Non-dairy	36.57	36.68	36.80	36.92	36.64	36.56	36.62	36.74	36.77	37.00	37.15	37.56	37.54	37.44	38.39	38.80
Sheep	21.18	21.33	21.47	21.61	21.76	21.90	20.11	18.32	16.53	14.75	16.95	16.95	16.95	16.95	16.95	16.95
Goats	21.18	21.33	21.47	21.61	21.76	21.90	20.11	18.32	16.53	14.75	16.95	16.95	16.36	16.36	16.36	16.36
Horses	48.89	47.77	46.66	45.54	44.42	43.31	43.31	43.31	43.31	43.31	43.31	43.31	43.31	43.31	43.31	43.31
Swine	11.62	11.43	11.17	10.40	10.38	9.62	9.89	9.74	9.65	9.83	9.63	9.18	9.58	9.25	9.48	9.01
Poultry	0.65	0.66	0.58	0.59	0.66	0.62	0.60	0.62	0.62	0.57	0.55	0.57	0.59	0.66	0.76	0.73
Fur farming	4.80	5.04	4.64	6.77	5.65	5.53	5.34	4.64	4.37	4.87	4.63	4.62	4.61	4.61	5.09	5.38

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
N-excretion. total																
(M kg N/year)	292	292	293	296	285	276	276	274	278	270	270	273	275	270	275	269

2. Stable system

A systematic statement of the stabling of husbandry does not exist and the stabling is therefore based on estimate from the Danish Agricultural Advisory Centre (Rasmussen, J.B. and Lundgaard, N.H., pers. comm.). The structural development in the agricultural sector has an influence in change of stable types. The last few year new stables have been build and for most of these new stables tied-up stables are replaced by bigger stables with loose-holding. In 1990 79% of the dairy cattle were kept in tied-up stables and in 2005 the part is reduced to 26%. In loose-holding systems the cattle have more space and this will increase the ammonia emission per animal compared to the tied-up stables. In Table 2C.2 the distribution of stable type for dairy cattle and slaughtering pigs from 1990-2005 is listed.

Table 2C.2 The percentage distribution of stable type – Dairy cattle and slaughtering pigs 1990 – 2005

Distribution of stable type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Dairy cattle																
Tied-up stables	79	78	77	76	74	73	72	66	60	60	46	40	35	26	22	26
Loose-holdings with beds	18	18	19	20	21	21	22	26	30	30	43	49	54	63	67	66
Deep litter	3	4	4	5	5	6	6	8	10	10	11	11	11	11	11	8
Slaughtering pigs																
Full slatted floor	51	56	60	60	60	60	60	60	60	60	58	57	56	55	53	49
Partly slatted floor	23	21	20	21	23	24	25	26	28	29	31	33	34	35	38	38
Solid floor	22	19	15	14	12	11	9	8	6	5	5	4	4	4	3	7
Deep litter	4	4	5	5	5	5	6	6	6	6	6	6	6	6	6	6

3. Emission of ammonia

3.1 Stable

The emission from stables is thus determined by a number of different conditions, that depends on stable type and the different kinds of manure disposal systems placed in these stables. Danish Institute of Agricultural Sciences has carried out a number of emission surveys and estimated emission coefficients for different types of stables (Poulsen *et al.*, 2001). In Table 2C.3 is shown the emission from Dairy cattle and slaughtering pigs in different stable systems.

Table 2C.3 Ammonia emission from stables – Dairy cattle and slaughtering pigs.

Livestock category	Manure system	Manure type	Ammonia emission
			pct NH_3-N of N ab Animal
Dairy cattle	Tied-up	Solid manure	5.0
		+ Liquid	5.0
	Tied-up	Slurry	3.0
	Loose-holding with beds, slatted floor	Slurry	8.0
	Loose-holding with beds, slatted floor, scrapes	Slurry	6.0
	Loose-holding with beds, solid floor	Slurry	10.0
	Deep litter (all)	Deep litter	6.0
	Deep litter, slatted floor	Deep litter	6.0
		+ Slurry	8.0
	Deep litter, slatted floor, scrapes	Deep litter	6.0
		+ Slurry	6.0
	Deep litter, solid floor, scrapes	Deep litter	6.0
		+ Slurry	10.0
Slaughtering pigs[1]	Partly slatted floor	Slurry	16.0
	Solid floor	Slurry	12.0
	Deep litter	Solid manure	18.0
		+ Liquid	18.0
	Deep litter	Deep litter	15.0
	Partley slatted floor and partley deep litter	Deep litter	15.0
		+ Slurry	12.0

3.2 Storage

Livestock manure is collected either as solid manure or as slurry depending on stable type. In Table 2C.4 is shown the emission factor used for storage. It is assumed that the part of solid manure taken directly from the stable into the field is 80% from cattle, 25% from pigs, 50% sows. 15% from poultry and 5% from hens (Poulsen et al. 2001). 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 crust in order to reduce ammonia emission. However, investigations show that that slurry tanks were incompletely covered earlier (COWI 2000), which result in a higher ammonia emission. In 2005 it is assumed that 5% of the tanks with pig slurry and 2% of tanks with cattle slurry are incompletely covered. This information has been incorporated in the emission inventory.

Table 2C.4 Emission factors for storage (Poulsen et al. 2001). Updated emf for cattle (solid and deep litter) – reference: Hanne Damgaard Poulsen pers. comm. 2006.

