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Aarhus University · Denmark

NERI Technical Report No. 703, 2009

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Data sheet

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Abstract: This report contains a description of models and background data for projection of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 for Denmark. The emissions are projected to 2025 using basic scenarios together with the expected results of a few individual policy measures. Official Danish forecasts of activity rates are used in the models for those sectors for which the forecasts are available, i.e. the latest official forecast from the Danish Energy Agency. The emission factors refer to international guidelines and some are country-specific and refer to Danish legislation, Danish research reports or calculations based on emission data from a considerable number of plants. The projection models are based on the same structure and method as the Danish emission inventories in order to ensure consistency.

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Contents

Preface

This report contains a description of models and background data for projection of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 for Denmark. The emissions are projected to 2025 using official base scenarios, which include the estimated effects on Denmark's greenhouse gas emissions of policies and measures implemented until April 2008 ('with measures' projections).

The Department of Policy Analysis of the National Environmental Research Institute, Aarhus University (NERI), has carried out the work. The project has been financed by the Danish Environment Protection Agency (EPA).

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- The Energy Agency for providing the energy consumption forecast.
- Risø National Laboratory for Sustainable Energy at the Technical University of Denmark for providing the data on scenarios of the development of landfill deposited waste production.
- The Faculty of Agricultural Sciences, University of Aarhus and the Danish Agricultural Advisory Centre for providing data for the agricultural sector.
- The Danish Environmental Protection Agency for partly financially supporting the work on solvent projections.

Summary

This report contains a description of the models and background data used for projection of the greenhouse gases CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 for Denmark. The emissions are projected to 2025 using basic scenarios, which include the estimated effects on Denmark's greenhouse gas emissions of policies and measures implemented until April 2008 ('with measures' projections). For activity rates, official Danish forecasts, e.g. the latest official forecast from the Danish Energy Agency, are used to provide activity rates in the models for those sectors for which these forecasts are available. The emission factors refer to international guidelines or are country-specific and refer to Danish legislation, Danish research reports or calculations based on emission data from a considerable number of plants in Denmark. The projection models are based on the same structure and methodology as the Danish emission inventories in order to ensure consistency.

The main sectors in the years 2008-2012 ('2010') are expected to be Energy Industries (39 %), Transport (25 %), Agriculture (15 %), and Other Sectors (7 %). For the latter sector the most important sources are fuel use in the residential sector and the agricultural sector (Figure S.1). GHG emissions show a decreasing trend in the projection period from 2008 to 2020 followed by a stabilisation towards 2025. In general, the emission share for the Energy Industries sector can be seen to be decreasing while the emission share for the Transport sector is increasing. The total emissions in '2010' are estimated to be 66,231 ktonnes CO_2 equivalents and 54,660 ktonnes in 2025, corresponding to a decrease of about 17 %. From 1990 to '2010' the emissions are estimated to decrease by about 4 %.

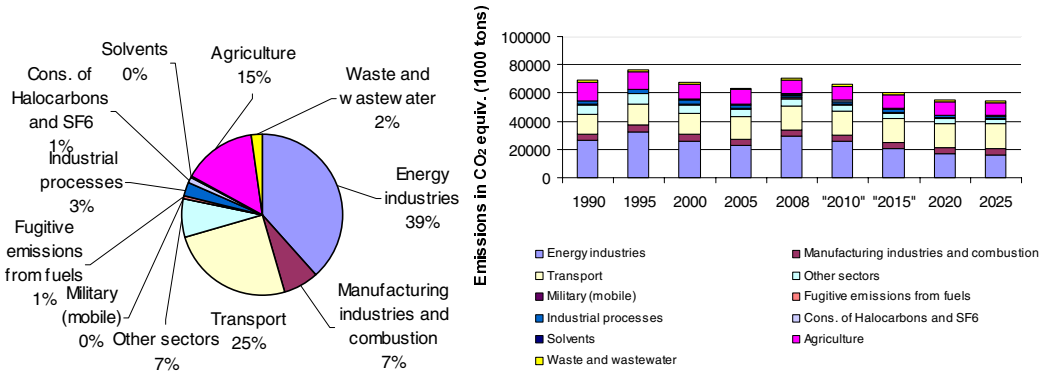


Figure S.1 Total GHG emissions in CO_2 equivalents. Distribution according to main sectors in '2010' (2008-2012) and time-series for 1990 to 2025.

Stationary Combustion

The GHG emissions in '2010' from the main source, which is Public power (59 %), are estimated to decrease significantly in the period from 2008 to 2025, due to a partial shift in fuel use from coal to wood and municipal waste. Also, for residential combustion plants a significant decrease in emissions is seen in the projection; the emissions almost halved from 1990 to 2025. The emissions from the other sectors remain

almost constant over the period, except for energy use in oil and gas extraction where emissions are projected to increase by more than 250 % from 1990 to '2010' and by almost 30 % from '2010' to 2025.

Industrial processes

The GHG emission from industrial processes increased during the nineties, reaching a maximum in 2000. Closure of the nitric acid/fertiliser plant in 2004 has resulted in a considerable decrease in the GHG emission and stabilisation at a level of about 1,700 ktonnes CO_2 equivalents. The most significant source is cement production, which contributes with more than 85 % of the process-related GHG emissions. Most of the processes are assumed to be constant in the projection to 2025 at the same level as in 2006. Consumption of limestone and the emission of CO_2 from flue gas cleaning are assumed to follow the combustion of coal and municipal solid waste (MSW) for generation of heat and power. The GHG emission from this sector will continue to be strongly dependant on the cement production in the future.

Solvents

In 2006 solvent and other product use account for 0.3 % of the total CO_2 emissions. Emission projections from 2006 to 2010 are based on linear projections of 1995 – 2006 historical data and projections of four industrial sectors, namely "Auto paint and repair", "Plastic industry", "Graphic industry" and "Lacquer and paint industry", comprising approximately 28 % of the total CO_2 emission from solvent use in 2006. Constant emissions are assumed from 2010 to 2030. An emission reduction of 12 % is expected between 2006 and 2007 and 22 % between 2006 and 2010 (and 2030). This decrease is mainly due to the general historical trend from 1995 – 2006 influencing a wide range of solvents used in households and industrial activities. Households, construction, plastic industry, industrial mass produced products and auto paint and repair are the largest sources to the Danish VOC emissions from solvent use.

Transport

Road transport is the main source of GHG emissions in '2010' and emissions from this sector are expected to increase by 64 % from 1990 to 2030 due to growth in traffic. The emission shares for the remaining mobile sources are small compared with road transport, and from 1990 to 2030 the total share for these categories reduces from 31 to 21 %. For agriculture/forestry/fisheries, the emissions reduce by 7 % from 1990 to 2030. The emissions reduce from 1990 to 2006, due to smaller numbers of agricultural tractors and harvesters though with larger engines. From 2007 and onwards the emissions remain more or less constant. For industry (1A2f), the emissions increase by 21 % from 1990-2030; for this sector there is a significant emission growth from 1990-2006 (due to increased activity) followed by a slight emission reduction from 2007-2030 due to machinery gradually becoming more fuel efficient. The latter explanation is also the reason for the small emission declines for the activities residential (gardening) (1A4b) and navigation (1A3d) during the forecast period.

Fluorinated gases

Over the period considered, the sum of F-gas emissions is predicted to reach a maximum in 2007-2008 and then decrease considerably due to Danish regulation targeting the gases. HFCs are the dominant F-gases, and in 2007 they contribute with 94 % of the F-gas emission.

Agriculture

From 1990 to 2006, the emission of greenhouse gases in the agricultural sector declined from 13,044 ktonnes CO_2 equivalents to 9,605 ktonnes CO_2 equivalents, which corresponds to a 26% reduction. This development is expected to continue, and the emission to 2025 is expected to fall further to 9,361 ktonnes CO_2 equivalents. The reduction both in the historical data and the projection can mainly be explained by improved utilisation of nitrogen in manure, a significant fall in the use of fertiliser and a reduced nitrogen leaching. These are consequences of active environmental policy measures in this area. Measures in the form of technologies to reduce ammonia emissions in the stable as well as expansion of biogas production are taken into account in the projections but do not contribute to significant changes in the total greenhouse gas emission.

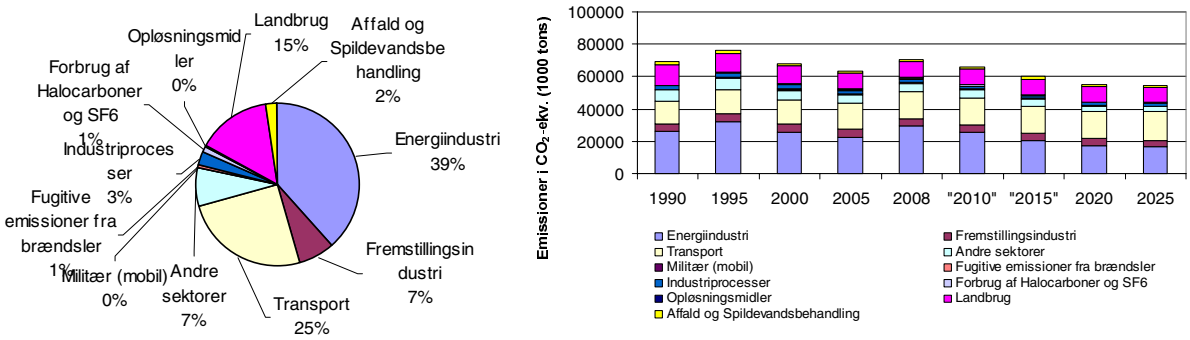
Waste (Landfill sites and wastewater treatment)

The total historical GHG emission from the waste sector has been slightly decreasing since 1990. The level predicted for '2010' and onwards is rather stagnant compared to the latest historic year. In '2010', CH_4 from landfill sites is predicted to contribute with 78 % of the emission from the sector as a whole. From '2010' no further decrease in the CH_4 emission from landfill is foreseen; an almost constant emission level or a slight decrease is predicted. An almost constant level for CH_4 emission from wastewater in the period considered is foreseen, while the N_2O emission from wastewater is forecasted to slightly decrease; the contributions to the sector of these emissions in '2010' being 18 and 4 % respectively.

Sammenfatning

Denne rapport indeholder en beskrivelse af modeller og baggrundsdata anvendt til fremskrivning af de danske emissioner af drivhusgasser (CO_2, CH_4, N_2O, HFCer, PFCer, SF_6). Emissionerne er fremskrevet til 2025 på baggrund af et basisscenarium, som medtager de estimerede effekter på Danmarks drivhusgasudledninger af virkemidler iværksat indtil april 2008 ('med eksisterende virkemiddel'-fremskrivninger). I modellerne er der, for de sektorer hvor det er muligt, anvendt officielle danske fremskrivninger af aktivitetsdata, fx er den seneste officielle energifremskrivning fra Energistyrelsen anvendt. Emissionsfaktorerne refererer enten til internationale vejledninger, dansk lovgivning, danske rapporter eller er baseret på målinger på danske anlæg. Fremskrivningsmodellerne bygger på samme struktur og metoder, som er anvendt for de danske emissionsopgørelser, hvilket sikrer at historiske og fremskrevne emissionsopgørelser er konsistente.

De vigtigste sektorer i 2008-2012 ('2010') forventes at være energiproduktion og -konvertering (39 %), transport (25 %), landbrug (15 %), og andre sektorer (7 %). For den sidstnævnte sektor er de vigtigste kilder husholdninger og landbrug (figur R.1). Drivhusgasemissionerne viser en faldende tendens i prognoseperioden fra 2007 til 2020, hvorefter emissionerne stiger en anelse frem til 2025. Generelt falder emissionsandelen for energisektoren, mens emissionsandelen for transportsektoren stiger. De totale emissioner er beregnet til 66.231 ktons CO_2-ækvivalenter i '2010' og til 54.660 ktons i 2025, svarende til et fald på omkring 17 %. Fra 1990 til '2010' er emissionerne beregnet til at falde med ca. 4 %.



Figur R.1 Totale drivhusgasemissioner i CO_2-ækvivalenter fordelt på hovedsektorer for '2010' og tidsserier fra 1990 til 2025.

Stationær forbrænding

Drivhusgasemissionen fra kraft- og kraftvarmeværker, som er den største kilde i '2010' (59 %), er beregnet til at falde markant i perioden 2008 til 2025 grundet et delvis brændselsskift fra kul til træ og affald. Emissionerne fra husholdningers forbrændingsanlæg falder ifølge fremskrivningen også og bliver næsten halveret i perioden 1990 til 2025. Drivhusgasemissionerne fra andre sektorer er næsten konstante i hele perioden med undtagelse af offshore-sektoren, hvor emissioner fra anvendelse af energi til udvinding af olie og gas stiger med mere end 250 % fra 1990 til '2010' og med næsten 30 % fra '2010' til 2030.

Industri

Emissionen af drivhusgasser fra industrielle processer er steget op gennem halvfemserne og topper i 2000. Ophør af produktion af salpetersyre/kunstgødning har resulteret i en betydelig reduktion af drivhusgasemissionen og den har stabiliseret sig omkring 1700 ktons CO_2-ækvivalenter. Den væsentligste kilde er cementproduktion, som bidrager med mere end 85 % af den procesrelaterede drivhusgasemission. De fleste procesemissioner er antaget at være konstante på samme niveau som 2006. Forbrug af kalk og derved emission af CO_2 fra røggasrensning antages at følge forbruget af kul og affald i kraftvarmeanlæg. Drivhusgasemissionen fra industri forventes også i fremtiden at være meget afhængig af cementproduktionen.

Opløsningsmidler

CO_2-emissioner fra anvendelse af opløsningsmidler udgør 0.3 % af de samlede danske CO_2-emissioner. Fremskrivningen fra 2006 til 2010 er baseret på lineære fremskrivninger af historiske data samt fremskrivninger af fire brancher: Autobranchen, plastbranchen, grafisk industri og lak- og farveindustrien. Sidstnævnte udgør ca. 28 % af de samlede CO_2-emissioner fra anvendelse af opløsningsmidler. Konstante emissioner antages fra 2010 til 2030. En emissionsreduktion på 12 % forventes fra 2006 til 2007 og 22 % fra 2006 til 2010 (og 2030). Reduktionerne skyldes fortrinsvis den generelle historiske trend fra 1995 til 2006, som influerer mange forskellige opløsningsmidler og anvendelser i husholdninger og industrier. Husholdninger, byggesektoren, plastindustrien and industrielt masseproducerede produkter er de største kilder til CO_2-emissioner fra anvendelse af opløsningsmidler.

Transport

Vejtransport er den største emissionskilde for drivhusgasser i '2010', og fra 1990 til 2030 forventes emissionerne at stige med 64 % pga. trafikkens vækst. Den samlede emission for andre mobile kilder er noget lavere end vejtransporten totalt, og fra 1990 til 2030 falder andre mobile kilders emissionsandel fra 31 til 21 %. For landbrug/skovbrug/fiskeri bliver emissionerne 7 % mindre i samme periode. Emissionerne for denne sektor falder fra 1990 til 2006, hovedsageligt pga. et fald i antallet af traktorer og mejetærskere. Fra 2007 til 2030 er emissionerne mere eller mindre konstante. For industri stiger emissionerne med 21 % fra 1990 til 2030. Fra 1990-2006 stiger emissionerne markant pga. øget aktivitet, hvorefter emissionerne falder en smule pga. gradvist mere energieffektive motorer. Dette er også grunden til de små emissionsfald for have-hushold (1A4b) og national søtransport i prognoseperioden.

F-gasser

I den aktuelle periode er det forventet, at den samlede F-gas-emission topper i 2007-2008 og derefter er stærkt faldende på grund af danske reguleringer på området. Den dominerende F-gas-gruppe er HFC'erne, som i 2007 bidrager med 94 % til den samlede F-gas emission.

Landbrug

I perioden fra 1990 til 2006 er emissionen af drivhusgasser faldet fra 13.044 ktons CO_2 ækvivalenter til 9.605 ktons CO_2 ækvivalenter, hvilket svarer til en reduktion på 26 %. Denne udvikling forventes at fortsætte og emissionen forudses at falde yderligere til 9.361 ktons CO_2 ækvivalenter i 2025. Årsagen til faldet i emissionen for den historiske såvel som den fremtidige udvikling kan forklares med en forbedring i udnyttelsen af kvælstof i husdyrgødningen, og hermed et markant fald i anvendelsen af handelsgødning og lavere emission fra kvælstofudvaskning – som resultat af en aktiv miljøpolitik på området. I fremskrivningen er der taget højde for teknologiske tiltag i form af ammoniakreducerende teknologi i stalden og en øget vækst i biogasanlæg, men disse tiltag har ikke en væsentlig indflydelse på den totale emission.

Affald (lossepladser og rensningsanlæg for spildevand)

Affaldssektionens samlede drivhusgasemissioner har i de historiske opgørelser vist et mindre fald siden 1990. Fremskrivningen viser at for '2010' og derefter er de samlede emissioner stagnerende i forhold til det seneste historiske år (2006). I '2010' forventes CH_4 fra lossepladser stadig at dominere sektoren og udgøre 78 % af hele sektorens emissioner. Fra '2010' er der forudset et lille fald eller stagnation i CH_4 emissioner fra lossepladser. CH_4 fra spildevand er forudset at falde lidt eller være nær konstant, mens N_2O fra spildevand ser ud til at falde lidt, således at bidraget af disse emissioner til sektorens samlede emission i '2010' er henholdsvis 18 og 4 %.

1 Introduction

In the Danish Environmental Protection Agency's project 'Projection models 2010' a range of sector-related partial models were developed to enable projection of the emissions of SO_2, NO_X, NMVOC and NH_3 forward to 2010 (Illerup et al., 2002). Subsequently, the project 'Projection of greenhouse gas emissions 2005 to 2030" was carried out in order to extend the projection models to include the greenhouse gases CO_2, CH_4, N_2O as well as HFCs, PFCs and SF_6, and project the emissions for these gases to 2030 (Illerup et al., 2007). The purpose of the present project "Projection of greenhouse gas emissions 2008 to 2025" has been to update the emission projections based on the latest national energy projections, relevant activity data and emission factors.

1.1 Obligations

In relation to the Kyoto Protocol, for the period 2008-2012 the EU has committed itself to reduce emissions of greenhouse gases (GHGs) to 8 % (on average) below the level in the so-called base year: 1990 for CO_2, methane, and nitrous oxide and either 1990 or 1995 for industrial greenhouse gases (HFCs, PFCs and SF_6). Under the Kyoto Protocol, Denmark has committed itself to a reduction of 21 % as an element of the burden-sharing agreement within the EU[1]. On the basis of the GHG inventory submission in 2006 and Denmark's choice of 1995 as the base year for industrial greenhouse gases, Denmark's total GHG emissions in the base year amount to 69,323 ktonnes CO_2 equivalents. Calculated as 79 % of the base year Denmark's assigned amount under the Burden Sharing Agreement amounts to 273,827 ktonnes CO_2 equivalents in total or in average 54,765 ktonnes CO_2 equivalents per year in the period 2008-2012.

Since 1990 Denmark has implemented policies and measures aiming at reducing Denmark's emissions of CO_2 and other greenhouse gases. In this report the estimated effects of policies and measures implemented until September 2008 are included in the projections, and the projection of the total GHG emissions is therefore a so-called 'with measures' projection.

In addition to the implementation of policies and measures with an effect on Denmark's GHG emissions by sources, parties to the Kyoto Protocol can also make use of certain removals by sinks and emission reductions achieved abroad through Joint Implementation projects (JI) or projects under the Clean Development Mechanism (CDM).

[1] In the Council's decision on the EU ratification to the Kyoto Protocol, the commitments of the different Member States are thus given as percentages compared to the base year. In connection with the Council decision, the Council (environment) and the Commission have, in a joint statement, agreed e.g. to show consideration in 2006 for Denmark's remarks to the Council conclusions of 16-17 June 1998 concerning emissions in the base year. However, in 2006 it was decided that the consideration will not take place until after the review of all EU initial reports on assigned amount under the Kyoto Protocol.

1.2 Greenhouse gases

The greenhouse gases reported under the Climate Convention and projected in this report are:

Carbon dioxide	CO_2
Methane	CH_4
Nitrous Oxide	N_2O
Hydrofluorocarbons	HFCs
Perfluorocarbons	PFCs
Sulphur hexafluoride	SF_6

The main greenhouse gas responsible for the anthropogenic influence on the heat balance is CO_2. The atmospheric concentration of CO_2 has increased from 280 to 370 ppm (about 30 %) since the pre-industrial era in the nineteenth century (IPCC, 2001). The main cause is the use of fossil fuels, but changing land use, including forest clearance, has also been a significant factor. Concentrations of the greenhouse gases methane and N_2O, which are very much linked to agricultural production, have increased by 150 % and 16 %, respectively (IPCC, Third Assessment Report). The lifetime of the gases in the atmosphere needs to be taken into account – the longer they remain in the atmosphere the greater the overall effect. The global warming potential (GWP) for various gases has been defined as the warming effect over a given time of a given weight of a specific substance relative to the same weight of CO_2. The purpose of this measure is to be able to compare and integrate the effects of individual substances on the global climate. Typical atmospheric lifetimes for different substances differ greatly, e.g. for CH_4 and N_2O, approximately 12 and 120 years, respectively. Thus the time perspective clearly plays a decisive role. The lifetime chosen is typically 100 years. The effect of the various greenhouse gases can then be converted into the equivalent quantity of CO_2, i.e. the quantity of CO_2 producing the same effect with regard to absorbing solar radiation. According to the IPCC and their Second Assessment Report, which UNFCCC has decided to use as reference, the global warming potentials for a 100-year time horizon are:

- CO_2: 1
- CH_4 21
- N_2O 310

Based on weight and a 100-year period, methane is thus 21 times more powerful a greenhouse gas than CO_2, and N_2O is 310 times more powerful. Some of the other greenhouse gases (hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) have considerably higher global warming potential values. For example, sulphur hexafluoride has a global warming potential of 23,900 (IPCC, 1996).

1.3 Historical emission data

The greenhouse gas emissions are estimated according to the IPCC guidelines and are aggregated into seven main sectors. The greenhouse gases include CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 (Nielsen et al., 2008).

Figure 1.1 shows the estimated total greenhouse gas emissions in CO_2 equivalents from 1990 to 2006. The emissions are not corrected for electricity trade or temperature variations. CO_2 is the most important greenhouse gas, followed by N_2O and CH_4 in relative importance. The contribution to national totals from HFCs, PFCs and SF_6 is approximately 1 %. Stationary combustion plants, transport and agriculture represent the largest sources, followed by Industrial processes, Waste and Solvents. The net CO_2 removal by forestry and soil is in 2006 2.6 % of the total emission in CO_2 equivalents. The national total greenhouse gas emission in CO_2 equivalents excluding LULUCF has increased by 2.1 % from 1990 to 2006 and decreased 1.3 % including LULUCF.

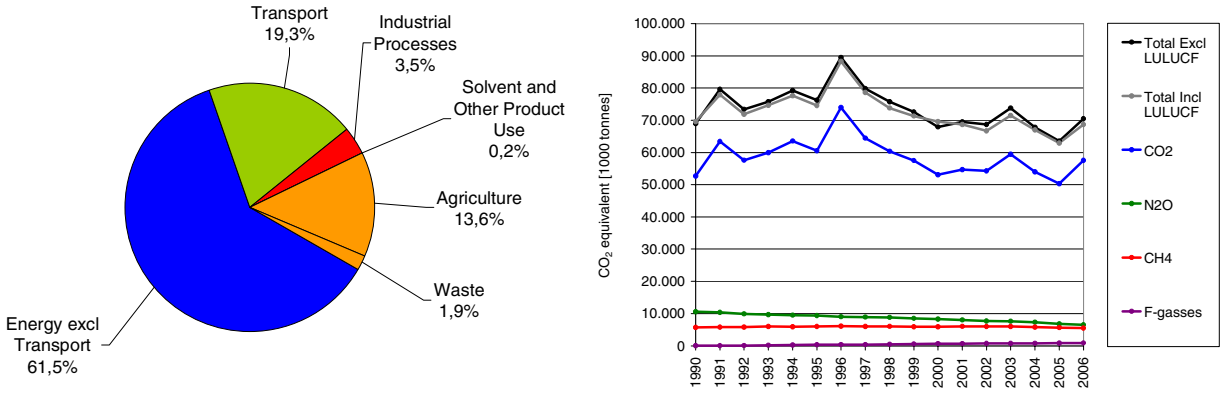


Figure 1.1 Greenhouse gas emissions in CO_2 equivalents distributed on main sectors for 2006 and time-series for 1990 to 2006.

1.3.1 Carbon dioxide

The largest source to the emission of CO_2 is the energy sector, which includes combustion of fossil fuels like oil, coal and natural gas (Figure 1.2). Energy Industries contribute with 51 % of the emissions. About 23 % come from the transport sector. The CO_2 emission increased by approximately 14 % from 2005 to 2006. The main reason for this increase was export of electricity. In 2006, the actual CO_2 emission was about 9 % higher than the emission in 1990.

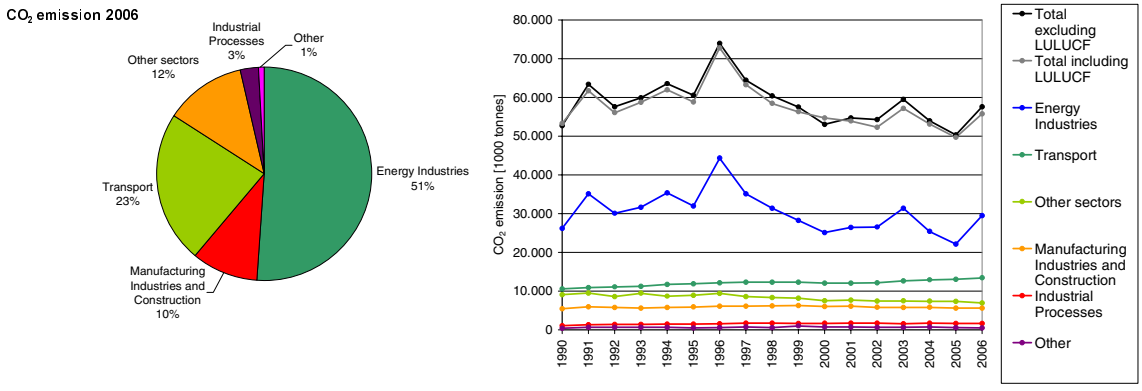


Figure 1.2 CO_2 emissions. Distribution according to the main sectors (2006) and time-series for 1990 to 2006.

1.3.2 Nitrous oxide

Agriculture is the most important N_2O emission source in 2006 contributing by 91.5 % (Figure 1.3) of which N_2O from soil dominates (83.5 %). N_2O is emitted as a result of microbial processes in the soil. Substantial emissions also come from drainage water and coastal waters where ni-

trogen is converted to N_2O through bacterial processes. However, the nitrogen converted in these processes originates mainly from the agricultural use of manure and fertilisers. The main reason for the drop in the emissions of N_2O in the agricultural sector of 34 % from 1990 to 2006, is legislation to improve the utilisation of nitrogen in manure. The legislation has resulted in less nitrogen excreted per unit of livestock produced and a considerable reduction in the use of fertilisers. The basis for the N_2O emission is thus reduced. Combustion of fossil fuels in the energy sector, both stationary and mobile sources, contributes with 7.2 %. The N_2O emission from transport contributes by 2.1 % in 2006. This emission has increased during the nineties because of the increase in the use of catalyst cars. Production of nitric acid stopped in 2004 and the emissions from industrial processes is therefore zero in 2005 and 2006. The sector Other covers N_2O from product use, e.g. anaesthesia.

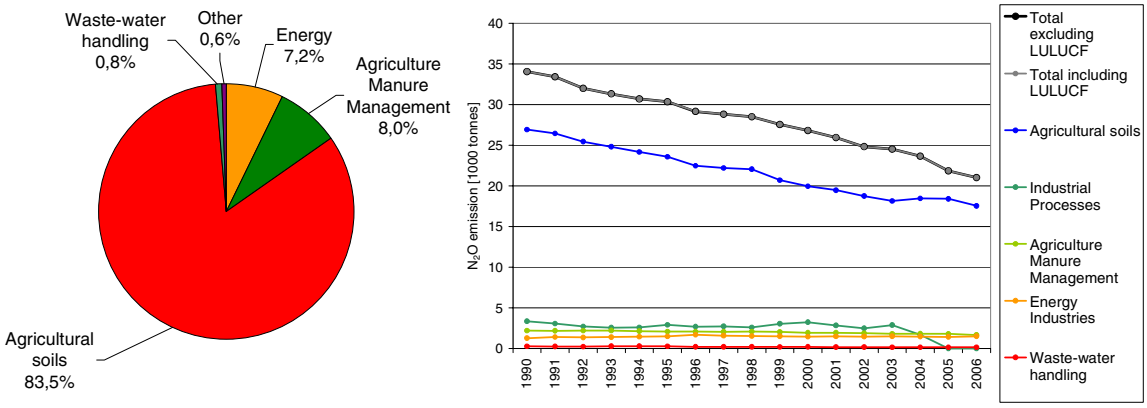


Figure 1.3 N_2O emissions. Distribution according to the main sectors (2006) and time-series for 1990 to 2006.

1.3.3 Methane

The largest sources of anthropogenic CH_4 emissions are agricultural activities contributing in 2006 by 66.1 %, waste by 23.1 %, public power and district heating plants by 4.3 %, see Figure 1.4. The emission from agriculture derives from enteric fermentation by 47.2 % and management of animal manure by 18.9 %. The CH_4 emission from public power and district heating plants increases due to the increasing use of gas engines in the decentralized cogeneration plant sector. Up to 3 % of the natural gas in the gas engines is not combusted. Over the time-series from 1990 to 2006, the emission of CH_4 from enteric fermentation has decreased 20.1 % due to the decrease in the number of cattle. However, the emission from manure management has in the same period increased 38.8 % due to a change in traditional stable systems towards an increase in slurry-based stable systems. Altogether, the emission of CH_4 from the agriculture sector has decreased by 9.1 % from 1990 to 2006. The emission of CH_4 from waste disposal has decreased slightly due to an increase in the incineration of waste.

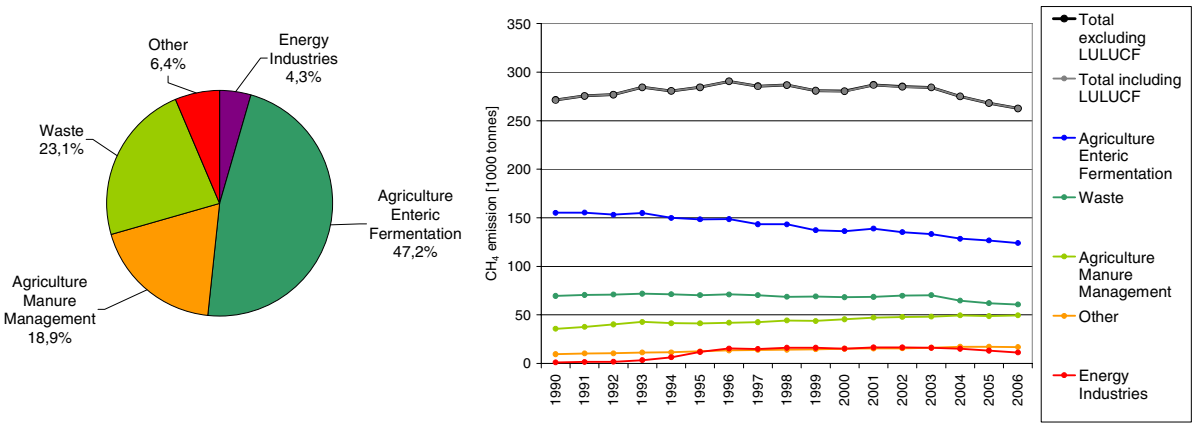


Figure 1.4 CH_4 emissions. Distribution according to the main sectors (2006) and time-series for 1990 to 2006.

1.3.4 HFCs, PFCs and SF_6

This part of the Danish inventory only comprises a full data set for all substances from 1995. From 1995 to 2000 there has been a continuous and substantial increase in the contribution from the range of F-gases as a whole, calculated as the sum of emissions in CO_2 equivalents, see figure 1.5. This increase is simultaneous with the increase in the emission of HFCs. For the time-series 2000-2006, the increase is lower than for the years 1995 to 2000. The increase from 1995 to 2006 is 172.3 %. SF_6 contributed considerably to the F-gas sum in earlier years, with 33 % in 1995. Environmental awareness and regulation of SF_6 under Danish law has reduced its use in the industry, see Figure 1.5. A further result is that the contribution of SF_6 to F-gases in 2006 was only 4.1 %. The use of HFCs has increased several folds. HFCs have, therefore, become dominant F-gases, comprising 66.7 % in 1995, but 94.2 % in 2006. HFCs are mainly used as a refrigerant. Danish legislation regulates the use of F-gases, e.g. since January 1, 2007 new stationary systems with HFC-based refrigerants are forbidden. Refill of old systems are still allowed and the use of air conditioning in mobile systems increases.

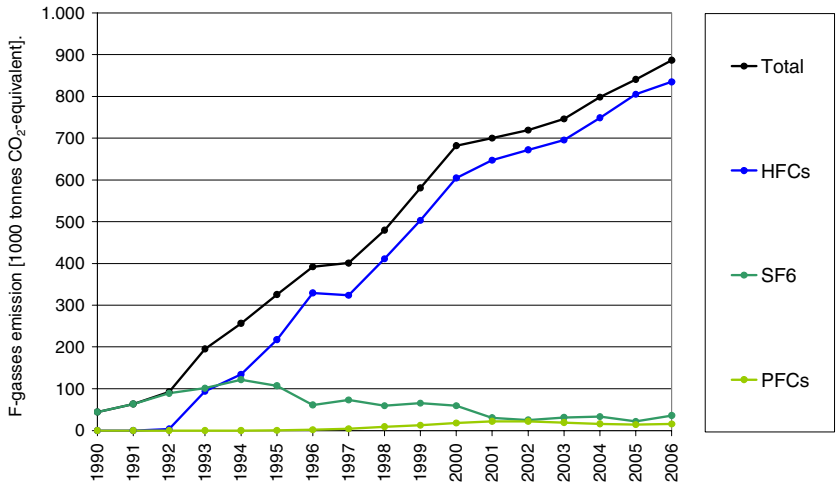


Figure 1.5 F-gas emissions. Time-series for 1990 to 2006.

1.4 Projection models

Projection of emissions can be considered as emission inventories for the future in which the historical data is replaced by a number of assumptions and simplifications. In the present project the emission factor method is used and the emission as a function of time for a given pollutant can be expressed as:

$$E = \sum_{s} A_s(t) \cdot \bar{EF}_s(t) \qquad (1.1)$$

where A_s is the activity for sector s for the year t and $EF_s(t)$ is the aggregated emission factor for sector s.

In order to model the emission development as a consequence of changes in technology and legislation, the activity rates and emission factors of the emission source should be aggregated at an appropriate level, at which relevant parameters such as process type, reduction targets and installation type can be taken into account. If detailed knowledge and information of the technologies and processes are available, the aggregated emission factor for a given pollutant and sector can be estimated from the weighted emission factors for relevant technologies as given in equation 1.2:

$$\overline{EF}_s(t) = \sum_{k} P_{s,k}(t) \cdot EF_{s,k}(t) \qquad (1.2)$$

where P is the activity share of a given technology within a given sector, $EF_{s,k}$ is the emission factor for a given technology and k is the type of technology.

Official Danish forecasts of activity rates are used in the models for those sectors for which the forecasts are available. For other sectors projected activity rates are estimated in co-operation with relevant research institutes and other organisations. The emission factors are based on recommendations from the IPCC Guidelines (IPCC, 1997), IPCC Good Practice Guidance and Uncertainty Management (2000) and the Joint EMEP/CORINAIR Guidebook (EMEP/CORINAIR, 2007) as well as

data from measurements made in Danish plants. The influence of legislation and ministerial orders on the development of the emission factors has been estimated and included in the models.

The projection models are based on the same structure and method as the Danish emission inventories in order to ensure consistency. In Denmark the emissions are estimated according to the CORINAIR method (EMEP/CORINAIR, 2007) and the SNAP (Selected Nomenclature for Air Pollution) sector categorisation and nomenclature are used. The detailed level makes it possible to aggregate to both the UN-ECE/EMEP nomenclature (NFR) and the IPCC nomenclature (CRF).

References

EMEP/CORINAIR, 2007: Emission Inventory Guidebook 3rd edition, prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections, 2007 update.
http://reports.eea.europa.eu/EMEPCORINAIR5/en/page002.html
(29-02-2008).

Illerup, J.B., Birr-Pedersen, K., Mikkelsen, M.H, Winther, M., Gyldenkærne, S., Bruun, H.G. & Fenhann, J. 2002: Projection Models 2010. Danish Emissions of SO_2, NO_X, NMVOC and NH_3. National Environmental Research Institute. - NERI Technical Report 414: 192 pp.
http://www2.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/FR414.pdf

Illerup, J.B., Lyck, E., Nielsen, O.K., Mikkelsen, M.H., Hoffmann, L., Gyldenkærne, S., Nielsen, M., Sørensen, P.B., Vesterdal, L., Fauser, P., Thomsen, M. & Winther, M. 2006: Denmark 's National Inventory Report 2006. Submitted under the United Nations Framework Convention on Climate Change, 1990-2004. National Environmental Research Institute. - NERI Technical Report 589: 555 pp.
http://www2.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/FR589.pdf

Illerup, J.B., Nielsen, O.K., Winther, M., Mikkelsen, M.H., Lyck, E., Nielsen, M., Hoffmann, L., Gyldenkærne, S. & Thomsen, M. 2007c: Projection of Greenhouse Gas Emissions. 2005 to 2030. National Environmental Research Institute, University of Aarhus. - NERI Technical Report 611: 116 pp. http://www.dmu.dk/Pub/FR611.pdf

IPCC, 1997: Greenhouse Gas Inventory Reporting Instructions. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 1, 2 and 3. The Intergovernmental Panel on Climate Change (IPCC), IPCC WGI Technical Support Unit, United Kingdom.
http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm

IPCC, 2000: IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.
http://www.ipcc-nggi-p.iges.or.jp/public/gp/gpgaum.htm

IPCC, 2001: Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovern-

mental Panel on Climate Change (IPCC). Edited by J.T. Houghton, Y. Ding, D.J. Griggs, M. Noguer, P. J. van der Linden, & D. Xiaosu. Cambridge University Press, Cambridge, United Kingdom and NY, USA, 881 pp.
http://www.cambridge.org/uk/earthsciences/climate-change/

IPCC, 1996: Climate Change 2005: The Science of Climate Change. Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Edited by J. T. Houghton, L.G. Meira Filho, B.A. Callender, N. Harris, A. Kattenberg, and K. Maskell. Cambridge University Press, Cambridge, United Kingdom and NY, USA, 572 pp. http://www.ipcc.ch/pub/sa(E).pdf

2 Stationary combustion

2.1 Methodology

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

The methodology for emission projections are, just as the Danish emission inventory for stationary combustion plants, based on the CORINAIR system described in the EMEP/CORINAIR Guidebook (EMEP/-CORINAIR, 2007). The projections are based on official activity rates forecasts from the Danish Energy Agency and on emission factors for different fuels, plants and sectors. For each of the fuels and categories (sector and e.g. type of plant), a set of general emission factors has been determined. Some emission factors refer to the IPPC Guidelines (IPCC, 1997), the EMEP/CORINAIR Guidebook (EMEP/CORINAIR, 2007) and some are country-specific and refer to Danish legislation, Danish research reports or calculations based on emission data from a considerable number of plants.

Some of the large plants, such as e.g. power plants and municipal waste incineration plants are registered individually as large point sources and emission data from the actual plants are used. The CO_2 from incineration of the plastic part of municipal waste is included in the projected emissions.

2.2 Sources

The combustion of fossil fuels is one of the most important sources of greenhouse gas emissions and this chapter covers all sectors that use fuels for energy production, with the exception of the transport sector. Table 2.1 shows the sector categories used and the relevant classification numbers according to SNAP and IPCC.

Table 2.1 Sectors included in stationary combustion.

Sector	IPCC	SNAP
Public power	1A1a	0101
District heating plants	1A1a	0102
Petroleum refining plants	1A1b	0103
Oil/gas extraction	1A1c	0105
Commercial and institutional plants	1A4a	0201
Residential plants	1A4b	0202
Plants in agriculture, forestry and aquaculture	1A4c	0203
Combustion in industrial plants	1A2	03
Flaring	1B2c	09

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)*.

Fugitive emissions and emissions from flaring in oil refinery and in gas and oil extraction are estimated in Chapter 3 on fugitive emissions.

As seen in Figure 1.2 in Section 1.3, the sector contributing most to the emission of CO_2 is public power and district heating plants.

2.3 Fuel consumption

Energy consumption in the model is based on the Danish Energy Agency's energy consumption projections to 2025 (Danish Energy Agency, 2008a) and energy projections for individual plants (Danish Energy Agency, 2008b) with the exception of two industrial plants where data are collected from Statistics Denmark and information obtained from the plants, themselves.

In the projection model the sources are separated into area sources and large point sources, where the latter cover all plants larger than 25 MW_e and two industrial plants. The projected fuel consumption of area sources is calculated as total fuel consumption minus the fuel consumption of large point sources and mobile sources.

The emission projections are based on the amount of fuel which is expected to be combusted in Danish plants and is not corrected for international trade in electricity. For plants larger than 25 MWe, fuel consumption is specified in addition to emission factors. Fuel use by fuel type is shown in Table 2.2, and Figures 2.1 and 2.3.

Table 2.2 Fuel consumption distributed on different fuel types [TJ].

Fuel type	2008	2010	2015	2020	2025
Steam coal	227 729	192 922	133 960	115 431	110 204
Natural gas	195 478	185 418	176 826	171 503	159 597
Wood and simil.	61 606	64 709	89 763	95 764	110 492
Municipal waste	38 094	39 839	42 754	45 142	45 370
Gas oil	24 416	20 693	10 757	5 018	1 824
Agricultural waste	23 930	23 954	20 308	18 206	17 726
Residual oil	21 280	17 869	15 224	14 031	12 808
Refinery gas	15 543	15 543	15 543	15 543	15 543
Petroleum coke	8 598	8 280	7 293	6 689	6 474
Biogas	4 525	6 524	9 011	10 172	10 039
LPG	1 775	1 725	1 484	1 395	1 351
Coke	706	704	687	719	758
Kerosene	235	190	148	125	113
Total	623 916	578 369	523 757	499 737	492 298

Throughout the period, natural gas and coal are the most important fuels, followed by wood and municipal waste. The largest variations are seen for coal use and renewable energy use. Coal use peaks in 2008/2009 and decreases steadily until 2025. For wood the projected consumption increases throughout the period as a whole and in 2025 the consumption of wood is projected to be higher than the consumption of coal.

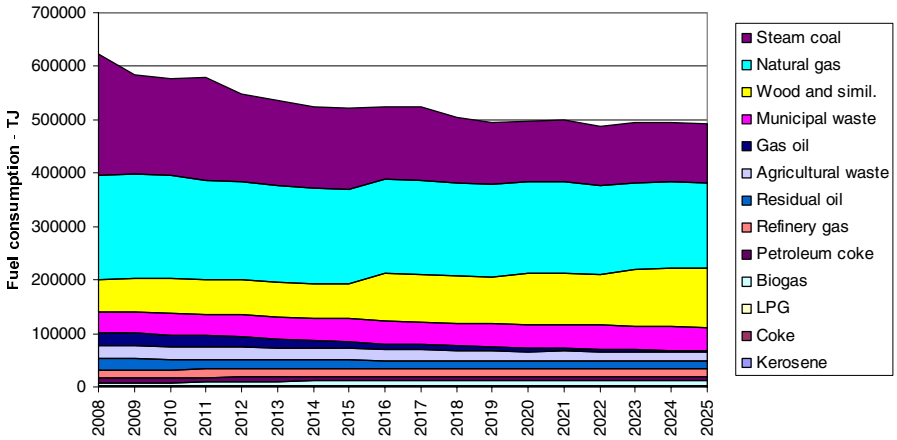


Figure 2.1 Projected energy consumption by fuel type.

Fuel use by sector is shown in Figure 2.2. The fuel sectors consuming the most fuel are public power, industry, residential, off-shore and district heating. According to the energy projection the fuel consumption in the off-shore sector will increase by almost 40 % from 2010 to 2020.

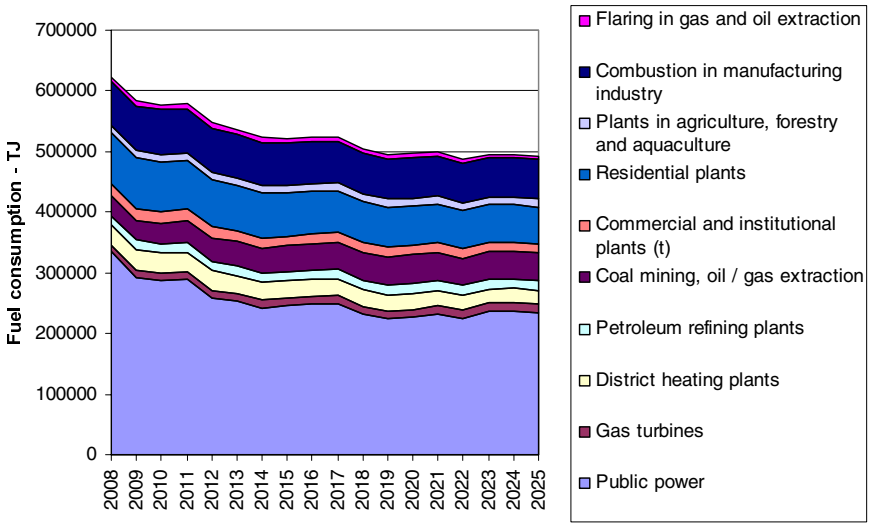


Figure 2.2 Projected energy consumption by sector.

Power plants larger than 25 MWe use about 40 % of total fuel, the fuel consumption in these sources decline from 2008 to 2014 thereafter the consumption remain relatively stable. The amount of wood combusted by large point sources increases whereas the coal consumption decreases. The share of fuel use comprised by exported electricity constitutes -3.6-8.2 % of total fuel consumption over the period 2008 to 2025 (Figure 2.4).

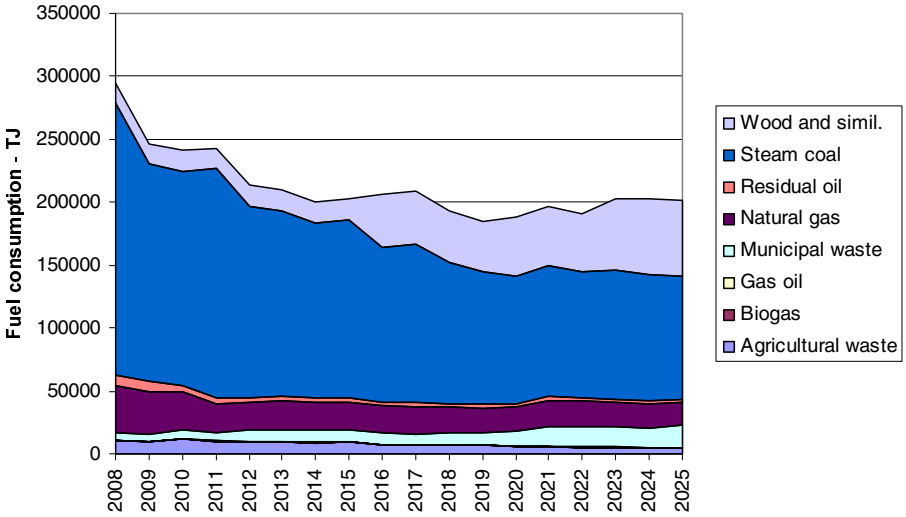


Figure 2.3 Projected Energy consumption for plants > 25 MWe

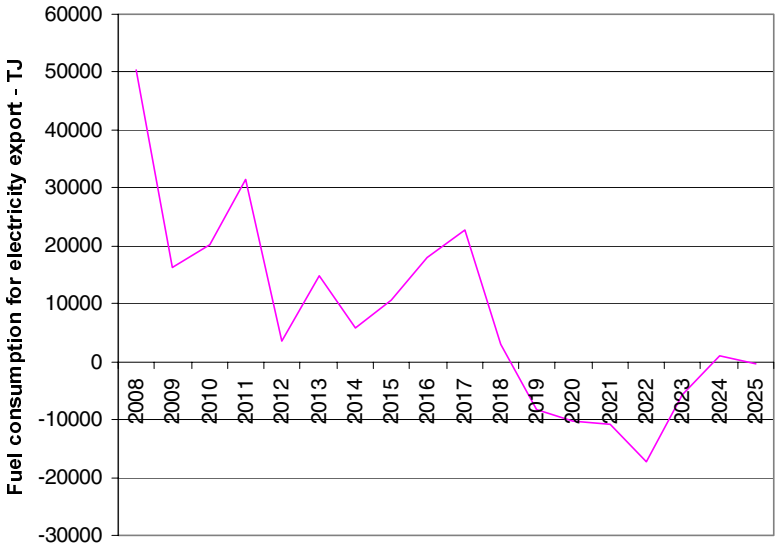


Figure 2.4 Fuel consumption associated with electricity export.

2.4 Emission factors

2.4.1 Area sources

For area sources, emission factors for 2006 have been used (Nielsen et al., 2008). The emission factor for CO_2 alone is fuel-dependent. The N_2O and CH_4 emission factors depend on the sector (SNAP) in which the fuel is used.

The energy projections are not made at similarly detailed SNAP level as the historic emissions inventories. The majority of emissions factors are, however, the same within the aggregated SNAP categories, which are combined in the projections.

For biogas and natural gas, however, different emissions factors are used within the majority of SNAP categories. Therefore, Implied Emis-

sion Factors (IEF) for these fuels has been calculated for each of the SNAP categories. In calculating these, it is assumed that the distribution of fuel use across boilers, gas turbines and engines within each SNAP category remains the same over the period 2007-2025. If consumption data falls/rises significantly, this is not a good assumption as production from gas engines/gas turbines is linked to district heat sales, whereas production from certain larger power plants is not. This, however, is thought not to be the case with the energy projections here.

The calculated Implied Emission Factors (IEF) for natural gas and biogas in 2006 are shown in Table 2.3. The IEFs are assumed to remain unchanged over the period 2008-2025 with one exception.

For SNAP 0101, point sources account for a large proportion of the consumption. In the calculation of the IEF for natural gas and biogas, it is assumed that all the plants under SNAP 010101 and 010102 are included as point sources, while SNAP 010103 is included as an area source. This is not entirely correct as SNAP 010103 includes plants < 50MW thermal input, while point sources cover plants larger than $25MW_e$. For gas turbines, a proportion of the consumption of natural gas is included under point sources and, in calculating the IEF, this fuel consumption is deducted.

In the calculation of IEF for industrial plants, consideration is not similarly given to that a proportion of the consumption is included as point sources.

Table 2.2 CH_4 and N_2O for natural gas and biogas, calculation of Implied Emission Factors (IEF) based on emission factors from 2006 and fuel consumption in 2006.

			Fuel consumption (TJ)			Emission factor (g pr GJ) (projections)			IEF (g pr GJ)
	SNAP	Fuel	Boilers	GT	GM	Boilers	GT	GM	
CH_4	010103 - 5	Natural gas	2 238	938	20 419	15	1,5	465	404
CH_4	102	Natural gas	2 259	-	853	15	1,5	465	138
CH_4	103	Natural gas	-	-	-	15	1,5	465	-
CH_4	105	Natural gas	379	28 342	8	15	1,5	465	1,8
CH_4	201	Natural gas	10 675	40	946	15	1,5	465	51
CH_4	202	Natural gas	28 569	-	1 499	15	1,5	465	37
CH_4	203	Natural gas	2 009	42	1 811	15	1,5	465	226
CH_4	301	Natural gas	30 017	4 711	952	15	1,5	465	25,2
CH_4	010103 - 5	Biogas	105	-	1 287	4	-	323	299
CH_4	102	Biogas	17	-	155	4	-	323	291
CH_4	103	Biogas	-	-	-	4	-	323	-
CH_4	105	Biogas	-	-	116	4	-	323	323
CH_4	201	Biogas	712	-	501	4	-	323	136
CH_4	202	Biogas	-	-	-	4	-	323	-
CH_4	203	Biogas	333	-	475	4	-	323	192
CH_4	301	Biogas	96	-	104	4	-	323	170
N_2O	010103 - 5	Natural gas	2 238	938	20 419	1	2,2	1,3	1,3
N_2O	102	Natural gas	2 259	-	853	1	2,2	1,3	1,1
N_2O	103	Natural gas	-	-	-	1	2,2	1,3	-
N_2O	105	Natural gas	379	28 342	8	1	2,2	1,3	2,2
N_2O	201	Natural gas	10 675	40	946	1	2,2	1,3	1,0
N_2O	202	Natural gas	28 569	-	1 499	1	2,2	1,3	1,0
N_2O	203	Natural gas	2 009	42	1 811	1	2,2	1,3	1,2
N_2O	301		30 017	4 711	952	1	2,2	1,3	1,2
N_2O	010103 - 5	Biogas	105	-	1 287	2	-	0,5	0,6
N_2O	102	Biogas	17	-	155	2	-	0,5	0,7
N_2O	103	Biogas	-	-	-	2	-	0,5	-
N_2O	105	Biogas	-	-	116	2	-	0,5	0,5
N_2O	201	Biogas	712	-	501	2	-	0,5	1,4
N_2O	202	Biogas	-	-	-	2	-	0,5	-
N_2O	203	Biogas	333	-	475	2	-	0,5	1,1
N_2O	301	Biogas	96	-	104	2	-	0,5	1,2

2.4.2 Point sources

Plant-specific emission factors are not used for greenhouse gases. Therefore, emission factors for the individual fuels/SNAP categories are used. Point sources are, with a few exceptions, plants under SNAP 010101/010102/010103. A few plants come under other SNAP categories:

- Gas turbines – here the emission factors for SNAP 010104 are used
- Aalborg Portland – here the emission factors for SNAP 0301 are used
- Rexam Glas Holmegaard - here the emission factors for SNAP 0301 are used.

2.5 Emissions

Emissions for the individual greenhouse gases are calculated by means of Equation 2.1, where A is the activity (fuel consumption) for sector *s* for year *t* and $EF_s(t)$ is the aggregate emission factor for sector *s*.

$$Eq.\ 2.1 \quad E = \sum_s A_s(t) \cdot \bar{EF_s}(t)$$

The total emission in CO_2 equivalents for stationary combustion is shown in Table 2.4.

Table 2.4 Total emission from stationary combustion in ktonnes CO_2 equivalents.

Sector	1990	1995	2000	2005	2008	'2010'	'2015'	2020	2025
Public power	23 009	29 351	22 834	19 680	24 715	20 698	15 730	12 161	11 602
Gas turbines	IE	IE	IE	IE	645	685	763	680	804
District heating plants	1 852	854	285	311	1 030	1 046	784	725	529
Petroleum refining plants	908	1 387	999	942	949	949	949	949	949
Oil/gas extraction	546	744	1 467	1 623	1 829	1 993	2 420	2 738	2 559
Commercial and institutional plants	1 419	1 139	941	940	972	914	713	682	678
Residential plants	5 066	5 132	4 149	3 918	3 576	3 242	2 490	1 907	1 502
Plants in agriculture, forestry and aquaculture	620	730	780	651	645	667	689	699	712
Combustion in industrial plants	4 640	5 105	5 145	4 676	4 744	4 720	4 461	4 234	4 217
Flaring	267	367	598	439	423	440	441	426	300
Total	38 327	44 810	37 199	33 180	39 529	35 354	29 440	25 202	23 852

The projected emissions in 2008-2012 are approximately 3600 ktonnes (CO_2-equiv.) lower than the emissions in 1990. From 1990 to 2025, the total emission falls by approximately 15,000 ktonnes (CO_2-equiv.) or 39 % due to coal being partially replaced by renewable energy. The emission projections for the three greenhouse gases are shown in Figures 2.5-2.10 and in Tables 2.5-2.7, together with the historic emissions for 1990, 2000 and 2005 (Nielsen et al. 2008).

2.5.1 CO_2 emissions

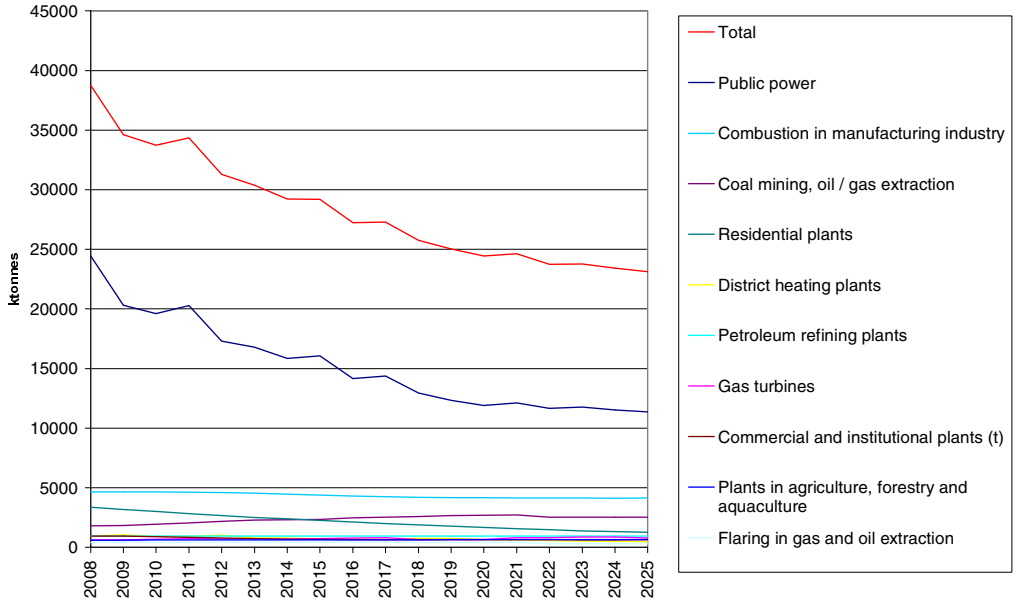


Figure 2.5 CO_2 emissions by sector.

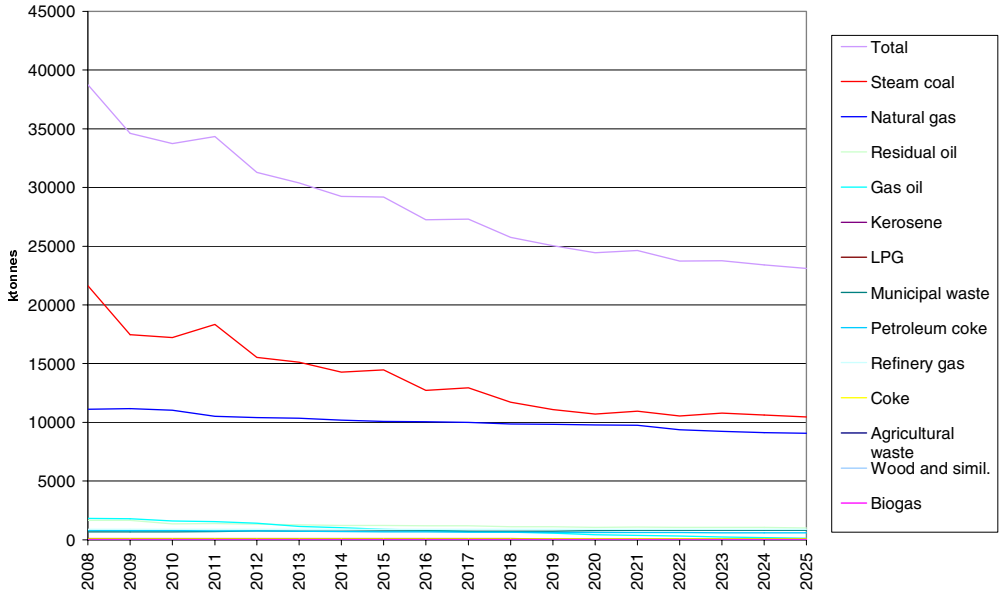


Figure 2.6 CO_2 emissions by fuel

Table 2.5 CO_2 emissions in ktonnes from stationary combustion plants.

Sector	1990	1995	2000	2005	2008	'2010'	'2015'	2020	2025
Public power	22 931	29 012	22 412	19 320	24 438	20 390	15 450	11 904	11 355
Gas turbines	IE	IE	IE	IE	637	677	753	672	794
District heating plants	1 805	817	265	283	956	977	724	668	480
Petroleum refining plants	897	1 371	988	932	938	938	938	938	938
Oil/gas extraction	540	735	1 449	1 602	1 807	1 968	2 390	2 704	2 528
Commercial and institutional plants	1 403	1 116	913	913	940	883	685	654	651
Residential plants	4 946	4 989	4 003	3 712	3 354	3 015	2 260	1 676	1 267
Plants in agriculture, forestry and aquaculture	594	695	726	606	597	618	639	649	662
Combustion in industrial plants	4 582	5 044	5 066	4 606	4 668	4 643	4 389	4 165	4 149
Flaring	263	363	593	435	421	437	438	424	298
Total	37 962	44 141	36 415	32 409	38 755	34 546	28 667	24 453	23 122

CO_2 is the dominant greenhouse gas for stationary combustion and comprises, in 2010, approximately 98 % of total emissions in CO_2 equivalents. The most important CO_2 source is the public power sector which contributes with about 60 % in '2010' to the total emissions from stationary combustion plants. Other important sources are combustion plants in industry, residential plants and oil/gas extraction. The emission of CO_2 decreases by 40 % from 2008 to 2025 due to the partial shift in fuels from coal to wood and municipal waste. IE is an abbreviation of included elsewhere, in this case the historic emission from gas turbines is included under public power.

2.5.2 CH_4 emissions

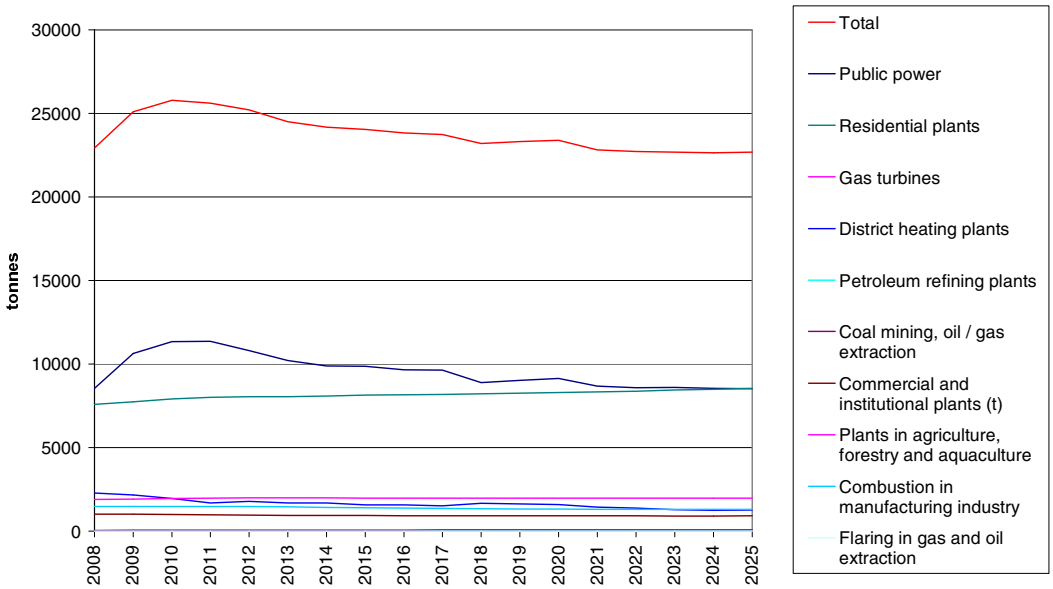


Figure 2.7 CH_4 emissions by sector.

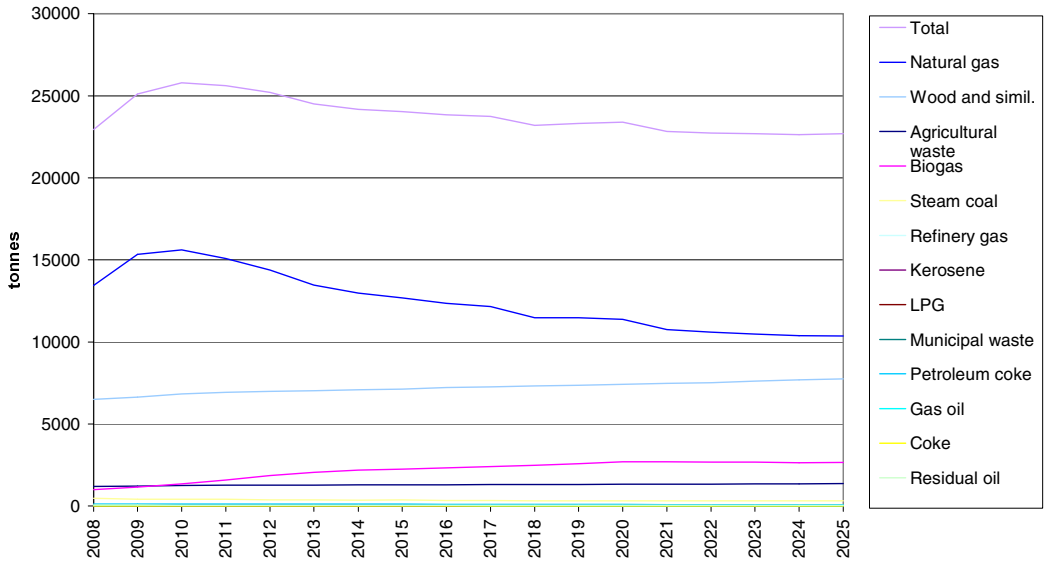


Figure 2.8 CH_4 emissions by fuel.

Table 2.6 CH_4 emissions in tonnes from stationary combustion plants.

Sector	1990	1995	2000	2005	2008	'2010'	'2015'	2020	2025
Public power	601	11 151	14 838	12 482	8 541	10 545	9 863	9 137	8 522
Gas turbines	IE	IE	IE	IE	17	18	20	19	22
District heating plants	464	608	384	636	2 279	1 978	1 610	1 591	1 259
Petroleum refining plants	32	44	2	2	25	25	25	25	25
Oil/gas extraction	16	40	58	80	57	62	76	86	80
Commercial and institutional plants	190	638	929	834	1 030	1 001	941	923	920
Residential plants	3 037	4 108	4 541	6 812	7 590	7 863	8 126	8 302	8 556
Plants in agriculture, forestry and aquaculture	794	1 225	2 183	1 804	1 906	1 955	1 988	1 980	1 987
Combustion in industrial plants	646	784	1 510	1 236	1 484	1 479	1 406	1 326	1 312
Flaring	84	100	111	98	7	8	8	7	5
Total	5 864	18 699	24 557	23 984	22 936	24 936	24 064	23 396	22 689

The two largest sources of CH_4 emissions are public power and residential plants, which also fits well with the fact that natural gas and wood are the fuels contributing most to the CH_4 emission. There is an apparent rise in emissions from 1990 to 2000 due to the increase in the use of gas engines during the 1990s; beginning around 2004 the natural gas consumption has begun to show a decreasing trend due to structural changes in the Danish electricity market. The increase in emission from residential plants is due to an increase in wood combustion.

2.5.3 N_2O emissions

The contribution from the N_2O emission to the total greenhouse gas emission is small and the emissions stem from various combustion plants.

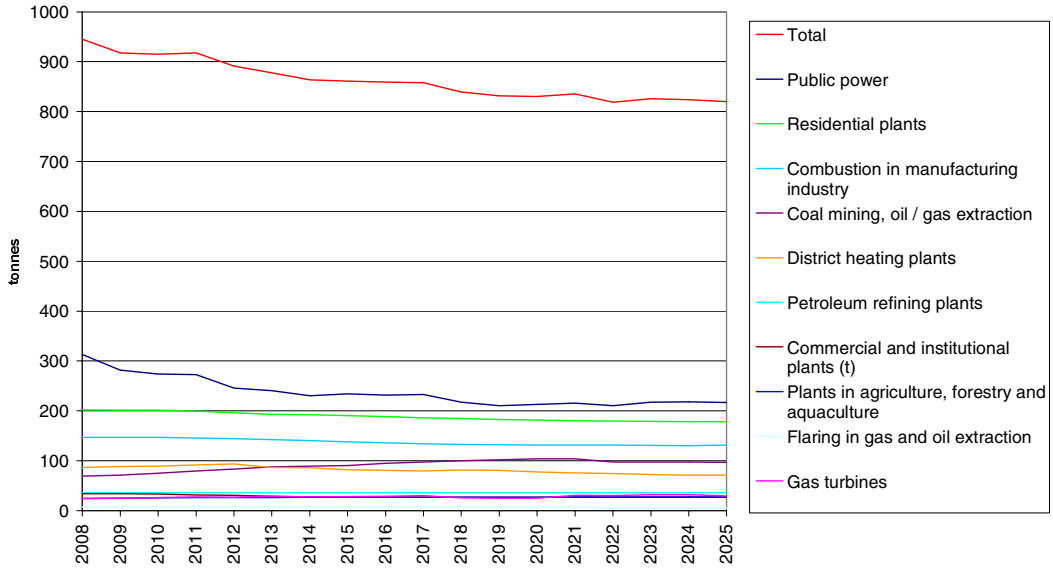


Figure 2.9 N_2O emissions by sector.

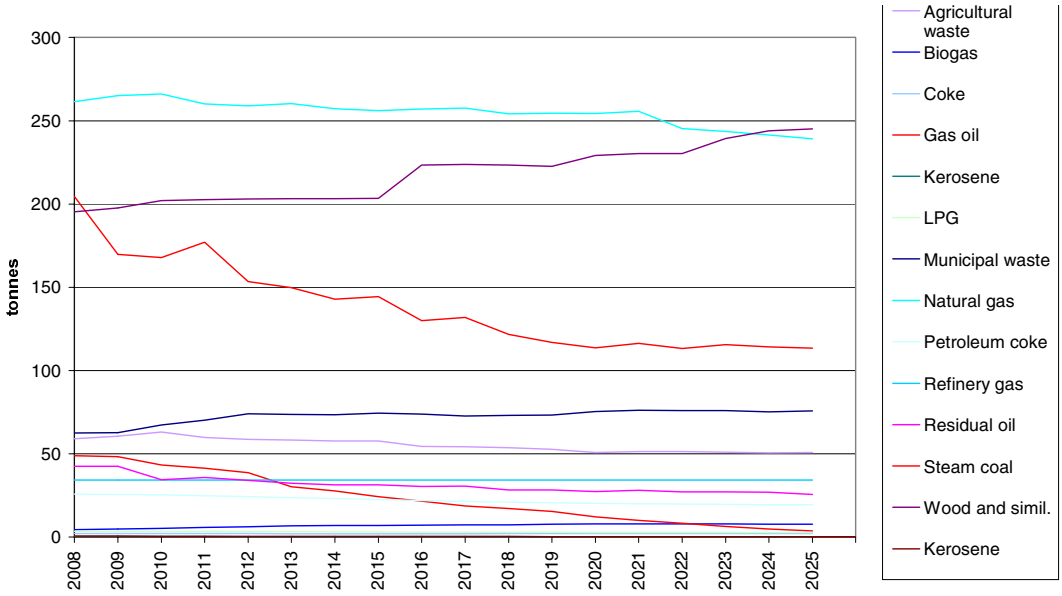


Figure 2.10 N_2O emissions by fuel.

