

PART III:

**GREENHOUSE-GAS
EMISSIONS**

1. SHARES AND TRENDS IN GHG EMISSIONS

The information in Part III (with the exception of CO₂ emissions from fuel combustion) has been provided by Jos G.J. Olivier from the PBL Netherlands Environmental Assessment Agency and Greet Janssens-Maenhout leading the EDGAR team of the Joint Research Centre (JRC) of the European Commission, using the EDGAR 4.2 FT2010 database developed jointly by JRC and PBL.

Country data have been provided for 1990, 2000, 2005 and 2010. Moving from the EDGAR 4.2 to the EDGAR 4.2 FT2010 database has resulted in a few revisions to greenhouse-gas (GHG) estimates for some source categories for years before 2010. However, in most cases these changes led to very small changes in the global total. Please see Chapter 2 for further details on data sources and methodology.

Emission trends for gases and sources are provided in this discussion through 2010.

CO₂ emissions from fuel combustion constitute the majority of anthropogenic GHG emissions. However, comprehensive analysis of emissions and emission trends considers other sources of CO₂ as well as other gases.

To complement work regarding the emissions of CO₂ from fuel combustion, the IEA elected to include the EDGAR data on other CO₂ sources and on five other greenhouse gases; CH₄, N₂O and the fluorinated gases (or “F-gases”) HFCs, PFCs and SF₆. These gases are addressed by the Kyoto Protocol.

When considering comparative shares and trends in GHG emissions, data on gases and sources other than CO₂ from fuel combustion are much more uncertain. Country-specific estimates of CO₂ from biomass burning and F-gas emissions are particularly difficult to ascertain.

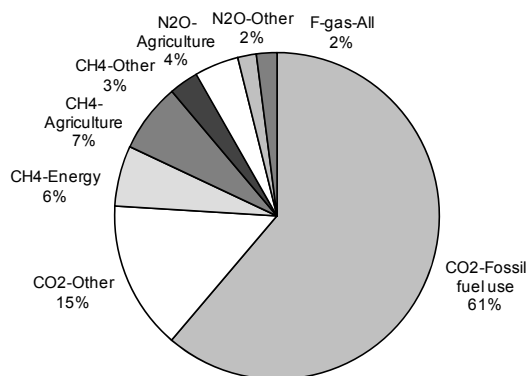
Shares by gas

The contribution of non-CO₂ gases to total emissions can be estimated by expressing the emissions of all the gases in CO₂-equivalent units. For a given gas, emissions expressed in mass are multiplied by its specific weighting factor, the Global Warming Potential (GWP). The GWP is an estimate of the relative contribution of a kilogramme of that gas to global radiative forcing, as compared to the same amount of CO₂, integrated over a fixed period of time (*e.g.* 100 years).

The UN Framework Convention on Climate Change (UNFCCC), following the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), uses the 100-year GWPs of 21 for CH₄, 310 for N₂O and 23 900 for SF₆. For the most common HFCs, GWPs vary between 140 and 3 000 (1 300 for HFC-134a). For the by-product HFC-23, the GWP is 11 700. The GWPs for PFCs vary between 6 500 (CF₄) to 9 200 (C₂F₆). These two PFCs, the ones most commonly used, are also significant sources of by-product emissions. This chapter expresses all emission data in CO₂-equivalents using these GWP values.

In 2010, CO₂ contributed 76% of global GHG emissions, CH₄ about 16%, N₂O about 6% and the combined F-gases about 2% (Figure 1). The largest sources of GHG emissions were the energy sector (68%, mainly CO₂ fossil fuel use), and agriculture (11%, mainly CH₄ and N₂O). Other sources of greenhouse gases were CO₂ from biomass burning (10%, mostly forest and peat fires and post-burn decay in non-Annex I countries), and CO₂ from cement production (3%, of which 54% originated in China). Please note that emissions from forest and peat fires are highly variable over the years.

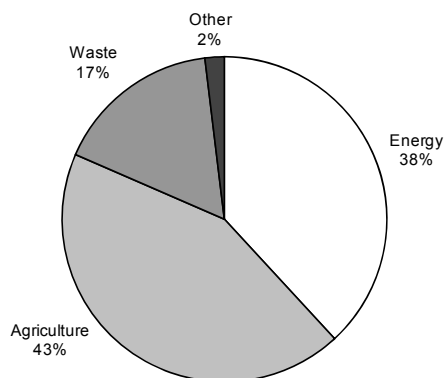
Figure 1. Global GHG emissions by gas/source in 2010



As seen in Figure 2, on an individual gas basis, the major global sources for **methane** (CH₄) in 2010 were:

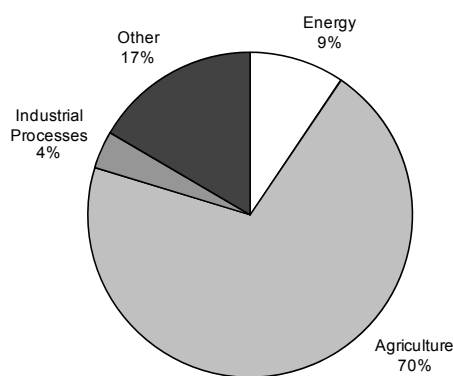
- agriculture (43%), mainly from enteric fermentation by animals and animal waste, from rice cultivation and from savannah burning;
- energy production and transmission (38%), mainly from coal production, and gas production and transmission;
- waste (17%), from landfills and wastewater.

Figure 2. Global CH₄ emissions in 2010



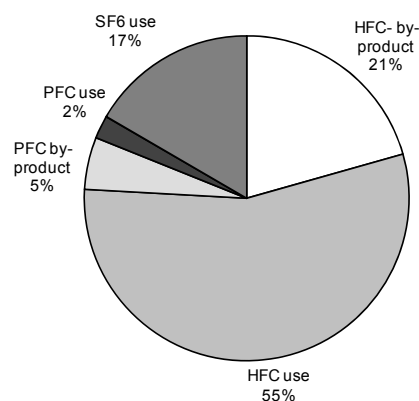
For **nitrous oxide** (N₂O), agriculture contributed 70% of emissions in 2010, mainly from synthetic fertilisers and animal waste dropped on soils (either as animal manure or by animals during grazing) and agricultural waste burning (Figure 3). A much smaller source is fuel combustion (9%, mainly from coal, fuelwood and road transport). Another small source is N₂O from industrial processes (4%), mostly in Annex I countries.

Figure 3. Global N₂O emissions in 2010



For the **fluorinated gases** (Figure 4), emissions are split between “use” and “by-products” because of the different ways they are produced. HFC use represented 55% of the total in 2010, of which HFC 134a alone represented 42%. Total by-product emissions of HFC contributed 21% and by-product emissions of PFCs another 5%. SF₆ use represented 17%, while PFC use represented the remaining 2%. Most F-gas emissions are emitted by Annex I countries.

Figure 4. Global F-gas emissions in 2010



Shares by region

In 2010, most **methane** emissions originated in non-Annex I regions such as Asia (42%) including China (21%) and Latin America¹ (12%). Emissions from Annex I countries contributed 26% of total emissions, with the largest contribution coming from the Annex I members of the Former Soviet Union (8%) and North America (8%).

For methane, emissions from animals and their waste dominate sources in Latin America and South Asia, while emissions from rice cultivation are common in South, East and Southeast Asia. Coal production emissions are concentrated in East Asia (mainly China), North America, and Other Europe and Eurasia, while emissions from gas systems are concentrated in the Former Soviet Union countries and North America. Methane from landfills stems mainly from Annex I countries, whereas methane emissions from wastewater disposal originate predominantly in non-Annex I countries.

Non-Annex I regions produced three-quarters of global **nitrous oxide** emissions in 2010: Asia (36%) including China (18%), Africa (19%) and Latin America (14%). N₂O emissions from Annex I countries contributed 27% to the global total, with most emissions originating in North America (11%) and OECD Europe (9%).

Of all nitrous oxide sources, animal waste emissions occur predominantly in the non-Annex I regions of Latin America, Africa and South Asia; N₂O from fertiliser use is largest in East Asia (mainly China) and Latin America followed by North America, Annex II Europe and South Asia (mainly India). N₂O emissions from crop production are largest in North America, Latin America, South Asia and East Asia. Industrial processes also emit significant volumes of N₂O.

The shares of Annex I countries in total CH₄ and total N₂O emissions (26% and 27% respectively) were relatively low compared to their share in global CO₂ emissions (38%).

In 2010, most **fluorinated gas** emissions originated in Annex I countries (66%), with North America contributing 38%, OECD Europe 13%, OECD Asia Oceania 9% and Other Europe and Eurasia 7%. Non-Annex I countries contributed about 34% to global F-gas emissions.

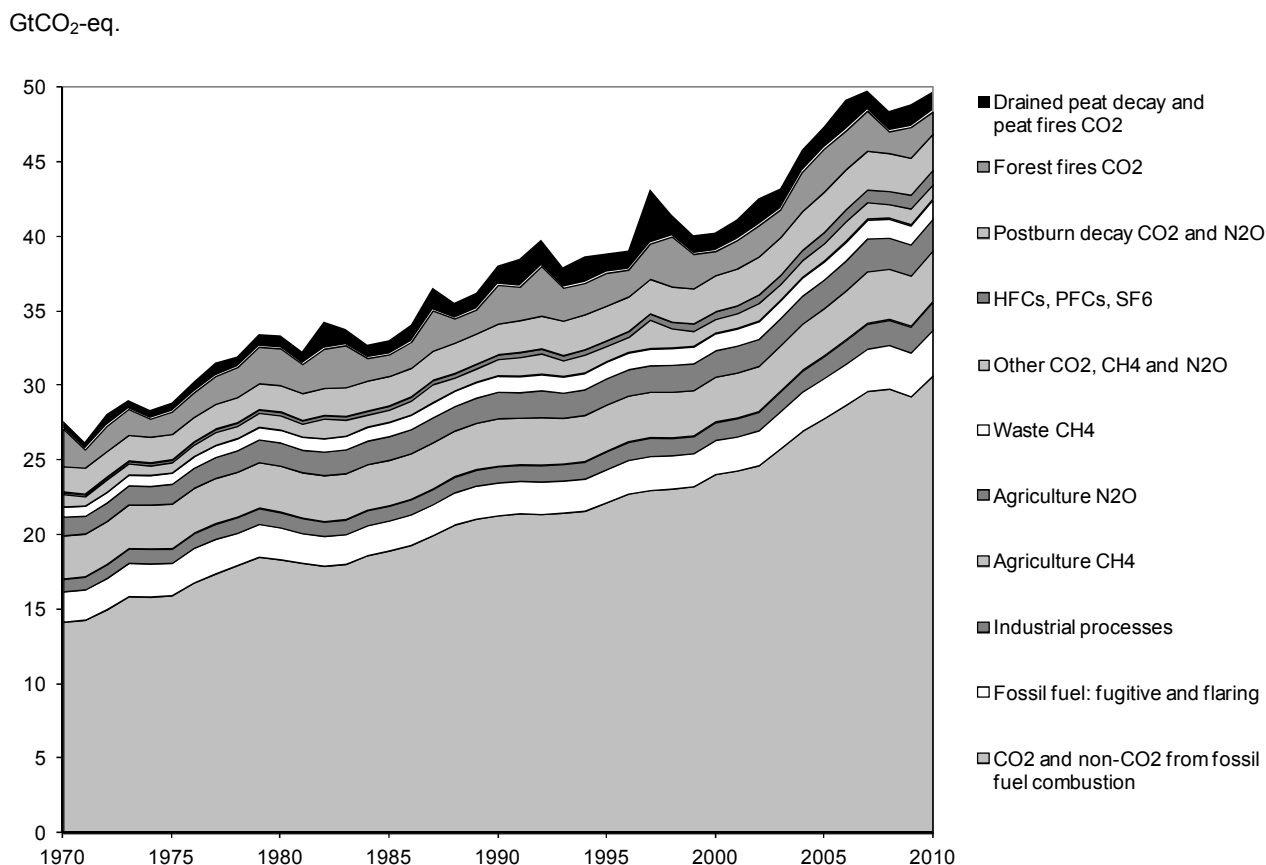
Total GHG emission trends

Emissions related to fossil fuels dominate the global trend in total GHG emissions. Between 1970 and 2010, total global anthropogenic GHG emissions increased considerably, with increases of CO₂ (including large-scale biomass burning of forests and biomass decay) by about 107% and increases of CH₄ and N₂O by about 47% and 43%, respectively, and the F-gases by about 700%. Total emissions of all greenhouse gases - weighted by their GWP - increased by about 80% since 1970.

According to the EDGAR 4.2 FT 2010 dataset, global total GHG emissions increased by 31% during the period 1990-2010 (Figure 5). A 44% growth in CO₂ emissions from fuel combustion drove much of this increase. Over the same period, although highly variable over time, CO₂ emissions from biomass burning and post-burn decay – based on satellite observations – are assumed to have decreased by about 10% with CO₂ from decay of drained peatland increasing by 18% since 1990. Increases in CO₂ emissions from cement production (120%), CH₄ emissions from fossil fuel production (44%) and waste (21%), N₂O emissions from agriculture (20%) and the F-gases (about 225%, mainly from HFC use) also contributed to the total increase. The F-gases (for which 1995 generally serves as base year) increased their share of global emissions from 1.0% in 1990 to 2.0% in 2010.

1. For the purposes of this discussion, Latin America refers to non-OECD Americas, Chile and Mexico. North America refers to Canada and the United States. Former Soviet Union contains both Annex I and non-Annex I countries.

Figure 5. Trend in global GHG emissions 1970-2010



Sources: IEA for CO₂ from fuel combustion and JRC/PBL (2012) [EDGAR 4.2 FT2010] for all other sources.

CO₂ emission trends

Energy dominates the trend in CO₂ emissions, accounting for 82% of the global total CO₂ emissions in 2010 including non-energy uses. About 10 percentage points higher than in 1970, this share now varies between 90-99% in most Annex I countries. Within non-Annex I countries, the energy share in CO₂ emissions varies more widely. Indeed, in some African, Latin American and Asian countries, it can be lower than 10%.

Over the 1990-2010 period, total fossil fuel combustion emissions of CO₂ increased about 44% worldwide (by about 145% in non-Annex I countries while remaining flat in Annex I countries). Emissions from electricity and heat production and from road transport dominated global trends. Between 1990 and 2010, CO₂ emissions from electricity and heat production increased by 18% for Annex II countries and by 108% in the rest of the world. Over the same period,

road transport emissions rose 21% in Annex II countries and 107% in the other countries. By 2010, these two sectors together accounted for 58% of global total CO₂ emissions from fuel combustion. The introduction at the beginning of this publication provides a more complete discussion of CO₂ emissions in 2010 and the trends in energy-related CO₂ emissions.

In 2010, the highly variable emissions from deforestation (*i.e.* forest fires) plus from decay of drained peatland accounted for about 7% of global CO₂ emissions (or about 13% including indirect CO₂ emissions from post-burn decay of remaining aboveground biomass). According to satellite observations the share of deforestation in global emissions was about 18% in the 1970s, 1980s and 1990s. Since 2000, however, this share has decreased due to rapidly increasing emissions from fossil fuel combustion. In 2010, CO₂ emissions from cement clinker production – excluding fossil fuel use – represented almost 4% of total emissions worldwide. Between 1990 and 2010, CO₂ from cement production increased by more than 150%.

CH₄ emission trends

Between 1970 and 2010, global methane emissions increased by almost half. In the 1970s emissions increased with an average growth rate of 1.3% per year. In the 1980s, this growth rate slowed down to an average 1.1% per year, determined mainly by growth of emissions in Other Europe and Eurasia from gas production and transmission and in East Asia from coal production (Figure 6). In addition, enteric fermentation by ruminants and waste and wastewater disposal contributed to the increased emissions, particularly in non-Annex I regions. Emissions from rice cultivation are estimated to have decreased due to changes in types of rice grown and to other organic amendment practices. Furthermore, coal production shifted to incorporate more surface mining, which releases much less methane than underground mines.