Animal category	Liquid manure	Slurry	Solid manure	Deep litter	
	Loss of NH_3-N in % of N ab stable				
Cattle	2.0	2.1	4.0	1.8	
Swine	2.0	2.4	25.0	12.5	Sows
	2.0	2.4	25.0	25.0	Piglets
	2.0	2.4	25.0	18.8	Slaughter pigs
Poultry	-	2.0	5.0	9.5	Hens and pullet
	-	-	-	12.8	Broilers
	-	-	-	15.0	Turkey. geese and ducks
Fur farming	0	2.0	15.0	-	
Sheep/goats	-	-	-	5.0	
Horses	-	-	-	5.0	

3.3 Spreading in fields

There is no statistical information on how the farmer handling the manure in practice. In calculation of emission from application of manure on the fields is used to different weighted emission factors, which distinguish between solid manure and liquid manure. In 2005 the emission factor for solid and liquid manure is estimated to 11% and 5% of N ab storage, respectively.

The weighted emission factor will vary from year to year depending on changes in the practice of spreading. The weighted emission factor is based on background estimates of time of spreading, application methods, spreading in growing crops or on bare soil and the time from spreading to ploughing in soil. In Table 2C.5 background information for 2005 are given.

Table 2C.5 Estimate for application method, time of spreading and time before the manure is incorporated in the soil (Based on information from the Organisation "Danish Agriculture" 2002)

Application methods 2005	Time of spreading	Percentage distribution of manure	Time before incorporation in soil			
			0	< 6 hours	>6 hours	not incorporated
Liquid manure						
Incorporated	winter-spring	26	26	-	-	-
Incorporated	summer-autumn	6	6	-	-	-
Trailing horses	winter-spring	60	-	16	-	44
Trailing horses	spring-summer	5	-	-	-	5
Trailing horses	late summer-autumn	3	-	1	-	2
Broad spreading	winter-spring	-	-	-	-	-
Broad spreading	spring-summer	-	-	-	-	-
Broad spreading	late summer-autumn	-	-	-	-	-
Total		100	32	17	-	51
Solid manure						
Broad spreading	winter-spring	78	-	60	6	12
Broad spreading	spring-summer	2	-	-	-	2
Broad spreading	late summer-autumn	20	-	17	-	3
Total		100	-	77	6	17

Annex 2C.2 Background information - NH_3 from Agricultural Soils

1. Crops

In the Danish emission inventory it is chosen to include NH_3 emission from crops, despite the uncertainties related to this emission source. Literature research shows that the volatilisation from crop types differs considerably (Andersen *et al*. 1999). Recent investigation of four different crop types measured in two seasons shows that the can be a volatilisation between 0-5 kg NH_3-N per hectare (Schjoerring and Mattsson 2001). Until more precisely data are available an average emission of 5 kg NH_3-N for cash crops and 3 kg NH_3-N for grass is used in the Danish inventory. 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 2C.6 Emission factor used to estimate the emission of ammonia from crops

Emission factor	Crops
	kg N/ha
Cash crops. beets and silage maize	5
Grass/clover in rotation	3
Permanent grass	3
Set-a side	0

2. Synthetic fertiliser

Since the beginning of the 1990s there has been a significant decrease in use of synthetic fertiliser. This is due to requirements to utilising of nitrogen in manure as outlined for example in the Action Plan on the Aquatic Environment. Further, the use of different fertiliser types has changed. At present, urea constitutes less than 1% of the total nitrogen used as fertiliser (Table 2C.7). It is estimated that 2.2% of the total nitrogen used in synthetic fertiliser is emitted as ammonia in 2005. It means the implied emission factor for 2005 is 2.2% compared to 10% in the EMEP-CLRTAP Guidebook.

Data on the use of synthetic fertiliser is based on the sale estimations collected by the Danish Plant Directorate (2006). Data for emission factors are collected by Danish Institute of Agricultural Sciences (Sommer et al. 1992. 1994 and 1996).

The use of mineral fertiliser includes fertiliser used in parks, golf courses and private gardens. Approximately 1-2 percent of the mineral fertiliser can be related to this use out side the agriculture area.

Table 2C.7 Synthetic fertiliser consumption 2005 and emission factors.

Synthetic fertiliser year 2005	Emission factor[1]	Consumption[2] Mio. kg N
Fertiliser type		
Calcium and boron calcium nitrate	0.02	0.4
Ammonium sulphate	0.05	2.7
Calcium ammonium nitrate and other nitrate types	0.02	92.0
Ammonium nitrate	0.02	9.9
Liquid ammonia	0.01	5.1
Urea	0.15	0.2
Magnesium fertliser	0.02	0.0
Other nitrogen fertiliser	0.05	12.4
NPK-fertiliser	0.02	73.4
Diammonphosphate	0.05	0.5
Other NP fertiliser types	0.02	3.6
NK fertiliser	0.02	6.1
Emission of NH_3-N from synthetic fertiliser	0.02	206.3

[1] Danish Institute of Agricultural Sciences (Sommer *et al*. 1992. 1994 and 1996)

[2] The Danish Plant Directorate

3. Grazing

It is assumed that 15% of the manure from dairy cattle is deposited in the field, which corresponding to 55 days per year. For heifers 54% of the nitrogen in the manure is estimated deposited during grazing, 61% for suckling cows, 50% for horses and 73% for sheep and goats.

An emission factor of 7% of the total nitrogen content is assumed to evaporate as NH_3 (Jarvis *et al*. 1998a, Jarvis *et al*. 1989b and Bussink 1994). The emission factor is used on all animal categories.

4. Ammonia treated straw

Ammonia is used for conservation of straw for feeding. Investigations show that 80-90% of the supplied ammonia (given in NH_3-N) will emit (Andersen *et al*. 1999). However, the emissions can be reduced particularly if the right dose is used. Therefore it is estimated that the emission factor is 65% of the applied ammonia (given in NH_3-N). Information on ammonia used for treatment of straw is collected from ammonia suppliers.

As for the emission ceiling given in the Gothenburg-Protocol and the EU NEC Directive the emission from ammonia treated straw is not taken into account.

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