Table 2.7 N_2O emissions in ktonnes from stationary combustion plants.

Sector	1990	1995	2000	2005	2008	'2010'	'2015'	2020	2025
Public power	212	341	354	315	313	277	234	213	217
Gas turbines	IE	IE	IE	IE	25	26	29	25	29
District heating plants	120	80	41	50	87	90	83	78	71
Petroleum refining plants	31	47	35	33	36	36	36	36	36
Oil/gas extraction	21	28	55	62	69	76	92	104	97
Commercial and institutional plants	39	32	25	28	34	33	28	27	27
Residential plants	182	184	164	202	202	200	190	182	178
Plants in agriculture, forestry and aquaculture	30	29	27	24	24	26	27	27	28
Combustion in industrial plants	141	145	152	141	147	146	138	132	131
Flaring	5	6	10	8	7	8	8	7	5
Total	780	892	863	862	945	917	864	830	820

2.6 Model description

The software used for the energy model is Microsoft Access 2003, which is a Relational Database Management System (RDBMS) for creating databases. The database is called the 'Fremskrivning2008-2025 model' and the overall construction of the database is shown in Figure 2.11.

The model consists of input data collected in tables containing data for fuel consumption and emission factors for combustion plants larger than 25 MW_e and combustion plants smaller than 25 MW_e. 'Area' and 'Point' in the model refer to small and large combustion plants, respectively. In Table 2.8 the names and the content of the tables are listed.

Table 2.3 Tables in the 'Fremskrivning2007-2025 model'.

Name	Content
tblEmfArea	Emission factors for small combustion plants
tblActArea	Fuel consumption for small combustion plants
tblEmfPoint	Emission factors for large combustion plants
tblActPoint	Fuel consumption for large combustion plants

From the data in these tables a number of calculations and unions are created by means of queries. The names and the functions of the queries used for calculating the total emissions are shown in Table 2.9.

Table 2.4 Queries for calculating the total emissions.

Name	Function
qEmissionArea	Calculation of the emissions from small combustion plants. Input: tblActArea and qEmfArea
qEmissionPoint	Calculation of the emissions from large combustion plants. Input: tblActPoint and qEmfPoint
qEmissionAll_a	Union of qEmissionArea and qEmissionPoint

Based on some of the queries a number of summation queries are available in the 'Fremskrivning2007-2025 model' (Figure 2.12). The outputs from the summation queries are Excel-pivot tables.

Table 2.5 Summation queries.

Name	Output
qxlsEmissionAll	Table containing emissions for SNAP groups, Years and Pollutants
qxlsEmissionArea	Table containing emissions for small combustion plants for SNAP groups, Years and Pollutants
qxlsEmissionPoint	Table containing emissions for large combustion plants for SNAP groups, Years and Pollutants
qxlsActivityAll	Table containing fuel consumption for SNAP groups, Years and Pollutants
qxlsActivityPoint	Table containing fuel consumption for large combustion plants for SNAP groups, Years and Pollutants

All the tables and queries are connected and changes of one or some of the parameters in the tables result in changes in the output tables.

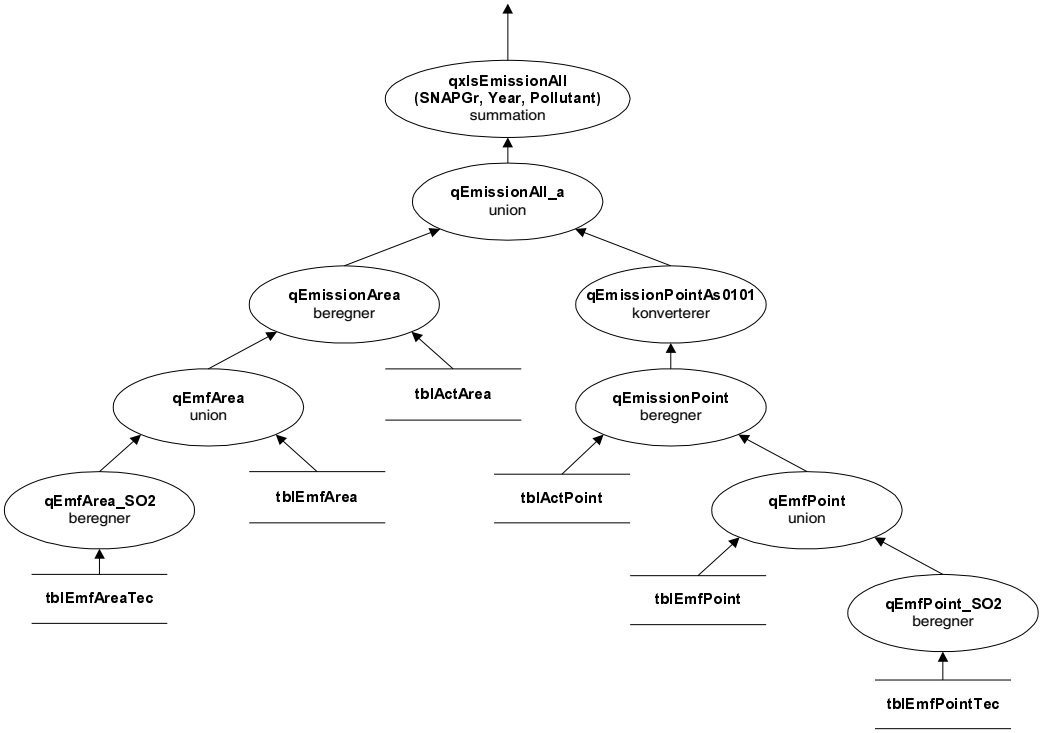


Figure 2.11 The overall construction of the database.

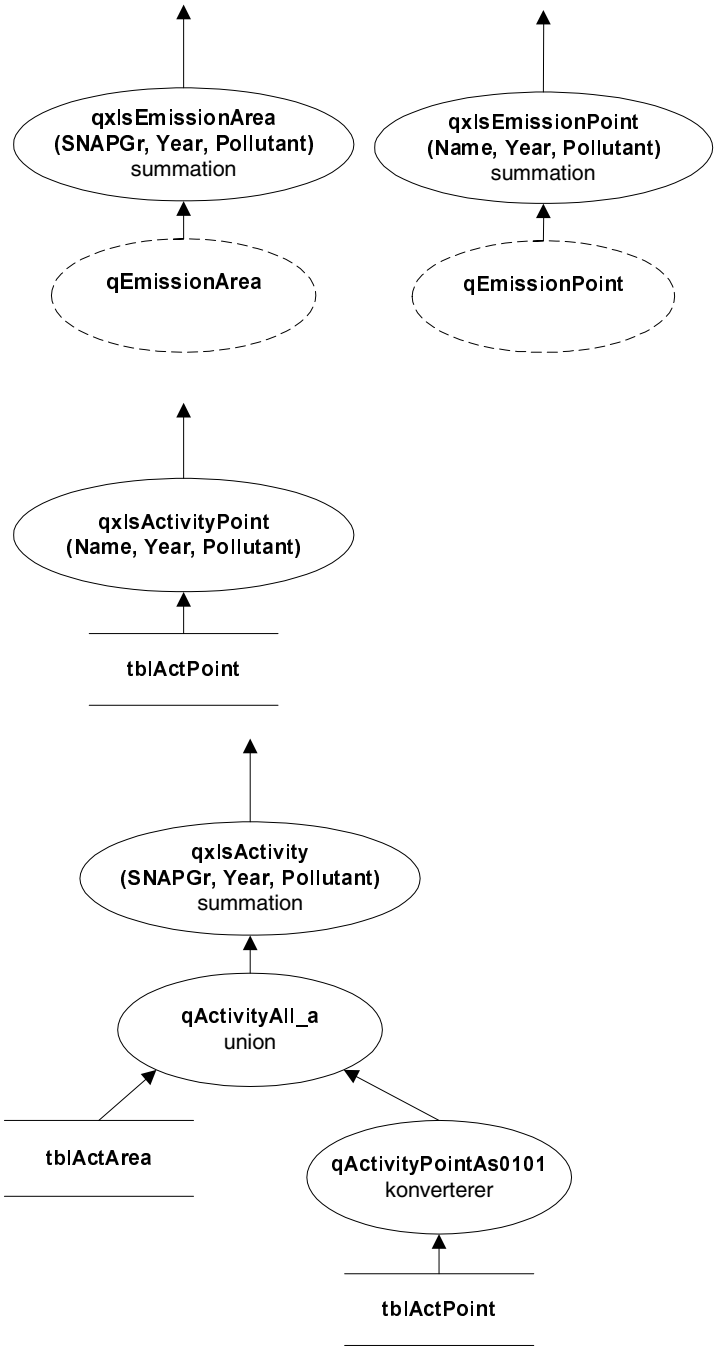


Figure 2.12 Summation queries.

References

Danish Energy Agency, 2008a: Energy projections 2008-2025, September 2008.

Danish Energy Agency, 2008b: Energy projections 2008-2025 of individual plants, RAMSES, September 2008.

EMEP/CORINAIR, 2007: Emission Inventory Guidebook 3rd edition, prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections, 2007 update.
http://reports.eea.europa.eu/EMEPCORINAIR5/en/page002.html

IPCC, 1997: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.
http://www.ipcc-nggip.iges.or.jp/public/gl/invs6.htm

Nielsen, M. Nielsen, O.-K. & Illerup, J.B., 2006: Danish emission inventories for stationary combustion plants. Inventories until year 2004. National Environmental Research Institute. - Research Notes from NERI 2006: 141 pp. http://www2.dmu.dk/Pub/FR628_Final.pdf

Nielsen, O.-K., Lyck, E., Mikkelsen, M.H., Hoffmann, L., Gyldenkærne, S., Winther, M., Nielsen, M., Fauser, P., Thomsen, M., Plejdrup, M.S., Illerup, J.B., Sørensen, P.B. & Vesterdal, L. 2008: Denmark's National Inventory Report 2008 - Emission Inventories 1990-2006 - Submitted under the United Nations Framework Convention on Climate Change. National Environmental Research Institute, University of Aarhus. 701 pp. – NERI Technical Report no. 667.
http://www2.dmu.dk/Pub/FR667.pdf

3 Oil and gas extraction (Fugitive emissions)

3.1 Methodology

The total emission of VOCs from the extraction of oil and gas is expressed in Equation 3.1.

$$Eq\,3.1 \quad E_{total} = E_{extraction} + E_{GT} + E_{ship} + E_{pipeline} + E_{networks}$$

$E_{extraction}$ represents emissions from plants which are used in connection with the offshore extraction of oil and gas and include emissions from venting, evaporation (fugitive loss) and flaring (refer to Equation 3.2).

$$Eq\,3.2 \quad E_{extraction} = E_{venting} + E_{fugitive} + E_{flaring}$$

In Denmark, the venting of gas is considered to be very limited as the controlled emission is flared. $E_{venting}$ is, therefore, set to zero.

According to the EMEP/CORINAIR Guidebook (EMEP/CORINAIR, 2007), the total fugitive emission of VOC can be calculated by means of Equation 3.3:

$$Eq\,3.3 \quad E_{VOC,fugitive} = 40.2 \cdot N_P + 1.1 \cdot 10^{-2} P_{gas} + 8.5 \cdot 10^{-6} \cdot P_{oil}$$

where N_P is the number of platforms, P_{gas} (10^6 Nm^3) is the production of gas and P_{oil} (10^6 tonnes) is the production of oil. If it can be considered that the VOC emitted consists of 75 % methane and 25 % NMVOC, then the methane and NMVOC emission can be calculated by means of Equations 3.4 and 3.5:

$$Eq\,3.4 \quad E_{extraction,NMVOC} = E_{fugitive,NMVOC} + E_{flaring,NMVOC}$$
$$= 0.25(40.2 \cdot N_P + 1.1 \cdot 10^{-2} P_{gas} + 8.5 \cdot 10^{-6} \cdot P_{oil}) + F_P \cdot EMF_{flaring,NMVOC}$$

$$Eq\,3.5 \quad E_{extraction,CH4} = E_{fugitive,CH4} + E_{flaring,CH4}$$
$$= 0.75(40.2 \cdot N_P + 1.1 \cdot 10^{-2} P_{gas} + 8.5 \cdot 10^{-6} \cdot P_{oil}) + F_P \cdot EMF_{flaring,CH4}$$

where $EMF_{flaring}$ is the emission factor for flaring.

The emission from gas treatment and storage can be arrived at via Equation 3.6:

$$Eq\,3.6 \quad E_{GT} = E_{GT,fugitive} + EMF_{flaring} \cdot F_{GT}$$

where $E_{GT,fugitive}$ represents the fugitive emissions, $EMF_{flaring}$ represents the emission factor for flaring and F_{GT} is the amount of gas flared.

The loading of ships with oil is carried out both offshore and onshore and the emission is calculated by means of Equation 3.7:

$$Eq\ 3.7 \qquad E_{ships} = EMF_{ships} \cdot L_{oil}$$

where EMF_{ships} is the emission factor for loading ships offshore and onshore and L_{oil} is the amount of oil loaded.

The emission of VOC from the transport of oil and gas in pipelines can be calculated by means of Equation 3.8:

$$Eq\ 3.8 \qquad E_{pipelines} = EMF_{pipeline,gas} \cdot T_{gas} + EMF_{pipeline,oil} \cdot T_{oil}$$

where T_{gas} and T_{oil} represent the amount of gas and oil transported, respectively, and $EMF_{pipeline,gas}$ and $EMF_{pipeline,olie}$ are the associated emission factors.

Emissions from the storage of crude oil can be calculated by means of Equation 3.9:

$$Eq\ 3.9 \qquad E_{\tan ks} = EMF_{\tan ks} \cdot T_{oil}$$

where EMF_{tanks} is the emission factor for storage of crude oil in tanks.

Emissions from the gas distribution network can be calculated by means of Equation 3.10:

$$Eq\ 3.10 \quad E_{networks} = EMF_{network} \cdot C_{gas}$$

where C_{gas} is the amount of gas transported and $EMF_{network}$ is the emission factor for the transport of gas via the gas distribution network.

3.2 Activity data

3.2.1 Historic

Activity data used in the calculation of the emissions is provided in Table 3.1 and stems from either the Danish Energy Agency's publications (Danish Energy Agency, 2007a) or from information from the Danish Gas Technology Centre (Oertenblad, 2007) or from the Danish gas transmission company DONG's environmental accounts ('grønne regnskaber') (DONG, 2007). The emissions from flaring are calculated in Chapter 2, 'Stationary Combustion'.

Table 3.1 Activity data for 2006.

Activity	Symbol	Year 2006	Ref.
Number of platforms	N_p	50	Danish Energy Agency, 2007a
Gas produced (10^6 Nm^3)	P_{gas}	10 878	Danish Energy Agency, 2007a
Oil produced (10^3 m^3)	$P_{oil,vol}$	19 847	Danish Energy Agency, 2007a
Oil produced (10^3 tonnes)	P_{oil}	17 068	Danish Energy Agency, 2007a
Gas transported by pipeline (10^6 Nm^3)	T_{gas}	9 164	Danish Energy Agency, 2007a
Oil transported by pipeline (10^3 m^3)	T_{oil}	16 900	DONG, 2007
Oil transported by pipeline (10^3 tonnes)	T_{oil}	14 534	Danish Energy Agency, 2007a
Oil loaded (10^3 m^3)	$L_{oil\ off\text{-}shore}$	2 957	Danish Energy Agency, 2007a
Oil loaded (10^3 tonnes)	$L_{oil\ off\text{-}shore}$	2 543	Danish Energy Agency, 2007a
Oil loaded (10^3 m^3)	$L_{oil\ on\text{-}shore}$	13 100	DONG, 2007
Oil loaded (10^3 tonnes)	$L_{oil\ on\text{-}shore}$	11 266	DONG, 2007
Volume gas consumed (10^6 Nm^3)	C_{gas}	2 983	Oertenblad, 2007

Mass weight crude oil = 0.86 tonnes pr m^3

3.2.2 Prognosis

The prognosis for the production of oil and gas shown in Figure 3.1 presents a path where technological progress and new extraction possibilities are assumed (Danish Energy Agency, 2007b). A decline in the extraction of gas and to a less extent for oil from 2004 to 2030 is foreseen in the prognosis.

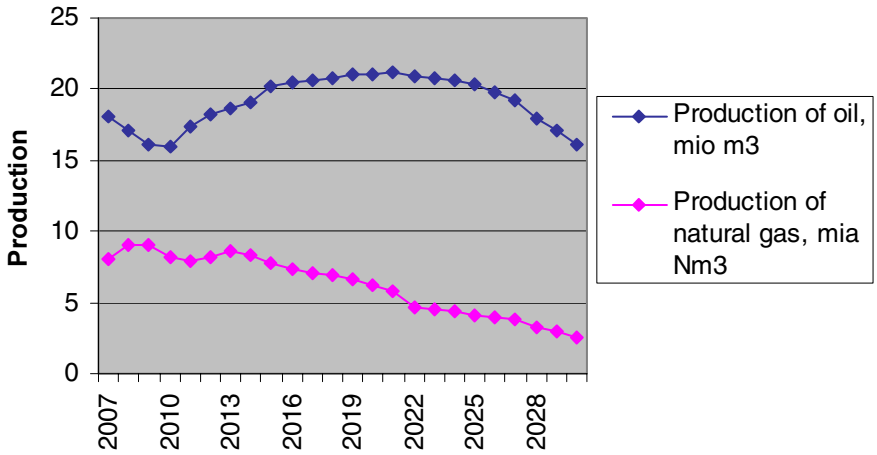


Figure 3.1 Prognosis for the production of oil and gas.

3.3 Emission factors

In the EMEP/CORINAIR Guidebook (EMEP/CORINAIR, 2007), the emission factors from different countries are provided. The Norwegian emission factors, which are also used in Norway's official emissions inventories (Flugsrud et al., 2000), have been selected for use in the projections (Table 3.2). The emissions from the storage of oil are stated in DONG's environmental accounts for 2006 (DONG, 2007) and the emission factor is calculated based on the amount of oil transported in pipelines.

Table 3.2 Emission factors for 2007-2009.

	CH_4	Unit	Ref.
Ships offshore	0.00005	Fraction of loaded	EMEP/CORINAIR, 2007
Ships onshore	0.000002	Fraction of loaded	EMEP/CORINAIR, 2007
Pipeline, gas [1)]	14,57	Kg pr 10^3 m^3	Karll 2003 & 2005, Oertenblad 2006 & 2007
Oil tanks	112,43	Kg pr 10^3 m^3	DONG, 2007
Network [1)]	23,23	Kg pr 10^6 m^3	Karll 2003 & 2005, Oertenblad 2006 & 2007

[1)] The emission factor is estimated as a mean of the emissions factors for a five year period (2002-2006).

According to the environment department of the local authority (Vejle Amt, 2005), stricter regulation of the emissions from oil tanks and on-shore loading of ships is going to be introduced. The emission factors for these sources have therefore decreased by 99 % and 46 % from 2010. The emission factors from 2010 to 2030 are listed in Table 3.3.

Table 3.3 Emission factors for 2010-2030

	CH_4	Unit	Ref.
Ships offshore	0.00005	Fraction of loaded	EMEP/CORINAIR, 2007
Ships onshore	0.00000108	Fraction of loaded	EMEP/CORINAIR, 2007 Vejle Amt, 2005
Pipeline, gas	14,57	Kg pr 10^3 m^3	Karll 2003 & 2005, Oertenblad 2006 & 2007
Oil tanks	1,12	Kg pr 10^3 m^3	DONG, 2007, Vejle Amt 2005
Network	23,23	kg pr 10^6 m^3	Karll 2003 & 2005, Oertenblad 2006 & 2007

3.4 Emissions

The emissions for CH_4 are calculated based on the activity data in Table 3.1 and the emission factors in Tables 3.2 and 3.3.

Table 3.4 CH_4 emissions (tonnes).

Extraction:	2006	2030
Fugitive	1 589	1 244
Gas treatment and storage:		
Fugitive + Flaring	78	78
Pipelines:		
Gas	134	32
Oil	n.a.	n.a.
Network	69	17
Oil tanks	1 900	15
Total minus ships	3 770	1 386
Ships:		
Offshore	127	103
Onshore	23	10
Total	3 920	1 499

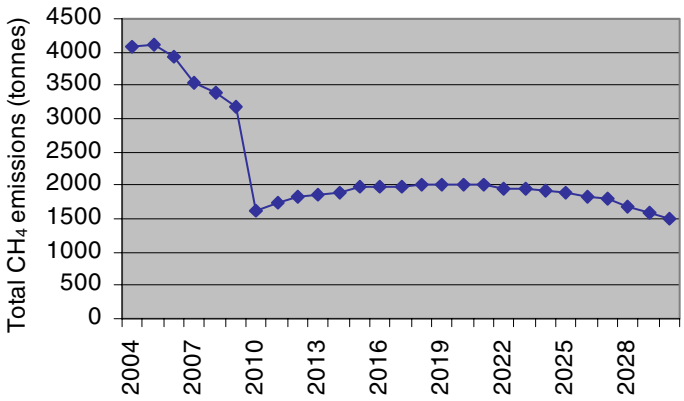


Figure 3.2 CH_4 emissions from oil and gas production.

Table 3.5 CH_4 emissions (ktonnes).

IPCC name	IPCC code	1990	1995	2000	2005	2007'	2010'	2015'	2020'	2025'
Fugitive emissions from oil	1B2a	1,54	2,26	3,48	4,44	3,30	2,12	1,72	1,81	1,72
Fugitive emissions from gas	1B2b	0,27	0,58	0,22	0,26	0,15	0,16	0,15	0,11	0,08
Total		1,80	2,84	3,70	4,70	3,45	2,28	1,87	1,92	1,80

Table 3.6 CH_4 emissions (ktonnes CO_2 equiv.).

IPCC name	IPCC code	1990	1995	2000	2005	2007'	2010'	2015'	2020'	2025'
Fugitive emissions from oil	1B2a	32	48	73	93	69	45	36	38	36
Fugitive emissions from gas	1B2b	6	12	5	5	3	3	3	2	2
Total		38	60	78	99	73	48	39	40	38

The decline in emissions reflects the expected environmental regulation in emissions from oil tanks and onshore loading of ships and decreasing extraction of oil and gas. It has been assumed that the number of platforms falls in line with the decline in extraction. The emission factors are assumed to be the same as those used in the historic inventories except for oil tanks and onshore loading of ships.

3.5 Model description

The model for the offshore industry is created in Microsoft Excel and the worksheets used in the model are collected in the 'Offshore model'. The names and content of the tables are listed in Table 3.6.

Table 3.7 Tables in the 'Offshore model'.

Name	Content
Activity data	Historically data for 2000 to 2006 (Table 2.2.1) plus estimated activity rates for 2007 to 2030 based on data in table 'Projected production'.
Projected production	Projected production of oil and gas for 2007 to 2030.
EMF	Emission factors for CH_4 and NMVOC for all activities.
Emissions	Projected emissions for 2007 to 2030 based on data in tables 'Activity data' and 'Emission factors'.

Changing the data in the input data tables will automatically update the projected emissions.

References

Danish Energy Agency, 2007a: Annual report on oil & gas production 2006.
http://www.ens.dk/graphics/Publikationer/Olie_Gas_UK/Oil_and_Gas_Production_in_Denmark_2006/index.htm

Danish Energy Agency, 2007b: Energy projections 2007-2030, October 2007.

DONG, 2007: DONG's Environmental accounts (Miljø – og sikkerheds-rapport (in Danish)).

EMEP/CORINAIR, 2007: EMEP/CORINAIR Emission Inventory Guidebook 3rd Edition December 2007 Update, Technical Report no 16/2007, European Environmental Agency, Copenhagen, Denmark. http://reports.eea.europa.eu/EMEPCORINAIR5/en/

Flugsrud, K., Gjerald, E., Haakonson, G., Holtskog, S., Høie, H., Rypdal, K., Tornsjø, B. & Weidemann, F. 2000: The Norwegian Emission Inventory, Statistics Norway and Norwegian Pollution Control Authority. http://www.ssb.no/english/subjects/01/04/10/rapp_emissions_en/arkiv/rapp_200001_en/

Karll, B. 2003: Personal communication, e-mail 17-11-2003, Danish Gas Technology Centre.

Karll, B. 2005: Personal communication, e-mail 09-11-2005, Danish Gas Technology Centre.

Oertenblad, M. 2006: personal communication, e-mail 30-11-2006, Danish Gas Technology Centre

Oertenblad, M. 2007: personal communication, e-mail 29-10-2007, Danish Gas Technology Centre

Vejle Amt, 2005: Pers. communication.

4 Industrial processes

4.1 Sources

A range of sources is covered in the projection of process emissions to 2025 (see Table 4.1).

Table 4.1 Sources/processes included in the projection of process emissions.

IPCC code		Sources/processes	SNAP code
2A	Mineral products	Cement	04 06 12
		Quicklime and bricks	
		- Quicklime production	04 06 14
		- Brick production	04 06 14
		- Production of expanded clay products	04 06 14
		Glass and glass wool	
		- Production of packaging glass	04 06 13
		- Glass wool production	04 06 13
		Other processes	
		- Flue gas cleaning	04 06 18
		- Mineral wool production	04 06 18
		- Quicklime production for use in chemical processes	04 06 18
		Asphalt products	
		- Roof covering with asphalt products	04 06 10
		- Road surfacing with asphalt	04 06 11
2B	Chemical industry	Catalysts/fertilisers	04 04 16
2C	Metal production	Electro-steel works	04 02 07

The projection of emissions from industrial processes is based on the national emissions inventory (Nielsen et al., 2008).

4.2 Projections

The results of projection of the greenhouse gas emission are presented in Table 4.2. The methodologies used are described below.

Aalborg Portland was contacted with regard to expectations for cement production in the future and the information was provided that budgeted production for 2007 was 2,786,800 tonnes clinker (Aalborg Portland, 2005). As production in 2006 totalled 2,842,282 tonnes cement equivalents (tce) (Aalborg Portland, 2007), the production forecast was already reached before 2007. The CO_2 emission is, therefore, assumed to be constant at an average of 2004, 2005 and 2006 level for the years 2007-2025. Aalborg Portland has presented company targets for substitution of fossil fuel with biofuels/CO_2 neutral fuels. The long-term target is substitution of 40 % of the fossil fuel. The substitution is assumed to be implemented from 2007 to 2025. The CO_2 reduction considered along with combustion.

No forecasts are available for projecting the production of quicklime, bricks and expanded clay products to 2025. The emission from these

products is, therefore, assumed to be constant at the 2006 level for the years 2007-2025.

No forecasts are available for the production of glass and glass wool to 2025. The emission from these processes is, therefore, assumed to be constant at 2006 level.

'Other processes' includes CO_2 emissions from the use of lime to refine sugar, for the production of mineral wool and for flue gas cleaning. The emissions from sugar refining and the production of mineral wool are assumed to be constant at the 2006 level over the period 2007-2025. The emission from flue gas cleaning is projected on the basis of expected future consumption of coal and waste in the energy sector (Danish Energy Agency 2007, 2008). Extrapolation factors are shown in Table 4.2.

Table 4.2 Extrapolation factors for estimation of CO_2 emissions from flue gas cleaning (based on projections by Danish Energy Agency (2008)).

	Coal	SO_2	Extrapol.	Waste	Extrapol.
	TWh	ktonnes	Factor	TWh	Factor
2006[1]	61.4	32.6		11.1	
2007	62.2	29.7	1.01	11.2	1.01
2008	57.1	22.9	0.93	11.1	1.00
2009	47.8	22.5	0.78	11.0	1.00
2010	47.2	20.3	0.77	11.3	1.02
2011	48.2	19.0	0.79	11.2	1.01
2012	40.6	19.2	0.66	11.2	1.01
2013	42.0	19.4	0.68	11.1	1.00
2014	40.4	19.2	0.66	11.1	1.00
2015	41.5	20.0	0.68	11.1	1.00
2016	40.7	21.6	0.66	11.1	1.00
2017	41.5	21.0	0.68	11.4	1.03
2018	37.8	20.6	0.62	11.5	1.03
2019	35.1	21.4	0.57	11.5	1.04
2020	33.8	20.7	0.55	11.5	1.04
2021	34.8	20.1	0.57	11.1	1.00
2022	34.6	20.0	0.56	11.1	1.00
2023	35.8	19.4	0.58	11.0	0.99
2024	35.5	19.6	0.58	11.2	1.01
2025	35.4	18.6	0.58	11.2	1.01

1. Energy Statistics 2006 (Danish Energy Agency, 2007).

For chemical processes, the emission in CO_2 equivalents declines sharply in 2004 as the production of nitric acid ceased in mid-2004 (http://www.kemira-growhow.com/dk; Kemira-Growhow, 2004). For the production of catalysts/fertilisers, the emission is assumed to lie at the same level as in the period 1990-2003.

Emissions from steelworks are, in the years 2002-2004, stated as nil as production was ceased in spring 2002. The production of steel sheets/plates was reopened by DanSteel in 2003, the production of steel bars was reopened by DanScan Metal in March 2004, and the electro steelwork was reopened by DanScan Steel in January 2005. The production at DanScan Metal and Steel ceased in the end of 2005, and in June 2006 DanScan Metal was take over by Duferco; the future for the electro steelwork (DanScan Steel) is still uncertain. Treatment of steel scrap is

assumed to be reopened and, thereby, the process-related emission of CO_2 is assumed to be at the same level as when production ceased.

Table 4.3 Projection of process emissions.

Year	2A kt CO_2	2B kt CO_2	2C kt CO_2	2B kt N_2O	2B (N_2O) kt CO_2-equiv.	Total kt CO_2-equiv.
1990	1073	0.80	28.4	3.36	1043	2145
1991	1251	0.80	28.4	3.08	955	2235
1992	1370	0.80	28.4	2.72	844	2243
1993	1387	0.80	31.0	2.56	795	2214
1994	1410	0.80	33.5	2.60	807	2251
1995	1409	0.80	38.6	2.92	904	2352
1996	1516	1.45	35.2	2.69	834	2386
1997	1685	0.87	35.0	2.74	848	2569
1998	1683	0.56	42.2	2.60	807	2532
1999	1610	0.58	43.0	3.07	950	2604
2000	1641	0.65	40.7	3.24	1004	2685
2001	1660	0.83	46.7	2.86	885	2593
2002	1696	0.55	0.0	2.50	774	2470
2003	1571	1.05	0.0	2.89	896	2468
2004	1728	3.01	0.0	1.45	448	2179
2005	1641	3.01	15.6	0.00	0	1659
2006	1609	2.18	0.0	0.00	0	1611
2007	1678	2.18	45.0	0.00	0	1725
2008	1673	2.18	45.0	0.00	0	1720
2009	1663	2.18	45.0	0.00	0	1710
2010	1663	2.18	45.0	0.00	0	1710
2011	1664	2.18	45.0	0.00	0	1711
2012	1656	2.18	45.0	0.00	0	1703
2013	1657	2.18	45.0	0.00	0	1704
2014	1656	2.18	45.0	0.00	0	1703
2015	1657	2.18	45.0	0.00	0	1704
2016	1656	2.18	45.0	0.00	0	1703
2017	1657	2.18	45.0	0.00	0	1704
2018	1653	2.18	45.0	0.00	0	1700
2019	1650	2.18	45.0	0.00	0	1697
2020	1649	2.18	45.0	0.00	0	1696
2021	1650	2.18	45.0	0.00	0	1697
2022	1650	2.18	45.0	0.00	0	1697
2023	1651	2.18	45.0	0.00	0	1698
2024	1651	2.18	45.0	0.00	0	1698
2025	1650	2.18	45.0	0.00	0	1698

The results are summarised under the main IPCC groupings in Table 4.4.

Table 4.4 Summary of results of projection of process emissions.

		1990	1995	2000	2005	2007	'2010' 2008-2012	'2015' 2013-2017	2020	2025
2A Mineral products	kt CO_2-eq.	1073	1409	1641	1641	1678	1664	1656	1649	1650
2B Chemical industry	kt CO_2-eq.	1044	905	1004	3.01	2.18	2.18	2.18	2.18	2.18
2C Metal production	kt CO_2-eq.	28.4	38.6	40.7	15.6	45.0	45.0	45.0	45.0	45.0

References

Danish Energy Agency, 2008: Energy projections 2005-2025, April 2008.

Danish Energy Agency, 2007: Energistatistik. Danmarks produktion og forbrug af energi 2006 (in Danish). www.ens.dk.

Kemira GrowHow, 2004: Miljø & arbejdsmiljø. Grønt regnskab 2003; inkl. 1996-2002 (in Danish).

Nielsen, O.-K., Lyck, E., Mikkelsen, M.H., Hoffmann, L., Gyldenkærne, S., Winther, M., Nielsen, M., Fauser, P., Thomsen, M., Plejdrup, M.S., Illerup, J.B., Sørensen, P.B. & Vesterdal, L. 2008: Denmark's National Inventory Report 2008 - Emission Inventories 1990-2006 - Submitted under the United Nations Framework Convention on Climate Change. National Environmental Research Institute, University of Aarhus. 701 pp. – NERI Technical Report no. 667. http://www.dmu.dk/Pub/FR667

Aalborg Portland, 2007: Environmental report 2006.

Aalborg Portland, 2005: Henrik Møller Thomsen, personal communication, 9 March 2005.

5 Solvents

5.1 Summary of method

Solvent use constitutes non-methane VOC (NMVOC) emissions of approximately 33.000 tonnes in 2006, which is one third of the total NMVOC emissions in Denmark. This amount represents 103.000 tonnes CO_2-equivalents, which constitutes 0.2 % of the total Danish CO_2 emissions (Illerup et al., 2007). Many different chemicals are categorized as solvents and thus used in various household products and industrial activities. The Danish NMVOC emission inventory for solvent use in industry and households is based on the detailed model as described in EMEP/CORINAIR (2004), and constitutes the following key issues:

- Defining the chemicals to be included
- Quantifying use amounts for each chemical
- Distributing use amounts to industry and household activities
- Assigning emission factors to chemicals use

The inventory includes chemicals from a gross list of 650 different chemicals and chemical groups (NAI, 2000). Use amounts for 427 NMVOCs are calculated from production, import and export figures derived from Statistics Denmark and of these, 44 NMVOCs constitute more than 95 % of the total use amount. These 44 NMVOCs are included in the solvent emissions inventory. Assignment of use amounts to industrial activities and households is made from SPIN (2007), a database comprising information on chemical consumption in industrial categories and product use categories. Emission factors have been obtained from the literature and personal communication with experts. Given the high complexity and uncertainty of data continuous refinements are being done and reported in the annual reports to EU and UN (e.g. Illerup et al., 2007).

5.2 Emission projections

Emission projections have been made for four industrial sectors: "Auto paint and repair", "Plastic industry", "Graphic industry" and "Lacquer and paint industry". Together they comprise approximately 28 % of the total NMVOC emission in 2006, and are thus suitable indicators for the total Danish NMVOC emissions trends. Projections for all other industrial sectors and for households are based on linear projections of historical 1995 – 2006 emissions.

Production and use of VOC containing products are regulated by two national directives "Directive no 350 on Limitation of Emissions of Volatile Organic Compounds from use of Organic Solvents in Certain Activities" aka VOC-directive, and "Directive no 1049 on Marketing

and Labelling of Volatile Organic Compounds in Certain Paints and Lacquers and Products for Auto Repair Lacquering" aka Directive 1049. The directives supplement each other, as the VOC-directive regulates activities with VOC consumption above a certain limit value, and Directive 1049 regulates activities with VOC consumption below the limit value.

Not all activities in the four sectors are regulated by the two directives, e.g. only the small amount used in surface treatment of plastic products is covered in the plastic industry. Projections on , e.g., solvent use for processing plastic are based on expert judgements on ongoing or planned emission reducing measures.

5.2.1 Auto paint and repair

Projections are based on fulfilment of NMVOC limit values in auto paint and lacquer products stated in the VOC-directive and Directive 1049. For this sector the limit values are identical in the two directives and are also reached by fulfilling a reduction program, outlined in the VOC-directive:

$$M = P \bullet R = P \bullet T \bullet F \qquad (3)$$

Where M is the target emission to be reached 31 October 2007, P is the ratio between target emission and reference emission, T is the dry mass of surface coating, lacquers, adhesives and paints used in a year, F is the ratio between NMVOC emission and dry matter (T). R (= T • F) is the reference emission and represents the annual emission on 31 October 2007 that would occur if emission reduction measures had not been implemented.

P is found from VOC-directive to be 0.4, the reference emission R is found from linear extrapolation of the 1995 – 2006 inventory data to be 3.23 ktonnes pr year. It is estimated that a third of the solvent use is in paints and lacquers and the remaining two thirds are therefore not regulated by the directives:

31.10.2007 emission = $3.23 \bullet (0.67 + 0.33 \bullet 0.4) = 2.59$ ktonnes pr year

Projections to 2010 and 2020 are based on linear extrapolation of 1995 – 2006 emissions, and subtracted the 2007 reductions:

2010 emission = $2.90 – 3.23 \bullet 0.33 \bullet (1 – 0.4) = 2.26$ ktonnes pr year

2020 emission = $1.80 – 3.23 \bullet 0.33 \bullet (1 – 0.4) = 1.16$ ktonnes pr year

5.2.2 Graphic industry

Graphic industry covers heat set-rotation, magazine photogravure, other photogravure, flexography, serigraphy, lamination and lacquering. The VOC-directive regulates activities with VOC consumption above 20 tonnes pr year. Activities with VOC consumption below 20 tonnes pr year are, however, not regulated by Directive 1049, as this covers paints and lacquers for buildings only.

Larger industries (use > 20 tonnes pr year) use catalytic and termic combustion of solvents, which reduces NMVOC emission below limit values in VOC-directive. An emission factor of 5 % is estimated for emissions from solvent use in larger industries. Conservative emissions projections are made based on extrapolation of 2006 emissions. It is assumed that NMVOC use is divided equally between smaller (< 20 tonnes pr year) and larger (use > 20 tonnes pr year) industries, which yield:

31.10 2007 emission = 2010 emission = 2030 emission =

1.51 • (0.5 • 0.05 + 0.5) = 0.79 ktonnes pr year

5.2.3 Lacquer and paint industry

This industry covers processing of surface coating, lacquers, adhesives and paints, e.g., through mixing of pigments, binders and adhesives with organic solvents and dissolving, dispersing, adjustment of viscosity, toning and tapping of the final products.

Emissions are mainly diffuse and are in the emission inventory estimated to be approximately 1 % of the NMVOC content in the products (Møller, 1995). The emission limit values are 3 % of the NMVOC content for activities with NMVOC consumption between 100 and 1000 tonnes pr year, and 5 % of the NMVOC content for activities with NMVOC consumption > 1000 tonnes pr year, according to VOC-directive.

For the NMVOC consumption below 100 tonnes pr year limit values for NMVOC content in water based and solvent based paints, lacquers, primers and other surface coatings are stated in Directive 1049 for fulfilment in 2007 and 2010, respectively. These limit values are compared to estimates of NMVOC content in water and solvent based products, derived from Møller (1995).

Directive 1049 limit values for water based paints and lacquers (19 % of the industry's NMVOC consumption) comply with the actual content, which is also the case for water based wood preservation (2 % of NMVOC consumption) and part of the solvent based wood preservation (32 % of the NMVOC consumption). For solvent based paints and lacquers (34 % of the NMVOC consumption) the limit values are exceeded, which is also the case for part of the solvent based wood preservation (32 % of the NMVOC consumption). The solvent content has decreased in paints and lacquers since 1995, which increases the amount of products that fulfil the limit values.

Linear extrapolation of 1995 – 2006 inventory data is used for projecting emissions:

31.10 2007 emission = 0.222 ktonnes pr year

2010 emission = 0.226 ktonnes pr year

2020 emission = 0.241 ktonnes pr year

5.2.4 Plastic industry

The plastic industry covers three main activities; production of expanded polystyrene products (EPS-branch), production of fibreglass-reinforced polyester products (composite-branch) and production of polyurethane products (PUR-branch).

Production of plastic materials does not take place in Denmark, only manufacture and processing of plastic containing products are relevant. E.g. polystyrene products are manufactured from imported polystyrene pellets. Apart from small amounts of solvent used in surface treatment of plastic products the plastic industry is not regulated by the VOC-directive or Directive 1049.

A number of emission reducing measures are being implemented at the moment; a general shift from open to closed processes, replacing solvent based with water based cleaning agents, instalment of coal filters and combustion of solvent waste. It is not possible for the industry to predict the effects of these measures, therefore a static and conservative estimate with constant emissions, at 2006 level, are estimated in 2007, 2010 and 2030.

5.3 Summary for solvents

Table 5.1 Summary of projected Danish NMVOC and CO_2 emissions for four selected sectors and total emissions (ktonnes pr year).

	Auto paint and repair[1)]	Graphic industry[2)]	Lacquer and paint industry[3)]	Plastic industry[4)]	Total NMVOC emissions[5)]	Total CO_2 emissions[6)]
31.10.2007	2.59	0.79	0.222	3.87	28.8	89.8
2010	2.26	0.79	0.226	3.87	25.5	79.5
2030	1.16	0.79	0.241	3.87	25.5	79.5

1) Regulated by VOC-directive and Directive 1049

2) Not covered by B1049. Reductions are estimated from catalytic and termic combustion of solvent in larger plants

3) Linear projection

4) 2006 emissions are assumed in 2007, 2010 and 2030. Static and conservative estimate

5) Other sectors and industries from 2007 to 2010 are based on linear projections of 1995 – 2006 inventory data. Constant 2010 emissions are projected to 2030.

6) A conversion factor of 0.85*3.6667 kg CO_2 pr kg NMVOC is used.

Differentiation in CRF categories is based on emissions of single chemicals and not on emissions from industrial sectors and households. The projected emissions from the four investigated sectors are therefore not differentiated in CRF sectors in the present inventory. The relative distribution in CRF sectors of the last historical year (2006) are used for the projected emissions.

The projected emissions in Table 5.2 and Figure 5.1 shows historical (1995-2006) and projected (2007-2030) CO_2 emissions of UNFCCC source categories Paint application (CRF sector 3A), Degreasing and dry cleaning (CRF sector 3B), Chemical products, manufacture and processing (CRF sector 3C) and Other (CRF sector 3D).

Table 5.2 Danish NMVOC emissions for UNFCCC source categories. 1995 – 2006: Consumed amounts of NMVOCs are from StatBank Denmark (2007), emission factors are from various sources, e.g. Rypdal (1994) and distribution on source categories are from SPIN use categories (SPIN, 2007). 2007 – 2025 are projections.

	1990	1995	2000	2005	2007	2010	2015	2020	2025
Paint application (3A)	60.71	50.15	48.38	40.81	36.46	32.28	32.28	32.28	32.28
Degreasing and dry cleaning (3B)	25.41	21.39	20.57	17	15.66	13.87	13.87	13.87	13.87
Chemical products, manufacturing and processing (3C)	10.14	11.07	8.82	10.32	7.746	6.859	6.859	6.859	6.859
Other (3D)	51.84	56.29	34.87	35.06	29.89	26.47	26.47	26.47	26.47

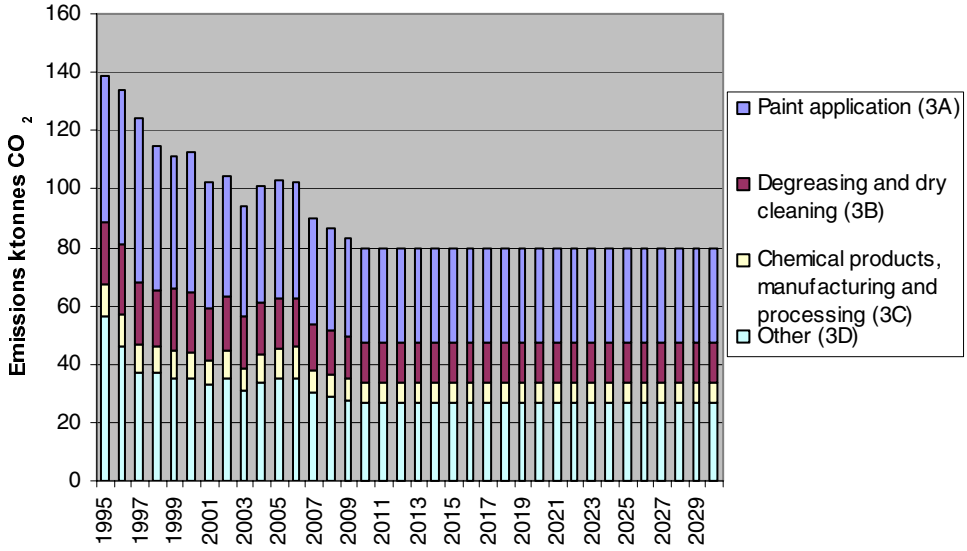


Figure 5.1 Danish NMVOC emissions for 1995 – 2030. 2007 – 2030 are projections.

There is a 27 % decrease in total VOC emissions from 1995 to 2006. Of the 26 industries and sectors nine show an increase. Households, construction, plastic industry, industrial mass produced products and auto paint and repair and are the largest sources to the Danish VOC emissions from solvent use, constituting 13 %, 13 %, 12 %, 11 % and 10 % of the total 2006 CO_2 emissions, respectively. Household use and the plastic industry show the largest increase relative to the total emissions. Household emissions are dominated by propane and butane, which are used as aerosols in spray cans, primarily in cosmetics. The increase in emissions from household use is mainly from increased use of ethanol glycerol and naphthalene. The main solvents used in the plastic industry are pentane, methanol and acetone and the emission increase originate mainly from increased use of pentane and methanol. Industrial mass produced products and graphics industry show the largest decreases relative to the total emissions. The decrease for industrial mass produced products originate from reduced use of turpentine and propylalcohol and the decrease in graphics industry is from reduced use of propylalcohol.

Overall the most abundantly used solvents are methanol, propylalcohol and turpentine, or white spirit defined as a mixture of stoddard solvent and solvent naphtha. Methanol is primarily used as intermediate (monomer), solvent in thinners, degreasers et al. and as disinfecting and conserving agent. Propylalcohol is used as flux agents for soldering, as

solvent and thinner and as windscreen washing agent. Turpentine is used as thinners for paints, lacquers and adhesives.

References

Directive no 350 on Limitation of Emissions of Volatile Organic Compounds from use of Organic Solvents in Certain Activities, aka VOC-directive.

Directive no 1049 on Marketing and Labelling of Volatile Organic Compounds in Certain Paints and Lacquers and Products for Auto Repair Lacquering, aka Directive 1049.

EMEP/CORINAIR, 2004: Emission Inventory Guidebook 3rd edition, prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections, 2004 update.
http://reports.eea.europa.eu/EMEPCORINAIR4/en/page002.html

EC, 2004: European Commission Directive 2004/42/CE of the European Parliament and Council on the Limitation of Emissions of Volatile Organic Compounds due to the Use of Organic Solvents in Certain Paints and Varnishes and Vehicle Refinishing Products and Amending Directive 1999/13/EC 30.04.2004, L 143/87

Illerup, J.B., Lyck, E., Nielsen, O.K., Mikkelsen, M.H., Hoffmann, L., Gyldenkærne, S., Nielsen, M., Winther, M., Fauser, P., Thomsen, M., Sørensen, P.B. & Vesterdal, L. 2007: Denmark's National Inventory Report 2007. Emission Inventories - Submitted under the United Nations Framework Convention on Climate Change, 1990-2005. National Environmental Research Institute, University of Aarhus. - NERI Technical Report 632: 642 pp. (electronic).
http://www2.dmu.dk/Pub/FR632_Final.pdf

IPCC, 1997: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.
http://www.ipcc-nggip.iges.or.jp/public/gl/invs6.html

IPCC, 2000: Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.
http://www.ipcc-nggip.iges.or.jp/public/gp/english/

Møller, S. 1995: VOC Reduktionsplan – Udarbejdelse af plan for nedbringelse af emissionen af flygtige organiske stoffer (VOC) I Danmark frem til år 2000. Arbejdsrapport fra Miljøstyrelsen, nr. 50 (in Danish).

NAI, 2000: British National Atmospheric Inventory performed by the National Environmental Technology Centre, June 2000.

Rypdal, K. 1994: Løsemiddelbalance for Norge – Utslipp, Forbruk og Metode (Solvent Balance for Norway – Emissions, Consumption and Methodology). Statens Forurensningstilsyn, Report 95:02. ISBN 82-7655-271-4 (in Norwegian).

Rypdal, K. & Flugsrud, K. 2001: Sensitivity Analysis as a Tool for Systematic Reductions in Greenhouse Gas Inventory Uncertainties. Environmental Science & Policy 4, pp. 117 – 135.

SPIN, 2007: Substances in Preparations in Nordic Countries.
http://www.spin2000.net

StatBank Denmark, 2007: Statistics Denmark.
http://www.statistikbanken.dk/statbank5a/default.asp?w=1024

6 Transport

In the forecast model all activity rates and emissions are defined in SNAP sector categories (Selected Nomenclature for Air Pollution) according to the CORINAIR system. The aggregation to the sector codes used for both the UNFCCC and UNECE Conventions is based on a correspondence list between SNAP and IPCC classification codes (CRF) shown in Table 5.1 (mobile sources only).

Table 6.1 SNAP – CRF correspondence table for transport.

SNAP classification	IPCC classification
07 Road transport	1A3b Transport-Road
0801 Military	1A5 Other
0802 Railways	1A3c Railways
0803 Inland waterways	1A3d Transport-Navigation
080402 National sea traffic	1A3d Transport-Navigation
080403 National fishing	1A4c Agriculture/forestry/fisheries
080404 International sea traffic	1A3d Transport-Navigation (international)
080501 Dom. airport traffic (LTO < 1000 m)	1A3a Transport-Civil aviation
080502 Int. airport traffic (LTO < 1000 m)	1A3a Transport-Civil aviation (international)
080503 Dom. cruise traffic (> 1000 m)	1A3a Transport-Civil aviation
080504 Int. cruise traffic (> 1000 m)	1A3a Transport-Civil aviation (international)
0806 Agriculture	1A4c Agriculture/forestry/fisheries
0807 Forestry	1A4c Agriculture/forestry/fisheries
0808 Industry	1A2f Industry-Other
0809 Household and gardening	1A4b Residential

Military transport activities (land and air) refer to the CRF sector Other (1A5), while the Transport-Navigation sector (1A3d) comprises national sea transport (ship movements between two Danish ports) and recreational craft. The working machinery and materiel in industry is grouped in Industry-Other (1A2f), while agricultural and forestry machinery is accounted for in the Agriculture/forestry/fisheries (1A4c) sector together with fishing activities. The description of methodologies and references for the transport part of the Danish inventory is given in two sections; one for road transport and one for the other mobile sources.

6.1 Methodology and references for road transport

For road transport, the detailed methodology is used to make annual estimates of the Danish emissions, as described in the EMEP/CORINAIR Emission Inventory Guidebook (EMEP/CORINAIR, 2007). The actual calculations are made with a model developed by NERI, using the European COPERT III model methodology, and updated fuel consumption and emission factors from the latest version of COPERT - COPERT IV. The latter model approach is explained in (EMEP/CORINAIR, 2007). In COPERT, fuel consumption and emission simulations can be made for operationally hot engines, taking into account gradually stricter emission standards and emission degradation due to catalyst wear. Furthermore, the emission effects of cold-start and evaporation are simulated.

6.1.1 Vehicle fleet and mileage data

Corresponding to the COPERT fleet classification, all present and future vehicles in the Danish traffic fleet are grouped into vehicle classes, sub-classes and layers. The layer classification is a further division of vehicle sub-classes into groups of vehicles with the same average fuel consumption and emission behaviour according to EU emission legislation levels. Table 5.2 gives an overview of the different model classes and sub-classes, and the layer level with implementation years are shown in Annex 5.I.

Table 6.2 Model vehicle classes and sub-classes, trip speeds and mileage split.

			Trip speed [km pr h]			Mileage split [%]		
Vehicle classes	Fuel type	Engine size/weight	Urban	Rural	Highway	Urban	Rural	Highway
PC	Gasoline	< 1.4 l.	40	70	100	35	46	19
PC	Gasoline	1.4 – 2 l.	40	70	100	35	46	19
PC	Gasoline	> 2 l.	40	70	100	35	46	19
PC	Diesel	< 2 l.	40	70	100	35	46	19
PC	Diesel	> 2 l.	40	70	100	35	46	19
PC	LPG		40	70	100	35	46	19
PC	2-stroke		40	70	100	35	46	19
LDV	Gasoline		40	65	80	35	50	15
LDV	Diesel		40	65	80	35	50	15
Trucks	Gasoline		35	60	80	32	47	21
Trucks	Diesel	3.5 – 7.5 tonnes	35	60	80	32	47	21
Trucks	Diesel	7.5 – 16 tonnes	35	60	80	32	47	21
Trucks	Diesel	16 – 32 tonnes	35	60	80	19	45	36
Trucks	Diesel	> 32 tonnes	35	60	80	19	45	36
Urban buses	Diesel		30	50	70	51	41	8
Coaches	Diesel		35	60	80	32	47	21
Mopeds	Gasoline		30	30	-	81	19	0
Motorcycles	Gasoline	2 stroke	40	70	100	47	39	14
Motorcycles	Gasoline	< 250 cc.	40	70	100	47	39	14
Motorcycles	Gasoline	250 – 750 cc.	40	70	100	47	39	14
Motorcycles	Gasoline	> 750 cc.	40	70	100	47	39	14

Information on the historical vehicle stock and annual mileage is obtained from the Danish Road Directorate (Ekman, 2005; Foldager 2007), Statistics Denmark (Dalbro, 2007) and The National Motorcycle Association (Markamp, 2007). The final input data consist of the number of vehicles and annual mileage per first registration year for all vehicle sub-classes, and mileage split between urban, rural and highway driving and the respective average speeds. For more information regarding historical input data, please refer to Nielsen et al. (2008).

To support the emission projections carried out by Illerup et al. (2002), a vehicle fleet and mileage prognosis was produced by the Danish Road Directorate (Trafikministeriet, 2002). The general approach was to assume new sales of vehicles and the mean lifespan of vehicles in the years contained in the forecast period, by undertaking historical data analyses and using economic parameters. Subsequently, the prognosis data has been modified for later Danish emission forecast projects. The latest data adjustments were made by NERI in 2008, and took into account the latest significant increase in new sold diesel passenger cars and vans.

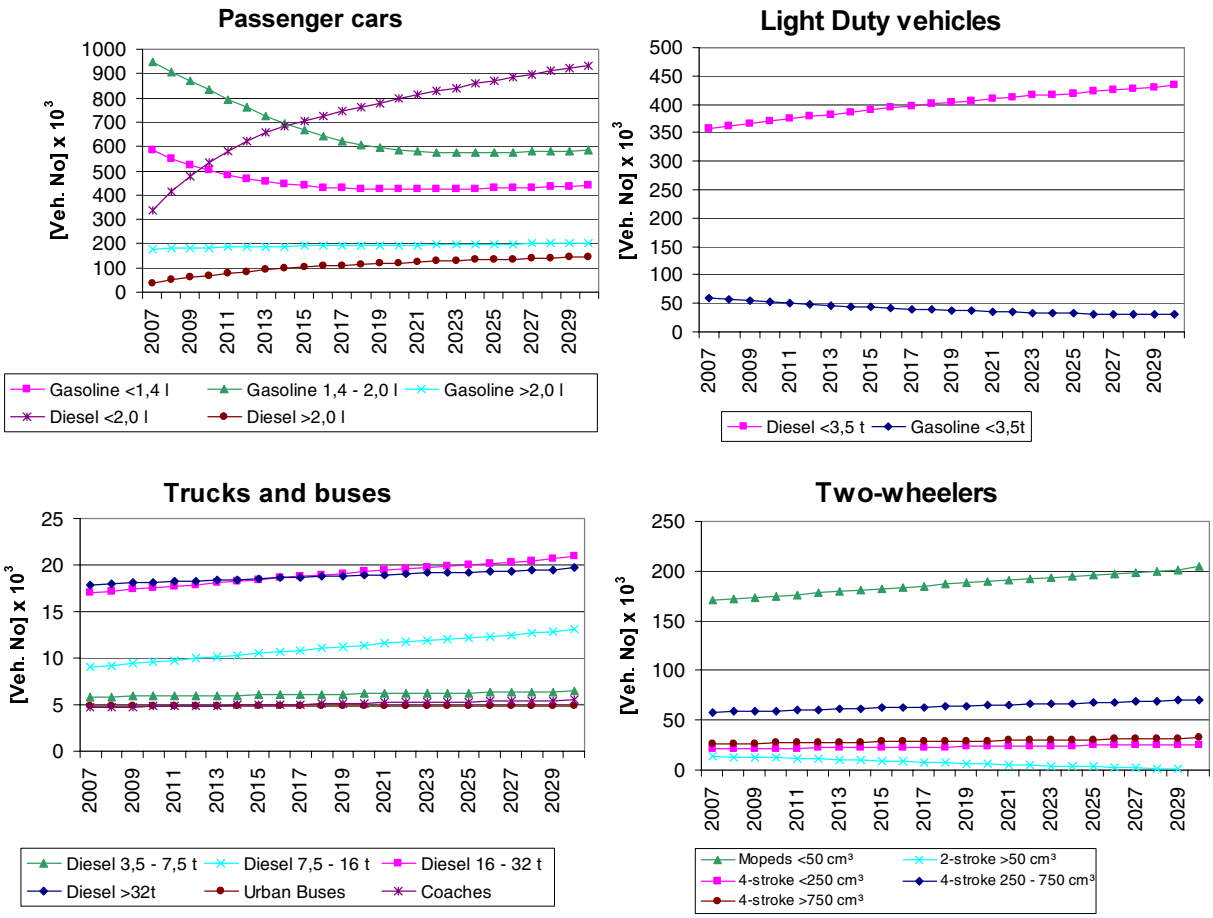


Figure 5.1 Number of vehicles in sub-classes from 2007-2030.

The vehicle numbers per sub-class are shown in Figure 5.1. The engine size differentiation is associated with some uncertainty.

The vehicle numbers are summed up in layers for each year (Figure 5.2) by using the correspondence between layers and first registration year:

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

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

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

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

Vehicle numbers and weighted annual mileages per layer are shown in Annex 5.1 for 2007-2030. The trends in vehicle numbers per EU layer are also shown in Figure 5.2 for the 2007-2030 periods. The latter figure clearly shows how vehicles complying with the gradually stricter EU

emission levels (EURO IV, V and VI) are introduced into the Danish motor fleet in the forecast period.

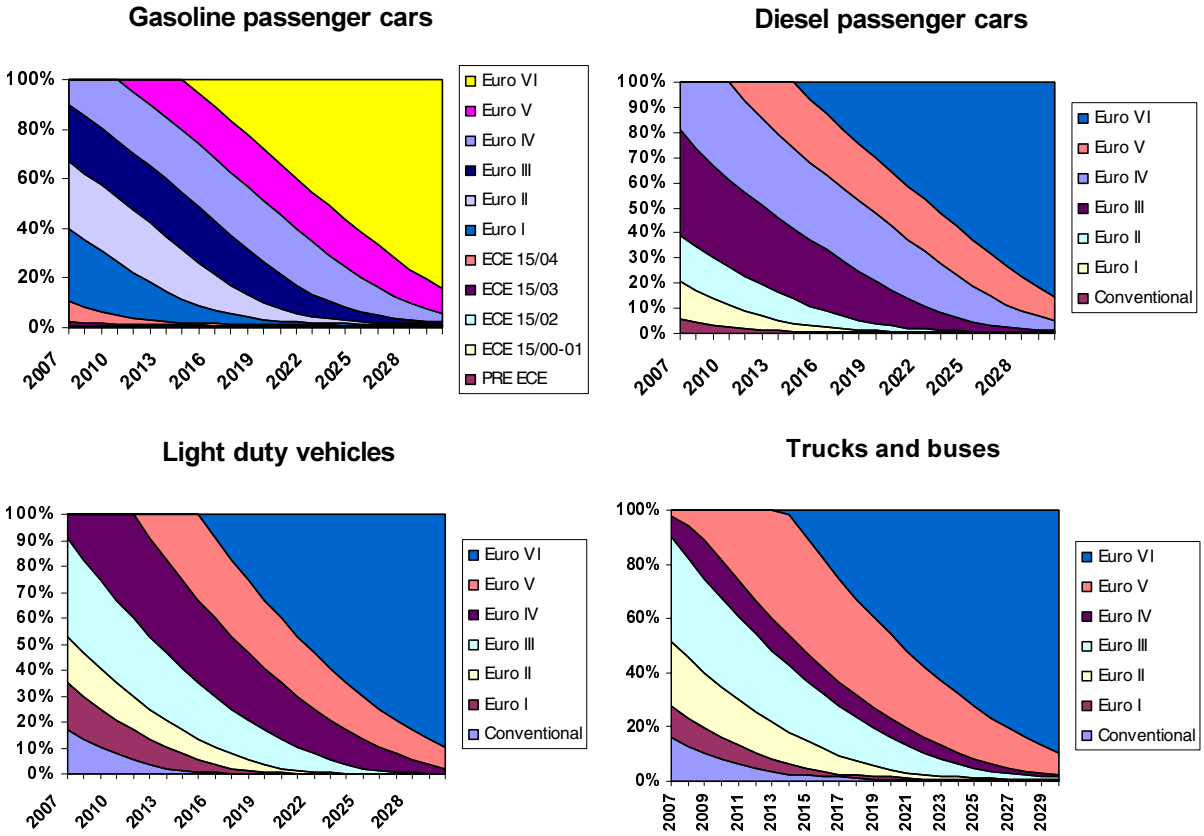


Figure 5.2 Layer distribution of vehicle numbers per vehicle type in 2007-2030.

6.1.2 Emission legislation

No specific emission legislation exists for CO_2; an EU strategy has, however, been formulated to improve the fuel efficiency for new vehicles sold in the EU. The goal is to bring down the average CO_2 emissions to 120 g pr km in 2010. The means by which the CO_2 target is to be met are:

- An agreement with the car manufacturers in Europe, Japan and Korea that new private cars sold in the EU in 2008/2009 emit, on average, CO_2 emissions of 140 or less g pr km.
- Energy labelling information from EU member states to car buyers.
- The use of fiscal instruments to promote fuel efficient cars.

The test cycle used in the EU for measuring fuel is the NEDC (New European Driving Cycle) used also for emission testing. The NEDC cycle consists of two parts, the first part being a 4-times repetition (driving length: 4 km) of the ECE test cycle, the so-called urban driving cycle (average speed: 19 km pr h). The second part of the test is the EUDC (Extra Urban Driving Cycle) test driving segment, simulating the fuel consumption under rural and highway driving conditions. The driving length in the EUDC is 7 km at an average speed of 63 km pr h. More information regarding the fuel measurement procedure can be found in the EU Directive 80/1268/EØF.

For NO_X, VOC (NMVOC + CH_4), CO and PM, the emissions from road transport vehicles have to comply with the different EU directives listed in Table 5.3. In the latter table, EU directive starting dates for vehicle new registrations are also listed. The specific emission limits can be seen in Winther (2008b).

For heavy duty trucks, specific information from the Danish Car Importers Association (Danske Bilimportører, DBI) of the Euro level for the trucks sold in Denmark between 2001 and 2007 is used to estimate a percentage new sales/Euro level matrix for truck engines for these inventory years. A full new sales matrix covering all relevant inventory years is subsequently made, based on a broader view of the 2001-2007 DBI data, and taking into account the actual starting dates for Euro 0-6 engines, see Annex 5.1.

Table 6.3 Overview of the existing EU emission directives for road transport vehicles.

Vehicle category	Emission layer	EU directive	First reg. date
Passenger cars (gasoline)	PRE ECE		0
	ECE 15/00-01	70/220 - 74/290	1972[a]
	ECE 15/02	77/102	1981[b]
	ECE 15/03	78/665	1982[c]
	ECE 15/04	83/351	1987[d]
	Euro I	91/441	1.10.1990[e]
	Euro II	94/12	1.1.1997
	Euro III	98/69	1.1.2001
	Euro IV	98/69	1.1.2006
	Euro V	692/2008	1.1.2011
	Euro VI	692/2008	1.9.2015
Passenger cars (diesel and LPG)		Conventional	0
	ECE 15/04	83/351	1987[d]
	Euro I	91/441	1.10.1990[e]
	Euro II	94/12	1.1.1997
	Euro III	98/69	1.1.2001
	Euro IV	98/69	1.1.2006
	Euro V	692/2008	1.1.2011
	Euro VI	692/2008	1.9.2015
Light duty trucks (gasoline and		Conventional	0
	ECE 15/00-01	70/220 - 74/290	1972[a]
	ECE 15/02	77/102	1981[b]
	ECE 15/03	78/665	1982[c]
	ECE 15/04	83/351	1987[d]
	Euro I	93/59	1.10.1994
	Euro II	96/69	1.10.1998
	Euro III	98/69	1.1.2002
	Euro IV	98/69	1.1.2007
	Euro V	692/2008	1.1.2012
	Euro VI	692/2008	1.9.2016
Heavy duty vehicles		Conventional	0
	Euro 0	88/77	1.10.1990
	Euro I	91/542	1.10.1993
	Euro II	91/542	1.10.1996
	Euro III	1999/96	1.10.2001
	Euro IV	1999/96	1.10.2006
	Euro V	1999/96	1.10.2009
	Euro VI	Proposal	1.10.2014
Mopeds		Conventional	0
	Euro I	97/24	2000
	Euro II	2002/51	2004
Motor cycles		Conventional	0
	Euro I	97/24	2000
	Euro II	2002/51	2004
	Euro III	2003/77	2007

a,b,c,d: Expert judgement suggest that Danish vehicles enter into the traffic before EU directive first registration dates. The effective inventory starting years are a: 1970; b: 1979; c: 1981; d: 1986.

e: The directive came into force in Denmark in 1991 (EU starting year: 1993).

For passenger cars and light duty vehicles the emission approval tests are made on a chassis dynamometer, and for Euro I-IV vehicles the EU NEDC test cycle is used (see Nørgaard and Hansen, 2004). The emission directives distinguish between three vehicle classes: passenger cars and light duty vehicles (<1305 kg), light duty vehicles (1305-1760 kg) and light duty vehicles (>1760 kg).

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

Therefore, in order to represent the Danish fleet and to support average national emission estimates, emission factors must be chosen which derive from numerous emissions measurements, using a broad range of real world driving patterns and sufficient numbers of test vehicles. It is similarly important to have separate fuel consumption and emission data for cold start emission calculations and gasoline evaporation (hydrocarbons).

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

6.1.3 Fuel legislation

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

6.1.4 Fuel consumption and emission factors

Trip speed dependent basis factors for fuel consumption and emissions are taken from the COPERT IV model using trip speeds as shown in Table 5.2. The factors can be seen in Winther (2008b). The scientific basis for COPERT IV is fuel consumption and emission information from various European measurement programmes, transformed into trip speed dependent fuel consumption and emission factors for all vehicle categories and layers.

For passenger cars, real measurement results are behind the emission factors for Euro 1-4 vehicles (updated figures), and those earlier

(COPERT III data). For light duty trucks the measurements represent Euro 1 and prior vehicle technologies from COPERT III. For mopeds and motorcycles, updated fuel consumption and emission figures are behind the conventional and Euro 1-3 technologies. For heavy-duty trucks and buses, average factors in terms of vehicle size are produced from COPERT IV data (Euro 0-V) in order to be consistent with the COPERT III vehicle size categories which correspond with the resolution of the Danish fleet and mileage data.

The emission factors for later engine technologies are produced by using reduction factors (see Winther, 2008b). The latter factors are determined by assessing the EU emission limits and the relevant emission approval test conditions, for each vehicle type and Euro class.

6.1.5 Fuel consumption and emission calculations

The fuel consumption and emissions are calculated for operationally hot engines and for engines during cold start, and a final fuel balance adjustment is made in order to account for the statistical fuel sold according to Danish energy statistics.

The calculation procedure for hot engines is to combine basis fuel consumption and emission factors, number of vehicles and annual mileage numbers (Annex 5.1), and mileage road type shares (from Table 5.2). For additional description of the hot and cold start calculations and fuel balance approach, please refer to Winther (2008b).

Fuel consumption and emission results per layer and vehicle type, respectively, are shown in Annex 5.1 from 2007-2030. The layer specific emission factors (km based) for CO_2, CH_4 and N_2O derived from the basis input data are also shown in Annex 5.1.

6.2 Other mobile sources

Other mobile sources are divided into several sub-sectors: sea transport, fishery, air traffic, railways, military, and working machinery and equipment in the sectors agriculture, forestry, industry and residential. The emission calculations are made using the detailed method as described in the EMEP/CORINAIR Emission Inventory Guidebook (EMEP/CORINAIR, 2007) for air traffic, off-road working machinery and equipment, and ferries, while for the remaining sectors the simple method is used.

6.2.1 Activity data

Air traffic

For historical years, the activity data for air traffic consists of air traffic statistics provided by the Danish Civil Aviation Agency (CAA-DK) and Copenhagen Airport. For 2001-2006, records are given per flight by CAA-DK as data for aircraft type, and origin and destination airports. For inventory years prior to 2001 detailed LTO/aircraft type statistics are obtained from Copenhagen Airport (for this airport only), while information of total take-off numbers for other Danish airports is pro-

vided by CAA-DK. Fuel statistics for jet fuel consumption and aviation gasoline are obtained from the Danish energy statistics (DEA, 2007).

Prior to emission calculations for historical years, the aircraft types are grouped into a smaller number of representative aircraft for which fuel consumption and emission data exist in the EMEP/CORINAIR databank. In this procedure the actual aircraft types are classified according to their overall aircraft type (jets, turbo props, helicopters and piston engine). Secondly, information on the aircraft MTOM (Maximum Take-Off Mass) and number of engines are used to append a representative aircraft to the aircraft type in question. A more thorough explanation is given in Winther (2001a, b).

No forecast of air traffic movements is available as input to the emission projection calculations. Instead, the official Danish national fuel consumption projections from the DEA (2008a) are used as activity data in the projection period.

Non road working machinery

Non road working machinery and equipment are used in agriculture, forestry and industry, for household/gardening purposes and inland waterways (recreational craft). The specific machinery types comprised in the Danish inventory are shown in Table 5.4.

Table 6.4 Machinery types comprised in the Danish non road inventory.

Sector	Diesel	Gasoline/LPG
Agriculture	Tractors, harvesters, machine pool, other	ATV's (All Terrain Vehicles), other
Forestry	Silvicultural tractors, harvesters, forwarders, chippers	-
Industry	Construction machinery, fork lifts, building and construction, Airport GSE, other	Fork lifts (LPG), building and construction, other
Household/ gardening	-	Riders, lawn movers, chain saws, cultivators, shrub clearers, hedge cutters, trimmers, other

A Danish research project has provided updated information of the number of different types of machines, their load factors, engine sizes and annual working hours (Winther et al., 2006). Please refer to the latter report for detailed information about activity data for non road machinery types.