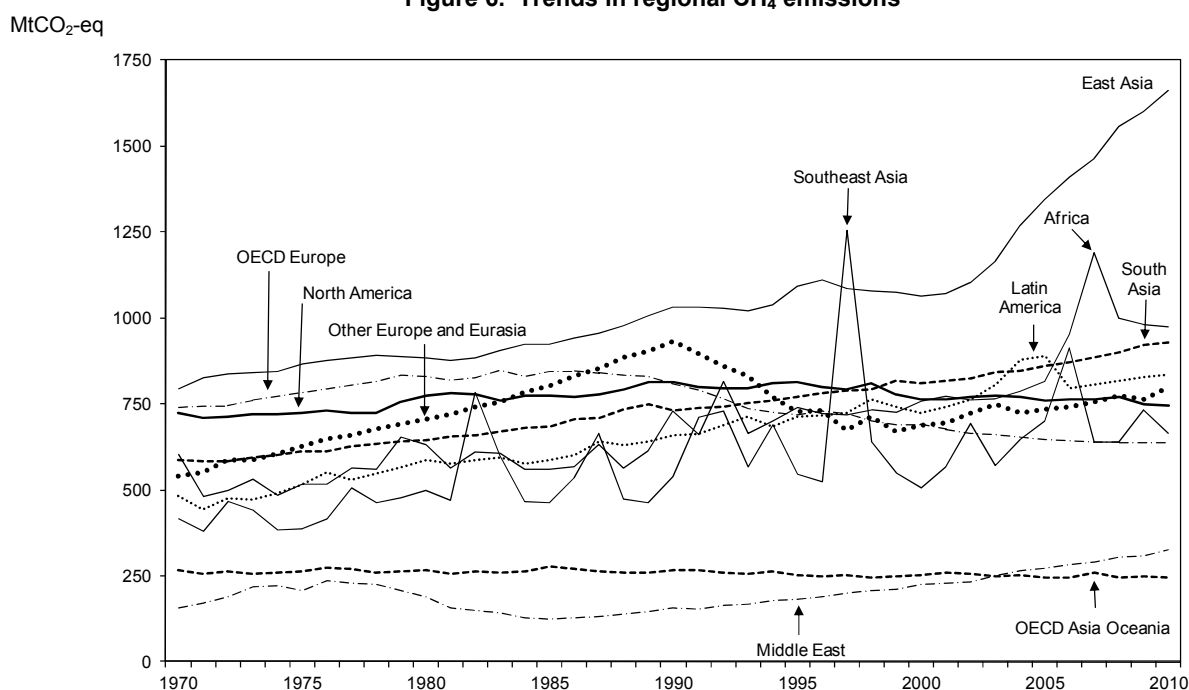
In the 1990s, an average decrease of 0.2% per year was observed. The economic decline of FSU countries in the early 1990s strongly influenced this global methane trend. Their emissions from coal production, from gas transmission and from animals (enteric fermentation) decreased substantially between 1990 and 1995. It should be stressed, however, that detailed statistics for this region are uncertain over this period. Despite the overall decline in the 1990s, increases were observed regionally: from gas production (particularly in the Middle East and North America), from waste handling (landfills in Latin America and

wastewater in South Asia), from large-scale biomass burning in developing countries and from coal production in China. These increases were partially offset by decreases in fugitive emissions from coal production and CH₄ emissions from animals in EIT countries.

Since 2000, emissions started increasing again, with an average growth rate of 1.9% per year, which has meant that since 2002, the emissions increased faster than in the last four decades. This led to a global increase of about 20% over the period 2000-2010, driven by increased coal mining by the top methane-emitting country China (+50%) and increased cattle numbers in Brazil (+23%).

Between 1990 and 2010, country-specific trends of activity data and emission factors lead to an increase of global total methane emissions of about 17%. During this period, emissions in non-Annex I countries increased about 38%, with the largest absolute growth occurring in Asia and Africa. Emissions in Annex I countries decreased by 18%, mainly driven by the countries of the Former Soviet Union. Annex II emissions as a whole decreased over the same period by 16% and OECD Europe decreased by about 21%, mainly as a result of the policies of the United Kingdom and Germany, which reduced coal production and increased methane recovery from coal mines, entailing emission reductions of about 50%. In North America and OECD Europe, methane emissions from landfills also decreased by about 50% due to enhanced waste separation and methane recovery.

Figure 6. Trends in regional CH₄ emissions



Source: EDGAR 4.2 FT2010 (JRC/PBL, 2012).

N₂O emission trends

Between 1970 and 2010, global emissions of N₂O increased by about 43%. Increased use since the 1970s of synthetic fertilisers and manure from livestock caused agricultural emissions in South Asia and East Asia to increase on average by 3-4% annually. These regional emission trends continued into the 2000s (Figure 7). Emissions from Latin America and Africa also increased in the 1990s, predominantly from the same sources and from forest fires.

In contrast, N₂O emissions from industrial processes decreased by 40% during the 1980s. This decrease resulted from the gradual upgrade of global production facilities for nitric acid. By 1990 about 20% of the facilities were equipped for non-selective catalytic reduction limiting NO_x emissions while simultaneously reducing N₂O emissions.

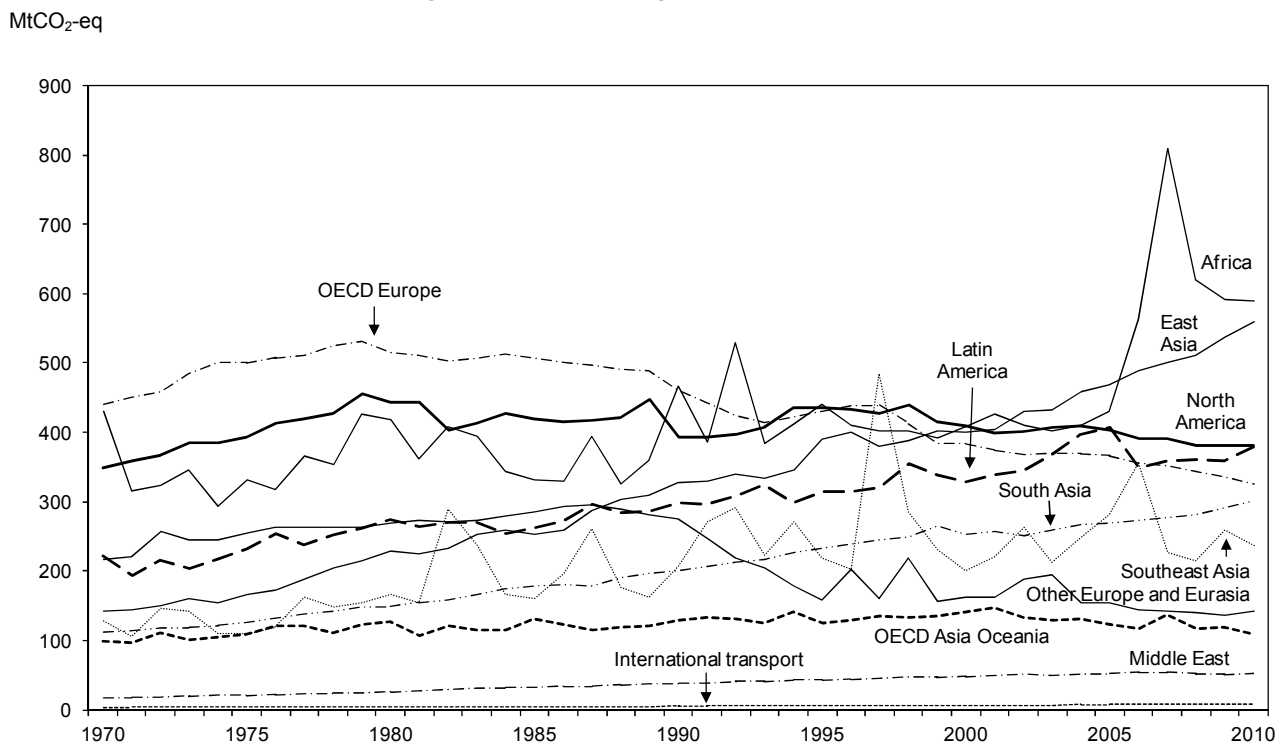
During the 1970s, North America and Japan introduced catalytic converters in gasoline-fired cars to reduce emissions of precursors of tropospheric ozone, but with higher N₂O emissions as a side effect. Since

the 1990s this technology was also introduced in Europe and Australia. Until about 2000 the catalytic converters contributed to the increase in N₂O emissions in these countries, though in the late 1990s newer types were introduced with lower specific N₂O emissions.

In the period 1990-2010, global N₂O emissions are estimated to have increased by about 10%. The three-quarter reduction in industrial emissions from adipic acid manufacturing particularly limited this increase. Over this period, emissions in non-Annex I countries increased by over 35%, mainly in the agricultural sector in South Asia, East Asia and Latin America. The increase was partially offset by decreasing emissions in the non-Annex I members of the Former Soviet Union (-24%) and, to a lesser extent, in other EIT countries. In OECD Europe, N₂O decreased by almost 29% since 1990, mainly due to emission abatement in the chemical industry and to a decrease in the use of nitrogen fertilisers.

When considering these trends, the reader should bear in mind that the uncertainties in annual emissions of most sources of N₂O are very large, *e.g.* the uncertainty for agricultural sources may sometimes exceed 100%.

Figure 7. Trends in regional N₂O emissions



Source: EDGAR 4.2 FT2010 (JRC,/PBL, 2012).

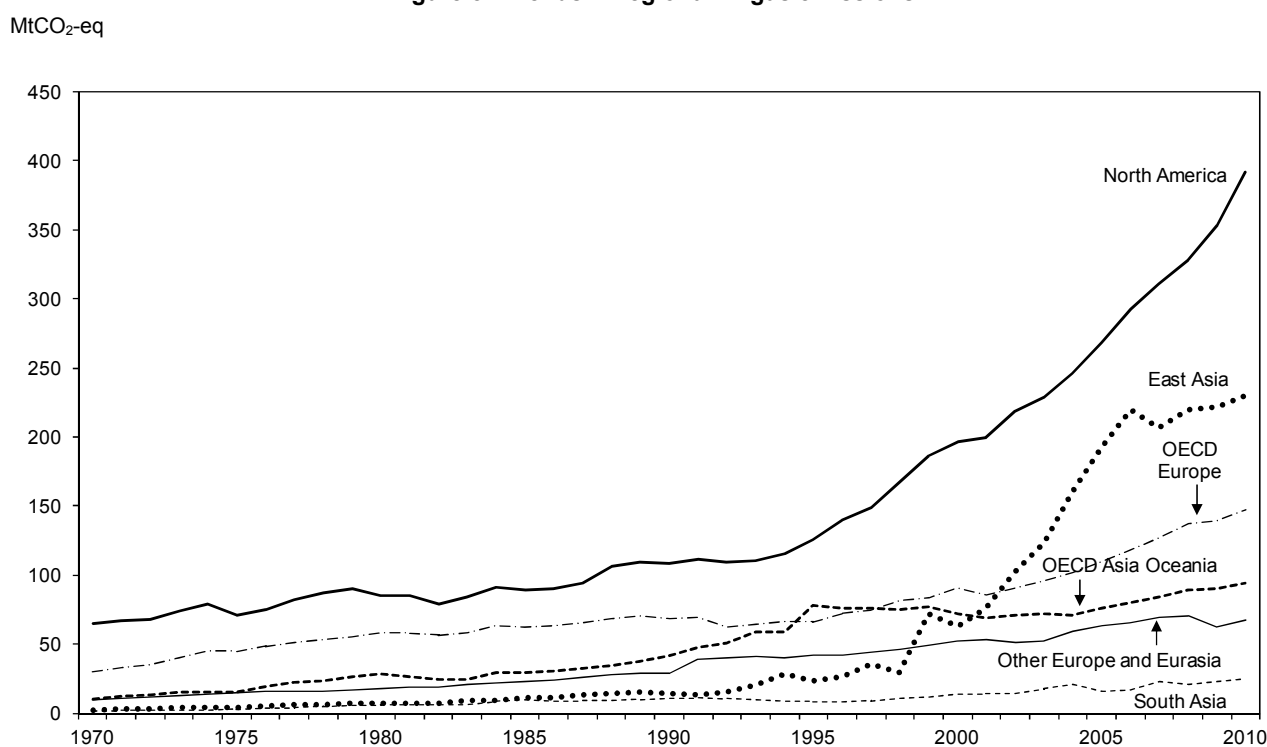
HFC, PFC and SF₆ emission trends

Between 1990 and 2010, the estimated emissions of F-gases increased by about 225%, mainly due to an increase in HFC emissions: emissions of HFC in 2010 were about 9 times higher than in 1990. During the same period, PFCs emissions decreased by about 35% while SF₆ emissions increased by about 45%. Annex I regions experienced large growth in F-gas emissions, with regional increases on the order of 125% except for North America which showed an increase of over 250%. On a regional basis, total F-gas emission trends varied between 10% and 1500% for the non-Annex I regions, with the largest absolute increases coming from East Asia, driven by a fifteen-fold increase in China, which is here included in East Asia.

Since 1995, global F-gas emissions have increased more rapidly. The increase in HFC emissions (4.5 times higher) more than offset a 30% reduction in PFCs emissions. The small reductions in global SF₆ emissions observed in the period 1996-2004 were mainly due to reductions in emissions from manufacture and use of switchgear for the electricity sector. The large reduction in PFC emissions in the last years is due to the phasing-out of old Söderberg technology for aluminium production in China. Global emissions of HFCs other than HFC-134a now exceed emissions of HFC-134a, widely used for refrigeration and air-conditioning.

When considering these trends, one should note that the uncertainties in annual emissions of most sources of F-gases are very large, *e.g.* at a country level they may well exceed 100%. Therefore, the figures provided for individual countries should be considered solely as order-of-magnitude estimates.

Figure 8. Trends in regional* F-gas emissions



* Only regions with significant emissions of F-gases have been included in this figure.

Source: EDGAR 4.2 FT2010 (JRC/PBL, 2012).

2. SOURCES AND METHODS

When looking at GHG emission trends, limiting the emissions to CO₂ from fuel combustion means that the estimates give an incomplete picture of total GHG emissions. Therefore, to put the CO₂ emissions from fuel combustion into context, information has been added from the emissions model “EDGAR”, developed by the Netherlands Environmental Assessment Agency (PBL) and the European Commission’s Joint Research Centre (JRC) to provide global anthropogenic emissions of greenhouse gases to be used as a reference database for science and policy applications.

The information in Part III (with the exception of CO₂ emissions from fossil fuel combustion) has been provided by Jos G.J. Olivier from PBL and Greet Janssens-Maenhout based on the EDGAR 4.2 FT2010 dataset. PBL and JRC are responsible for the calculation of the EDGAR 4.2 FT2010 data. Please see below for further details.

Background on PBL and JRC

The **PBL Netherlands Environmental Assessment Agency** is a government-funded agency that supports national and international policy makers by exploring future spatial and social trends that influence environmental, ecological and spatial quality, and by evaluating possible policy options. PBL explores the future quality of the environment and identifies possible strategic options. It aims to contribute to improving the quality of political and administrative decision-making at a regional, national, European and global scale by conducting outlook studies, analyses and evaluations in which an integrated approach and policy relevance are considered paramount.

PBL provides independent integrated assessments on topics such as sustainable development, energy and climate change, biodiversity, spatial planning, transport,

land use and air quality. PBL acts as an interface between science and policy and provides the Netherlands government and international organisations such as EU/EEA, IEA/OECD, UN and the World Bank with sound, evidence-based assessments. PBL employs about 200 staff members and works in close collaboration with national and international partners, to assess future policies and the effects of policies already in place. A key feature of PBL research is taking a broad view of the subject matter and revealing the links between different spatial scales of investigation. This ranges from Dutch problems in the European and global context to global topics such as climate change, as well as European and global sustainability issues. PBL participates in the Topic Centre on Air and Climate Change of the European Environmental Agency (EEA), whose aim is to support EU policy on air pollution and climate change, together with 12 other organisations in Europe. PBL was also involved in the work of the IPCC’s National Greenhouse Gas Inventory Programme (NGGIP).

The **Joint Research Centre (JRC)** is a Directorate General of the European Commission (EC). The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. A service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether national or private. The Institute for Environment and Sustainability (IES) is one of seven institutes of the JRC, located in Ispra (Italy). The mission of IES is to provide scientific-technical support to the European Union’s policies for the protection and sustainable development of the European and global environment. The IES adopts a systems-based approach to understand the complex interactions

between human activity and the physical environment, and manage strategic resources (water, land, forests, food, minerals, etc.) in a more sustainable manner. Together with other JRC institutes, the IES provides the scientific basis for the conception, development, implementation and evaluation of EU policies that promote the greening of Europe and the global sustainable management of natural resources. The IES has over 400 staff members and manages several large-scale research infrastructures and hosts a large number of unique pan-European and global databases. The main customers of the IES are the Policy Directorates-General of the European Commission, other European bodies such as the European Environment Agency (EEA) and the European Space Agency (ESA), and global organisations such as the United Nations Environment Programme (UNEP) and the United Nations Food and Agricultural Organisation (FAO). The IES cooperates with international organisations such as UN-ECE, WHO, IPCC and NASA.