National sea transport

A new methodology is used to estimate the fuel consumption figures for national sea transport, based on fleet activity estimates for regional ferries, local ferries and other national sea transport (Winther, 2008a). The estimated fuel totals per fuel type for national sea transport replace the fuel sales projections from DEA (2008a).

Following this, for fisheries and industry (stationary sources) the updated fuel consumption time series for national sea transport lead, in turn, to changes in the fuel activity data for fisheries (gas oil) and industry (heavy fuel oil), so the national energy balance can remain unchanged.

Table 5.5 lists the most important domestic ferry routes in Denmark in the period 1990-2007. For these ferry routes the following detailed traffic and technical data have been gathered: Ferry name, year of service, engine size (MCR), engine type, fuel type, average load factor, auxiliary engine size and sailing time (single trip). The same data have been gathered also for 2006 and 2007 for use in the present project, in the case of Mols-Linien (Sjællands Odde-Ebeltoft, Sjællands Odde-Århus, Kalundborg-Århus; Hansen et al., 2004; Wismann, 1999; PHP, 1996; Kristensen, 2008; Hjortberg, 2008) and Bornholmstrafikken (Køge-Rønne). For the years 2007+ the sailing activities are assumed to be the same as in 2007.

Please refer to Winther (2008a) for detailed information about the number of round trips per ferry route, different ferry specific technical and operational data, and issues regarding the balance between fleet activity based fuel consumption estimates and projected fuel sales figures.

Table 5.5 Ferry routes comprised in the present project.

Ferry service	Service period
Halsskov-Knudshoved	1990-1999
Hundested-Grenaa	1990-1996
Kalundborg-Juelsminde	1990-1996
Kalundborg-Samsø	1990-
Kalundborg-Århus	1990-
Korsør-Nyborg, DSB	1990-1997
Korsør-Nyborg, Vognmandsruten	1990-1999
København-Rønne	1990-2004
Køge-Rønne	2004-
Sjællands Odde-Ebeltoft	1990-
Sjællands Odden-Århus	1999-
Tårs-Spodsbjerg	1990-

Other sectors

The activity data for military, railways, international sea transport and fishery consists of fuel consumption information from DEA (2008a). For international sea transport, the basis is expected fuel sold in Danish ports for vessels with a foreign destination, as prescribed by the IPCC guidelines.

For fisheries, the calculation methodology described by Winther (2008a) remains fuel based. However, the input fuel data differ from the fuel sales figures previously used. The changes are the result of further data processing of the DEA reported gas oil sales for national sea transport and fisheries, prior to inventory input.

For all other mobile sectors, fuel consumption figures are given in Annex 5.2 for the years 2007-2030 in both CollectER and CRF formats.

6.2.2 Emission legislation

For the engines used by other mobile sources, no legislation limits exist for specific fuel consumption or the directly fuel dependent emissions of CO_2. The engine emissions, however, have to comply with the general emission legislation limits agreed by the EU and, except for ships

(no VOC exhaust emission regulation), the VOC emission limits influence the emissions of CH_4, the latter emissions being a part of total VOC.

For non road working machinery and equipment, recreational craft and railway locomotives/motor cars, the emission directives list specific emission limit values (g pr kWh) for CO, VOC, NO_X (or VOC + NO_X) and TSP, depending on engine size (kW for diesel, ccm for gasoline) and date of implementation (referring to engine market date).

For diesel, the directives 97/68 and 2004/26 relate to non road machinery other than agricultural and forestry tractors, and the directives have different implementation dates for machinery operating under transient and constant loads. The latter directive also comprises emission limits for railway machinery. For tractors the relevant directives are 2000/25 and 2005/13. For gasoline, Directive 2002/88 distinguishes between handheld (SH) and non handheld (NS) types of machinery.

For engine type approval, the emissions (and fuel consumption) are measured using various test cycles (ISO 8178). Each test cycle consists of a number of measurement points for specific engine loads during constant operation. The specific test cycle used depends of the machinery type in question, and the test cycles are described in more detail in the directives.

Table 6.6 Overview of EU emission directives relevant for diesel fuelled non road machinery.

Stage/Engine size [kW]	CO	VOC	NO_X	VOC+NO_X	PM	Diesel machinery			Tractors	
						EU	Implement. date		EU	Implement.
	[g pr kWh]					directive	Transient	Constant	directive	date
Stage I										
37<=P<75	6.5	1.3	9.2	-	0.85	97/68	1/4 1999	-	2000/25	1/7 2001
Stage II										
130<=P<560	3.5	1	6	-	0.2	97/68	1/1 2002	1/1 2007	2000/25	1/7 2002
75<=P<130	5	1	6	-	0.3		1/1 2003	1/1 2007		1/7 2003
37<=P<75	5	1.3	7	-	0.4		1/1 2004	1/1 2007		1/1 2004
18<=P<37	5.5	1.5	8	-	0.8		1/1 2001	1/1 2007		1/1 2002
Stage IIIA										
130<=P<560	3.5	-	-	4	0.2	2004/26	1/1 2006	1/1 2011	2005/13	1/1 2006
75<=P<130	5	-	-	4	0.3		1/1 2007	1/1 2011		1/1 2007
37<=P<75	5	-	-	4.7	0.4		1/1 2008	1/1 2012		1/1 2008
19<=P<37	5.5	-	-	7.5	0.6		1/1 2007	1/1 2011		1/1 2007
Stage IIIB										
130<=P<560	3.5	0.19	2	-	0.025	2004/26	1/1 2011	-	2005/13	1/1 2011
75<=P<130	5	0.19	3.3	-	0.025		1/1 2012	-		1/1 2012
56<=P<75	5	0.19	3.3	-	0.025		1/1 2012	-		1/1 2012
37<=P<56	5	-	-	4.7	0.025		1/1 2013	-		1/1 2013
Stage IV										
130<=P<560	3.5	0.19	0.4	-	0.025	2004/26	1/1 2014		2005/13	1/1 2014
56<=P<130	5	0.19	0.4	-	0.025		1/10 2014			1/10 2014

Table 6.7 Overview of the EU emission directive 2002/88 for gasoline fuelled non road machinery.

	Category	Engine size [ccm]	CO [g pr kWh]	HC [g pr kWh]	NO_X [g pr kWh]	HC+NO_X [g pr kWh]	Implementation date
	Stage I						
Hand held	SH1	S<20	805	295	5.36	-	1/2 2005
	SH2	20=<S<50	805	241	5.36	-	1/2 2005
	SH3	50=<S	603	161	5.36	-	1/2 2005
Not hand held	SN3	100=<S<225	519	-	-	16.1	1/2 2005
	SN4	225=<S	519	-	-	13.4	1/2 2005
	Stage II						
Hand held	SH1	S<20	805	-	-	50	1/2 2008
	SH2	20=<S<50	805	-	-	50	1/2 2008
	SH3	50=<S	603	-	-	72	1/2 2009
Not hand held	SN1	S<66	610	-	-	50	1/2 2005
	SN2	66=<S<100	610	-	-	40	1/2 2005
	SN3	100=<S<225	610	-	-	16.1	1/2 2008
	SN4	225=<S	610	-	-	12.1	1/2 2007

For recreational craft, Directive 2003/44 comprises the emission legislation limits for diesel and for 2-stroke and 4-stroke gasoline engines, respectively. The CO and VOC emission limits depend on engine size (kW), and the inserted parameters given in the calculation formulae in Table 5.8. For NO_X, a constant limit value is given for each of the three engine types. For TSP, the constant emission limit regards diesel engines only.

Table 6.8 Overview of the EU emission directive 2003/44 for recreational craft.

Engine type	Impl. date	CO=A+B/Pn			HC=A+B/Pn			NO_X	TSP
		A	B	n	A	B	n		
2-stroke gasoline	1/1 2007	150.0	600.0	1.0	30.0	100.0	0.75	10.0	-
4-stroke gasoline	1/1 2006	150.0	600.0	1.0	6.0	50.0	0.75	15.0	-
Diesel	1/1 2006	5.0	0.0	0	1.5	2.0	0.5	9.8	1.0

Table 6.9 Overview of the EU emission directive 2004/26 for railway locomotives and motor cars.

	Engine size [kW]		CO [g pr kWh]	HC [g pr kWh]	NO_X [g pr kWh]	HC+NO_X [g pr kWh]	PM [g pr kWh]	Implementation date
Locomotives	Stage IIIA							
	130<=P<560	RL A	3.5	-	-	4	0.2	1/1 2007
	560<P	RH A	3.5	0.5	6	-	0.2	1/1 2009
	2000<=P and piston displacement >= 5 l/cyl.	RH A	3.5	0.4	7.4	-	0.2	1/1 2009
	Stage IIIB	RB	3.5	-	-	4	0.025	1/1 2012
Motor cars	Stage IIIA							
	130<P	RC A	3.5	-	-	4	0.2	1/1 2006
	Stage IIIB							
	130<P	RC B	3.5	0.19	2	-	0.025	1/1 2012

Aircraft engine emissions of NO_X, CO, VOC and smoke are regulated by ICAO (International Civil Aviation Organization). The engine emission certification standards are contained in Annex 16 — Environmental Protection, Volume II — Aircraft Engine Emissions to the Convention on International Civil Aviation (ICAO Annex 16, 1993). The emission standards relate to the total emissions (in grams) from the so-called LTO (Landing and Take Off) cycle divided by the rated engine thrust (kN). The ICAO LTO cycle contains the idealised aircraft movements below 3000 ft (915 m) during approach, landing, airport taxiing, take off and climb out.

For smoke all aircraft engines manufactured from 1 January 1983 have to meet the emission limits agreed by ICAO. For NO_X, CO, VOC The emission legislation is relevant for aircraft engines with a rated engine thrust larger than 26.7 kN. In the case of CO and VOC, the ICAO regulations apply for engines manufactured from 1 January 1983.

For NO_X, the emission regulations fall in four categories

- For engines of a type or model for which the date of manufacture of the first individual production model is on or before 31 December 1995, and for which the production date of the individual engine is on or before 31 December 1999.
- For engines of a type or model for which the date of manufacture of the first individual production model is after 31 December 1995, or for individual engines with a production date after 31 December 1999.
- For engines of a type or model for which the date of manufacture of the first individual production model is after 31 December 2003.
- For engines of a type or model for which the date of manufacture of the first individual production model is after 31 December 2007.

The regulations published by ICAO are given in the form of the total quantity of pollutants (D_p) emitted in the LTO cycle divided by the maximum sea level thrust (F_{oo}) and plotted against engine pressure ratio at maximum sea level thrust.

The limit values for NO_X are given by the formulae in Table 6.10.

Table 6.10 Current certification limits for NO_X for turbo jet and turbo fan engines.

	Engines first produced before 31.12.1995 & for engines manufactured up to 31.12.1999	Engines first produced after 31.12.1995 & for engines manufactured after 31.12.1999	Engines for which the date of manufacture of the first individual production model was after 31 December 2003	Engines for which the date of manufacture of the first individual production model was after 31 December 2007
Applies to engines >26.7 kN	$Dp/F_{oo} = 40 + 2\pi_{oo}$	$Dp/F_{oo} = 32 + 1.6\pi_{oo}$		
Engines of pressure ratio less than 30				
Thrust more than 89 kN			$Dp/F_{oo} = 19 + 1.6\pi_{oo}$	$Dp/F_{oo} = 16.72 + 1.4080\pi_{oo}$
Thrust between 26.7 kN and not more than 89 kN			$Dp/F_{oo} = 37.572 + 1.6\pi_{oo} - 0.208F_{oo}$	$Dp/F_{oo} = 38.54862 + (1.6823\pi_{oo}) – (0.2453F_{oo}) – (0.00308\pi_{oo}F_{oo})$
Engines of pressure ratio more than 30 and less than 62.5				
Thrust more than 89 kN			$Dp/F_{oo} = 7+2.0\pi_{oo}$	$Dp/F_{oo} = -1.04+ (2.0*\pi_{oo})$
Thrust between 26.7 kN and not more than 89 kN			$Dp/F_{oo} = 42.71 +1.4286\pi_{oo} -0.4013F_{oo} +0.00642\pi_{oo}F_{oo}$	$Dp/F_{oo} = 46.1600 + (1.4286\pi_{oo}) – (0.5303F_{oo}) – (0.00642\pi_{oo}F_{oo})$
Engines with pressure ratio 82.6 or more			$Dp/F_{oo} = 32+1.6\pi_{oo}$	$Dp/F_{oo} = 32+1.6\pi_{oo}$
Source: International Standards and Recommended Practices, Environmental Protection, ICAO Annex 16 Volume II Part III Paragraph 2.3.2, 2nd edition July 1993, plus amendments: Amendment 3 (20 March 1997),Amendment 4 (4 November 1999),Amendment 5 (24 November 2005)				
where:				
D_p = the sum of emissions in the LTO cycle in g				
F_{oo} = thrust at sea level take-off (100 %)				
π_{oo} = pressure ratio at sea level take-off thrust point (100 %)				

The equivalent limits for HC and CO are D_p/F_{oo} = 19.6 for HC and D_p/F_{oo} = 118 for CO (ICAO Annex 16 Vol. II paragraph 2.2.2). Smoke is limited to a regulatory smoke number = 83 $(F_{oo})^{-0.274}$ or a value of 50, whichever is the lower.

A further description of the technical definitions in relation to engine certification as well as actual engine exhaust emission measurement data can be found in the ICAO Engine Exhaust Emission Database. The latter database is accessible from http://www.caa.co.uk, hosted by the UK Civil Aviation Authority.

For seagoing vessels, NO_X emissions are regulated as explained in Marpol 73/78 Annex VI, formulated by IMO (International Maritime Organisation). The legislation is relevant for diesel engines with a power output higher than 130 kW, which are installed on a ship constructed on or after 1 January 2000 and diesel engines with a power output higher than 130 kW, which undergo major conversion on or after 1 January 2000.

The NO_X emission limits for ship engines in relation to their rated engine speed (n) given in RPM (Revolutions Per Minute) are the following:

- 17 g pr kWh, n < 130 RPM

- 45 x n-0.2 g pr kWh, 130 ≤ n < 2000 RPM
- 9,8 g pr kWh, n ≥ 2000 RPM

Further, the Marine Environment Protection Committee (MEPC) of IMO has approved proposed amendments to MARPOL Annex VI to be agreed by IMO in October 2008 in order to strengthen the emission standards for NO_X and the sulphur contents of heavy fuel oil used by ship engines.

For NO_X emission regulations, a three tiered approach is considered, which comprises the following:

- Tier I: Diesel engines (> 130 kW) installed on a ship constructed on or after 1 January 2000 and prior to 1 January 2011.
- Tier II: Diesel engines (> 130 kW) installed on a ship constructed on or after 1 January 2011.
- Tier III[2]: Diesel engines (> 130 kW) installed on a ship constructed on or after 1 January 2016.

As for the existing NO_X emission limits, the new Tier I-III NO_X legislation values rely on the rated engine speeds. The emission limit equations are shown in Table 6.11.

Table 6.11 Tier I-III NO_X emission limits for ship engines (amendments to MARPOL Annex VI).

	NO_X limit	RPM (n)
Tier I	17 g pr kWh	n < 130
	45 x n-0.2 g pr kWh	130 ≤ n < 2000
	9,8 g pr kWh	n ≥ 2000
Tier II	14.4 g pr kWh	n < 130
	44 x n-0.23 g pr kWh	130 ≤ n < 2000
	7.7 g pr kWh	n ≥ 2000
Tier III	3.4 g pr kWh	n < 130
	9 x n-0.2 g pr kWh	130 ≤ n < 2000
	2 g pr kWh	n ≥ 2000

The Tier I emission limits are identical with the existing emission limits from MARPOL Annex VI.

Also to be agreed by IMO in October 2008, the NO_X Tier I limits are to be applied for existing engines with a power output higher than 5000 kW and a displacement per cylinder at or above 90 litres, installed on a ship constructed on or after 1 January 1990 but prior to 1 January 2000.

In relation to the sulphur content in heavy fuel and marine gas oil used by ship engines, Table 6.12 shows the current legislation in force, and the amendment of MARPOL Annex VI to be agreed by IMO in October 2008.

[2] For ships operating in a designated Emission Control Area. Outside a designated Emission Control Area, Tier II limits apply.

Table 6.12 Current legislation in relation to marine fuel quality.

Legislation		Heavy fuel oil		Gas oil	
		S-%	Impl. date	S-%	Impl. date
EU-directive 93/12		None		0.2[1]	1.10.1994
EU-directive 1999/32		None		0.2	1.1.2000
EU-directive 2005/33	SECA - Baltic sea	1.5	11.08.2006	0.1	1.1.2008
	SECA - North sea	1.5	11.08.2007	0.1	1.1.2008
	Outside SECA's	None		0.1	1.1.2008
MARPOL Annex VI	SECA – Baltic sea	1.5	19.05.2006		
	SECA – North sea	1.5	21.11.2007		
	Outside SECA	4.5	19.05.2006		
MARPOL Annex VI amendments	SECA's	1	01.03.2010		
	SECA's	0.1	01.01.2015		
	Outside SECA's	0.5	01.01.2020[2]		

[1] Sulphur content limit for fuel sold inside EU.

[2] Subject to a feasibility review to be completed no later than 2018. If the conclusion of such a review becomes negative the effective date would default 1 January 2025.

For non road machinery, the EU directive 2003/17/EC gives a limit value of 50 ppm sulphur in diesel (from 2005).

6.2.3 Emission factors

The CO_2 emission factors are country specific and come from the DEA. The N_2O emission factors are taken from the EMEP/CORINAIR guidebook (CORINAIR, 2007). For military machinery aggregated CH_4 emission factors for gasoline and diesel are derived from the road traffic emission simulations. The CH_4 emission factors for railways are derived from specific Danish VOC measurements from the Danish State Railways (Næraa, 2007) and a NMVOC/CH_4 split based on own judgment.

For agriculture, forestry, industry, household gardening and inland waterways, the VOC emission factors are derived from various European measurement programmes; see IFEU (2004) and Winther et al. (2006). The NMVOC/CH_4 split is taken from USEPA (2004).

For the ferries used by Mols_Linien (Sjællands Odde-Ebeltoft, Sjællands Odde-Århus, Kalundborg-Århus) the VOC emission factors provided by Kristensen (2008) are from measurements made by Hansen et al. (2004), Wismann (1999) and PHP (1996). For the remaining domestic ferries, other national and international sea transport, and fisheries, the VOC emission factors come from the Danish TEMA2000 model. The NMVOC/CH_4 split comes from the EMEP/CORINAIR guidebook (CORINAIR, 2007). The latter source also provides CH_4 emission factors for the remaining sectors.

Emission factors are given in CollectER and CRF formats in Annex 5.2 for the years 2007-2030.

6.2.4 Calculation method

Air traffic

For aviation the estimates are made separately for landing and take-off (LTOs < 3000 ft), and cruise (> 3000 ft). The calculations furthermore distinguish between national and international flights. For more details regarding the calculation procedure please refer to Winther (2001a, 2001b and 2006).

Non-road working machinery and recreational craft

The fuel consumption and emissions are calculated as the product of the number of engines, annual working hours, average rated engine size, load factor, and fuel consumption/emission factors. For diesel and gasoline engines, the deterioration effects (due to engine ageing) are included in the emission calculation equation by using deterioration factors according to engine type, size, age, lifetime and emission level. For diesel engines before Stage IIIB and IV, transient operational effects are also considered by using average transient factors. For more details regarding the calculation procedure, please refer to Winther et al. (2006).

National sea transport

For Danish regional ferries the fuel consumption and emissions are calculated as the product of the number of round trips, sailing time per round trip, engine size, load factor, and fuel consumption/emission factors. For local ferries and other ships, simple fuel based calculations are made using fuel-related emission factors and fuel consumption estimates from Winther (2008a). Please refer to the latter report for more details regarding this calculation procedure.

Other sectors

For fishing vessels, military and railways, the emissions are estimated with the simple method using fuel-related emission factors and fuel consumption from DEA (2008a), though slightly modified for fisheries based on the findings from Winther (2008a).

6.3 Fuel consumption and emission results

An overview of the fuel consumption and emission results is given in Table 6.13 for all mobile sources in Denmark. The '2010' and '2015' results are the average figures for the years 2008-2012 and 2013-2017, respectively.

Table 6.13 Summary table of fuel consumption and emissions for mobile sources in Denmark.

		1990	1995	2000	2005	2007	'2010'	'2015'	2020	2025
Energy (PJ)	Industry - Other (1A2f)	12	8	12	13	14	14	14	14	14
	Civil Aviation (1A3a)	3	3	2	2	2	2	2	3	3
	Road (1A3b)	126	144	153	166	175	179	187	196	208
	Railways (1A3c)	4	4	3	3	3	3	3	3	4
	Navigation (1A3d)	9	10	6	6	6	6	6	6	6
	Residential (1A4b)	2	2	2	3	3	3	3	3	3
	Ag./for./fish. (1A4c)	26	23	22	21	21	23	23	23	23
	Military (1A5)	2	3	2	4	2	2	2	2	2
	Navigation int. (1A3d)	40	66	56	35	46	45	45	45	45
	Civil Aviation int. (1A3a)	24	26	33	36	36	36	38	41	44
CO_2 (ktonnes)	Industry - Other (1A2f)	842	848	879	950	1022	1028	1037	1026	1025
	Civil Aviation (1A3a)	243	199	154	133	159	161	169	181	192
	Road (1A3b)	9275	10585	11202	12229	12838	12745	12878	13017	13794
	Railways (1A3c)	297	303	228	232	226	228	235	247	265
	Navigation (1A3d)	714	766	466	462	454	452	449	449	449
	Residential (1A4b)	113	118	129	220	232	228	225	225	225
	Ag./for./fish. (1A4c)	1899	1728	1626	1586	1521	1668	1677	1685	1703
	Military (1A5)	119	252	111	271	153	153	153	153	153
	Navigation int. (1A3d)	3087	5061	4279	2636	3559	3443	3443	3443	3443
	Civil Aviation int. (1A3a)	1736	1867	2350	2575	2594	2605	2742	2983	3183
CH_4 (tonnes)	Industry - Other (1A2f)	60	53	50	45	42	38	35	32	31
	Civil Aviation (1A3a)	7	7	5	7	5	5	5	6	6
	Road (1A3b)	2619	2370	1861	1376	1236	959	649	466	387
	Railways (1A3c)	12	13	10	9	7	4	2	0	0
	Navigation (1A3d)	31	35	30	32	32	32	31	31	31
	Residential (1A4b)	150	136	137	219	235	219	202	200	200
	Ag./for./fish. (1A4c)	139	106	88	86	90	88	82	80	79
	Military (1A5)	5	18	6	13	7	6	4	4	3
	Navigation int. (1A3d)	65	110	97	62	86	84	87	90	91
	Civil Aviation int. (1A3a)	31	35	42	49	52	52	55	60	64
N_2O (tonnes)	Industry - Other (1A2f)	34	35	37	40	43	43	44	44	44
	Civil Aviation (1A3a)	10	10	8	8	9	10	10	11	11
	Road (1A3b)	312	414	443	406	434	425	399	389	406
	Railways (1A3c)	8	8	6	6	6	6	6	7	7
	Navigation (1A3d)	43	46	27	26	26	26	26	26	26
	Residential (1A4b)	2	2	2	3	4	4	4	4	4
	Ag./for./fish. (1A4c)	87	81	79	77	72	81	82	83	83
	Military (1A5)	4	7	3	9	5	5	5	6	6
	Navigation int. (1A3d)	194	318	269	166	224	216	216	216	216
	Civil Aviation int. (1A3a)	59	64	82	89	89	89	94	102	109
GHG-eq. (ktonnes)	Industry - Other (1A2f)	853	860	892	963	1036	1042	1051	1040	1039
	Civil Aviation (1A3a)	246	202	157	136	162	164	172	185	196
	Road (1A3b)	9427	10763	11379	12384	12998	12896	13015	13148	13928
	Railways (1A3c)	300	306	230	234	228	230	237	249	267
	Navigation (1A3d)	728	781	475	471	462	460	458	458	458
	Residential (1A4b)	116	121	133	226	238	234	231	230	230
	Ag./for./fish. (1A4c)	1929	1755	1652	1612	1545	1695	1704	1713	1730
	Military (1A5)	120	254	112	274	155	155	155	155	155
	Navigation int. (1A3d)	3149	5162	4365	2689	3630	3512	3512	3512	3512
	Civil Aviation int. (1A3a)	1755	1888	2376	2604	2623	2634	2772	3016	3218

6.3.1 Road transport

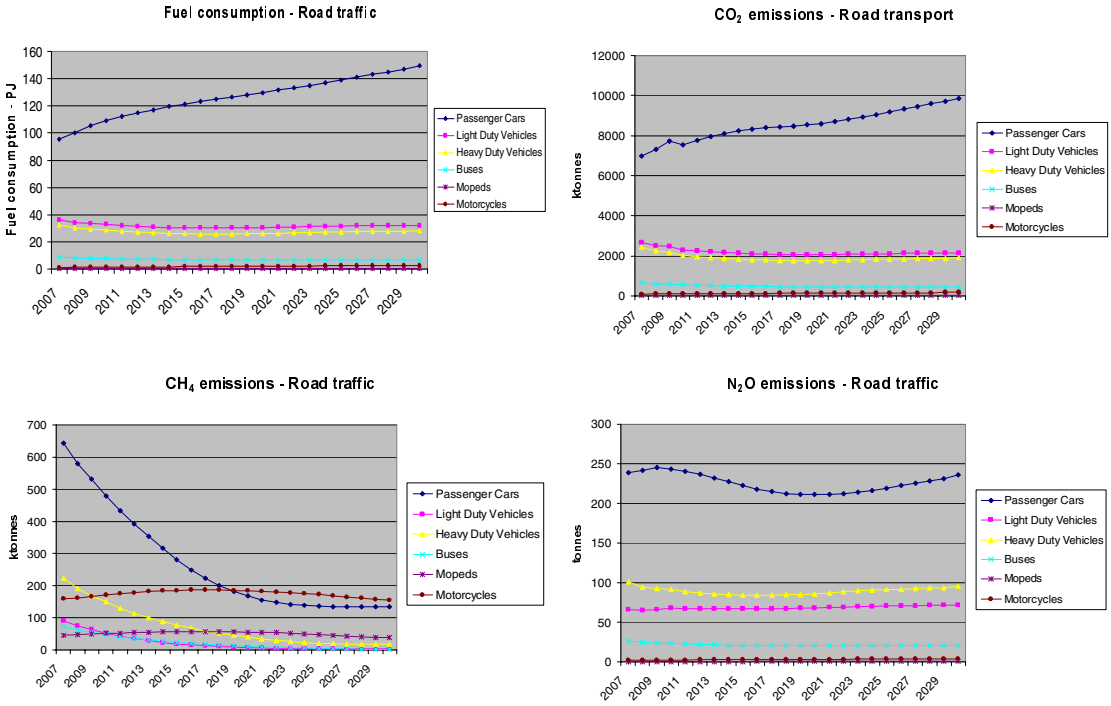


Figure 6.3 Fuel consumption, CO_2, CH_4 and N_2O emissions from 2007-2030 for road traffic.

The total fuel consumption for road traffic increases by 26 % from 2007 to 2030. Passenger cars have the largest fuel consumption share, followed by light duty vehicles, heavy duty vehicles, buses and 2-wheelers in decreasing order. Light and heavy duty vehicles have similar fuel consumption totals, and the fuel consumption levels are considerably higher than noted for buses and 2-wheelers in particular.

The CO_2 emissions directly depend of the fuel consumption and the percentage amount of biofuels used in the Danish road transportation sector. In 2010, the DEA (2008a) assumes this percentage to be 5.75, (clearly visible from Figure 6.3, and following the EU directive 2003/30), with a linear increase to 10 % in 2020, following a EU Commission proposal from 2008. The total CO_2 emissions increase is expected to be 14 % from 2007-2030.

The majority of the CH_4 and N_2O emissions from road transport come from gasoline passenger cars (Figure 6.3). The CH_4 emission decrease of 72 % from 2007 to 2030 is explained by the introduction of gradually more efficient catalytic converters for gasoline cars. An undesirable environmental side effect of the introduction of catalyst cars is the increase in the emissions of N_2O from the first generation of catalyst cars (Euro 1) compared to conventional cars. The emission factors for later catalytic converter technologies are considerably lower than the ones for Euro 1, thus causing the emissions to decrease during the projection period until the number of Euro 1 cars are only insignificant.

6.3.2 Other mobile sources

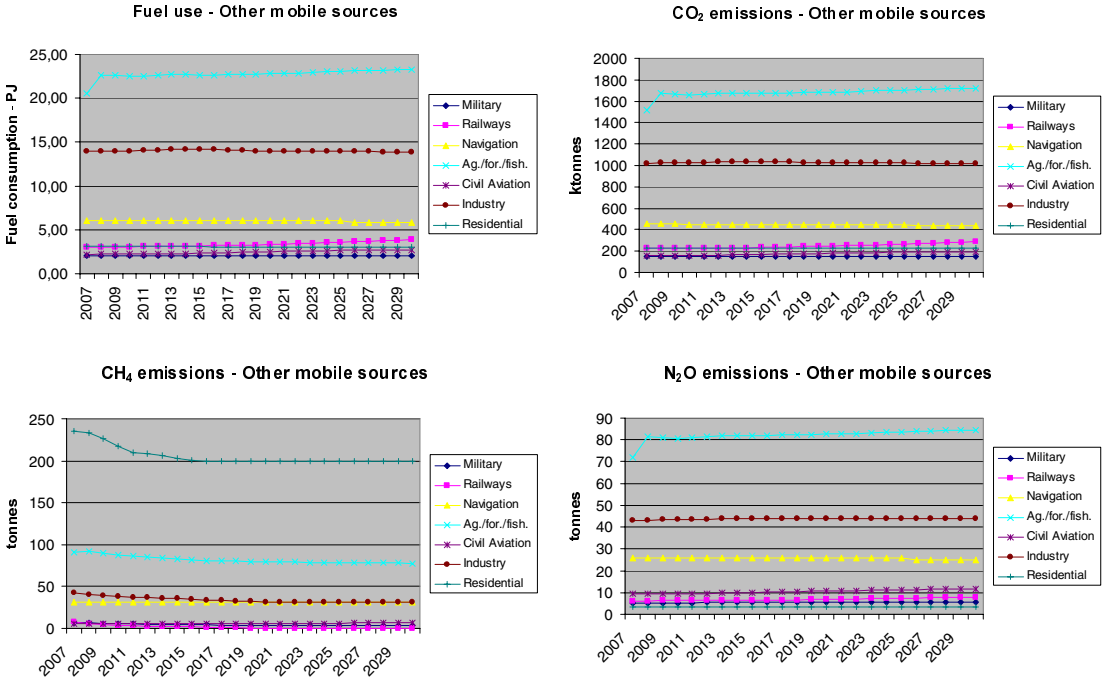


Figure 6.4 Fuel consumption, CO_2, CH_4 and N_2O emissions from 2007-2030 for other mobile sources.

For other mobile sources the levels of fuel consumption and emissions for Agriculture/forestry/fisheries (1A4c) are more or less constant throughout the forecast period, apart from the sudden data jump from 2007 to 2008. For fishing vessels, the fuel consumption data are the newly released historical values for 2007 (DEA, 2008b), which have been included in the updated version of the NERI emission model for navigation. Thus, the updated model includes a new historical inventory for 2007, and updated historical emission inventories for 2006 and prior years. For air traffic, the DEA energy projections assumes a similar growth rate for domestic and international flights corresponding to a fuel consumption increase of 23 % from 2007 to 2030. The marginal fuel consumption decreases for Industry (1A2f), Residential (1A4b) and Navigation (1A3d) is due to a gradual phase out of older and less fuel efficient technology.

Agriculture/forestry/fisheries (1A4c) is the most important source of N_2O emissions, followed by Industry (1A2f) and Navigation (1A3d). The emission reduction for the latter sector is due to the gradual shift from 2-stroke to 4-stroke gasoline engines in recreational craft (also visible for CH_4). The emission contributions from Railways (1A3c), Domestic aviation (1A3a) and Military (1A5) are small compared to the overall N_2O total for other mobile sources.

By far the majority of the CH_4 emission comes from gasoline gardening machinery (Residential, 1A4b), whereas for the railway, domestic air traffic and military categories only small emission contributions are noted. The CH_4 emission reduction for the residential category is due to the introduction of the cleaner gasoline stage II emission technology. Also for Agriculture/forestry-/fisheries (1A4c) and Industry (1A2f), the gradually stricter emission standards for diesel engines cause the CH_4 emissions to decrease over the forecast period.

6.4 Model structure for NERI transport models

More detailed emission models for transport comprising road transport, air traffic, non road machinery and sea transport have been developed by NERI. The emission models are organised in databases. The basis is input data tables for fleet and operational data as well as fuel sale figures, and output fuel consumption and emission results are obtained through linked database queries. A thorough documentation of the database input data side, and data manipulation queries will be given in a NERI report in 2009, along with flow-chart diagrams.

References

Danish Energy Agency, 2007: The Danish energy statistics. http://www.ens.dk/sw16508.asp

Danish Energy Agency, 2008a: Energy projections 2007-2025, September 2008.

Danish Energy Agency, 2008b: The Danish energy statistics. http://www.ens.dk/sw11654.asp

Dalbro, S. 2007: Unpublished data material from Statistics Denmark.

Ekman, B. 2005: Historical traffic data. Unpublished data material from the Danish Road Directorate.

EMEP/CORINAIR, 2007: Emission Inventory Guidebook 3rd edition, prepared by the UNECE/EMEP Task Force on Emissions Inventories and Projections, 2007 update. http://reports.eea.europa.eu/EMEPCORINAIR5/en/page002.html

Foldager, I. 2007: Unpublished data material from the Danish Road Directorate.

Hansen, K.F. & Jensen, M.G. 2004: MÅLING AF EMISSIONER FRA FREMDRIVNINGSANLÆG PÅ MADS MOLS. Ruston 20RK270, Sagsnr.: 1076868, Documentation note, 5 pages (in Danish).

Hjortberg, F.K. 2008: Unpublished data material from Bornholmstrafikken.

ICAO Annex 16: 'International standards and recommended practices', Volume II 'Aircraft Engine Emissions', 2nd ed. (1993), plus amendments: Amendment 3 March 20 1997 and amendment 4 November 4 1999.

IFEU, 2004: Entwicklung eines Modells zur Berechnung der Luftschadstoffemissionen und des Kraftstoffverbrauchs von Verbrennungsmotoren in mobilen Geräten und Maschinen - Endbericht, UFOPLAN Nr. 299 45 113, pp. 122, Heidelberg.

Illerup, J.B., Birr-Pedersen, K., Mikkelsen, M.H., Winther, M., Gyldenkærne, S., Bruun, H.G. & Fenhann, J. 2002: Projection Models

2010. Danish emissions of SO_2, NO_X, NMVOC and NH_3. National Environmental Research Institute, Denmark. 192 pg - NERI Technical Report No. 414.
http://www2.dmu.dk/1_viden/2_Publikationer/3_fagrapporter/rapporter/FR414.pdf

Kristensen, F. 2008: Unpublished data material from Mols-Linjen.

Markamp, K. 2007: Personal communication, Henrik Markamp, The National Motorcycle Association.

Nielsen, O.-K., Lyck, E., Mikkelsen, M.H., Hoffmann, L., Gyldenkærne, S., Winther, M., Nielsen, M., Fauser, P., Thomsen, M., Plejdrup, M.S., Illerup, J.B., Sørensen, P.B. & Vesterdal, L. 2008: Denmark's National Inventory Report 2008 - Emission Inventories 1990-2006 - Submitted under the United Nations Framework Convention on Climate Change. National Environmental Research Institute, University of Aarhus. 701 pp. – NERI Technical Report no. 667.
http://www2.dmu.dk/Pub/FR667.pdf

Ntziachristos, L. & Samaras, Z. 2000: COPERT III Computer Programme to Calculate Emissions from Road Transport - Methodology and Emission Factors (Version 2.1). Technical report No 49. European Environment Agency, November 2000, Copenhagen.
http://reports.eea.eu.int/Technical_report_No_49/en

Næraa, R. 2007: Unpublished data material from the Danish State Railways.

Nørgaard, T. & Hansen, K.F. 2004: Chiptuning af køretøjer - miljømæssig effekt, Miljøprojekt nr. 888, Miljøstyrelsen.

PHP, 1996: Research Report – Emission tests at Alpha, Mols 2 and Mols 4, 9L25MC mk6 engines #35031 and #35033, 22-23/10 1995 and 16/1 1996, DOK, PHP Basic Research, October 1996, 20 pages.

Trafikministeriet, 2002: Vejsektorens emissioner. Dokumentationsnotat, ISBN: 87-91013-28-3, Trafikministeriet, november 2002 (in Danish).

USEPA, 2004: Conversion Factors for Hydrocarbon Emission Components. EPA420-P-04-001, US Environmental Protection Agency, 5 pp.

Winther, M. 2001a: 1998 Fuel Use and Emissions for Danish IFR Flights. Environmental Project no. 628, 2001. 112 p. Danish EPA. Prepared by the National Environmental Research Institute, Denmark. Available at http://www.mst.dk/udgiv/Publications/2001/87-7944-661-2/html/.

Winther, M. 2001b: Improving fuel statistics for Danish aviation. National Environmental Research Institute, Denmark. 56 p. – NERI Technical Report No. 387.

Winther, M. & Nielsen O. 2006: Fuel use and emissions from non road machinery in Denmark from 1985-2004 - and projections from 2005-2030. Environmental Project 1092. The Danish Environmental Protection

Agency. 238 pp. http://www.mst.dk/udgiv/Publica-tions/2006/87-7052-085-2/pdf/87-7052-086-0.pdf

Winther, M. 2008a: Fuel consumption and emissions from navigation in Denmark from 1990-2005 - and projections from 2006-2030. Technical Report from NERI no. 650. 109 pp.
http://www2.dmu.dk/Pub/FR650.pdf

Winther, M. 2008b: Danish emission inventories for road transport and other mobile sources. Inventories until year 2006. National Environmental Research Institute, University of Aarhus. 219 pp. – NERI Technical Report No. 686. http://www.dmu.dk/Pub/FR686.pdf.

Wismann, T. 1999: MOLS-LINIEN, Mai Mols - Måling af emissioner fra fra hovedturbiner, dk-RAPPORT 14.901, 9 pages (in Danish).

7 Fluorinated gases (F-gases)

These gases comprise HFCs, PFCs and SF_6. They all contain fluorine, hence the name F-gases, which is the international name.

None of the F-gases are produced in Denmark. The emission of these gases is, therefore, associated with their use alone.

An account of the annual consumption and emission of F-gases is prepared by a consultant on behalf of the Danish Environmental Protection Agency (DEPA). In this connection, projections to 2020 are also prepared. Annual reports are available which contain both consumption and emission data.

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F-gases are powerful greenhouse gases with GWP between 140 and 23 900. F-gases, therefore, receive a great deal of attention in connection with greenhouse gas emission inventories. For many F-gas applications, the gases can be controlled and/or replaced, which has been, and continues to be, the case in Denmark. Data for the projections mentioned here take this into consideration, but the projections do not take the potential influence of new EU legislation in this field into consideration. These will, however, only have a lowering effect on emissions from mobile air conditioning equipment, as for the remaining application areas the legislation are already covered by different existing Danish legislation. Neither do the projections take the cease of the Danish bans on e.g. refrigeration equipment in 2013 into account. In the emission inventories for 2004, the total contribution from F-gases, converted into CO_2 equivalents, constituted 0.9 % of the Danish total without CO_2 from LUCF. Of this contribution the HFCs dominates with 94 %.

HFCs comprise a range of substances, of which the following, relevant for Denmark, are approved for inventory under the Climate Convention and Kyoto Protocol (KP), with stated and approved GWP values:

Substance:	GWP CO_2-equiv.
HFC-32	650
HFC-125	2800
HFC-134a	1300

HFC-143a	3800
HFC-152a	140
HFC-227ea	2900

However, HFCs are estimated in Denmark in accordance with the trade names for HFC mixtures which are put together from the 'pure' HFCs listed in Table 7.1.

Table 7.1 Relationship (weight %) between HFCs, as calculated for the Climate Convention ('pure' HFCs) and the HFC mixtures used under trade names in Denmark.

Pure HFCs:	HFC-32	HFC-125	HFC-134a	HFC-143a	HFC-152a	HFC-227ea
HFC mixtures						
HFC-365						8
HFC-401a					13	
HFC-402a		60				
HFC-404a		44	4	52		
HFC-407a	23	25	52			
HFC-410a	50	50				
HFC-507a		50		50		

HFCs are in most widespread use as refrigerants in stationary and mobile air-conditioning and refrigeration systems. A more minor application is in insulation foams and foams of other types.

With regard to PFCs, only C_3F_8 is considered to be relevant for Denmark and approved for inventory under the Climate Convention and KP, with a GWP of 7 000. The use of C_3F_8, mostly as a refrigerant, is limited.

SF_6 is used in Denmark and is estimated under the Climate Convention and KP, with a GWP value of 23 900. It is primarily used in high voltage equipment, in double-glazing and, to a lesser degree, in laboratories, for shoe soles and a limited number of other minor applications.

7.1 Emissions model

Emissions are calculated with a model for the individual substance's life-cycle over the years, taking the emissions associated with the actual processes into consideration. For refrigeration and high voltage equipment, the processes are filling up/topping up, operation and destruction. For foam, the processes are production of the products in which the substances are used as well as use and destruction of the product. The model has been developed and used in connection with the annual historic emission inventories for the Climate Convention, see NIR 2008. As a result, the model corresponds with the guidelines produced for this purpose. The model is built in Microsoft Excel, combining an Excel spreadsheet file for each year. For details of the model and the calculation methodologies, refer also to the DEPA's annual reports produced as a basis for the F-gas inventories.

7.2 Emissions of the F-gases HFCs, PFCs and SF_6 1993-2020 (2025)

Data is available for historic values for F-gas emissions for the period 1993-2006, as well as projected values for the period 2005-2020 as calculated for DEPA. As mentioned, the calculations are based on the trade names for HFC mixtures, and the inventories and projections are at this level of detail. The total F-gas emission in CO_2 equivalents agrees almost entirely with the historic values reported to the EU and the Climate Convention, where the mixtures are converted to pure HFCs. Where agreement is not total, this is due to the lack of complete correspondence between the GWP values for mixtures and for the pure HFCs, as well as the minor rounding which takes place in the databases and formats (CRF) used for the reporting. These differences are not of any significant importance.

The reference for the data in the tables below is, therefore, the 2008 report prepared for DEPA (DEPA, 2008). Moreover, these data has been based on detailed spreadsheets, prepared in connection with the consultant's work on the F-gas inventories for DEPA.

Furthermore, the report and the data collected in this connection indicate that, with regard to projection of the emissions, the data are based on 'steady state' consumption, with 2006 as the reference year. Also, cut-off dates in relation to the phasing out of individual substances, in connection with Danish regulation concerning the phasing out of powerful greenhouse gases, are taken into account. HFCs used in foaming agents in flexible foam plastic were phased out from of January 1, 2006. Furthermore, a tax effect has been introduced for relevant applications and, as far as possible, expected increases in the use of these substances will be taken into consideration in a number of application areas – as will reductions expected. Projection of the use of HFC-404A is based on a balancing exercise, as the development of the used of HCFC-22 refrigeration systems can, on the one hand, be expected to lead to higher than predicted increases in consumption of HFC-404A in commercial refrigeration plant, as HFC-404A together with CO_2 systems are the most obvious potential substitutes. On the other hand, from January 1, 2000, building new HCFC-22-based systems has not been permitted and, from January 1, 2002, substitution with HCFC-22 in existing systems has been banned. For SF_6, use in connection with double-glazing was banned in 2002, but throughout the period there will be emission of SF_6 in connection with the disposal of double-glazing panes where SF_6 has been used.

The available historic and projected data are presented first at the CRF category level equivalent to the Summary 2 table in the CRF reporting format, Table 7.2. This level is equivalent to the sum of the emissions for all HFCs, PFCs and SF_6, respectively. Small deviations between the data in Table 6.2 and that reported for 1993-2006 have been explained above (the latest reported data are http://cdr.eionet.europa.eu/dk/Air_Emission_Inventories/Submission_UNFCCC/colsasntw/envsasn6g). It should be noted that the basic data for the years before 1995 is not entirely adequate with regard to coverage, in relation to actual emissions. Under the Kyoto Protocol, it is possible to choose 1995 as base year for F-gases. Due to the lack of cov-

erage prior to 1995, this option is used in Denmark. Therefore, the projection on the '5-year level' for F-gases summarised in Table 7.3 starts from 1995. For the projection after 2020, the total projected emission for 2020 is retained.

Table 7.2 Total F-gas emissions in CO_2-equiv. (1 000 tonnes). Historic data: 1993-2006. Projections: 2007-2020.

Year	Sum HFCs	PFCs	SF_6	Total F-gases
1993	93.9	0.0	101.2	195.1
1994	134.5	0.1	122.1	256.6
1995	217.7	0.5	107.3	325.6
1996	329.3	1.7	61.0	391.9
1997	323.7	4.1	73.1	400.9
1998	411.0	9.1	59.4	479.5
1999	502.6	12.5	65.4	580.5
2000	604.1	17.9	59.2	681.2
2001	646.4	22.1	30.4	698.9
2002	671.2	22.2	25.5	718.8
2003	694.4	19.3	31.9	745.6
2004	747.8	15.9	33.1	796.8
2005	803.9	13.9	21.8	839.5
2006	833.6	15.7	36.0	885.3
2007	844.2	13.9	35.5	893.6
2008	846.7	12.4	35.7	894.7
2009	829.7	11.2	35.9	876.8
2010	804.4	10.3	36.1	850.8
2011	755.7	9.6	69.3	834.6
2012	692.1	8.9	115.4	816.4
2013	645.9	8.3	125.4	779.7
2014	563.3	7.8	137.9	709.0
2015	487.9	7.4	123.2	618.6
2016	404.7	7.0	95.5	507.2
2017	347.6	6.6	80.6	434.9
2018	267.5	6.3	110.6	384.4
2019	225.0	6.0	79.8	310.9
2020	151.8	5.8	59.3	216.9

Table 7.3 Total emission of F-gases in CO_2-equiv. (1 000 tonnes). Historic data: 1993-2006. Projections: 2007-2020. After 2020, the emission value for 2020 is retained.

CRF-sector	Year	1995	2000	2005	2007	2010	2015	2020	2025
	Note	(1)				(2)	(3)		
2. Industrial Processes.									
F. Consumption of Halocarboner and SF_6		325.6	681.2	839.5	893.6	854.7	609.9	216.9	216.9

Note:

(1) Relevant data is not available for 1990; 1995 can be selected in the KP for F-gases as the base year.

(2) 5-year average: 2008-2012.

(3) 5-year average: 2013-2017.

In Figure 7.1, the data from Table 7.2 are illustrated. The apparent increase within historic data for the total F-gas emission runs from 1995 (1993) to the most recent historic inventory for 2006. In 2001, legislation began to be adopted to control F-gases in Denmark. The legislation in-

volves, from 2001, a tax on use of F-gases; while in 2002 bans were introduced, of which the majority first come into force in 2006 and 2007. In the projections, the regulation in this area translates into decreasing emissions after 2007. The figure shows that F-gas emissions are dominated by HFCs, whereas PFCs comprise only a very small share. SF_6, at the beginning of the historic inventory period, comprises a considerable share, falling thereafter due to the gradual phasing out of the use of SF_6 in metal works. The projection for SF_6 shows a rise and then a fall towards the end of the period; this path reflects the expected emission from the destruction of double-glazing in which SF_6 is used.

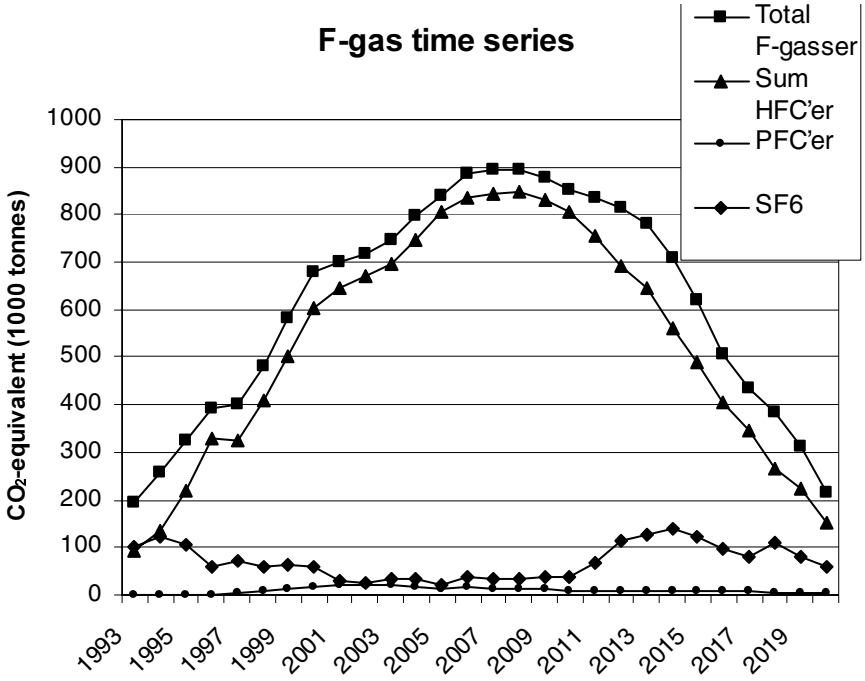

Figure 7.1 Time-series for F-gas emissions, divided into HFCs, PFCs and SF_6.

References

Danish Environmental Protection Agency, 2004: Ozone depleting substances and the greenhouse gases HFCs, PFCs and SF_6. Danish consumption and emissions 2002. Environmental Project No. 890. http://www2.mst.dk/Udgiv/publications/2004/87-7614-123-3/pdf/87-7614-124-1.pdf

Danish Environmental Protection Agency, 2005: Ozone depleting substances and the greenhouse gases HFCs, PFCs and SF_6. Danish consumption and emissions 2003. Environmental Project No. 890. http://www2.mst.dk/Udgiv/publications/2005/87-7614-601-4/pdf/87-7614-602-2.pdf

Danish Environmental Protection Agency, 2006: Ozone-depleting substances and the greenhouse gases HFCs, PFCs and SF_6. Danish consumption and emissions 2004. Environmental Project No. 890. http://www2.mst.dk/Udgiv/publications/2006/87-7614-990-0/pdf/87-7614-991-9.pdf

Danish Environmental Protection Agency, 2007: Ozone-depleting substances and the greenhouse gases HFCs, PFCs and SF_6. Danish con-

sumption and emissions 2005. Environmental Project No. 1168 http://www2.mst.dk/Udgiv/publications/2007/978-87-7052-465-0/pdf/978-87-7052-466-7.pdf

Danish Environmental Protection Agency, 2008: Ozone-depleting substances and the greenhouse gases HFCs, PFCs and SF_6. Danish consumption and emissions 2006. Environmental Project No. xxx (Under publication).

8 Agriculture

The emission of greenhouse gases from the agricultural sector includes the emission of methane and nitrous oxide. The emission of carbon dioxide from agriculture is not included in this projection as it is reported under forestry and land-use change (LULUCF – Land Use, Land Use Change and Forestry). The projection comprises an assessment of the greenhouse gas emissions from the agricultural sector to 2025.

8.1 Projection of agricultural greenhouse gas emissions

Assessment of future greenhouse gas emissions from the agricultural sector is regularly updated in line with actual developments and new scientific knowledge. The present projection is similar to the latest basic projection for greenhouse gases published in 2007 (Illerup et al., 2007), except that the historic emission from 1990 to 2006 has been updated in accordance with the latest official reporting from Denmark.

The following measures are included in the present projection. The ammonia action plan, improvements in feed efficiency, the effects of implementation of the Plan for the Aquatic Environment III (VMPIII), the EU agricultural reform and expected emission-reducing technologies.

In the period from 1990 to 2006, the emission of greenhouse gases declined from 13,044 ktonnes CO_2 equivalents to 9,605 ktonnes CO_2 equivalents.

Until 2010 a slightly increase is expected in the green house gas emission from agriculture to 9,930 ktonnes CO_2 equivalents.

Until 2025 a slightly decrease is expected to 9,360 ktonnes CO_2 equivalents in 2025. This means that in the period from 2006 to 2025, emissions are expected to decrease by 2.6 % – see Table 8.1.

Methane emissions will increase slightly in the near future due to that the number of dairy cows in future is not reduced as previously assumed. The main reason is the currently planned increase in the Danish milk quota, which in the short term will not reduce the number of cows. In the long term is it expected a steady milk production leading to a decrease in the methane emission. The change in the number of cattle also contributes to changes in the nitrous oxide emission, but the reduction in the emission from the leaching of nitrogen (N-leaching) and artificial fertiliser is of greater importance. It is expected that N-leaching will be reduced as a result of initiatives implemented in connection with Danish plan for the aquatic environment, VMPIII, where it has been decided that the amount of leached N shall be reduced with minimum 13 % by 2015 compared to 2003. Artificial fertiliser use is expected to fall, partly due to the decrease in land area under agricultural cultivation and partly due to improved utilisation of nitrogen in animal manure.

Measures in the form of technologies to reduce ammonia emissions in the stable and expansion of biogas plant do not contribute to significant changes in the total greenhouse gas emission from the agricultural sector. Both the greenhouse gas emission related to the emission of ammonia and emission reductions from biogas production are currently relatively minor emission sources, contributing to the total greenhouse gas emission with approx. 4 %, in total. The current Danish energy plan plans to more than double the amount of animal manure treated in biogas plants. It is assumed that this target will be reached in 2020.

The overall emission figures is shown in Table 8.1

Table 8.1 Projected greenhouse gas emission from the different sectors until 2025.

	CRF category	*Source*	1990	2000	2006	2010	2020	2025
CH_4, Gg	4A – Enteric Fermentation	Enteric fermentation	155.19	136.28	123.93	130.37	117.23	118.96
	4B - Manure Management	Manure Management (incl. reduction from biogas)	35.77	45.44	49.63	50.26	60.61	58.45
		Total	190.96	181.73	173.56	180.63	177.84	177.42
N_2O, Gg	4B- Manure Management	Manure Management (incl. reduction from biogas)	2.21	1.94	1.67	1.88	1.65	1.65
	4D.1 – Direct Soil Emissions	Mineral fertilizer	7.69	4.83	3.68	3.74	3.17	3.17
		Animal manure applied to soils	3.51	3.40	3.43	3.77	3.86	3.88
		N-fixing crops	0.87	0.75	0.68	0.68	0.68	0.68
		Crop residue	1.17	1.09	1.06	1.04	1.00	1.00
		Histosoils	0.38	0.36	0.37	0.35	0.35	0.35
	4D.2 – Animal Production	Pasture	1.01	0.99	0.90	0.89	0.79	0.80
	4D.3 – Indirect Soil Emissions	Atm. deposition	1.72	1.33	1.12	0.97	0.88	0.88
		N-leaching and run-off	10.50	7.05	6.03	6.20	5.50	5.50
			NO	NO	NO	NO	NO	NO
	4D.4 - Other	Sewage sludges /industrial waste	0.09	0.17	0.27	0.27	0.27	0.27
		N_2O total	29.14	21.91	19.23	19.80	18.15	18.18
CO_2-eq., M tons		CH_4	4.01	3.82	3.64	3.79	3.73	3.73
		N_2O	9.03	6.79	5.96	6.14	5.63	5.63
	4. GHG – Agriculture, total		13.04	10.61	9.61	9.93	9.36	9.36

8.2 Assumptions for the projection

In this section, a short description of the assumptions is made, which is short review of the latest base line projection made in 2008 (Poulsen et al. 2008). For dairy cows is it assumed a 10 % increase compared to Poulsen et al. (2008). This increase has been made because the latest development in the Danish heard of dairy cattle is slightly increasing due to the increase in the Danish milk quota. The review concerns the establishment of ammonia-reducing technology in the stable, extension of biogas production, increased requirements for the utilisation of N in animal manure resulting from the Plan for the Aquatic Environment III (VMPIII), as well as the predicted assumptions for cattle and pig production. For other animal categories is only minor changes is foreseen (Poulsen et al. 2008)

8.2.1 Livestock production

Slaughter pigs

More than 80 % of Danish pork is exported and production, therefore, is heavily dependent on conditions in the export market. Until 2006 has the Danish pig production increased every year, but lately has the number of sows been constant of 1.15 million sows. The number of produced pigs has increased due to an increased number of piglets per sow, but lately from 2007 has the export of piglets increased and consequently has the number of slaughtered pigs in Denmark been reduced. The projection made by Poulsen et al. (2008) takes into account this development and is hence used in the projection.

Based on the mentioned assumptions, the production of slaughter pigs is expected to rise from the 23.1 million slaughter pigs produced in 2007 to 26.5 million in 2020 and thereafter kept constant.

Dairy cattle

Until 2007 has the dairy heard decreased with 10,000 to 15,000 dairy cows per year due to a fixed milk quota. The latest increase in the quota of 2.5 % and the expected annual increase in the milk quota of 1 % per year until 2013 combined with competitive Danish farmers will change this trend. In future it is expected that the dairy heard will decrease slightly less than previously from 545,000 in 2007 with a slight increase in 2009 to 2010 and hereafter a decrease to 457,000 in 2020. From 2020 to 2025 the number is kept constant.

8.2.2 Feed consumption and nitrogen excretion from livestock

Both the feed consumption and the nitrogen excretion, affects the greenhouse gas emission.

For sows is it expected an increase in the feed consumption from 1470 Danish feeding units (FE) to 1600 FE in 2025. For slaughter pigs is expected an unaltered feed consumption in terms of energy despite a slightly increase in slaughter weight is expected. This is due to an expected increase in feeding efficacy.

The nitrogen excretion from pigs is expected to continue the decrease which has been seen for the last 20 years. From 1985 to 2007 has the ni-

trogen excretion per produced fattening pig (30-100 kg) been reduced from 5.09 kg N to 3.10 kg combined with an increase in the slaughter weight to 107 kg. Poulsen et al. (2008) expects that the nitrogen excretion rate will continue to decrease in future to an average of 2.70 kg N/produced pig in 2020. From 2020 to 2025 is it kept constant.

For dairy cows of large breed is it expected an increase in feed consumption from 6811 FE in 2007 to 7500 FE in 2025 due to increased demands for milk production. The nitrogen excretion is expected to increase from 140.2 kg N to 150 kg N in 2025.

Cattle and pig production contributes with by far the largest share of the animal manure emission – approx. 80 %. The remaining livestock categories are not, therefore, close to being of so much importance in assessing the future total greenhouse gas emission. Here has only minor changes in the feed consumption and nitrogen excretion been made.

In total is the amount of nitrogen in excreted animal manure expected to be rather constant of 250,000 tonnes pr year.

8.2.3 Requirements for nitrogen utilisation in animal manure

Under evaluation of VMPIII in 2008 and 2011, a position will be taken on whether it is possible to set stricter requirements for the utilisation of the nitrogen content in animal manure of a further 4.5 – 5 %. In order to achieve the target set by VMPIII for a 13 % reduction in nitrogen leaching, as well as research in improvements of feed efficiency, this will require stricter demands for N-utilisation in animal manure. This represents the basis for the further tightening of the requirements for the utilisation of nitrogen but is not included in the projection.

8.2.4 Use of mineral fertilisers

Consumption of artificial fertilisers depends on the amount of nitrogen in animal manure, requirements for N-utilisation and area under agricultural cultivation. In the projection, it is assumed that there is no significant change in the distribution of crops, which mean, that the total nitrogen demand per unit of area under cultivation does not change to a marked degree.

In combination with an increased gasification of slurry which makes the nitrogen more plant accessible and higher utilization demands and a less agricultural area is the consumption of mineral fertiliser assumed to be reduced from the current 200,000 tonnes per year to 165,000 tonnes.

8.2.5 N-leaching

In VMPIII, focus is furthermore directed at improvements in feed utilisation, protection of especially vulnerable habitat areas, taking areas out of production for establishment of wetlands and forest, as well as stricter requirements with regard to handling animal manures. Based on these approaches, N-leaching from the root zone is expected to fall by 13 % to 2015. This corresponds to a reduction in N-leaching from 164,200 tonnes N in 2003 to approx. 142,800 tonnes N in 2015. It is assumed that the leaching in kept constant of 140,000 tonnes N from 2015 and onwards.

The ongoing revision of the VMPIII has so far not shown any reduction in the amount of leached N from agricultural land from 2003 to 2007 so it may be difficult to reach the above mentioned target.

8.2.6 Agricultural area

In previous years has the agricultural area decreased slightly which can be explained by an urbanisation of agricultural land. This will also take place in future. On the other hand does the abandon of the EU set-a-side rules increased the area where manure and mineral fertiliser application can take place. Changes in the agricultural area in future is therefore expected only to have very limited effect on the consumption and leaching of nitrogen and hence is these small changes not included in the projection. This include also the planned increase in established wetlands of 10,000 hectares as planned according to VMPIII. The current agricultural land in Denmark is approx. 2.6 million hectares.

8.2.7 Technology

Biogas production

The use of liquid slurry in the production of biogas will contribute to a reduction in the emission of methane as well as nitrous oxide.

The latest projection from the Danish Energy Agency (Energistyrelsen, June 2008) expects an increase in the biogas production from 4.5 PJ in 2007 to 10.0 PJ in 2020. Currently is approx. 2.5 million tonnes of slurry treated in biogas plants. The expected increase in energy yield will increase the treated amount from approx. 6 million tonnes slurry in 2020. This amount is kept constant until 2025.

Table 8.1 Expected development in liquid slurry used in biogas production 2006 to 2025

	Million tonnes liquid slurry used in the production of biogas	Reduced emission		
		Gg CH_4	Gg N_2O	ktonnes CO_2-equiv.
2003	1.8	1.027	0.004	23
2006	2.1	1.249	0.004	28
2010	2.8	1.517	0.006	36
2025	6.5	3.793	0.013	84

Ammonia emission

The current legislation force the farmers to reduce the ammonia emission from stable and storages from new production facilities and when enlarged with 25 % of the enlarged part compared to a normative ammonia emission in 2005/2006.

This legislate practice is expected to continue in future. The average life age of Danish stables are 15-20 %. As a consequence is it expected that 92 % of all pig production units are renewed under this ammonia emission reducing demands and 82 % of all cattle units (Poulsen et al. 2008).

The overall ammonia emission is therefore expected to decrease from 71,000 tonnes NH3-N in 2006 to 56,000 tonnes in 2025. Currently is the Danish ammonia inventory under revision, which may lower some of the used emission factors. It is expected that the current estimates are overestimated with 5-10,000 tonnes NH3-N.

8.3 Summary

Livestock farming is moving in the direction of larger operating units which are expected to have higher productivity compared with today's average. This entails a general increase in yield per livestock unit produced, better utilisation of feed, improved handling and utilisation of manure – measures which lead to a reduction in greenhouse gas emissions. The emission of both ammonia and greenhouse gases from the agricultural sector is expected to be reduced over time, but it is more difficult to predict the rate at which this will occur and the limit for how much the emission can be reduced. This depends on general structural developments in farming and developments within environmental regulation on production, especially for larger farm units. The Danish and the EU agricultural policy also plays a deciding role and, of course, the conditions for export and import of agricultural products.

In the projection, the greenhouse gas emission is expected to fall from 9,610 ktonnes CO_2 equivalents in 2006 to 9,360 ktonnes CO_2 equivalents in 2025 – corresponding to a fall of 2.6 %. The reduction in the methane emission from enteric fermentation will be outweighed by an increase in the emission from manure management as a consequence of the out phasing of stables with solid manure and deep litter bedding towards slurry based systems. Furthermore will the increased feeding demand increase the amount of volatile substance in the manure. The reduction in nitrous oxide emission is due mainly to a reduction in N-leaching, stemming from the effects of VMPIII and a fall in the use of mineral, resulting, in turn, from improvements in the utilisation of nitrogen in animal manure.

Establishment of certain technical measures, such as ammonia-reducing measures in the stable and expansion of biogas production, is taken into account. As the ammonia emission, however, is just one of the more minor sources of the nitrous oxide emission, a reduction will have limited effect on total greenhouse emissions. Evaporated ammonia is one of many sources of greenhouse gas emissions, contributing with less than 3 % of total greenhouse gas emission from agriculture. Therefore, a marked reduction in ammonia evaporation, e.g. 10 %, assuming that the remaining sources of emissions are maintained at the same level, would give a somewhat smaller reduction in the total greenhouse emission of 0.3 %.

Biogas-treated slurry contributes in 2006 to a reduction of 28 ktonnes CO_2 equivalents. This contribution is expected to increase in 2025 to 84 ktonnes without taking into account that the produced methane is substituting energy consumption in other sectors. To achieve a significant effect on the total emission in the agricultural sector, a considerable increase in the existing biogas production would be required. Apart from the biogas treatment of slurry, no other technical solutions exist in agriculture today which is specifically aimed towards limiting greenhouse gases.

8.4 Uncertainty

The uncertainty in the projected estimates is in the short term relative precise as the green house gas emission from agriculture is based on the existing production capacity. For 2020 to 2025 the estimates becomes more uncertain. This can be allocated to a number of issues:

- Danish agriculture has a very high export and hence very dependent on the global demand and on global food prices
- National and the EU environmental policies intend to reduce the environmental impact from agriculture. The result could be a reduced number of animals in future
- The Danish coupling with animal production and ownership of land for manure application in combination with high costs for agricultural land may reduce further development in the animal production
- Due to the large investments costs in stables and machinery is already established productions facilities a stabilization factor in the emission trend. On the other hand can the current global financial crisis delay the necessary replacement in new production facilities

The overall uncertainty in the projection in 2020-2025 is thus high. However, in 2020 it is assumed that the total greenhouse gas emission from the agricultural sector will be approx. 9,360 ktonnes CO_2-eqv. or only 2.6 % less than in 2006.

References

Energistyrelsen (2008): Basisfremskrivningen af Danmarks energiforbrug frem til 2025 - opdateret udgave. http://www.ens.dk/sw68196.asp

Illerup, J.B., Nielsen, O.K., Winther, M., Mikkelsen, M.H., Lyck, E., Nielsen, M., Hoffmann, L., Gyldenkærne, S., Thomsen, M., 2007. Projection of Greenhouse Gas Emissions 2005 to 2030. NERI Technical Report No. 611

Poulsen, H. D. et al. 2008. Evaluering af det generelle ammoniakkrav Rapport April 2008, Udarbejdet af repræsentanter fra Dansk Landbrug, Dansk Svineproduktion, Landscentret, Dansk Kvæg, Fødevareøkonomisk Institut (Københavns Universitet), Danmarks Miljøundersøgelser (Aarhus Universitet), Det Jordbrugsvidenskabelige Fakultet (Aarhus Universitet) og Miljøstyrelsen.

VMPIII – aftale. Aftale om Vandmiljøplan III 2005-2015 mellem regeringen, Dansk Folkeparti og Kristendemokraterne, 2. april 2004 (WWW.vmp3.dk).

9 Landfill sites

Deposited waste at landfill sites gives rise to CH_4 emissions.

CH_4 emissions are calculated by means of an emissions model, where activity data is annual data for the amount of waste deposited and where emissions factors, which are the amounts of CH_4 emitted per amount of waste deposited, result from model assumptions about the decay of waste and release of CH_4.

9.1 Activity data

Waste quantities are collected by the Danish Environmental Protection Agency (DEPA) under the 'Information System for Waste and Recycling' ('Informationssystem for Affald og Genanvendelse', ISAG). ISAG was used for the first time in 1993. ISAG is based on the principle that Danish waste treatment plants should register and report a range of information on all waste which is weighed-in or weighed-out of the plants. The information for the previous year has to be reported to the Danish Environmental Protection Agency (DEPA) each year, by 31 January at the latest. The report for waste amounts for 2006 is number fourteen. The results of this reporting are published in the form of annual waste statistics, statistics for year 2006 being the latest year; DEPA, 2008. The most recent reports before this report are DEPA (2007), DEPA (2006a), DEPA (2005a), and DEPA (2004).

The annual waste statistics include the amount of waste sent to landfill.

9.2 Emissions model

The model has been developed and used in connection with the historic emissions inventories prepared for the United Nation Climate Convention. As a result, the model has been developed in accordance with the guidelines found in the IPCC Guidelines (1996) and IPCC Good Practice Guidance (2001). Based on the recommendation in these reports, a so-termed Tier 2 method, a decay model, has been selected for the model. The model is described in the National Inventory Report which is prepared for the Climate Convention, the latest being the 2008 NIR report (Nielsen et al., 2008). In short, the model assumes that the carbon in the deposited waste decays and is converted to CH_4. In the model, this process is assumed to unfold in such way that, 10 years after deposition, half of the degradable carbon has been converted to form the basis for emissions of CH_4. The model and its results have, in connection with the annual emissions inventories under the Climate Convention, been subject to reporting review processes. This results in an incentive for the model's continued use in basically unchanged form in preparation of the emissions inventories. The model is built in one file in Microsoft Excel.

9.3 Historic emissions

In connection with greenhouse gas inventories for the Climate Convention, a so-called key category analysis is carried out. The analysis aggregates CO_2, CH_4, N_2O and the F-gases in relation to their respective greenhouse gas potentials, and lists these on a source level in relation to the Danish national total figures for greenhouse gas emissions. In an analysis of this type, carried out most recently for the greenhouse gases for the year 2006, the CH_4 emission from the landfill of waste is categorised as a key-source category. This is because this source, out of the 72 sources the analysis comprises, belongs to the 23 largest sources whose greenhouse gas emissions totals comprise 95 % of the national total. The landfill of waste is calculated to rank as no. 13 in size among the 23 key sources. The CH_4 emission from landfill sites comprised 1.4 % of the national total in 2006. Historic emissions, as well as the amounts of waste deposited, are shown together with the projected waste amounts and emissions in Table 8.2. In this table, the column 'potential emissions' expresses the total emission stemming from waste landfilled in a given year and 'actual gross emissions' expresses the actual emission estimated by means of the decay model. The emission to the atmosphere is, thereafter, 'actual gross' minus CH_4 combusted in landfill gas plant.

9.4 Projections

Waste strategies have been prepared in connection with the waste plan, 'Waste 21' ('Affald 21'), which covers the period 1998-2004. Many of the initiatives in this plan relate to increased sorting of certain waste fractions, with the intention to move away from the incineration of waste towards recycling. Furthermore, the plan aims to stabilise the total amount of waste produced.

The government's 2003 'Waste Strategy 2005-2008' ('Affaldsstrategi 2005-2008') is based on the principle of decoupling the growth in the amount of waste produced from economic growth. The projections carried out here are based on what this report mentions concerning waste targets. The results of work on indicators in the area of waste, also mentioned in the report, may have implications for updating projections at a later date, as the desirability of recycling and incineration in relation to landfill may lead to new initiatives which may, in turn, lead to changes in the amount of waste sent to landfill.

The waste strategy provides targets for the amount of waste to be sent to landfill for the year 2008. The Waste Statistics (DEPA, 2008) reported distribution (%) by sector of waste deposited at landfill for 2006 is presented in Table 9.1, along with the Waste Strategy targets for 2008.

Table 9.1 Share (%) of total landfill.

	Distribution 2006	Target 2008
Household waste	1	0
Large items of waste	21	25
Garden waste	1	0
Waste from institutions, commerce and offices	8	5
Industry	19	15
Construction	3	8
Wastewater plants	5	5
Power stations	4	10
Total	8	9

Projections of quantities of waste produced, in connection with ISAG reporting, are carried out using the model FRIDA (FRemskrivning af Isag DAta – Projection of ISAG Data) developed by researchers in the Department of Policy Analysis at the research centre, Risø (DEPA, 2006b). The model is a further development of the model described in the report from DEPA (DEPA, 1998) and is based on the waste data from the ISAG system as well as data for economic development from the ADAM model. Projection of the development in the amount of waste produced is based on the Ministry of Finance's projection of the economic development April 2006, on the energy strategy (Energistrategi, 2025) prepared by the Danish Ministry of Transport and Energy, as well as on ISAG data up to and including 2004.

For the amount of waste deposited at landfill, this projection uses the waste strategy 2005-2008's target, i.e. that 9 % of the total amount of waste produced goes to landfill in 2008. Furthermore, the FRIDA model's projection of total waste amount is used. With the total amount of waste produced for 2008 calculated as described, waste amounts for 2008 are then calculated on the basis of the same distribution as registered in 2006. The amount of waste for the respective waste fractions is, thereafter, interpolated between the registered values for 2006 and the projected values for 2008. After 2008, the distribution of the various waste fractions for 2003 and 2008 is retained. For 2009-2020, it is projected that the amount of waste deposited is 9 % of the Frida model's projected total waste figure. After 2020, projected waste amounts are not found in the Risø model. In this part of the projection, the total amount of waste deposited is retained as the amount projected for 2020.

The emission projection uses the same CH_4 emission model used for calculation of the historic emissions. The resulting projections of the amounts of waste produced and CH_4 emissions can be seen in Table 9.2 and Figure 9.1. For the emission of CH_4, it is characteristic of the disintegration model that the time-series fluctuations for the amount of waste deposited are not nearly as visible in the emission.

The recovery of CH_4 at landfill sites is deducted from the CH_4 emission calculated; see Table 8.2. Official energy statistics (Energistatistikken) are used for this purpose for the historic data. With regard to the projection of the amount of landfill gas recovered, the Danish Energy Agency's general projections only contain projection of biogas production, which in this connection is not viewed to be of use. In work carried out for DEPA (Miljøstyrelsen, 2005b), the firm LFG-Consult (H. C. Willumsen) has reviewed Danish landfill sites and, in this connection, sce-

narios for methane recovery have been prepared for the years 2005-2009. In the projections in hand, Table 9.2, a scenario (Miljøstyrelsen, 2005b) has been used without optimisation of landfill sites. For the period 2010-2030, an exponential extrapolation has been carried out; see Figure 9.2.

The overall projection is shown in Table 9.3.

Model runs, which are not included here, are believed to show that the projection of the emission of the total amount of waste is of most significance for emission projections, and the distribution across the various waste fractions landfilled is of less importance. Closer documentation here would demand that, with data from the projections with the model FRIDA (DEPA, 2006b), landfilled waste amounts are projected, corresponding to ISAG waste fractions

Table 9.2 Amount of waste deposited at landfill and CH4 emissions. Historic data: 1993-2006. Projections: 2007-2025.

Year	Quantities of waste (1 000 tonnes)									Emissions (1000 tons CH_4)			
	House hold	Large items	Garden	Commer-cial	Industry	Construc-tion	Sewage sludge	Slags	Total	Potential	Actual gross	Biogas recover	Net
1990	199	251	85	109	822	951	222	535	3175	94.7	71.1	0.5	63.6
1991	199	259	71	120	824	804	193	562	3032	93.0	72.6	0.7	64.7
1992	198	267	56	131	826	657	165	589	2890	91.3	73.9	1.4	65.2
1993	198	276	42	141	828	510	136	616	2747	89.7	74.9	1.7	65.9
1994	198	284	27	152	830	363	107	643	2604	88.0	75.8	4.6	64.1
1995	190	286	17	128	779	321	101	135	1957	83.0	76.3	7.4	62.0
1996	132	275	6	135	822	317	117	703	2507	79.3	76.5	8.2	61.5
1997	83	248	6	170	707	264	130	475	2083	73.3	76.3	11.1	58.6
1998	98	234	20	161	746	266	124	210	1859	73.6	76.1	13.2	56.6
1999	117	239	3	164	582	224	126	12	1467	70.6	75.7	11.5	57.8
2000	85	264	7	152	611	269	94	0	1482	69.5	75.3	11.0	57.9
2001	50	180	3	150	583	260	64	10	1300	55.4	74.0	10.0	57.6
2002	37	161	4	137	520	229	48	38	1174	48.8	72.3	11.2	55.0
2003	24	143	4	131	379	170	55	60	966	41.8	70.2	7.9	56.1
2004	11	132	5	140	452	172	42	46	1000	41.7	68.3	11.0	51.6
2005	12	165	5	152	352	208	35	28	957	43.8	66.7	11.5	49.7
2006	13	156	6	152	375	204	39	31	976	43.7	65.2	10.8	49.0
2007	15	180	7	176	433	236	45	36	1127	50.5	64.2	6.5	51.9
2008	17	204	8	199	491	267	51	41	1278	57.2	63.7	6.0	51.9
2009	17	206	8	201	495	269	51	41	1288	57.6	63.3	5.7	51.9
2010	17	205	8	199	492	267	51	41	1280	57.3	62.9	5.3	51.8
2011	17	208	8	202	499	271	52	41	1299	58.1	62.6	5.0	51.8
2012	17	209	8	204	503	273	52	42	1308	58.6	62.3	4.7	51.8
2013	18	212	8	206	509	277	53	42	1325	59.3	62.1	4.5	51.9
2014	18	213	8	207	511	278	53	42	1330	59.5	61.9	4.3	51.9
2015	18	215	8	210	517	281	54	43	1346	60.3	61.8	4.1	52.0
2016	18	215	8	210	518	282	54	43	1348	60.3	61.7	3.9	52.0
2017	18	216	8	211	520	283	54	43	1354	60.6	61.6	3.8	52.1
2018	18	218	8	212	523	285	54	43	1362	61.0	61.6	3.6	52.2
2019	18	218	8	213	524	285	55	43	1365	61.1	61.6	3.5	52.2
2020	18	220	8	215	529	288	55	44	1377	61.7	61.6	3.4	52.4
2021	18	220	8	215	529	288	55	44	1377	61.7	61.6	3.3	52.4
2022	18	220	8	215	529	288	55	44	1377	61.7	61.6	3.2	52.5
2023	18	220	8	215	529	288	55	44	1377	61.7	61.6	3.1	52.6
2024	18	220	8	215	529	288	55	44	1377	61.7	61.6	3.1	52.7
2025	18	220	8	215	529	288	55	44	1377	61.7	61.6	3.0	52.7

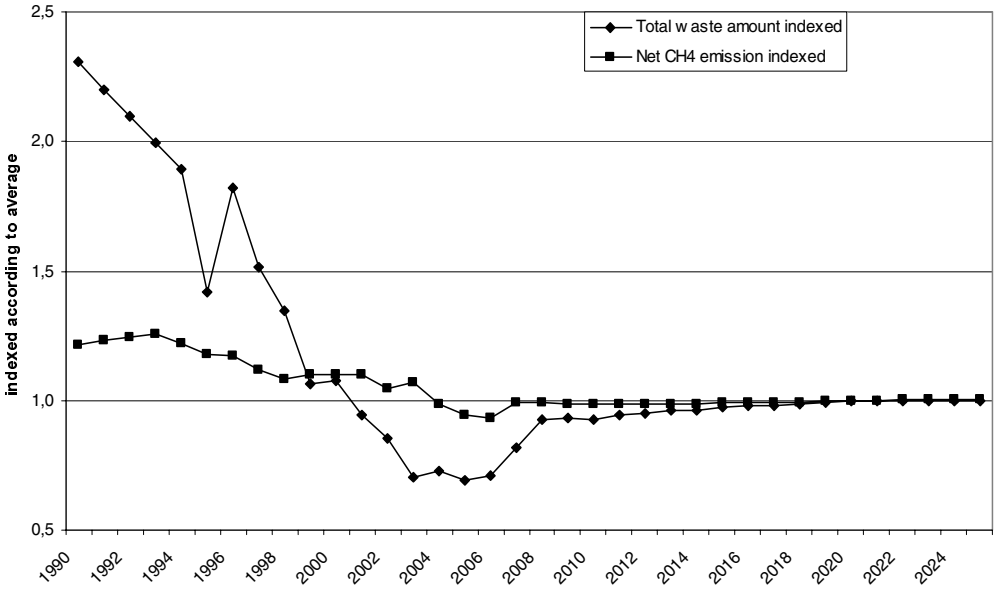

Figure 9.1 Development of waste deposited at landfill and CH_4 emissions. Historic data: 1993-2006. Projections: 2007-2025. Indexation is in relation to the time series average for the relevant parameter.

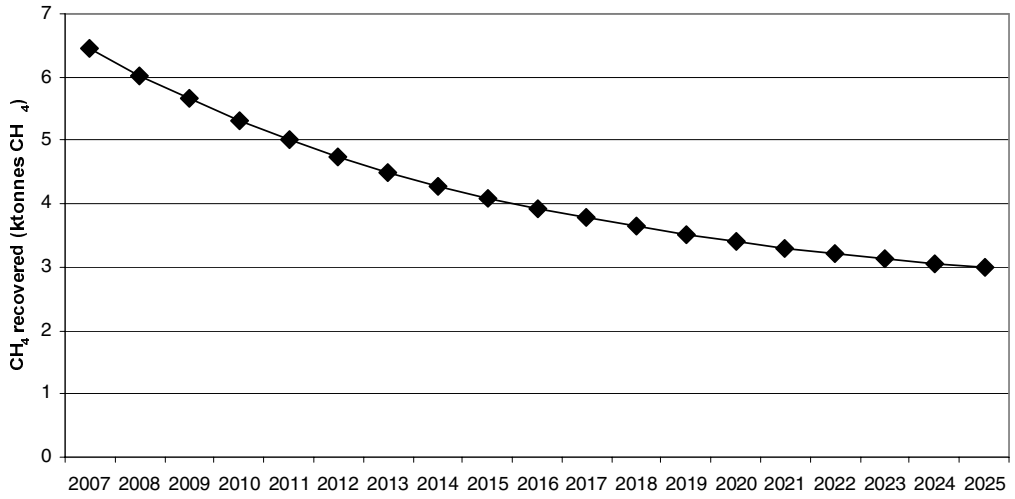

Figure 9.2 Projection of CH_4 recovery at landfill sites. For 2007-2009 data according to the Danish Environmental Protection Agency (DEPA 2005b). For 2009-2025: exponential extrapolation.

Table 9.3 Emission of CH_4 from landfill of waste in CO_2-equiv. (1 000 tonnes =Gg). Historic data: 1993-2006. Projections: 2007-2025.

CRF-sector	Year Note	1990	1995	2000	2005	2007	2010 (1)	2015 (2)	2020	2025
6. Solid waste disposal on Land										
1. Managed Waste Disposal on Land		1335.2	1301.2	1215.4	1042.8	1090.8	1088.7	1091.1	1099.4	1107.6

Note:
(1) 5-year average 2008-2012.
(2) 5-year average 2013-2017.

References

Danish Environmental Protection Agency, 1998: A Scenario Model for the Generation of Waste. Environmental Project no. 434. http://www.mst.dk/udgiv/Publications-/1998/87-7909-168-7/html-/default_eng.htm

Danish Environmental Protection Agency, 2004: Waste Statistics 2002. http://www2.mst.dk/Udgiv/publications/2004/87-7614-107-1/pdf/87-7972-109-8.pdf

Danish Environmental Protection Agency, 2005a: Waste Statistics 2003. http://www2.mst.dk/Udgiv/publications/2005/87-7614-585-9/pdf/87-7614-586-7.pdf

Danish Environmental Protection Agency, 2005b: Optimization of gas-recovery at solid waste deposition sites in Denmark (in Danish: "Optimering af gasindvinding på deponeringsanlæg i Danmark." Summary and conclusions in English). http://www.mst.dk/udgiv/Publikationer/2005/87-76-14-763-0/pdf/87-7614-764-9.PDF

Danish Environmental Protection Agency, 2006a: Waste Statistics 2004. http://www2.mst.dk/Udgiv/publications/2006/87-7614-962-5/pdf/87-7614-963-3.pdf

Danish Environmental Protection Agency, 2006b: A model for projection of Danish waste amount data (Isag)) (In Danish: "En Model til Fremskrivning af Isag Data FRIDA". Summary and conclusions in English). Arbejdsrapport 35. http://www2.mst.dk/udgiv/publikationer/2006/87-7052-239-1/pdf/87-7052-240-5.pdf

Danish Environmental Protection Agency, 2007: Waste Statistics 2005. http://www2.mst.dk/Udgiv/publications/2007/978-87-7052-581-7/pdf/978-87-7052-581-7.pdf

Danish Environmental Protection Agency, 2008: Waste Statistics 2006. To be published.

IPCC, 1996: Greenhouse Gas Inventory Reporting Instructions. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Vol 1,

2 and 3. The Intergovernmental Panel on Climate Change (IPCC), IPCC WGI Technical Support Unit, United Kingdom.
http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm

IPCC, 2000: IPCC Good Practice Guidance and Uncertainty Management in national Greenhouse Gas Inventories.
http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm

Nielsen, O.-K., Lyck, E., Mikkelsen, M.H., Hoffmann, L., Gyldenkærne, S., Winther, M., Nielsen, M., Fauser, P., Thomsen, M., Plejdrup, M.S., Illerup, J.B., Sørensen, P.B. & Vesterdal, L. 2008: Denmark's National Inventory Report 2008 - Emission Inventories 1990-2006 - Submitted under the United Nations Framework Convention on Climate Change. National Environmental Research Institute, University of Aarhus. 701 pp. – NERI Technical Report no. 667.
http://www.dmu.dk/Pub/FR667.pdf

The Danish Government, 2003: Waste Strategy 2005-2008 (In Danish: "Affaldsstrategi 2005-2008, Regeringen".

10 Wastewater treatment

Below, a short overview of the emissions inventories of methane and nitrous oxide from wastewater treatment 1990-2006 is provided and based on the latest National Inventory Report (Nielsen, O-K., et al., 2008), as well a projection to 2025.

In short, the emission calculations for methane are based on the theoretical maximum emission termed, here, 'gross methane emission'. This gross emission is based on the emission from the entire methane potential in the amount of biodegradable organic material in the discharges entering the sewage treatment plants. From this theoretical maximum emission, the methane potential which is used for biogas and other reuse or flared is deducted. The resulting net methane emission is an estimate of the real methane emission from treatment processes at wastewater treatment plants. Central parameters are the industrial contribution to the wastewater entering wastewater treatment plants as well as the fraction of sewage sludge which is treated anaerobically. For a detailed review of calculation methodologies, refer to the report Thomsen, M and Lyck, E (2005).

Emission calculations for nitrous oxide are divided into the contribution from the treatment processes at the wastewater treatment plants, termed the direct emission, and a contribution from the discharges from the wastewater treatment plants, termed the indirect N_2O emission.

Table 10.1 Gross, retained (re-used or flared) methane potentials and net emission of methane from 1990 to 2030 in Gg.

	Estimated values					
Year	$CH_{4,\ external\ combustion}$	$CH_{4,\ internal\ combustion}$	$CH_{4,\ reuse}$	$CH_{4,\ biogas}$	$CH_{4,\ gross}$	$CH_{4,\ net}$
1987	2.34	4.91	1.15	0.17		
1990	2.39	4.67	1.20	0.24	14.49	5.98
1991	2.41	4.60	1.34	0.27	14.46	5.84
1992	2.43	4.52	1.49	0.30	14.51	5.78
1993	2.44	4.44	1.63	0.32	14.91	6.07
1994	2.46	4.36	1.78	0.35	16.20	7.24
1995	2.47	4.29	1.92	0.38	17.49	8.43
1996	2.49	4.21	2.07	0.40	18.79	9.62
1997	2.19	4.42	1.23	0.46	20.10	11.81
1998	2.52	4.05	2.36	0.45	21.42	12.03
1999	2.25	4.29	2.67	0.55	21.04	11.28
2000	3.64	3.12	3.61	0.51	21.22	10.34
2001	2.74	4.28	3.19	0.43	21.65	11.02
2002	1.91	3.47	2.87	0.41	23.43	14.78
2003	2.07	4.13	3.08	0.44	24.03	14.30
2004	2.07	4.13	3.23	0.44	22.96	13.08
2005	2.07	4.13	3.37	0.44	22.47	12.45
2006	2.07	4.13	3.52	0.44	21.99	11.82
2007	2.07	4.13	3.66	0.44	22.51	12.20
2008	2.07	4.13	3.81	0.44	22.54	12.08
2009	2.07	4.13	3.95	0.44	22.57	11.97
2010	2.07	4.13	4.10	0.44	22.60	11.86
2011	2.07	4.13	4.24	0.44	22.63	11.74
2012	2.07	4.13	4.39	0.44	22.66	11.63
2013	2.07	4.13	4.53	0.44	22.69	11.51
2014	2.07	4.13	4.68	0.44	22.73	11.40
2015	2.07	4.13	4.82	0.44	22.76	11.29
2016	2.07	4.13	4.97	0.44	22.79	11.17
2017	2.07	4.13	5.11	0.44	22.82	11.06
2018	2.07	4.13	5.26	0.44	22.85	10.95
2019	2.07	4.13	5.40	0.44	22.88	10.83
2020	2.07	4.13	5.55	0.44	22.91	10.72
2021	2.07	4.13	5.69	0.44	22.95	10.61
2022	2.07	4.13	5.84	0.44	22.98	10.49
2023	2.07	4.13	5.98	0.44	23.01	10.38
2024	2.07	4.13	6.13	0.44	23.04	10.27
2025	2.07	4.13	6.27	0.44	23.07	10.15

Based on interpolation between reported data, the methane potential converted via external combustion is assessed to be constant, while for internal combustion it is assessed to decline slightly over the period 1987-2002. The rationale for a constant emission level from combustion from 2003 and forward is that the total level aligns with the government's target for 2008. The total amount of sewage sludge incinerated have reached a level corresponding to the government's target for 2008 (The Danish Government, 2003) and the projections assume that the total amount of sewage sludge which is incinerated remains constant at present levels. The rise in retained methane potential is expected to be due to increased reuse of sludge in industrial processes (see the government waste strategy, The Danish Government, 2003, Thomsen and Lyck, 2005).

The emission calculations are based on data from private and municipal wastewater treatment plants included in the national reports from the Danish Environmental Protection Agency (Thomsen and Lyck, 2005). The contribution to methane emission from wastewater treatment within separate industries is not included in the calculations.

The trend from 1990 to 2006, as well as the regression equations used in the projection to 2030, is shown in Figure 10.1.

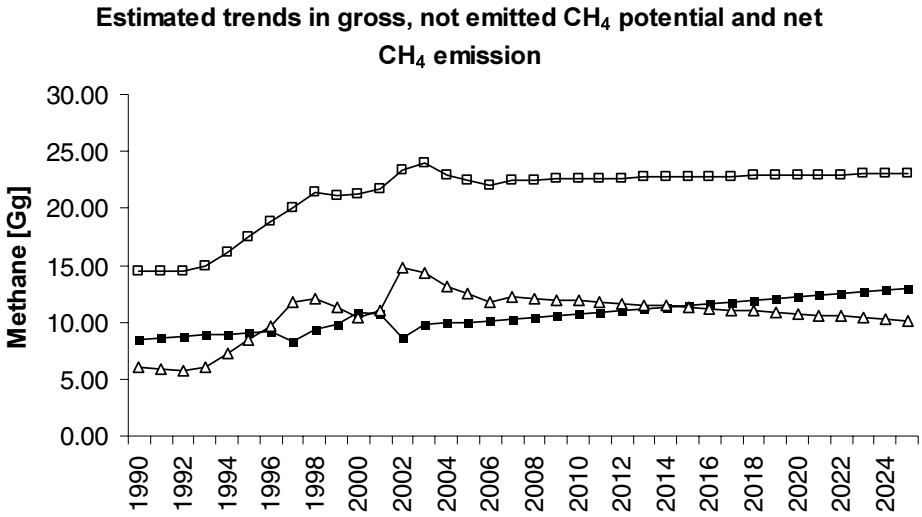

Figure 10.1 Estimated trends in gross, retained (i.e. recycled or flared) CH_4 potential, and the resulting net CH_4 emission. For use in the projection of the gross emission of methane, the period from 1999 has been used, from which point the contribution of industry to the amount of total organic material at the local authority treatment works is constant and the rise in the gross emission is caused by a real increase in the total amount of organic material in the wastewater entering the works. The curved sequence represented by open squares and white triangles represent the gross and net emission of methane, respectively. The curved sequence represented by black filled squares represents the total amount retained (recycled or flared) methane potential.

The emission of N_2O from wastewater treatment plants is divided into a direct emission, from biological treatment processes at the plants, and an indirect emission, from the nitrogen which exits the plants with the discharge of effluent wastewater. The total emission of nitrous oxide is the sum of these two contributions.

Table 10.2 Estimated direct, indirect and total emissions of N_2O in tonnes.

Year	$E_{N2O,WWTP,direct\ (Danish\ EF)}$	E_{N2O}, effluent in total Tonne	E_{N2O}, total [T]
1990	17.35	265.32	282.67
1991	17.39	251.93	269.32
1992	17.44	219.26	236.70
1993	19.70	273.48	293.18
1994	29.02	268.38	297.41
1995	36.57	238.10	274.67
1996	44.30	179.63	223.93
1997	52.03	158.21	210.24
1998	58.78	153.94	212.72
1999	52.68	147.13	199.81
2000	53.74	157.22	210.97
2001	50.31	134.40	184.71
2002	50.49	137.34	187.83
2003	51.69	108.85	160.55
2004	52.36	119.26	171.62
2005	52.50	110.51	163.00
2006	52.65	108.51	161.17
2007	52.84	111.78	164.63
2008	53.12	111.78	164.90
2009	53.18	111.78	164.96
2010	53.32	111.78	165.11
2011	53.46	111.78	165.24
2012	53.59	111.78	165.37
2013	53.71	111.78	165.49
2014	53.83	111.78	165.61
2015	53.94	111.78	165.72
2016	54.05	111.78	165.83
2017	54.16	111.78	165.94
2018	54.26	111.78	166.05
2019	54.37	111.78	166.16
2020	54.48	111.78	166.27
2021	54.60	111.78	166.38
2022	54.71	111.78	166.49
2023	54.82	111.78	166.60
2024	54.93	111.78	166.71
2025	55.03	111.78	166.82

Calculation of the direct emission and projections are based on population size as well as on a calculation methodology for emissions factors, which is corrected for industry's contribution to the N in the wastewater entering the sewage treatment works. Generally, the percent industrial contribution is assumed to be constant from 1999 and thereafter. The emission contribution from industry is set at 41.9 % (the average of the contribution in the years 1999-2002) for both projections. Nitrous oxide production takes place under anaerobic as well as aerobic conditions (nitrification and denitrification), but its generation is most pronounced under aerobic conditions. The nitrous oxide emission is expected to remain at a constant level due to the fully optimised cleaning of wastewater effluent which has occurred in connection with the plans for the aquatic environment. The estimated trend in indirect and direct nitrous oxide emission from 1990 to 2025 is illustrated graphically in Figure 10.2 and 10.3.

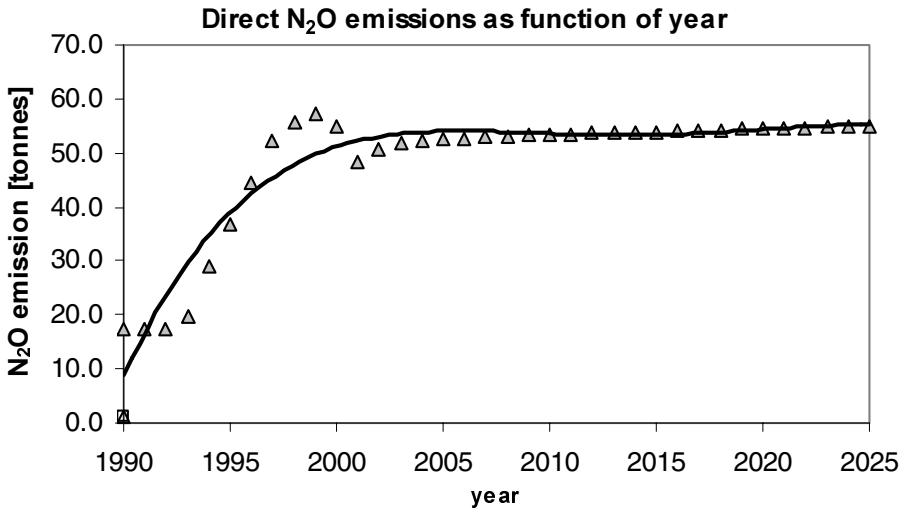

Figure 10.2 Trend for direct nitrous oxide emissions from wastewater treatment processes at sewage treatment works. The observed maximum in 1998 cannot be regarded as actual, but a visualisation unexplained random fluctuations of the measured data. Furthermore, it expresses the relatively large uncertainty in the average national data for the content of nitrogen in wastewater entering sewage treatment works.

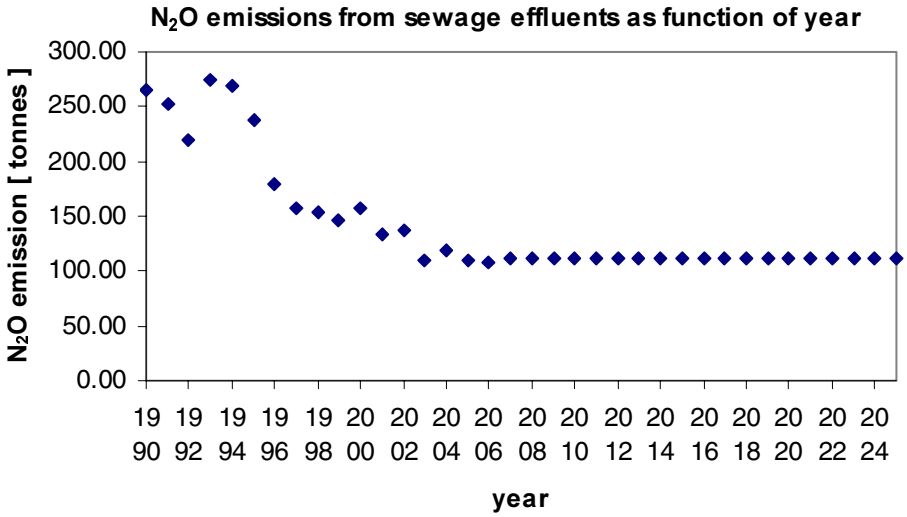

Figure 10.3 Trend for indirect nitrous oxide emissions. The declining trend is due to the results of technological development and the improvement in the treatment processes at sewage works in the form of an increased reduction of P, N and BOD in biological and chemical treatment processes for discharge. The reduction in the discharge of nitrogen is not expected to fall further.

Total N_2O and net CH_4 emission figures converted to CO_2 equivalents are given in Table 9.3.

Table 10.3 N_2O and CH_4 emissions in CO_2 equivalents and the unit Gg. Inventories: 1990-2006. Projections: 2007-2025.

	Emissions in CO_2-equiv. (Gg)	
Year	N_20	CH_4
1990	87.63	125.62
1991	83.49	122.60
1992	73.38	121.29
1993	90.88	127.49
1994	92.20	152.13
1995	85.15	176.97
1996	69.42	202.01
1997	65.17	248.11
1998	65.94	252.60
1999	61.94	236.86
2000	65.40	217.19
2001	57.26	231.45
2002	58.23	310.29
2003	49.77	300.36
2004	53.20	274.77
2005	50.53	261.54
2006	49.96	248.31
2007	51.03	256.11
2008	51.12	253.73
2009	51.14	251.34
2010	51.18	248.96
2011	51.23	246.57
2012	51.27	244.19
2013	51.30	241.81
2014	51.34	239.42
2015	51.37	237.04
2016	51.41	234.65
2017	51.44	232.27
2018	51.47	229.88
2019	51.51	227.50
2020	51.54	225.11
2021	51.58	222.73
2022	51.61	220.34
2023	51.65	217.96
2024	51.68	215.58
2025	51.71	213.19

Table 10.4 Sum of the emission of CH_4 and N_2O from wastewater treatment in CO_2 equivalents (1 000 tonnes =Gg).

CRF-sector	Year	1990	1995	2000	2005	2007	2010	2015	2020	2025
	Note						(1)	(2)		
6. B Waste Water Handling		213.2	262.1	282.6	312.1	307.1	300.1	288.4	276.7	264.9

Note:

(1) 5-year average 2008-2013.

(2) 5-year average 2013-2018.

References

Thomsen, M. & Lyck, E. 2005: Emission of CH4 and N2O from Waste-water Treatment plants (6B). Department of Policy Analysis. National Environmental Research Institute DK-4000 Roskilde.
http://www2.dmu.dk/1_viden/2_Publikationer/3_arbrapporter/rapporter/AR208.pdf

Nielsen, O.-K., Lyck, E., Mikkelsen, M.H., Hoffmann, L., Gyldenkærne, S., Winther, M., Nielsen, M., Fauser, P., Thomsen, M., Plejdrup, M.S., Illerup, J.B., Sørensen, P.B. & Vesterdal, L. 2008: Denmark's National Inventory Report 2008 - Emission Inventories 1990-2006 - Submitted under the United Nations Framework Convention on Climate Change. National Environmental Research Institute, University of Aarhus. 701 pp. – NERI Technical Report no. 667.
http://www.dmu.dk/Pub/FR667.pdf

The Danish Government, 2003: Waste Strategy 2005-2008 (In Danish: "Affaldsstrategi 2005-2008, Regeringen".

11 Conclusions

The historic and projected greenhouse gas (GHG) emissions are shown in Tables 11.1 – 11.9 and illustrated in Figure 11.1. Projected GHG emissions include the estimated effects of policies and measures implemented until April 2008, and the projection of total GHG emissions is therefore a so-called 'with measures' projection.

The main sectors in the years 2008-2012 ('2010') are expected to be Energy Industries (39 %), Transport (25 %), Agriculture (14 %), and Other Sectors (8 %). For the latter sector the most important sources are fuel use in the residential sector and the agricultural sector. GHG emissions show a decreasing trend in the projection period from 2007 to 2020 followed by a small emission increase in 2025. In general, the emission share for the Energy Industries sector can be seen to be decreasing while the emission share for the Transport sector is increasing. The total emissions in '2010' are estimated to be 66,475 ktonnes CO_2 equivalents and 62,204 ktonnes in 2025, corresponding to a decrease of about 6 %. From 1990 to '2010' the emissions are estimated to decrease by about 4 %. The commitment to a reduction of 21 % or a maximum emission of about 55 million tonnes in '2010' under the Kyoto Protocol can be obtained either by national reductions, use of the flexible mechanisms under the Kyoto Protocol or by including CO_2 uptake in forestry and soil.

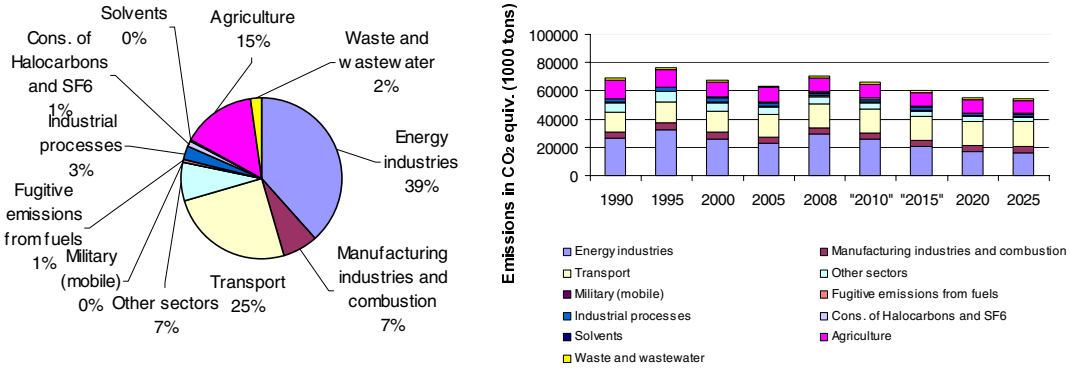

Figure 11.1 Total GHG emissions in CO_2 equivalents. Distribution according to main sectors ('2010') and time-series for 1990 to 2025.

11.1 Stationary combustion

The GHG emissions in '2010' from the main source, which is public power (59 %), are estimated to decrease significantly in the period from 2008 to 2025 due to partial shift in fuel type from coal to wood and municipal waste. Also, for residential combustion plants a significant decrease in emissions is seen; the emissions almost halve from 1990 to 2025. The emissions from the other sectors remain almost constant over the period except for energy use in offshore industry (oil and gas extraction), where the emissions are projected to increase by more than 250 % from 1990 to '2010' and by almost 30 % from '2010' to 2025.

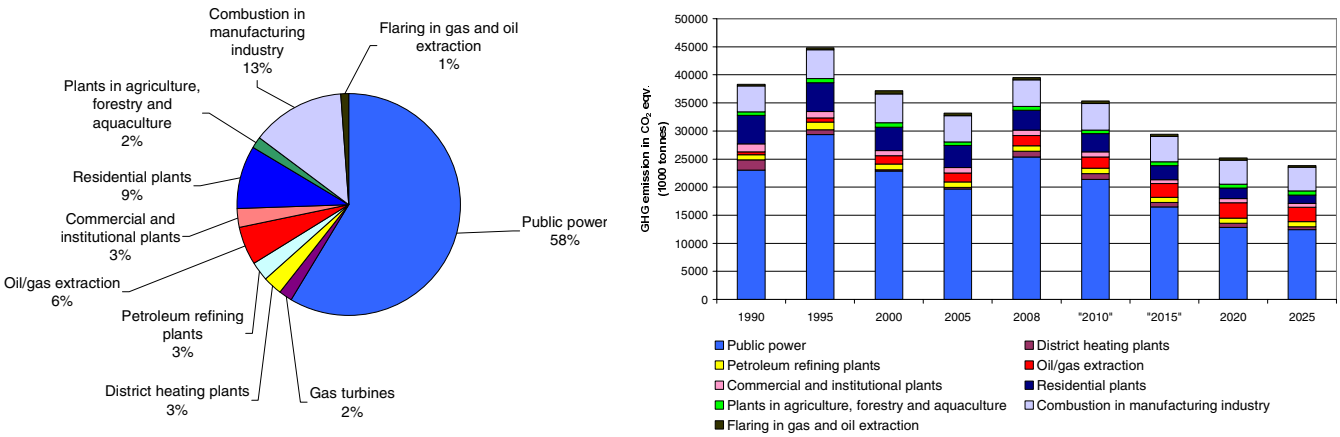

Figure 11.2 GHG emissions in CO_2 equivalents for stationary combustion. Distribution according to sources ('2010') and time-series for 1990 to 2025 for main sources.

11.2 Industrial processes

The GHG emission from industrial processes increased during the nineties, reaching a maximum in 2000. Closure of the nitric acid/fertiliser plant in 2004 has resulted in a considerable decrease in the GHG emission and stabilisation at a level about 1,700 ktonnes CO_2 equivalents. The most significant source is cement production, which contributes with more than 85 % of the process-related GHG emission. Most of the pro-cesses are assumed to be constant at the same level as in 2004. Consumption of limestone and the emission of CO_2 from flue gas cleaning are assumed to follow the consumption of coal and MSW for generation of heat and power. The GHG emission from this sector will continue to be strongly dependant on cement production.

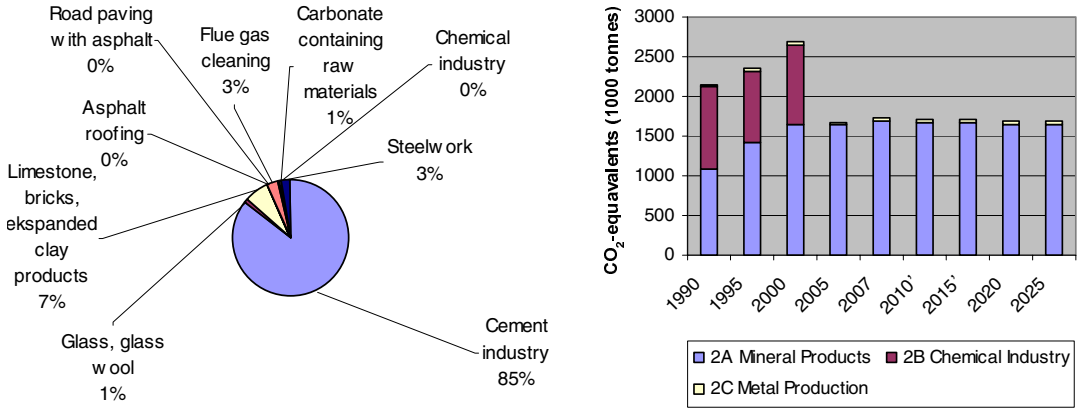

Figure 11.3 Total GHG emissions in CO_2 equivalents for industrial processes. Distribution according to main sectors ('2010') and time-series for 1990 to 2025.

11.3 Solvents

In 2006 solvent and other product use account for 0.3 % of the total CO_2 emissions. Emission projections from 2006 to 2010 are based on linear projections of 1995 – 2006 historical data and projections of four industrial sectors, namely "Auto paint and repair", "Plastic industry", "Graphic industry" and "Lacquer and paint industry", comprising approximately 28 % of the total CO_2 emission from solvent use in 2006. Constant emissions are assumed from 2010 to 2030. An emission reduction of 12 % is expected between 2006 and 2007 and 22 % between 2006 and 2010 (and 2030). This decrease is mainly due to the general historical trend from 1995 – 2006 influencing a wide range of solvents used in

households and industrial activities. Households, construction, plastic industry, industrial mass produced products and auto paint and repair and are the largest sources to the Danish VOC emissions from solvent use.

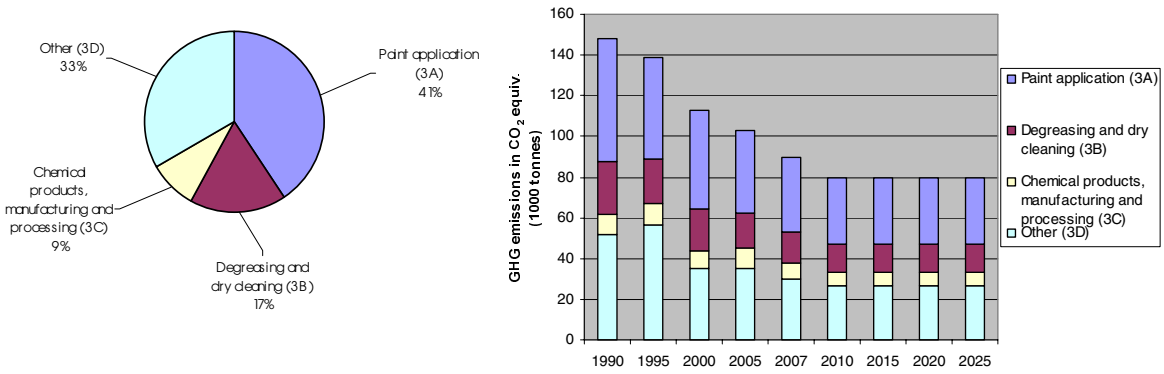

Figure 11.4 Total GHG emissions in CO_2 equivalents for solvent use. Distribution according to main sectors ('2010') and time-series for 1990 to 2025.

11.4 Transport

Road transport is the main source of GHG emissions in '2010' and emissions from this sector are expected to increase by 64 % from 1990 to 2030 due to growth in traffic. The emission shares for the remaining mobile sources are small compared with road transport, and from 1990 to 2030 the total share for these categories reduces from 31 to 21 %. For agriculture/forestry/fisheries, the emissions reduce by 7 % from 1990 to 2030. For this sector, the emissions reduce from 1990 to 2006, due to smaller numbers of agricultural tractors and harvesters though with larger engines. From 2007 onwards the emissions remain more or less constant. For industry (1A2f), the emissions increase by 21 % from 1990-2030; for this sector there is a significant emission growth from 1990-2006 (due to increased activity), followed by a slight emission reduction from 2007-2030 due to machinery gradually becoming more fuel efficient. The latter explanation is also the reason for the small emission declines for the activities residential (gardening) (1A4b) and navigation (1A3d) during the forecast period.

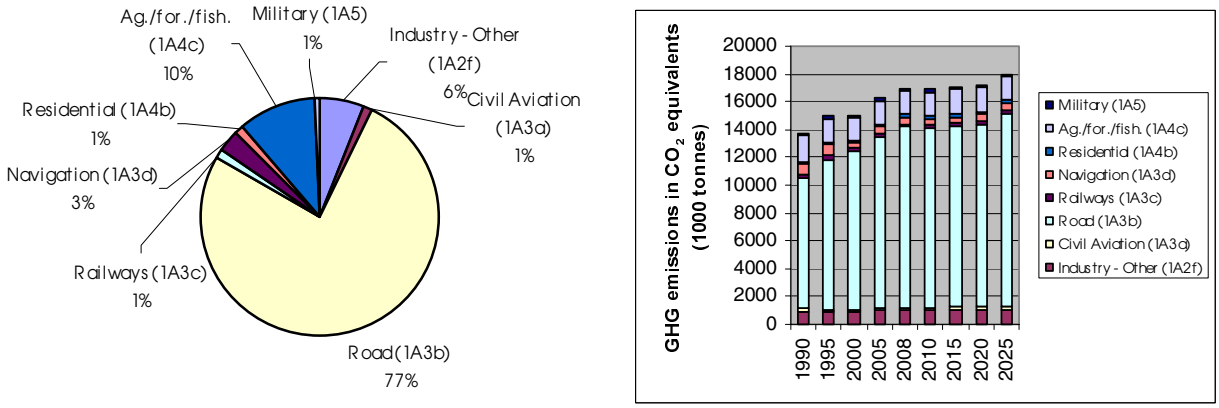

Figure 11.5 GHG emissions in CO_2 equivalents for mobile sources. Distribution according to sources ('2010') and time-series for 1990 to 2025 for main sources.

11.5 Fluorinated gases

Danish regulation concerning the powerful F-gas greenhouse gases includes phasing out of some F-gases and taxation on others. Although the use of SF_6 in double-glazing window panes was in banned in 2002, throughout the period there will still be emission of SF_6 in connection with the disposal of the panes. HFCs are dominant F-gases , and in '2010' are expected to contribute with 94% of the F-gas emission, Figure 10.5.

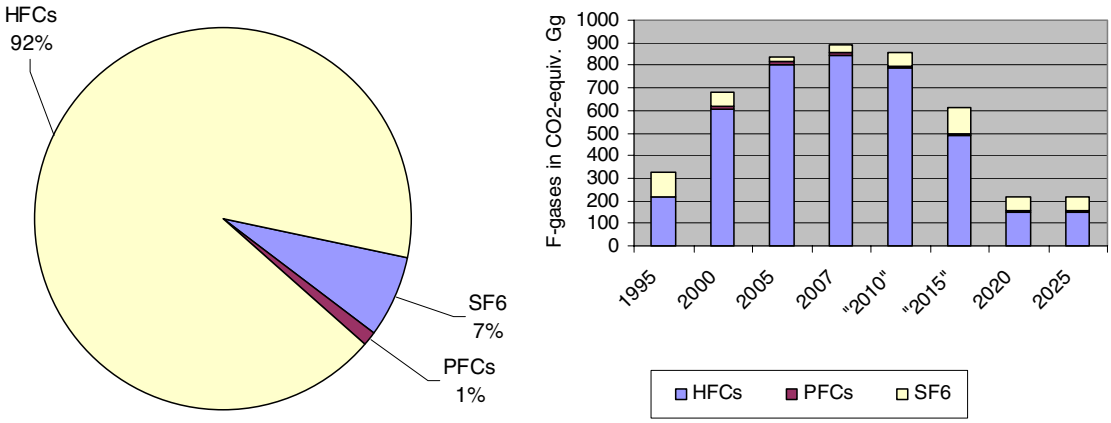

Figure 11.6 GHG emissions in CO_2 equivalents for F-gases. Distribution according to F-gas type ('2010') and time-series for 1990 to 2025 for F-gas type

11.6 Agriculture

From 1990 to 2006, the emission of greenhouse gases in the agricultural sector has declined from 13,044 ktonnes CO_2 equivalents to 9,605 ktonnes CO_2 equivalents, which corresponds to a 26 % reduction. This development continues, and the emission to 2025 is expected to fall further to 9,631 ktonnes CO_2 equivalents. The reduction both in the historical data and the projection can mainly be explained by improved utilisation of nitrogen in manure and a significant fall in the use of fertiliser and a lower emission from N-leaching. These are consequences of an active environmental policy in this area. Measures in the form of technologies to reduce ammonia emissions in the stable and expansion of biogas production are taken into account in the projections but do not contribute to significant changes in the total greenhouse gas emission.

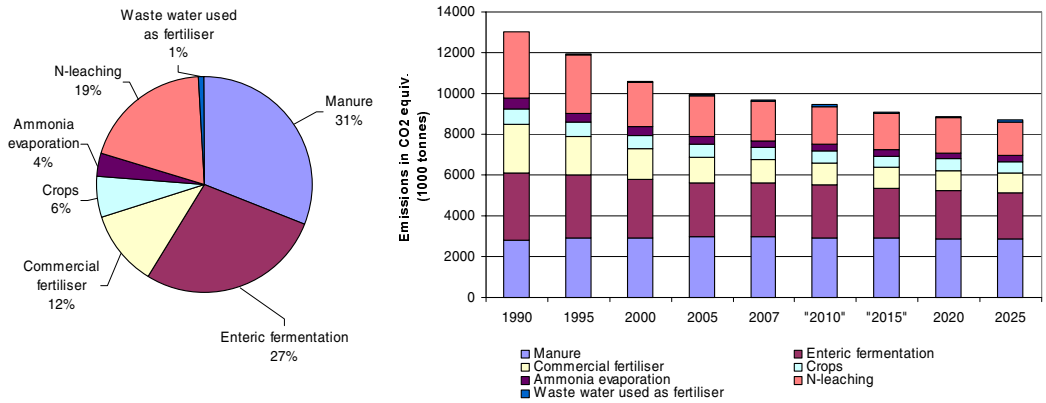

Figure 11.7 GHG emissions in CO_2 equivalents for agriculture sources. Distribution according to sources ('2010') and time-series for 1990 to 2025 of main sources.

11.7 Waste (Landfill sites and wastewater treatment)

The target in the government's 2003 'Waste Strategy 2005-2008' ('Affaldsstrategi 2005-2008') of 9 % of waste produced to be deposited at landfill sites in 2008 has been used in combination with the Risø FRIDA model for amounts of waste coupled with economic growth. The waste strategy target has already been reached (8 % in 2004). A slight increase in the amount of waste deposited is now foreseen due to an increase in the amount of waste produced predicted by FRIDA. In the historical data, the amount of waste deposited at landfill decreased; so, after some years with decreasing CH_4 emissions, a slight increase or an almost constant emission level is now foreseen. However, there exists a time-lag between reductions in the amount of waste deposited at landfill and the associated CH_4 emission due to the duration of the biochemical processes involved, which is predicted by the decay model used for the emission estimates. The prediction of the contribution of CH_4 from landfill to the sector total in '2010' is 78 %, Figure 10.7.

The predicted emission of CH_4 from wastewater is 18 %. The estimated increase in the total amount of organic material in the influent wastewater is assumed to be a function of an increase in the population size alone, while the contribution from industry is assumed to stay at a constant level. With these assumptions the yearly increase in the gross methane emission is less than the methane potential not emitted due to an estimated still increasing amount of sludge entering reuse processes. This results in a slight decrease in the net CH_4 emissions of approximately 0.1 Gg pr yr.

The emission of N_2O from wastewater is predicted to contribute to the total GHG emission for the sector with 4 %. Due to the action plans for the aquatic environment, the N_2O emission is predicted to remain at an almost constant level.

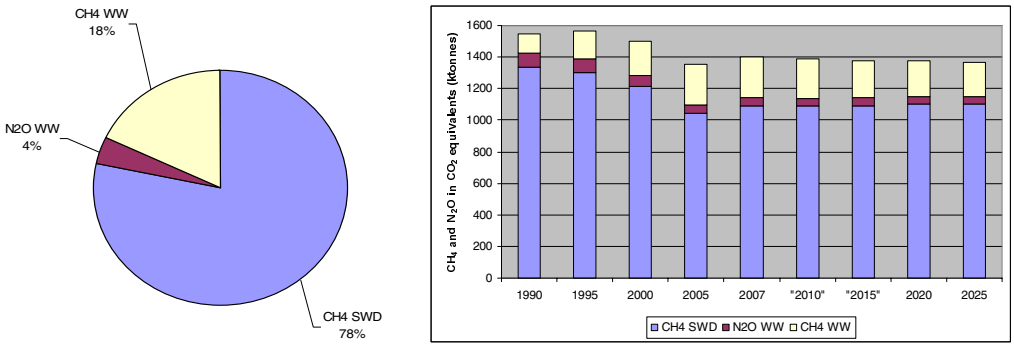

Figure 11.8 GHG emissions in CO_2 equivalents for Waste. Distribution according to source Wastewater (WW) and Solid Waste Disposal (SWD) and gas ('2010') and the time-series for 1990 to 2025.

Table 11.1 Historic and projected greenhouse gas (GHG) emissions in ktonnes CO_2 equivalents.

	Sector	1990	1995	2000	2005	2008	"2010"	"2015"	2020	2025
1A1a	Public power	23009	29351	22834	19680	24715	20698	15730	12161	11602
1A1a	Gas turbines	0	0	0	0	645	685	763	680	804
1A1a	District heating plants	1852	854	285	311	1030	1046	784	725	529
1A1b	Petroleum refining plants	908	1387	999	942	949	949	949	949	949
1A1c	Coal mining, oil / gas extraction, pipeline c	546	744	1467	1623	1829	1993	2420	2738	2559
1A2	Combustion in manufacturing industry	4640	5105	5209	4727	4744	4720	4461	4234	4217
1A2f	Industry - Other (mobile)	853	860	892	963	1037	1042	1051	1040	1039
1A3a	Civil Aviation	246	202	157	136	163	164	172	185	196
1A3b	Road	9427	10763	11379	12384	12993	12896	13015	13148	13928
1A3c	Railways	300	306	230	234	228	230	237	249	267
1A3d	Navigation	728	781	475	471	462	460	458	458	458
1A4a	Commercial and institutional plants (t)	1419	1139	941	940	972	914	713	682	678
1A4b	Residential plants	5066	5132	4149	3918	3576	3242	2490	1907	1502
1A4b	Residential (mobile)	116	121	133	226	237	234	231	230	230
1A4c	Plants in agriculture, forestry and aquaculture	620	730	780	651	645	667	689	699	712
1A4c	Ag./for./fish. (mobile)	1929	1755	1652	1612	1699	1695	1704	1713	1730
1A5	Military (mobile)	120	254	112	274	155	155	155	155	155
1B2a	Fugitive emissions from oil	32	48	73	93	66	45	36	38	36
1B2b	Fugitive emissions from gas	6	12	5	5	5	5	5	4	3
1B2c	Fugitive emissions from flaring	267	367	598	439	423	440	441	426	300
2A	Mineral Products	1073	1407	1641	1641	1673	1664	1656	1649	1650
2B	Chemical Industry	1044	905	1004	3	2	2	2	2	2
2C	Metal Production	28	39	41	16	45	45	45	45	45
2F	Consumption of Halocarbons and SF6	44	326	682	841	895	855	610	217	217
3	Solvents (2004)	148	139	113	117	124	119	117	117	117
4A	Enteric Fermentation	3259	3116	2862	2661	2667	2700	2600	2462	2498
4B	Manure Management	1436	1513	1556	1583	1612	1640	1712	1785	1740
4D	Agricultural Soils	8349	7309	6190	5709	5587	5538	5335	5115	5122
6A1	Managed Waste Disposal on Land	1335	1301	1215	1043	1090	1089	1091	1099	1108
6B	Wastewater Handling	213	262	283	312	305	300	288	277	265
	Total without LULUCF	69013	76227	67953	63554	70574	66231	59961	55189	54660
1A3a	Civil Aviation, international	1755	1888	2376	2604	2640	2634	2772	3016	3218
1A3d	Navigation, international	3149	5162	4365	2689	3512	3512	3512	3512	3512

Table 11.2 Historic and projected CO_2 emissions in ktonnes CO_2.

CO_2 emissions and projections (Gg)		KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Denmark's total emissions excluding net emissions from LULUCF		**52712**	**52712**	**60523**	**53068**	**50306**	**57316**	**53410**	**51963**	**52640**	**49671**	**53000**	**47822**	**43213**	**42704**
1. Energy		**51474**	**51462**	**58938**	**51273**	**48543**	**55509**	**51617**	**50173**	**50850**	**47889**	**51207**	**46039**	**41437**	**40927**
A. Fuel Combustion (Sectoral Approach)		**51211**	**51198**	**58576**	**50680**	**48109**	**55089**	**51172**	**49730**	**50411**	**47450**	**50770**	**45600**	**41014**	**40629**
1. Energy Industries		**26173**	**26173**	**31934**	**25114**	**22136**	**28775**	**24785**	**24107**	**24948**	**22131**	**24949**	**20790**	**16885**	**16095**
a Public Electricity and Heat Production		24736	24736	29828	22677	19603	26031	21997	21218	21947	19023	22043	17496	13243	12630
b Petroleum Refining		897	897	1371	988	932	938	938	938	938	938	938	938	938	938
c Manufacture of Solid Fuels and Other Energy Industries		540	540	735	1449	1602	1807	1851	1951	2063	2170	1968	2356	2704	2528
2. Manufacturing Industries and Construction		**5423**	**5424**	**5891**	**6008**	**5607**	**5691**	**5693**	**5688**	**5655**	**5629**	**5671**	**5421**	**5191**	**5174**
3. Transport		**10336**	**10528**	**11852**	**12050**	**13056**	**13676**	**13914**	**13362**	**13445**	**13529**	**13585**	**13752**	**13895**	**14700**
a Civil Aviation		243	243	199	154	133	160	161	161	161	162	161	169	181	192
b Road Transport		9241	9275	10585	11202	12229	12837	13074	12521	12604	12686	12745	12899	13017	13794
c Railways		297	297	303	228	232	226	227	228	229	229	228	234	247	265
d Navigation		555	713	765	466	462	453	452	452	451	450	452	449	449	449
4. Other Sectors		**9159**	**8954**	**8646**	**7398**	**7039**	**6794**	**6626**	**6421**	**6209**	**6009**	**6412**	**5485**	**4889**	**4507**
a Commercial and Institutional		1403	1403	1116	913	913	940	933	901	840	799	883	677	654	651
b Residential		5084	5059	5106	4132	3933	3585	3414	3237	3076	2902	3243	2494	1901	1492
c Agriculture/Forestry/Fisheries		2673	2493	2424	2352	2192	2269	2279	2282	2293	2309	2286	2315	2334	2365
5. Other	(1)	**119**	**119**	**252**	**111**	**271**	**153**	**153**	**153**	**153**	**153**	**153**	**153**	**153**	**153**
B. Fugitive Emissions from Fuels		**263**	**263**	**363**	**593**	**435**	**421**	**445**	**443**	**439**	**438**	**437**	**438**	**424**	**298**
1. Solid Fuels		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas		**263**	**263**	**363**	**593**	**435**	**421**	**445**	**443**	**439**	**438**	**437**	**438**	**424**	**298**
a Oil		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
b Natural Gas		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
c Flaring		263	263	363	593	435	421	445	443	439	438	437	438	424	298
2. Industrial Processes		**1101**	**1102**	**1446**	**1682**	**1659**	**1720**	**1710**	**1710**	**1711**	**1703**	**1711**	**1704**	**1696**	**1698**
A. Mineral Products		**1072**	**1073**	**1407**	**1641**	**1641**	**1673**	**1663**	**1663**	**1664**	**1656**	**1664**	**1657**	**1649**	**1650**
1 Cement Production		882	882	1204	1406	1456									
2 Lime Production		152	116	88	77	63									
3 Limestone and Dolomite Use		18	18	55	94	61									
4 Soda Ash Production and Use	NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO									
5 Asphalt Roofing	(<0,5)	0	0	0	0	0									
6 Road Paving with Asphalt		2	2	2	2	2									

7 Other	(2)	17	55	58	63	59									
B. Chemical Industry		**1**	**1**	**1**	**1**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
2 Nitric Acid Production															
5 Other	(3)	1	1	1	1	3	2	2	2	2	2	2	2	2	2
C. Metal Production		**28**	**28**	**39**	**41**	**16**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**
1 Iron and Steel Production		28	28	39	41	16	45	45	45	45	45	45	45	45	45
4 SF_6 Used in Aluminium and Magnesium Foundries															
D. Other Production		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Production of Halocarbons and SF_6															
F. Consumption of Halocarbons and SF_6															
1. Refrigeration and Air Conditioning Equipment															
2 Foam Blowing															
3 Fire Extinguishers															
4 Aerosol/Metered Dose Inhalers															
8 Electrical Equipment															
9 Other															
C_3F_8	(4)														
SF_6	(5)														
G. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
3. Solvent and Other Product Use		**137**	**148**	**139**	**113**	**103**	**86**	**83**	**79**	**79**	**79**	**82**	**79**	**79**	**79**
A Paint Application		24	61	50	48	41	35	34	32	32	32	33	32	32	32
B Degreasing and Dry Cleaning		46	25	21	21	17	15	14	14	14	14	14	14	14	14
C Chemical Products, Manufacture and Processing		3	10	11	9	10	7	7	7	7	7	7	7	7	7
D Other		**64**	**52**	**56**	**35**	**35**	**29**	**28**	**26**	**26**	**26**	**27**	**26**	**26**	**26**
1 Use of N_2O for Anaesthesia															
5 Other	(6)	**64**	52	56	35	35	29	28	26	26	26	27	26	26	26
4. Agriculture															
A Enteric Fermentation															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 Sheep															
4 Goats															

5 Camels and Llamas		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6 Horses															
7 Mules and Asses		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8 Swine															
9 Poultry	NE														
10 Other															
Fur farming	NE														
B. Manure Management															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo	NO														
3 Sheep															
4 Goats															
5 Camels and Llamas	NO														
6 Horses															
7 Mules and Asses	NO														
8 Swine															
9 Poultry															
10 Other livestock															
Fur farming															
11 Anaerobic Lagoons															
12 Liquid Systems															
13 Solid Storage and Dry Lot															
14 Other AWMS															
C. Rice Cultivation	NO														
D. Agricultural Soils															
1 Direct Soil Emissions															
2 Pasture, Range and Paddock Manure															
3 Indirect Emissions															
4 Other															
Industrial waste used as fertilizer															
Use of sewage sludge as fertilizers															
E. Prescribed Burning of Savannas	NO														
F. Field Burning of Agricultural Residues	NO														
G. Other	NO														

6. Waste															
A. Solid Waste Disposal on Land	NE														
B. Waste-water Handling															
C. Waste Incineration	IE														
D. Other	NO														
7. Other	**NA**														
Memo Items (not included above):															
International Bunkers		**4823**	**4823**	**6928**	**6629**	**5211**	**6055**	**6058**	**6046**	**6027**	**6054**	**6048**	**6184**	**6426**	**6626**
Aviation		1736	1736	1867	2350	2575	2612	2615	2603	2584	2611	2605	2741	2983	3183
Marine		3087	3087	5061	4279	2636	3443	3443	3443	3443	3443	3443	3443	3443	3443
Multilateral Operations		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CO_2 Emissions from Biomass		**4641**	**4641**	**5869**	**7169**	**10908**									

Notes:

(1): Military mobile combustion of fuels

(2): Glass production, production of bricks and clay products

(3): Catalysts/Fertilizers, Pesticides and Sulphuric acid

(4): PFC used as detergent

(5): Window plate production, research laboratories and running shoes

(6): Other products, manufacture and processing such as vessels, vehicles, wood, food and graphic

NO: Not occurring

NE: Not estimated

NA: Not Applicable

IE: Included elsewhere

Table 11.3 Historic and projected methane (CH_4) emissions in ktonnes CO_2 equivalents.

CH_4 emissions and projections (Gg CO_2 equivalents)		KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Denmark's total emissions excluding net emissions from LULUCF		**5692**	**5695**	**5971**	**5888**	**5630**	**5633**	**5713**	**5734**	**5723**	**5706**	**5702**	**5660**	**5610**	**5578**
1. Energy		**222**	**224**	**510**	**639**	**640**	**585**	**624**	**604**	**601**	**593**	**601**	**568**	**551**	**532**
A. Fuel Combustion (Sectoral Approach)		**182**	**185**	**448**	**559**	**539**	**514**	**557**	**570**	**564**	**554**	**552**	**526**	**508**	**492**
1. Energy Industries		**23**	**23**	**249**	**321**	**277**	**229**	**271**	**282**	**277**	**267**	**265**	**243**	**228**	**208**
a Public Electricity and Heat Production		22	22	247	320	275	228	270	280	275	265	263	241	226	206
b Petroleum Refining		1	1	1	0	0	1	1	1	1	1	1	1	1	1
c Manufacture of Solid Fuels and Other Energy Industries		0	0	1	1	2	1	1	1	1	1	1	2	2	2
2. Manufacturing Industries and Construction		**15**	**15**	**18**	**33**	**27**	**32**	**32**	**32**	**32**	**32**	32	**30**	**29**	**28**
3. Transport		**53**	**56**	**51**	**40**	**30**	**24**	**23**	**21**	**19**	**18**	**21**	**14**	**11**	**9**
a Civil Aviation		0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Road Transport		52	55	50	39	29	23	22	20	18	17	20	14	10	8
c Railways		0	0	0	0	0	0	0	0	0	0	0	0	0	0
d Navigation		1	1	1	1	1	1	1	1	1	1	1	1	1	1
4. Other Sectors		**91**	**90**	**130**	**165**	**205**	**228**	**231**	**235**	**237**	**237**	**234**	**238**	**241**	**247**
a Commercial and Institutional		4	4	13	20	18	22	21	21	21	20	21	20	19	19
b Residential		68	67	89	98	148	164	167	171	173	173	170	175	179	184
c Agriculture/Forestry/Fisheries		20	20	28	48	40	42	43	43	43	44	43	43	43	43
5. Other	(1)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0	**0**	**0**	**0**
B. Fugitive Emissions from Fuels		**40**	**40**	**62**	**80**	**101**	**71**	**67**	**34**	**37**	**38**	**50**	**42**	**42**	**40**
1. Solid Fuels		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas		**40**	**40**	**62**	**80**	**101**	**71**	**67**	**34**	**37**	**38**	**50**	**42**	**42**	**40**
a Oil		32	32	48	73	93	66	62	29	32	33	45	37	38	36
b Natural Gas		6	6	12	5	5	5	5	5	5	5	5	5	4	3
c Flaring		2	2	2	2	2	0	0	0	0	0	0	0	0	0
2. Industrial Processes	NA, NO, NE														
A. Mineral Products															
1 Cement Production															
2 Lime Production															
3 Limestone and Dolomite Use															
4 Soda Ash Production and Use	NO														
5 Asphalt Roofing	(<0,5)														

6 Road Paving with Asphalt															
7 Other	(2)														
B. Chemical Industry		NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
2 Nitric Acid Production															
5 Other	(3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Metal Production															
1 Iron and Steel Production		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 SF_6 Used in Aluminium and Magnesium Foundries															
D. Other Production		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Production of Halocarbons and SF_6															
F. Consumption of Halocarbons and SF_6															
1. Refrigeration and Air Conditioning Equipment															
2 Foam Blowing															
3 Fire Extinguishers															
4 Aerosol/Metered Dose Inhalers															
8 Electrical Equipment															
9 Other															
C_3F_8	(4)														
SF_6	(5)														
G. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
3. Solvent and Other Product Use															
A Paint Application															
B Degreasing and Dry Cleaning															
C Chemical Products, Manufacture and Processing															
D Other															
1 Use of N_2O for Anaesthesia															
5 Other	(6)														
4. Agriculture		**4011**	**4010**	**3983**	**3816**	**3686**	**3704**	**3748**	**3793**	**3787**	**3782**	**3763**	**3764**	**3735**	**3726**
A Enteric Fermentation		**3259**	**3259**	**3116**	**2862**	**2661**	**2667**	**2702**	**2738**	**2710**	**2683**	**2700**	**2600**	**2462**	**2498**
1 Cattle		**2950**	**2950**	**2770**	**2484**	**2256**									
Dairy Cattle		1844	1844	1762	1564	1518									
Non-Dairy Cattle		1106	1106	1008	920	738									
2 Buffalo		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 Sheep		33	33	29	29	34									

4 Goats		2	2	3	3	4									
5 Camels and Llamas		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6 Horses		60	60	64	67	70									
7 Mules and Asses		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8 Swine		213	213	250	278	297									
9 Poultry	NE	NE	NE	NE	NE	NE									
10 Other		**NE**	**NE**	**NE**	**NE**	**NE**									
Fur farming	NE	NE	NE	NE	NE	NE									
B. Manure Management		**752**	**751**	**867**	**954**	**1025**	**1037**	**1046**	**1055**	**1077**	**1099**	**1063**	**1164**	**1273**	**1227**
1 Cattle		**282**	**282**	**268**	**260**	**261**									
Dairy Cattle		213	213	216	214	225									
Non-Dairy Cattle		69	69	52	45	36									
2 Buffalo	NO	NO	NO	NO	NO	NO									
3 Sheep		1	1	1	1	1									
4 Goats		0	0	0	0	0									
5 Camels and Llamas	NO	NO	NO	NO	NO	NO									
6 Horses		4	4	5	5	5									
7 Mules and Asses	NO	NO	NO	NO	NO	NO									
8 Swine		448	448	578	667	720									
9 Poultry		6	6	7	6	6									
10 Other livestock		**9**	**9**	**9**	**16**	**31**									
Fur farming		9	9	9	16	31									
11 Anaerobic Lagoons															
12 Liquid Systems															
13 Solid Storage and Dry Lot															
14 Other AWMS															
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils		NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE	NA, NE
1 Direct Soil Emissions		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2 Pasture, Range and Paddock Manure															
3 Indirect Emissions		NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
4 Other		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Industrial waste used as fertilizer		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Use of sewage sludge as fertilizers		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

F. Field Burning of Agricultural Residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Waste		**1460**	**1461**	**1478**	**1433**	**1304**	**1344**	**1340**	**1337**	**1335**	**1332**	**1338**	**1328**	**1324**	**1321**
A. Solid Waste Disposal on Land		1334	1335	1301	1215	1043	1090	1089	1088	1088	1088	1089	1091	1099	1108
B. Waste-water Handling		126	126	177	217	262	254	251	249	247	244	249	237	225	213
C. Waste Incineration		IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
D. Other		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7. Other		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items (not included above):															
International Bunkers		**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**		**3**	**3**	**3**
Aviation		1	1	1	1	1	1	1	1	1	1		1	1	1
Marine		1	1	2	2	1	2	2	2	2	2		2	2	2
Multilateral Operations		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass															

Notes:

(1): Military mobile combustion of fuels

(2): Glass production, production of bricks and clay products

(3): Catalysts/Fertilizers, Pesticides and Sulphuric acid

(4): PFC used as detergent

(5): Window plate production, research laboratories and running shoes

(6): Other products, manufacture and processing such as vessels, vehicles, wood, food and graphic

NO: Not occurring

NE: Not estimated

NA: Not Applicable

IE: Included elsewhere

Table 11.4 Historic and projected nitrous oxide (N_2O) emissions in ktonnes CO_2 equivalents.