General note on EDGAR

Version 4 of the *Emission Database for Global Atmospheric Research*, in short the *EDGAR 4 system*, has been developed jointly by the European Commission's Joint Research Centre (JRC) and the PBL Netherlands Environmental Assessment Agency. The aim of the EDGAR system, which was started in 1992 with financial support from the Netherlands' former Ministry of Housing, Spatial Planning and the Environment (VROM) and the Netherlands' National Research Programme on Global Air Pollution and Climate Change (NRP), is to provide global anthropogenic emissions of greenhouse gases CO₂, CH₄, N₂O, HFCs, PFCs and SF₆ and of precursor gases and air pollutants CO, NO_x, NMVOC, SO₂ and the aerosols BC/OC, per source category, both at country/region levels as well as on a 0.1x0.1 degree grid. It is meant to serve as a reference database for policy applications, e.g. to provide JRC's POLES global economic energy scenario model and PBL's integrated global change model IMAGE 2 with emissions data and for assessments of potentials for emission reductions, as well as for scientific studies by providing gridded emissions as input for atmospheric models. The latter function is part of the *Global Exchange and Interactions Activity* (GEIA), that combines efforts to produce gridded inventories for all compounds relevant for the modelling activities within the *Analysis, Integration and Modelling of the Earth System* (AIMES) project of the *International Geosphere-Biosphere Programme* (IGBP) and of

ACCENT, a Network of Excellence funded by the EC, 6th Framework Programme (FP6), Priority 1.1.6.3 Global Change and Ecosystems. EDGAR data have also been used in the Fourth Report of IPCC Working Group III (IPCC, 2007).

Activity data were mostly taken from international statistical sources and emission factors for greenhouse gases were selected mostly from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (IPCC, 2006) to ensure a consistent approach across countries. JRC and PBL have made all reasonable efforts to ensure that the information was generated correctly, but it is the responsibility of the EDGAR consortium to modify activity data when required to arrive at complete time series and for selecting the emission factors. It is stressed that the uncertainty in the resulting dataset at national level may be substantial, especially for methane and nitrous oxide, and even more so for the F-gases. The uncertainty is caused by the limited accuracy of international activity data used and in particular of emission factors selected for calculating emissions on a country level (Olivier *et al.*, 1999, 2001; Olivier and Berdowski, 2001; Olivier, 2002; Olivier *et al.*, 2005). However, since the methods used are either IPCC methodologies or comparable to them (see below), global totals comply with budgets used in atmospheric studies, plus the data were based on international information sources, this dataset provides a sound basis for comparability.

The main aim of the EDGAR 4.2 Fast Track 2010 (FT 2010) dataset was to provide an extended time series by adding emissions for 2009 and 2010. For the GHG update, the impact of CDM projects in developing countries to reduce CH₄, N₂O and HFC-23 emissions was taken into account. This applies to sources such as coal mines and landfills (CH₄ recovery), nitric acid and adipic acid production (N₂O) and the production of HCFC-22 (HFC-23), which now start to influence significantly global emission trends. In addition, a few errors found in the dataset have been corrected.

Although this dataset has been constructed with great care, JRC and PBL do not accept any liability from use of the data provided in this report including any inaccuracies or omissions in the data provided. For details on uncertainty and caveats identified in the dataset, as well as more detailed source category estimates, we refer user to the EDGAR 4 website at edgar.jrc.ec.europa.eu. Note that preliminary estimates for other more recent years than 2010 will be made publicly available through this website. Preliminary global trends of GHG emissions will also be made

available at PBL (2012). For CO₂ emissions through to 2011 please refer to Olivier et al. (2012).

Source definitions

For carbon dioxide:

Fuel combustion refers to fossil fuel combustion and the unstored fraction of non-energy/feedstock use (IPCC Source/Sink Category 1A) estimated using the IPCC Sectoral Approach from the *Revised 1996 IPCC Guidelines* (see Part I).

Fugitive refers to flaring of associated gas in oil and gas production (in some cases including indirect CO₂ from methane venting) (IPCC Source/Sink Category 1B).

Industrial Processes refers to production of cement, lime, soda ash, carbides, ammonia, methanol, ethylene and other chemicals, metals and to the use of soda ash, limestone and dolomite, and non-energy use of lubricants and waxes (IPCC Source/Sink Category 2). However, from EDGAR 4.1, only emissions from production of cement, lime and soda ash and from the use of soda ash, limestone and dolomite are included here, since all others were estimated by the IEA and reported under 'Fuel combustion'.

Other refers to direct emissions from forest fires and peat fires plus emissions from decay (decomposition) of aboveground biomass that remains after logging and deforestation and emissions from peat fires and decay of drained peat soils (IPCC Source/Sink Category 5). CO₂ from solvent use (IPCC Source/Sink Category 3), application of agricultural lime (IPCC Source/Sink Category 4) and from fossil fuel fires, notably coal fires and the Kuwait oil fires (IPCC Source/Sink Category 7), is also included here.

For methane:

Energy comprises production, handling, transmission and combustion of fossil fuels and biofuels (IPCC Source/Sink Categories 1A and 1B).

Agriculture comprises animals, animal waste, rice production, agricultural waste burning (non-energy, on-site) and savannah burning (IPCC Source/Sink Category 4).

Waste comprises landfills, wastewater treatment, human wastewater disposal and waste incineration (non-energy) (IPCC Source/Sink Category 6).

Others includes industrial process emissions such as methanol production, forest and peat fires and other vegetation fires (IPCC Source/Sink Categories 2 and 5).

For nitrous oxide:

Energy comprises combustion of fossil fuels and bio-fuels (IPCC Source/Sink Categories 1A and 1B).

Agriculture comprises fertiliser use (synthetic and animal manure), animal waste management, agricultural waste burning (non-energy, on-site) and savannah burning (IPCC Source/Sink Category 4).

Industrial Processes comprises non-combustion emissions from manufacturing of adipic acid, nitric acid, caprolactam and glyoxal (IPCC Source/Sink Category 2).

Others includes N₂O usage, forest and peat fires (including post-burn emissions from remaining biomass) and other vegetation fires, human sewage discharge and waste incineration (non-energy) and indirect N₂O from atmospheric deposition of NO_x and NH₃ from non-agricultural sources (IPCC Source/Sink Categories 3, 5, 6 and 7).

For fluorinated gases:

HFC emissions comprise by-product emissions of HFC-23 from HCFC-22 manufacture and the use of HFCs (IPCC Source/Sink Categories 2E and 2F).

PFC emissions comprise by-product emissions of CF₄ and C₂F₆ from primary aluminium production and the use of PFCs, in particular for the manufacture of semiconductors, flat panel displays and photovoltaic cells (IPCC Source/Sink Categories 2C, 2E and 2F).

SF₆ emissions stem from various sources of SF₆ use, of which the largest is the use and manufacture of Gas Insulated Switchgear (GIS) used in the electricity distribution networks (IPCC Source/Sink Categories 2C and 2F) and from SF₆ production (Category 2E).

Data sources and methodology for EDGAR 4.2 FT2010

For EDGAR 4.2 Fast Track 2010 (EDGAR 4.2 FT2010) the same methods and data were applied for 1970-2008 as for EDGAR 4.2 FT 2008 that was used in last year's edition, however, with some corrections (CO₂ from power generation in the United States in 2008). For greenhouse gases the default emission factors from the *2006 IPCC Guidelines* (IPCC, 2006) were used instead of those of the *Revised 1996 IPCC Guidelines* (IPCC, 1997), except for CH₄ and N₂O from road transport where technology-specific factors

were used from the EMEP-EEA emission inventory guidebook (EEA, 2009).

EDGAR 4.2 FT2010 provides an extended time series for all sources by adding emissions for 2009 and 2010. For the new Fast Track estimates for 2009 and 2010, for the main sources of each greenhouse gas as proxy of the emissions trend in these years, either the official national reported emissions trend from UNFCCC (2012) was used, or the trend in the latest activity data for 2008 to 2010, or statistics for an activity that was assumed to be a good proxy for that source. These statistics were sectoral CO₂ emissions (IEA, this publication), fossil-fuel production (IEA, 2012), gas flaring (NOAA/NCDC, 2012), production of steel, aluminium, cement, lime and ammonia (USGS, 2012; WSA, 2012), animal numbers, crop production and nitrogen fertiliser consumption (FAO, 2012), large-scale biomass burning (GFED 3; Van der Werf et al., 2010), photovoltaic solar cell production and flat panel display sales (IEA, 2011; and others).

For small-scale sources, such as industrial process sources of methane and nitrous oxide from caprolactam production, linear extrapolation of the past trend from 2005 to 2008 was assumed. These proxies – sometimes adjusted to incorporate significant trends in the emission factors – were applied to most sources, comprising more than 95% of the global total for gas. For important sources, where significant trends in the technology mix or in the application rate of emission control technology had occurred, trend estimates were included. In all other cases the mix and fraction of end-of-pipe abatement technology has been left unchanged after 2008.

To take into account non-CO₂ emission reductions that have occurred due to control measures implemented since 1990, officially reported emissions were used for Annex I countries (mainly countries that were already members of the OECD in 1990). These emission trends have been taken from the CRF emission data files which make up part of the National Inventory Reports (NIR) to the UNFCCC (UNFCCC, 2008, 2010, 2012). In addition, for non-CO₂ emission reductions in developing countries up to 2010, we used information on so-called CDM projects that have been implemented according to the “CDM pipeline” database maintained by the UNEP-Risø Centre (2011). This was done for methane recovery from coal mining and landfills, N₂O abatement in industrial processes and HFC-23 emission reductions from HCFC-22 manufacture.

Methods and data applied for all years except 2009 and 2010 are described below.

Energy / Fugitive / Biofuel

The data sources for **fugitive CO₂ emissions** and **CH₄ and N₂O from energy** are listed below. Data for fossil fuel production and use for 138 countries were taken from the IEA energy statistics for OECD and Non-OECD countries 1970-2008 (extended energy balances, in energy units) (IEA, 2007, 2010). This dataset comprises 94 sectors and 64 fuel types. For the countries of the Former Soviet Union and Former Yugoslavia a modified dataset was used to achieve a complete time series for the new countries from 1970 to 2008, the sum of which converges to the older dataset for the total Former Soviet Union and Yugoslavia. For another 62 countries, the aggregated IEA data for the regions ‘Other America’, ‘Other Africa’ and ‘Other Asia’ have been split using the sectoral IEA data per region together with total production and consumption figures per country of coal, gas and oil from energy statistics reported by the US Energy Information Administration (EIA, 2007, 2010).

Please note that the figures of CO₂ from fuel combustion and non-energy use of fuels in this report differ somewhat from the EDGAR 4.2 FT2010 dataset, for the following reasons:

- IEA energy statistics used for 1970-2008 may differ slightly due to revisions included in subsequent IEA releases. For EDGAR 4.2 FT2010 the releases of 2007 and 2010 were used for 1970-1999 and 2000-2008, respectively (IEA, 2007, 2010);
- the IEA uses the default CO₂ emission factors from the *Revised 1996 IPCC Guidelines*, which differ slightly due to different default oxidation factors (coal updated value +2%, oil products +1%, natural gas +0.5%) and updated defaults for carbon content for some fuels, the quality of which may vary considerably (mainly refinery gas, updated value -7%, coke oven gas -7%, blast furnace gas +7%, coke -1%);
- the IEA estimates CO₂ emissions from carbon released in fossil fuel use labelled in the sectoral energy balance as ‘non-energy use’ or ‘chemical feedstock’ using default fractions stored. For EDGAR 4.2 FT2010, for 1970-2008 default emission factors and methods from the *2006 IPCC Guidelines* were applied, which may give rise to considerable differences compared to the 1996 guidelines.

In addition, subtraction of the non-energy/feedstock fuel use part of the EDGAR 4.2 FT2010 dataset in order to combine it with the IEA CO₂ dataset also introduces some uncertainty.

To estimate CH₄ emissions from fossil fuel production and transmission, hard coal and brown coal production data have been separated into surface and underground mining based on various national reports. For gas transport and distribution, pipeline length was used as activity data. Pipeline length and material statistics are taken from reports on Europe by Eurogas and Marcogaz, national reports (e.g. the United States and Canada), UNFCCC (2008) and supplemental data from CIA (2008). Total amounts of natural gas flared (sometimes including gas vented) for most countries for 1994 onwards are primarily based on amounts of gas flared determined from the satellite observations of the intensity of flaring lights (Elvidge et al., 2009), reported by NOAA (2011). For other years before 1994 and for other countries emissions or emissions trends were supplemented by CO₂ trends from CDIAC (Marland *et al.*, 2006), EIA (2011) and UNFCCC (2010).

Biofuel data were also taken from IEA (2007). However, to avoid incomplete time series for large sectors, solid biomass consumption in the residential and commercial sectors in non-OECD countries were replaced by fuelwood and charcoal consumption from FAO (2007a). Vegetal waste used as fuel is based on the amounts of crop residues per country and fractions used as fuel based on Yevich and Logan (2003) and IPCC (2006). The amount of dung used as fuel is based on the total amount of manure produced per country and the fraction of total manure burned as fuel with fractions from IPCC (2006) and UNFCCC (2008). The results are rather close to the work of Fernandes *et al.* (2007) who made an extensive analysis of global and regional biofuel use in 2000. Charcoal production data were taken from IEA (2010) and supplemented or extrapolated using data from UN (2010) for 1990-2005 and FAO (2010) for pre-1990 data and 49 more countries not included in the IEA dataset.

Emission factors for fossil fuel production and use are based on the default values in the *2006 IPCC Guidelines* (IPCC, 2006). Methane emission factors for coal mining are based on average depths of coal production based on CIAB (1994), EURACOAL (2008), Kirchgessner *et al.* (1993) and include post mining emissions. Methane recovery from coal mining was included for twelve countries amounting to about 1.3 Tg in 1990 (of which about one-third was

allocated to the United States and Germany). Recovery in 2005 was estimated at 2.8 Tg (of which 50% in China and 25% in the United States (UNFCCC, 2010; Thakur *et al.*, 1994, 1996; EPA, 2008; Cheng *et al.*, 2011).

Emission factors for oil and gas production, transport and distribution were taken from IPCC (2006), supplemented with data from UNFCCC (2008), except for the emission factor for CH₄ from oil tanker transport which is from Rudd and Hill (2001). The CH₄ emission factor for venting and flaring has been derived from country-specific data reported to UNFCCC (2010), with the average value used as global default, applied to all other countries. The CO₂ emission factor excludes the indirect emissions through gas venting.

For N₂O from gasoline cars in road transport, the fraction of cars equipped with different types of catalytic converters was taken into account (based on various references). The factors for biofuel combustion were taken from the *2006 IPCC Guidelines*. For charcoal production the emissions factors are from Andreae (2011).

Industrial processes

Production data for the CO₂ sources cement, iron and steel, non-ferrous metals and various chemicals were based on UN Industrial Commodity Statistics (UN, 2006a), often supplemented for recent years by data from the US Geological Survey (USGS, 2007). The same method applied to paper, wine, beer and bread production. Data for other CO₂ sources such as production of lime, soda ash, ammonia, ferroalloys and non-ferrous metals were from USGS (2007, 2010), supplemented by data reported to the UNFCCC (2010). IFA (2007) was used for urea production (where it is assumed that the fossil carbon in CO₂ from ammonia production is stored) and FAO (2007a,c) for production of pulp, meat and poultry. Iron and steel production was further split into technologies (basic oxygen furnace, open hearth, electric arc furnace) using data from WSA (2010).

For the N₂O sources nitric acid, adipic acid and caprolactam, production data are based on UNFCCC (2010) and on smoothed and averaged SRIC (2005) data. For other industrial production for which no international statistics were available, such as silicon carbide and glyoxal, UNFCCC (2010) was used, though limited to Annex I countries.

However, for many countries interpolations and extrapolations were necessary to arrive at complete time series per country for 1970-2005/2008. Special

attention had to be given to new EIT countries, in particular to Former Soviet Union and Former Yugoslavia countries, to maintain consistency with the older totals for the former countries.

Emission factors for CO₂, CH₄ and N₂O are described in IPCC (2006). Note that emissions of CO₂ from cement production are only a proxy for cement clinker production. The N₂O emission factors for the production of adipic acid, nitric acid, caprolactam and glyoxal are based on IPCC (2006). For adipic acid, abatement is only assumed from 1990 onwards if indicated in UNFCCC (2010) combined with activity data from SRIC (2005). For nitric acid in 1970, all old technology is assumed, changing their technology towards 1990 into high pressure plants in non-Annex I countries and a mix of low and medium pressure plants in Annex I countries that matches reported emissions in UNFCCC (2010). In addition, about 20% of global total production, all in Annex II countries, is equipped with Non-Selective Catalytic Reduction (NSCR) technology (Choe *et al.*, 1993). The emission factors for the F-gases as by-product emissions were based on IPCC (2006), but modified to match global emissions to observations of atmospheric concentrations.

Global annual total production of HCFC-22 was taken from AFEAS (2008) and McCulloch and Lindley (2007) and included captive production, but was modified using UNFCCC (2010) and other data sources. Primary aluminium production statistics per country from UN (2006a) were combined with smelter types characterised by one of five technologies according to Aluminium Verlag (2007) and Hunt (2004) for China. The default emission factor for HFC-23 from HCFC-22 manufacture was set for non-OECD countries at the IPCC default for old, un-optimised plants and for OECD countries at a somewhat lower and which decreased over time to reflect atmospheric concentrations. Country-specific fractions of emission abatement were estimated for six Annex II countries based on reported emissions in UNFCCC (2010) and UNEP Risø Centre (2011) for other countries. For aluminium production the CF₄ emission factors per technology were based on large-survey factors for 1990 to 2002 reported by IAI (2006, 2008), but with modifications for Söderberg technologies to comply with atmospheric concentration trends, and for C₂F₆ based on the ratio to CF₄ reported in IPCC (2006) for default Tier 2 emission factors.

Global consumption of HFC-125, 134a (in three applications) and 143a was taken from AFEAS

(2008), for HFC-152a, 227ea, 245fa, 32 and 365mfc from Ashford *et al.* (2004) and for HFC-23, 236fa and 43-10-mee from UNFCCC (2008). Global HFC consumption was distributed to countries according to their share in global CFC-12 or CFC-11 consumption (ODP consumption statistics from the UN Ozone Secretariat) depending on their characteristics (either mostly for refrigeration/air-conditioning or mostly for other applications, largely foams/aerosols) and calibrated to regional totals calculated by Ashford *et al.* (2004). Global emission factors for HFC use were derived from the emissions also reported by these data sources, except for HFC-125 and 143a which were from Ashford *et al.* (2004).

Global consumption data of PFCs (and SF₆) for semiconductor manufacture for Annex I countries in 1990 to 2005 were based on UNFCCC (2008) and the *National Inventory Report 2008* of Japan, for Taiwan on Lu (2006) and for other non-Annex I countries for 1995 and 2005 based on their global share in semiconductor manufacture (SEMI, 1998; SEMI, 2009). The trend from 1982 to 2005 of PFC use within four regions/countries (the United States, Japan, Europe and Rest of the World) was estimated from world market sales (SIA, 2006). Global CF₄ and SF₆ consumption and consumption in Taiwan for the production of flat panel displays for 2003 is from Lu (2006); trends and market shares per country from SEMI (2007). National consumption of PFCs for PV cells is based on the production per country of PV systems in m² (estimated from production statistics in MW for 1985-2003: Kammen, 2005; and for 1990, 1995, 2000-2007: Jäger-Waldau, 2008). The emission factors are from IPCC (2006), for semiconductors and FPD using the Tier 2a factors and for PV production taking into account the fraction of thin film production per country and assuming that 50% of the manufacturers uses PFCs. PFC consumption for other PFC uses was based on data for PFC use in fire extinguishing and air-conditioning, together with use as solvent reported by a few Annex I countries (UNFCCC, 2008), extrapolated to all Annex I countries and assuming an emission factor of 1.

Global consumption of SF₆ per application was taken from Knopman and Smythe (2007). For SF₆ containing switchgear, equipment manufacture and utility stock estimates were adjusted using the method in Mais and Brenninkmeijer (1998) with the regional and per country distribution based on various references (*e.g.* Mais and Brenninkmeijer, 1998; Bitsch, 1998, personal communication) and for missing countries and years

based on the trend in the increase of electricity consumption as a proxy for GIS stock additions. For primary magnesium production and diecasting global consumption was distributed using production statistics from USGS (2007) and IMA (1999a,b) and others for the number of diecasting companies per country. Other sources were distributed as follows: sport shoes among Annex I countries based on GDP, tyres according to reported consumption in Germany (UNFCCC, 2008), sound insulating windows mainly in Germany with 10% used in neighbouring countries, aluminium production as reported in UNFCCC (2010), accelerators were distributed according to the number of high-energy physics laboratories and miscellaneous sources according to the number of airborne early warning systems such as AWACs. A major revision was made to soundproof window production and small revisions to other sources, partly based on UNFCCC (2010).

Note that both the variables for distributing global total consumption per source category and the emission factors vary widely between different plants and countries. This implies that the estimated emissions of F-gases at country level should be considered as very uncertain (an order of magnitude).

Please note that CO₂ from fossil carbon accounted for in this sector (such as from ammonia and carbide production, iron and steel production using a blast furnace and metal production through smelting processes with carbon anode consumption) and CO₂ from urea application in agriculture have been subtracted from the EDGAR 4.2 FT2010 data. This avoids double counting compared with the IEA CO₂ dataset for fuel combustion that includes these emissions (see section on Energy).

Solvent and other product use

For N₂O from the use of anaesthesia, an amount of 24 gN₂O and 34 gN₂O per capita in 2000 was used for EIT and Annex II countries, respectively, based on the average values in UNFCCC (2010) and tentatively set at 5 g/cap/year for non-Annex I countries, based on Kroeze (1994). A global declining rate of 20% between 1990 and 2005 was assumed as observed for total Annex I countries.

For N₂O from aerosol spray cans, an amount of 10 gN₂O per capita in 2000 was used for Annex I countries based on the average values in UNFCCC (2010), and none for non-Annex I countries. A uniform inclining rate from 1990 to 2005 of 50% was assumed as observed for total Annex I countries.

Agriculture

In general, the IPCC (2006) methodology and new default emission factors for CO₂, CH₄ and N₂O were used to estimate agricultural emissions, except for the instances specified below. Please note that N₂O emissions from agriculture as reported in EDGAR 4.2 FT2010 are substantially lower than those presently reported by most Annex I countries due to two markedly lower emission factors: 1) the default IPCC emission factor (“EF1”) for direct soil emissions of N₂O from the use of synthetic fertilisers, manure used as fertiliser and from crop residues left in the field has been reduced by 20%; and 2) the default emission factor (“EF5”) for indirect N₂O emissions from nitrogen leaching and run-off been reduced by 70% compared to the values recommended in the 1996 IPCC Guidelines and the IPCC Good Practice Guidance (IPCC, 1997, 2000).

Livestock numbers were taken from FAO (2007b,c, 2010). For enteric fermentation by cattle, country-specific methane emission factors were calculated following the IPCC methodology (IPCC, 2006) using country-specific milk yield (dairy cattle) and carcass weight (other cattle) trends from FAO (2007c) to estimate the trends in the emission factors. For other animal types, regional emission factors from IPCC (2006) were used.

Livestock numbers were combined with estimates for animal waste generated per head to estimate the total amount of animal waste generated. Nitrogen excretion rates for cattle, pigs and chicken in Europe were based on the CAPRI model (Pérez, 2005; Britz, 2005; Leip *et al.*, 2007) and for all other countries and animal types in IPCC (2006). The trend in carcass weight was used to determine the development in nitrogen excretion over time. The shares of different animal waste management systems were based on regional defaults provided in IPCC (2006) and regional trend estimates for dairy and non-dairy cattle for the fractions stall-fed, extensive grazing and mixed systems from Bouwman *et al.* (2005). Methane emissions from manure management were estimated by applying default IPCC emission factors for each country and temperature zone. For the latter, the 1x1 degree grid map for non-dairy cattle from Lerner *et al.* (1988) was used and the annual average temperature per grid cell from New *et al.* (1999) to calculate the livestock fractions of the countries in 19 annual mean temperature zones for cattle, swine and buffalo and three climate zones for other animals (cold, temperate, warm). N₂O emissions

from manure management were based on distribution of manure management systems from Annex I countries reporting to the UNFCCC (2008), Zhou *et al.* (2007) for China and IPCC (2006) for the rest of the countries.

The total area for rice cultivation was obtained from FAO (2007d, 2010), which was split over different ecology types (rainfed, irrigated, deep water and upland) using IRRI (2007). The total harvested area of rice production in China was increased by 40%, due to recognition that official harvested rice area statistics for China largely underestimate the actual area (Denier van der Gon, 1999; 2000; personal communication, 2000). However, methane emission factors were not taken from IPCC (2006) but from a review of Neue (1997), and country-specific studies by Mitra *et al.* (2004), Gupta *et al.* (2002) and IIASA (2007). For the period 1970-2000 a trend in the emission factors was assumed based on data from Denier van der Gon (1999, 2000).

The same data as described above for manure management were used to estimate N₂O emissions from the use of animal waste as fertilizer by taking into account the loss of nitrogen that occurs from manure management systems before manure is applied to soils and additional nitrogen introduced by bedding material. N₂O emissions from fertilizer use and CO₂ from urea fertilization were estimated based on IFA (2007) and FAO (2007e) statistics and emission factors from IPCC (2006).

CO₂ emissions from liming of soils were estimated from Annex I country reports to the UNFCCC (2010), and on the use of ammonium fertilizers for other countries (FAO, 2007e) as liming is needed to balance the acidity caused by ammonium fertilizers.

Areas of cultivated histosols were estimated by combining three different maps: the FAO climate map (FAO Geonetwork, 2007a), the FAO soil map (FAO Geonetwork, 2007b) and the land use map of Goldewijk *et al.* (2007). However, where available areas reported by Annex I countries to the UNFCCC (2008) were used. Separate N₂O emission factors were applied for tropical and non-tropical regions (IPCC, 2006).

Nitrogen and dry-matter content of agricultural residues were estimated based on cultivation area and yield for 24 crop types from FAO (2007d) and IPCC (2006) factors. The fractions of crop residues removed from and burned in the field were estimated using data of Yevich and Logan (2003) and UNFCCC (2008) for

fractions burned in the field by Annex I countries. Subsequently, N₂O emissions from crop residues left in the field and non-CO₂ emissions from field burning of the residues were calculated using IPCC (2006) emission factors.

Indirect N₂O emissions from leaching and runoff were estimated based on nitrogen input to agricultural soils as described above. Leaching and run-off was assumed to occur in other areas than non-irrigated dryland regions, which were identified based on FAO (1999; 2000; 2005) and Murray *et al.* (1999). The fraction of nitrogen lost through leaching and runoff was based on a study of Van Drecht *et al.* (2003). IPCC (2006) emission factors were used for indirect N₂O from leaching and runoff, as well as from deposition of agricultural NH₃ and NO_x emissions.

For savannah burning, estimates for areas burned are based on satellite measurements (see next section) and emission factors from IPCC (2006).

Large-scale biomass burning

For estimating the amounts of biomass burned in large-scale fires the three key parameters have to be multiplied: (a) area burned, (b) aboveground biomass density (fuel load) (kg/ha), and (c) fraction of aboveground biomass burned (combustion completeness). Country-specific data for large-scale biomass burning (total amount of dry matter burned, which were subdivided into tropical and non-tropical forest fires, savannah fires and grassland fires), have been taken from the gridded data at 1x1 degree grid of the *Global Fire Emissions Database* (GFED version 2; Van der Werf *et al.*, 2006) for the years 1997-2005. For years prior to 1997, the GFED v2.0 data were scaled back to 1970 using regional biomass burning trends from the RETRO dataset, covering the period 1960-2000 (Schultz *et al.*, 2008). GFED data for agricultural areas were attributed to savannah and grassland fires. There is an insignificant overlap with the EDGAR category for agricultural waste burning. The GFED data on biomass burning were estimated using burned area time series for 2001-2005 derived from the MODIS satellite sensors in combination with the fuel load estimated by the satellite-driven Carnegie-Ames-Stanford-Approach (CASA) biogeochemical model that was adjusted to account for fires. The 1997-2000 period was included using fire counts from the VIRS/ATSR sensors. The burning areas were mapped at 0.5x0.5 km spatial resolution. For some countries a correction was made to the time series for the

allocation of biomass burned in savannahs and tropical forests. Since these sources have different emission factors, total emissions have changed for these countries. For 2006-2008 the trend in the activity data from the GFED v3 model (Van der Werf et al., 2010) was used, since the new dataset is not consistent with the previous version. The non-CO₂ emission factors for large scale biomass burning have been updated using data from Andreae (2011). The GHG emission factors were not taken from IPCC (2006), (which were from Andreae and Merlet (2001)), but updated values from Andreae (2011), including the carbon content of 0.47 kg C/kg dry matter, which is the default value for tropical forest. For greenhouse gas accounting purposes, net CO₂ emissions from savannah and grassland fires have been assumed to be zero (organic carbon in a short cycle). There is a large uncertainty in the assumptions for the carbon contents and the fraction of carbon that is actually being burned and thus in the amount of burned carbon.

CO₂ emissions from large-scale biomass burning are only one component of emissions from forest fires. Roughly half of the aboveground biomass is not burned, but rather decomposes over time. This results in delayed decay emissions of approximately the same level of magnitude as the direct emissions from the fires but distributed over a period of 10 to 20 years (IPCC, 2006). Post-burn CO₂ emissions have been estimated from the same activity data as direct burning emissions by assuming that remaining aboveground biomass decays in the 15 year² after the year the fire or deforestation occurred, *i.e.* 1/15 per year and a carbon content of 0.47 kg C/kg dry matter tropical forest from IPCC (2006).

For CO₂ emissions from drained peatlands the comprehensive dataset of Joosten (2009) was used, comprising of activity data for 1990 and 2008 and CO₂ emission factors per hectare of drained peatland. For intervening years, the activity data were linearly interpolated, except for Indonesia, for which the trend in the area of palm oil plantations was used as proxy for the interpolation. For years before 1990 a linear increase from 0 in 1970 was assumed, with a few exceptions, where the area was assumed to remain constant prior to 1990. In EDGAR 4.2 FT2010 the amount of peat burned (in Indonesia only) has been separated from the amount of tropical forest burned in the GFED v2.0 dataset and different emission factors have been applied for most substances (Christian et al., 2003; Weiss (2002), resulting in different emissions.

In addition, enhanced N₂O emissions that occur after large-scale tropical biomass burning (Bouwman *et al.*, 1997) were calculated from the post-burn biomass dataset.

Waste handling

To estimate the amount of organic solid waste in landfills three key parameters have to be determined: (a) Municipal Solid Waste (MSW) generated per year (kg/cap), (b) fraction of total solid waste that is landfilled, and (c) fraction of Degradable Organic Carbon (DOC) in the MSW (%). Total and urban population figures were taken from UN (2006b). The amounts of Municipal Solid Waste (MSW) generated are the primary statistics for emissions from landfills. For 70 countries, the 2006 IPCC Guidelines provide country-specific data for 2000 of the amount of MSW generated per year per capita (urban capita in case of non-Annex I countries) and the fraction landfilled and incinerated. For 58 more countries, country-specific values for the MSW generation per capita were found in the literature. For the remaining 91 countries, the waste generation per capita in 2000 was estimated using an exponential fit of the IPCC (2006) country-specific data for 70 countries of MSW/cap for 2000 to GDP/cap. For Annex I countries trend data for MSW generation/cap are available for the period 1990-2005 (UNFCCC, 2008). For other years and for other countries for which these data are not available, extrapolation from 2000 back and forward was done using the exponential fit mentioned above. When the country-specific fraction of MSW landfilled was missing, regional defaults provided in IPCC (2006) were used. In addition, UN statistics on MSW treatment may provide country-specific data for years other than 2000. Based on regional defaults for the composition of MSW, IPCC (2006) provides regional defaults for the fraction of Degradable Organic Carbon (DOC). For Annex I countries, country-specific data from UNFCCC (2008) were used (sometimes including a change over time) and for 94 Non-Annex I countries, country-specific MSW composition data were found, from which the average DOC value was calculated. However, in version 4.2, for a number of Annex I countries, the DOC fraction was adjusted to better reflect the overall emission trends for landfills as reported to UNFCCC (2008).

Calculation of methane emissions from landfills using the First Order Decay (FOD) model of IPCC (2006), the Methane Conversion Factor (MCF), requires the k-value and the Oxidation Factor (OX). The MCF is

characterised by the type of landfill: managed aerobic or anaerobic, unmanaged deep or shallow. Apart from country-specific time series which are available for 11 Annex I countries, two sets of MCF time series for Annex I and non-Annex I countries were determined based on assumptions about the fractions of the four landfill types over time. For the k-value, which is the methane generation rate (inversely proportional to the half life value of the DOC), default regional MSW composition weighted k-values for four climate zones (tropical dry/wet and non-tropical dry/wet) were provided by IPCC (2006). For EDGAR 4.2 FT2010, country-specific values were calculated using the country-specific fractions of the population (urban population for non-Annex I countries) in each climate zone. The IPCC default values were used to estimate the Oxidation Factor (0.1 for Annex I and 0 for non-Annex I). Finally, the amounts of methane recovered (and used or flared) to be subtracted from the gross methane emissions, were taken as reported by Annex I countries in UNFCCC (2010) and for 23 non-Annex I countries from CDM projects reported by the UNEP Risø Centre (2011). Total recovery in 2010 is estimated at 12.9 Tg CH₄, half of which was by the United States and almost one fifth by the United Kingdom; about 13% is recovered by non-Annex I countries.