N_2O emissions and projections (Gg CO_2 equivalents)		KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Denmark's total emissions excluding net emissions from LULUCF		**10593**	**10561**	**9407**	**8316**	**6777**	**6731**	**6711**	**6698**	**6646**	**6585**	**6674**	**6417**	**6149**	**6160**
1. Energy		**425**	**397**	**463**	**456**	**446**	**480**	**472**	**470**	**469**	**459**	**470**	**445**	**434**	**436**
A. Fuel Combustion (Sectoral Approach)		**424**	**395**	**461**	**452**	**443**	**478**	**469**	**468**	**467**	**457**	**468**	**443**	**431**	**435**
1. Energy Industries		**119**	**119**	**154**	**150**	**142**	**164**	**156**	**155**	**157**	**150**	**157**	**146**	**141**	**140**
a Public Electricity and Heat Production		103	103	131	122	113	132	123	121	122	114	122	107	98	98
b Petroleum Refining		9	9	15	11	10	11	11	11	11	11	11	11	11	11
c Manufacture of Solid Fuels and Other Energy Industries		6	6	9	17	19	22	22	23	25	26	23	28	32	30
2. Manufacturing Industries and Construction		**54**	**54**	**56**	**59**	**57**	**59**	**59**	**59**	**59**	**58**	59	**56**	**54**	**54**
3. Transport		**141**	**116**	**148**	**150**	**138**	**146**	**146**	**146**	**144**	**142**	**145**	**136**	**134**	**140**
a Civil Aviation		3	3	3	2	2	3	3	3	3	3	3	3	3	4
b Road Transport		125	97	128	137	126	133	133	133	131	129	132	123	121	126
c Railways		3	3	3	2	2	2	2	2	2	2	2	2	2	2
d Navigation		10	13	14	8	8	8	8	8	8	8	8	8	8	8
4. Other Sectors		**109**	**105**	**101**	**92**	**103**	**107**	**107**	**107**	**106**	**105**	**106**	**102**	**100**	**99**
a Commercial and Institutional		12	12	10	8	9	10	10	10	10	9	10	9	8	8
b Residential		57	57	58	52	64	64	64	63	63	62	63	60	57	56
c Agriculture/Forestry/Fisheries		40	36	34	33	31	33	33	33	33	33	33	34	34	35
5. Other	(1)	**1**	**1**	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**2**	2	**2**	**2**	**2**
B. Fugitive Emissions from Fuels		**1**	**1**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
1. Solid Fuels		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Oil and Natural Gas		**1**	**1**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
a Oil		NA	NA	NA	NA	NA	0	0	0	0	0	0	0	0	0
b Natural Gas		NA,NO	NA,NO	NA,NO	0	NA,NO	0	0	0	0	0	0	0	0	0
c Flaring		1	1	2	3	2	2	2	2	2	2	2	2	2	2
2. Industrial Processes	NA, NO	**1043**	**1043**	**904**	**1004**										
A. Mineral Products		IE, NA	IE, NA	IE, NA	IE, NA	IE, NA									
1 Cement Production															
2 Lime Production															
3 Limestone and Dolomite Use															
4 Soda Ash Production and Use	NO														
5 Asphalt Roofing	(<0,														

	5)														
6 Road Paving with Asphalt															
7 Other	(2)														
B. Chemical Industry		**1043**	**1043**	**904**	**1004**	**NO, NA**	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
2 Nitric Acid Production		1043	1043	904	1004	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5 Other	(3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Metal Production		NA	NA	NA	NA	NA									
1 Iron and Steel Production		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 SF_6 Used in Aluminium and Magnesium Foundries															
D. Other Production		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6															
F. Consumption of Halocarbons and SF_6															
1. Refrigeration and Air Conditioning Equipment															
2 Foam Blowing															
3 Fire Extinguishers															
4 Aerosol/Metered Dose Inhalers															
8 Electrical Equipment															
9 Other															
C_3F_8	(4)														
SF_6	(5)														
G. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
3. Solvent and Other Product Use		**NA**	**NA**	**NA**	**NA**	**14**	**37**	**37**	**37**	**37**	**37**	**37**	**37**	**37**	**37**
A Paint Application		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B Degreasing and Dry Cleaning		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C Chemical Products, Manufacture and Processing		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D Other		NA	NA	NA	NA	14	37	37	37	37	37	37	37	37	37
1 Use of N_2O for Anaesthesia		NA	NE	NE	NE	14	37	37	37	37	37	37	37	37	37
5 Other	(6)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Agriculture		**9037**	**9033**	**7955**	**6791**	**6266**	**6162**	**6151**	**6139**	**6088**	**6037**	**6115**	**5883**	**5627**	**5635**
A Enteric Fermentation															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo															

3 Sheep															
4 Goats															
5 Camels and Llamas															
6 Horses															
7 Mules and Asses															
8 Swine															
9 Poultry	NE														
10 Other															
Fur farming	NE														
B. Manure Management		**685**	**684**	**645**	**601**	**558**	**575**	**580**	**584**	**577**	**570**	**577**	**548**	**512**	**513**
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo	NO														
3 Sheep															
4 Goats															
5 Camels and Llamas	NO														
6 Horses															
7 Mules and Asses	NO														
8 Swine															
9 Poultry															
10 Other livestock															
Fur farming															
11 Anaerobic Lagoons		NO	NO	NO	NO	NO									
12 Liquid Systems		96	95	84	80	77									
13 Solid Storage and Dry Lot		589	590	562	522	481									
14 Other AWMS		NO	NO	NO	NO	NO									
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils		**8352**	**8349**	**7309**	**6190**	**5709**	**5587**	**5571**	**5555**	**5511**	**5467**	**5538**	**5335**	**5115**	**5122**
1 Direct Soil Emissions		4225	4222	3617	3235	2986									
2 Pasture, Range and Paddock Manure		312	312	324	307	282									
3 Indirect Emissions		3787	3787	3314	2595	2361									
4 Other		**28**	**28**	**55**	**53**	**79**									
Industrial waste used as fertilizer		9	9	27	31	61									
Use of sewage sludge as fertilizers		19	19	28	22	18									
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

F. Field Burning of Agricultural Residues	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6. Waste		**88**	**88**	**85**	**65**	**51**	**51**	**51**	**51**	**51**	**51**	**51**	**51**	**52**	**52**
A. Solid Waste Disposal on Land		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Waste-water Handling		88	88	85	65	51	51	51	51	51	51	51	51	52	52
C. Waste Incineration		IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
D. Other		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
7. Other		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items (not included above):															
International Bunkers		**78**	**78**	**119**	**109**	**79**	**95**	**95**	**95**	**95**	**95**		**95**	**95**	**95**
Aviation		18	18	20	25	28	28	28	28	28	28		28	28	28
Marine		60	60	99	83	51	67	67	67	67	67		67	67	67
Multilateral Operations		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass															

Notes:

(1): Military mobile combustion of fuels

(2): Glass production, production of bricks and clay products

(3): Catalysts/Fertilizers, Pesticides and Sulphuric acid

(4): PFC used as detergent

(5): Window plate production, research laboratories and running shoes

(6): Other products, manufacture and processing such as vessels, vehicles, wood, food and graphic

NO: Not occurring

NA: Not Applicable

NE: Not estimated

IE: Included elsewhere

Table 11.5 Historic and projected hydrofluorocarbons (HFCs) emissions in ktonnes CO_2 equivalents.

HFCs emissions and projections (Gg CO_2 equivalents)		KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Denmark's total emissions excluding net emissions from LULUCF		**218**		**218**	**605**	**805**	**847**	**830**	**804**	**756**	**692**	**786**	**488**	**152**	**152**
1. Energy															
A. Fuel Combustion (Sectoral Approach)															
1. Energy Industries															
a Public Electricity and Heat Production															
b Petroleum Refining															
c Manufacture of Solid Fuels and Other Energy Industries															
2. Manufacturing Industries and Construction															
3. Transport															
a Civil Aviation															
b Road Transport															
c Railways															
d Navigation															
4. Other Sectors															
a Commercial and Institutional															
b Residential															
c Agriculture/Forestry/Fisheries															
5. Other	(1)														
B. Fugitive Emissions from Fuels															
1. Solid Fuels															
2. Oil and Natural Gas															
a Oil															
b Natural Gas															
c Flaring															
2. Industrial Processes		**218**		**218**	**605**	**805**	**847**	**830**	**804**	**756**	**692**	**786**	**488**	**152**	**152**
A. Mineral Products															
1 Cement Production															
2 Lime Production															
3 Limestone and Dolomite Use															
4 Soda Ash Production and Use	NO														
5 Asphalt Roofing	(<0,5)														
6 Road Paving with Asphalt															
7 Other	(2)														

B. Chemical Industry															
2 Nitric Acid Production															
5 Other	(3)														
C. Metal Production															
1 Iron and Steel Production															
4 SF_6 Used in Aluminium and Magnesium Foundries															
D. Other Production															
E. Production of Halocarbons and SF_6		NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6		**218**		**218**	**605**	**805**	**847**	**830**	**804**	**756**	**692**	**786**	**488**	**152**	**152**
1. Refrigeration and Air Conditioning Equipment		35		35	420	651									
2 Foam Blowing		183		183	168	146									
3 Fire Extinguishers		NO		NO	NO	NO									
4 Aerosol/Metered Dose Inhalers		NA		NA	17	9									
8 Electrical Equipment		NA		NA	NA	NA									
9 Other															
C_3F_8	(4)														
SF_6	(5)														
G. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
3. Solvent and Other Product Use															
A Paint Application															
B Degreasing and Dry Cleaning															
C Chemical Products, Manufacture and Processing															
D Other															
1 Use of N_2O for Anaesthesia															
5 Other	(6)														
4. Agriculture															
A Enteric Fermentation															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 Sheep															
4 Goats															
5 Camels and Llamas		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6 Horses															

7 Mules and Asses		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8 Swine															
9 Poultry	NE														
10 Other															
Fur farming	NE														
B. Manure Management															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo	NO														
3 Sheep															
4 Goats															
5 Camels and Llamas	NO														
6 Horses															
7 Mules and Asses	NO														
8 Swine															
9 Poultry															
10 Other livestock															
Fur farming															
11 Anaerobic Lagoons															
12 Liquid Systems															
13 Solid Storage and Dry Lot															
14 Other AWMS															
C. Rice Cultivation	NO														
D. Agricultural Soils															
1 Direct Soil Emissions															
2 Pasture, Range and Paddock Manure															
3 Indirect Emissions															
4 Other															
Industrial waste used as fertilizer															
Use of sewage sludge as fertilizers															
E. Prescribed Burning of Savannas	NO														
F. Field Burning of Agricultural Residues	NO														
G. Other	NO														
6. Waste															
A. Solid Waste Disposal on Land															

B. Waste-water Handling															
C. Waste Incineration															
D. Other															
7. Other															
Memo Items (not included above):															
International Bunkers															
Aviation															
Marine															
Multilateral Operations															
CO_2 Emissions from Biomass															

Notes:

(1): Military mobile combustion of fuels
(2): Glass production, production of bricks and clay products
(3): Catalysts/Fertilizers, Pesticides and Sulphuric acid
(4): PFC used as detergent
(5): Window plate production, research laboratories and running shoes
(6): Other products, manufacture and processing such as vessels, vehicles, wood, food and graphic

NO: Not occurring
NE: Not estimated
NA: Not Applicable
IE: Included elsewhere

Table 11.6 Historic and projected perfluorocarbons (PFCs) emissions in ktonnes CO_2 equivalents.

PFCs emissions and projections (Gg CO_2 equivalents)		KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Denmark's total emissions excluding net emissions from LULUCF		**1**		**1**	**18**	**14**	**12**	**11**	**10**	**10**	**9**	**10**	**7**	**6**	**6**
1. Energy															
A. Fuel Combustion (Sectoral Approach)															
1. Energy Industries															
a Public Electricity and Heat Production															
b Petroleum Refining															
c Manufacture of Solid Fuels and Other Energy Industries															
2. Manufacturing Industries and Construction															
3. Transport															
a Civil Aviation															
b Road Transport															
c Railways															
d Navigation															
4. Other Sectors															
a Commercial and Institutional															
b Residential															
c Agriculture/Forestry/Fisheries															
5. Other	(1)														
B. Fugitive Emissions from Fuels															
1. Solid Fuels															
2. Oil and Natural Gas															
a Oil															
b Natural Gas															
c Flaring															
2. Industrial Processes		**1**		**1**	**18**	**14**	**12**	**11**	**10**	**10**	**9**	**10**	**7**	**6**	**6**
A. Mineral Products															
1 Cement Production															
2 Lime Production															
3 Limestone and Dolomite Use															
4 Soda Ash Production and Use	NO														
5 Asphalt Roofing	(<0,5)														
6 Road Paving with Asphalt															

7 Other	(2)														
B. Chemical Industry															
2 Nitric Acid Production															
5 Other	(3)														
C. Metal Production															
1 Iron and Steel Production															
4 SF_6 Used in Aluminium and Magnesium Foundries															
D. Other Production															
E. Production of Halocarbons and SF_6		NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6		**1**		**1**	**18**	**14**	**12**	**11**	**10**	**10**	**9**	**10**	**7**	**6**	**6**
1. Refrigeration and Air Conditioning Equipment		1		1	16	14	9	8	7	6	6	7	4	2	2
2 Foam Blowing		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3 Fire Extinguishers		NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4 Aerosol/Metered Dose Inhalers		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8 Electrical Equipment		NA		NA	0	0	3	3	3	3	3	3	3	3	3
9 Other		**NA,NO**		**NA,NO**	**2**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**
C_3F_8	(4)	NA,NO		NA,NO	2	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
SF_6	(5)														
G. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
3. Solvent and Other Product Use															
A Paint Application															
B Degreasing and Dry Cleaning															
C Chemical Products, Manufacture and Processing															
D Other															
1 Use of N_2O for Anaesthesia															
5 Other	(6)														
4. Agriculture															
A Enteric Fermentation															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 Sheep															
4 Goats															

5 Camels and Llamas		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6 Horses															
7 Mules and Asses		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8 Swine															
9 Poultry	NE														
10 Other															
Fur farming	NE														
B. Manure Management															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo	NO														
3 Sheep															
4 Goats															
5 Camels and Llamas	NO														
6 Horses															
7 Mules and Asses	NO														
8 Swine															
9 Poultry															
10 Other livestock															
Fur farming															
11 Anaerobic Lagoons															
12 Liquid Systems															
13 Solid Storage and Dry Lot															
14 Other AWMS															
C. Rice Cultivation	NO														
D. Agricultural Soils															
1 Direct Soil Emissions															
2 Pasture, Range and Paddock Manure															
3 Indirect Emissions															
4 Other															
Industrial waste used as fertilizer															
Use of sewage sludge as fertilizers															
E. Prescribed Burning of Savannas	NO														
F. Field Burning of Agricultural Residues	NO														
G. Other	NO														

6. Waste															
A. Solid Waste Disposal on Land															
B. Waste-water Handling															
C. Waste Incineration															
D. Other															
7. Other															
Memo Items (not included above):															
International Bunkers															
Aviation															
Marine															
Multilateral Operations															
CO_2 Emissions from Biomass															

Notes:

(1): Military mobile combustion of fuels
(2): Glass production, production of bricks and clay products
(3): Catalysts/Fertilizers, Pesticides and Sulphuric acid
(4): PFC used as detergent
(5): Window plate production, research laboratories and running shoes
(6): Other products, manufacture and processing such as vessels, vehicles, wood, food and graphic

NO: Not occurring
NE: Not estimated
NA: Not Applicable
IE: Included elsewhere

Table 11.7 Historic and projected sulphur hexafluoride (SF_6) emissions in ktonnes CO_2 equivalents.

SF_6 emissions and projections (Gg CO_2 equivalents)		KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Denmark's total emissions excluding net emissions from LULUCF		**107**		**107**	**59**	**22**	**36**	**36**	**36**	**69**	**115**	**58**	**123**	**59**	**59**
1. Energy															
A. Fuel Combustion (Sectoral Approach)															
1. Energy Industries															
a Public Electricity and Heat Production															
b Petroleum Refining															
c Manufacture of Solid Fuels and Other Energy Industries															
2. Manufacturing Industries and Construction															
3. Transport															
a Civil Aviation															
b Road Transport															
c Railways															
d Navigation															
4. Other Sectors															
a Commercial and Institutional															
b Residential															
c Agriculture/Forestry/Fisheries															
5. Other	(1)														
B. Fugitive Emissions from Fuels															
1. Solid Fuels															
2. Oil and Natural Gas															
a Oil															
b Natural Gas															
c Flaring															
2. Industrial Processes		**107**		**107**	**59**	**22**	**36**	**36**	**36**	**69**	**115**	**58**	**123**	**59**	**59**
A. Mineral Products															
1 Cement Production															
2 Lime Production															
3 Limestone and Dolomite Use															
4 Soda Ash Production and Use	NO														
5 Asphalt Roofing	(<0,5)														
6 Road Paving with Asphalt															

7 Other	(2)														
B. Chemical Industry															
2 Nitric Acid Production															
5 Other	(3)														
C. Metal Production		**36**		**36**	**21**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
1 Iron and Steel Production															
4 SF_6 Used in Aluminium and Magnesium Foundries		36		36	21	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Other Production															
E. Production of Halocarbons and SF_6		NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6		**71**		**71**	**38**	**22**	**36**	**36**	**36**	**69**	**115**	**58**	**123**	**59**	**59**
1. Refrigeration and Air Conditioning Equipment		0		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2 Foam Blowing		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3 Fire Extinguishers		NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4 Aerosol/Metered Dose Inhalers		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8 Electrical Equipment		4		4	11	13	13	13	13	14	14	13	15	16	16
9 Other		**68**		**68**	**27**	**9**	**23**	**23**	**23**	**56**	**101**	**45**	**108**	**43**	**43**
C_3F_8	(4)														
SF_6	(5)	68		68	27	9	23	23	23	56	101	45	108	43	43
G. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
3. Solvent and Other Product Use															
A Paint Application															
B Degreasing and Dry Cleaning															
C Chemical Products, Manufacture and Processing															
D Other															
1 Use of N_2O for Anaesthesia															
5 Other	(6)														
4. Agriculture															
A Enteric Fermentation															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 Sheep															
4 Goats															
5 Camels and Llamas		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

6 Horses															
7 Mules and Asses		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8 Swine															
9 Poultry	NE														
10 Other															
Fur farming	NE														
B. Manure Management															
1 Cattle															
Dairy Cattle															
Non-Dairy Cattle															
2 Buffalo	NO														
3 Sheep															
4 Goats															
5 Camels and Llamas	NO														
6 Horses															
7 Mules and Asses	NO														
8 Swine															
9 Poultry															
10 Other livestock															
Fur farming															
11 Anaerobic Lagoons															
12 Liquid Systems															
13 Solid Storage and Dry Lot															
14 Other AWMS															
C. Rice Cultivation	NO														
D. Agricultural Soils															
1 Direct Soil Emissions															
2 Pasture, Range and Paddock Manure															
3 Indirect Emissions															
4 Other															
Industrial waste used as fertilizer															
Use of sewage sludge as fertilizers															
E. Prescribed Burning of Savannas	NO														
F. Field Burning of Agricultural Residues	NO														
G. Other	NO														
6. Waste															

A. Solid Waste Disposal on Land															
B. Waste-water Handling															
C. Waste Incineration															
D. Other															
7. Other															
Memo Items (not included above):															
International Bunkers															
Aviation															
Marine															
Multilateral Operations															
CO_2 Emissions from Biomass															

Notes:

(1): Military mobile combustion of fuels

(2): Glass production, production of bricks and clay products

(3): Catalysts/Fertilizers, Pesticides and Sulphuric acid

(4): PFC used as detergent

(5): Window plate production, research laboratories and running shoes

(6): Other products, manufacture and processing such as vessels, vehicles, wood, food and graphic

NO: Not occurring

NA: Not Applicable

NE: Not estimated

IE: Included elsewhere

Table 11.8 Historic and projected greenhouse gas (GHG) emissions in ktonnes CO_2 equivalents.

GHG emissions and projections (Gg CO2 equivalents)		KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Denmark's total emissions excluding net emissions from LULUCF		**69323,336**	**68969**	**76227**	**67953**	**63554**	**70574**	**66711**	**65246**	**65844**	**62779**	**66231**	**60517**	**55189**	**54660**
1. Energy		**52121**	**52083**	**59911**	**52368**	**49629**	**56574**	**52713**	**51248**	**51920**	**48941**	**52279**	**47051**	**42421**	**41895**
A. Fuel Combustion (Sectoral Approach)		**51817**	**51779**	**59485**	**51692**	**49091**	**56080**	**52198**	**50768**	**51442**	**48462**	**51790**	**46569**	**41953**	**41556**
1. Energy Industries		**26315**	**26315**	**32337**	**25585**	**22556**	**29169**	**25212**	**24543**	**25382**	**22549**	**25371**	**21179**	**17254**	**16443**
a Public Electricity and Heat Production		24861	24861	30206	23119	19991	26390	22389	21619	22343	19402	22429	17844	13567	12934
b Petroleum Refining		908	908	1387	999	942	949	949	949	949	949	949	949	949	949
c Manufacture of Solid Fuels and Other Energy Industries		546	546	744	1467	1623	1829	1874	1975	2089	2198	1993	2385	2738	2559
2. Manufacturing Industries and Construction		**5493**	**5493**	**5965**	**6100**	**5690**	**5782**	**5784**	**5779**	**5745**	**5719**	**5762**	**5507**	**5274**	**5257**
3. Transport		**10529**	**10700**	**12051**	**12240**	**13225**	**13846**	**14083**	**13528**	**13608**	**13688**	**13751**	**13902**	**14040**	**14849**
a Civil Aviation		246	246	202	157	136	163	164	164	164	165	164	172	185	196
b Road Transport		9418	9427	10763	11379	12384	12993	13229	12674	12754	12832	12896	13036	13148	13928
c Railways		300	300	306	230	234	228	229	230	231	231	230	236	249	267
d Navigation		566	727	780	475	471	462	461	460	460	459	460	458	458	458
4. Other Sectors		**9359**	**9150**	**8878**	**7655**	**7347**	**7129**	**6965**	**6763**	**6552**	**6351**	**6752**	**5826**	**5230**	**4853**
a Commercial and Institutional		1419	1419	1139	941	940	972	965	932	870	828	914	705	682	678
b Residential		5208	5183	5253	4282	4144	3813	3645	3472	3312	3137	3476	2729	2137	1732
c Agriculture/Forestry/Fisheries		2732	2549	2486	2433	2263	2343	2354	2358	2369	2386	2362	2392	2412	2443
5. Other	(1)	**120**	**120**	**254**	**112**	**274**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**	**155**
B. Fugitive Emissions from Fuels		**304**	**304**	**426**	**676**	**538**	**494**	**515**	**480**	**478**	**479**	**489**	**482**	**468**	**340**
1. Solid Fuels		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
2. Oil and Natural Gas		**304**	**304**	**426**	**676**	**538**	**494**	**515**	**480**	**478**	**479**	**489**	**482**	**468**	**340**
a Oil		32	32	48	73	93	66	62	29	32	33	45	37	38	36
b Natural Gas		6	6	12	5	5	5	5	5	5	5	5	5	4	3
c Flaring		267	267	367	598	439	423	448	445	442	441	440	441	426	300
2. Industrial Processes		**2470**	**2145**	**2675**	**3367**	**2500**	**2615**	**2587**	**2561**	**2546**	**2519**	**2566**	**2322**	**1913**	**1915**
A. Mineral Products		**1072**	**1073**	**1407**	**1641**	**1641**	**1673**	**1663**	**1663**	**1664**	**1656**	**1664**	**1657**	**1649**	**1650**
1 Cement Production		882	882	1204	1406	1456	0	0	0	0	0	0	0	0	0
2 Lime Production		152	116	88	77	63	0	0	0	0	0	0	0	0	0
3 Limestone and Dolomite Use		18	18	55	94	61	0	0	0	0	0	0	0	0	0
4 Soda Ash Production and Use	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Asphalt Roofing	(<0,5)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 Road Paving with Asphalt		2	2	2	2	2	0	0	0	0	0	0	0	0	0

7 Other	(2)	17	55	58	63	59	0	0	0	0	0	0	0	0	0
B. Chemical Industry		**1044**	**1044**	**905**	**1004**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
2 Nitric Acid Production		1043	1043	904	1004	0	0	0	0	0	0	0	0	0	0
5 Other	(3)	1	1	1	1	3	2	2	2	2	2	2	2	2	2
C. Metal Production		**64**	**28**	**74**	**62**	**16**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**
1 Iron and Steel Production		28	28	39	41	16	45	45	45	45	45	45	45	45	45
4 SF_6 Used in Aluminium and Magnesium Foundries		36	0	36	21	0	0	0	0	0	0	0	0	0	0
D. Other Production		**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**	**NE, NA**
E. Production of Halocarbons and SF_6		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
F. Consumption of Halocarbons and SF_6		**290**	**0**	**290**	**660**	**841**	**895**	**877**	**851**	**835**	**816**	**855**	**619**	**217**	**217**
1. Refrigeration and Air Conditioning Equipment		36	0	36	436	664	9	8	7	6	6	7	4	2	2
2 Foam Blowing		183	0	183	168	146	0	0	0	0	0	0	0	0	0
3 Fire Extinguishers		0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Aerosol/Metered Dose Inhalers		0	0	0	17	9	0	0	0	0	0	0	0	0	0
8 Electrical Equipment		4	0	4	11	13	16	17	17	17	17	17	18	20	20
9 Other		**68**	**0**	**68**	**29**	**9**	**23**	**23**	**23**	**56**	**101**	**45**	**108**	**43**	**43**
C_3F_8	(4)	0	0	0	2	0	0	0	0	0	0	0	0	0	0
SF_6	(5)	68	0	68	27	9	23	23	23	56	101	45	108	43	43
G. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
3. Solvent and Other Product Use		**137**	**148**	**139**	**113**	**117**	**124**	**120**	**117**	**117**	**117**	**119**	**117**	**117**	**117**
A Paint Application		24	61	50	48	41	35	34	32	32	32	33	32	32	32
B Degreasing and Dry Cleaning		46	25	21	21	17	15	14	14	14	14	14	14	14	14
C Chemical Products, Manufacture and Processing		3	10	11	9	10	7	7	7	7	7	7	7	7	7
D Other		**64**	**52**	**56**	**35**	**49**	**66**	**65**	**64**	**64**	**64**	**64**	**64**	**64**	**64**
1 Use of N_2O for Anaesthesia		0	0	0	0	14	37	37	37	37	37	37	37	37	37
5 Other	(6)	64	52	56	35	35	29	28	26	26	26	27	26	26	26
4. Agriculture		**13048**	**13044**	**11938**	**10607**	**9952**	**9866**	**9899**	**9932**	**9875**	**9818**	**9878**	**9647**	**9361**	**9361**
A Enteric Fermentation		**3259**	**3259**	**3116**	**2862**	**2661**	**2667**	**2702**	**2738**	**2710**	**2683**	**2700**	**2600**	**2462**	**2498**
1 Cattle		**2950**	**2950**	**2770**	**2484**	**2256**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Dairy Cattle		1844	1844	1762	1564	1518	0	0	0	0	0	0	0	0	0
Non-Dairy Cattle		1106	1106	1008	920	738	0	0	0	0	0	0	0	0	0
2 Buffalo		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
3 Sheep		33	33	29	29	34	0	0	0	0	0	0	0	0	0
4 Goats		2	2	3	3	4	0	0	0	0	0	0	0	0	0

5 Camels and Llamas		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
6 Horses		60	60	64	67	70	0	0	0	0	0	0	0	0	0
7 Mules and Asses		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
8 Swine		213	213	250	278	297	0	0	0	0	0	0	0	0	0
9 Poultry	NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Other		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Fur farming	NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. Manure Management		**1437**	**1436**	**1513**	**1556**	**1583**	**1612**	**1626**	**1639**	**1654**	**1669**	**1640**	**1712**	**1785**	**1740**
1 Cattle		**282**	**282**	**268**	**260**	**261**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Dairy Cattle		213	213	216	214	225	0	0	0	0	0	0	0	0	0
Non-Dairy Cattle		69	69	52	45	36	0	0	0	0	0	0	0	0	0
2 Buffalo	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 Sheep		1	1	1	1	1	0	0	0	0	0	0	0	0	0
4 Goats		0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Camels and Llamas	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 Horses		4	4	5	5	5	0	0	0	0	0	0	0	0	0
7 Mules and Asses	NO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 Swine		448	448	578	667	720	0	0	0	0	0	0	0	0	0
9 Poultry		6	6	7	6	6	0	0	0	0	0	0	0	0	0
10 Other livestock		**9**	**9**	**9**	**16**	**31**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Fur farming		9	9	9	16	31	0	0	0	0	0	0	0	0	0
11 Anaerobic Lagoons		0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 Liquid Systems		96	95	84	80	77	0	0	0	0	0	0	0	0	0
13 Solid Storage and Dry Lot		589	590	562	522	481	0	0	0	0	0	0	0	0	0
14 Other AWMS		0	0	0	0	0	0	0	0	0	0	0	0	0	0
C. Rice Cultivation	NO	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
D. Agricultural Soils		**8352**	**8349**	**7309**	**6190**	**5709**	**5587**	**5571**	**5555**	**5511**	**5467**	**5538**	**5335**	**5115**	**5122**
1 Direct Soil Emissions		4225	4222	3617	3235	2986	0	0	0	0	0	0	0	0	0
2 Pasture, Range and Paddock Manure		312	312	324	307	282	0	0	0	0	0	0	0	0	0
3 Indirect Emissions		3787	3787	3314	2595	2361	0	0	0	0	0	0	0	0	0
4 Other		**28**	**28**	**55**	**53**	**79**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Industrial waste used as fertilizer		9	9	27	31	61	0	0	0	0	0	0	0	0	0
Use of sewage sludge as fertilizers		19	19	28	22	18	0	0	0	0	0	0	0	0	0
E. Prescribed Burning of Savannas	NO	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
F. Field Burning of Agricultural Residues	NO	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
G. Other	NO	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

6. Waste		**1547**	**1548**	**1563**	**1498**	**1355**	**1395**	**1392**	**1388**	**1386**	**1384**	**1389**	**1379**	**1376**	**1373**
A. Solid Waste Disposal on Land		**1334**	**1335**	**1301**	**1215**	**1043**	**1090**	**1089**	**1088**	**1088**	**1088**	**1089**	**1091**	**1099**	**1108**
B. Waste-water Handling		**213**	**213**	**262**	**283**	**312**	**305**	**302**	**300**	**298**	**295**	**300**	**288**	**277**	**265**
C. Waste Incineration		**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**	**IE**
D. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items (not included above):															
International Bunkers		**4904**	**4904**	**7049**	**6741**	**5293**	**6153**	**6155**	**6144**	**6125**	**6152**	**6048**	**6282**	**6524**	**6724**
Aviation		1755	1755	1888	2376	2604	2640	2643	2632	2613	2640	2605	2770	3012	3212
Marine		3149	3149	5162	4365	2689	3512	3512	3512	3512	3512	3443	3512	3512	3512
Multilateral Operations		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**4641**	**4641**	**5869**	**7169**	**10908**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**

Notes:

(1): Military mobile combustion of fuels

(2): Glass production, production of bricks and clay products

(3): Catalysts/Fertilizers, Pesticides and Sulphuric acid

(4): PFC used as detergent

(5): Window plate production, research laboratories and running shoes

(6): Other products, manufacture and processing such as vessels, vehicles, wood, food and graphic

NO: Not occurring

NE: Not estimated

NA: Not Applicable

IE: Included elsewhere

Table 11.9 Trends in greenhouse gas (GHG) emissions and distributions by gases and sectors.

GHG emissions and projections	KP Base year	1990	1995	2000	2005	2008	2009	2010	2011	2012	2008-12	2015	2020	2025
Distribution by gases (%):														
CO_2	76,0	76,4	79,4	78,1	79,2	81,2	80,1	79,6	79,9	79,1	80,0	79,0	78,3	78,1
CH_4	8,2	8,3	7,8	8,7	8,9	8,0	8,6	8,8	8,7	9,1	8,6	9,4	10,2	10,2
N_2O	15,3	15,3	12,3	12,2	10,7	9,5	10,1	10,3	10,1	10,5	10,1	10,6	11,1	11,3
HFCs	0,3	NA	0,3	0,9	1,3	1,2	1,2	1,2	1,1	1,1	1,2	0,8	0,3	0,3
PFCs	0,0	NA	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
SF_6	0,2	NA	0,1	0,1	0,0	0,1	0,1	0,1	0,1	0,2	0,1	0,2	0,1	0,1
Total (%)	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**
Industrial gases (HFCs+PFCs+SF_6)	0,5%	NA	0,4%	1,0%	1,3%	1,3%	1,3%	1,3%	1,3%	1,3%	1,3%	1,0%	0,4%	0,4%
Trends relative to the KP base year 1990/95, index base year equals 100:														
CO_2	100	100	115	101	95	109	101	99	100	94	101	91	82	81
CH_4	100	100	105	103	99	99	100	101	101	100	100	99	99	98
N_2O	100	100	89	78	64	64	63	63	63	62	63	61	58	58
HFCs	100	NA	100	278	370	389	381	369	347	318	361	224	70	70
PFCs	100	NA	100	3563	2768	2460	2230	2051	1906	1778	2085	1473	1145	1145
SF_6	100	NA	100	55	20	33	33	34	65	108	54	115	55	55
Total	**100**	**99**	**110**	**98**	**92**	**102**	**96**	**94**	**95**	**91**	**96**	**87**	**80**	**79**
Industrial gases (HFCs+PFCs+SF_6)	100	NA	100	209	258	275	269	261	256	251	263	190	67	67
Distribution by IPCC main sector categories (%):														
Energy	75,2	75,5	78,6	77,1	78,1	80,2	79,0	78,5	78,9	78,0	78,9	77,7	76,9	76,6
Industrial Processes	3,6	3,1	3,5	5,0	3,9	3,7	3,9	3,9	3,9	4,0	3,9	3,8	3,5	3,5
Solvent and Other Product Use	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Agriculture	18,8	18,9	15,7	15,6	15,7	14,0	14,8	15,2	15,0	15,6	14,9	15,9	17,0	17,1
Waste	2,2	2,2	2,1	2,2	2,1	2,0	2,1	2,1	2,1	2,2	2,1	2,3	2,5	2,5
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Trends relative to the KP base year 1990/95, index base year equals 100:														
Energy	100	100	115	100	95	109	101	98	100	94	100	90	81	80
Industrial Processes	100	87	108	136	101	106	105	104	103	102	104	94	77	78
Solvent and Other Product Use	100	108	101	82	86	90	88	85	85	85	87	85	85	85
Agriculture	100	100	91	81	76	76	76	76	76	75	76	74	72	72
Waste	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total	**100**	**99**	**110**	**98**	**92**	**102**	**96**	**94**	**95**	**91**	**96**	**87**	**80**	**79**

Table 11.9 Continued

Economic sector categories* Gg CO_2 eqv.:														
Energy	26620	26620	32763	26261	23093	29663	25726	25023	25860	23028	25860	21661	17723	16782
Transport	10650	10820	12305	12352	13499	14001	14237	13683	13763	13843	13905	14057	14194	15003
Agriculture, forestry, fisheries	15780	15592	14423	13040	12215	12210	12253	12291	12245	12204	12240	12039	11773	11803
Business	9518	9205	9918	10521	9247	9492	9457	9389	9278	9183	9360	8651	7985	7966
Domestic sector	5208	5183	5253	4282	4144	3813	3645	3472	3312	3137	3476	2729	2137	1732
Waste	1547	1548	1563	1498	1355	1395	1392	1388	1386	1384	1389	1379	1376	1373
Total	**69323**	**68969**	**76227**	**67953**	**63554**	**70574**	**66711**	**65246**	**65844**	**62779**	**66231**	**60517**	**55189**	**54660**
Distribution by economic sector (%):														
Energy	38,4	38,6	43,0	38,6	36,3	42,0	38,6	38,4	39,3	36,7	39,0	35,8	32,1	30,7
Transport	15,4	15,7	16,1	18,2	21,2	19,8	21,3	21,0	20,9	22,1	21,0	23,2	25,7	27,4
Agriculture, forestry, fisheries	22,8	22,6	18,9	19,2	19,2	17,3	18,4	18,8	18,6	19,4	18,5	19,9	21,3	21,6
Business	13,7	13,3	13,0	15,5	14,6	13,4	14,2	14,4	14,1	14,6	14,1	14,3	14,5	14,6
Domestic sector	7,5	7,5	6,9	6,3	6,5	5,4	5,5	5,3	5,0	5,0	5,2	4,5	3,9	3,2
Waste	2,2	2,2	2,1	2,2	2,1	2,0	2,1	2,1	2,1	2,2	2,1	2,3	2,5	2,5
Total (%)	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**	**100,0**
Trends relative to the KP base year 1990/95, index base year equals 100:														
Energy	100	100	123	99	87	111	97	94	97	87	97	81	67	63
Transport	100	102	116	116	127	131	134	128	129	130	131	132	133	141
Agriculture, forestry, fisheries	100	99	91	83	77	77	78	78	78	77	78	76	75	75
Business	100	97	104	111	97	100	99	99	97	96	98	91	84	84
Domestic sector	100	100	101	82	80	73	70	67	64	60	67	52	41	33
Waste	100	100	101	97	88	90	90	90	90	89	90	89	89	89
Total	**100**	**99**	**110**	**98**	**92**	**102**	**96**	**94**	**95**	**91**	**96**	**87**	**80**	**79**

Annex 1

Fleet data for road traffic 2007-2030 (Vehicle no.).

Sector	Subsector	Tech 2	FYear	LYear	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	4400	4221	4068	3938	3829	3738	3662	3599	3547	3503	3465	3431
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	2754	2233	1808	1558	1368	1237	1154	1114	1098	1084	1072	1062
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	968	783	689	521	398	328	261	198	155	143	141	140
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	18081	12447	8677	6261	5097	4112	3293	2804	2289	1741	1430	1159
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990	79975	58752	42411	30115	20995	14955	10890	8012	6209	5233	4231	3427
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996	157235	138277	118736	99713	81506	64729	50089	37786	27946	20163	14601	10670
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000	125944	119811	113863	107411	100116	91819	82299	71814	60610	49429	38928	29739
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005	134719	128437	123385	119090	115350	111904	108505	104629	99925	94099	86901	78152
Passenger Cars	Gasoline <1,4 l	Euro IV	2006	2010	60421	86571	110436	132796	128111	124265	121048	118604	116518	114608	112581	110251
Passenger Cars	Gasoline <1,4 l	Euro V	2011	2014					25897	50591	74307	97285	95013	93148	91525	90331
Passenger Cars	Gasoline <1,4 l	Euro VI	2015	9999									25262	49406	73594	97931
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	3367	3229	3112	3013	2930	2860	2802	2754	2714	2680	2651	2625
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	1874	1523	1241	1074	948	862	807	780	769	759	751	744
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	602	488	429	324	248	204	163	123	97	89	88	87
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	9995	6890	4809	3472	2830	2283	1827	1555	1269	966	793	643
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	55383	40826	29561	21028	14707	10474	7587	5548	4256	3579	2897	2343
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	314028	280495	245021	209182	173623	139627	109047	82791	61557	44770	32336	23348
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	283647	269631	255989	240972	223980	204813	182887	158839	133375	108316	84975	64698
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	197756	188594	181195	174867	169333	164156	159005	153001	145704	136746	125754	112541
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	80843	115831	147762	177680	171410	166264	161961	158690	155899	153344	150631	147515
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014					34650	67690	99421	130166	127126	124631	122459	120862
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	2015	9999									33800	66105	98468	131031
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	260	250	241	233	227	221	217	213	210	207	205	203
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	133	109	89	78	69	64	60	58	57	57	56	55
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	39	32	28	21	16	13	11	8	6	6	6	6
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	1179	811	566	407	332	268	214	183	149	113	93	75
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	5597	4102	2952	2093	1454	1040	761	560	439	371	298	243
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	26453	23679	20725	17748	14792	11951	9375	7141	5330	3882	2807	2034
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	54259	51658	49147	46468	43446	39989	35994	31577	26813	21984	17399	13347
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	61539	58664	56355	54394	52689	51123	49583	47833	45717	43088	39833	35867
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	28316	40571	51755	62234	60038	58236	56729	55583	54605	53710	52760	51668
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014					12137	23709	34823	45592	44527	43653	42892	42333
Passenger Cars	Gasoline >2,0 l	Euro VI	2015	9999									11839	23154	34489	45895
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	54123	57939	57276	53282	46917	39270	31511	24360	18315	13429	9800	7167
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996	62488	71917	78183	81439	81797	79411	74298	67156	58436	48933	39434	30758
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000	137396	158233	173480	184067	190845	194277	194812	192204	186461	177704	165780	150559
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005	61136	105812	154045	203626	210282	214029	215625	216166	215746	214800	213188	210886
Passenger Cars	Diesel <2,0 l	Euro IV	2006	2010					42508	87136	132363	177310	175928	174580	173316	172784

Passenger Cars	Diesel <2,0 l	Euro V	2011	2014	21333	19087	16049	12995	10409	8404	6870	5738	4931	4406	3944	3561
Passenger Cars	Diesel <2,0 l	Euro VI	2015	9999									46775	92598	139361	187322
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	2161	2329	2319	2174	1930	1629	1316	1022	773	569	415	303
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	6618	7624	8301	8674	8749	8536	8032	7311	6412	5406	4383	3436
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	19779	22772	24964	26489	27471	27981	28082	27753	26989	25794	24147	22019
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	9508	16456	23958	31669	32704	33287	33535	33619	33554	33407	33156	32798
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010					6611	13552	20586	27576	27361	27151	26955	26872
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	631	560	467	375	298	239	194	161	138	122	108	96
Passenger Cars	Diesel >2,0 l	Euro VI	2015	9999									7275	14401	21674	29133
Passenger Cars	Gasoline <3,5t	Conventional	0	1994	10072	7615	5596	3965	2676	1690	971	491	223	146	104	73
Passenger Cars	Gasoline <3,5t	Euro I	1995	1998	10850	9402	8076	6859	5741	4712	3762	2884	2068	1310	739	355
Passenger Cars	Gasoline <3,5t	Euro II	1999	2001	10749	9543	8437	7422	6489	5629	4835	4101	3420	2788	2197	1646
Passenger Cars	Gasoline <3,5t	Euro III	2002	2006	22890	20651	18597	16709	14972	13372	11894	10528	9261	8084	6988	5965
Passenger Cars	Gasoline <3,5t	Euro IV	2007	2011	5324	9922	13879	17272	20169	18359	16688	15143	13712	12383	11146	9993
Passenger Cars	Gasoline <3,5t	Euro V	2012	2015						4270	8018	11301	14174	13001	11910	10894
Passenger Cars	Gasoline <3,5t	Euro VI	2016	9999										3680	6953	9862
Passenger Cars	Diesel <3,5 t	Conventional	0	1994	59972	48167	37525	28124	20035	13324	8051	4270	2034	1391	1029	755
Passenger Cars	Diesel <3,5 t	Euro I	1995	1998	64601	59470	54148	48648	42981	37156	31184	25071	18827	12457	7324	3669
Passenger Cars	Diesel <3,5 t	Euro II	1999	2001	64002	60364	56574	52641	48576	44386	40077	35658	31134	26511	21794	16986
Passenger Cars	Diesel <3,5 t	Euro III	2002	2006	136291	130628	124694	118507	112084	105439	98585	91535	84298	76886	69308	61571
Passenger Cars	Diesel <3,5 t	Euro IV	2007	2011	31701	62758	93059	122501	150990	144768	138322	131665	124808	117763	110539	103147
Passenger Cars	Diesel <3,5 t	Euro V	2012	2015						33673	66455	98261	129013	123641	118118	112452
Passenger Cars	Diesel <3,5 t	Euro VI	2016	9999										34998	68955	101801
Passenger Cars	Gasoline >3,5 t	Conventional	0	9999	258	261	264	267	271	274	277	280	283	286	289	292
Passenger Cars	Diesel 3,5 - 7,5 t	Conventional	0	1993	1142	966	805	662	536	427	336	263	208	171	153	113
Passenger Cars	Diesel 3,5 - 7,5 t	Euro I	1994	1996	653	601	549	496	443	389	335	280	225	169	113	98
Passenger Cars	Diesel 3,5 - 7,5 t	Euro II	1997	2001	1281	1205	1129	1052	974	895	816	736	655	573	491	408
Passenger Cars	Diesel 3,5 - 7,5 t	Euro III	2002	2006	2092	2000	1906	1812	1718	1622	1525	1427	1329	1230	1129	1028
Passenger Cars	Diesel 3,5 - 7,5 t	Euro IV	2007	2009	383	590	678	651	624	597	569	541	512	484	455	426
Passenger Cars	Diesel 3,5 - 7,5 t	Euro V	2010	2015	144	359	679	1098	1503	1893	2267	2513	2405	2296	2186	2074
Passenger Cars	Diesel 3,5 - 7,5 t	Euro VI	2016	9999								113	565	1001	1422	1828
Passenger Cars	Diesel 7,5 - 16 t	Conventional	0	1993	1807	1550	1312	1094	898	725	578	458	367	306	277	206
Passenger Cars	Diesel 7,5 - 16 t	Euro I	1994	1996	1032	965	894	819	742	661	576	488	397	303	205	179
Passenger Cars	Diesel 7,5 - 16 t	Euro II	1997	2001	2027	1935	1839	1738	1632	1520	1404	1283	1156	1025	889	747
Passenger Cars	Diesel 7,5 - 16 t	Euro III	2002	2006	3309	3211	3106	2995	2878	2755	2625	2489	2347	2199	2044	1884
Passenger Cars	Diesel 7,5 - 16 t	Euro IV	2007	2009	607	947	1105	1076	1046	1013	979	943	905	865	824	780
Passenger Cars	Diesel 7,5 - 16 t	Euro V	2010	2015	228	577	1106	1815	2519	3215	3903	4382	4248	4106	3957	3801
Passenger Cars	Diesel 7,5 - 16 t	Euro VI	2016	9999								198	997	1790	2574	3348
Passenger Cars	Diesel 16 - 32 t	Conventional	0	1993	2199	1720	1301	945	653	428	271	186	155	129	112	76
Passenger Cars	Diesel 16 - 32 t	Euro I	1994	1996	1903	1713	1518	1320	1118	911	701	486	285	150	79	83

Passenger Cars	Diesel 16 - 32 t	Euro II	1997	2001	4008	3736	3459	3175	2885	2589	2287	1979	1664	1344	1017	703
Passenger Cars	Diesel 16 - 32 t	Euro III	2002	2006	6877	6557	6230	5895	5553	5203	4845	4479	4106	3726	3338	2942
Passenger Cars	Diesel 16 - 32 t	Euro IV	2007	2009	1288	1986	2286	2192	2096	1998	1898	1796	1691	1584	1475	1364
Passenger Cars	Diesel 16 - 32 t	Euro V	2010	2015	483	1212	2297	3730	5118	6460	7754	8601	8210	7810	7401	6984
Passenger Cars	Diesel 16 - 32 t	Euro VI	2016	9999								395	1977	3512	4999	6436
Passenger Cars	Diesel >32t	Conventional	0	1993	2295	1784	1342	969	666	434	274	187	155	128	110	75
Passenger Cars	Diesel >32t	Euro I	1994	1996	1985	1777	1567	1355	1141	925	708	488	285	149	78	82
Passenger Cars	Diesel >32t	Euro II	1997	2001	4181	3876	3568	3258	2945	2628	2310	1988	1664	1337	1007	692
Passenger Cars	Diesel >32t	Euro III	2002	2006	7175	6803	6428	6050	5668	5282	4893	4501	4105	3706	3304	2898
Passenger Cars	Diesel >32t	Euro IV	2007	2009	1343	2060	2358	2249	2140	2029	1917	1804	1691	1576	1460	1343
Passenger Cars	Diesel >32t	Euro V	2010	2015	504	1257	2370	3827	5224	6559	7832	8643	8208	7769	7326	6879
Passenger Cars	Diesel >32t	Euro VI	2016	9999								397	1976	3494	4949	6340
Passenger Cars	Urban Buses	Conventional	0	1993	867	709	567	442	332	239	163	102	58	30	18	17
Passenger Cars	Urban Buses	Euro I	1994	1996	572	523	474	425	377	328	279	230	182	133	84	41
Passenger Cars	Urban Buses	Euro II	1997	2001	1278	1197	1115	1034	953	872	790	709	628	547	465	384
Passenger Cars	Urban Buses	Euro III	2002	2006	1684	1603	1522	1441	1359	1278	1197	1116	1034	953	872	791
Passenger Cars	Urban Buses	Euro IV	2007	2009	386	755	1108	1059	1011	962	913	865	816	767	718	670
Passenger Cars	Urban Buses	Euro V	2010	2015				386	755	1108	1445	1766	1685	1604	1522	1441
Passenger Cars	Urban Buses	Euro VI	2016	9999									386	755	1109	1446
Passenger Cars	Coaches	Conventional	0	1993	875	721	581	456	346	251	172	109	62	32	19	19
Passenger Cars	Coaches	Euro I	1994	1996	577	532	486	439	392	344	295	245	195	143	91	45
Passenger Cars	Coaches	Euro II	1997	2001	1290	1217	1143	1068	991	914	835	754	673	590	506	420
Passenger Cars	Coaches	Euro III	2002	2006	1700	1631	1560	1488	1414	1340	1264	1187	1108	1029	948	865
Passenger Cars	Coaches	Euro IV	2007	2009	389	768	1136	1094	1052	1008	964	920	874	828	781	733
Passenger Cars	Coaches	Euro V	2010	2015				398	786	1162	1526	1878	1805	1731	1655	1577
Passenger Cars	Coaches	Euro VI	2016	9999									413	815	1205	1582
Passenger Cars	<50 cm³	Conventional	0	1999	125462	121017	116552	112069	107571	103058	98533	93997	89454	84904	80349	75792
Passenger Cars	<50 cm³	Euro I	2000	2003	22666	22565	22458	22347	22230	22108	21981	21850	21712	21570	21423	21271
Passenger Cars	<50 cm³	Euro II	2004	9999	23845	29879	35937	42018	48120	54242	60380	66534	72702	78881	85069	91266
Passenger Cars	2-stroke >50 cm³	Conventional	0	1999	8891	8160	7463	6799	6169	5571	5005	4472	3971	3501	3062	2653
Passenger Cars	2-stroke >50 cm³	Euro I	2000	2003	1606	1522	1438	1356	1275	1195	1117	1040	964	889	816	745
Passenger Cars	2-stroke >50 cm³	Euro II	2004	2006	1260	1194	1129	1065	1002	940	879	819	760	701	644	588
Passenger Cars	2-stroke >50 cm³	Euro III	2007	9999	430	821	1172	1484	1757	1992	2188	2347	2468	2551	2597	2607
Passenger Cars	4-stroke <250 cm³	Conventional	0	1999	13684	13205	12723	12239	11753	11265	10776	10286	9794	9302	8808	8314
Passenger Cars	4-stroke <250 cm³	Euro I	2000	2003	2472	2462	2452	2440	2429	2417	2404	2391	2377	2363	2348	2333
Passenger Cars	4-stroke <250 cm³	Euro II	2004	2006	1939	1932	1925	1917	1909	1901	1892	1883	1874	1864	1854	1843
Passenger Cars	4-stroke <250 cm³	Euro III	2007	9999	662	1328	1998	2672	3348	4028	4712	5398	6087	6778	7472	8169
Passenger Cars	4-stroke 250 - 750 cm³	Conventional	0	1999	37632	36313	34987	33656	32320	30980	29635	28286	26935	25580	24223	22864
Passenger Cars	4-stroke 250 - 750 cm³	Euro I	2000	2003	6799	6771	6742	6711	6679	6646	6611	6575	6538	6499	6458	6417
Passenger Cars	4-stroke 250 - 750 cm³	Euro II	2004	2006	5331	5312	5293	5272	5250	5227	5203	5178	5152	5125	5097	5068

Passenger Cars	4-stroke 250 - 750 cm³	Euro III	2007	9999	1821	3653	5495	7347	9208	11078	12957	14844	16738	18640	20549	22464
Passenger Cars	4-stroke >750 cm³	Conventional	0	1999	17106	16506	15903	15298	14691	14082	13470	12857	12243	11627	11010	10393
Passenger Cars	4-stroke >750 cm³	Euro I	2000	2003	3090	3078	3064	3051	3036	3021	3005	2989	2972	2954	2936	2917
Passenger Cars	4-stroke >750 cm³	Euro II	2004	2006	2423	2415	2406	2396	2386	2376	2365	2354	2342	2330	2317	2304
Passenger Cars	4-stroke >750 cm³	Euro III	2007	9999	828	1661	2498	3339	4185	5036	5889	6747	7608	8473	9340	10211

Sector	Subsector	Tech 2	FYear	LYear	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	3401	3374	3350	3328	3308	3291	3272	3256	3242	3229	3218	3209
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	1053	1044	1037	1030	1024	1019	1013	1008	1003	999	996	993
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	139	138	137	136	135	134	134	133	132	132	131	131
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	939	791	734	729	725	721	717	713	710	707	705	703
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990	2867	2332	1807	1465	1228	1071	977	943	939	936	932	930
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996	7722	5759	4511	3694	3021	2484	2088	1686	1318	1107	940	815
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000	22235	16281	11784	8346	5946	4395	3363	2780	2340	1927	1615	1313
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005	68326	57885	47352	37427	28760	21596	15832	11425	8242	5985	4384	3355
Passenger Cars	Gasoline <1,4 l	Euro IV	2006	2010	107007	102628	96822	89439	80362	70110	59211	48282	38085	29229	21930	16100
Passenger Cars	Gasoline <1,4 l	Euro V	2011	2014	89310	88318	87311	86047	84395	81883	78184	73287	66920	59398	50940	42163
Passenger Cars	Gasoline <1,4 l	Euro VI	2015	9999	121383	145093	168941	192917	215797	239830	263143	286551	309326	331000	350599	369408
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	2602	2582	2563	2546	2531	2518	2504	2491	2480	2471	2462	2455
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	737	731	726	721	717	713	709	706	703	700	698	696
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	87	86	85	85	84	84	83	83	82	82	82	82
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	522	441	410	407	405	402	400	398	396	395	394	392
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	1971	1607	1241	1010	843	728	656	630	627	624	622	621
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	16634	12238	9398	7708	6358	5252	4408	3592	2804	2326	1916	1606
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	48309	35322	25514	17996	12896	9651	7377	6117	5194	4237	3531	2887
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	97848	82481	67161	52880	40541	30381	22236	15995	11568	8461	6219	4789
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	143174	137315	129547	119668	107524	93807	79224	64600	50958	39108	29343	21541
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014	119496	118168	116822	115130	112920	109558	104609	98056	89538	79474	68157	56413
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	2015	9999	162409	194133	226041	258120	288734	320889	352081	383401	413875	442873	469097	494263
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	201	200	198	197	196	195	194	193	192	191	190	190
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	55	54	54	54	53	53	53	53	52	52	52	52
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	6	6	6	5	5	5	5	5	5	5	5	5
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	61	51	48	47	47	47	46	46	46	46	46	46
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	203	164	127	103	87	76	70	68	68	68	67	67
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	1451	1064	803	660	545	445	377	311	239	199	165	138
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	10004	7338	5322	3787	2686	1962	1493	1233	1029	851	719	584
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	31403	26641	21820	17265	13276	9974	7315	5283	3811	2762	2020	1544
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	50148	48096	45375	41915	37661	32857	27749	22627	17848	13698	10278	7545
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014	41855	41390	40918	40325	39551	38374	36640	34345	31362	27836	23873	19759

Passenger Cars	Gasoline >2,0 l	Euro VI	2015	9999	56885	67997	79173	90409	101132	112394	123320	134290	144964	155121	164306	173120
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	5191	3894	3085	2555	2125	1785	1507	1227	974	816	683	585
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996	23450	17437	12830	9295	6693	4887	3660	3070	2574	2110	1830	1513
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000	133004	113940	94303	75416	58638	44540	32996	24041	17482	12799	9444	7267
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005	206889	200723	191650	179187	162951	143814	122762	101070	80413	62179	46959	34671
Passenger Cars	Diesel <2,0 l	Euro IV	2006	2010	172673	172735	172825	172391	171130	167962	162098	153414	141294	126358	109075	90798
Passenger Cars	Diesel <2,0 l	Euro V	2011	2014	3291	3052	2845	2729	2652	2604	2579	2578	2589	2599	2607	2614
Passenger Cars	Diesel <2,0 l	Euro VI	2015	9999	234684	283778	334403	386498	437574	491951	545571	599849	653105	704139	750720	795518
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	219	163	126	105	88	73	62	51	40	34	28	24
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	2627	1957	1444	1051	754	543	403	338	281	231	203	167
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	19542	16812	13968	11207	8732	6643	4928	3599	2615	1902	1399	1071
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	32176	31217	29806	27868	25343	22367	19092	15719	12506	9670	7303	5392
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010	26855	26864	26878	26811	26615	26122	25210	23860	21975	19652	16964	14121
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	88	80	74	70	68	67	66	66	66	67	67	67
Passenger Cars	Diesel >2,0 l	Euro VI	2015	9999	36499	44134	52008	60110	68053	76510	84849	93291	101573	109511	116755	123722
Passenger Cars	Gasoline <3,5t	Conventional	0	1994	53											
Passenger Cars	Gasoline <3,5t	Euro I	1995	1998	143	129	92	65	48							
Passenger Cars	Gasoline <3,5t	Euro II	1999	2001	1128	640	301	116	72	86	61	45				
Passenger Cars	Gasoline <3,5t	Euro III	2002	2006	5006	4105	3256	2454	1692	1075	619	305	162	108	78	56
Passenger Cars	Gasoline <3,5t	Euro IV	2007	2011	8914	7903	6953	6057	5209	4390	3626	2896	2197	1525	979	569
Passenger Cars	Gasoline <3,5t	Euro V	2012	2015	9945	9057	8224	7440	6700	5979	5316	4684	4081	3503	2947	2422
Passenger Cars	Gasoline <3,5t	Euro VI	2016	9999	12447	14740	16772	18568	20153	21472	22681	23730	24632	25397	26037	26672
Passenger Cars	Diesel <3,5 t	Conventional	0	1994	570											
Passenger Cars	Diesel <3,5 t	Euro I	1995	1998	1534	1437	1062	778	587							
Passenger Cars	Diesel <3,5 t	Euro II	1999	2001	12094	7119	3466	1374	881	1081	791	597				
Passenger Cars	Diesel <3,5 t	Euro III	2002	2006	53684	45653	37484	29184	20757	13590	8039	4070	2216	1511	1114	818
Passenger Cars	Diesel <3,5 t	Euro IV	2007	2011	95594	87887	80034	72042	63915	55470	47111	38635	30046	21347	14011	8317
Passenger Cars	Diesel <3,5 t	Euro V	2012	2015	106650	100718	94664	88491	82206	75555	69069	62485	55806	49036	42178	35385
Passenger Cars	Diesel <3,5 t	Euro VI	2016	9999	133472	163909	193056	220861	247275	271332	294706	316560	336855	355556	372629	389710
Passenger Cars	Gasoline >3,5 t	Conventional	0	9999	295	298	302	305	308	309	312	315	318	320	323	329
Passenger Cars	Diesel 3,5 - 7,5 t	Conventional	0	1993												
Passenger Cars	Diesel 3,5 - 7,5 t	Euro I	1994	1996	173	155	114									
Passenger Cars	Diesel 3,5 - 7,5 t	Euro II	1997	2001	324	240	196	245	198	170	119	67	3	2	2	
Passenger Cars	Diesel 3,5 - 7,5 t	Euro III	2002	2006	926	823	719	614	509	401	336	291	277	220	180	156
Passenger Cars	Diesel 3,5 - 7,5 t	Euro IV	2007	2009	397	367	337	307	277	245	214	183	152	120	88	62
Passenger Cars	Diesel 3,5 - 7,5 t	Euro V	2010	2015	1962	1849	1735	1620	1503	1382	1264	1144	1024	903	781	662
Passenger Cars	Diesel 3,5 - 7,5 t	Euro VI	2016	9999	2217	2591	2949	3290	3615	3910	4199	4471	4725	4961	5178	5399
Passenger Cars	Diesel 7,5 - 16 t	Conventional	0	1993												
Passenger Cars	Diesel 7,5 - 16 t	Euro I	1994	1996	321	291	216									
Passenger Cars	Diesel 7,5 - 16 t	Euro II	1997	2001	601	450	372	469	384	330	234	134	7	3	3	

Passenger Cars	Diesel 7,5 - 16 t	Euro III	2002	2006	1717	1543	1364	1178	986	779	659	577	554	445	368	324
Passenger Cars	Diesel 7,5 - 16 t	Euro IV	2007	2009	735	688	639	589	536	477	421	363	304	243	180	128
Passenger Cars	Diesel 7,5 - 16 t	Euro V	2010	2015	3638	3467	3290	3105	2914	2686	2481	2270	2052	1827	1595	1378
Passenger Cars	Diesel 7,5 - 16 t	Euro VI	2016	9999	4111	4859	5593	6309	7007	7601	8246	8867	9463	10032	10573	11228
Passenger Cars	Diesel 16 - 32 t	Conventional	0	1993												
Passenger Cars	Diesel 16 - 32 t	Euro I	1994	1996	133	115	78									
Passenger Cars	Diesel 16 - 32 t	Euro II	1997	2001	454	270	179	187	155	129	88	47	3	1	1	
Passenger Cars	Diesel 16 - 32 t	Euro III	2002	2006	2538	2127	1708	1301	927	616	402	265	207	173	144	122
Passenger Cars	Diesel 16 - 32 t	Euro IV	2007	2009	1250	1134	1016	896	773	645	518	390	262	142	76	48
Passenger Cars	Diesel 16 - 32 t	Euro V	2010	2015	6558	6123	5680	5228	4767	4271	3795	3311	2819	2322	1839	1398
Passenger Cars	Diesel 16 - 32 t	Euro VI	2016	9999	7821	9151	10425	11641	12796	13801	14819	15770	16653	17464	18204	19016
Passenger Cars	Diesel >32t	Conventional	0	1993												
Passenger Cars	Diesel >32t	Euro I	1994	1996	130	112	76									
Passenger Cars	Diesel >32t	Euro II	1997	2001	445	263	174	181	149	124	84	45	2	1	1	
Passenger Cars	Diesel >32t	Euro III	2002	2006	2488	2075	1659	1257	892	592	385	252	197	163	135	113
Passenger Cars	Diesel >32t	Euro IV	2007	2009	1225	1107	987	866	744	619	496	371	248	134	71	45
Passenger Cars	Diesel >32t	Euro V	2010	2015	6429	5974	5516	5053	4587	4104	3631	3154	2674	2194	1730	1304
Passenger Cars	Diesel >32t	Euro VI	2016	9999	7667	8928	10124	11252	12312	13264	14180	15025	15799	16500	17128	17747
Passenger Cars	Urban Buses	Conventional	0	1993												
Passenger Cars	Urban Buses	Euro I	1994	1996	30	18	17									
Passenger Cars	Urban Buses	Euro II	1997	2001	303	221	146	102	58	30	18	17				
Passenger Cars	Urban Buses	Euro III	2002	2006	709	628	547	465	384	303	222	146	102	58	30	18
Passenger Cars	Urban Buses	Euro IV	2007	2009	621	572	523	474	426	377	328	279	231	182	133	84
Passenger Cars	Urban Buses	Euro V	2010	2015	1360	1279	1197	1116	1035	953	872	791	710	628	547	466
Passenger Cars	Urban Buses	Euro VI	2016	9999	1766	2071	2359	2632	2887	3127	3350	3557	3748	3923	4081	4224
Passenger Cars	Coaches	Conventional	0	1993												
Passenger Cars	Coaches	Euro I	1994	1996	33	20	19									
Passenger Cars	Coaches	Euro II	1997	2001	334	246	163	115	65	34	21	20				
Passenger Cars	Coaches	Euro III	2002	2006	782	697	611	524	435	344	253	167	118	67	35	21
Passenger Cars	Coaches	Euro IV	2007	2009	684	635	585	534	482	428	375	321	267	212	156	100
Passenger Cars	Coaches	Euro V	2010	2015	1499	1419	1338	1256	1173	1083	997	910	821	732	641	553
Passenger Cars	Coaches	Euro VI	2016	9999	1947	2299	2637	2962	3272	3550	3829	4092	4339	4571	4785	5015
Passenger Cars	<50 cm³	Conventional	0	1999	71234	66677	62124	57575	53033	48230	43723	39230	34755	30298	25861	21597
Passenger Cars	<50 cm³	Euro I	2000	2003	21113	20951	20783	20610	20432	20136	19945	19748	19547	19340	19129	19045
Passenger Cars	<50 cm³	Euro II	2004	9999	97468	103674	109882	116090	122297	127782	133912	140033	146142	152237	158317	165528
Passenger Cars	2-stroke >50 cm³	Conventional	0	1999	2275	1927	1609	1320	1059	824	620	443	293	170	72	
Passenger Cars	2-stroke >50 cm³	Euro I	2000	2003	674	606	538	472	408	344	283	223	165	108	53	
Passenger Cars	2-stroke >50 cm³	Euro II	2004	2006	533	479	426	374	324	273	225	177	131	86	43	
Passenger Cars	2-stroke >50 cm³	Euro III	2007	9999	2580	2518	2420	2286	2118	1911	1675	1405	1102	767	399	
Passenger Cars	4-stroke <250 cm³	Conventional	0	1999	7819	7324	6829	6334	5838	5331	4837	4344	3853	3362	2872	2392

Passenger Cars	4-stroke <250 cm³	Euro I	2000	2003	2318	2301	2285	2267	2249	2226	2207	2187	2167	2146	2125	2109
Passenger Cars	4-stroke <250 cm³	Euro II	2004	2006	1832	1821	1809	1797	1784	1767	1753	1739	1725	1710	1695	1684
Passenger Cars	4-stroke <250 cm³	Euro III	2007	9999	8867	9568	10270	10974	11680	12357	13062	13768	14475	15182	15889	16646
Passenger Cars	4-stroke 250 - 750 cm³	Conventional	0	1999	21503	20142	18780	17418	16056	14660	13303	11947	10594	9245	7899	6577
Passenger Cars	4-stroke 250 - 750 cm³	Euro I	2000	2003	6373	6329	6283	6235	6186	6121	6068	6014	5958	5901	5843	5800
Passenger Cars	4-stroke 250 - 750 cm³	Euro II	2004	2006	5038	5007	4974	4941	4906	4859	4822	4783	4744	4703	4661	4632
Passenger Cars	4-stroke 250 - 750 cm³	Euro III	2007	9999	24385	26311	28243	30179	32119	33983	35921	37862	39805	41749	43694	45777
Passenger Cars	4-stroke >750 cm³	Conventional	0	1999	9774	9155	8536	7917	7298	6664	6047	5431	4816	4202	3590	2990
Passenger Cars	4-stroke >750 cm³	Euro I	2000	2003	2897	2877	2856	2834	2812	2782	2758	2734	2708	2682	2656	2636
Passenger Cars	4-stroke >750 cm³	Euro II	2004	2006	2290	2276	2261	2246	2230	2209	2192	2174	2156	2138	2119	2106
Passenger Cars	4-stroke >750 cm³	Euro III	2007	9999	11084	11960	12838	13718	14600	15447	16328	17210	18093	18977	19861	20808

Annual mileage for road transport 2007-2030 (km).