For domestic wastewater, total organics in wastewater (BOD₅) was estimated using regional default or country-specific default values for BOD₅ generation per capita per day provided by IPCC (2006). For industrial wastewater, total organically degradable material in wastewater from industry was calculated per type of industry from WW generation per ton of product and COD values (chemical oxygen demand (industrial degradable organic component in wastewater) in kg/m³ WW, using defaults from IPCC (2006). Production statistics for industry types that produce most organics in wastewater are available from UN (2006a). Examples are meat and poultry, raw sugar, alcohol, pulp and organic chemicals. To estimate methane emissions from domestic wastewater, additional information is required on the WW treatment systems, such as sewer systems (to wastewater treatment plants (WWTP) or to raw discharge), latrines by type, open pits and septic tanks. Regional or country-specific default fractions for 2000 were from IPCC (2006). In addition, country-specific fractions of improved sanitation over time from Van Drecht *et al.* (2009) were used, based on the UN Water Supply and Sanitation (WSS) dataset and other national reports, and fractions reported by Doorn and Liles (1999). For

industrial methane emissions, fractions of on-site treatment in WWTP, sewer with and without city-WWTP, and raw discharge were based on regional values reported by Doorn *et al.* (1997). To calculate methane emissions from wastewater, default factors provided by IPCC (2006) per type of WW treatment were used, with default methane correction factors (MCF) per type of treatment. For Annex I countries, OECD or EIT average fractions of methane recovered in WWTPs (and either used as biogas or flared) were used, except for five countries for which country-specific values reported in UNFCCC (2008) were used.

To estimate N₂O emissions from wastewater, the activity data used is the total annual amount of nitrogen in the wastewater, which was calculated from annual protein consumption per capita reported by FAO (2007f), using correction factors for non-consumed protein and for the fraction of industrial and commercial protein that is co-discharged. For the correction factors and the N₂O emission factor, defaults provided in IPCC (2006) were used.

Other waste sources are incineration, with activity data from UNFCCC (2008) and IPCC (2006) and extrapolations assuming a fixed ratio to landfilling, and composting (UNFCCC, 2008; ECN, 2008; CCC, 2008).

Other sources

Indirect N₂O emissions from atmospheric deposition of nitrogen of NO_x and NH₃ emissions from non-agricultural sources, mainly fossil fuel combustion and large scale biomass burning, were estimated using nitrogen in NO_x and NH₃ emissions from these sources as activity data, based on preliminary EDGAR 4.2 FT2010 data for these gases. The same IPCC (2006) emission factor was used for indirect N₂O from atmospheric deposition of nitrogen from NH₃ and NO_x emissions as was used for agricultural emissions.

General Note

We note that EDGAR 4.2 FT2010 estimates for all sources have been made for all years. For more detailed data of the EDGAR 4.2 FT2010 dataset, including the complete period 1970-2010 and possible small revisions upon the final release of the dataset and preliminary estimates for more recent years we refer to the EDGAR version 4 website at edgar.jrc.ec.europa.eu. Aggregated preliminary estimates can also be found at PBL (2012) and for CO₂ in Olivier *et al.* (2012).

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TOTAL GHG EMISSIONS

1990 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
World *	20 973.9	451.2	839.2	5 987.4	28 251.7	75.8%	2 075.4	3 185.8	1 068.8	270.2	6 600.2	31.4%
<i>Annex I Parties</i>	13 906.7	206.4	456.6	850.5	15 420.2	91.5%	1 043.2	842.7	555.4	30.5	2 471.8	42.2%
<i>Annex II Parties</i>	9 802.1	78.9	271.8	379.1	10 531.8	93.8%	442.3	542.1	444.2	14.6	1 443.3	30.6%
<i>North America</i>	5 301.5	24.3	70.2	136.0	5 532.0	96.3%	282.0	191.6	229.3	8.2	711.2	39.7%
<i>Europe</i>	3 152.8	39.2	129.8	183.3	3 505.1	91.1%	127.9	210.8	182.5	2.2	523.4	24.4%
<i>Asia Oceania</i>	1 347.8	15.4	71.8	59.7	1 494.7	91.2%	32.4	139.7	32.4	4.2	208.7	15.5%
<i>Annex I EIT</i>	3 975.4	123.4	172.4	470.1	4 741.1	86.4%	593.0	276.0	99.7	15.9	984.5	60.2%
<i>Non-Annex I Parties</i>	6 449.4	244.7	382.6	5 136.9	12 213.6	54.8%	1 031.4	2 343.1	513.4	239.7	4 127.6	25.0%
<i>Annex I Kyoto Parties</i>	8 784.3	180.8	381.1	694.8	10 041.0	89.3%	784.4	631.2	333.4	25.1	1 774.0	44.2%
Int. marine bunkers	362.5	-	-	-	362.5	100.0%	0.7	-	-	-	0.7	100%
Int. aviation bunkers	255.3	-	-	-	255.3	100.0%	0.0	-	-	-	0.0	100%
Non-OECD Total	9 199.3	359.1	495.3	5 520.6	15 574.3	61.4%	1 496.8	2 501.1	568.7	253.4	4 820.0	31.1%
OECD Total	11 156.8	92.1	343.9	466.7	12 059.5	93.3%	577.8	684.7	500.1	16.8	1 779.4	32.5%
Canada	432.9	2.9	9.1	25.7	470.5	92.6%	32.2	18.9	22.1	2.9	76.1	42.4%
Chile	31.0	0.7	2.0	1.0	34.7	91.5%	3.0	5.8	3.0	0.2	12.0	25.1%
Mexico	264.9	2.9	16.3	39.1	323.1	82.9%	29.0	52.5	15.3	1.5	98.3	29.5%
United States	4 868.7	21.4	61.1	110.3	5 061.6	96.6%	249.8	172.7	207.2	5.4	635.1	39.3%
OECD Americas	5 597.4	27.9	88.4	176.1	5 889.9	95.5%	314.1	249.9	247.5	10.0	821.5	38.2%
Australia	260.0	4.2	6.0	25.9	296.1	89.2%	24.6	75.6	11.3	3.6	115.0	21.4%
Israel	33.5	-	1.5	0.3	35.3	94.9%	0.1	0.7	1.1	0.0	1.9	6.3%
Japan	1 064.4	11.1	65.4	28.7	1 169.6	92.0%	6.9	40.5	19.0	0.5	66.9	10.3%
Korea	229.3	1.5	17.6	0.4	248.9	92.8%	8.8	15.0	7.5	0.1	31.3	28.0%
New Zealand	23.4	0.1	0.4	5.1	29.1	81.0%	0.9	23.6	2.1	0.0	26.7	3.4%
OECD Asia Oceania	1 610.6	16.9	90.9	60.4	1 778.9	91.5%	41.2	155.4	41.0	4.3	241.9	17.0%
Austria	56.4	0.5	3.7	0.6	61.2	93.0%	2.0	5.0	3.0	0.1	10.0	20.3%
Belgium	107.9	1.3	5.3	0.8	115.4	94.7%	2.7	6.6	3.1	0.0	12.4	21.6%
Czech Republic	155.1	3.0	5.3	2.0	165.6	95.5%	6.4	8.9	2.7	0.2	18.2	35.3%
Denmark	50.4	0.3	1.0	3.7	55.4	91.5%	0.6	5.5	1.9	-	8.0	7.6%
Estonia	36.1	-	0.6	14.1	50.8	71.1%	1.2	1.7	0.5	-	3.4	35.0%
Finland	54.4	0.2	1.2	53.7	109.5	49.9%	0.8	2.6	6.7	0.0	10.1	7.6%
France	352.3	4.1	24.6	8.0	389.1	91.6%	20.3	40.7	14.6	0.1	75.7	26.8%
Germany	949.7	13.1	26.6	40.6	1 029.9	93.5%	36.8	41.8	36.6	0.2	115.4	31.8%
Greece	70.1	0.1	6.2	0.8	77.3	90.9%	1.6	3.7	2.3	0.1	7.7	20.6%
Hungary	66.4	0.5	2.8	1.1	70.8	94.5%	2.1	5.3	2.5	0.0	10.1	21.1%
Iceland	1.9	-	0.1	17.6	19.6	9.6%	0.0	0.2	0.1	0.0	0.3	2.0%
Ireland	29.8	-	0.9	10.9	41.6	71.6%	1.2	10.8	1.9	0.0	13.9	8.7%
Italy	397.4	4.5	22.5	3.1	427.5	94.0%	8.6	21.0	17.3	0.3	47.1	18.2%
Luxembourg	10.4	-	0.8	0.0	11.2	92.9%	0.1	0.8	0.1	0.0	1.0	10.1%
Netherlands	155.8	0.7	1.3	9.5	167.3	93.6%	6.3	11.6	12.2	0.1	30.1	20.8%
Norway	28.3	2.1	0.8	1.2	32.4	94.0%	6.1	2.2	5.8	0.1	14.1	43.0%
Poland	342.1	0.0	9.9	27.5	379.6	90.1%	74.8	22.8	9.9	0.1	107.6	69.5%
Portugal	39.3	0.2	3.5	0.3	43.3	91.2%	0.7	4.3	4.7	0.1	9.9	7.2%
Slovak Republic	56.7	0.2	3.0	0.4	60.3	94.4%	1.1	4.0	1.3	0.0	6.5	17.4%
Slovenia	12.5	0.0	0.7	0.4	13.7	91.6%	1.0	1.4	0.6	0.0	3.0	32.8%
Spain	205.2	1.8	15.0	2.0	224.0	92.4%	5.4	17.7	8.9	0.8	32.8	16.4%
Sweden	52.8	0.9	2.0	15.1	70.8	75.8%	1.1	3.4	7.0	0.0	11.5	9.6%
Switzerland	41.4	0.0	2.6	2.3	46.2	89.6%	1.1	3.7	1.0	0.1	5.9	18.8%
Turkey	126.9	4.2	12.5	1.4	145.0	90.4%	7.9	24.5	11.4	0.1	43.9	18.0%
United Kingdom	549.3	9.2	11.8	13.2	583.5	95.7%	32.7	29.1	55.4	0.1	117.3	27.8%
OECD Europe	3 948.7	47.2	164.6	230.2	4 390.8	91.0%	222.5	279.3	211.6	2.6	716.0	31.1%
<i>European Union - 27</i>	<i>4 050.0</i>	<i>42.4</i>	<i>165.0</i>	<i>221.3</i>	<i>4 478.7</i>	<i>91.4%</i>	<i>230.1</i>	<i>278.3</i>	<i>207.7</i>	<i>2.5</i>	<i>718.6</i>	<i>32.0%</i>

* Total World includes Non-OECD total, OECD total as well as international bunkers.

Sources: IEA, Sectoral Approach for CO₂ emissions from fuel combustion. EDGAR 4.2 FT2010 database for other emissions. In general, estimates for emissions other than CO₂ from fuel combustion are subject to significantly larger uncertainties.

1990 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
255.6	239.9	1 805.6	526.9	2 827.9	9.0%	75.8	115.6	114.1	37 985.4	62.5%	1.05	World
147.4	213.7	623.0	162.1	1 146.2	12.9%	61.5	86.7	83.9	19 270.4	79.4%	0.76	Annex I Parties
115.3	166.3	408.3	108.9	798.8	14.4%	56.5	65.3	76.9	12 972.5	80.5%	0.61	Annex II Parties
76.0	56.4	170.1	52.0	354.5	21.4%	29.6	29.4	46.2	6 702.9	84.8%	0.77	North America
30.0	98.7	168.2	37.7	334.6	9.0%	17.1	26.4	15.8	4 422.4	75.7%	0.49	Europe
9.3	11.2	70.0	19.3	109.7	8.4%	9.8	9.5	14.9	1 847.2	76.1%	0.50	Asia Oceania
28.2	47.2	192.4	50.5	318.3	8.8%	5.0	20.9	5.0	6 075.0	77.7%	1.75	Annex I / EIT
88.0	26.2	1 182.5	364.8	1 661.6	5.3%	14.3	28.9	30.2	18 076.2	43.2%	1.66	Non-Annex I Parties
73.5	166.8	435.1	113.4	788.8	9.3%	32.3	65.4	39.7	12 741.3	77.1%	0.76	Annex I Kyoto Parties
15.6	-	-	-	15.6	100%	-	-	-	378.8	100.0%	..	Int. marine bunkers
4.6	-	-	-	4.6	100%	-	-	-	260.0	100.0%	..	Int. aviation bunkers
105.6	62.2	1 299.4	400.4	1 867.6	5.7%	15.9	46.5	29.8	22 354.1	49.9%	1.83	Non-OECD Total
129.8	177.8	506.1	126.5	940.1	13.8%	60.0	69.1	84.4	14 992.5	79.7%	0.62	OECD Total
7.0	11.8	17.0	6.8	42.6	16.4%	0.4	8.6	4.0	602.1	78.9%	0.80	Canada
0.3	0.0	4.1	0.7	5.1	5.7%	-	0.0	0.0	51.8	67.7%	0.60	Chile
2.2	1.0	31.0	5.8	40.1	5.6%	1.6	0.5	0.9	464.6	64.4%	0.55	Mexico
69.0	44.6	153.1	45.1	311.9	22.1%	29.2	20.8	42.2	6 100.8	85.4%	0.77	United States
78.5	57.5	205.2	58.5	399.7	19.7%	31.2	30.0	47.0	7 219.3	83.4%	0.75	OECD Americas
2.7	0.8	50.4	9.2	63.1	4.2%	0.6	3.9	0.4	479.1	60.8%	1.13	Australia
0.1	0.3	0.7	0.4	1.5	9.1%	0.0	0.0	1.0	39.8	84.9%	0.48	Israel
6.3	10.3	9.7	9.8	36.2	17.5%	9.2	4.7	14.4	1 300.9	83.7%	0.40	Japan
1.6	1.1	4.9	2.2	9.8	16.1%	1.9	0.8	3.5	296.1	81.4%	0.63	Korea
0.3	-	9.9	0.3	10.5	2.4%	0.0	0.9	0.0	67.2	36.8%	1.04	New Zealand
11.0	12.5	75.7	21.9	121.1	9.1%	11.7	10.3	19.3	2 183.1	76.9%	0.51	OECD Asia Oceania
0.6	0.8	2.9	0.7	5.1	12.6%	0.0	1.0	0.4	77.8	76.6%	0.40	Austria
0.7	3.9	3.3	1.1	9.0	8.1%	0.0	0.0	0.1	137.0	82.3%	0.55	Belgium
1.9	1.3	5.2	1.3	9.7	19.8%	0.0	0.0	0.0	193.5	86.1%	1.13	Czech Republic
0.5	1.1	5.8	0.6	8.0	6.0%	0.0	0.0	0.1	71.5	72.5%	0.55	Denmark
0.5	-	1.2	0.2	1.9	24.9%	-	0.0	0.0	56.1	67.4%	3.45	Estonia
1.4	1.5	3.8	0.7	7.4	19.0%	0.0	0.0	0.1	127.1	44.7%	1.10	Finland
3.6	26.7	35.5	4.8	70.7	5.1%	4.7	1.6	3.2	544.9	69.8%	0.39	France
11.1	20.5	33.6	8.0	73.2	15.2%	2.6	4.4	5.6	1 231.0	82.1%	0.60	Germany
0.8	1.1	4.5	1.1	7.5	11.1%	0.5	1.7	0.1	94.8	76.6%	0.54	Greece
0.7	3.2	5.4	0.8	10.1	6.7%	0.0	0.7	0.0	91.7	76.1%	0.67	Hungary
0.0	0.0	0.3	0.0	0.4	6.1%	-	1.0	0.0	21.3	8.9%	3.27	Iceland
0.2	0.9	6.6	0.3	8.2	3.0%	0.0	0.0	0.0	63.7	49.1%	0.97	Ireland
2.4	7.2	15.6	5.2	30.3	7.8%	2.0	0.9	1.2	509.0	81.1%	0.38	Italy
0.0	-	0.3	0.1	0.4	12.4%	0.0	0.0	-	12.6	83.9%	0.77	Luxembourg
0.7	5.8	7.2	1.3	15.0	4.7%	2.8	3.1	0.3	218.6	74.8%	0.56	Netherlands
0.4	2.1	1.9	0.5	4.9	8.1%	-	6.3	2.3	60.0	61.5%	0.44	Norway
2.1	3.4	19.0	2.9	27.3	7.5%	0.0	0.4	0.1	515.0	81.3%	1.65	Poland
0.5	0.5	2.9	0.9	4.8	11.2%	0.0	0.0	0.1	58.1	70.2%	0.36	Portugal
1.1	1.0	2.9	0.4	5.5	20.2%	-	0.1	-	72.4	81.8%	1.14	Slovak Republic
0.1	-	1.0	0.2	1.3	9.5%	-	0.8	0.0	18.8	72.6%	0.57	Slovenia
1.9	3.0	15.5	4.5	24.9	7.6%	2.0	3.8	0.4	287.8	74.5%	0.37	Spain
1.0	0.8	4.0	0.9	6.7	15.1%	0.0	0.7	0.2	89.9	62.1%	0.43	Sweden
0.4	0.2	1.6	0.6	2.8	15.1%	0.0	0.3	0.6	55.9	76.9%	0.25	Switzerland
3.9	0.2	22.3	2.6	29.0	13.6%	-	0.5	2.0	220.4	64.9%	0.51	Turkey
3.5	22.6	22.8	6.4	55.3	6.3%	2.6	1.6	1.1	761.3	78.1%	0.59	United Kingdom
40.3	107.8	225.2	46.1	419.4	9.6%	17.1	28.8	18.0	5 590.1	76.2%	0.55	OECD Europe
37.5	112.4	224.8	45.3	420.1	8.9%	17.1	22.6	13.1	5 670.2	76.9%	0.59	European Union - 27

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD.

1990 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Non-OECD Total	9 199.3	359.1	495.3	5 520.6	15 574.3	61.4%	1 496.8	2 501.1	568.7	253.4	4 820.0	31.1%
Albania	6.3	0.1	0.3	0.7	7.3	86.6%	0.8	1.6	0.2	0.0	2.5	31.0%
Armenia	20.5	-	0.7	0.4	21.5	95.1%	1.3	1.3	0.3	0.0	2.9	45.4%
Azerbaijan	65.0	0.0	0.6	0.3	65.9	98.7%	5.8	4.3	1.4	0.0	11.4	50.6%
Belarus	124.5	0.0	1.9	44.0	170.4	73.1%	1.1	14.3	3.3	0.0	18.7	6.1%
Bosnia-Herzegovina	23.7	-	0.2	0.4	24.3	97.5%	2.8	1.6	0.2	0.0	4.6	60.1%
Bulgaria	74.8	1.1	4.1	0.3	80.3	94.5%	1.3	5.5	8.8	0.1	15.7	8.4%
Croatia	21.6	0.2	1.4	0.1	23.2	93.8%	1.6	1.8	0.8	0.0	4.2	37.8%
Cyprus	3.8	-	0.5	0.0	4.3	88.6%	0.0	0.2	0.2	-	0.4	3.3%
Georgia	33.2	0.0	0.3	0.4	34.0	97.9%	1.7	2.6	0.7	0.0	5.0	34.5%
Gibraltar	0.2	-	-	0.0	0.2	99.8%	0.0	-	0.0	-	0.0	12.0%
Kazakhstan	236.4	6.1	6.7	16.2	265.5	91.4%	33.7	25.6	3.2	6.8	69.2	48.6%
Kosovo *	..	..	..	..	..	..	..	..	..	..	..	..
Kyrgyzstan	22.5	0.0	0.7	0.7	23.8	94.2%	0.7	4.3	0.6	0.2	5.8	12.2%
Latvia	18.7	-	0.9	5.2	24.8	75.4%	1.6	3.2	0.6	0.0	5.5	30.0%
Lithuania	33.1	0.0	1.8	6.1	41.0	80.8%	1.6	4.9	1.1	0.0	7.6	21.3%
FYR of Macedonia	8.5	-	0.3	0.1	8.9	95.7%	0.3	1.1	0.2	0.1	1.7	18.7%
Malta	2.3	-	0.0	0.0	2.3	99.6%	0.0	0.1	0.1	-	0.2	1.6%
Republic of Moldova	30.2	-	1.3	0.2	31.6	95.4%	1.4	2.2	0.5	0.0	4.1	34.8%
Montenegro *	..	..	..	..	..	..	..	..	..	..	..	..
Romania	167.0	0.5	9.0	2.0	178.3	93.9%	18.1	15.7	3.6	0.0	37.4	48.3%
Russian Federation	2 178.8	83.2	98.4	355.0	2 715.4	83.3%	422.5	132.5	54.3	15.1	624.5	67.7%
Serbia *	61.4	0.2	2.2	0.6	64.5	95.6%	4.5	6.2	1.2	0.0	11.9	37.9%
Tajikistan	10.9	0.0	0.6	0.1	11.5	94.5%	0.8	2.9	0.6	0.0	4.3	18.4%
Turkmenistan	45.8	0.9	0.6	0.6	47.8	97.6%	26.4	2.8	0.6	0.0	29.8	88.5%
Ukraine	687.9	34.5	32.6	12.0	767.0	94.2%	58.4	54.1	9.5	0.2	122.3	47.8%
Uzbekistan	119.8	1.8	3.6	1.7	126.8	95.9%	17.1	13.2	2.6	0.0	32.9	52.0%
Non-OECD Europe and Eurasia	3 996.8	128.6	168.6	446.7	4 740.7	87.0%	603.7	301.6	94.7	22.6	1 022.7	59.0%
Algeria	52.7	12.1	3.0	0.2	68.1	95.2%	24.4	3.7	3.1	0.0	31.2	78.2%
Angola	4.0	6.9	0.1	7.4	18.4	59.0%	6.8	14.0	1.1	0.1	22.1	31.0%
Benin	0.3	0.0	0.1	37.9	38.3	0.7%	0.7	1.9	0.5	2.0	5.1	13.9%
Botswana	2.9	-	-	0.4	3.3	87.6%	0.4	5.5	0.2	0.1	6.1	6.1%
Cameroon	2.7	3.7	0.3	63.4	70.1	9.1%	3.3	7.7	1.6	3.4	16.0	20.7%
Congo	0.6	1.5	0.0	49.8	51.9	4.1%	1.8	2.4	0.3	2.7	7.2	25.3%
Dem. Rep. of Congo	3.0	0.0	0.3	1 188.1	1 191.4	0.2%	3.6	26.8	4.0	63.9	98.3	3.7%
Côte d'Ivoire	2.6	0.0	0.2	129.5	132.4	2.0%	1.6	2.1	1.5	6.9	12.1	13.5%
Egypt	78.4	3.7	6.8	1.1	90.0	91.2%	10.4	10.5	6.0	0.0	26.9	38.7%
Eritrea	-	-	0.0	0.0	0.0	0.0%	0.3	1.5	0.3	-	2.1	15.0%
Ethiopia	2.2	-	0.2	0.4	2.8	79.5%	3.2	32.6	4.2	-	40.0	8.1%
Gabon	0.9	3.4	0.1	4.1	8.5	51.0%	3.0	0.1	0.2	0.2	3.5	86.2%
Ghana	2.7	-	0.3	12.7	15.7	17.2%	1.8	3.7	1.7	0.7	7.9	22.5%
Kenya	5.5	-	0.9	2.1	8.5	65.0%	4.9	13.4	2.1	-	20.3	23.9%
Libya	27.4	14.1	1.5	0.1	43.1	96.2%	14.8	1.1	0.8	0.0	16.7	88.7%
Morocco	19.6	-	2.5	0.3	22.4	87.6%	1.0	5.4	2.9	-	9.2	10.4%
Mozambique	1.1	-	0.0	17.4	18.5	5.8%	1.7	7.7	1.5	0.9	11.8	14.6%
Namibia	-	-	0.0	0.0	0.0	0.0%	0.1	3.3	0.1	-	3.6	2.2%
Nigeria	29.2	38.6	1.4	9.4	78.6	86.2%	33.8	22.0	8.8	0.4	65.1	51.9%
Senegal	2.1	-	0.2	0.1	2.4	88.6%	1.0	3.7	1.0	-	5.6	17.4%
South Africa	253.7	14.4	4.9	2.6	275.6	97.2%	23.6	19.1	8.4	2.2	53.4	44.3%
Sudan	5.5	-	0.1	4.0	9.6	57.2%	5.1	39.1	2.9	-	47.1	10.9%
United Rep. of Tanzania	1.7	-	0.3	44.9	46.9	3.6%	2.4	19.8	2.3	2.4	26.9	8.9%
Togo	0.6	-	0.2	7.4	8.1	7.0%	0.8	1.5	0.4	0.4	3.1	24.9%
Tunisia	12.1	0.0	2.5	0.1	14.7	82.2%	1.2	1.8	1.0	0.0	4.1	30.5%
Zambia	2.6	-	0.4	142.6	145.5	1.8%	1.7	19.2	0.8	7.5	29.1	5.7%
Zimbabwe	16.0	-	0.5	0.8	17.3	92.5%	1.2	8.1	0.9	0.0	10.3	11.4%
Other Africa	14.4	-	0.5	268.1	283.0	5.1%	14.9	104.9	11.2	13.2	144.3	10.4%
Africa	544.4	98.4	27.4	1 995.1	2 665.3	24.1%	169.7	382.6	69.8	107.0	729.1	23.3%

* For 1990, Serbia includes Kosovo and Montenegro.

1990 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
105.6	62.2	1 299.4	400.4	1 867.6	5.7%	15.9	46.5	29.8	22 354.1	49.9%	1.83	Non-OECD Total
0.0	-	1.1	0.2	1.3	3.0%	-	-	-	11.1	64.3%	0.86	Albania
0.0	-	0.6	0.2	0.8	4.6%	-	-	-	25.2	86.5%	2.42	Armenia
0.1	-	2.1	0.4	2.7	3.3%	-	0.2	-	80.1	88.4%	2.35	Azerbaijan
0.9	2.1	12.5	0.9	16.4	5.2%	-	0.0	-	205.4	61.6%	3.13	Belarus
0.9	-	0.9	0.2	2.0	43.8%	-	0.6	-	31.5	86.7%	6.23	Bosnia-Herzegovina
0.6	2.3	5.7	0.8	9.4	6.6%	-	0.0	-	105.4	73.9%	1.60	Bulgaria
0.4	0.9	2.2	0.3	3.8	9.7%	-	0.9	-	32.1	74.0%	0.50	Croatia
0.0	-	0.2	0.0	0.2	6.6%	-	-	-	5.0	77.1%	0.48	Cyprus
0.1	0.8	1.6	0.3	2.8	3.4%	-	-	-	41.8	84.0%	1.42	Georgia
0.0	-	-	0.0	0.0	21.3%	-	-	-	0.2	95.5%	0.31	Gibraltar
3.6	-	18.3	11.6	33.5	10.7%	-	-	-	368.2	76.0%	3.18	Kazakhstan
..	..	..	..	..	..	..	..	..	..	..	..	Kosovo
0.8	-	2.2	0.6	3.6	21.4%	-	-	-	33.2	72.0%	3.00	Kyrgyzstan
0.2	-	2.5	0.3	3.0	7.3%	0.0	0.0	-	33.3	61.7%	1.24	Latvia
0.3	0.8	3.9	0.4	5.3	5.6%	0.0	0.0	-	53.9	65.0%	1.16	Lithuania
0.1	-	0.6	0.1	0.9	14.6%	-	-	-	11.4	78.3%	0.70	FYR of Macedonia
0.0	-	0.0	0.0	0.1	12.0%	-	-	-	2.6	90.0%	0.53	Malta
0.1	-	1.4	0.3	1.7	4.9%	-	-	-	37.5	84.6%	2.21	Republic of Moldova
..	..	..	..	..	..	..	..	..	..	..	..	Montenegro
0.9	4.1	13.4	1.5	19.8	4.3%	-	2.0	0.0	237.6	78.5%	1.30	Romania
15.0	15.2	84.9	35.9	150.9	9.9%	5.0	15.9	4.9	3 516.6	76.8%	1.88	Russian Federation
0.4	0.7	3.3	0.6	4.9	8.8%	0.0	0.8	-	82.1	81.1%	0.79	Serbia
0.0	-	1.2	0.2	1.4	2.3%	-	2.8	-	20.0	58.6%	1.27	Tajikistan
0.1	0.1	1.8	0.2	2.2	3.5%	-	-	-	79.9	91.6%	5.81	Turkmenistan
3.6	13.0	32.6	4.7	53.9	6.7%	0.0	0.2	-	943.4	83.1%	2.25	Ukraine
0.2	0.2	7.8	1.0	9.2	2.0%	-	-	-	169.0	82.2%	4.12	Uzbekistan
28.3	40.1	200.7	60.7	329.8	8.6%	5.0	23.4	4.9	6 126.5	77.7%	1.92	Non-OECD Europe and Eurasia
0.3	0.4	2.5	0.7	3.9	7.9%	-	-	0.3	103.5	86.5%	0.66	Algeria
0.1	-	15.7	2.0	17.7	0.7%	-	-	-	58.2	30.6%	1.71	Angola
0.1	-	1.8	1.8	3.7	2.5%	-	-	-	47.2	2.2%	8.85	Benin
0.0	-	4.9	0.5	5.4	0.6%	-	-	-	14.8	22.5%	1.54	Botswana
0.2	-	7.0	3.3	10.5	1.5%	-	0.9	-	97.4	10.1%	3.84	Cameroon
0.0	-	2.1	2.3	4.4	0.9%	-	-	-	63.5	6.3%	7.47	Congo
0.7	-	31.4	55.1	87.2	0.8%	-	-	-	1 376.9	0.5%	59.94	Dem. Rep. of Congo
0.2	-	1.7	5.8	7.6	2.3%	-	-	-	152.2	2.9%	6.36	Côte d'Ivoire
0.5	1.4	8.4	1.6	11.9	4.2%	-	1.3	0.8	130.9	71.1%	0.71	Egypt
0.0	-	1.0	0.0	1.0	3.0%	-	-	-	3.1	10.9%	..	Eritrea
0.7	-	23.1	1.5	25.3	2.6%	-	-	-	68.0	9.0%	2.58	Ethiopia
0.0	-	0.1	0.2	0.3	8.7%	-	-	-	12.3	59.9%	0.88	Gabon
0.3	-	3.8	1.1	5.1	5.0%	-	0.6	-	29.4	16.2%	2.19	Ghana
0.4	-	8.5	0.4	9.3	4.5%	-	-	-	38.1	28.3%	1.14	Kenya
0.1	-	0.8	0.3	1.2	11.6%	-	-	0.3	61.3	92.1%	0.94	Libya
0.2	-	4.4	0.6	5.2	3.5%	-	-	-	36.8	56.5%	0.55	Morocco
0.3	-	8.5	1.8	10.6	2.4%	-	-	-	40.9	7.5%	7.56	Mozambique
0.1	-	2.4	0.1	2.5	2.1%	-	-	-	6.1	2.2%	..	Namibia
1.2	-	15.5	2.3	19.0	6.1%	-	-	0.2	163.0	63.0%	1.18	Nigeria
0.1	-	2.6	0.3	2.9	3.5%	-	-	-	11.0	29.2%	1.03	Senegal
2.0	1.0	13.5	5.1	21.5	9.2%	0.0	0.4	1.1	352.0	83.4%	1.25	South Africa
0.4	-	32.7	2.9	36.0	1.1%	-	-	-	92.8	11.9%	3.40	Sudan
0.4	-	17.3	3.5	21.1	1.7%	-	-	-	95.0	4.7%	4.46	United Rep. of Tanzania
0.1	-	1.6	0.5	2.2	3.8%	-	-	-	13.4	10.6%	3.99	Togo
0.1	0.4	1.2	0.2	2.0	7.0%	-	-	-	20.8	64.9%	0.57	Tunisia
0.2	0.5	25.8	8.6	35.0	0.5%	-	-	-	209.7	2.1%	21.37	Zambia
0.2	-	6.0	0.5	6.8	3.6%	-	-	-	34.3	50.7%	7.08	Zimbabwe
1.9	-	86.3	19.0	107.2	1.8%	-	-	-	534.6	5.9%	4.97	Other Africa
10.7	3.7	330.3	122.0	466.7	2.3%	0.0	3.2	2.7	3 867.0	21.3%	2.89	Africa

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for DR of Congo and Zambia is due to high levels of forest fires and subsequent post-burn decay.