Sector	Subsector	Tech	FYear	LYear	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	7184	7254	7412	7751	7813	7842	7853	7846	7823	7748	7608	7407
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	8538	8643	8806	9201	9252	9263	9269	9293	9329	9308	9213	9048
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	9614	9778	10081	10660	10840	11000	11145	11278	11386	11423	11389	11273
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	10709	10926	11280	11912	12161	12374	12563	12771	12961	13050	13076	12995
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990	11655	11931	12367	13127	13449	13711	13936	14153	14341	14482	14551	14505
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996	14386	14652	15166	15902	15855	15462	15907	16251	16588	16845	16966	16955
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000	16934	16756	16886	17639	18047	18796	18777	18509	18092	17633	17864	17895
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005	18089	17922	17860	18605	18598	18280	18210	18286	18397	18553	18606	18411
Passenger Cars	Gasoline <1,4 l	Euro IV	2006	2010	21052	21396	22224	23348	23219	23052	22808	22418	22394	22197	21522	21073
Passenger Cars	Gasoline <1,4 l	Euro V	2011	2014					26749	27423	27825	28470	28037	27500	27069	26033
Passenger Cars	Gasoline <1,4 l	Euro VI	2015	9999									31467	32044	32122	32309
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	7635	7709	7877	8238	8303	8334	8346	8338	8314	8234	8085	7871
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	9039	9146	9315	9729	9781	9793	9801	9826	9862	9838	9735	9559
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	10214	10389	10710	11326	11517	11687	11841	11982	12096	12136	12100	11977
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	11376	11606	11981	12651	12915	13141	13343	13563	13765	13859	13887	13799
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	12422	12717	13182	13993	14336	14618	14861	15093	15293	15447	15521	15471
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	15551	15986	16587	17200	17094	16548	17032	17398	17756	18025	18162	18170
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	17980	17725	17892	18784	19251	20051	19832	19517	19216	18769	19009	19041
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	19147	18950	18893	19684	19691	19315	19259	19398	19571	19778	19678	19427
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	22372	22739	23619	24813	24676	24498	24239	23825	23799	23590	22872	22395
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014					28427	29144	29571	30256	29796	29225	28767	27666
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	2015	9999									33441	34055	34138	34336
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	7908	7986	8159	8533	8601	8633	8645	8637	8612	8529	8375	8154
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	9304	9410	9581	10003	10056	10072	10083	10110	10144	10117	10008	9824
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	10582	10763	11096	11734	11932	12108	12268	12414	12532	12573	12536	12409
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	11793	12033	12422	13119	13394	13628	13837	14065	14276	14372	14402	14315
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	12799	13102	13579	14413	14767	15050	15294	15532	15738	15890	15969	15918
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	16108	16564	17214	17955	17988	17172	17702	18084	18459	18740	18883	18892
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	18651	18518	18647	19393	19764	20585	20753	20532	19988	19353	19621	19656
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	19939	19755	19689	20510	20497	20151	20080	20147	20253	20411	20496	20315
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	23175	23554	24465	25703	25561	25376	25108	24679	24652	24436	23692	23198
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014					29447	30189	30631	31341	30864	30273	29798	28658
Passenger Cars	Gasoline >2,0 l	Euro VI	2015	9999									34640	35276	35362	35567
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	19860	19614	19333	18562	17642	16630	16491	16278	16026	15779	15494	15128
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996	24060	23085	22239	21360	20648	20713	20267	19713	18660	17131	16997	16649
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000	30020	28711	27232	26258	25193	23846	22902	22232	21587	21125	20700	19995
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005	35423	34737	34353	33407	31889	30463	29078	27625	26625	25598	24192	23131
Passenger Cars	Diesel <2,0 l	Euro IV	2006	2010					36737	36240	35475	35083	33335	31714	30427	28575
Passenger Cars	Diesel <2,0 l	Euro V	2011	2014	15380	15095	14757	14305	13805	13248	12669	12084	11483	10962	10392	9759

Passenger Cars	Diesel <2,0 l	Euro VI	2015	9999										37413	36954	36108	35464
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	20878	20684	20429	19643	18790	17453	17333	17109	16846	16587	16289	15910	
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	25386	24457	23557	22492	21610	21678	21440	20975	19755	17974	17849	17483	
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	31618	30252	28694	27664	26525	25135	24142	23373	22637	22110	21779	21106	
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	37075	36356	35955	34964	33375	31883	30434	28913	27866	26792	25320	24210	
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010					38449	37929	37128	36718	34889	33192	31846	29907	
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	16135	15852	15520	15073	14579	14029	13461	12884	12297	11773	11181	10531	
Passenger Cars	Diesel >2,0 l	Euro VI	2015	9999									39157	38677	37791	37118	
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	18311	19026	20033	21695	22659	23606	24528	25440	26431	27316	28093	28839	
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	18311	19026	20033	21695	22659	23606	24528	25440	26431	27316	28093	28839	
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	18311	19026	20033	21695	22659	23606	24528	25440	26431	27316	28093	28839	
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006	18311	19026	20033	21695	22659	23606	24528	25440	26431	27316	28093	28839	
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011	18311	19026	20033	21695	22659	23606	24528	25440	26431	27316	28093	28839	
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015						23606	24528	25440	26431	27316	28093	28839	
Light Duty Vehicles	Gasoline <3,5t	Euro VI	2016	9999										27316	28093	28839	
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	1994	30810	28695	27704	27344	26332	25513	24857	24367	24075	23857	23673	23574	
Light Duty Vehicles	Diesel <3,5 t	Euro I	1995	1998	30810	28695	27704	27344	26332	25513	24857	24367	24075	23857	23673	23574	
Light Duty Vehicles	Diesel <3,5 t	Euro II	1999	2001	30810	28695	27704	27344	26332	25513	24857	24367	24075	23857	23673	23574	
Light Duty Vehicles	Diesel <3,5 t	Euro III	2002	2006	30810	28695	27704	27344	26332	25513	24857	24367	24075	23857	23673	23574	
Light Duty Vehicles	Diesel <3,5 t	Euro IV	2007	2011	30810	28695	27704	27344	26332	25513	24857	24367	24075	23857	23673	23574	
Light Duty Vehicles	Diesel <3,5 t	Euro V	2012	2015						25513	24857	24367	24075	23857	23673	23574	
Light Duty Vehicles	Diesel <3,5 t	Euro VI	2016	9999										23857	23673	23574	
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	9999	42252	43828	46069	49810	51936	54018	56036	58023	60185	62099	63761	65347	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	1993	52498	48585	46611	45715	43746	42116	40773	39715	38991	38392	37853	37454	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	1994	1996	52498	48585	46611	45715	43746	42116	40773	39715	38991	38392	37853	37454	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	1997	2001	52498	48585	46611	45715	43746	42116	40773	39715	38991	38392	37853	37454	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	2002	2006	52498	48585	46611	45715	43746	42116	40773	39715	38991	38392	37853	37454	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro IV	2007	2009	52498	48585	46611	45715	43746	42116	40773	39715	38991	38392	37853	37454	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro V	2010	2015	52498	48585	46611	45715	43746	42116	40773	39715	38991	38392	37853	37454	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro VI	2016	9999								39715	38991	38392	37853	37454	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	1993	23313	22625	22720	23286	23249	23321	23493	23781	24237	24747	25276	25884	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	1994	1996	23313	22625	22720	23286	23249	23321	23493	23781	24237	24747	25276	25884	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	1997	2001	23313	22625	22720	23286	23249	23321	23493	23781	24237	24747	25276	25884	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	2002	2006	23313	22625	22720	23286	23249	23321	23493	23781	24237	24747	25276	25884	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro IV	2007	2009	23313	22625	22720	23286	23249	23321	23493	23781	24237	24747	25276	25884	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro V	2010	2015	23313	22625	22720	23286	23249	23321	23493	23781	24237	24747	25276	25884	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro VI	2016	9999								23781	24237	24747	25276	25884	
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	1993	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283	
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	1994	1996	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283	
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	1997	2001	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283	
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	2002	2006	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283	

Heavy Duty Vehicles	Diesel 16 - 32 t	Euro IV	2007	2009	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro V	2010	2015	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro VI	2016	9999								65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel >32t	Conventional	0	1993	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel >32t	Euro I	1994	1996	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel >32t	Euro II	1997	2001	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel >32t	Euro III	2002	2006	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel >32t	Euro IV	2007	2009	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel >32t	Euro V	2010	2015	81900	76347	73777	72885	70252	68127	66435	65182	64460	63932	63495	63283
Heavy Duty Vehicles	Diesel >32t	Euro VI	2016	9999								65182	64460	63932	63495	63283
Buses	Urban Buses	Conventional	0	1993	109515	101797	98090	96628	92874	89812	87334	85448	84265	83344	82545	82043
Buses	Urban Buses	Euro I	1994	1996	109515	101797	98090	96628	92874	89812	87334	85448	84265	83344	82545	82043
Buses	Urban Buses	Euro II	1997	2001	109515	101797	98090	96628	92874	89812	87334	85448	84265	83344	82545	82043
Buses	Urban Buses	Euro III	2002	2006	109515	101797	98090	96628	92874	89812	87334	85448	84265	83344	82545	82043
Buses	Urban Buses	Euro IV	2007	2009	109515	101797	98090	96628	92874	89812	87334	85448	84265	83344	82545	82043
Buses	Urban Buses	Euro V	2010	2015				96628	92874	89812	87334	85448	84265	83344	82545	82043
Buses	Urban Buses	Euro VI	2016	9999									84265	83344	82545	82043
Buses	Coaches	Conventional	0	1993	76564	71399	69021	68211	65771	63804	62241	61090	60433	59960	59570	59392
Buses	Coaches	Euro I	1994	1996	76564	71399	69021	68211	65771	63804	62241	61090	60433	59960	59570	59392
Buses	Coaches	Euro II	1997	2001	76564	71399	69021	68211	65771	63804	62241	61090	60433	59960	59570	59392
Buses	Coaches	Euro III	2002	2006	76564	71399	69021	68211	65771	63804	62241	61090	60433	59960	59570	59392
Buses	Coaches	Euro IV	2007	2009	76564	71399	69021	68211	65771	63804	62241	61090	60433	59960	59570	59392
Buses	Coaches	Euro V	2010	2015				68211	65771	63804	62241	61090	60433	59960	59570	59392
Buses	Coaches	Euro VI	2016	9999									60433	59960	59570	59392
Mopeds	<50 cm³	Conventional	0	1999	1628	1723	1848	2038	2167	2297	2427	2559	2702	2837	2964	3089
Mopeds	<50 cm³	Euro I	2000	2003	1628	1723	1848	2038	2167	2297	2427	2559	2702	2837	2964	3089
Mopeds	<50 cm³	Euro II	2004	9999	1628	1723	1848	2038	2167	2297	2427	2559	2702	2837	2964	3089
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke >750 cm³	Conventional	0	1999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668

Motorcycles	4-stroke >750 cm³	Euro II	2004	2006	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999	7777	8106	8562	9302	9745	10184	10615	11043	11508	11929	12305	12668

Sector	Subsector	Tech	FYear	LYear	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	Gasoline <1,4 l	PRE ECE	0	1969	7193	6946	6643	6317	5987	5630	5284	4920	4538	4145	3754	3364
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1970	1978	8871	8658	8377	8070	7760	7418	7092	6746	6377	5995	5618	5247
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1979	1980	11147	10978	10727	10446	10164	9841	9543	9221	8869	8503	8145	7799
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1981	1985	12875	12684	12421	12159	11896	11588	11309	11004	10665	10310	9966	9638
Passenger Cars	Gasoline <1,4 l	ECE 15/04	1986	1990	14472	14380	14163	13934	13657	13299	12975	12657	12329	11984	11653	11342
Passenger Cars	Gasoline <1,4 l	Euro I	1991	1996	16927	16812	16554	16353	16141	15852	15659	15425	15085	14739	14371	13999
Passenger Cars	Gasoline <1,4 l	Euro II	1997	2000	17921	17896	17744	17545	17352	17122	16951	16702	16423	16133	15822	15555
Passenger Cars	Gasoline <1,4 l	Euro III	2001	2005	18200	17568	16542	16508	16375	16183	16034	15852	15632	15377	15128	14905
Passenger Cars	Gasoline <1,4 l	Euro IV	2006	2010	20784	20577	20360	19978	19566	18982	18271	17234	17135	16912	16710	16537
Passenger Cars	Gasoline <1,4 l	Euro V	2011	2014	25531	24869	23966	22988	22237	21614	21231	21437	20774	20019	19097	17874
Passenger Cars	Gasoline <1,4 l	Euro VI	2015	9999	32053	31924	31703	31293	30932	30548	30284	29891	29532	29216	29005	28961
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0	1969	7644	7382	7059	6713	6362	5983	5615	5229	4822	4405	3989	3575
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1970	1978	9369	9141	8842	8515	8185	7821	7474	7106	6713	6307	5905	5510
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1979	1980	11842	11663	11396	11097	10797	10455	10137	9795	9421	9032	8651	8284
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1981	1985	13670	13465	13186	12907	12627	12300	12004	11679	11319	10941	10575	10227
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1986	1990	15439	15344	15111	14869	14579	14200	13851	13510	13163	12796	12445	12115
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	1991	1996	18156	18053	17795	17575	17347	17037	16834	16581	16219	15872	15513	15144
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	1997	2000	19067	19039	18876	18663	18458	18214	18029	17763	17465	17155	16822	16539
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2001	2005	19238	18615	17583	17539	17397	17192	17032	16839	16604	16332	16066	15829
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	2006	2010	22088	21868	21638	21231	20794	20173	19417	18315	18210	17973	17758	17574
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	2011	2014	27133	26429	25469	24430	23632	22970	22563	22782	22078	21275	20295	18996
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	2015	9999	34064	33927	33692	33257	32873	32465	32184	31766	31385	31049	30825	30778
Passenger Cars	Gasoline >2,0 l	PRE ECE	0	1969	7918	7646	7312	6954	6591	6198	5817	5416	4995	4563	4132	3703
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	1970	1978	9626	9388	9077	8737	8395	8017	7656	7274	6866	6445	6029	5618
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1979	1980	12269	12083	11807	11498	11187	10832	10504	10149	9762	9358	8964	8584
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1981	1985	14185	13976	13688	13399	13110	12771	12465	12129	11756	11365	10986	10626
Passenger Cars	Gasoline >2,0 l	ECE 15/04	1986	1990	15879	15773	15539	15284	14973	14578	14224	13877	13516	13136	12771	12428
Passenger Cars	Gasoline >2,0 l	Euro I	1991	1996	18878	18773	18497	18271	18037	17711	17503	17249	16868	16507	16135	15751
Passenger Cars	Gasoline >2,0 l	Euro II	1997	2000	19685	19659	19493	19276	19065	18812	18628	18356	18050	17734	17394	17101
Passenger Cars	Gasoline >2,0 l	Euro III	2001	2005	20070	19359	18212	18176	18030	17819	17655	17455	17213	16933	16659	16413
Passenger Cars	Gasoline >2,0 l	Euro IV	2006	2010	22880	22652	22414	21993	21539	20896	20114	18972	18863	18617	18395	18204
Passenger Cars	Gasoline >2,0 l	Euro V	2011	2014	28106	27377	26382	25306	24479	23793	23372	23599	22869	22038	21022	19677
Passenger Cars	Gasoline >2,0 l	Euro VI	2015	9999	35285	35143	34900	34449	34051	33629	33338	32905	32510	32163	31930	31882
Passenger Cars	Diesel <2,0 l	Conventional	0	1990	14774	14386	13968	13561	13231	12825	12563	12266	11942	11615	11316	11012
Passenger Cars	Diesel <2,0 l	Euro I	1991	1996	16322	15975	15603	15188	14853	14422	14114	13807	13490	13165	12928	12703
Passenger Cars	Diesel <2,0 l	Euro II	1997	2000	19343	18302	16976	16665	16349	15941	15672	15379	15077	14737	14463	14200
Passenger Cars	Diesel <2,0 l	Euro III	2001	2005	22308	21633	21073	20328	19684	18835	17985	16828	16642	16339	16112	15907

Passenger Cars	Diesel <2,0 l	Euro IV	2006	2010	27402	26146	24804	23391	22370	21446	20899	20932	20176	19341	18413	17193
Passenger Cars	Diesel <2,0 l	Euro V	2011	2014	9187	8580	7937	7368	6885	6404	6023	5677	5356	5030	4726	4427
Passenger Cars	Diesel <2,0 l	Euro VI	2015	9999	34402	33563	32812	31843	31118	30312	29809	29187	28683	28227	27967	27858
Passenger Cars	Diesel >2,0 l	Conventional	0	1990	15544	15141	14701	14274	13929	13498	13226	12919	12575	12237	11933	11621
Passenger Cars	Diesel >2,0 l	Euro I	1991	1996	17139	16774	16384	15947	15600	15156	14834	14515	14187	13842	13592	13359
Passenger Cars	Diesel >2,0 l	Euro II	1997	2000	20381	19242	17797	17476	17144	16717	16434	16125	15811	15460	15174	14902
Passenger Cars	Diesel >2,0 l	Euro III	2001	2005	23347	22642	22055	21276	20601	19713	18823	17612	17418	17101	16863	16649
Passenger Cars	Diesel >2,0 l	Euro IV	2006	2010	28680	27365	25961	24481	23413	22446	21873	21908	21117	20243	19271	17995
Passenger Cars	Diesel >2,0 l	Euro V	2011	2014	9925	9270	8586	7970	7455	6946	6549	6190	5855	5513	5196	4885
Passenger Cars	Diesel >2,0 l	Euro VI	2015	9999	36005	35127	34342	33327	32569	31725	31199	30548	30020	29543	29271	29157
Light Duty Vehicles	Gasoline <3,5t	Conventional	0	1994	29565											
Light Duty Vehicles	Gasoline <3,5t	Euro I	1995	1998	29565	30256	30807	31411	31847							
Light Duty Vehicles	Gasoline <3,5t	Euro II	1999	2001	29565	30256	30807	31411	31847	32309	32644	32983				
Light Duty Vehicles	Gasoline <3,5t	Euro III	2002	2006	29565	30256	30807	31411	31847	32309	32644	32983	33237	33488	33632	33866
Light Duty Vehicles	Gasoline <3,5t	Euro IV	2007	2011	29565	30256	30807	31411	31847	32309	32644	32983	33237	33488	33632	33866
Light Duty Vehicles	Gasoline <3,5t	Euro V	2012	2015	29565	30256	30807	31411	31847	32309	32644	32983	33237	33488	33632	33866
Light Duty Vehicles	Gasoline <3,5t	Euro VI	2016	9999	29565	30256	30807	31411	31847	32309	32644	32983	33237	33488	33632	33866
Light Duty Vehicles	Diesel <3,5 t	Conventional	0	1994	23580											
Light Duty Vehicles	Diesel <3,5 t	Euro I	1995	1998	23580	23624	23642	23731	23710							
Light Duty Vehicles	Diesel <3,5 t	Euro II	1999	2001	23580	23624	23642	23731	23710	23890	23906	23871				
Light Duty Vehicles	Diesel <3,5 t	Euro III	2002	2006	23580	23624	23642	23731	23710	23890	23906	23871	23815	23760	23634	23519
Light Duty Vehicles	Diesel <3,5 t	Euro IV	2007	2011	23580	23624	23642	23731	23710	23890	23906	23871	23815	23760	23634	23519
Light Duty Vehicles	Diesel <3,5 t	Euro V	2012	2015	23580	23624	23642	23731	23710	23890	23906	23871	23815	23760	23634	23519
Light Duty Vehicles	Diesel <3,5 t	Euro VI	2016	9999	23580	23624	23642	23731	23710	23890	23906	23871	23815	23760	23634	23519
Heavy Duty Vehicles	Gasoline >3,5 t	Conventional	0	9999	66886	68337	69471	70719	71587	72594	73236	73884	74338	74786	74994	75288
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Conventional	0	1993												
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro I	1994	1996	37223	37054	36844									
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro II	1997	2001	37223	37054	36844	36745	36476	36692	36487	36208	35898	35592	35181	
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro III	2002	2006	37223	37054	36844	36745	36476	36692	36487	36208	35898	35592	35181	34571
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro IV	2007	2009	37223	37054	36844	36745	36476	36692	36487	36208	35898	35592	35181	34571
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro V	2010	2015	37223	37054	36844	36745	36476	36692	36487	36208	35898	35592	35181	34571
Heavy Duty Vehicles	Diesel 3,5 - 7,5 t	Euro VI	2016	9999	37223	37054	36844	36745	36476	36692	36487	36208	35898	35592	35181	34571
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Conventional	0	1993												
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro I	1994	1996	26600	27358	28084									
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro II	1997	2001	26600	27358	28084	28895	29570	29977	30673	31301	31895	32485	32968	
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro III	2002	2006	26600	27358	28084	28895	29570	29977	30673	31301	31895	32485	32968	34105
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro IV	2007	2009	26600	27358	28084	28895	29570	29977	30673	31301	31895	32485	32968	34105
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro V	2010	2015	26600	27358	28084	28895	29570	29977	30673	31301	31895	32485	32968	34105
Heavy Duty Vehicles	Diesel 7,5 - 16 t	Euro VI	2016	9999	26600	27358	28084	28895	29570	29977	30673	31301	31895	32485	32968	34105
Heavy Duty Vehicles	Diesel 16 - 32 t	Conventional	0	1993												
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro I	1994	1996	63353	63527	63629									

Heavy Duty Vehicles	Diesel 16 - 32 t	Euro II	1997	2001	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro III	2002	2006	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro IV	2007	2009	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro V	2010	2015	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Heavy Duty Vehicles	Diesel 16 - 32 t	Euro VI	2016	9999	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Heavy Duty Vehicles	Diesel >32t	Conventional	0	1993												
Heavy Duty Vehicles	Diesel >32t	Euro I	1994	1996	63353	63527	63629									
Heavy Duty Vehicles	Diesel >32t	Euro II	1997	2001	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	
Heavy Duty Vehicles	Diesel >32t	Euro III	2002	2006	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Heavy Duty Vehicles	Diesel >32t	Euro IV	2007	2009	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Heavy Duty Vehicles	Diesel >32t	Euro V	2010	2015	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Heavy Duty Vehicles	Diesel >32t	Euro VI	2016	9999	63353	63527	63629	63923	63919	64420	64513	64472	64372	64275	63984	63771
Buses	Urban Buses	Conventional	0	1993												
Buses	Urban Buses	Euro I	1994	1996	81908	81908	81816									
Buses	Urban Buses	Euro II	1997	2001	81908	81908	81816	81972	81745	82328	82234	81969				
Buses	Urban Buses	Euro III	2002	2006	81908	81908	81816	81972	81745	82328	82234	81969	81632	81300	80725	80048
Buses	Urban Buses	Euro IV	2007	2009	81908	81908	81816	81972	81745	82328	82234	81969	81632	81300	80725	80048
Buses	Urban Buses	Euro V	2010	2015	81908	81908	81816	81972	81745	82328	82234	81969	81632	81300	80725	80048
Buses	Urban Buses	Euro VI	2016	9999	81908	81908	81816	81972	81745	82328	82234	81969	81632	81300	80725	80048
Buses	Coaches	Conventional	0	1993												
Buses	Coaches	Euro I	1994	1996	59478	59661	59777									
Buses	Coaches	Euro II	1997	2001	59478	59661	59777	60074	60090	60566	60673	60653				
Buses	Coaches	Euro III	2002	2006	59478	59661	59777	60074	60090	60566	60673	60653	60578	60506	60250	60087
Buses	Coaches	Euro IV	2007	2009	59478	59661	59777	60074	60090	60566	60673	60653	60578	60506	60250	60087
Buses	Coaches	Euro V	2010	2015	59478	59661	59777	60074	60090	60566	60673	60653	60578	60506	60250	60087
Buses	Coaches	Euro VI	2016	9999	59478	59661	59777	60074	60090	60566	60673	60653	60578	60506	60250	60087
Mopeds	<50 cm³	Conventional	0	1999	3214	3338	3448	3565	3665	3731	3819	3909	3988	4069	4136	4265
Mopeds	<50 cm³	Euro I	2000	2003	3214	3338	3448	3565	3665	3731	3819	3909	3988	4069	4136	4265
Mopeds	<50 cm³	Euro II	2004	9999	3214	3338	3448	3565	3665	3731	3819	3909	3988	4069	4136	4265
Motorcycles	2-stroke >50 cm³	Conventional	0	1999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	
Motorcycles	2-stroke >50 cm³	Euro I	2000	2003	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	
Motorcycles	2-stroke >50 cm³	Euro II	2004	2006	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	
Motorcycles	2-stroke >50 cm³	Euro III	2007	9999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	
Motorcycles	4-stroke <250 cm³	Conventional	0	1999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke <250 cm³	Euro I	2000	2003	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke <250 cm³	Euro II	2004	2006	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke <250 cm³	Euro III	2007	9999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0	1999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke 250 - 750 cm³	Euro I	2000	2003	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke 250 - 750 cm³	Euro II	2004	2006	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke 250 - 750 cm³	Euro III	2007	9999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386

Motorcycles	4-stroke >750 cm³	Conventional	0	1999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke >750 cm³	Euro I	2000	2003	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke >750 cm³	Euro II	2004	2006	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386
Motorcycles	4-stroke >750 cm³	Euro III	2007	9999	13026	13369	13652	13959	14193	14409	14598	14790	14943	15096	15201	15386

New sold trucks in EURO classes (Danish Car Importers Association, DBI).

Year	Total sales	Total from DBI	I	II	III	IV	V
2000	4784	4686	0	98			
2001	4643	166	4	1911	2543	17	2
2002	4146	84	4	100	3947	10	1
2003	4249	252	2	43	3947	5	0
2004	4655	76	0	36	4536	7	0
2005	5990	80	0	20	5635	205	50
2006	5993	101	1	18	4728	848	297
2007	6905	73	1	7	156	4821	1847
ult. Aug. 2008	4519	3033					1486

New sales/EURO classe matrix based on DBI data and general judgment.

Year	Conv.	I	II	III	IV	V	VI	
1991	100	0	0	0	0	0	0	100
1992	100	0	0	0	0	0	0	100
1993	75	25	0	0	0	0	0	100
1994	0	100	0	0	0	0	0	100
1995	0	100	0	0	0	0	0	100
1996	0	75	25	0	0	0	0	100
1997	0	0	100	0	0	0	0	100
1998	0	0	100	0	0	0	0	100
1999	0	0	100	0	0	0	0	100
2000	0	0	75	25	0	0	0	100
2001	0	0	43	57	0	0	0	100
2002	0	0	2	98	0	0	0	100
2003	0	0	1	99	0	0	0	100
2004	0	0	1	99	0	0	0	100
2005	0	0	0	96	3	1	0	100
2006	0	0	0	81	14	5	0	100
2007	0	0	0	2	71	27	0	100
2008	0	0	0	0	50	50	0	100
2009	0	0	0	0	25	75	0	100
2010	0	0	0	0	0	100	0	100
2011	0	0	0	0	0	100	0	100
2012	0	0	0	0	0	100	0	100
2013	0	0	0	0	0	100	0	100
2014	0	0	0	0	0	75	25	100
2015	0	0	0	0	0	0	100	100

Fuel use and emissions for road transport 2007-2018 - Energy.

Sector	Subsector	Tech 2	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	Gasoline <1,4 l	PRE ECE	93	90	89	90	88	86	84	83	82	80	77	75
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	57	47	39	35	31	28	26	25	25	25	24	23
Passenger Cars	Gasoline <1,4 l	ECE 15/02	22	18	16	13	10	9	7	5	4	4	4	4
Passenger Cars	Gasoline <1,4 l	ECE 15/03	458	322	232	177	147	120	98	85	70	54	44	36
Passenger Cars	Gasoline <1,4 l	ECE 15/04	2114	1590	1190	897	640	465	344	257	202	172	140	113
Passenger Cars	Gasoline <1,4 l	Euro I	4856	4349	3866	3404	2774	2149	1710	1318	995	729	532	388
Passenger Cars	Gasoline <1,4 l	Euro II	4407	4149	3973	3915	3734	3566	3193	2747	2266	1801	1437	1100
Passenger Cars	Gasoline <1,4 l	Euro III	5279	4987	4774	4800	4647	4432	4280	4145	3983	3782	3503	3117
Passenger Cars	Gasoline <1,4 l	Euro IV	2863	4169	5524	6979	6695	6448	6214	5985	5873	5726	5454	5229
Passenger Cars	Gasoline <1,4 l	Euro V					1559	3123	4654	6234	5996	5766	5576	5293
Passenger Cars	Gasoline <1,4 l	Euro VI									1789	3563	5321	7122
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	91	88	86	87	86	84	82	81	79	78	75	73
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	48	40	33	30	26	24	22	22	22	21	21	20
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	17	14	12	10	8	6	5	4	3	3	3	3
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	309	217	156	119	99	81	66	57	47	36	30	24
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	1800	1359	1020	770	552	401	295	219	170	145	118	95
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	12309	11303	10244	9069	7481	5824	4682	3631	2755	2034	1480	1069
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	12560	11769	11279	11147	10619	10113	8932	7635	6312	5007	3978	3034
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	9741	9194	8807	8855	8578	8157	7878	7636	7336	6958	6366	5625
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	4854	7068	9365	11831	11351	10930	10535	10146	9956	9707	9245	8865
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V					2643	5294	7889	10568	10165	9774	9453	8973
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI									3033	6041	9020	12073
Passenger Cars	Gasoline >2,0 l	PRE ECE	9	8	8	8	8	8	8	8	8	7	7	7
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	4	3	3	2	2	2	2	2	2	2	2	2
Passenger Cars	Gasoline >2,0 l	ECE 15/02	1	1	1	1	1	1	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/03	46	32	23	18	15	12	10	9	7	5	4	4
Passenger Cars	Gasoline >2,0 l	ECE 15/04	224	168	125	94	67	49	36	27	22	18	15	12
Passenger Cars	Gasoline >2,0 l	Euro I	1378	1268	1154	1030	860	664	537	418	318	235	171	124
Passenger Cars	Gasoline >2,0 l	Euro II	3389	3204	3069	3018	2876	2757	2502	2171	1795	1425	1143	879
Passenger Cars	Gasoline >2,0 l	Euro III	3702	3496	3347	3366	3258	3108	3004	2907	2793	2653	2463	2198
Passenger Cars	Gasoline >2,0 l	Euro IV	2321	3380	4479	5658	5428	5227	5038	4852	4761	4642	4421	4240
Passenger Cars	Gasoline >2,0 l	Euro V					1264	2532	3773	5054	4861	4674	4521	4291
Passenger Cars	Gasoline >2,0 l	Euro VI									1451	2889	4314	5774
Passenger Cars	Diesel <2,0 l	Conventional	733	643	529	415	321	249	194	155	126	108	91	78
Passenger Cars	Diesel <2,0 l	Euro I	2235	2363	2302	2056	1721	1358	1080	824	610	441	316	225
Passenger Cars	Diesel <2,0 l	Euro II	3238	3576	3745	3747	3638	3543	3243	2852	2349	1806	1444	1103

Passenger Cars	Diesel <2,0 l	Euro III	8611	9484	9862	10090	10037	9671	9314	8921	8403	7837	7164	6285
Passenger Cars	Diesel <2,0 l	Euro IV	4521	7673	11048	14201	13999	13611	13089	12466	11992	11479	10767	10183
Passenger Cars	Diesel <2,0 l	Euro V					3260	6592	9802	12986	12243	11558	11009	10307
Passenger Cars	Diesel <2,0 l	Euro VI									3653	7144	10505	13868
Passenger Cars	Diesel >2,0 l	Conventional	23	20	16	13	10	7	6	5	4	3	3	2
Passenger Cars	Diesel >2,0 l	Euro I	127	136	134	120	102	80	64	49	37	27	19	14
Passenger Cars	Diesel >2,0 l	Euro II	474	526	552	550	533	522	486	433	357	274	221	169
Passenger Cars	Diesel >2,0 l	Euro III	1764	1943	2021	2067	2056	1984	1913	1830	1723	1609	1484	1311
Passenger Cars	Diesel >2,0 l	Euro IV	994	1688	2430	3124	3079	2994	2879	2742	2638	2525	2368	2240
Passenger Cars	Diesel >2,0 l	Euro V					717	1450	2156	2856	2693	2542	2422	2267
Passenger Cars	Diesel >2,0 l	Euro VI									804	1571	2311	3050
Light Duty Veh.	Gasoline <3,5t	Conventional	604	475	367	282	199	131	78	41	19	13	10	7
Light Duty Veh.	Gasoline <3,5t	Euro I	764	688	622	572	500	428	355	282	210	138	80	39
Light Duty Veh.	Gasoline <3,5t	Euro II	757	698	650	619	566	511	456	401	348	293	237	183
Light Duty Veh.	Gasoline <3,5t	Euro III	1612	1511	1433	1394	1305	1214	1122	1030	942	849	755	662
Light Duty Veh.	Gasoline <3,5t	Euro IV	375	726	1069	1441	1758	1667	1574	1482	1394	1301	1204	1108
Light Duty Veh.	Gasoline <3,5t	Euro V						388	756	1106	1441	1366	1287	1208
Light Duty Veh.	Gasoline <3,5t	Euro VI										387	751	1094
Light Duty Veh.	Diesel <3,5 t	Conventional	5961	4459	3354	2481	1702	1097	646	336	158	107	79	57
Light Duty Veh.	Diesel <3,5 t	Euro I	5707	4893	4301	3814	3245	2718	2222	1752	1300	852	497	248
Light Duty Veh.	Diesel <3,5 t	Euro II	5654	4966	4494	4127	3668	3247	2856	2491	2149	1813	1479	1148
Light Duty Veh.	Diesel <3,5 t	Euro III	12040	10747	9905	9291	8462	7713	7026	6395	5819	5259	4704	4162
Light Duty Veh.	Diesel <3,5 t	Euro IV	2801	5163	7392	9604	11400	10590	9858	9199	8615	8056	7503	6972
Light Duty Veh.	Diesel <3,5 t	Euro V						2463	4736	6865	8906	8458	8018	7601
Light Duty Veh.	Diesel <3,5 t	Euro VI										2394	4680	6881
Heavy Duty Veh.	Gasoline >3,5 t	Conventional	85	89	95	103	109	115	120	126	132	138	143	148
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional	242	189	151	122	95	73	55	42	33	26	23	17
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	117	100	88	78	66	56	47	38	30	22	15	13
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	221	192	173	158	140	124	109	96	84	72	61	50
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	380	336	308	287	260	236	215	196	179	163	148	133
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	65	93	103	97	89	82	75	70	65	60	56	52
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	25	57	104	165	216	262	304	328	308	290	272	256
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI								15	72	126	177	225
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional	296	246	209	179	146	119	95	76	62	53	49	38
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	145	132	123	115	104	93	82	70	58	45	31	28
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	275	255	243	236	221	207	192	178	163	148	131	113
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	469	441	429	424	407	390	375	360	346	331	314	296
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	80	122	143	142	138	134	131	128	125	122	118	115

Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	31	75	145	244	338	433	530	602	595	587	578	568
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI								27	140	256	376	501
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional	1856	1353	989	710	473	300	186	125	103	85	73	49
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	1406	1180	1011	868	708	560	420	286	166	86	45	48
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	2869	2493	2230	2022	1771	1542	1328	1127	938	751	564	389
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	5071	4508	4139	3869	3512	3191	2898	2629	2383	2145	1908	1676
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	885	1273	1416	1341	1236	1143	1059	983	915	850	786	724
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	338	789	1445	2318	3066	3753	4393	4781	4513	4258	4008	3769
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI								220	1087	1915	2707	3474
Heavy Duty Veh.	Diesel >32t	Conventional	2583	1872	1361	971	643	407	250	167	137	113	96	65
Heavy Duty Veh.	Diesel >32t	Euro I	1981	1653	1408	1203	977	768	573	388	224	116	61	63
Heavy Duty Veh.	Diesel >32t	Euro II	4072	3519	3131	2824	2460	2129	1825	1541	1275	1016	760	521
Heavy Duty Veh.	Diesel >32t	Euro III	7137	6309	5760	5355	4836	4371	3948	3563	3214	2878	2548	2227
Heavy Duty Veh.	Diesel >32t	Euro IV	1242	1775	1963	1850	1696	1560	1437	1327	1230	1137	1046	959
Heavy Duty Veh.	Diesel >32t	Euro V	473	1100	2004	3197	4206	5121	5963	6457	6064	5692	5331	4989
Heavy Duty Veh.	Diesel >32t	Euro VI								297	1460	2560	3601	4598
Buses	Urban Buses	Conventional	1145	870	671	515	372	259	171	105	59	30	18	17
Buses	Urban Buses	Euro I	648	551	481	426	362	305	252	204	158	115	72	35
Buses	Urban Buses	Euro II	1412	1229	1104	1008	893	790	697	611	534	460	388	318
Buses	Urban Buses	Euro III	1947	1722	1575	1469	1332	1211	1103	1006	920	838	760	685
Buses	Urban Buses	Euro IV	420	764	1080	1017	933	859	793	734	683	635	589	546
Buses	Urban Buses	Euro V				378	711	1009	1280	1530	1439	1355	1274	1199
Buses	Urban Buses	Euro VI									330	638	928	1202
Buses	Coaches	Conventional	666	512	399	309	226	159	106	66	37	19	12	11
Buses	Coaches	Euro I	405	348	307	274	236	201	168	137	108	79	50	24
Buses	Coaches	Euro II	905	796	723	667	597	534	476	422	372	324	276	229
Buses	Coaches	Euro III	1281	1146	1060	999	916	841	774	713	659	607	556	506
Buses	Coaches	Euro IV	277	510	729	694	643	598	558	522	491	461	432	405
Buses	Coaches	Euro V				260	494	709	908	1097	1043	992	942	896
Buses	Coaches	Euro VI									239	467	686	898
Mopeds	<50 cm³	Conventional	224	228	236	250	255	259	262	263	265	264	261	256
Mopeds	<50 cm³	Euro I	24	26	27	30	32	33	35	37	39	40	42	43
Mopeds	<50 cm³	Euro II	21	27	35	45	55	66	78	90	104	118	133	149
Motorcycles	2-stroke >50 cm³	Conventional	97	93	90	89	84	80	75	69	64	59	53	47
Motorcycles	2-stroke >50 cm³	Euro I	14	14	14	14	14	14	13	13	13	12	11	11
Motorcycles	2-stroke >50 cm³	Euro II	10	10	10	10	10	10	10	9	9	9	8	8
Motorcycles	2-stroke >50 cm³	Euro III	3	5	8	11	14	16	18	20	22	24	25	26
Motorcycles	4-stroke <250 cm³	Conventional	123	124	126	131	132	132	132	131	130	128	125	122

Motorcycles	4-stroke <250 cm³	Euro I	25	25	27	29	30	31	33	34	35	36	37	38
Motorcycles	4-stroke <250 cm³	Euro II	19	20	21	23	24	25	26	27	28	28	29	30
Motorcycles	4-stroke <250 cm³	Euro III	7	14	22	32	42	52	64	76	89	103	117	132
Motorcycles	4-stroke 250 - 750 cm³	Conventional	378	380	387	404	406	407	406	403	400	394	385	374
Motorcycles	4-stroke 250 - 750 cm³	Euro I	71	74	78	84	88	91	95	98	102	105	107	110
Motorcycles	4-stroke 250 - 750 cm³	Euro II	56	58	61	66	69	72	75	77	80	83	85	87
Motorcycles	4-stroke 250 - 750 cm³	Euro III	19	40	64	92	121	152	186	221	260	300	341	384
Motorcycles	4-stroke >750 cm³	Conventional	212	214	217	227	228	229	228	227	225	221	216	210
Motorcycles	4-stroke >750 cm³	Euro I	43	45	47	51	53	55	57	59	61	63	65	66
Motorcycles	4-stroke >750 cm³	Euro II	34	35	37	40	42	43	45	47	48	50	51	52
Motorcycles	4-stroke >750 cm³	Euro III	12	24	38	56	73	92	112	134	157	182	207	232

Fuel use and emissions for road transport 2007-2018 - CO_2

Sector	Subsector	Tech 2	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	Gasoline <1,4 l	PRE ECE	6758	6546	6446	5925	5807	5689	5581	5480	5318	5136	4926	4690
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	4156	3411	2814	2300	2031	1838	1716	1661	1623	1579	1526	1466
Passenger Cars	Gasoline <1,4 l	ECE 15/02	1604	1320	1196	869	675	564	455	349	273	249	243	235
Passenger Cars	Gasoline <1,4 l	ECE 15/03	33362	23432	16862	11666	9696	7958	6470	5600	4583	3465	2817	2239
Passenger Cars	Gasoline <1,4 l	ECE 15/04	153858	115704	86576	59245	42313	30726	22740	16990	13175	11074	8883	7082
Passenger Cars	Gasoline <1,4 l	Euro I	353359	316506	281313	224906	183289	141937	112986	87076	64919	46972	33829	24396
Passenger Cars	Gasoline <1,4 l	Euro II	320729	301893	289135	258686	246673	235608	210952	181438	147823	116032	91419	69080
Passenger Cars	Gasoline <1,4 l	Euro III	384181	362883	347422	317151	307050	292765	282756	273797	259810	243653	222827	195803
Passenger Cars	Gasoline <1,4 l	Euro IV	208344	303393	402018	461105	442357	425945	410491	395322	383126	368879	346929	328484
Passenger Cars	Gasoline <1,4 l	Euro V					103015	206296	307414	411801	391144	371432	354735	332472
Passenger Cars	Gasoline <1,4 l	Euro VI									116719	229564	338491	447348
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	6586	6379	6282	5775	5659	5545	5439	5341	5183	5006	4801	4571
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	3506	2882	2392	1964	1743	1585	1486	1440	1407	1369	1323	1270
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	1214	1001	907	658	512	427	345	264	207	189	184	178
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	22454	15791	11377	7876	6553	5379	4369	3780	3093	2339	1900	1512
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	131012	98869	74210	50877	36453	26470	19491	14475	11112	9320	7486	5959
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	895764	822480	745472	599211	494243	384739	309252	239820	179726	131036	94171	67167
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	913978	856455	820815	736494	701567	668117	590025	504305	411732	322534	253049	190561
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	708893	669070	640917	585093	566758	538890	520413	504384	478588	448253	404988	353320
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	353197	514330	681526	781694	749910	722088	695890	670174	649498	625346	588135	556866
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V					174637	349725	521147	698109	663091	629675	601368	563627
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI									197869	389171	573830	758370
Passenger Cars	Gasoline >2,0 l	PRE ECE	632	612	603	554	543	532	522	512	497	480	461	439

Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	283	233	195	161	144	132	125	121	119	115	111	107
Passenger Cars	Gasoline >2,0 l	ECE 15/02	100	82	75	54	42	35	28	22	17	16	15	15
Passenger Cars	Gasoline >2,0 l	ECE 15/03	3362	2359	1698	1173	975	801	651	563	461	349	284	225
Passenger Cars	Gasoline >2,0 l	ECE 15/04	16309	12235	9127	6236	4439	3234	2404	1797	1411	1189	947	759
Passenger Cars	Gasoline >2,0 l	Euro I	100271	92297	83952	68081	56846	43842	35450	27586	20756	15153	10905	7804
Passenger Cars	Gasoline >2,0 l	Euro II	246628	233121	223346	199396	189987	182115	165249	143424	117088	91788	72729	55188
Passenger Cars	Gasoline >2,0 l	Euro III	269371	254409	243593	222365	215250	205306	198405	192037	182211	170918	156675	138075
Passenger Cars	Gasoline >2,0 l	Euro IV	168906	245963	325920	373822	358622	345317	332789	320491	310604	299054	281259	266305
Passenger Cars	Gasoline >2,0 l	Euro V					83515	167246	249223	333850	317104	301124	287587	269538
Passenger Cars	Gasoline >2,0 l	Euro VI									94625	186110	274418	362669
Passenger Cars	Diesel <2,0 l	Conventional	54210	47603	39132	28896	22333	17304	13525	10775	8730	7389	6220	5232
Passenger Cars	Diesel <2,0 l	Euro I	165363	174830	170353	143142	119789	94511	75194	57377	42142	30184	21459	15201
Passenger Cars	Diesel <2,0 l	Euro II	239645	264628	277136	260849	253240	246616	225757	198473	162199	123720	98141	74384
Passenger Cars	Diesel <2,0 l	Euro III	637190	701815	729805	702417	698712	673202	648303	620879	580306	536956	486977	423795
Passenger Cars	Diesel <2,0 l	Euro IV	334556	567813	817516	988620	974485	947454	911078	867669	828145	786497	731886	686722
Passenger Cars	Diesel <2,0 l	Euro V					226936	458876	682300	903836	845476	791941	748353	695061
Passenger Cars	Diesel <2,0 l	Euro VI									252294	489460	714085	935217
Passenger Cars	Diesel >2,0 l	Conventional	1681	1468	1198	880	675	521	407	322	262	220	183	153
Passenger Cars	Diesel >2,0 l	Euro I	9419	10057	9889	8387	7123	5582	4478	3434	2536	1823	1297	918
Passenger Cars	Diesel >2,0 l	Euro II	35069	38926	40823	38314	37130	36338	33812	30109	24676	18781	15000	11426
Passenger Cars	Diesel >2,0 l	Euro III	130546	143812	149532	143916	143090	138105	133121	127358	119023	110231	100846	88410
Passenger Cars	Diesel >2,0 l	Euro IV	73588	124895	179819	217455	214346	208400	200399	190851	182157	172996	160984	151050
Passenger Cars	Diesel >2,0 l	Euro V					49916	100933	150077	198806	185969	174194	164606	152884
Passenger Cars	Diesel >2,0 l	Euro VI									55494	107661	157069	205708
Light Duty Veh.	Gasoline <3,5t	Conventional	43970	34539	26727	18621	13125	8633	5156	2704	1262	843	607	434
Light Duty Veh.	Gasoline <3,5t	Euro I	55610	50068	45282	37818	33059	28265	23447	18638	13717	8866	5077	2477
Light Duty Veh.	Gasoline <3,5t	Euro II	55094	50820	47310	40923	37363	33764	30135	26509	22685	18868	15105	11466
Light Duty Veh.	Gasoline <3,5t	Euro III	117321	109974	104276	92126	86210	80207	74127	68047	61420	54721	48038	41561
Light Duty Veh.	Gasoline <3,5t	Euro IV	27289	52836	77821	95230	116135	110125	104006	97880	90936	83813	76616	69625
Light Duty Veh.	Gasoline <3,5t	Euro V						25615	49968	73048	94000	87997	81869	75906
Light Duty Veh.	Gasoline <3,5t	Euro VI										24908	47793	68716
Light Duty Veh.	Diesel <3,5 t	Conventional	441092	329939	248163	172701	118473	76333	44933	23362	10911	7335	5342	3870
Light Duty Veh.	Diesel <3,5 t	Euro I	422311	362074	318285	265521	225898	189199	154696	121914	89750	58386	33795	16725
Light Duty Veh.	Diesel <3,5 t	Euro II	418393	367514	332541	287315	255304	226010	198815	173394	148420	124255	100556	77425
Light Duty Veh.	Diesel <3,5 t	Euro III	890958	795302	732952	646810	589089	536894	489059	445103	401858	360360	319789	280647
Light Duty Veh.	Diesel <3,5 t	Euro IV	207237	382093	547002	668604	793567	737157	686186	640243	594972	551945	510032	470153
Light Duty Veh.	Diesel <3,5 t	Euro V						171463	329670	477813	615019	579497	545001	512566
Light Duty Veh.	Diesel <3,5 t	Euro VI										164033	318159	464017

Heavy Duty Veh.	Gasoline >3,5 t	Conventional	6160	6466	6878	6831	7204	7578	7950	8323	8621	8880	9101	9309
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional	17910	14008	11208	8500	6583	5051	3847	2930	2256	1815	1589	1148
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	8684	7400	6482	5405	4617	3906	3254	2652	2074	1525	997	845
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	16337	14226	12782	10987	9734	8614	7599	6675	5787	4950	4147	3382
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	28122	24879	22757	19962	18101	16454	14979	13655	12384	11193	10056	8986
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	4836	6887	7596	6730	6170	5678	5241	4853	4480	4133	3802	3493
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	1838	4249	7698	11495	15053	18250	21163	22845	21296	19861	18495	17231
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI								1031	5000	8659	12034	15181
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional	21886	18219	15482	12446	10198	8264	6636	5322	4309	3640	3340	2529
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	10746	9746	9066	8015	7243	6471	5685	4877	4011	3096	2123	1884
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	20372	18880	18017	16415	15386	14381	13378	12371	11278	10128	8897	7601
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	34681	32656	31725	29497	28298	27168	26079	25032	23868	22651	21340	19973
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	5949	9018	10563	9920	9623	9353	9103	8875	8613	8343	8048	7745
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	2269	5583	10742	17002	23557	30163	36881	41918	41084	40230	39286	38336
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI								1891	9647	17541	25561	33775
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional	137369	100144	73205	49401	32908	20908	12931	8678	7111	5829	4960	3336
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	104030	87290	74789	60432	49317	38990	29234	19894	11443	5922	3087	3212
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	212291	184489	165030	140792	123308	107304	92422	78453	64748	51445	38368	26204
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	375285	333578	306262	269334	244508	222150	201723	182983	164593	146953	129705	113031
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	65514	94191	104749	93369	86061	79554	73684	68389	63193	58254	53444	48853
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	24975	58387	106926	161387	213461	261271	305774	332777	311669	291753	272424	254166
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI								15299	75046	131203	184015	234237
Heavy Duty Veh.	Diesel >32t	Conventional	191124	138556	100727	67605	44794	28309	17417	11629	9481	7733	6547	4382
Heavy Duty Veh.	Diesel >32t	Euro I	146595	122319	104225	83761	67990	53469	39881	27001	15452	7957	4127	4274
Heavy Duty Veh.	Diesel >32t	Euro II	301326	260404	231658	196562	171232	148222	127001	107251	88067	69623	51670	35116
Heavy Duty Veh.	Diesel >32t	Euro III	528144	466831	426246	372819	336643	304247	274833	248021	221965	197186	173183	150186
Heavy Duty Veh.	Diesel >32t	Euro IV	91890	131375	145298	128810	118093	108588	100052	92386	84934	77905	71120	64693
Heavy Duty Veh.	Diesel >32t	Euro V	35017	81407	148264	222567	292807	356497	415049	449384	418747	390030	362393	336460
Heavy Duty Veh.	Diesel >32t	Euro VI								20659	100829	175399	244787	310078
Buses	Urban Buses	Conventional	84736	64409	49652	35831	25916	18045	11917	7317	4052	2046	1214	1140
Buses	Urban Buses	Euro I	47958	40777	35630	29625	25210	21222	17568	14185	10942	7854	4885	2329
Buses	Urban Buses	Euro II	104497	90959	81698	70199	62168	54990	48486	42560	36872	31500	26349	21443
Buses	Urban Buses	Euro III	144043	127437	116575	102270	92750	84327	76786	70024	63527	57443	51631	46163
Buses	Urban Buses	Euro IV	31052	56514	79928	70817	64931	59760	55165	51090	47172	43525	40048	36808
Buses	Urban Buses	Euro V				26300	49490	70241	89066	106477	99393	92834	86596	80828
Buses	Urban Buses	Euro VI									22756	43723	63057	81080
Buses	Coaches	Conventional	49266	37857	29501	21519	15731	11070	7388	4584	2565	1309	784	744
Buses	Coaches	Euro I	29941	25736	22732	19105	16432	13980	11695	9543	7438	5395	3389	1632

Buses	Coaches	Euro II	66942	58907	53484	46452	41579	37170	33121	29378	25718	22199	18761	15424
Buses	Coaches	Euro III	94803	84791	78407	69528	63732	58562	53889	49660	45524	41591	37768	34115
Buses	Coaches	Euro IV	20503	37722	53931	48299	44760	41634	38839	36349	33912	31614	29390	27288
Buses	Coaches	Euro V				18077	34382	49318	63198	76346	72012	67958	64045	60392
Buses	Coaches	Euro VI									16487	32007	46637	60580
Mopeds	<50 cm³	Conventional	16271	16618	17167	16527	16862	17121	17298	17400	17267	16994	16587	16103
Mopeds	<50 cm³	Euro I	1764	1859	1985	1977	2091	2204	2315	2427	2515	2590	2654	2712
Mopeds	<50 cm³	Euro II	1494	1983	2558	2994	3645	4354	5122	5951	6781	7629	8486	9370
Motorcycles	2-stroke >50 cm³	Conventional	7068	6762	6532	5870	5579	5265	4930	4583	4187	3779	3367	2966
Motorcycles	2-stroke >50 cm³	Euro I	1025	1013	1011	940	926	907	883	855	816	771	721	669
Motorcycles	2-stroke >50 cm³	Euro II	732	723	722	672	662	649	633	613	585	553	518	480
Motorcycles	2-stroke >50 cm³	Euro III	192	382	577	720	894	1058	1212	1352	1463	1548	1605	1638
Motorcycles	4-stroke <250 cm³	Conventional	8942	8994	9154	8686	8738	8752	8725	8664	8490	8254	7961	7639
Motorcycles	4-stroke <250 cm³	Euro I	1786	1854	1950	1914	1996	2075	2152	2226	2278	2318	2346	2370
Motorcycles	4-stroke <250 cm³	Euro II	1400	1454	1531	1504	1569	1632	1693	1753	1795	1828	1852	1872
Motorcycles	4-stroke <250 cm³	Euro III	478	1000	1589	2096	2752	3459	4217	5026	5832	6649	7465	8297
Motorcycles	4-stroke 250 - 750 cm³	Conventional	27481	27640	28130	26691	26852	26895	26813	26624	26091	25365	24465	23477
Motorcycles	4-stroke 250 - 750 cm³	Euro I	5197	5394	5673	5571	5808	6039	6261	6478	6629	6745	6828	6896
Motorcycles	4-stroke 250 - 750 cm³	Euro II	4075	4232	4454	4376	4565	4750	4928	5102	5224	5320	5389	5447
Motorcycles	4-stroke 250 - 750 cm³	Euro III	1392	2910	4624	6099	8007	10067	12271	14624	16971	19347	21724	24143
Motorcycles	4-stroke >750 cm³	Conventional	15447	15536	15812	15003	15093	15118	15072	14965	14666	14258	13752	13196
Motorcycles	4-stroke >750 cm³	Euro I	3143	3262	3431	3369	3513	3652	3786	3918	4009	4079	4129	4171
Motorcycles	4-stroke >750 cm³	Euro II	2464	2560	2694	2646	2761	2873	2980	3085	3159	3217	3259	3294
Motorcycles	4-stroke >750 cm³	Euro III	842	1760	2797	3688	4843	6088	7421	8844	10264	11700	13138	14601

Fuel use and emissions for road transport 2007-2018 - CH_4

Sector	Subsector	Tech 2	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	Gasoline <1,4 l	PRE ECE	2.39	2.32	2.28	2.31	2.27	2.22	2.18	2.14	2.10	2.06	2.00	1.93
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1.78	1.46	1.21	1.09	0.96	0.87	0.81	0.78	0.78	0.76	0.75	0.73
Passenger Cars	Gasoline <1,4 l	ECE 15/02	0.71	0.58	0.53	0.42	0.33	0.27	0.22	0.17	0.13	0.12	0.12	0.12
Passenger Cars	Gasoline <1,4 l	ECE 15/03	14.67	10.30	7.41	5.65	4.70	3.85	3.13	2.71	2.25	1.72	1.42	1.14
Passenger Cars	Gasoline <1,4 l	ECE 15/04	70.60	53.10	39.73	29.94	21.39	15.53	11.50	8.59	6.74	5.74	4.66	3.77
Passenger Cars	Gasoline <1,4 l	Euro I	53.20	47.66	42.36	37.30	30.40	23.54	18.74	14.44	10.90	7.99	5.83	4.26
Passenger Cars	Gasoline <1,4 l	Euro II	51.21	48.20	46.16	45.49	43.38	41.44	37.10	31.91	26.33	20.93	16.70	12.78
Passenger Cars	Gasoline <1,4 l	Euro III	21.11	19.94	19.09	19.19	18.58	17.72	17.11	16.57	15.92	15.12	14.00	12.46
Passenger Cars	Gasoline <1,4 l	Euro IV	4.98	7.25	9.61	12.13	11.64	11.21	10.80	10.41	10.21	9.96	9.48	9.09
Passenger Cars	Gasoline <1,4 l	Euro V					2.71	5.43	8.09	10.84	10.43	10.02	9.70	9.20

Passenger Cars	Gasoline <1,4 l	Euro VI									3.11	6.20	9.25	12.38
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	1.95	1.89	1.86	1.88	1.84	1.81	1.77	1.74	1.71	1.67	1.62	1.57
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1.28	1.05	0.88	0.79	0.70	0.64	0.60	0.58	0.57	0.57	0.55	0.54
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	0.47	0.38	0.35	0.28	0.22	0.18	0.15	0.11	0.09	0.08	0.08	0.08
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	8.61	6.06	4.36	3.33	2.77	2.27	1.85	1.60	1.32	1.01	0.83	0.67
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	52.11	39.33	29.52	22.29	15.97	11.60	8.54	6.34	4.93	4.19	3.41	2.75
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	114.87	105.47	95.59	84.63	69.81	54.35	43.69	33.88	25.71	18.98	13.81	9.98
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	122.45	114.75	109.97	108.68	103.53	98.60	87.08	74.43	61.53	48.81	38.78	29.58
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	32.79	30.95	29.65	29.81	28.88	27.46	26.52	25.70	24.70	23.42	21.43	18.94
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	7.08	10.31	13.66	17.25	16.55	15.94	15.36	14.80	14.52	14.16	13.48	12.93
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V					3.85	7.72	11.51	15.41	14.82	14.25	13.79	13.09
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI									4.42	8.81	13.16	17.61
Passenger Cars	Gasoline >2,0 l	PRE ECE	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.13
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	0.09	0.08	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline >2,0 l	ECE 15/03	1.05	0.74	0.53	0.40	0.34	0.28	0.22	0.19	0.16	0.12	0.10	0.08
Passenger Cars	Gasoline >2,0 l	ECE 15/04	5.43	4.07	3.04	2.29	1.63	1.19	0.88	0.66	0.52	0.45	0.36	0.29
Passenger Cars	Gasoline >2,0 l	Euro I	10.02	9.23	8.39	7.50	6.26	4.83	3.90	3.04	2.31	1.71	1.25	0.90
Passenger Cars	Gasoline >2,0 l	Euro II	24.30	22.97	22.00	21.64	20.62	19.76	17.93	15.57	12.87	10.21	8.20	6.30
Passenger Cars	Gasoline >2,0 l	Euro III	10.63	10.04	9.61	9.66	9.35	8.92	8.62	8.35	8.02	7.62	7.07	6.31
Passenger Cars	Gasoline >2,0 l	Euro IV	2.57	3.74	4.96	6.26	6.01	5.78	5.57	5.37	5.27	5.14	4.89	4.69
Passenger Cars	Gasoline >2,0 l	Euro V					1.40	2.80	4.17	5.59	5.38	5.17	5.00	4.75
Passenger Cars	Gasoline >2,0 l	Euro VI									1.60	3.20	4.77	6.39
Passenger Cars	Diesel <2,0 l	Conventional	5.07	4.45	3.66	2.87	2.22	1.72	1.34	1.07	0.87	0.75	0.63	0.54
Passenger Cars	Diesel <2,0 l	Euro I	10.94	11.57	11.27	10.07	8.43	6.65	5.29	4.04	2.99	2.16	1.55	1.10
Passenger Cars	Diesel <2,0 l	Euro II	5.98	6.60	6.92	6.92	6.72	6.54	5.99	5.27	4.34	3.34	2.67	2.04
Passenger Cars	Diesel <2,0 l	Euro III	4.33	4.77	4.96	5.07	5.05	4.86	4.68	4.49	4.23	3.94	3.60	3.16
Passenger Cars	Diesel <2,0 l	Euro IV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel <2,0 l	Euro V					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel <2,0 l	Euro VI									0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Conventional	0.16	0.14	0.11	0.09	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.02
Passenger Cars	Diesel >2,0 l	Euro I	0.46	0.49	0.48	0.43	0.37	0.29	0.23	0.18	0.13	0.10	0.07	0.05
Passenger Cars	Diesel >2,0 l	Euro II	0.67	0.74	0.78	0.78	0.75	0.74	0.69	0.61	0.50	0.39	0.31	0.24
Passenger Cars	Diesel >2,0 l	Euro III	0.66	0.72	0.75	0.77	0.77	0.74	0.71	0.68	0.64	0.60	0.55	0.49
Passenger Cars	Diesel >2,0 l	Euro IV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro V					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro VI									0.00	0.00	0.00	0.00
Light Duty Veh.	Gasoline <3,5t	Conventional	16.24	12.76	9.87	7.58	5.34	3.51	2.10	1.10	0.52	0.35	0.26	0.19

Light Duty Veh.	Gasoline <3,5t	Euro I	4.69	4.22	3.82	3.51	3.07	2.63	2.18	1.73	1.29	0.84	0.49	0.24
Light Duty Veh.	Gasoline <3,5t	Euro II	4.74	4.37	4.07	3.88	3.54	3.20	2.86	2.51	2.18	1.83	1.49	1.14
Light Duty Veh.	Gasoline <3,5t	Euro III	3.60	3.37	3.20	3.11	2.91	2.71	2.50	2.30	2.10	1.89	1.68	1.48
Light Duty Veh.	Gasoline <3,5t	Euro IV	0.39	0.75	1.11	1.50	1.83	1.73	1.63	1.54	1.45	1.35	1.25	1.15
Light Duty Veh.	Gasoline <3,5t	Euro V						0.40	0.79	1.15	1.50	1.42	1.34	1.25
Light Duty Veh.	Gasoline <3,5t	Euro VI										0.40	0.78	1.14
Light Duty Veh.	Diesel <3,5 t	Conventional	28.84	21.57	16.23	12.00	8.24	5.31	3.12	1.62	0.76	0.52	0.38	0.28
Light Duty Veh.	Diesel <3,5 t	Euro I	20.74	17.78	15.63	13.86	11.80	9.88	8.08	6.37	4.72	3.10	1.81	0.90
Light Duty Veh.	Diesel <3,5 t	Euro II	7.92	6.96	6.30	5.78	5.14	4.55	4.00	3.49	3.01	2.54	2.07	1.61
Light Duty Veh.	Diesel <3,5 t	Euro III	4.41	3.94	3.63	3.40	3.10	2.82	2.57	2.34	2.13	1.93	1.72	1.52
Light Duty Veh.	Diesel <3,5 t	Euro IV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Veh.	Diesel <3,5 t	Euro V						0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Veh.	Diesel <3,5 t	Euro VI										0.00	0.00	0.00
Heavy Duty Veh.	Gasoline >3,5 t	Conventional	1.21	1.27	1.35	1.48	1.56	1.64	1.72	1.81	1.89	1.98	2.05	2.12
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional	2.53	1.98	1.58	1.28	0.99	0.76	0.58	0.44	0.34	0.28	0.24	0.18
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	1.45	1.23	1.08	0.96	0.82	0.69	0.58	0.47	0.37	0.27	0.18	0.15
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	2.07	1.80	1.62	1.48	1.31	1.16	1.02	0.90	0.78	0.68	0.57	0.47
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	3.20	2.83	2.59	2.41	2.19	1.99	1.81	1.65	1.51	1.37	1.24	1.12
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	0.04	0.05	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	0.01	0.03	0.06	0.09	0.12	0.15	0.17	0.18	0.17	0.16	0.15	0.14
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI								0.01	0.04	0.07	0.10	0.12
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional	1.78	1.48	1.26	1.08	0.88	0.71	0.57	0.46	0.38	0.32	0.30	0.23
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	1.02	0.92	0.86	0.81	0.73	0.65	0.57	0.49	0.41	0.32	0.22	0.20
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	1.45	1.35	1.28	1.24	1.17	1.09	1.01	0.94	0.86	0.78	0.69	0.59
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	2.25	2.11	2.05	2.03	1.95	1.87	1.80	1.72	1.66	1.58	1.50	1.42
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	0.03	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	0.01	0.02	0.05	0.08	0.11	0.14	0.17	0.19	0.19	0.19	0.18	0.18
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI								0.01	0.04	0.08	0.12	0.16
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional	17.01	12.40	9.07	6.50	4.33	2.75	1.70	1.14	0.94	0.78	0.67	0.45
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	14.72	12.35	10.58	9.09	7.42	5.86	4.40	2.99	1.73	0.90	0.48	0.50
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	24.96	21.69	19.40	17.59	15.41	13.41	11.55	9.81	8.16	6.53	4.91	3.38
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	42.26	37.56	34.49	32.24	29.27	26.59	24.15	21.91	19.86	17.87	15.90	13.97
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	0.53	0.76	0.85	0.80	0.74	0.68	0.63	0.59	0.55	0.51	0.47	0.43
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	0.20	0.47	0.85	1.37	1.81	2.21	2.59	2.82	2.66	2.51	2.36	2.22
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI								0.13	0.64	1.13	1.60	2.05
Heavy Duty Veh.	Diesel >32t	Conventional	17.75	12.87	9.35	6.67	4.42	2.79	1.72	1.15	0.94	0.78	0.66	0.45
Heavy Duty Veh.	Diesel >32t	Euro I	15.35	12.81	10.92	9.33	7.57	5.95	4.44	3.01	1.73	0.90	0.47	0.49
Heavy Duty Veh.	Diesel >32t	Euro II	26.04	22.50	20.02	18.05	15.73	13.62	11.67	9.85	8.15	6.50	4.86	3.33

Heavy Duty Veh.	Diesel >32t	Euro III	44.09	38.97	35.58	33.08	29.87	27.00	24.39	22.01	19.86	17.78	15.74	13.76
Heavy Duty Veh.	Diesel >32t	Euro IV	0.55	0.79	0.88	0.82	0.76	0.70	0.64	0.59	0.55	0.51	0.47	0.43
Heavy Duty Veh.	Diesel >32t	Euro V	0.21	0.48	0.88	1.40	1.85	2.25	2.62	2.83	2.66	2.50	2.34	2.19
Heavy Duty Veh.	Diesel >32t	Euro VI								0.13	0.64	1.12	1.58	2.02
Buses	Urban Buses	Conventional	12.12	9.21	7.10	5.45	3.94	2.74	1.81	1.11	0.62	0.32	0.19	0.18
Buses	Urban Buses	Euro I	7.99	6.80	5.94	5.25	4.47	3.76	3.11	2.51	1.95	1.41	0.89	0.43
Buses	Urban Buses	Euro II	11.61	10.11	9.08	8.29	7.34	6.50	5.73	5.03	4.39	3.78	3.19	2.61
Buses	Urban Buses	Euro III	13.89	12.29	11.24	10.48	9.51	8.65	7.87	7.18	6.56	5.98	5.42	4.89
Buses	Urban Buses	Euro IV	0.16	0.29	0.42	0.39	0.36	0.33	0.31	0.28	0.26	0.24	0.23	0.21
Buses	Urban Buses	Euro V				0.14	0.27	0.38	0.48	0.58	0.54	0.51	0.48	0.45
Buses	Urban Buses	Euro VI									0.12	0.24	0.35	0.45
Buses	Coaches	Conventional	7.26	5.58	4.35	3.37	2.46	1.73	1.16	0.72	0.40	0.21	0.13	0.12
Buses	Coaches	Euro I	4.79	4.11	3.63	3.25	2.79	2.38	1.99	1.62	1.27	0.93	0.59	0.29
Buses	Coaches	Euro II	6.95	6.12	5.55	5.13	4.59	4.10	3.66	3.24	2.86	2.49	2.12	1.76
Buses	Coaches	Euro III	8.32	7.44	6.88	6.48	5.94	5.46	5.03	4.63	4.28	3.94	3.61	3.28
Buses	Coaches	Euro IV	0.10	0.18	0.25	0.24	0.22	0.21	0.20	0.18	0.17	0.16	0.15	0.14
Buses	Coaches	Euro V				0.09	0.17	0.24	0.31	0.37	0.35	0.34	0.32	0.30
Buses	Coaches	Euro VI									0.08	0.16	0.23	0.31
Mopeds	<50 cm³	Conventional	44.72	45.67	47.18	50.03	51.04	51.83	52.37	52.68	52.94	52.76	52.15	51.27
Mopeds	<50 cm³	Euro I	1.62	1.70	1.82	2.00	2.11	2.22	2.34	2.45	2.57	2.68	2.78	2.88
Mopeds	<50 cm³	Euro II	0.93	1.24	1.60	2.06	2.51	3.00	3.53	4.10	4.73	5.39	6.07	6.79
Motorcycles	2-stroke >50 cm³	Conventional	10.37	9.92	9.58	9.49	9.02	8.51	7.97	7.41	6.85	6.26	5.65	5.04
Motorcycles	2-stroke >50 cm³	Euro I	1.27	1.25	1.25	1.28	1.26	1.24	1.21	1.17	1.13	1.08	1.02	0.96
Motorcycles	2-stroke >50 cm³	Euro II	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.28	0.27	0.26	0.24	0.23
Motorcycles	2-stroke >50 cm³	Euro III	0.04	0.08	0.13	0.17	0.22	0.26	0.29	0.33	0.36	0.38	0.40	0.42
Motorcycles	4-stroke <250 cm³	Conventional	21.28	21.41	21.79	22.77	22.91	22.95	22.88	22.72	22.54	22.19	21.68	21.07
Motorcycles	4-stroke <250 cm³	Euro I	2.72	2.82	2.97	3.21	3.35	3.48	3.61	3.73	3.87	3.99	4.09	4.18
Motorcycles	4-stroke <250 cm³	Euro II	1.70	1.76	1.86	2.01	2.10	2.18	2.26	2.34	2.43	2.51	2.57	2.63
Motorcycles	4-stroke <250 cm³	Euro III	0.28	0.59	0.94	1.37	1.79	2.25	2.75	3.27	3.85	4.44	5.05	5.69
Motorcycles	4-stroke 250 - 750 cm³	Conventional	58.53	58.87	59.91	62.61	62.99	63.10	62.91	62.47	61.99	61.03	59.61	57.93
Motorcycles	4-stroke 250 - 750 cm³	Euro I	8.42	8.74	9.19	9.94	10.37	10.78	11.18	11.56	11.98	12.35	12.66	12.95
Motorcycles	4-stroke 250 - 750 cm³	Euro II	5.69	5.91	6.22	6.73	7.02	7.30	7.58	7.85	8.13	8.39	8.61	8.81
Motorcycles	4-stroke 250 - 750 cm³	Euro III	0.93	1.94	3.09	4.48	5.89	7.40	9.02	10.75	12.64	14.59	16.59	18.67
Motorcycles	4-stroke >750 cm³	Conventional	26.61	26.76	27.23	28.46	28.63	28.68	28.60	28.40	28.18	27.74	27.10	26.33
Motorcycles	4-stroke >750 cm³	Euro I	2.42	2.51	2.64	2.86	2.98	3.10	3.21	3.32	3.44	3.55	3.64	3.72
Motorcycles	4-stroke >750 cm³	Euro II	1.47	1.53	1.61	1.74	1.81	1.89	1.96	2.03	2.10	2.17	2.22	2.27
Motorcycles	4-stroke >750 cm³	Euro III	0.23	0.49	0.78	1.13	1.48	1.86	2.27	2.70	3.18	3.67	4.17	4.69

Fuel use and emissions for road transport 2007-2018 - N_2O

Sector	Subsector	Tech 2	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	Gasoline <1,4 l	PRE ECE	0.24	0.24	0.23	0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.20
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	0.18	0.15	0.12	0.11	0.10	0.09	0.08	0.08	0.08	0.08	0.08	0.07
Passenger Cars	Gasoline <1,4 l	ECE 15/02	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1.50	1.05	0.76	0.58	0.48	0.39	0.32	0.28	0.23	0.18	0.14	0.12
Passenger Cars	Gasoline <1,4 l	ECE 15/04	7.20	5.42	4.05	3.05	2.18	1.58	1.17	0.88	0.69	0.59	0.48	0.38
Passenger Cars	Gasoline <1,4 l	Euro I	27.23	24.39	21.68	19.09	15.56	12.05	9.59	7.39	5.58	4.09	2.98	2.18
Passenger Cars	Gasoline <1,4 l	Euro II	14.38	13.54	12.97	12.78	12.18	11.64	10.42	8.96	7.40	5.88	4.69	3.59
Passenger Cars	Gasoline <1,4 l	Euro III	2.80	2.68	2.58	2.61	2.54	2.42	2.34	2.26	2.17	2.06	1.91	1.70
Passenger Cars	Gasoline <1,4 l	Euro IV	1.18	1.73	2.31	2.94	2.87	2.80	2.74	2.66	2.63	2.57	2.45	2.35
Passenger Cars	Gasoline <1,4 l	Euro V					0.64	1.28	1.93	2.61	2.55	2.49	2.45	2.35
Passenger Cars	Gasoline <1,4 l	Euro VI									0.73	1.47	2.21	2.98
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0.20	0.19	0.19	0.19	0.19	0.18	0.18	0.18	0.17	0.17	0.17	0.16
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	0.13	0.11	0.09	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	0.88	0.62	0.45	0.34	0.28	0.23	0.19	0.16	0.13	0.10	0.09	0.07
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	5.31	4.01	3.01	2.27	1.63	1.18	0.87	0.65	0.50	0.43	0.35	0.28
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	58.78	53.97	48.92	43.31	35.72	27.81	22.36	17.34	13.16	9.71	7.07	5.11
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	34.39	32.23	30.89	30.53	29.08	27.70	24.46	20.91	17.28	13.71	10.89	8.31
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	4.37	4.17	4.02	4.06	3.94	3.75	3.62	3.51	3.37	3.20	2.93	2.59
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	1.68	2.46	3.29	4.19	4.09	4.00	3.91	3.80	3.74	3.66	3.48	3.34
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V					0.90	1.83	2.75	3.72	3.64	3.56	3.50	3.35
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI									1.04	2.09	3.15	4.25
Passenger Cars	Gasoline >2,0 l	PRE ECE	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Gasoline >2,0 l	ECE 15/03	0.11	0.08	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01
Passenger Cars	Gasoline >2,0 l	ECE 15/04	0.55	0.42	0.31	0.23	0.17	0.12	0.09	0.07	0.05	0.05	0.04	0.03
Passenger Cars	Gasoline >2,0 l	Euro I	5.13	4.72	4.29	3.84	3.20	2.47	2.00	1.55	1.18	0.88	0.64	0.46
Passenger Cars	Gasoline >2,0 l	Euro II	6.82	6.45	6.18	6.08	5.79	5.55	5.04	4.37	3.61	2.87	2.30	1.77
Passenger Cars	Gasoline >2,0 l	Euro III	1.41	1.35	1.30	1.32	1.28	1.22	1.18	1.14	1.09	1.04	0.97	0.86
Passenger Cars	Gasoline >2,0 l	Euro IV	0.61	0.90	1.20	1.52	1.49	1.46	1.42	1.38	1.36	1.33	1.26	1.21
Passenger Cars	Gasoline >2,0 l	Euro V					0.33	0.66	1.00	1.35	1.32	1.30	1.27	1.22
Passenger Cars	Gasoline >2,0 l	Euro VI									0.38	0.76	1.14	1.54
Passenger Cars	Diesel <2,0 l	Conventional	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel <2,0 l	Euro I	3.55	3.75	3.65	3.26	2.73	2.16	1.71	1.31	0.97	0.70	0.50	0.36
Passenger Cars	Diesel <2,0 l	Euro II	7.62	8.41	8.81	8.82	8.56	8.34	7.63	6.71	5.53	4.25	3.40	2.60

Passenger Cars	Diesel <2,0 l	Euro III	29.45	32.44	33.73	34.51	34.33	33.08	31.86	30.51	28.74	26.80	24.50	21.49
Passenger Cars	Diesel <2,0 l	Euro IV	15.46	26.24	37.78	48.57	47.88	46.55	44.77	42.64	41.01	39.26	36.82	34.83
Passenger Cars	Diesel <2,0 l	Euro V					11.15	22.55	33.53	44.41	41.87	39.53	37.65	35.25
Passenger Cars	Diesel <2,0 l	Euro VI									12.49	24.43	35.93	47.43
Passenger Cars	Diesel >2,0 l	Conventional	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro I	0.15	0.16	0.16	0.14	0.12	0.09	0.08	0.06	0.04	0.03	0.02	0.02
Passenger Cars	Diesel >2,0 l	Euro II	0.85	0.95	0.99	0.99	0.96	0.94	0.87	0.78	0.64	0.49	0.40	0.30
Passenger Cars	Diesel >2,0 l	Euro III	4.47	4.92	5.11	5.23	5.20	5.02	4.84	4.63	4.36	4.07	3.75	3.32
Passenger Cars	Diesel >2,0 l	Euro IV	2.52	4.27	6.15	7.91	7.79	7.58	7.29	6.94	6.68	6.39	5.99	5.67
Passenger Cars	Diesel >2,0 l	Euro V					1.81	3.67	5.46	7.23	6.82	6.43	6.13	5.74
Passenger Cars	Diesel >2,0 l	Euro VI									2.03	3.98	5.85	7.72
Light Duty Veh.	Gasoline <3,5t	Conventional	1.42	1.12	0.87	0.66	0.47	0.31	0.18	0.10	0.05	0.03	0.02	0.02
Light Duty Veh.	Gasoline <3,5t	Euro I	5.19	4.67	4.22	3.89	3.40	2.90	2.41	1.92	1.43	0.93	0.54	0.27
Light Duty Veh.	Gasoline <3,5t	Euro II	4.74	4.38	4.07	3.88	3.54	3.20	2.86	2.51	2.18	1.83	1.49	1.14
Light Duty Veh.	Gasoline <3,5t	Euro III	1.73	1.63	1.54	1.50	1.40	1.31	1.21	1.11	1.01	0.91	0.81	0.71
Light Duty Veh.	Gasoline <3,5t	Euro IV	0.09	0.18	0.27	0.37	0.45	0.45	0.43	0.42	0.40	0.38	0.36	0.33
Light Duty Veh.	Gasoline <3,5t	Euro V						0.09	0.19	0.28	0.37	0.36	0.35	0.34
Light Duty Veh.	Gasoline <3,5t	Euro VI										0.09	0.18	0.27
Light Duty Veh.	Diesel <3,5 t	Conventional	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Veh.	Diesel <3,5 t	Euro I	6.57	5.63	4.95	4.39	3.73	3.13	2.56	2.02	1.50	0.98	0.57	0.29
Light Duty Veh.	Diesel <3,5 t	Euro II	9.99	8.78	7.94	7.30	6.48	5.74	5.05	4.40	3.80	3.21	2.61	2.03
Light Duty Veh.	Diesel <3,5 t	Euro III	29.98	26.76	24.66	23.14	21.07	19.21	17.50	15.92	14.49	13.10	11.71	10.36
Light Duty Veh.	Diesel <3,5 t	Euro IV	6.97	12.86	18.41	23.92	28.39	26.37	24.55	22.91	21.45	20.06	18.68	17.36
Light Duty Veh.	Diesel <3,5 t	Euro V						6.13	11.79	17.10	22.18	21.06	19.97	18.93
Light Duty Veh.	Diesel <3,5 t	Euro VI										5.96	11.66	17.14
Heavy Duty Veh.	Gasoline >3,5 t	Conventional	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional	1.80	1.41	1.13	0.91	0.70	0.54	0.41	0.31	0.24	0.20	0.17	0.13
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	1.03	0.88	0.77	0.68	0.58	0.49	0.41	0.33	0.26	0.19	0.13	0.11
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	2.02	1.76	1.58	1.44	1.28	1.13	1.00	0.88	0.77	0.66	0.56	0.46
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	3.29	2.91	2.67	2.49	2.25	2.05	1.87	1.70	1.55	1.42	1.28	1.16
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	0.60	0.86	0.95	0.89	0.82	0.75	0.70	0.64	0.60	0.56	0.52	0.48
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	0.23	0.52	0.95	1.51	1.97	2.39	2.77	2.99	2.81	2.64	2.48	2.33
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI								0.14	0.66	1.15	1.61	2.05
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional	1.26	1.05	0.89	0.76	0.63	0.51	0.41	0.33	0.27	0.23	0.21	0.16
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	0.72	0.65	0.61	0.57	0.52	0.46	0.41	0.35	0.29	0.22	0.16	0.14
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	1.42	1.31	1.25	1.21	1.14	1.06	0.99	0.92	0.84	0.76	0.67	0.58
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	2.31	2.18	2.12	2.09	2.01	1.93	1.85	1.78	1.71	1.63	1.55	1.46
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	0.42	0.64	0.75	0.75	0.73	0.71	0.69	0.67	0.66	0.64	0.62	0.61

Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	0.16	0.39	0.75	1.27	1.76	2.25	2.75	3.13	3.09	3.05	3.00	2.95
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI								0.14	0.73	1.33	1.95	2.60
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional	5.40	3.94	2.88	2.07	1.38	0.87	0.54	0.36	0.30	0.25	0.21	0.14
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	4.67	3.92	3.36	2.89	2.36	1.86	1.40	0.95	0.55	0.29	0.15	0.16
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	9.85	8.56	7.65	6.94	6.08	5.29	4.56	3.87	3.22	2.58	1.94	1.33
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	16.90	15.02	13.79	12.89	11.70	10.63	9.66	8.76	7.94	7.15	6.36	5.58
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	3.16	4.55	5.06	4.79	4.42	4.08	3.78	3.51	3.27	3.04	2.81	2.59
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	1.19	2.78	5.08	8.16	10.79	13.20	15.45	16.82	15.88	14.98	14.10	13.26
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI								0.77	3.82	6.74	9.52	12.22
Heavy Duty Veh.	Diesel >32t	Conventional	5.64	4.09	2.97	2.12	1.40	0.89	0.55	0.36	0.30	0.25	0.21	0.14
Heavy Duty Veh.	Diesel >32t	Euro I	4.88	4.07	3.47	2.96	2.40	1.89	1.41	0.96	0.55	0.29	0.15	0.16
Heavy Duty Veh.	Diesel >32t	Euro II	10.27	8.88	7.90	7.12	6.21	5.37	4.60	3.89	3.22	2.56	1.92	1.31
Heavy Duty Veh.	Diesel >32t	Euro III	17.63	15.58	14.23	13.23	11.94	10.80	9.75	8.80	7.94	7.11	6.29	5.50
Heavy Duty Veh.	Diesel >32t	Euro IV	3.30	4.72	5.22	4.92	4.51	4.15	3.82	3.53	3.27	3.02	2.78	2.55
Heavy Duty Veh.	Diesel >32t	Euro V	1.24	2.88	5.24	8.37	11.01	13.41	15.61	16.90	15.87	14.90	13.96	13.06
Heavy Duty Veh.	Diesel >32t	Euro VI								0.78	3.82	6.70	9.43	12.04
Buses	Urban Buses	Conventional	2.85	2.17	1.67	1.28	0.93	0.64	0.43	0.26	0.15	0.07	0.04	0.04
Buses	Urban Buses	Euro I	1.88	1.60	1.40	1.23	1.05	0.88	0.73	0.59	0.46	0.33	0.21	0.10
Buses	Urban Buses	Euro II	4.20	3.65	3.28	3.00	2.66	2.35	2.07	1.82	1.59	1.37	1.15	0.95
Buses	Urban Buses	Euro III	5.53	4.90	4.48	4.18	3.79	3.44	3.14	2.86	2.62	2.38	2.16	1.95
Buses	Urban Buses	Euro IV	1.27	2.31	3.26	3.07	2.82	2.59	2.39	2.22	2.06	1.92	1.78	1.65
Buses	Urban Buses	Euro V				1.12	2.10	2.99	3.79	4.53	4.26	4.01	3.77	3.55
Buses	Urban Buses	Euro VI									0.98	1.89	2.75	3.56
Buses	Coaches	Conventional	2.01	1.54	1.20	0.93	0.68	0.48	0.32	0.20	0.11	0.06	0.03	0.03
Buses	Coaches	Euro I	1.33	1.14	1.01	0.90	0.77	0.66	0.55	0.45	0.35	0.26	0.16	0.08
Buses	Coaches	Euro II	2.96	2.61	2.37	2.19	1.96	1.75	1.56	1.38	1.22	1.06	0.90	0.75
Buses	Coaches	Euro III	3.91	3.49	3.23	3.04	2.79	2.56	2.36	2.17	2.01	1.85	1.69	1.54
Buses	Coaches	Euro IV	0.89	1.64	2.35	2.24	2.07	1.93	1.80	1.69	1.58	1.49	1.40	1.31
Buses	Coaches	Euro V				0.81	1.55	2.22	2.85	3.44	3.27	3.11	2.96	2.81
Buses	Coaches	Euro VI									0.75	1.47	2.15	2.82
Mopeds	<50 cm³	Conventional	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.23
Mopeds	<50 cm³	Euro I	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07
Mopeds	<50 cm³	Euro II	0.04	0.05	0.07	0.09	0.10	0.12	0.15	0.17	0.20	0.22	0.25	0.28
Motorcycles	2-stroke >50 cm³	Conventional	0.14	0.13	0.13	0.13	0.12	0.11	0.11	0.10	0.09	0.08	0.08	0.07
Motorcycles	2-stroke >50 cm³	Euro I	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Motorcycles	2-stroke >50 cm³	Euro II	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Motorcycles	2-stroke >50 cm³	Euro III	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.05	0.06	0.06	0.06	0.07
Motorcycles	4-stroke <250 cm³	Conventional	0.21	0.21	0.22	0.23	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.21

Motorcycles	4-stroke <250 cm³	Euro I	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
Motorcycles	4-stroke <250 cm³	Euro II	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05
Motorcycles	4-stroke <250 cm³	Euro III	0.01	0.02	0.03	0.05	0.07	0.08	0.10	0.12	0.14	0.16	0.18	0.21
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0.59	0.59	0.60	0.63	0.63	0.63	0.63	0.62	0.62	0.61	0.60	0.58
Motorcycles	4-stroke 250 - 750 cm³	Euro I	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.16
Motorcycles	4-stroke 250 - 750 cm³	Euro II	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.13	0.13
Motorcycles	4-stroke 250 - 750 cm³	Euro III	0.03	0.06	0.09	0.14	0.18	0.23	0.28	0.33	0.39	0.44	0.51	0.57
Motorcycles	4-stroke >750 cm³	Conventional	0.27	0.27	0.27	0.28	0.29	0.29	0.29	0.28	0.28	0.28	0.27	0.26
Motorcycles	4-stroke >750 cm³	Euro I	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07
Motorcycles	4-stroke >750 cm³	Euro II	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06
Motorcycles	4-stroke >750 cm³	Euro III	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.26

Fuel use and emissions for road transport 2019-2030 - Energy

Sector	Subsector	Tech 2	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	Gasoline <1,4 l	PRE ECE	72	69	65	62	58	54	51	47	43	39	35	32
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	23	22	21	20	19	18	17	17	16	15	14	13
Passenger Cars	Gasoline <1,4 l	ECE 15/02	4	4	3	3	3	3	3	3	3	3	3	2
Passenger Cars	Gasoline <1,4 l	ECE 15/03	29	24	22	21	20	20	19	19	18	17	17	16
Passenger Cars	Gasoline <1,4 l	ECE 15/04	94	76	58	46	38	32	29	27	26	25	25	24
Passenger Cars	Gasoline <1,4 l	Euro I	281	208	160	130	105	85	70	56	43	35	29	24
Passenger Cars	Gasoline <1,4 l	Euro II	823	602	432	303	213	156	118	96	79	64	53	42
Passenger Cars	Gasoline <1,4 l	Euro III	2694	2203	1697	1339	1020	757	550	392	279	199	144	108
Passenger Cars	Gasoline <1,4 l	Euro IV	5006	4753	4437	4022	3539	2995	2435	1873	1469	1113	825	599
Passenger Cars	Gasoline <1,4 l	Euro V	5132	4944	4710	4452	4224	3983	3736	3536	3129	2676	2190	1696
Passenger Cars	Gasoline <1,4 l	Euro VI	8757	10426	12055	13588	15024	16490	17937	19279	20562	21767	22889	24081
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	70	67	64	60	57	53	50	46	42	38	35	31
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	20	19	18	17	17	16	15	14	13	13	12	11
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	3	3	3	3	2	2	2	2	2	2	2	2
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	19	16	15	14	14	13	13	13	12	12	11	11
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	80	65	49	39	32	27	24	22	22	21	20	20
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	761	557	422	341	278	226	187	150	115	93	75	61
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	2268	1656	1186	827	586	433	328	268	223	179	146	118
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	4843	3950	3038	2386	1814	1344	974	693	494	355	257	195
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	8487	8058	7522	6818	6000	5078	4128	3175	2490	1886	1398	1016
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	8701	8381	7984	7548	7161	6753	6334	5995	5305	4537	3712	2876
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	14846	17674	20437	23036	25470	27956	30408	32683	34857	36901	38803	40823
Passenger Cars	Gasoline >2,0 l	PRE ECE	7	6	6	6	5	5	5	4	4	4	3	3
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	2	2	2	1	1	1	1	1	1	1	1	1
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0	0	0	0	0	0	0	0	0	0	0	0
Passenger Cars	Gasoline >2,0 l	ECE 15/03	3	2	2	2	2	2	2	2	2	2	2	2
Passenger Cars	Gasoline >2,0 l	ECE 15/04	10	8	6	5	4	3	3	3	3	3	3	3
Passenger Cars	Gasoline >2,0 l	Euro I	89	65	48	39	32	25	21	17	13	11	9	7
Passenger Cars	Gasoline >2,0 l	Euro II	660	483	347	244	172	124	93	76	62	51	42	33
Passenger Cars	Gasoline >2,0 l	Euro III	1901	1556	1199	947	722	536	390	278	198	141	102	76
Passenger Cars	Gasoline >2,0 l	Euro IV	4058	3853	3597	3261	2869	2428	1974	1518	1191	902	669	486
Passenger Cars	Gasoline >2,0 l	Euro V	4161	4008	3818	3609	3425	3229	3029	2867	2537	2170	1775	1375
Passenger Cars	Gasoline >2,0 l	Euro VI	7100	8452	9773	11016	12180	13369	14542	15630	16670	17647	18556	19522
Passenger Cars	Diesel <2,0 l	Conventional	68	58	50	45	41	37	35	33	31	29	28	26
Passenger Cars	Diesel <2,0 l	Euro I	159	116	90	72	58	48	39	31	24	20	16	13
Passenger Cars	Diesel <2,0 l	Euro II	824	600	431	304	214	152	111	91	75	60	51	41

Passenger Cars	Diesel <2,0 l	Euro III	5371	4353	3342	2624	2001	1482	1080	772	550	394	285	215
Passenger Cars	Diesel <2,0 l	Euro IV	9635	9065	8431	7604	6696	5655	4609	3551	2794	2121	1579	1151
Passenger Cars	Diesel <2,0 l	Euro V	9878	9428	8949	8418	7992	7520	7072	6704	5951	5102	4193	3259
Passenger Cars	Diesel <2,0 l	Euro VI	16854	19883	22906	25692	28426	31130	33951	36549	39106	41493	43830	46265
Passenger Cars	Diesel >2,0 l	Conventional	2	2	1	1	1	1	1	1	1	1	1	1
Passenger Cars	Diesel >2,0 l	Euro I	10	7	5	4	3	3	2	2	1	1	1	1
Passenger Cars	Diesel >2,0 l	Euro II	127	93	67	47	33	23	17	14	11	9	8	6
Passenger Cars	Diesel >2,0 l	Euro III	1124	913	701	553	422	313	228	164	117	83	60	45
Passenger Cars	Diesel >2,0 l	Euro IV	2119	1994	1854	1673	1473	1244	1014	781	615	467	347	253
Passenger Cars	Diesel >2,0 l	Euro V	2173	2074	1968	1852	1758	1654	1556	1475	1309	1122	922	717
Passenger Cars	Diesel >2,0 l	Euro VI	3707	4373	5038	5651	6252	6847	7468	8039	8602	9127	9641	10176
Light Duty Veh.	Gasoline <3,5t	Conventional	5											
Light Duty Veh.	Gasoline <3,5t	Euro I	16	15	11	8	6							
Light Duty Veh.	Gasoline <3,5t	Euro II	128	75	36	14	9	11	8	6				
Light Duty Veh.	Gasoline <3,5t	Euro III	569	478	386	296	207	134	78	39	21	14	10	7
Light Duty Veh.	Gasoline <3,5t	Euro IV	1014	920	824	732	638	546	455	367	281	196	127	74
Light Duty Veh.	Gasoline <3,5t	Euro V	1131	1054	975	899	821	743	667	594	522	451	381	315
Light Duty Veh.	Gasoline <3,5t	Euro VI	1415	1715	1987	2243	2469	2668	2848	3010	3149	3271	3368	3474
Light Duty Veh.	Diesel <3,5 t	Conventional	43											
Light Duty Veh.	Diesel <3,5 t	Euro I	104	97	72	53	40							
Light Duty Veh.	Diesel <3,5 t	Euro II	818	482	235	94	60	74	54	41				
Light Duty Veh.	Diesel <3,5 t	Euro III	3629	3092	2541	1986	1411	931	551	279	151	103	75	55
Light Duty Veh.	Diesel <3,5 t	Euro IV	6463	5953	5425	4902	4345	3800	3229	2644	2052	1454	949	561
Light Duty Veh.	Diesel <3,5 t	Euro V	7210	6822	6417	6021	5588	5175	4734	4277	3811	3341	2858	2386
Light Duty Veh.	Diesel <3,5 t	Euro VI	9024	11102	13087	15028	16810	18586	20200	21667	23002	24223	25251	26279
Heavy Duty Veh.	Gasoline >3,5 t	Conventional	153	158	163	167	171	174	177	180	183	186	188	192
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional												
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	22	20	14									
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	40	29	24	30	24	20	14	8	0	0	0	
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	119	106	92	78	64	51	42	36	34	27	22	19
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	48	44	40	37	33	29	25	22	18	14	10	7
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	240	225	210	196	180	167	152	136	121	106	90	75
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI	271	316	357	398	434	472	504	532	558	581	599	614
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional												
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	52	48	37									
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	93	72	61	79	66	58	42	24	1	1	1	
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	277	256	233	207	177	142	123	110	107	88	74	67
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	111	107	102	97	90	81	73	65	55	45	34	25

Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	559	548	534	519	498	465	440	411	378	343	304	272
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI	632	768	908	1053	1197	1317	1462	1604	1744	1883	2014	2213
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional												
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	76	66	45									
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	251	150	99	105	86	73	50	27	1	1	1	
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	1448	1217	979	749	534	357	233	154	120	100	83	70
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	665	605	543	481	415	349	281	211	141	77	41	26
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	3543	3317	3082	2850	2599	2346	2088	1820	1547	1273	1003	760
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI	4225	4958	5657	6346	6975	7582	8153	8671	9142	9573	9933	10342
Heavy Duty Veh.	Diesel >32t	Conventional												
Heavy Duty Veh.	Diesel >32t	Euro I	100	86	59									
Heavy Duty Veh.	Diesel >32t	Euro II	335	199	131	138	113	95	65	34	2	1	1	
Heavy Duty Veh.	Diesel >32t	Euro III	1914	1601	1282	976	693	463	301	198	154	127	105	88
Heavy Duty Veh.	Diesel >32t	Euro IV	876	793	709	625	537	450	361	270	180	97	52	32
Heavy Duty Veh.	Diesel >32t	Euro V	4668	4350	4022	3702	3360	3030	2685	2331	1973	1616	1269	953
Heavy Duty Veh.	Diesel >32t	Euro VI	5567	6500	7383	8243	9019	9793	10484	11102	11656	12155	12560	12971
Buses	Urban Buses	Conventional												
Buses	Urban Buses	Euro I	25	15	14									
Buses	Urban Buses	Euro II	250	183	120	84	48	25	15	14				
Buses	Urban Buses	Euro III	613	543	472	403	331	263	192	126	88	50	25	15
Buses	Urban Buses	Euro IV	505	466	425	386	346	308	268	228	187	147	107	67
Buses	Urban Buses	Euro V	1129	1062	993	927	858	796	727	657	587	518	448	378
Buses	Urban Buses	Euro VI	1467	1720	1957	2187	2393	2610	2793	2956	3102	3233	3340	3427
Buses	Coaches	Conventional												
Buses	Coaches	Euro I	18	11	10									
Buses	Coaches	Euro II	182	134	89	63	36	19	11	11				
Buses	Coaches	Euro III	458	409	360	310	257	205	151	100	70	40	21	13
Buses	Coaches	Euro IV	378	352	325	298	270	241	212	181	150	119	87	56
Buses	Coaches	Euro V	852	809	765	721	674	627	578	527	476	423	369	318
Buses	Coaches	Euro VI	1107	1311	1507	1701	1880	2055	2220	2372	2513	2643	2756	2881
Mopeds	<50 cm³	Conventional	251	244	235	225	213	197	183	168	152	135	117	101
Mopeds	<50 cm³	Euro I	45	46	47	48	49	49	50	51	51	52	52	53
Mopeds	<50 cm³	Euro II	166	183	200	219	237	252	271	290	308	328	346	373
Motorcycles	2-stroke >50 cm³	Conventional	42	36	31	26	21	17	13	9	6	4	2	
Motorcycles	2-stroke >50 cm³	Euro I	10	9	8	7	7	6	5	4	3	2	1	
Motorcycles	2-stroke >50 cm³	Euro II	7	7	6	5	5	4	3	3	2	1	1	
Motorcycles	2-stroke >50 cm³	Euro III	27	27	26	25	24	22	19	16	13	9	5	
Motorcycles	4-stroke <250 cm³	Conventional	118	113	108	102	96	89	82	74	66	59	50	42

Motorcycles	4-stroke <250 cm³	Euro I	39	39	40	40	41	41	41	41	41	41	41	41
Motorcycles	4-stroke <250 cm³	Euro II	30	31	32	32	32	32	33	33	33	33	33	33
Motorcycles	4-stroke <250 cm³	Euro III	147	163	179	196	212	227	243	260	276	293	308	327
Motorcycles	4-stroke 250 - 750 cm³	Conventional	361	347	331	314	294	273	251	228	204	180	155	131
Motorcycles	4-stroke 250 - 750 cm³	Euro I	112	114	116	118	119	119	120	120	120	120	120	121
Motorcycles	4-stroke 250 - 750 cm³	Euro II	89	90	92	93	94	95	95	96	96	96	96	96
Motorcycles	4-stroke 250 - 750 cm³	Euro III	429	475	521	569	616	661	708	756	803	851	897	951
Motorcycles	4-stroke >750 cm³	Conventional	203	195	186	176	165	153	141	128	115	101	87	73
Motorcycles	4-stroke >750 cm³	Euro I	68	69	70	71	72	72	72	73	73	73	73	73
Motorcycles	4-stroke >750 cm³	Euro II	54	55	55	56	57	57	57	58	58	58	58	58
Motorcycles	4-stroke >750 cm³	Euro III	259	287	315	344	372	400	428	457	486	515	543	575

Fuel use and emissions for road transport 2019-2030 - CO_2

Sector	Subsector	Tech 2	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	Gasoline <1,4 l	PRE ECE	4458	4216	4003	3782	3563	3333	3111	2883	2648	2409	2175	1943
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	1407	1345	1291	1236	1182	1124	1068	1011	952	892	833	775
Passenger Cars	Gasoline <1,4 l	ECE 15/02	227	219	213	206	199	192	185	178	170	163	155	148
Passenger Cars	Gasoline <1,4 l	ECE 15/03	1776	1454	1322	1285	1250	1211	1176	1139	1099	1058	1019	983
Passenger Cars	Gasoline <1,4 l	ECE 15/04	5837	4657	3555	2836	2330	1979	1761	1659	1609	1558	1510	1466
Passenger Cars	Gasoline <1,4 l	Euro I	17404	12728	9816	7941	6411	5177	4299	3420	2614	2145	1777	1500
Passenger Cars	Gasoline <1,4 l	Euro II	51073	36871	26459	18529	13056	9523	7215	5879	4865	3936	3235	2586
Passenger Cars	Gasoline <1,4 l	Euro III	167086	134907	103920	81969	62480	46369	33680	24039	17102	12216	8804	6638
Passenger Cars	Gasoline <1,4 l	Euro IV	310487	291067	271719	246293	216739	183449	149138	114743	90000	68172	50541	36723
Passenger Cars	Gasoline <1,4 l	Euro V	318323	302733	288415	272648	258684	243957	228831	216649	191723	163992	134166	103951
Passenger Cars	Gasoline <1,4 l	Euro VI	543146	638427	738233	832138	920092	1009911	1098566	1181160	1259813	1333719	1402537	1475681
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	4344	4109	3901	3686	3473	3249	3032	2810	2580	2348	2119	1894
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	1219	1165	1118	1070	1022	972	923	874	822	769	718	668
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	173	166	161	156	151	145	140	135	129	123	118	112
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	1202	986	898	873	849	823	798	773	746	718	692	667
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	4938	3952	3005	2406	1970	1657	1456	1364	1323	1281	1242	1206
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	47214	34100	25814	20912	17026	13813	11454	9198	7023	5701	4591	3758
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	140693	101416	72631	50653	35901	26510	20061	16393	13686	10966	8965	7206
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	300371	241886	186045	146124	111118	82292	59675	42453	30277	21782	15751	11952
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	526356	493433	460635	417530	367429	310994	252828	194520	152573	115570	85681	62256
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	539641	513210	488938	462209	438537	413571	387929	367276	325021	278010	227445	176223
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	920774	1082299	1251497	1410690	1559796	1712062	1862355	2002373	2135711	2261001	2377665	2501662
Passenger Cars	Gasoline >2,0 l	PRE ECE	417	394	374	354	333	312	291	270	248	225	203	182

Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	103	98	94	90	86	82	78	73	69	64	60	56
Passenger Cars	Gasoline >2,0 l	ECE 15/02	14	14	13	13	12	12	12	11	11	10	10	9
Passenger Cars	Gasoline >2,0 l	ECE 15/03	178	146	132	129	125	121	118	114	110	106	102	99
Passenger Cars	Gasoline >2,0 l	ECE 15/04	624	495	379	302	250	214	192	182	176	170	165	160
Passenger Cars	Gasoline >2,0 l	Euro I	5492	3957	2942	2389	1948	1562	1306	1061	800	652	527	432
Passenger Cars	Gasoline >2,0 l	Euro II	40907	29583	21274	14969	10504	7570	5705	4643	3812	3098	2567	2049
Passenger Cars	Gasoline >2,0 l	Euro III	117923	95276	73412	57975	44223	32836	23862	17043	12126	8644	6220	4685
Passenger Cars	Gasoline >2,0 l	Euro IV	251714	235970	220285	199672	175712	148724	120908	93023	72964	55268	40974	29772
Passenger Cars	Gasoline >2,0 l	Euro V	258067	245428	233821	221038	209718	197778	185516	175639	155432	132950	108769	84274
Passenger Cars	Gasoline >2,0 l	Euro VI	440333	517578	598492	674622	745927	818744	890617	957577	1021342	1081258	1137049	1196347
Passenger Cars	Diesel <2,0 l	Conventional	4515	3879	3344	2978	2704	2470	2300	2167	2053	1935	1823	1713
Passenger Cars	Diesel <2,0 l	Euro I	10666	7728	5943	4779	3877	3156	2610	2074	1603	1306	1066	887
Passenger Cars	Diesel <2,0 l	Euro II	55148	39807	28606	20170	14203	10069	7378	6055	4958	3966	3377	2744
Passenger Cars	Diesel <2,0 l	Euro III	359268	288834	221708	174037	132739	98302	71586	51176	36479	26104	18902	14278
Passenger Cars	Diesel <2,0 l	Euro IV	644486	601441	559323	504419	444125	375021	305639	235422	185223	140603	104700	76312
Passenger Cars	Diesel <2,0 l	Euro V	660752	625547	593690	558395	530077	498717	468959	444505	394573	338229	277933	216012
Passenger Cars	Diesel <2,0 l	Euro VI	1127423	1319203	1519623	1704258	1885386	2064544	2251363	2423423	2592736	2750752	2905451	3066502
Passenger Cars	Diesel >2,0 l	Conventional	130	110	94	83	75	69	64	61	57	54	51	48
Passenger Cars	Diesel >2,0 l	Euro I	642	462	348	280	228	184	153	124	94	77	62	51
Passenger Cars	Diesel >2,0 l	Euro II	8497	6145	4427	3137	2201	1539	1119	918	745	598	515	418
Passenger Cars	Diesel >2,0 l	Euro III	75157	60549	46525	36649	28010	20775	15150	10856	7732	5500	3969	2985
Passenger Cars	Diesel >2,0 l	Euro IV	141760	132292	123028	110951	97689	82489	67228	51783	40741	30927	23030	16785
Passenger Cars	Diesel >2,0 l	Euro V	145338	137594	130587	122824	116595	109697	103151	97772	86790	74396	61134	47514
Passenger Cars	Diesel >2,0 l	Euro VI	247986	290169	334253	374865	414706	454113	495205	533051	570293	605050	639077	674502
Light Duty Veh.	Gasoline <3,5t	Conventional	320											
Light Duty Veh.	Gasoline <3,5t	Euro I	1009	921	669	484	359							
Light Duty Veh.	Gasoline <3,5t	Euro II	7954	4562	2185	855	539	651	468	348				
Light Duty Veh.	Gasoline <3,5t	Euro III	35309	29256	23630	18153	12690	8185	4758	2371	1269	852	617	447
Light Duty Veh.	Gasoline <3,5t	Euro IV	62874	56322	50454	44813	39076	33408	27882	22510	17209	12035	7760	4544
Light Duty Veh.	Gasoline <3,5t	Euro V	70146	64545	59676	55045	50259	45504	40878	36406	31963	27644	23360	19331
Light Duty Veh.	Gasoline <3,5t	Euro VI	87788	105040	121702	137384	151180	163414	174418	184442	192934	200444	206382	212904
Light Duty Veh.	Diesel <3,5 t	Conventional	2903											
Light Duty Veh.	Diesel <3,5 t	Euro I	6938	6459	4775	3511	2649							
Light Duty Veh.	Diesel <3,5 t	Euro II	54694	31995	15586	6203	3973	4909	3595	2709				
Light Duty Veh.	Diesel <3,5 t	Euro III	242785	205171	168567	131721	93591	61738	36538	18469	10032	6822	5005	3658
Light Duty Veh.	Diesel <3,5 t	Euro IV	432321	394978	359917	325159	288191	251994	214132	175334	136023	96413	62937	37173
Light Duty Veh.	Diesel <3,5 t	Euro V	482323	452644	425705	399404	370665	343238	313936	283569	252645	221467	189465	158157
Light Duty Veh.	Diesel <3,5 t	Euro VI	603627	736631	868176	996852	1114963	1232625	1339513	1436616	1525004	1605837	1673876	1741850

Heavy Duty Veh.	Gasoline >3,5 t	Conventional	9507	9691	9955	10238	10469	10644	10843	11047	11221	11395	11534	11794
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional												
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	1477	1305	955									
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	2650	1935	1575	1958	1572	1356	947	531	27	12	12	
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	7979	7002	6082	5181	4258	3375	2811	2416	2280	1795	1456	1237
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	3206	2930	2676	2430	2173	1937	1684	1428	1173	921	669	458
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	16068	14950	13945	12982	11961	11058	10055	9036	8018	7009	5991	4992
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI	18158	20952	23706	26375	28761	31294	33415	35300	36981	38494	39717	40686
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional												
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	3447	3182	2432									
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	6231	4755	4041	5241	4385	3823	2774	1615	84	41	41	
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	18555	17017	15435	13715	11745	9407	8147	7272	7123	5816	4892	4454
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	7439	7103	6773	6415	5979	5387	4867	4288	3656	2977	2241	1647
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	37403	36370	35421	34396	33025	30855	29164	27223	25071	22733	20141	17996
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI	42267	50971	60213	69879	79413	87324	96923	106349	115642	124851	133525	146679
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional												
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	5072	4355	2966									
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	16812	9932	6593	6937	5737	4819	3293	1761	95	47	41	
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	96848	80720	64924	49656	35399	23703	15482	10191	7965	6632	5482	4627
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	44472	40133	36010	31891	27526	23118	18613	13989	9370	5078	2701	1699
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	237004	220096	204466	189044	172360	155608	138450	120691	102591	84392	66514	50379
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI	282652	328941	375294	420944	462642	502845	540641	574907	606084	634621	658439	685465
Heavy Duty Veh.	Diesel >32t	Conventional												
Heavy Duty Veh.	Diesel >32t	Euro I	6715	5739	3890									
Heavy Duty Veh.	Diesel >32t	Euro II	22422	13183	8710	9122	7509	6301	4287	2283	123	60	52	
Heavy Duty Veh.	Diesel >32t	Euro III	128064	106232	85043	64743	45944	30727	19984	13098	10193	8452	6958	5825
Heavy Duty Veh.	Diesel >32t	Euro IV	58609	52640	47011	41441	35605	29869	23943	17918	11951	6449	3417	2131
Heavy Duty Veh.	Diesel >32t	Euro V	312233	288583	266834	245567	222872	200974	178040	154538	130807	107153	84104	63186
Heavy Duty Veh.	Diesel >32t	Euro VI	372370	431297	489769	546803	598225	649444	695236	736139	772778	805784	832574	859728
Buses	Urban Buses	Conventional												
Buses	Urban Buses	Euro I	1685	1009	960									
Buses	Urban Buses	Euro II	16740	12146	7970	5599	3160	1637	987	937				
Buses	Urban Buses	Euro III	41017	36021	31320	26711	21982	17451	12749	8349	5830	3286	1679	1005
Buses	Urban Buses	Euro IV	33797	30889	28221	25636	22935	20449	17780	15086	12398	9734	7069	4436
Buses	Urban Buses	Euro V	75533	70442	65883	61521	56878	52777	48216	43576	38932	34328	29671	25046
Buses	Urban Buses	Euro VI	98115	114097	129823	145055	158705	173078	185207	196003	205652	214340	221400	227171
Buses	Coaches	Conventional												
Buses	Coaches	Euro I	1193	722	694									

Buses	Coaches	Euro II	12164	8915	5909	4193	2389	1241	756	724				
Buses	Coaches	Euro III	30620	27163	23856	20549	17079	13593	10025	6627	4671	2657	1370	835
Buses	Coaches	Euro IV	25311	23368	21564	19785	17876	15979	14025	12012	9965	7896	5788	3699
Buses	Coaches	Euro V	57011	53706	50736	47851	44679	41563	38332	34971	31537	28067	24485	21050
Buses	Coaches	Euro VI	74055	86990	99976	112822	124666	136304	147241	157295	166587	175246	182698	190926
Mopeds	<50 cm³	Conventional	15551	14924	14363	13765	13034	12068	11199	10287	9300	8271	7177	6180
Mopeds	<50 cm³	Euro I	2765	2813	2883	2956	3013	3023	3065	3107	3138	3168	3185	3270
Mopeds	<50 cm³	Euro II	10281	11212	12275	13411	14524	15450	16574	17743	18896	20080	21229	22888
Motorcycles	2-stroke >50 cm³	Conventional	2582	2217	1889	1585	1293	1022	779	564	377	221	94	
Motorcycles	2-stroke >50 cm³	Euro I	615	559	508	456	400	343	285	228	170	113	56	
Motorcycles	2-stroke >50 cm³	Euro II	442	403	366	328	289	248	206	165	123	82	41	
Motorcycles	2-stroke >50 cm³	Euro III	1646	1628	1597	1543	1454	1332	1182	1005	797	560	294	
Motorcycles	4-stroke <250 cm³	Conventional	7294	6923	6592	6252	5860	5432	4994	4546	4073	3591	3089	2604
Motorcycles	4-stroke <250 cm³	Euro I	2390	2405	2438	2474	2496	2507	2518	2529	2532	2534	2526	2538
Motorcycles	4-stroke <250 cm³	Euro II	1889	1902	1930	1960	1979	1990	2001	2012	2016	2019	2015	2027
Motorcycles	4-stroke <250 cm³	Euro III	9144	9997	10959	11974	12958	13919	14907	15924	16915	17924	18890	20034
Motorcycles	4-stroke 250 - 750 cm³	Conventional	22416	21277	20258	19212	18008	16694	15347	13969	12516	11034	9494	8002
Motorcycles	4-stroke 250 - 750 cm³	Euro I	6954	6998	7094	7199	7262	7295	7328	7360	7368	7372	7350	7386
Motorcycles	4-stroke 250 - 750 cm³	Euro II	5497	5536	5616	5704	5760	5791	5823	5854	5866	5876	5864	5899
Motorcycles	4-stroke 250 - 750 cm³	Euro III	26607	29091	31889	34843	37706	40503	43378	46337	49223	52157	54968	58296
Motorcycles	4-stroke >750 cm³	Conventional	12600	11959	11387	10799	10122	9384	8627	7852	7035	6202	5336	4498
Motorcycles	4-stroke >750 cm³	Euro I	4206	4232	4290	4354	4392	4412	4432	4451	4456	4459	4445	4467
Motorcycles	4-stroke >750 cm³	Euro II	3324	3348	3397	3450	3483	3502	3521	3540	3548	3553	3546	3568
Motorcycles	4-stroke >750 cm³	Euro III	16091	17593	19285	21072	22803	24495	26234	28023	29768	31543	33243	35255

Fuel use and emissions for road transport 2019-2030 - CH_4

Sector	Subsector	Tech 2	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	Gasoline <1,4 l	PRE ECE	1.85	1.78	1.69	1.59	1.50	1.40	1.31	1.21	1.11	1.01	0.92	0.82
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	0.71	0.68	0.66	0.63	0.60	0.57	0.54	0.51	0.48	0.45	0.42	0.39
Passenger Cars	Gasoline <1,4 l	ECE 15/02	0.12	0.11	0.11	0.11	0.10	0.10	0.10	0.09	0.09	0.08	0.08	0.08
Passenger Cars	Gasoline <1,4 l	ECE 15/03	0.92	0.76	0.69	0.67	0.65	0.63	0.61	0.59	0.57	0.55	0.53	0.51
Passenger Cars	Gasoline <1,4 l	ECE 15/04	3.14	2.54	1.94	1.55	1.27	1.08	0.96	0.90	0.88	0.85	0.82	0.80
Passenger Cars	Gasoline <1,4 l	Euro I	3.07	2.28	1.76	1.42	1.15	0.93	0.77	0.61	0.47	0.38	0.32	0.27
Passenger Cars	Gasoline <1,4 l	Euro II	9.57	7.00	5.02	3.52	2.48	1.81	1.37	1.11	0.92	0.75	0.61	0.49
Passenger Cars	Gasoline <1,4 l	Euro III	10.77	8.81	6.78	5.35	4.08	3.03	2.20	1.57	1.12	0.80	0.57	0.43
Passenger Cars	Gasoline <1,4 l	Euro IV	8.70	8.26	7.71	6.99	6.15	5.21	4.23	3.26	2.55	1.93	1.43	1.04
Passenger Cars	Gasoline <1,4 l	Euro V	8.92	8.60	8.19	7.74	7.34	6.93	6.50	6.15	5.44	4.65	3.81	2.95

Passenger Cars	Gasoline <1,4 l	Euro VI	15.23	18.13	20.96	23.63	26.12	28.67	31.19	33.52	35.75	37.85	39.80	41.87
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	1.51	1.44	1.37	1.29	1.22	1.14	1.06	0.99	0.91	0.82	0.74	0.66
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	0.52	0.51	0.49	0.47	0.44	0.42	0.40	0.38	0.36	0.33	0.31	0.29
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	0.54	0.45	0.41	0.40	0.39	0.37	0.36	0.35	0.34	0.33	0.32	0.30
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	2.30	1.87	1.42	1.14	0.93	0.78	0.69	0.64	0.62	0.61	0.59	0.57
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	7.10	5.20	3.93	3.19	2.59	2.10	1.75	1.40	1.07	0.87	0.70	0.57
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	22.12	16.15	11.56	8.06	5.72	4.22	3.19	2.61	2.18	1.74	1.43	1.15
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	16.30	13.30	10.23	8.03	6.11	4.52	3.28	2.33	1.66	1.20	0.87	0.66
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	12.38	11.75	10.97	9.94	8.75	7.41	6.02	4.63	3.63	2.75	2.04	1.48
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	12.69	12.22	11.64	11.01	10.44	9.85	9.24	8.74	7.74	6.62	5.41	4.19
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	21.65	25.78	29.80	33.59	37.14	40.77	44.35	47.66	50.83	53.81	56.59	59.53
Passenger Cars	Gasoline >2,0 l	PRE ECE	0.12	0.12	0.11	0.10	0.10	0.09	0.09	0.08	0.07	0.07	0.06	0.05
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Gasoline >2,0 l	ECE 15/03	0.07	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04
Passenger Cars	Gasoline >2,0 l	ECE 15/04	0.24	0.20	0.15	0.12	0.10	0.08	0.08	0.07	0.07	0.07	0.07	0.06
Passenger Cars	Gasoline >2,0 l	Euro I	0.64	0.47	0.35	0.28	0.23	0.19	0.16	0.13	0.09	0.08	0.06	0.05
Passenger Cars	Gasoline >2,0 l	Euro II	4.73	3.46	2.49	1.75	1.23	0.89	0.67	0.54	0.45	0.36	0.30	0.24
Passenger Cars	Gasoline >2,0 l	Euro III	5.46	4.47	3.44	2.72	2.07	1.54	1.12	0.80	0.57	0.40	0.29	0.22
Passenger Cars	Gasoline >2,0 l	Euro IV	4.49	4.26	3.98	3.61	3.17	2.69	2.18	1.68	1.32	1.00	0.74	0.54
Passenger Cars	Gasoline >2,0 l	Euro V	4.60	4.43	4.22	3.99	3.79	3.57	3.35	3.17	2.81	2.40	1.96	1.52
Passenger Cars	Gasoline >2,0 l	Euro VI	7.86	9.35	10.81	12.19	13.48	14.79	16.09	17.29	18.44	19.52	20.53	21.60
Passenger Cars	Diesel <2,0 l	Conventional	0.47	0.40	0.35	0.31	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18
Passenger Cars	Diesel <2,0 l	Euro I	0.78	0.57	0.44	0.35	0.29	0.23	0.19	0.15	0.12	0.10	0.08	0.07
Passenger Cars	Diesel <2,0 l	Euro II	1.52	1.11	0.80	0.56	0.40	0.28	0.21	0.17	0.14	0.11	0.09	0.08
Passenger Cars	Diesel <2,0 l	Euro III	2.70	2.19	1.68	1.32	1.01	0.75	0.54	0.39	0.28	0.20	0.14	0.11
Passenger Cars	Diesel <2,0 l	Euro IV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel <2,0 l	Euro V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel <2,0 l	Euro VI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Conventional	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Diesel >2,0 l	Euro I	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro II	0.18	0.13	0.09	0.07	0.05	0.03	0.02	0.02	0.02	0.01	0.01	0.01
Passenger Cars	Diesel >2,0 l	Euro III	0.42	0.34	0.26	0.21	0.16	0.12	0.09	0.06	0.04	0.03	0.02	0.02
Passenger Cars	Diesel >2,0 l	Euro IV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro VI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Veh.	Gasoline <3,5t	Conventional	0.14											

Light Duty Veh.	Gasoline <3,5t	Euro I	0.10	0.09	0.07	0.05	0.04							
Light Duty Veh.	Gasoline <3,5t	Euro II	0.80	0.47	0.22	0.09	0.06	0.07	0.05	0.04				
Light Duty Veh.	Gasoline <3,5t	Euro III	1.27	1.07	0.86	0.66	0.46	0.30	0.17	0.09	0.05	0.03	0.02	0.02
Light Duty Veh.	Gasoline <3,5t	Euro IV	1.05	0.95	0.86	0.76	0.66	0.57	0.47	0.38	0.29	0.20	0.13	0.08
Light Duty Veh.	Gasoline <3,5t	Euro V	1.17	1.09	1.01	0.93	0.85	0.77	0.69	0.62	0.54	0.47	0.40	0.33
Light Duty Veh.	Gasoline <3,5t	Euro VI	1.47	1.78	2.06	2.33	2.56	2.77	2.96	3.13	3.27	3.40	3.50	3.61
Light Duty Veh.	Diesel <3,5 t	Conventional	0.21											
Light Duty Veh.	Diesel <3,5 t	Euro I	0.38	0.35	0.26	0.19	0.15							
Light Duty Veh.	Diesel <3,5 t	Euro II	1.15	0.68	0.33	0.13	0.08	0.10	0.08	0.06				
Light Duty Veh.	Diesel <3,5 t	Euro III	1.33	1.13	0.93	0.73	0.52	0.34	0.20	0.10	0.06	0.04	0.03	0.02
Light Duty Veh.	Diesel <3,5 t	Euro IV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Veh.	Diesel <3,5 t	Euro V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Veh.	Diesel <3,5 t	Euro VI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Duty Veh.	Gasoline >3,5 t	Conventional	2.20	2.27	2.33	2.40	2.45	2.49	2.54	2.58	2.62	2.67	2.70	2.76
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional												
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	0.27	0.24	0.18									
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	0.37	0.27	0.22	0.28	0.22	0.19	0.13	0.07	0.00	0.00	0.00	
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	1.00	0.89	0.77	0.66	0.54	0.43	0.36	0.31	0.29	0.23	0.18	0.16
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	0.13	0.13	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.06	0.05	0.04
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI	0.15	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.31	0.32	0.33	0.34
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional												
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	0.36	0.34	0.26									
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	0.49	0.38	0.32	0.42	0.35	0.30	0.22	0.13	0.01	0.00	0.00	
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	1.33	1.23	1.11	0.99	0.85	0.68	0.59	0.53	0.51	0.42	0.35	0.32
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	0.18	0.17	0.17	0.16	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI	0.20	0.24	0.29	0.33	0.38	0.42	0.46	0.51	0.55	0.59	0.64	0.70
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional												
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	0.79	0.69	0.47									
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	2.19	1.30	0.86	0.91	0.75	0.63	0.43	0.23	0.01	0.01	0.01	
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	12.06	10.14	8.16	6.24	4.45	2.98	1.95	1.28	1.00	0.83	0.69	0.58
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	0.40	0.36	0.33	0.29	0.25	0.21	0.17	0.13	0.08	0.05	0.02	0.02
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	2.09	1.96	1.82	1.68	1.53	1.38	1.23	1.07	0.91	0.75	0.59	0.45
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI	2.49	2.92	3.34	3.74	4.11	4.47	4.81	5.11	5.39	5.65	5.86	6.10
Heavy Duty Veh.	Diesel >32t	Conventional												
Heavy Duty Veh.	Diesel >32t	Euro I	0.78	0.67	0.45									
Heavy Duty Veh.	Diesel >32t	Euro II	2.14	1.27	0.84	0.88	0.72	0.61	0.41	0.22	0.01	0.01	0.01	

Heavy Duty Veh.	Diesel >32t	Euro III	11.83	9.89	7.92	6.03	4.28	2.86	1.86	1.22	0.95	0.79	0.65	0.54
Heavy Duty Veh.	Diesel >32t	Euro IV	0.39	0.35	0.32	0.28	0.24	0.20	0.16	0.12	0.08	0.04	0.02	0.01
Heavy Duty Veh.	Diesel >32t	Euro V	2.05	1.91	1.77	1.62	1.47	1.33	1.18	1.02	0.87	0.71	0.56	0.42
Heavy Duty Veh.	Diesel >32t	Euro VI	2.44	2.85	3.24	3.62	3.96	4.30	4.60	4.87	5.12	5.33	5.51	5.69
Buses	Urban Buses	Conventional												
Buses	Urban Buses	Euro I	0.31	0.19	0.18									
Buses	Urban Buses	Euro II	2.06	1.51	0.99	0.69	0.39	0.20	0.12	0.12				
Buses	Urban Buses	Euro III	4.38	3.87	3.37	2.87	2.37	1.88	1.37	0.90	0.63	0.35	0.18	0.11
Buses	Urban Buses	Euro IV	0.19	0.18	0.16	0.15	0.13	0.12	0.10	0.09	0.07	0.06	0.04	0.03
Buses	Urban Buses	Euro V	0.43	0.40	0.38	0.35	0.32	0.30	0.27	0.25	0.22	0.20	0.17	0.14
Buses	Urban Buses	Euro VI	0.55	0.65	0.74	0.83	0.90	0.99	1.06	1.12	1.17	1.22	1.26	1.29
Buses	Coaches	Conventional												
Buses	Coaches	Euro I	0.21	0.13	0.12									
Buses	Coaches	Euro II	1.40	1.03	0.68	0.49	0.28	0.14	0.09	0.08				
Buses	Coaches	Euro III	2.97	2.66	2.33	2.01	1.67	1.33	0.98	0.65	0.46	0.26	0.13	0.08
Buses	Coaches	Euro IV	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02
Buses	Coaches	Euro V	0.29	0.28	0.26	0.25	0.23	0.21	0.20	0.18	0.16	0.14	0.13	0.11
Buses	Coaches	Euro VI	0.38	0.45	0.51	0.58	0.64	0.70	0.75	0.81	0.85	0.90	0.94	0.98
Mopeds	<50 cm³	Conventional	50.15	48.74	46.91	44.95	42.57	39.41	36.57	33.58	30.36	27.00	23.42	20.17
Mopeds	<50 cm³	Euro I	2.97	3.06	3.14	3.22	3.28	3.29	3.34	3.38	3.41	3.45	3.47	3.56
Mopeds	<50 cm³	Euro II	7.55	8.34	9.13	9.97	10.80	11.49	12.32	13.19	14.04	14.92	15.77	17.01
Motorcycles	2-stroke >50 cm³	Conventional	4.45	3.87	3.29	2.76	2.25	1.78	1.36	0.98	0.66	0.38	0.16	
Motorcycles	2-stroke >50 cm³	Euro I	0.89	0.82	0.75	0.67	0.59	0.50	0.42	0.34	0.25	0.17	0.08	
Motorcycles	2-stroke >50 cm³	Euro II	0.21	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	
Motorcycles	2-stroke >50 cm³	Euro III	0.42	0.42	0.42	0.40	0.38	0.35	0.31	0.26	0.21	0.15	0.08	
Motorcycles	4-stroke <250 cm³	Conventional	20.37	19.58	18.65	17.68	16.57	15.36	14.12	12.85	11.51	10.15	8.73	7.36
Motorcycles	4-stroke <250 cm³	Euro I	4.27	4.35	4.41	4.47	4.51	4.53	4.55	4.57	4.58	4.58	4.57	4.59
Motorcycles	4-stroke <250 cm³	Euro II	2.69	2.74	2.78	2.83	2.85	2.87	2.88	2.90	2.90	2.91	2.90	2.92
Motorcycles	4-stroke <250 cm³	Euro III	6.35	7.03	7.70	8.42	9.11	9.78	10.48	11.19	11.88	12.59	13.27	14.07
Motorcycles	4-stroke 250 - 750 cm³	Conventional	56.02	53.85	51.27	48.63	45.58	42.25	38.84	35.34	31.66	27.91	24.01	20.24
Motorcycles	4-stroke 250 - 750 cm³	Euro I	13.22	13.47	13.66	13.86	13.98	14.05	14.11	14.17	14.18	14.19	14.14	14.21
Motorcycles	4-stroke 250 - 750 cm³	Euro II	9.00	9.18	9.32	9.46	9.55	9.61	9.66	9.71	9.73	9.74	9.72	9.78
Motorcycles	4-stroke 250 - 750 cm³	Euro III	20.84	23.07	25.29	27.64	29.91	32.12	34.40	36.73	39.02	41.34	43.57	46.20
Motorcycles	4-stroke >750 cm³	Conventional	25.46	24.48	23.31	22.10	20.72	19.20	17.65	16.06	14.39	12.69	10.92	9.20
Motorcycles	4-stroke >750 cm³	Euro I	3.80	3.87	3.93	3.98	4.02	4.04	4.05	4.07	4.07	4.08	4.06	4.08
Motorcycles	4-stroke >750 cm³	Euro II	2.32	2.37	2.41	2.44	2.47	2.48	2.49	2.51	2.51	2.52	2.51	2.53
Motorcycles	4-stroke >750 cm³	Euro III	5.24	5.80	6.36	6.95	7.52	8.08	8.65	9.23	9.81	10.39	10.95	11.62

Fuel use and emissions for road transport 2019-2030 - N_2O

Sector	Subsector	Tech 2	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	Gasoline <1,4 l	PRE ECE	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08
Passenger Cars	Gasoline <1,4 l	ECE 15/00-01	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04
Passenger Cars	Gasoline <1,4 l	ECE 15/02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline <1,4 l	ECE 15/03	0.09	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05
Passenger Cars	Gasoline <1,4 l	ECE 15/04	0.32	0.26	0.20	0.16	0.13	0.11	0.10	0.09	0.09	0.09	0.08	0.08
Passenger Cars	Gasoline <1,4 l	Euro I	1.57	1.17	0.90	0.73	0.59	0.47	0.39	0.31	0.24	0.20	0.16	0.14
Passenger Cars	Gasoline <1,4 l	Euro II	2.69	1.96	1.41	0.99	0.70	0.51	0.38	0.31	0.26	0.21	0.17	0.14
Passenger Cars	Gasoline <1,4 l	Euro III	1.47	1.20	0.93	0.73	0.56	0.41	0.30	0.21	0.15	0.11	0.08	0.06
Passenger Cars	Gasoline <1,4 l	Euro IV	2.25	2.14	1.99	1.81	1.59	1.35	1.09	0.84	0.66	0.50	0.37	0.27
Passenger Cars	Gasoline <1,4 l	Euro V	2.30	2.22	2.12	2.00	1.90	1.79	1.68	1.59	1.41	1.20	0.98	0.76
Passenger Cars	Gasoline <1,4 l	Euro VI	3.69	4.43	5.15	5.83	6.48	7.13	7.77	8.37	8.95	9.49	9.99	10.52
Passenger Cars	Gasoline 1,4 - 2,0 l	PRE ECE	0.15	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.09	0.08	0.08	0.07
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/00-01	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/03	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
Passenger Cars	Gasoline 1,4 - 2,0 l	ECE 15/04	0.24	0.19	0.14	0.12	0.09	0.08	0.07	0.07	0.06	0.06	0.06	0.06
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro I	3.64	2.66	2.01	1.63	1.33	1.08	0.89	0.72	0.55	0.44	0.36	0.29
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro II	6.21	4.54	3.25	2.27	1.61	1.19	0.90	0.73	0.61	0.49	0.40	0.32
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro III	2.23	1.82	1.40	1.10	0.83	0.62	0.45	0.32	0.23	0.16	0.12	0.09
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro IV	3.20	3.04	2.84	2.57	2.26	1.91	1.56	1.20	0.94	0.71	0.53	0.38
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro V	3.27	3.16	3.01	2.84	2.70	2.55	2.39	2.26	2.00	1.71	1.40	1.08
Passenger Cars	Gasoline 1,4 - 2,0 l	Euro VI	5.27	6.32	7.35	8.32	9.24	10.16	11.08	11.93	12.75	13.52	14.23	14.99
Passenger Cars	Gasoline >2,0 l	PRE ECE	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline >2,0 l	ECE 15/00-01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Gasoline >2,0 l	ECE 15/02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Gasoline >2,0 l	ECE 15/03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Gasoline >2,0 l	ECE 15/04	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Passenger Cars	Gasoline >2,0 l	Euro I	0.33	0.24	0.18	0.15	0.12	0.09	0.08	0.06	0.05	0.04	0.03	0.03
Passenger Cars	Gasoline >2,0 l	Euro II	1.33	0.97	0.70	0.49	0.35	0.25	0.19	0.15	0.13	0.10	0.08	0.07
Passenger Cars	Gasoline >2,0 l	Euro III	0.75	0.61	0.47	0.37	0.28	0.21	0.15	0.11	0.08	0.06	0.04	0.03
Passenger Cars	Gasoline >2,0 l	Euro IV	1.16	1.10	1.03	0.93	0.82	0.69	0.56	0.43	0.34	0.26	0.19	0.14
Passenger Cars	Gasoline >2,0 l	Euro V	1.19	1.15	1.09	1.03	0.98	0.92	0.87	0.82	0.73	0.62	0.51	0.39
Passenger Cars	Gasoline >2,0 l	Euro VI	1.91	2.30	2.67	3.02	3.36	3.69	4.03	4.33	4.63	4.91	5.17	5.45
Passenger Cars	Diesel <2,0 l	Conventional	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel <2,0 l	Euro I	0.25	0.18	0.14	0.11	0.09	0.08	0.06	0.05	0.04	0.03	0.03	0.02
Passenger Cars	Diesel <2,0 l	Euro II	1.94	1.41	1.01	0.72	0.50	0.36	0.26	0.21	0.18	0.14	0.12	0.10

Passenger Cars	Diesel <2,0 l	Euro III	18.37	14.89	11.43	8.97	6.84	5.07	3.69	2.64	1.88	1.35	0.98	0.74
Passenger Cars	Diesel <2,0 l	Euro IV	32.95	31.00	28.84	26.01	22.90	19.34	15.76	12.14	9.56	7.25	5.40	3.94
Passenger Cars	Diesel <2,0 l	Euro V	33.78	32.25	30.61	28.79	27.33	25.72	24.19	22.93	20.35	17.45	14.34	11.15
Passenger Cars	Diesel <2,0 l	Euro VI	57.64	68.00	78.34	87.87	97.22	106.47	116.12	125.01	133.75	141.91	149.91	158.23
Passenger Cars	Diesel >2,0 l	Conventional	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro I	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger Cars	Diesel >2,0 l	Euro II	0.23	0.17	0.12	0.08	0.06	0.04	0.03	0.02	0.02	0.02	0.01	0.01
Passenger Cars	Diesel >2,0 l	Euro III	2.84	2.31	1.77	1.40	1.07	0.79	0.58	0.41	0.30	0.21	0.15	0.11
Passenger Cars	Diesel >2,0 l	Euro IV	5.36	5.05	4.69	4.23	3.73	3.15	2.57	1.98	1.56	1.18	0.88	0.64
Passenger Cars	Diesel >2,0 l	Euro V	5.50	5.25	4.98	4.69	4.45	4.19	3.94	3.73	3.31	2.84	2.33	1.81
Passenger Cars	Diesel >2,0 l	Euro VI	9.38	11.07	12.75	14.30	15.83	17.33	18.90	20.35	21.77	23.10	24.40	25.76
Light Duty Veh.	Gasoline <3,5t	Conventional	0.01											
Light Duty Veh.	Gasoline <3,5t	Euro I	0.11	0.10	0.07	0.05	0.04							
Light Duty Veh.	Gasoline <3,5t	Euro II	0.80	0.47	0.22	0.09	0.06	0.07	0.05	0.04				
Light Duty Veh.	Gasoline <3,5t	Euro III	0.61	0.51	0.42	0.32	0.22	0.14	0.08	0.04	0.02	0.01	0.01	0.01
Light Duty Veh.	Gasoline <3,5t	Euro IV	0.30	0.27	0.25	0.22	0.19	0.16	0.14	0.11	0.08	0.06	0.04	0.02
Light Duty Veh.	Gasoline <3,5t	Euro V	0.33	0.31	0.29	0.27	0.25	0.22	0.20	0.18	0.16	0.13	0.11	0.09
Light Duty Veh.	Gasoline <3,5t	Euro VI	0.36	0.44	0.52	0.60	0.67	0.73	0.78	0.83	0.87	0.91	0.94	0.97
Light Duty Veh.	Diesel <3,5 t	Conventional	0.00											
Light Duty Veh.	Diesel <3,5 t	Euro I	0.12	0.11	0.08	0.06	0.05							
Light Duty Veh.	Diesel <3,5 t	Euro II	1.45	0.85	0.42	0.17	0.11	0.13	0.10	0.07				
Light Duty Veh.	Diesel <3,5 t	Euro III	9.04	7.70	6.33	4.94	3.51	2.32	1.37	0.69	0.38	0.26	0.19	0.14
Light Duty Veh.	Diesel <3,5 t	Euro IV	16.09	14.82	13.51	12.21	10.82	9.46	8.04	6.58	5.11	3.62	2.36	1.40
Light Duty Veh.	Diesel <3,5 t	Euro V	17.96	16.99	15.98	14.99	13.92	12.89	11.79	10.65	9.49	8.32	7.12	5.94
Light Duty Veh.	Diesel <3,5 t	Euro VI	22.47	27.65	32.59	37.42	41.86	46.28	50.30	53.95	57.28	60.32	62.88	65.44
Heavy Duty Veh.	Gasoline >3,5 t	Conventional	0.12	0.12	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Conventional												
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro I	0.19	0.17	0.13									
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro II	0.36	0.27	0.22	0.27	0.22	0.19	0.13	0.07	0.00	0.00	0.00	
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro III	1.03	0.91	0.79	0.68	0.56	0.44	0.37	0.32	0.30	0.23	0.19	0.16
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro IV	0.44	0.41	0.37	0.34	0.30	0.27	0.23	0.20	0.16	0.13	0.09	0.06
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro V	2.19	2.06	1.92	1.79	1.64	1.52	1.38	1.24	1.10	0.96	0.82	0.69
Heavy Duty Veh.	Diesel 3,5 - 7,5 t	Euro VI	2.48	2.88	3.26	3.63	3.96	4.30	4.60	4.86	5.09	5.30	5.47	5.60
Heavy Duty Veh.	Diesel 7,5 - 16 t	Conventional												
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro I	0.26	0.24	0.18									
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro II	0.48	0.37	0.31	0.41	0.34	0.30	0.22	0.13	0.01	0.00	0.00	
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro III	1.37	1.27	1.15	1.02	0.87	0.70	0.61	0.54	0.53	0.43	0.36	0.33
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro IV	0.59	0.56	0.54	0.51	0.48	0.43	0.39	0.34	0.29	0.24	0.18	0.13

Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro V	2.90	2.85	2.77	2.69	2.58	2.42	2.28	2.13	1.96	1.78	1.58	1.41
Heavy Duty Veh.	Diesel 7,5 - 16 t	Euro VI	3.28	3.99	4.71	5.47	6.22	6.84	7.59	8.33	9.06	9.78	10.46	11.49
Heavy Duty Veh.	Diesel 16 - 32 t	Conventional												
Heavy Duty Veh.	Diesel 16 - 32 t	Euro I	0.25	0.22	0.15									
Heavy Duty Veh.	Diesel 16 - 32 t	Euro II	0.86	0.51	0.34	0.36	0.30	0.25	0.17	0.09	0.00	0.00	0.00	
Heavy Duty Veh.	Diesel 16 - 32 t	Euro III	4.82	4.05	3.26	2.49	1.78	1.19	0.78	0.51	0.40	0.33	0.28	0.23
Heavy Duty Veh.	Diesel 16 - 32 t	Euro IV	2.38	2.16	1.94	1.72	1.48	1.25	1.00	0.75	0.51	0.27	0.15	0.09
Heavy Duty Veh.	Diesel 16 - 32 t	Euro V	12.46	11.67	10.84	10.03	9.14	8.25	7.34	6.40	5.44	4.48	3.53	2.67
Heavy Duty Veh.	Diesel 16 - 32 t	Euro VI	14.86	17.44	19.90	22.32	24.54	26.67	28.68	30.50	32.16	33.68	34.94	36.38
Heavy Duty Veh.	Diesel >32t	Conventional												
Heavy Duty Veh.	Diesel >32t	Euro I	0.25	0.21	0.14									
Heavy Duty Veh.	Diesel >32t	Euro II	0.85	0.50	0.33	0.35	0.29	0.24	0.16	0.09	0.00	0.00	0.00	
Heavy Duty Veh.	Diesel >32t	Euro III	4.73	3.95	3.17	2.41	1.71	1.14	0.74	0.49	0.38	0.31	0.26	0.22
Heavy Duty Veh.	Diesel >32t	Euro IV	2.33	2.11	1.88	1.66	1.43	1.20	0.96	0.72	0.48	0.26	0.14	0.09
Heavy Duty Veh.	Diesel >32t	Euro V	12.22	11.39	10.53	9.69	8.80	7.93	7.03	6.10	5.16	4.23	3.32	2.50
Heavy Duty Veh.	Diesel >32t	Euro VI	14.57	17.02	19.32	21.58	23.61	25.63	27.44	29.06	30.51	31.82	32.88	33.95
Buses	Urban Buses	Conventional												
Buses	Urban Buses	Euro I	0.07	0.04	0.04									
Buses	Urban Buses	Euro II	0.74	0.54	0.36	0.25	0.14	0.07	0.04	0.04				
Buses	Urban Buses	Euro III	1.74	1.54	1.34	1.14	0.94	0.75	0.55	0.36	0.25	0.14	0.07	0.04
Buses	Urban Buses	Euro IV	1.53	1.41	1.28	1.17	1.04	0.93	0.81	0.69	0.56	0.44	0.32	0.20
Buses	Urban Buses	Euro V	3.34	3.14	2.94	2.74	2.54	2.35	2.15	1.94	1.74	1.53	1.32	1.12
Buses	Urban Buses	Euro VI	4.34	5.09	5.79	6.47	7.08	7.72	8.27	8.75	9.18	9.57	9.88	10.14
Buses	Coaches	Conventional												
Buses	Coaches	Euro I	0.06	0.04	0.03									
Buses	Coaches	Euro II	0.60	0.44	0.29	0.21	0.12	0.06	0.04	0.04				
Buses	Coaches	Euro III	1.40	1.25	1.10	0.94	0.78	0.62	0.46	0.30	0.21	0.12	0.06	0.04
Buses	Coaches	Euro IV	1.22	1.14	1.05	0.96	0.87	0.78	0.68	0.58	0.49	0.38	0.28	0.18
Buses	Coaches	Euro V	2.67	2.54	2.40	2.26	2.11	1.97	1.81	1.66	1.49	1.33	1.16	1.00
Buses	Coaches	Euro VI	3.47	4.11	4.73	5.34	5.90	6.45	6.97	7.45	7.89	8.30	8.65	9.04
Mopeds	<50 cm³	Conventional	0.23	0.22	0.21	0.21	0.19	0.18	0.17	0.15	0.14	0.12	0.11	0.09
Mopeds	<50 cm³	Euro I	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Mopeds	<50 cm³	Euro II	0.31	0.35	0.38	0.41	0.45	0.48	0.51	0.55	0.58	0.62	0.65	0.71
Motorcycles	2-stroke >50 cm³	Conventional	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.00	
Motorcycles	2-stroke >50 cm³	Euro I	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	
Motorcycles	2-stroke >50 cm³	Euro II	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	
Motorcycles	2-stroke >50 cm³	Euro III	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.01	
Motorcycles	4-stroke <250 cm³	Conventional	0.20	0.20	0.19	0.18	0.17	0.15	0.14	0.13	0.12	0.10	0.09	0.07

Motorcycles	4-stroke <250 cm³	Euro I	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Motorcycles	4-stroke <250 cm³	Euro II	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Motorcycles	4-stroke <250 cm³	Euro III	0.23	0.26	0.28	0.31	0.33	0.36	0.38	0.41	0.43	0.46	0.48	0.51
Motorcycles	4-stroke 250 - 750 cm³	Conventional	0.56	0.54	0.51	0.49	0.46	0.42	0.39	0.35	0.32	0.28	0.24	0.20
Motorcycles	4-stroke 250 - 750 cm³	Euro I	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Motorcycles	4-stroke 250 - 750 cm³	Euro II	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Motorcycles	4-stroke 250 - 750 cm³	Euro III	0.64	0.70	0.77	0.84	0.91	0.98	1.05	1.12	1.19	1.26	1.33	1.41
Motorcycles	4-stroke >750 cm³	Conventional	0.25	0.24	0.23	0.22	0.21	0.19	0.18	0.16	0.14	0.13	0.11	0.09
Motorcycles	4-stroke >750 cm³	Euro I	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Motorcycles	4-stroke >750 cm³	Euro II	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Motorcycles	4-stroke >750 cm³	Euro III	0.29	0.32	0.35	0.38	0.41	0.45	0.48	0.51	0.54	0.57	0.60	0.64

Fuel use and emissions for road transport (per vehicle category) 2007-2018

	Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Energy	Passenger Cars	96	100	106	112	115	118	120	122	125	127	129	131
	Light Duty Vehicles	36	34	34	34	33	32	32	31	31	31	31	31
	Heavy Duty Vehicles	32	30	29	29	28	27	27	26	26	26	26	26
	Buses	9	8	8	8	8	7	7	7	7	7	7	7
	Mopeds	0	0	0	0	0	0	0	0	0	0	0	0
	Motorcycles	1	1	1	1	1	2	2	2	2	2	2	2
	Total	175	175	178	184	185	186	188	189	191	194	196	198
CO_2	Passenger Cars	6990	7340	7721	7516	7739	7929	8093	8252	8324	8381	8430	8464
	Light Duty Vehicles	2679	2535	2480	2326	2268	2224	2190	2169	2145	2126	2108	2096
	Heavy Duty Vehicles	2393	2231	2158	2010	1943	1891	1852	1826	1802	1784	1769	1760
	Buses	674	625	602	558	537	520	507	498	488	481	475	470
	Mopeds	20	20	22	21	23	24	25	26	27	27	28	28
	Motorcycles	82	85	91	90	95	99	104	109	112	116	119	121
	Total	12838	12837	13074	12521	12604	12686	12771	12879	12899	12914	12928	12939
CH_4	Passenger Cars	645	582	532	497	451	408	367	328	293	262	236	213
	Light Duty Vehicles	92	76	64	55	45	37	30	24	20	16	13	11
	Heavy Duty Vehicles	221	189	167	150	131	115	101	88	78	68	60	53
	Buses	73	62	54	49	42	36	32	27	24	21	18	15
	Mopeds	47	49	51	54	56	57	58	59	60	61	61	61
	Motorcycles	142	145	149	159	162	165	168	170	173	175	175	176
	Total	1220	1102	1017	963	887	818	756	698	648	602	564	529
N_2O	Passenger Cars	239	242	245	249	246	241	236	231	226	221	218	215
	Light Duty Vehicles	67	66	67	69	69	69	69	69	69	69	69	69
	Heavy Duty Vehicles	99	94	91	91	89	87	85	85	85	85	85	85
	Buses	27	25	24	24	23	23	22	22	21	21	21	21
	Mopeds	0	0	0	0	0	0	0	0	0	1	1	1
	Motorcycles	2	2	2	2	2	2	2	2	3	3	3	3
	Total	434	429	430	435	429	422	415	409	403	399	396	394

Fuel use and emissions for road transport (per vehicle category) 2019-2030

	Sector	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Energy	Passenger Cars	133	135	137	139	140	142	145	147	149	151	153	155
	Light Duty Vehicles	32	32	32	32	32	33	33	33	33	33	33	33
	Heavy Duty Vehicles	26	27	27	27	27	28	28	28	28	28	28	29
	Buses	7	7	7	7	7	7	7	7	7	7	7	7
	Mopeds	0	0	0	0	0	0	1	1	1	1	1	1
	Motorcycles	2	2	2	2	2	2	2	2	2	2	2	3
	Total	200	203	205	208	210	212	215	218	220	222	224	228
CO_2	Passenger Cars	8506	8548	8666	8775	8885	9001	9150	9300	9434	9550	9669	9839
	Light Duty Vehicles	2091	2089	2101	2120	2128	2146	2156	2163	2167	2172	2169	2178
	Heavy Duty Vehicles	1758	1760	1775	1795	1808	1824	1840	1852	1863	1875	1881	1903
	Buses	467	465	467	470	470	474	475	476	476	476	474	474
	Mopeds	29	29	30	30	31	31	31	31	31	32	32	32
	Motorcycles	124	126	129	133	136	139	142	144	147	149	151	155
	Total	12974	13017	13168	13322	13458	13614	13794	13966	14118	14253	14376	14581
CH_4	Passenger Cars	195	179	167	158	152	148	145	144	143	143	143	144
	Light Duty Vehicles	9	8	7	6	5	5	5	4	4	4	4	4
	Heavy Duty Vehicles	46	41	36	31	27	24	22	20	19	19	18	18
	Buses	13	11	10	8	7	6	5	4	4	3	3	3
	Mopeds	61	60	59	58	57	54	52	50	48	45	43	41
	Motorcycles	176	175	174	172	170	167	164	161	157	154	150	147
	Total	500	474	452	434	418	404	393	384	376	368	361	356
N_2O	Passenger Cars	214	214	214	215	216	218	222	225	228	231	234	238
	Light Duty Vehicles	70	70	71	71	72	72	73	73	73	74	74	74
	Heavy Duty Vehicles	86	87	88	90	90	91	92	93	94	94	95	96
	Buses	21	21	21	21	22	22	22	22	22	22	22	22
	Mopeds	1	1	1	1	1	1	1	1	1	1	1	1
	Motorcycles	3	3	3	3	3	3	3	3	3	3	3	4
	Total	395	396	398	401	404	408	412	417	421	425	428	434

Emission factors per vehicle type (g pr GJ) 2007 - 2018

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	73.1	73.1	73.2	67.2	67.3	67.3	67.4	67.4	66.7	66.0	65.3	64.6
Light Duty Vehicles	73.9	73.9	73.8	69.2	69.1	69.1	69.1	69.1	68.5	67.9	67.4	66.8
Heavy Duty Vehicles	74.0	74.0	74.0	69.6	69.6	69.6	69.6	69.6	69.0	68.5	68.0	67.4
Buses	74.0	74.0	74.0	69.6	69.6	69.6	69.6	69.6	69.1	68.5	68.0	67.4
Mopeds	72.8	72.8	72.8	66.1	66.1	66.1	66.1	66.1	65.2	64.4	63.6	62.8
Motorcycles	72.8	72.8	72.8	66.1	66.1	66.1	66.1	66.1	65.2	64.4	63.6	62.8

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	6.740	5.793	5.039	4.449	3.918	3.465	3.057	2.683	2.350	2.061	1.829	1.627
Light Duty Vehicles	2.525	2.206	1.901	1.625	1.371	1.142	0.942	0.770	0.628	0.517	0.424	0.347
Heavy Duty Vehicles	6.824	6.261	5.717	5.194	4.696	4.224	3.780	3.365	2.981	2.629	2.310	2.023
Buses	8.038	7.354	6.698	6.059	5.453	4.881	4.344	3.842	3.378	2.951	2.563	2.213
Mopeds	176.139	172.916	169.612	166.223	162.749	159.186	155.533	151.786	147.944	144.004	139.963	135.820
Motorcycles	126.771	123.350	119.957	116.596	113.267	109.973	106.715	103.496	100.316	97.177	94.081	91.029

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Cars	2.501	2.412	2.325	2.226	2.135	2.045	1.965	1.885	1.808	1.740	1.688	1.644
Light Duty Vehicles	1.839	1.923	1.993	2.053	2.102	2.140	2.169	2.189	2.200	2.203	2.204	2.205
Heavy Duty Vehicles	3.075	3.105	3.132	3.155	3.176	3.195	3.212	3.226	3.238	3.250	3.260	3.271
Buses	2.946	2.965	2.983	2.993	3.003	3.011	3.017	3.023	3.027	3.030	3.031	3.031
Mopeds	1.043	1.063	1.084	1.105	1.127	1.150	1.172	1.196	1.220	1.245	1.270	1.297
Motorcycles	1.469	1.468	1.466	1.464	1.463	1.460	1.458	1.456	1.453	1.450	1.447	1.443

Emission factors per vehicle type (g pr GJ) 2019 - 2030

Sector	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	63.9	63.2	63.2	63.2	63.2	63.2	63.2	63.3	63.3	63.3	63.3	63.3
Light Duty Vehicles	66.2	65.7	65.7	65.7	65.7	65.7	65.7	65.7	65.7	65.7	65.7	65.7
Heavy Duty Vehicles	66.9	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.2
Buses	66.9	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3	66.3
Mopeds	62.0	61.2	61.2	61.2	61.2	61.2	61.2	61.3	61.3	61.3	61.3	61.3
Motorcycles	62.0	61.2	61.2	61.2	61.2	61.2	61.2	61.3	61.3	61.3	61.3	61.3

Sector	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	1.462	1.327	1.217	1.139	1.080	1.037	1.004	0.981	0.962	0.948	0.936	0.926
Light Duty Vehicles	0.287	0.239	0.206	0.182	0.166	0.151	0.141	0.134	0.127	0.125	0.123	0.122
Heavy Duty Vehicles	1.765	1.534	1.327	1.141	0.994	0.873	0.780	0.714	0.674	0.657	0.644	0.635
Buses	1.904	1.634	1.398	1.175	0.991	0.833	0.701	0.592	0.505	0.442	0.403	0.386
Mopeds	131.571	127.215	122.748	118.168	113.473	108.660	103.728	98.673	93.494	88.188	82.753	77.188
Motorcycles	88.022	85.062	82.148	79.284	76.468	73.703	70.988	68.325	65.714	63.156	60.650	58.198

Sector	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	1.608	1.581	1.563	1.548	1.541	1.534	1.531	1.529	1.529	1.529	1.530	1.532
Light Duty Vehicles	2.206	2.208	2.209	2.210	2.212	2.216	2.219	2.222	2.225	2.228	2.231	2.233
Heavy Duty Vehicles	3.282	3.291	3.299	3.307	3.314	3.318	3.324	3.328	3.332	3.336	3.340	3.347
Buses	3.033	3.034	3.034	3.035	3.036	3.037	3.039	3.040	3.041	3.041	3.042	3.042
Mopeds	1.323	1.351	1.379	1.408	1.437	1.468	1.499	1.531	1.563	1.597	1.631	1.666
Motorcycles	1.440	1.436	1.433	1.429	1.425	1.420	1.416	1.412	1.407	1.402	1.398	1.393

Emission factors per vehicle type (g pr km)

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,4	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Light Duty Vehicles	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0
Heavy Duty Vehicles	9,7	9,6	9,5	9,5	9,4	9,4	9,3	9,3	9,2	9,2	9,2	9,1	9,1	9,1	9,0	9,0	9,0	9,0	9,0	9,0	8,9	8,9	8,9	8,9
Buses	10,2	10,1	10,1	10,0	10,0	10,0	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9	9,9
Mopeds	1,0	0,9	0,9	0,9	0,9	0,9	0,9	0,8	0,8	0,8	0,8	0,8	0,8	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,6	0,6	0,6	0,6
Motorcycles	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4
Total	3,1	3,0	3,0	2,9	2,9	2,9	2,9	2,9	2,9	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8	2,8

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	176,8	176,6	176,6	162,4	162,7	162,9	163,2	163,5	162,2	160,8	159,4	158,0	156,6	155,1	155,3	155,5	155,6	155,7	155,7	155,8	155,8	155,8	155,8	155,8
Light Duty Vehicles	221,7	221,3	220,8	206,5	206,2	206,0	205,8	205,6	203,8	202,0	200,3	198,5	196,7	194,9	194,8	194,7	194,7	194,5	194,5	194,4	194,3	194,3	194,2	194,1
Heavy Duty Vehicles	720,0	712,9	706,6	659,5	654,9	650,8	647,2	644,1	636,5	629,1	622,1	615,0	607,8	601,2	599,6	598,0	596,6	595,8	594,7	593,8	593,0	592,3	591,5	590,1
Buses	753,5	748,7	744,3	697,7	695,5	693,6	692,0	690,8	684,5	678,5	672,8	667,4	661,6	656,1	655,9	655,6	655,3	655,1	654,7	654,3	654,2	653,9	653,8	653,7
Mopeds	69,8	68,4	67,1	59,8	58,6	57,5	56,3	55,2	53,5	51,7	50,1	48,4	46,9	45,3	44,4	43,5	42,6	41,7	40,9	40,0	39,2	38,4	37,6	36,8
Motorcycles	99,1	99,2	99,3	90,2	90,3	90,5	90,6	90,8	89,8	88,9	87,9	87,0	86,1	85,3	85,5	85,7	86,0	86,2	86,5	86,8	87,1	87,4	87,7	88,0
Total	225,5	220,8	217,7	199,6	197,7	196,3	195,2	194,5	192,1	189,9	187,7	185,7	183,8	181,9	181,8	181,8	181,7	181,6	181,4	181,1	180,9	180,7	180,4	180,1

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	16,3	14,0	12,2	10,7	9,5	8,4	7,4	6,5	5,7	5,0	4,5	4,0	3,6	3,3	3,0	2,8	2,7	2,6	2,5	2,4	2,4	2,3	2,3	2,3
Light Duty Vehicles	7,6	6,6	5,7	4,9	4,1	3,4	2,8	2,3	1,9	1,5	1,3	1,0	0,9	0,7	0,6	0,5	0,5	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Heavy Duty Vehicles	66,4	60,3	54,6	49,2	44,2	39,5	35,2	31,1	27,5	24,1	21,1	18,5	16,0	13,9	12,0	10,3	8,9	7,8	7,0	6,4	6,0	5,9	5,8	5,7
Buses	81,9	74,4	67,4	60,7	54,5	48,6	43,2	38,1	33,5	29,2	25,4	21,9	18,8	16,2	13,8	11,6	9,8	8,2	6,9	5,8	5,0	4,4	4,0	3,8
Mopeds	168,9	162,6	156,5	150,4	144,4	138,5	132,7	126,9	121,2	115,7	110,2	104,8	99,4	94,2	89,0	83,9	78,9	74,0	69,2	64,5	59,8	55,2	50,7	46,3
Motorcycles	172,6	168,1	163,6	159,2	154,9	150,6	146,4	142,2	138,1	134,0	130,1	126,1	122,3	118,4	114,7	111,0	107,4	103,8	100,3	96,8	93,4	90,1	86,8	83,6
Total	21,4	18,9	16,9	15,4	13,9	12,7	11,6	10,5	9,6	8,9	8,2	7,6	7,1	6,6	6,2	5,9	5,6	5,4	5,2	5,0	4,8	4,7	4,5	4,4

Sector	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Passenger Cars	6,1	5,8	5,6	5,4	5,2	4,9	4,8	4,6	4,4	4,2	4,1	4,0	3,9	3,9	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8
Light Duty Vehicles	5,5	5,8	6,0	6,1	6,3	6,4	6,5	6,5	6,5	6,5	6,6	6,6	6,6	6,6	6,6	6,6	6,6	6,6	6,6	6,6	6,6	6,6	6,6	6,6
Heavy Duty Vehicles	29,9	29,9	29,9	29,9	29,9	29,9	29,9	29,9	29,9	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8	29,8
Buses	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0	30,0
Mopeds	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Motorcycles	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0	2,0
Total	7,6	7,4	7,2	6,9	6,7	6,5	6,3	6,2	6,0	5,9	5,8	5,7	5,6	5,5	5,5	5,5	5,5	5,4	5,4	5,4	5,4	5,4	5,4	5,4

Annex 2

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 – Energy.