1990 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Bangladesh	13.6	-	0.2	10.4	24.1	56.2%	5.8	69.4	11.6	0.4	87.1	6.6%
Brunei Darussalam	3.4	0.0	0.0	10.7	14.2	23.9%	3.0	0.0	0.1	0.5	3.6	83.5%
Cambodia	-	-	-	0.0	0.0	0.0%	1.0	13.2	0.8	-	15.1	6.9%
Chinese Taipei	114.4	1.2	8.8	0.8	125.2	92.3%	1.0	1.4	3.9	0.0	6.3	16.2%
India	582.3	14.0	23.5	52.0	671.8	88.8%	67.2	366.9	77.0	2.5	513.6	13.1%
Indonesia	146.1	10.2	7.8	694.2	858.3	18.2%	37.4	82.0	26.2	6.6	152.2	24.6%
DPR of Korea	114.0	2.0	8.1	3.1	127.2	91.2%	12.4	5.6	2.7	1.0	21.6	57.1%
Malaysia	49.6	1.5	2.8	106.7	160.6	31.9%	9.1	6.9	3.0	4.6	23.6	38.4%
Mongolia	12.7	-	0.3	30.5	43.5	29.1%	0.6	6.4	0.2	1.1	8.3	7.7%
Myanmar	4.1	0.0	0.2	742.9	747.1	0.5%	3.1	39.0	4.5	37.4	84.0	3.7%
Nepal	0.9	-	0.1	0.2	1.2	75.1%	1.3	17.3	1.7	0.0	20.3	6.4%
Pakistan	58.6	0.6	3.6	0.4	63.2	93.7%	15.4	64.6	10.8	0.0	90.8	16.9%
Philippines	38.2	0.0	3.0	5.1	46.3	82.5%	3.7	28.6	9.0	0.2	41.6	8.9%
Singapore	29.4	0.2	0.9	0.3	30.8	96.1%	0.4	0.1	0.5	0.0	1.0	41.2%
Sri Lanka	3.7	-	0.3	1.0	5.0	74.3%	0.6	8.6	2.3	0.0	11.5	5.1%
Thailand	80.5	0.0	8.7	13.2	102.4	78.6%	14.5	61.3	8.6	0.5	85.0	17.1%
Vietnam	17.2	1.1	1.7	6.1	26.1	70.1%	6.6	46.8	7.0	0.0	60.5	10.9%
Other Asia	10.2	0.0	0.2	40.3	50.8	20.2%	2.3	15.9	3.3	1.6	23.1	9.9%
Asia	1 278.8	30.9	70.3	1 718.0	3 098.0	42.3%	185.4	833.9	173.3	56.6	1 249.1	14.8%
People's Rep. of China	2 211.3	26.4	170.2	83.4	2 491.3	89.8%	353.5	523.3	135.7	4.4	1 016.9	34.8%
Hong Kong, China	32.8	0.7	0.9	0.1	34.4	97.4%	0.1	-	1.4	-	1.5	6.0%
China	2 244.1	27.1	171.1	83.5	2 525.7	89.9%	353.6	523.3	137.2	4.4	1 018.5	34.7%
Argentina	99.9	3.2	1.8	17.3	122.2	84.3%	13.6	78.2	7.1	3.0	102.0	13.4%
Bolivia	5.1	0.8	0.2	149.1	155.3	3.8%	2.8	11.4	0.9	7.3	22.4	12.4%
Brazil	194.3	5.8	17.1	905.2	1 122.3	17.8%	25.0	209.5	41.4	43.7	319.6	7.8%
Colombia	45.0	1.4	3.9	52.0	102.3	45.4%	6.9	36.1	4.7	2.5	50.2	13.7%
Costa Rica	2.6	-	0.2	0.1	2.9	88.8%	0.2	3.2	0.4	-	3.8	4.5%
Cuba	33.8	0.9	1.8	4.5	41.0	84.7%	1.3	8.2	2.6	0.1	12.1	10.4%
Dominican Republic	7.7	-	0.5	0.6	8.8	87.4%	0.5	4.2	1.2	0.0	6.0	8.2%
Ecuador	13.2	1.7	0.8	1.0	16.7	89.3%	2.4	7.3	1.3	0.0	11.0	22.0%
El Salvador	2.2	-	0.3	0.3	2.8	80.2%	0.3	1.6	0.7	-	2.7	12.2%
Guatemala	3.2	0.0	0.5	3.8	7.5	42.8%	0.8	2.9	1.0	0.2	4.8	16.1%
Haiti	0.9	-	0.2	0.0	1.1	82.1%	0.7	1.7	0.9	-	3.3	22.2%
Honduras	2.2	-	0.1	5.0	7.3	29.5%	0.3	2.9	0.5	0.2	4.0	8.8%
Jamaica	7.2	-	0.3	0.1	7.5	95.4%	0.2	0.6	0.4	-	1.2	18.8%
Netherlands Antilles	2.7	-	-	0.0	2.8	98.3%	0.1	0.0	0.0	-	0.1	56.6%
Nicaragua	1.8	-	0.1	0.4	2.3	79.5%	0.3	3.8	0.7	-	4.8	5.9%
Panama	2.6	-	0.1	0.4	3.1	82.1%	0.1	2.3	0.4	-	2.8	4.7%
Paraguay	1.9	-	0.2	37.2	39.3	4.9%	0.8	12.0	0.7	2.0	15.5	5.3%
Peru	19.2	0.4	1.0	19.4	40.1	49.0%	1.7	7.9	3.0	0.9	13.6	12.4%
Trinidad and Tobago	11.4	0.5	0.2	0.0	12.2	97.8%	2.4	0.1	0.6	0.0	3.0	77.9%
Uruguay	3.7	0.0	0.2	0.4	4.4	85.2%	0.1	15.0	0.7	-	15.8	0.7%
Venezuela	105.1	1.9	2.8	39.8	149.6	71.5%	18.8	19.4	4.0	1.8	43.9	42.7%
Other Non-OECD Americas	12.4	0.0	1.0	22.1	35.5	35.0%	0.2	2.6	1.8	0.8	5.4	4.0%
Non-OECD Americas	578.1	16.7	33.4	1 259.0	1 887.2	31.5%	79.5	430.9	75.0	62.6	648.0	12.3%
Bahrain	11.7	0.0	0.1	0.1	11.9	98.6%	1.6	0.0	0.1	0.0	1.8	90.0%
Islamic Rep. of Iran	178.7	22.3	7.4	0.7	209.1	96.1%	31.1	17.7	7.9	0.0	56.7	54.8%
Iraq	53.4	13.1	6.1	3.1	75.7	87.8%	15.2	3.3	2.9	0.0	21.4	71.0%
Jordan	9.2	-	0.8	0.0	10.1	91.7%	0.1	0.3	0.4	-	0.9	13.7%
Kuwait	28.7	2.5	0.4	0.0	31.7	98.6%	4.7	0.1	0.6	0.0	5.3	88.4%
Lebanon	5.5	-	0.4	0.0	5.9	92.5%	0.1	0.2	0.4	-	0.7	11.7%
Oman	10.2	4.8	0.0	14.0	29.0	51.7%	5.6	0.3	0.2	-	6.2	91.0%
Qatar	14.1	2.0	0.1	0.0	16.2	98.9%	4.1	0.1	0.2	0.0	4.4	93.0%
Saudi Arabia	159.1	3.9	5.7	0.2	168.9	96.5%	24.7	1.8	3.0	0.1	29.7	83.3%
Syrian Arab Republic	28.2	4.1	1.4	0.1	33.8	95.5%	4.5	2.6	1.3	0.0	8.4	53.4%
United Arab Emirates	51.9	4.7	1.5	0.1	58.1	97.3%	12.7	0.3	0.4	-	13.4	95.0%
Yemen	6.4	0.0	0.5	0.0	7.0	92.4%	0.7	2.2	1.0	-	3.9	17.0%
Middle East	557.1	57.4	24.5	18.4	657.4	93.5%	105.0	28.8	18.7	0.1	152.6	68.8%

1990 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
1.3	-	12.2	1.7	15.2	8.4%	-	-	-	126.4	16.3%	1.61	Bangladesh
0.0	-	0.1	0.5	0.6	1.0%	-	-	-	18.3	34.9%	1.44	Brunei Darussalam
0.2	-	3.3	0.4	3.9	5.4%	-	-	-	19.0	6.6%	..	Cambodia
0.4	0.5	2.4	0.7	4.0	10.3%	0.0	0.1	1.9	137.6	85.0%	0.50	Chinese Taipei
18.4	1.1	121.1	18.7	159.5	11.6%	1.7	2.1	5.8	1 354.5	50.3%	1.28	India
3.7	0.1	54.9	30.2	88.9	4.2%	-	0.7	1.1	1 101.2	17.9%	2.97	Indonesia
0.6	-	5.6	2.6	8.7	6.9%	0.0	-	-	157.6	81.9%	1.03	DPR of Korea
0.3	-	8.2	5.1	13.6	1.9%	0.0	0.0	0.6	198.4	30.5%	1.65	Malaysia
0.1	-	3.3	1.8	5.2	1.8%	-	-	-	56.9	23.5%	10.66	Mongolia
0.4	-	8.4	35.4	44.2	0.9%	-	-	-	875.3	0.9%	6.50	Myanmar
0.5	-	2.8	0.3	3.6	13.7%	-	-	-	25.1	10.7%	1.85	Nepal
2.1	0.6	13.7	2.0	18.4	11.6%	-	-	1.0	173.5	44.2%	0.96	Pakistan
1.0	-	7.1	1.6	9.7	9.9%	-	-	0.2	97.7	43.9%	0.62	Philippines
0.1	-	0.1	0.3	0.4	16.8%	0.0	0.1	0.4	32.7	92.0%	0.43	Singapore
0.2	-	1.2	0.3	1.8	14.0%	-	-	-	18.3	25.0%	0.53	Sri Lanka
2.8	-	14.4	2.3	19.5	14.6%	-	-	1.4	208.2	47.0%	0.93	Thailand
0.9	-	9.5	1.2	11.6	7.4%	-	-	-	98.2	26.2%	1.64	Vietnam
0.4	-	10.3	2.3	13.0	3.2%	-	-	-	86.9	14.9%	2.01	Other Asia
33.4	2.4	278.5	107.3	421.6	7.9%	1.7	3.0	12.3	4 785.8	31.9%	1.60	Asia
21.3	10.1	253.4	33.6	318.4	6.7%	6.0	4.7	1.7	3 839.0	68.1%	3.07	People's Rep. of China
0.1	-	-	0.2	0.4	37.2%	-	-	0.4	36.7	91.9%	0.27	Hong Kong, China
21.4	10.1	253.4	33.9	318.8	6.7%	6.0	4.7	2.1	3 875.7	68.3%	2.80	China
0.9	0.1	32.4	5.1	38.5	2.4%	0.2	1.9	0.1	265.0	44.4%	1.09	Argentina
0.1	-	7.5	7.0	14.6	0.6%	-	-	-	192.3	4.6%	9.40	Bolivia
4.1	4.1	102.5	45.0	155.8	2.7%	1.9	5.0	1.5	1 606.1	14.3%	1.50	Brazil
0.6	0.2	16.3	3.1	20.2	3.1%	-	0.0	0.0	172.8	31.2%	0.85	Colombia
0.1	0.1	1.5	0.1	1.8	2.8%	-	-	-	8.5	33.1%	0.44	Costa Rica
0.8	0.7	7.3	0.9	9.6	8.1%	-	-	-	62.7	58.7%	1.43	Cuba
0.1	-	1.7	0.3	2.1	4.8%	-	-	-	16.9	48.9%	0.61	Dominican Republic
0.2	-	2.7	0.3	3.2	4.9%	-	-	-	30.9	56.6%	0.56	Ecuador
0.1	-	1.1	0.2	1.3	6.1%	-	-	-	6.8	39.0%	0.35	El Salvador
0.2	-	1.9	0.4	2.5	7.2%	0.0	-	-	14.8	28.1%	0.50	Guatemala
0.1	-	0.8	0.1	0.9	6.2%	-	-	-	5.4	32.3%	0.54	Haiti
0.1	-	2.0	0.4	2.4	3.6%	-	-	-	13.7	18.9%	1.05	Honduras
0.1	-	0.3	0.1	0.5	12.8%	-	-	-	9.2	80.9%	0.65	Jamaica
0.0	-	0.0	0.1	0.1	9.9%	-	-	-	3.0	93.9%	1.95	Netherlands Antilles
0.1	-	2.8	0.2	3.1	2.4%	-	-	-	10.2	21.5%	1.31	Nicaragua
0.0	-	0.9	0.1	1.0	3.5%	-	-	-	6.9	39.4%	0.47	Panama
0.1	-	6.6	2.3	9.0	1.6%	-	-	-	63.8	4.5%	3.75	Paraguay
0.2	0.2	3.9	1.2	5.6	4.1%	-	-	-	59.2	36.4%	0.61	Peru
0.0	-	0.1	0.1	0.2	10.9%	-	-	-	15.4	92.6%	1.17	Trinidad and Tobago
0.1	-	5.9	0.1	6.1	1.5%	-	-	-	26.2	15.2%	1.16	Uruguay
0.4	0.0	9.2	2.5	12.0	3.0%	1.0	1.9	0.3	208.8	60.4%	1.10	Venezuela
0.1	-	2.5	1.0	3.6	2.6%	-	0.3	0.0	44.8	28.5%	1.67	Other Non-OECD Americas
8.4	5.4	209.9	70.4	294.0	2.8%	3.1	9.1	2.0	2 843.5	24.0%	1.32	Non-OECD Americas
0.0	-	0.0	0.0	0.1	19.5%	-	2.5	-	16.3	81.9%	1.85	Bahrain
2.0	0.3	14.5	2.1	18.8	10.5%	-	0.2	2.4	287.2	81.5%	0.84	Islamic Rep. of Iran
0.2	-	3.0	0.5	3.8	6.4%	-	-	0.3	101.2	81.0%	0.71	Iraq
0.0	-	0.3	0.1	0.5	6.7%	-	-	-	11.4	82.3%	1.09	Jordan
0.1	-	0.0	0.2	0.3	25.3%	0.0	-	0.3	37.5	95.9%	0.75	Kuwait
0.0	-	0.2	0.1	0.4	8.8%	-	-	-	7.0	80.0%	0.41	Lebanon
0.0	-	0.2	0.1	0.3	14.6%	-	-	-	35.5	58.1%	1.30	Oman
0.0	-	0.0	0.1	0.1	20.9%	-	-	-	20.7	97.1%	1.06	Qatar
0.6	-	3.1	1.8	5.5	10.0%	0.0	-	2.4	206.6	91.1%	0.66	Saudi Arabia
0.2	0.2	3.2	0.5	4.1	5.1%	-	-	-	46.3	79.9%	1.26	Syrian Arab Republic
0.1	-	0.2	0.4	0.7	18.5%	-	0.4	0.5	73.1	95.0%	0.55	United Arab Emirates
0.1	-	1.8	0.2	2.1	2.8%	-	-	-	13.0	55.3%	0.59	Yemen
3.4	0.5	26.6	6.1	36.7	9.2%	0.0	3.1	5.8	855.7	84.5%	0.76	Middle East

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for Mongolia is due to high levels of peat decay.