	Category	Military			Railways	Inland waterways		National sea				National fishing				
			Air LTO	Air cruise												
	SNAP code	801	801	801	802	803	803	80402	80402	80402	80402	80403	80403	80403	80403	80403
	Fuel code	205A	207A	207A	205B	205B	208B	203V	204B	206A	3030	203V	204B	206A	2080	3030
[PJ]	Fuel type	Diesel	Jet fuel	Jet fuel	Diesel	Diesel	Gasoline	Res. Oil	Diesel	Kerosene	LPG	Res. Oil	Diesel	Kerosene	Gasoline	LPG
Energy	2007	0.99	0.11	0.99	0.00	0.01	3.05	1.00	0.37	0.61	4.12	0.00	0.00	0.99	0.11	0.99
Energy	2008	0.99	0.11	0.99	0.00	0.01	3.06	1.00	0.36	0.61	4.12	0.00	0.00	0.99	0.11	0.99
Energy	2009	0.99	0.11	0.99	0.00	0.01	3.06	1.00	0.35	0.61	4.12	0.00	0.00	0.99	0.11	0.99
Energy	2010	0.99	0.11	0.99	0.00	0.01	3.08	1.00	0.35	0.61	4.12	0.00	0.00	0.99	0.11	0.99
Energy	2011	0.99	0.11	0.99	0.00	0.01	3.10	1.00	0.34	0.61	4.12	0.00	0.00	0.99	0.11	0.99
Energy	2012	0.99	0.11	0.99	0.00	0.01	3.10	1.00	0.34	0.61	4.11	0.00	0.00	0.99	0.11	0.99
Energy	2013	0.99	0.11	0.99	0.00	0.01	3.12	1.00	0.33	0.61	4.11	0.00	0.00	0.99	0.11	0.99
Energy	2014	0.99	0.11	0.99	0.00	0.01	3.14	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2015	0.99	0.11	0.99	0.00	0.01	3.17	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2016	0.99	0.11	0.99	0.00	0.01	3.20	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2017	0.99	0.11	0.99	0.00	0.01	3.23	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2018	0.99	0.11	0.99	0.00	0.01	3.27	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2019	0.99	0.11	0.99	0.00	0.01	3.30	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2020	0.99	0.11	0.99	0.00	0.01	3.34	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2021	0.99	0.11	0.99	0.00	0.01	3.38	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2022	0.99	0.11	0.99	0.00	0.01	3.43	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2023	0.99	0.11	0.99	0.00	0.01	3.48	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2024	0.99	0.11	0.99	0.00	0.01	3.53	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2025	0.99	0.11	0.99	0.00	0.01	3.58	1.00	0.33	0.61	4.10	0.00	0.00	0.99	0.11	0.99
Energy	2026	0.99	0.11	0.99	0.00	0.01	3.65	1.00	0.33	0.61	3.95	0.00	0.00	0.99	0.11	0.99
Energy	2027	0.99	0.11	0.99	0.00	0.01	3.70	1.00	0.33	0.61	3.95	0.00	0.00	0.99	0.11	0.99
Energy	2028	0.99	0.11	0.99	0.00	0.01	3.77	1.00	0.33	0.61	3.92	0.00	0.00	0.99	0.11	0.99
Energy	2029	0.99	0.11	0.99	0.00	0.01	3.83	1.00	0.33	0.61	3.92	0.00	0.00	0.99	0.11	0.99
Energy	2030	0.99	0.11	0.99	0.00	0.01	3.87	1.00	0.33	0.61	3.92	0.00	0.00	0.99	0.11	0.99

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 - CO_2.

	Category	Military			Railways	Inland waterways		National sea	National fishing							
			Air LTO	Air cruise												
	SNAP code	801	801	801	802	803	803	80402	80402	80402	80402	80403	80403	80403	80403	80403
	Fuel code	205A	207A	207A	205B	205B	208B	203V	204B	206A	3030	203V	204B	206A	2080	3030
[ktons]	Fuel type	Diesel	Jet fuel	Jet fuel	Diesel	Diesel	Gasoline	Res. Oil	Diesel	Kerosene	LPG	Res. Oil	Diesel	Kerosene	Gasoline	LPG
CO_2	2007	73	8	71	0	0	226	74	27	48	305	0	0	73	8	71
CO_2	2008	73	8	71	0	0	226	74	26	48	305	0	0	73	8	71
CO_2	2009	73	8	71	0	0	227	74	26	48	305	0	0	73	8	71
CO_2	2010	73	8	71	0	0	228	74	25	48	305	0	0	73	8	71
CO_2	2011	73	8	71	0	0	229	74	25	48	305	0	0	73	8	71
CO_2	2012	73	8	71	0	0	229	74	24	48	304	0	0	73	8	71
CO_2	2013	73	8	71	0	0	231	74	24	48	304	0	0	73	8	71
CO_2	2014	73	8	71	0	0	232	74	24	48	304	0	0	73	8	71
CO_2	2015	73	8	71	0	0	234	74	24	48	304	0	0	73	8	71
CO_2	2016	73	8	71	0	0	237	74	24	48	304	0	0	73	8	71
CO_2	2017	73	8	71	0	0	239	74	24	48	304	0	0	73	8	71
CO_2	2018	73	8	71	0	0	242	74	24	48	304	0	0	73	8	71
CO_2	2019	73	8	71	0	0	244	74	24	48	304	0	0	73	8	71
CO_2	2020	73	8	71	0	0	247	74	24	48	304	0	0	73	8	71
CO_2	2021	73	8	71	0	0	250	74	24	48	304	0	0	73	8	71
CO_2	2022	73	8	71	0	0	254	74	24	48	304	0	0	73	8	71
CO_2	2023	73	8	71	0	0	258	74	24	48	304	0	0	73	8	71
CO_2	2024	73	8	71	0	0	261	74	24	48	304	0	0	73	8	71
CO_2	2025	73	8	71	0	0	265	74	24	48	304	0	0	73	8	71
CO_2	2026	73	8	71	0	0	270	74	24	48	292	0	0	73	8	71
CO_2	2027	73	8	71	0	0	274	74	24	48	292	0	0	73	8	71
CO_2	2028	73	8	71	0	0	279	74	24	48	290	0	0	73	8	71
CO_2	2029	73	8	71	0	0	283	74	24	48	290	0	0	73	8	71
CO_2	2030	73	8	71	0	0	287	74	24	48	290	0	0	73	8	71

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 - CH_4.

	Category	Military			Railways	Inland waterways		National sea				National fishing				
			Air LTO	Air cruise												
	SNAP code	801	801	801	802	803	803	80402	80402	80402	80402	80403	80403	80403	80403	80403
	Fuel code	205A	207A	207A	205B	205B	208B	203V	204B	206A	3030	203V	204B	206A	2080	3030
[tons]	Fuel type	Diesel	Jet fuel	Jet fuel	Diesel	Diesel	Gasoline	Res. Oil	Diesel	Kerosene	LPG	Res. Oil	Diesel	Kerosene	Gasoline	LPG
CH_4	2007	3.98	0.29	2.62	0.08	0.07	7.44	2.71	21.84	1.16	6.10	0.00	0.00	3.98	0.29	2.62
CH_4	2008	3.41	0.29	2.62	0.08	0.07	6.09	2.68	21.77	1.17	6.11	0.00	0.00	3.41	0.29	2.62
CH_4	2009	2.93	0.29	2.62	0.08	0.06	4.75	2.64	21.71	1.17	6.12	0.00	0.00	2.93	0.29	2.62
CH_4	2010	2.54	0.29	2.62	0.08	0.06	3.41	2.61	21.66	1.18	6.14	0.00	0.00	2.54	0.29	2.62
CH_4	2011	2.18	0.29	2.62	0.08	0.05	3.10	2.58	21.62	1.18	6.15	0.00	0.00	2.18	0.29	2.62
CH_4	2012	1.86	0.29	2.62	0.08	0.05	2.78	2.55	21.58	1.19	6.16	0.00	0.00	1.86	0.29	2.62
CH_4	2013	1.60	0.29	2.62	0.08	0.05	2.47	2.52	21.56	1.19	6.17	0.00	0.00	1.60	0.29	2.62
CH_4	2014	1.36	0.29	2.62	0.08	0.04	2.16	2.49	21.54	1.20	6.18	0.00	0.00	1.36	0.29	2.62
CH_4	2015	1.16	0.29	2.62	0.08	0.04	1.85	2.46	21.53	1.20	6.18	0.00	0.00	1.16	0.29	2.62
CH_4	2016	0.99	0.29	2.62	0.08	0.04	1.53	2.42	21.53	1.21	6.19	0.00	0.00	0.99	0.29	2.62
CH_4	2017	0.84	0.29	2.62	0.08	0.04	1.21	2.39	21.53	1.21	6.20	0.00	0.00	0.84	0.29	2.62
CH_4	2018	0.71	0.29	2.62	0.08	0.03	0.88	2.36	21.53	1.21	6.20	0.00	0.00	0.71	0.29	2.62
CH_4	2019	0.60	0.29	2.62	0.08	0.03	0.54	2.33	21.53	1.22	6.21	0.00	0.00	0.60	0.29	2.62
CH_4	2020	0.50	0.29	2.62	0.08	0.03	0.20	2.30	21.53	1.22	6.21	0.00	0.00	0.50	0.29	2.62
CH_4	2021	0.42	0.29	2.62	0.08	0.03	0.20	2.30	21.53	1.22	6.21	0.00	0.00	0.42	0.29	2.62
CH_4	2022	0.35	0.29	2.62	0.08	0.03	0.20	2.30	21.53	1.23	6.21	0.00	0.00	0.35	0.29	2.62
CH_4	2023	0.30	0.29	2.62	0.08	0.03	0.21	2.30	21.53	1.23	6.22	0.00	0.00	0.30	0.29	2.62
CH_4	2024	0.25	0.29	2.62	0.08	0.03	0.21	2.30	21.53	1.23	6.22	0.00	0.00	0.25	0.29	2.62
CH_4	2025	0.21	0.29	2.62	0.08	0.03	0.21	2.30	21.53	1.23	6.22	0.00	0.00	0.21	0.29	2.62
CH_4	2026	0.19	0.29	2.62	0.08	0.02	0.22	2.30	21.53	1.24	6.22	0.00	0.00	0.19	0.29	2.62
CH_4	2027	0.17	0.29	2.62	0.08	0.02	0.22	2.30	21.53	1.24	6.22	0.00	0.00	0.17	0.29	2.62
CH_4	2028	0.16	0.29	2.62	0.08	0.02	0.22	2.30	21.53	1.24	6.22	0.00	0.00	0.16	0.29	2.62
CH_4	2029	0.15	0.29	2.62	0.08	0.02	0.23	2.30	21.53	1.24	6.22	0.00	0.00	0.15	0.29	2.62
CH_4	2030	0.15	0.29	2.62	0.08	0.02	0.23	2.30	21.53	1.24	6.22	0.00	0.00	0.15	0.29	2.62

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 - N_2O.

	Category	Military			Railways	Inland waterways		National sea				National fishing				
			Air LTO	Air cruise												
	SNAP code	801	801	801	802	803	803	80402	80402	80402	80402	80403	80403	80403	80403	80403
	Fuel code	205A	207A	207A	205B	205B	208B	203V	204B	206A	3030	203V	204B	206A	2080	3030
[tons]	Fuel type	Diesel	Jet fuel	Jet fuel	Diesel	Diesel	Gasoline	Res. Oil	Diesel	Kerosene	LPG	Res. Oil	Diesel	Kerosene	Gasoline	LPG
N_2O	2007	2.51	0.25	2.27	0.01	0.02	6.23	2.98	0.47	2.98	19.28	0.00	0.00	2.51	0.25	2.27
N_2O	2008	2.60	0.25	2.27	0.01	0.01	6.24	2.98	0.49	2.98	19.28	0.00	0.00	2.60	0.25	2.27
N_2O	2009	2.67	0.25	2.27	0.01	0.01	6.25	2.98	0.50	2.98	19.28	0.00	0.00	2.67	0.25	2.27
N_2O	2010	2.74	0.25	2.27	0.01	0.01	6.28	2.98	0.50	2.98	19.28	0.00	0.00	2.74	0.25	2.27
N_2O	2011	2.79	0.25	2.27	0.01	0.01	6.32	2.98	0.51	2.98	19.28	0.00	0.00	2.79	0.25	2.27
N_2O	2012	2.84	0.25	2.27	0.01	0.01	6.33	2.98	0.52	2.98	19.25	0.00	0.00	2.84	0.25	2.27
N_2O	2013	2.88	0.25	2.27	0.01	0.01	6.36	2.98	0.52	2.98	19.25	0.00	0.00	2.88	0.25	2.27
N_2O	2014	2.92	0.25	2.27	0.01	0.01	6.40	2.98	0.53	2.98	19.22	0.00	0.00	2.92	0.25	2.27
N_2O	2015	2.95	0.25	2.27	0.01	0.01	6.46	2.98	0.53	2.98	19.22	0.00	0.00	2.95	0.25	2.27
N_2O	2016	2.97	0.25	2.27	0.01	0.01	6.53	2.98	0.53	2.98	19.22	0.00	0.00	2.97	0.25	2.27
N_2O	2017	2.99	0.25	2.27	0.01	0.00	6.59	2.98	0.53	2.98	19.22	0.00	0.00	2.99	0.25	2.27
N_2O	2018	3.01	0.25	2.27	0.01	0.00	6.66	2.98	0.53	2.98	19.22	0.00	0.00	3.01	0.25	2.27
N_2O	2019	3.02	0.25	2.27	0.01	0.00	6.73	2.98	0.53	2.98	19.22	0.00	0.00	3.02	0.25	2.27
N_2O	2020	3.03	0.25	2.27	0.01	0.00	6.81	2.98	0.53	2.98	19.22	0.00	0.00	3.03	0.25	2.27
N_2O	2021	3.03	0.25	2.27	0.01	0.00	6.90	2.98	0.53	2.98	19.22	0.00	0.00	3.03	0.25	2.27
N_2O	2022	3.04	0.25	2.27	0.01	0.00	7.00	2.98	0.53	2.98	19.22	0.00	0.00	3.04	0.25	2.27
N_2O	2023	3.04	0.25	2.27	0.01	0.00	7.11	2.98	0.53	2.98	19.22	0.00	0.00	3.04	0.25	2.27
N_2O	2024	3.05	0.25	2.27	0.01	0.00	7.20	2.98	0.53	2.98	19.22	0.00	0.00	3.05	0.25	2.27
N_2O	2025	3.05	0.25	2.27	0.01	0.00	7.31	2.98	0.53	2.98	19.22	0.00	0.00	3.05	0.25	2.27
N_2O	2026	3.05	0.25	2.27	0.01	0.00	7.44	2.98	0.53	2.98	18.48	0.00	0.00	3.05	0.25	2.27
N_2O	2027	3.05	0.25	2.27	0.01	0.00	7.56	2.98	0.53	2.98	18.48	0.00	0.00	3.05	0.25	2.27
N_2O	2028	3.06	0.25	2.27	0.01	0.00	7.69	2.98	0.53	2.98	18.35	0.00	0.00	3.06	0.25	2.27
N_2O	2029	3.06	0.25	2.27	0.01	0.00	7.81	2.98	0.53	2.98	18.35	0.00	0.00	3.06	0.25	2.27
N_2O	2030	3.06	0.25	2.27	0.01	0.00	7.90	2.98	0.53	2.98	18.35	0.00	0.00	3.06	0.25	2.27

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 – Energy.

	International sea		Dom. LTO	Dom. LTO	Int. LTO	Int. LTO	Dom. Cruise	Int. cruise	Agriculture		Forestry		Industry			Household
	80404	80404	80501	80501	80502	80502	80503	80504	806	806	807	807	808	808	808	809
	203W	204B	207A	209A	207A	209A	207A	207A	205B	208B	205B	208B	205B	208B	3030	208B
Year	Res. Oil	Diesel	Jet fuel	Avgas	Jet fuel	Avgas	Jet fuel	Jet fuel	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	LPG	Gasoline
2007	35.24	10.95	0.44	2.97	1.77	33.06	14.79	0.38	0.16	0.07	12.74	0.16	1.03	3.18	35.24	10.95
2008	31.70	13.12	0.44	2.99	1.79	33.28	14.92	0.38	0.16	0.07	12.76	0.16	1.03	3.16	31.70	13.12
2009	31.70	13.12	0.44	3.00	1.79	33.32	15.00	0.38	0.16	0.07	12.79	0.16	1.03	3.14	31.70	13.12
2010	31.70	13.12	0.44	2.98	1.79	33.17	15.04	0.38	0.16	0.07	12.82	0.16	1.03	3.12	31.70	13.12
2011	31.70	13.12	0.44	2.96	1.79	32.93	15.09	0.38	0.16	0.07	12.87	0.16	1.03	3.10	31.70	13.12
2012	31.70	13.12	0.44	2.99	1.81	33.27	15.18	0.38	0.16	0.07	12.90	0.16	1.03	3.09	31.70	13.12
2013	31.70	13.12	0.45	3.04	1.83	33.77	15.25	0.38	0.16	0.07	12.94	0.16	1.05	3.09	31.70	13.12
2014	31.70	13.12	0.46	3.09	1.86	34.34	15.28	0.38	0.16	0.07	12.96	0.16	1.05	3.09	31.70	13.12
2015	31.70	13.12	0.46	3.14	1.89	34.92	15.22	0.38	0.16	0.07	12.96	0.16	1.04	3.09	31.70	13.12
2016	31.70	13.12	0.47	3.19	1.91	35.52	15.21	0.38	0.16	0.07	12.93	0.16	1.04	3.08	31.70	13.12
2017	31.70	13.12	0.48	3.25	1.94	36.13	15.25	0.38	0.16	0.07	12.91	0.16	1.02	3.08	31.70	13.12
2018	31.70	13.12	0.48	3.30	1.97	36.75	15.32	0.38	0.16	0.07	12.89	0.16	1.01	3.08	31.70	13.12
2019	31.70	13.12	0.49	3.36	2.00	37.38	15.34	0.38	0.16	0.07	12.87	0.16	0.99	3.08	31.70	13.12
2020	31.70	13.12	0.50	3.42	2.02	38.02	15.35	0.38	0.16	0.07	12.85	0.16	0.98	3.08	31.70	13.12
2021	31.70	13.12	0.50	3.46	2.05	38.51	15.37	0.38	0.16	0.07	12.84	0.16	0.97	3.08	31.70	13.12
2022	31.70	13.12	0.51	3.51	2.07	39.02	15.44	0.38	0.16	0.07	12.84	0.16	0.96	3.08	31.70	13.12
2023	31.70	13.12	0.51	3.55	2.09	39.53	15.52	0.38	0.16	0.07	12.84	0.16	0.96	3.08	31.70	13.12
2024	31.70	13.12	0.52	3.60	2.12	40.04	15.57	0.38	0.16	0.07	12.85	0.16	0.97	3.08	31.70	13.12
2025	31.70	13.12	0.53	3.65	2.14	40.56	15.59	0.38	0.16	0.07	12.85	0.16	0.96	3.08	31.70	13.12
2026	31.70	13.12	0.53	3.65	2.15	40.55	15.58	0.38	0.16	0.07	12.81	0.16	0.96	3.08	31.70	13.12
2027	31.70	13.12	0.53	3.65	2.15	40.55	15.55	0.38	0.16	0.07	12.80	0.16	0.96	3.08	31.70	13.12
2028	31.70	13.12	0.53	3.65	2.16	40.54	15.59	0.38	0.16	0.07	12.79	0.16	0.96	3.08	31.70	13.12
2029	31.70	13.12	0.53	3.65	2.17	40.53	15.63	0.38	0.16	0.07	12.78	0.16	0.96	3.08	31.70	13.12
2030	31.70	13.12	0.53	3.64	2.17	40.53	15.65	0.38	0.16	0.07	12.77	0.16	0.96	3.08	31.70	13.12

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 - CO_2.

	International sea		Dom. LTO	Dom. LTO	Int. LTO	Int. LTO	Dom. Cruise	Int. cruise	Agriculture		Forestry		Industry			Household
	80404	80404	80501	80501	80502	80502	80503	80504	806	806	807	807	808	808	808	809
	203W	204B	207A	209A	207A	209A	207A	207A	205B	208B	205B	208B	205B	208B	3030	208B
Year	Res. Oil	Diesel	Jet fuel	Avgas	Jet fuel	Avgas	Jet fuel	Jet fuel	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	LPG	Gasoline
2007	72946	16774	122	1003	489	10219	10760	41	90	6	8715	32	1371	288	72946	16774
2008	66103	20300	123	1010	493	10287	10107	41	81	6	8005	32	1372	297	66103	20300
2009	66575	20495	124	1011	495	10298	9507	41	72	6	7576	33	1371	296	66575	20495
2010	67025	20684	124	1007	495	10252	8969	41	65	5	7148	33	1367	297	67025	20684
2011	67127	20745	124	999	494	10179	8370	41	60	4	6763	33	1366	297	67127	20745
2012	67201	20797	125	1010	499	10283	7841	41	55	4	6377	33	1374	304	67201	20797
2013	67211	20835	126	1025	506	10440	7354	41	51	4	6131	33	1392	304	67211	20835
2014	67156	20859	128	1042	513	10614	6835	41	45	4	5890	34	1398	304	67156	20859
2015	67034	20867	130	1060	520	10795	6157	41	38	4	5523	34	1387	304	67034	20867
2016	65461	20416	132	1078	528	10979	5568	41	32	4	5153	34	1382	304	65461	20416
2017	63800	19942	134	1096	535	11166	5088	41	27	4	4865	34	1360	304	63800	19942
2018	62066	19447	136	1115	543	11359	4667	41	23	4	4596	34	1335	304	62066	19447
2019	60260	18932	138	1134	551	11553	4247	41	18	4	4354	34	1314	304	60260	18932
2020	58381	18395	140	1154	558	11751	3846	41	15	4	4136	34	1303	304	58381	18395
2021	56429	17838	141	1169	565	11904	3448	41	13	4	3941	34	1291	304	56429	17838
2022	54455	17267	143	1184	571	12060	3161	41	10	4	3769	34	1280	304	54455	17267
2023	52459	16682	145	1199	578	12217	2915	41	10	4	3600	34	1274	304	52459	16682
2024	50443	16083	146	1215	585	12377	2661	41	9	4	3449	34	1283	304	50443	16083
2025	48409	15471	148	1231	591	12537	2391	41	9	4	3426	34	1280	304	48409	15471
2026	46358	14846	148	1231	593	12535	2113	41	9	4	3385	34	1274	304	46358	14846
2027	44292	14208	149	1230	595	12533	1866	41	8	4	3364	34	1274	304	44292	14208
2028	42214	13560	149	1230	596	12531	1697	41	8	4	3349	34	1274	304	42214	13560
2029	40125	12900	149	1230	598	12529	1538	41	8	4	3334	34	1274	304	40125	12900
2030	38332	12310	150	1230	599	12527	1378	41	8	4	3319	34	1274	304	38332	12310

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 – CH_4.

	International sea		Dom. LTO	Dom. LTO	Int. LTO	Int. LTO	Dom. Cruise	Int. cruise	Agriculture		Forestry		Industry				Household
	80404	80404	80501	80501	80502	80502	80503	80504	806	806	807	807	808	808	808	809	
	203W	204B	207A	209A	207A	209A	207A	207A	205B	208B	205B	208B	205B	208B	3030	208B	
Year	Res. Oil	Diesel	Jet fuel	Avgas	Jet fuel	Avgas	Jet fuel	Jet fuel	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	LPG	Gasoline	
2007	2749	810	31	214	128	2380	1094	28	12	5	943	12	67	232	2749	810	
2008	2473	971	32	215	129	2396	1104	28	12	5	944	12	67	231	2473	971	
2009	2473	971	32	216	129	2399	1110	28	12	5	946	11	67	229	2473	971	
2010	2473	971	32	215	129	2388	1113	28	12	5	949	11	67	228	2473	971	
2011	2473	971	32	213	129	2371	1117	28	12	5	952	11	67	226	2473	971	
2012	2473	971	32	215	130	2395	1123	28	12	5	955	11	67	226	2473	971	
2013	2473	971	32	219	132	2432	1129	28	12	5	957	11	68	226	2473	971	
2014	2473	971	33	222	134	2472	1130	28	12	5	959	11	68	225	2473	971	
2015	2473	971	33	226	136	2514	1127	28	12	5	959	11	68	225	2473	971	
2016	2473	971	34	230	138	2557	1126	28	12	5	957	11	68	225	2473	971	
2017	2473	971	34	234	140	2601	1129	28	12	5	955	11	67	225	2473	971	
2018	2473	971	35	238	142	2646	1133	28	12	5	954	11	65	225	2473	971	
2019	2473	971	35	242	144	2691	1135	28	12	5	952	11	64	225	2473	971	
2020	2473	971	36	246	146	2737	1136	28	12	5	951	11	64	225	2473	971	
2021	2473	971	36	249	147	2773	1138	28	12	5	950	11	63	225	2473	971	
2022	2473	971	37	253	149	2809	1143	28	12	5	950	11	63	225	2473	971	
2023	2473	971	37	256	151	2846	1149	28	12	5	950	11	62	225	2473	971	
2024	2473	971	37	259	153	2883	1153	28	12	5	951	11	63	225	2473	971	
2025	2473	971	38	263	154	2920	1154	28	12	5	951	11	63	225	2473	971	
2026	2473	971	38	263	155	2920	1153	28	12	5	948	11	62	225	2473	971	
2027	2473	971	38	263	155	2919	1151	28	12	5	947	11	62	225	2473	971	
2028	2473	971	38	263	156	2919	1154	28	12	5	946	11	62	225	2473	971	
2029	2473	971	38	262	156	2918	1157	28	12	5	945	11	62	225	2473	971	
2030	2473	971	38	262	156	2918	1158	28	12	5	945	11	62	225	2473	971	

Fuel use and emissions for other mobile sources given per SNAP sector and fuel type 2007-2030 - N_2O.

	International sea		Dom. LTO	Dom. LTO	Int. LTO	Int. LTO	Dom. Cruise	Int. cruise	Agriculture		Forestry		Industry			Household
	80404	80404	80501	80501	80502	80502	80503	80504	806	806	807	807	808	808	808	809
	203W	204B	207A	209A	207A	209A	207A	207A	205B	208B	205B	208B	205B	208B	3030	208B
Year	Res. Oil	Diesel	Jet fuel	Avgas	Jet fuel	Avgas	Jet fuel	Jet fuel	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	LPG	Gasoline
2007	66.71	18.87	1.48	13.66	3.61	38.59	18.39	58.27	0.11	4.27	17.31	17.07	7.94	235.36	66.71	18.87
2008	60.46	22.78	1.50	13.75	3.64	38.85	16.78	58.27	0.10	4.27	15.27	17.06	7.95	233.54	60.46	22.78
2009	60.91	22.94	1.50	13.76	3.65	38.89	15.38	58.26	0.09	3.62	14.15	17.05	7.94	225.99	60.91	22.94
2010	61.36	23.10	1.50	13.70	3.65	38.72	14.07	58.26	0.08	2.92	13.06	17.04	7.92	217.89	61.36	23.10
2011	61.79	23.26	1.50	13.60	3.65	38.44	12.85	58.26	0.07	2.17	12.37	17.02	7.91	209.24	61.79	23.26
2012	62.22	23.41	1.52	13.74	3.68	38.83	11.78	58.26	0.07	2.17	11.66	17.01	7.96	208.90	62.22	23.41
2013	62.63	23.56	1.54	13.95	3.73	39.42	10.79	58.26	0.06	2.17	11.03	17.00	8.06	206.20	62.63	23.56
2014	63.04	23.70	1.56	14.18	3.78	40.08	9.87	58.26	0.06	2.17	10.37	16.98	8.09	203.39	63.04	23.70
2015	63.43	23.84	1.58	14.43	3.84	40.77	8.89	58.25	0.05	2.17	9.79	16.90	8.03	200.47	63.43	23.84
2016	63.80	23.97	1.60	14.67	3.89	41.46	8.16	58.24	0.05	2.17	9.20	16.82	8.00	200.10	63.80	23.97
2017	64.16	24.10	1.62	14.92	3.95	42.17	7.66	58.24	0.05	2.17	8.65	16.74	7.87	199.73	64.16	24.10
2018	64.50	24.22	1.65	15.18	4.01	42.89	7.27	58.24	0.05	2.17	8.15	16.74	7.73	199.74	64.50	24.22
2019	64.83	24.34	1.67	15.44	4.06	43.63	6.86	58.24	0.04	2.17	7.82	16.74	7.61	199.75	64.83	24.34
2020	65.13	24.45	1.69	15.70	4.12	44.37	6.47	58.24	0.04	2.17	7.57	16.74	7.54	199.75	65.13	24.45
2021	65.41	24.54	1.71	15.91	4.17	44.96	6.22	58.24	0.04	2.17	7.40	16.74	7.47	199.75	65.41	24.54
2022	65.66	24.64	1.73	16.12	4.22	45.54	6.04	58.24	0.04	2.17	7.28	16.74	7.41	199.75	65.66	24.64
2023	65.89	24.72	1.75	16.33	4.26	46.14	5.91	58.24	0.04	2.17	7.19	16.74	7.38	199.75	65.89	24.72
2024	66.09	24.79	1.77	16.54	4.31	46.74	5.73	58.24	0.04	2.17	7.13	16.74	7.43	199.75	66.09	24.79
2025	66.26	24.85	1.79	16.76	4.36	47.35	5.49	58.24	0.04	2.17	7.06	16.74	7.41	199.75	66.26	24.85
2026	66.40	24.90	1.80	16.75	4.38	47.34	5.21	58.24	0.04	2.17	6.95	16.74	7.38	199.75	66.40	24.90
2027	66.51	24.94	1.80	16.75	4.39	47.33	4.94	58.24	0.04	2.17	6.88	16.74	7.38	199.75	66.51	24.94
2028	66.59	24.96	1.81	16.75	4.40	47.32	4.77	58.24	0.04	2.17	6.83	16.74	7.38	199.75	66.59	24.96
2029	66.62	24.98	1.81	16.74	4.41	47.31	4.59	58.24	0.04	2.17	6.78	16.74	7.38	199.75	66.62	24.98
2030	66.62	24.98	1.82	16.74	4.42	47.31	4.40	58.24	0.04	2.17	6.73	16.74	7.38	199.75	66.62	24.98

Fuel use and emissions for other mobile sources given per IPCC sector 2007-2030 – Energy.

[PJ]	Year	Industry (1A2f)	Civil Aviation (1A3a)	Railways (1A3c)	Navigation (1A3d)	Residential (1A4b)	Ag./for./fish. (1A4c)	Military (1A5)	Navigation int. (1A3d)	Civil Aviation int. (1A3a)
Energy	2007	13.94	2.21	174.79	3.05	6.10	3.18	21.70	2.10	46.19
Energy	2008	13.95	2.22	174.77	3.06	6.09	3.16	22.73	2.10	44.82
Energy	2009	13.98	2.23	177.98	3.06	6.08	3.14	22.70	2.10	44.82
Energy	2010	14.01	2.23	184.01	3.08	6.07	3.12	22.59	2.10	44.82
Energy	2011	14.05	2.23	185.23	3.10	6.07	3.10	22.64	2.10	44.82
Energy	2012	14.09	2.25	186.43	3.10	6.06	3.09	22.73	2.10	44.82
Energy	2013	14.14	2.28	187.67	3.12	6.05	3.09	22.81	2.10	44.82
Energy	2014	14.17	2.32	189.25	3.14	6.04	3.09	22.84	2.10	44.82
Energy	2015	14.16	2.35	191.42	3.17	6.04	3.09	22.78	2.10	44.82
Energy	2016	14.13	2.38	193.55	3.20	6.04	3.08	22.77	2.10	44.82
Energy	2017	14.09	2.42	195.68	3.23	6.04	3.08	22.81	2.10	44.82
Energy	2018	14.05	2.45	197.81	3.27	6.04	3.08	22.88	2.10	44.82
Energy	2019	14.01	2.49	200.35	3.30	6.04	3.08	22.90	2.10	44.82
Energy	2020	13.98	2.52	203.06	3.34	6.04	3.08	22.91	2.10	44.82
Energy	2021	13.97	2.55	205.43	3.38	6.04	3.08	22.93	2.10	44.82
Energy	2022	13.96	2.58	207.84	3.43	6.04	3.08	23.00	2.10	44.82
Energy	2023	13.96	2.61	209.96	3.48	6.04	3.08	23.08	2.10	44.82
Energy	2024	13.98	2.64	212.42	3.53	6.04	3.08	23.13	2.10	44.82
Energy	2025	13.97	2.67	215.23	3.58	6.04	3.08	23.15	2.10	44.82
Energy	2026	13.92	2.68	217.91	3.65	5.89	3.08	23.18	2.10	44.82
Energy	2027	13.91	2.68	220.29	3.70	5.89	3.08	23.15	2.10	44.82
Energy	2028	13.90	2.69	222.42	3.77	5.86	3.08	23.21	2.10	44.82
Energy	2029	13.89	2.70	224.35	3.83	5.86	3.08	23.24	2.10	44.82
Energy	2030	13.88	2.71	227.56	3.87	5.86	3.08	23.26	2.10	44.82

Fuel use and emissions for other mobile sources given per IPCC sector 2007-2030 - CO_2.

[ktons]	Year	Industry (1A2f)	Civil Aviation (1A3a)	Railways (1A3c)	Navigation (1A3d)	Residential (1A4b)	Ag./for./fish. (1A4c)	Military (1A5)	Navigation int. (1A3d)	Civil Aviation int. (1A3a)
CO_2	2007	1022	159	12838	226	453	232	1605	153	3559
CO_2	2008	1023	160	12837	226	453	231	1681	153	3443
CO_2	2009	1025	161	13074	227	452	229	1679	153	3443
CO_2	2010	1027	161	12521	228	452	228	1671	153	3443
CO_2	2011	1031	161	12604	229	451	226	1674	153	3443
CO_2	2012	1034	162	12686	229	450	226	1681	153	3443
CO_2	2013	1037	164	12771	231	450	226	1687	153	3443
CO_2	2014	1039	167	12879	232	449	225	1689	153	3443
CO_2	2015	1038	169	12899	234	449	225	1685	153	3443
CO_2	2016	1036	172	12914	237	449	225	1684	153	3443
CO_2	2017	1033	174	12928	239	449	225	1688	153	3443
CO_2	2018	1030	176	12939	242	449	225	1692	153	3443
CO_2	2019	1028	179	12974	244	449	225	1694	153	3443
CO_2	2020	1026	181	13017	247	449	225	1695	153	3443
CO_2	2021	1025	184	13168	250	449	225	1696	153	3443
CO_2	2022	1024	186	13322	254	449	225	1701	153	3443
CO_2	2023	1024	188	13458	258	449	225	1707	153	3443
CO_2	2024	1025	190	13614	261	449	225	1711	153	3443
CO_2	2025	1025	192	13794	265	449	225	1712	153	3443
CO_2	2026	1022	193	13966	270	438	225	1715	153	3443
CO_2	2027	1021	193	14118	274	438	225	1713	153	3443
CO_2	2028	1020	194	14253	279	435	225	1717	153	3443
CO_2	2029	1019	194	14376	283	435	225	1719	153	3443
CO_2	2030	1018	195	14581	287	435	225	1721	153	3443

Fuel use and emissions for other mobile sources given per IPCC sector 2007-2030 - CH_4.

[tons]	Year	Industry (1A2f)	Civil Aviation (1A3a)	Railways (1A3c)	Navigation (1A3d)	Residential (1A4b)	Ag./for./fish. (1A4c)	Military (1A5)	Navigation int. (1A3d)	Civil Aviation int. (1A3a)
CH_4	2007	42	5	1220	7	32	235	92	7	86
CH_4	2008	40	5	1102	6	32	234	92	6	83
CH_4	2009	39	5	1017	5	32	226	90	6	84
CH_4	2010	38	5	963	3	32	218	88	6	84
CH_4	2011	37	5	887	3	32	209	86	5	85
CH_4	2012	37	5	818	3	31	209	85	5	86
CH_4	2013	36	5	756	2	31	206	84	5	86
CH_4	2014	35	5	698	2	31	203	83	4	87
CH_4	2015	35	5	648	2	31	200	82	4	87
CH_4	2016	34	5	602	2	31	200	81	4	88
CH_4	2017	33	6	564	1	31	200	81	4	88
CH_4	2018	33	6	529	1	31	200	81	4	89
CH_4	2019	32	6	500	1	31	200	80	4	89
CH_4	2020	32	6	474	0	31	200	80	4	90
CH_4	2021	32	6	452	0	31	200	80	3	90
CH_4	2022	31	6	434	0	31	200	79	3	90
CH_4	2023	31	6	418	0	31	200	79	3	91
CH_4	2024	31	6	404	0	31	200	79	3	91
CH_4	2025	31	6	393	0	31	200	79	3	91
CH_4	2026	31	6	384	0	31	200	79	3	91
CH_4	2027	31	6	376	0	31	200	78	3	91
CH_4	2028	31	6	368	0	31	200	78	3	92
CH_4	2029	31	6	361	0	31	200	78	3	92
CH_4	2030	31	6	356	0	31	200	78	3	92

Fuel use and emissions for other mobile sources given per IPCC sector 2007-2030 - N_2O.

[tons]	Year	Industry (1A2f)	Civil Aviation (1A3a)	Railways (1A3c)	Navigation (1A3d)	Residential (1A4b)	Ag./for./fish. (1A4c)	Military (1A5)	Navigation int. (1A3d)	Civil Aviation int. (1A3a)
N_2O	2007	43	9	434	6	26	4	77	5	224
N_2O	2008	43	9	429	6	26	4	82	5	216
N_2O	2009	43	10	430	6	26	4	82	5	216
N_2O	2010	43	10	435	6	26	4	81	5	216
N_2O	2011	44	9	429	6	26	4	82	5	216
N_2O	2012	44	10	422	6	26	4	82	5	216
N_2O	2013	44	10	415	6	26	4	82	5	216
N_2O	2014	44	10	409	6	26	4	82	5	216
N_2O	2015	44	10	403	6	26	4	82	5	216
N_2O	2016	44	10	399	7	26	4	82	6	216
N_2O	2017	44	10	396	7	26	4	83	6	216
N_2O	2018	44	10	394	7	26	4	83	6	216
N_2O	2019	44	11	395	7	26	4	83	6	216
N_2O	2020	44	11	396	7	26	4	83	6	216
N_2O	2021	44	11	398	7	26	4	83	6	216
N_2O	2022	44	11	401	7	26	4	83	6	216
N_2O	2023	44	11	404	7	26	4	84	6	216
N_2O	2024	44	11	408	7	26	4	84	6	216
N_2O	2025	44	11	412	7	26	4	84	6	216
N_2O	2026	44	11	417	7	25	4	84	6	216
N_2O	2027	44	11	421	8	25	4	84	6	216
N_2O	2028	44	11	425	8	25	4	84	6	216
N_2O	2029	44	11	428	8	25	4	84	6	216
N_2O	2030	44	12	434	8	25	4	85	6	216

Emission factors for other mobile sources given per SNAP sector and fuel type 2007-2030 - CO_2.

	Category	Military					Railways	Inland waterways		National sea				National fishing				
			Air LTO	Air cruise														
	SNAP code	801	801	801	801	801	802	803	803	80402	80402	80402	80402	80403	80403	80403	80403	80403
	Fuel code	205A	207A	207A	209A		205B	205B	208B	203V	204B	206A	3030	203V	204B	206A	2080	3030
[kg/GJ]	Fuel type	Diesel	Jet fuel	Jet fuel	Avgas	Gasoline	Diesel	Diesel	Gasoline	Res. Oil	Diesel	Kerosene	LPG	Res. Oil	Diesel	Kerosene	Gasoline	LPG
CO_2	2007	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2008	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2009	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2010	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2011	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2012	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2013	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2014	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2015	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2016	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2017	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2018	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2019	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2020	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2021	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2022	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2023	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2024	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2025	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2026	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2027	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2028	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2029	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65
CO_2	2030	74	72	72	73	73	74	74	73	78	74	-	-	-	74	72	-	65

Emission factors for other mobile sources given per SNAP sector and fuel type 2007-2030 - CH_4.

	Category	Military					Railways	Inland waterways		National sea				National fishing				
			Air LTO	Air cruise														
	SNAP code	801	801	801	801	801	802	803	803	80402	80402	80402	80402	80403	80403	80403	80403	80403
	Fuel code	205A	207A	207A	209A		205B	205B	208B	203V	204B	206A	3030	203V	204B	206A	2080	3030
[g/GJ]	Fuel type	Diesel	Jet fuel	Jet fuel	Avgas	Gasoline	Diesel	Diesel	Gasoline	Res. Oil	Diesel	Kerosene	LPG	Res. Oil	Diesel	Kerosene	Gasoline	LPG
CH_4	2007	4.02	2.65	2.65	21.90	10.66	2.44	2.70	58.91	1.91	1.48	-	-	-	1.75	7.00	-	20.26
CH_4	2008	3.44	2.65	2.65	21.90	9.90	1.99	2.67	60.27	1.92	1.48	-	-	-	1.76	7.00	-	20.26
CH_4	2009	2.96	2.65	2.65	21.90	9.23	1.55	2.64	61.52	1.93	1.49	-	-	-	1.77	7.00	-	20.26
CH_4	2010	2.56	2.65	2.65	21.90	8.64	1.11	2.61	62.64	1.93	1.49	-	-	-	1.78	7.00	-	20.26
CH_4	2011	2.20	2.65	2.65	21.90	8.10	1.00	2.58	63.61	1.94	1.49	-	-	-	1.78	7.00	-	20.26
CH_4	2012	1.88	2.65	2.65	21.90	7.62	0.90	2.55	64.41	1.95	1.50	-	-	-	1.79	7.00	-	20.26
CH_4	2013	1.61	2.65	2.65	21.90	7.15	0.79	2.51	65.03	1.96	1.50	-	-	-	1.79	7.00	-	20.26
CH_4	2014	1.38	2.65	2.65	21.90	6.69	0.69	2.48	65.44	1.97	1.50	-	-	-	1.79	7.00	-	20.26
CH_4	2015	1.17	2.65	2.65	21.90	6.25	0.58	2.45	65.65	1.97	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2016	1.00	2.65	2.65	21.90	5.85	0.48	2.42	65.65	1.98	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2017	0.84	2.65	2.65	21.90	5.51	0.37	2.39	65.65	1.99	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2018	0.71	2.65	2.65	21.90	5.20	0.27	2.36	65.65	1.99	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2019	0.60	2.65	2.65	21.90	4.93	0.16	2.33	65.65	2.00	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2020	0.51	2.65	2.65	21.90	4.68	0.06	2.29	65.65	2.00	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2021	0.43	2.65	2.65	21.90	4.47	0.06	2.29	65.65	2.01	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2022	0.36	2.65	2.65	21.90	4.31	0.06	2.29	65.65	2.01	1.51	-	-	-	1.80	7.00	-	20.26
CH_4	2023	0.30	2.65	2.65	21.90	4.16	0.06	2.29	65.65	2.02	1.52	-	-	-	1.80	7.00	-	20.26
CH_4	2024	0.25	2.65	2.65	21.90	4.01	0.06	2.29	65.65	2.02	1.52	-	-	-	1.80	7.00	-	20.26
CH_4	2025	0.22	2.65	2.65	21.90	3.88	0.06	2.29	65.65	2.03	1.52	-	-	-	1.80	7.00	-	20.26
CH_4	2026	0.19	2.65	2.65	21.90	3.77	0.06	2.29	65.65	2.03	1.58	-	-	-	1.80	7.00	-	20.26
CH_4	2027	0.17	2.65	2.65	21.90	3.66	0.06	2.29	65.65	2.03	1.58	-	-	-	1.80	7.00	-	20.26
CH_4	2028	0.16	2.65	2.65	21.90	3.56	0.06	2.29	65.65	2.03	1.59	-	-	-	1.80	7.00	-	20.26
CH_4	2029	0.15	2.65	2.65	21.90	3.45	0.06	2.29	65.65	2.03	1.59	-	-	-	1.80	7.00	-	20.26
CH_4	2030	0.15	2.65	2.65	21.90	3.36	0.06	2.29	65.65	2.03	1.59	-	-	-	1.80	7.00	-	20.26

Emission factors for other mobile sources given per SNAP sector and fuel type 2007-2030 - N_2O.

	Category	Military					Railways	Inland waterways		National sea				National fishing				
			Air LTO	Air cruise														
	SNAP code	801	801	801	801	801	802	803	803	80402	80402	80402	80402	80403	80403	80403	80403	80403
	Fuel code	205A	207A	207A	209A		205B	205B	208B	203V	204B	206A	3030	203V	204B	206A	2080	3030
[g/GJ]	Fuel type	Diesel	Jet fuel	Jet fuel	Avgas	Gasoline	Diesel	Diesel	Gasoline	Res. Oil	Diesel	Kerosene	LPG	Res. Oil	Diesel	Kerosene	Gasoline	LPG
N_2O	2007	2.53	2.30	2.30	2.00	2.42	2.04	2.97	1.28	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2008	2.62	2.30	2.30	2.00	2.24	2.04	2.97	1.34	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2009	2.70	2.30	2.30	2.00	2.06	2.04	2.97	1.41	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2010	2.76	2.30	2.30	2.00	1.87	2.04	2.97	1.46	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2011	2.82	2.30	2.30	2.00	1.67	2.04	2.97	1.51	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2012	2.87	2.30	2.30	2.00	1.48	2.04	2.97	1.55	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2013	2.91	2.30	2.30	2.00	1.31	2.04	2.97	1.58	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2014	2.95	2.30	2.30	2.00	1.15	2.04	2.97	1.60	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2015	2.98	2.30	2.30	2.00	0.99	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2016	3.00	2.30	2.30	2.00	0.85	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2017	3.02	2.30	2.30	2.00	0.75	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2018	3.04	2.30	2.30	2.00	0.66	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2019	3.05	2.30	2.30	2.00	0.59	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2020	3.06	2.30	2.30	2.00	0.54	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2021	3.07	2.30	2.30	2.00	0.50	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2022	3.07	2.30	2.30	2.00	0.47	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2023	3.07	2.30	2.30	2.00	0.45	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2024	3.08	2.30	2.30	2.00	0.44	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2025	3.08	2.30	2.30	2.00	0.43	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2026	3.08	2.30	2.30	2.00	0.43	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2027	3.09	2.30	2.30	2.00	0.42	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2028	3.09	2.30	2.30	2.00	0.42	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2029	3.09	2.30	2.30	2.00	0.41	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00
N_2O	2030	3.09	2.30	2.30	2.00	0.41	2.04	2.97	1.61	4.89	4.68	-	-	-	4.68	0.00	-	0.00

Emission factors for other mobile sources given per SNAP sector and fuel type 2007-2030 – CO_2.

	International sea		Dom. LTO	Dom. LTO	Int. LTO	Int. LTO	Dom. Cruise	Int. cruise	Agriculture		Forestry		Industry				Household
	80404	80404	80501	80501	80502	80502	80503	80504	806	806	807	807	808	808	808	808	809
	203W	204B	207A	209A	207A	209A	207A	207A	205B	208B	205B	208B	205B	208B	3030		208B
Year	Res. Oil	Diesel	Jet fuel	Avgas	Jet fuel	Avgas	Jet fuel	Jet fuel	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	LPG		Gasoline
2007	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2008	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2009	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2010	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2011	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2012	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2013	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2014	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2015	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2016	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2017	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2018	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2019	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2020	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2021	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2022	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2023	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2024	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2025	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2026	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2027	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2028	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2029	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73
2030	78	74	72	73	72	73	72	72	74	73	74	73	74	73	65		73

Emission factors for other mobile sources given per SNAP sector and fuel type 2007-2030 – CH_4.

	International sea		Dom. LTO	Dom. LTO	Int. LTO	Int. LTO	Dom. Cruise	Int. cruise	Agriculture		Forestry		Industry				Household
	80404	80404	80501	80501	80502	80502	80503	80504	806	806	807	807	808	808	808	808	809
	203W	204B	207A	209A	207A	209A	207A	207A	205B	208B	205B	208B	205B	208B	3030		208B
Year	Res. Oil	Diesel	Jet fuel	Avgas	Jet fuel	Avgas	Jet fuel	Jet fuel	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	LPG		Gasoline
2007	1.89	1.72	3.41	21.90	4.59	-	2.04	1.17	1.24	152.40	0.72	57.62	1.36	106.02	7.69		74.06
2008	1.91	1.74	3.41	21.90	4.59	-	2.04	1.17	1.12	152.40	0.63	57.62	1.20	107.34	7.69		73.83
2009	1.92	1.75	3.41	21.90	4.59	-	2.04	1.17	1.03	152.40	0.54	49.79	1.11	108.68	7.69		71.96
2010	1.94	1.76	3.41	21.90	4.59	-	2.04	1.17	0.94	152.39	0.50	40.93	1.02	108.73	7.69		69.88
2011	1.95	1.77	3.41	21.90	4.59	-	2.04	1.17	0.85	152.39	0.46	30.97	0.96	108.78	7.69		67.60
2012	1.96	1.78	3.41	21.90	4.59	-	2.04	1.17	0.78	152.38	0.42	30.97	0.90	108.83	7.69		67.54
2013	1.98	1.80	3.41	21.90	4.59	-	2.04	1.17	0.71	152.38	0.39	30.97	0.85	108.88	7.69		66.73
2014	1.99	1.81	3.41	21.90	4.59	-	2.04	1.17	0.65	152.38	0.35	30.97	0.80	108.93	7.69		65.87
2015	2.00	1.82	3.41	21.90	4.59	-	2.04	1.17	0.58	152.36	0.32	30.97	0.76	108.42	7.69		64.97
2016	2.01	1.83	3.41	21.90	4.59	-	2.04	1.17	0.54	152.34	0.30	30.97	0.71	107.89	7.69		64.90
2017	2.02	1.84	3.41	21.90	4.59	-	2.04	1.17	0.50	152.32	0.29	30.97	0.67	107.35	7.69		64.82
2018	2.03	1.85	3.41	21.90	4.59	-	2.04	1.17	0.47	152.32	0.29	30.97	0.63	107.35	7.69		64.83
2019	2.05	1.86	3.41	21.90	4.59	-	2.04	1.17	0.45	152.32	0.28	30.97	0.61	107.35	7.69		64.83
2020	2.05	1.86	3.41	21.90	4.59	-	2.04	1.17	0.42	152.32	0.28	30.97	0.59	107.35	7.69		64.83
2021	2.06	1.87	3.41	21.90	4.59	-	2.04	1.17	0.40	152.32	0.28	30.97	0.58	107.35	7.69		64.83
2022	2.07	1.88	3.41	21.90	4.59	-	2.04	1.17	0.39	152.32	0.28	30.97	0.57	107.35	7.69		64.83
2023	2.08	1.88	3.41	21.90	4.59	-	2.04	1.17	0.38	152.32	0.28	30.97	0.56	107.35	7.69		64.83
2024	2.08	1.89	3.41	21.90	4.59	-	2.04	1.17	0.37	152.32	0.28	30.97	0.55	107.35	7.69		64.83
2025	2.09	1.89	3.41	21.90	4.59	-	2.04	1.17	0.35	152.32	0.28	30.97	0.55	107.35	7.69		64.83
2026	2.09	1.90	3.41	21.90	4.59	-	2.04	1.17	0.33	152.32	0.27	30.97	0.54	107.35	7.69		64.83
2027	2.10	1.90	3.41	21.90	4.59	-	2.04	1.17	0.32	152.32	0.27	30.97	0.54	107.35	7.69		64.83
2028	2.10	1.90	3.41	21.90	4.59	-	2.04	1.17	0.31	152.32	0.27	30.97	0.53	107.35	7.69		64.83
2029	2.10	1.90	3.41	21.90	4.59	-	2.04	1.17	0.29	152.32	0.27	30.97	0.53	107.35	7.69		64.83
2030	2.10	1.90	3.41	21.90	4.59	-	2.04	1.17	0.28	152.32	0.27	30.97	0.53	107.35	7.69		64.83

Emission factors for other mobile sources given per SNAP sector and fuel type 2007-2030 – N_2O.

	International sea		Dom. LTO	Dom. LTO	Int. LTO	Int. LTO	Dom. Cruise	Int. cruise	Agriculture		Forestry		Industry				Household
	80404	80404	80501	80501	80502	80502	80503	80504	806	806	807	807	808	808	808	808	809
	203W	204B	207A	209A	207A	209A	207A	207A	205B	208B	205B	208B	205B	208B	3030		208B
Year	Res. Oil	Diesel	Jet fuel	Avgas	Jet fuel	Avgas	Jet fuel	Jet fuel	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline	LPG		Gasoline
2007	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.15	1.68	3.21	0.43	3.09	1.44	3.50		1.13
2008	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.16	1.68	3.21	0.43	3.09	1.46	3.50		1.13
2009	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.16	1.68	3.21	0.44	3.09	1.48	3.50		1.14
2010	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.17	1.68	3.21	0.45	3.09	1.48	3.50		1.15
2011	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.18	1.68	3.21	0.46	3.09	1.48	3.50		1.16
2012	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.18	1.68	3.21	0.46	3.09	1.49	3.50		1.16
2013	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.19	1.68	3.22	0.46	3.09	1.49	3.50		1.16
2014	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.20	1.68	3.22	0.46	3.10	1.49	3.50		1.16
2015	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.20	1.68	3.22	0.46	3.10	1.49	3.50		1.16
2016	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.21	1.68	3.23	0.46	3.11	1.49	3.50		1.16
2017	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.21	1.68	3.23	0.46	3.11	1.49	3.50		1.16
2018	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.22	1.68	3.23	0.46	3.12	1.49	3.50		1.16
2019	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.22	1.68	3.23	0.46	3.13	1.49	3.50		1.16
2020	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.23	0.46	3.13	1.49	3.50		1.16
2021	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.14	1.49	3.50		1.16
2022	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.14	1.49	3.50		1.16
2023	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.14	1.49	3.50		1.16
2024	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.14	1.49	3.50		1.16
2025	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.15	1.49	3.50		1.16
2026	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.15	1.49	3.50		1.16
2027	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.15	1.49	3.50		1.16
2028	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.16	1.49	3.50		1.16
2029	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.23	1.68	3.24	0.46	3.16	1.49	3.50		1.16
2030	4.89	4.68	12.22	2.00	4.41	-	2.30	2.30	3.24	1.68	3.24	0.46	3.16	1.49	3.50		1.16

Emission factors for other mobile sources given per IPCC sector 2007-2030 – CO_2.

[ktons]	Year	Industry (1A2f)	Civil Aviation (1A3a)	Railways (1A3c)	Navigation (1A3d)	Residential (1A4b)	Ag./for./fish. (1A4c)	Military (1A5)	Navigation int. (1A3d)	Civil Aviation int. (1A3a)
CO_2	2007	73.3	72.0	74.0	74.3	73.0	74.0	72.9	77.1	72.0
CO_2	2008	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2009	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2010	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2011	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2012	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2013	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2014	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2015	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2016	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2017	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2018	73.3	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2019	73.4	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2020	73.4	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2021	73.4	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2022	73.4	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2023	73.4	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2024	73.4	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2025	73.4	72.0	74.0	74.3	73.0	74.0	72.9	76.8	72.0
CO_2	2026	73.4	72.0	74.0	74.4	73.0	74.0	72.9	76.8	72.0
CO_2	2027	73.4	72.0	74.0	74.4	73.0	74.0	72.9	76.8	72.0
CO_2	2028	73.4	72.0	74.0	74.4	73.0	74.0	72.9	76.8	72.0
CO_2	2029	73.4	72.0	74.0	74.4	73.0	74.0	72.9	76.8	72.0
CO_2	2030	73.4	72.0	74.0	74.4	73.0	74.0	72.9	76.8	72.0

Emission factors for other mobile sources given per IPCC sector 2007-2030 – CH_4.

[tons]	Year	Industry (1A2f)	Civil Aviation (1A3a)	Railways (1A3c)	Navigation (1A3d)	Residential (1A4b)	Ag./for./fish. (1A4c)	Military (1A5)	Navigation int. (1A3d)	Civil Aviation int. (1A3a)
CH_4	2007	3.0	2.3	2.4	5.2	74.1	4.3	3.4	1.9	1.4
CH_4	2008	2.9	2.3	2.0	5.2	73.8	4.1	3.1	1.9	1.4
CH_4	2009	2.8	2.3	1.6	5.2	72.0	4.0	2.9	1.9	1.4
CH_4	2010	2.7	2.3	1.1	5.2	69.9	3.9	2.7	1.9	1.4
CH_4	2011	2.7	2.3	1.0	5.2	67.6	3.8	2.5	1.9	1.4
CH_4	2012	2.6	2.3	0.9	5.2	67.5	3.7	2.3	1.9	1.4
CH_4	2013	2.6	2.3	0.8	5.2	66.7	3.7	2.2	1.9	1.4
CH_4	2014	2.5	2.3	0.7	5.2	65.9	3.6	2.1	1.9	1.4
CH_4	2015	2.5	2.3	0.6	5.2	65.0	3.6	2.0	1.9	1.4
CH_4	2016	2.4	2.3	0.5	5.2	64.9	3.6	1.9	2.0	1.4
CH_4	2017	2.4	2.3	0.4	5.2	64.8	3.6	1.8	2.0	1.4
CH_4	2018	2.3	2.3	0.3	5.2	64.8	3.5	1.8	2.0	1.4
CH_4	2019	2.3	2.3	0.2	5.2	64.8	3.5	1.7	2.0	1.4
CH_4	2020	2.3	2.3	0.1	5.2	64.8	3.5	1.7	2.0	1.4
CH_4	2021	2.3	2.3	0.1	5.2	64.8	3.5	1.6	2.0	1.4
CH_4	2022	2.3	2.3	0.1	5.2	64.8	3.5	1.6	2.0	1.4
CH_4	2023	2.2	2.3	0.1	5.2	64.8	3.4	1.6	2.0	1.4
CH_4	2024	2.2	2.3	0.1	5.2	64.8	3.4	1.6	2.0	1.4
CH_4	2025	2.2	2.3	0.1	5.2	64.8	3.4	1.5	2.0	1.4
CH_4	2026	2.2	2.3	0.1	5.3	64.8	3.4	1.5	2.0	1.4
CH_4	2027	2.2	2.3	0.1	5.3	64.8	3.4	1.5	2.0	1.4
CH_4	2028	2.2	2.3	0.1	5.3	64.8	3.4	1.5	2.0	1.4
CH_4	2029	2.2	2.3	0.1	5.3	64.8	3.4	1.5	2.0	1.4
CH_4	2030	2.2	2.3	0.1	5.3	64.8	3.3	1.5	2.0	1.4

Emission factors for other mobile sources given per IPCC sector 2007-2030 - N_2O.

[tons]	Year	Industry (1A2f)	Civil Aviation (1A3a)	Railways (1A3c)	Navigation (1A3d)	Residential (1A4b)	Ag./for./fish. (1A4c)	Military (1A5)	Navigation int. (1A3d)	Civil Aviation int. (1A3a)
N_2O	2007	3.1	4.3	2.0	4.2	1.1	3.6	2.4	4.8	2.5
N_2O	2008	3.1	4.3	2.0	4.2	1.1	3.6	2.5	4.8	2.5
N_2O	2009	3.1	4.3	2.0	4.2	1.1	3.6	2.5	4.8	2.5
N_2O	2010	3.1	4.3	2.0	4.2	1.1	3.6	2.5	4.8	2.5
N_2O	2011	3.1	4.3	2.0	4.2	1.2	3.6	2.5	4.8	2.5
N_2O	2012	3.1	4.3	2.0	4.2	1.2	3.6	2.6	4.8	2.5
N_2O	2013	3.1	4.3	2.0	4.3	1.2	3.6	2.6	4.8	2.5
N_2O	2014	3.1	4.3	2.0	4.3	1.2	3.6	2.6	4.8	2.5
N_2O	2015	3.1	4.3	2.0	4.3	1.2	3.6	2.6	4.8	2.5
N_2O	2016	3.1	4.3	2.0	4.3	1.2	3.6	2.6	4.8	2.5
N_2O	2017	3.1	4.3	2.0	4.3	1.2	3.6	2.6	4.8	2.5
N_2O	2018	3.1	4.3	2.0	4.3	1.2	3.6	2.6	4.8	2.5
N_2O	2019	3.1	4.3	2.0	4.3	1.2	3.6	2.6	4.8	2.5
N_2O	2020	3.1	4.3	2.0	4.3	1.2	3.6	2.7	4.8	2.5
N_2O	2021	3.1	4.3	2.0	4.3	1.2	3.6	2.7	4.8	2.5
N_2O	2022	3.1	4.3	2.0	4.3	1.2	3.6	2.7	4.8	2.5
N_2O	2023	3.1	4.3	2.0	4.3	1.2	3.6	2.7	4.8	2.5
N_2O	2024	3.2	4.3	2.0	4.3	1.2	3.6	2.7	4.8	2.5
N_2O	2025	3.2	4.3	2.0	4.3	1.2	3.6	2.7	4.8	2.5
N_2O	2026	3.2	4.3	2.0	4.2	1.2	3.6	2.7	4.8	2.5
N_2O	2027	3.2	4.3	2.0	4.2	1.2	3.6	2.7	4.8	2.5
N_2O	2028	3.2	4.3	2.0	4.2	1.2	3.6	2.7	4.8	2.5
N_2O	2029	3.2	4.3	2.0	4.2	1.2	3.6	2.7	4.8	2.5
N_2O	2030	3.2	4.3	2.0	4.2	1.2	3.6	2.7	4.8	2.5

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