2000 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
World *	23 509.1	427.2	1 003.2	5 300.8	30 240.4	79.2%	2 137.7	3 007.8	1 144.1	176.0	6 465.6	33.1%
<i>Annex I Parties</i>	13 762.0	169.0	379.2	836.5	15 146.8	92.0%	913.4	685.9	456.9	37.0	2 093.2	43.6%
<i>Annex II Parties</i>	11 006.1	59.7	273.0	351.5	11 690.2	94.7%	432.8	536.1	334.4	15.1	1 318.5	32.8%
<i>North America</i>	6 231.4	26.6	81.6	106.4	6 446.1	97.1%	279.1	208.5	160.0	6.5	654.1	42.7%
<i>Europe</i>	3 220.9	25.4	125.6	168.0	3 539.9	91.7%	116.8	193.7	150.3	1.8	462.6	25.2%
<i>Asia Oceania</i>	1 553.7	7.6	65.8	77.1	1 704.2	91.6%	36.9	133.9	24.1	6.8	201.8	18.3%
<i>Annex I EIT</i>	2 553.2	106.8	89.1	483.9	3 233.1	82.3%	471.2	127.3	97.8	21.9	718.2	65.6%
<i>Non-Annex I Parties</i>	8 908.3	258.2	624.0	4 464.3	14 254.7	64.3%	1 223.3	2 321.9	687.2	139.0	4 371.4	28.0%
<i>Annex I Kyoto Parties</i>	7 802.5	143.9	289.5	712.2	8 948.1	88.8%	670.7	469.9	296.5	32.5	1 469.6	45.6%
Int. marine bunkers	488.8	-	-	-	488.8	100.0%	0.9	-	-	-	0.9	100%
Int. aviation bunkers	350.1	-	-	-	350.1	100.0%	0.1	-	-	-	0.1	100%
Non-OECD Total	10 035.8	351.5	644.5	4 863.9	15 895.7	65.3%	1 595.4	2 349.8	728.8	159.3	4 833.2	33.0%
OECD Total	12 634.4	75.7	358.7	436.9	13 505.8	94.1%	541.3	658.0	415.3	16.7	1 631.4	33.2%
Canada	533.3	4.0	10.4	26.3	574.1	93.6%	46.8	23.3	28.3	2.0	100.4	46.6%
Chile	52.5	1.0	2.2	0.3	56.1	95.5%	4.3	6.9	5.6	0.1	16.9	25.1%
Mexico	349.3	5.4	18.6	42.7	416.2	85.2%	29.3	53.5	18.7	1.2	102.7	28.5%
United States	5 698.1	22.6	71.2	80.1	5 872.0	97.4%	232.4	185.2	131.7	4.4	553.7	42.0%
OECD Americas	6 633.3	33.1	102.5	149.5	6 918.3	96.4%	312.7	268.9	184.4	7.8	773.8	40.4%
Australia	338.8	3.2	6.2	42.5	390.7	87.5%	31.4	78.5	11.5	6.4	127.7	24.6%
Israel	55.2	-	3.2	0.2	58.7	94.1%	0.1	1.0	1.5	0.0	2.7	5.0%
Japan	1 184.0	4.4	59.1	29.7	1 277.2	93.0%	4.5	31.8	10.8	0.4	47.5	9.4%
Korea	437.7	1.9	25.5	0.5	465.6	94.4%	5.9	12.5	12.4	0.1	30.9	19.1%
New Zealand	30.9	0.0	0.5	4.9	36.3	85.1%	1.1	23.5	1.9	0.1	26.6	4.0%
OECD Asia Oceania	2 046.6	9.6	94.6	77.8	2 228.5	92.3%	43.0	147.5	38.0	6.9	235.4	18.3%
Austria	61.7	0.4	3.7	0.5	66.2	93.7%	1.9	4.4	2.6	0.0	9.0	21.7%
Belgium	118.6	0.2	5.2	0.6	124.6	95.3%	1.6	6.5	2.9	0.0	11.0	14.7%
Czech Republic	121.9	4.0	4.1	1.2	131.1	96.0%	5.7	4.3	2.9	0.1	12.9	43.8%
Denmark	50.6	0.4	1.6	3.3	56.0	91.3%	1.1	5.4	1.7	-	8.1	13.0%
Estonia	14.6	-	0.4	11.4	26.5	55.3%	0.8	0.6	0.7	-	2.1	38.3%
Finland	55.1	0.5	1.1	52.2	108.8	51.0%	0.8	2.1	7.4	0.0	10.3	7.4%
France	376.9	1.7	20.6	7.6	406.7	93.1%	34.2	38.3	13.0	0.1	85.6	39.9%
Germany	825.0	5.1	23.1	36.6	889.9	93.3%	21.2	31.8	23.0	0.2	76.1	27.8%
Greece	87.4	0.0	7.1	0.5	95.0	92.0%	1.9	3.7	2.5	0.1	8.1	23.3%
Hungary	54.2	0.5	1.9	1.0	57.6	94.9%	2.4	3.0	2.8	0.0	8.2	28.9%
Iceland	2.1	-	0.1	17.6	19.8	10.8%	0.0	0.2	0.1	0.0	0.3	1.7%
Ireland	40.9	-	1.7	9.5	52.1	78.4%	1.3	11.8	1.8	0.0	14.9	8.6%
Italy	426.0	4.2	22.1	2.4	454.7	94.6%	7.5	18.3	20.7	0.2	46.7	16.1%
Luxembourg	8.1	-	0.6	0.0	8.7	92.6%	0.1	0.8	0.1	0.0	1.0	10.2%
Netherlands	172.1	0.6	1.3	7.4	181.4	95.2%	4.9	10.1	9.1	0.1	24.3	20.2%
Norway	33.5	1.7	1.0	0.9	37.1	95.0%	11.6	2.2	3.3	0.1	17.2	67.4%
Poland	290.9	0.2	9.0	26.3	326.4	89.2%	48.7	14.7	9.3	0.1	72.8	66.9%
Portugal	59.4	0.2	4.2	0.3	64.1	93.0%	0.9	4.4	6.6	0.5	12.3	7.4%
Slovak Republic	37.4	0.4	2.1	0.4	40.3	93.8%	0.9	1.8	1.7	0.0	4.4	21.1%
Slovenia	14.1	-	1.5	0.3	15.8	89.1%	1.1	1.1	0.7	0.0	2.9	37.3%
Spain	283.9	2.1	18.2	1.6	305.8	93.5%	4.3	20.0	10.4	0.5	35.1	12.2%
Sweden	52.8	1.5	2.0	14.7	70.9	76.5%	1.2	3.3	6.9	0.0	11.5	10.6%
Switzerland	42.5	0.0	1.7	0.5	44.8	94.9%	0.9	3.2	1.0	0.0	5.1	17.8%
Turkey	200.6	2.5	17.1	1.2	221.4	91.7%	9.3	22.4	24.5	0.0	56.3	16.6%
United Kingdom	524.3	6.8	10.3	11.8	553.2	96.0%	21.5	27.2	37.2	0.1	85.9	25.0%
OECD Europe	3 954.6	33.1	161.7	209.7	4 359.0	91.5%	185.7	241.7	192.9	2.0	622.2	29.8%
<i>European Union - 27</i>	3 830.6	30.8	150.5	202.0	4 213.8	91.6%	180.6	227.4	180.5	2.4	590.9	30.6%

* Total World includes Non-OECD total, OECD total as well as international bunkers.

Sources: IEA, Sectoral Approach for CO₂ emissions from fuel combustion. EDGAR 4.2 FT2010 database for other emissions. In general, estimates for emissions other than CO₂ from fuel combustion are subject to significantly larger uncertainties.

2000 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
295.1	183.1	1 802.2	495.3	2 775.8	10.6%	293.1	100.7	117.1	39 992.6	65.9%	0.83	World
156.8	131.5	541.5	166.6	996.4	15.7%	227.7	73.8	84.6	18 622.4	80.6%	0.60	Annex I Parties
132.8	91.6	424.4	112.4	761.3	17.4%	207.4	46.2	74.2	14 097.8	82.5%	0.51	Annex II Parties
91.4	31.3	191.5	53.4	367.6	24.9%	118.9	21.8	50.9	7 659.4	86.5%	0.63	North America
27.9	54.2	156.8	35.7	274.7	10.2%	51.5	13.8	15.6	4 358.0	77.8%	0.39	Europe
13.6	6.2	76.0	23.3	119.1	11.4%	37.0	10.6	7.7	2 080.3	77.5%	0.48	Asia Oceania
20.0	35.6	95.5	50.9	201.9	9.9%	19.3	27.0	9.4	4 208.9	74.9%	1.55	Annex I / EIT
112.6	51.7	1 260.8	328.7	1 753.7	6.4%	65.4	26.9	32.5	20 504.7	51.2%	1.19	Non-Annex I Parties
69.3	98.0	342.8	115.6	625.7	11.1%	113.9	58.5	37.7	11 253.5	77.2%	0.59	Annex I Kyoto Parties
20.3	-	-	-	20.3	100%	-	-	-	510.0	100.0%	..	Int. marine bunkers
5.4	-	-	-	5.4	100%	-	-	-	355.5	100.0%	..	Int. aviation bunkers
116.0	69.7	1 286.1	363.4	1 835.2	6.3%	70.6	50.0	35.8	22 720.5	53.3%	1.36	Non-OECD Total
153.3	113.4	516.2	132.0	914.9	16.8%	222.5	50.7	81.3	16 406.6	81.7%	0.52	OECD Total
8.3	3.8	22.5	6.3	40.9	20.3%	6.2	7.1	4.9	733.6	80.7%	0.73	Canada
0.8	0.7	5.3	0.8	7.6	10.1%	-	0.0	0.0	80.6	72.6%	0.50	Chile
2.8	1.2	32.5	6.7	43.2	6.5%	3.3	0.6	0.8	566.8	68.3%	0.48	Mexico
83.1	27.5	169.0	47.1	326.7	25.4%	112.7	14.7	45.9	6 925.8	87.2%	0.62	United States
94.9	33.3	229.3	60.9	418.4	22.7%	122.2	22.4	51.7	8 306.8	85.2%	0.62	OECD Americas
4.0	1.7	56.6	13.3	75.6	5.3%	2.5	1.2	0.5	598.2	63.1%	0.98	Australia
0.3	0.2	0.9	0.6	1.9	13.6%	0.7	0.1	1.0	65.1	85.4%	0.45	Israel
9.2	4.4	8.7	9.7	32.0	28.7%	34.1	9.0	7.2	1 407.0	85.4%	0.39	Japan
3.1	6.8	4.7	3.3	18.0	17.2%	8.4	2.2	4.1	529.1	84.8%	0.60	Korea
0.4	-	10.8	0.3	11.5	3.4%	0.3	0.4	0.1	75.2	43.1%	0.87	New Zealand
16.9	13.2	81.7	27.2	138.9	12.2%	46.1	12.8	12.7	2 674.5	79.1%	0.50	OECD Asia Oceania
0.6	0.8	2.5	0.8	4.8	13.3%	1.0	0.1	0.3	81.4	79.4%	0.32	Austria
0.8	4.8	3.1	1.1	9.8	8.0%	1.0	0.0	0.1	146.7	82.6%	0.47	Belgium
5.0	1.2	3.2	1.0	10.5	47.7%	0.4	0.0	0.0	155.0	88.1%	0.87	Czech Republic
0.6	1.0	4.9	0.6	7.1	8.1%	0.7	0.0	0.1	71.9	73.3%	0.43	Denmark
0.2	-	0.6	0.1	0.8	20.0%	0.0	0.0	0.0	29.4	53.0%	1.87	Estonia
1.6	1.3	3.2	0.6	6.7	24.6%	0.4	0.0	0.1	126.4	45.9%	0.89	Finland
4.0	10.0	33.6	4.6	52.1	7.6%	9.4	1.1	2.4	557.3	74.8%	0.32	France
6.5	9.6	30.5	5.8	52.5	12.4%	11.3	1.7	5.6	1 037.0	82.7%	0.42	Germany
1.0	0.8	3.7	1.1	6.6	14.6%	2.4	0.3	0.1	112.5	80.2%	0.51	Greece
0.3	1.8	4.0	0.7	6.9	5.0%	0.4	0.3	0.0	73.5	78.1%	0.53	Hungary
0.0	-	0.3	0.0	0.4	9.8%	0.0	0.1	0.0	20.7	10.5%	2.46	Iceland
0.3	0.7	7.0	0.4	8.4	3.9%	0.4	0.4	0.1	76.3	55.6%	0.60	Ireland
2.8	8.1	14.1	5.6	30.6	9.2%	7.1	0.4	1.3	540.8	81.5%	0.34	Italy
0.1	-	0.3	0.1	0.4	19.1%	0.1	0.0	-	10.2	80.9%	0.38	Luxembourg
0.9	5.7	6.2	1.3	14.2	6.2%	6.2	1.0	0.3	227.3	78.5%	0.42	Netherlands
0.4	1.8	1.8	0.7	4.8	7.7%	0.2	4.6	1.0	64.8	72.9%	0.33	Norway
3.5	4.4	17.0	2.5	27.4	12.8%	0.7	0.5	0.2	427.9	80.2%	0.95	Poland
0.8	0.5	2.8	1.7	5.8	14.0%	0.4	0.0	0.1	82.7	74.2%	0.38	Portugal
0.5	1.1	1.2	0.3	3.1	15.8%	0.1	0.1	-	48.1	81.6%	0.70	Slovak Republic
0.2	-	0.8	0.2	1.2	14.3%	0.1	0.2	0.0	20.2	76.0%	0.51	Slovenia
2.6	2.5	17.4	4.9	27.4	9.4%	3.3	2.3	2.5	376.3	77.8%	0.37	Spain
1.1	0.7	3.8	0.8	6.5	17.7%	0.6	0.7	0.2	90.3	62.7%	0.35	Sweden
0.5	0.2	1.4	0.5	2.6	18.9%	0.8	0.1	0.3	53.7	81.8%	0.22	Switzerland
3.9	4.3	21.6	3.3	33.0	11.9%	1.0	0.6	1.0	313.2	69.1%	0.50	Turkey
3.3	5.6	20.2	5.0	34.1	9.6%	6.3	0.9	1.2	681.6	81.6%	0.40	United Kingdom
41.5	67.0	205.2	43.9	357.5	11.6%	54.2	15.5	16.8	5 425.3	77.7%	0.43	OECD Europe
38.0	66.2	191.2	42.2	337.7	11.2%	52.9	10.8	14.6	5 220.7	78.2%	0.44	European Union - 27

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD.

2000 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Non-OECD Total	10 035.8	351.5	644.5	4 863.9	15 895.7	65.3%	1 595.4	2 349.8	728.8	159.3	4 833.2	33.0%
Albania	3.1	0.0	0.0	0.6	3.8	82.5%	0.4	1.8	0.2	0.2	2.6	14.7%
Armenia	3.4	-	0.1	0.3	3.8	88.8%	1.3	0.9	0.4	0.0	2.6	50.9%
Azerbaijan	29.8	0.3	0.1	0.2	30.4	98.9%	4.3	4.1	1.5	0.0	10.0	43.5%
Belarus	58.7	0.0	1.4	43.0	103.1	56.9%	0.9	8.4	4.0	0.0	13.3	7.0%
Bosnia-Herzegovina	13.5	-	0.2	0.4	14.1	96.1%	0.9	1.0	0.3	0.5	2.7	35.3%
Bulgaria	42.1	0.9	2.7	0.3	46.0	93.3%	1.3	2.4	9.8	0.3	13.8	9.3%
Croatia	17.7	0.0	1.5	0.0	19.2	92.1%	1.9	1.1	0.9	0.0	3.9	47.2%
Cyprus	6.3	-	0.6	0.0	6.9	91.5%	0.0	0.3	0.3	-	0.6	3.8%
Georgia	4.6	0.0	0.2	0.3	5.1	90.9%	1.4	2.1	0.6	0.0	4.1	33.3%
Gibraltar	0.4	-	-	0.0	0.4	99.9%	0.0	-	0.0	-	0.0	11.9%
Kazakhstan	113.0	13.5	2.1	0.6	129.2	97.9%	23.3	9.4	3.8	2.1	38.6	60.3%
Kosovo *	5.0	..	..	..	..	..	..	..	..	..	..	..
Kyrgyzstan	4.5	0.0	0.2	0.5	5.2	85.9%	0.3	2.5	0.7	0.0	3.5	7.3%
Latvia	6.8	-	0.2	4.6	11.7	58.6%	1.4	0.8	0.6	0.0	2.8	49.1%
Lithuania	11.2	0.0	0.3	6.0	17.6	63.9%	1.8	1.9	1.3	0.0	5.0	36.3%
FYR of Macedonia	8.4	-	0.2	0.1	8.7	96.3%	0.5	0.7	0.3	0.0	1.5	30.5%
Malta	2.1	-	0.0	0.0	2.1	99.5%	0.0	0.1	0.2	-	0.2	1.0%
Republic of Moldova	5.7	-	0.1	0.1	5.9	95.7%	1.7	1.1	0.4	0.0	3.3	51.3%
Montenegro *	..	..	..	..	..	..	..	..	..	..	..	..
Romania	86.2	1.1	4.9	1.5	93.6	93.2%	12.2	8.4	4.4	0.1	25.1	48.6%
Russian Federation	1 505.5	68.0	43.6	380.0	1 997.1	78.8%	337.3	58.1	49.2	21.0	465.5	72.5%
Serbia *	42.5	0.0	1.2	0.7	44.4	95.8%	3.3	4.0	1.2	0.2	8.7	37.8%
Tajikistan	2.2	-	0.0	0.1	2.3	96.4%	0.5	2.1	0.7	0.0	3.3	13.7%
Turkmenistan	35.4	2.0	0.2	0.4	38.1	98.3%	16.3	4.2	0.8	0.0	21.2	76.6%
Ukraine	292.0	31.6	15.6	7.8	347.0	93.3%	54.8	20.8	9.5	0.2	85.2	64.3%
Uzbekistan	117.6	2.3	1.8	1.6	123.2	97.3%	22.8	11.0	3.2	0.0	37.1	61.6%
Non-OECD Europe and Eurasia	2 417.5	119.7	77.3	449.2	3 063.7	82.8%	488.4	147.1	94.2	24.8	754.6	64.7%
Algeria	63.5	14.9	3.7	0.2	82.3	95.3%	35.4	4.2	4.1	0.0	43.8	80.9%
Angola	5.1	10.5	0.2	6.2	22.0	70.9%	10.2	3.9	1.5	0.1	15.8	65.0%
Benin	1.4	-	0.1	25.2	26.7	5.3%	0.8	2.1	0.8	0.8	4.5	18.1%
Botswana	4.2	-	0.1	0.4	4.7	88.5%	0.5	3.2	0.2	0.0	3.9	11.5%
Cameroon	2.8	2.1	0.4	56.2	61.4	8.0%	2.5	8.6	2.2	2.6	15.8	15.6%
Congo	0.5	3.6	0.0	43.1	47.2	8.6%	3.9	1.6	0.5	2.1	8.0	48.7%
Dem. Rep. of Congo	1.7	0.0	0.1	912.7	914.4	0.2%	5.4	14.5	5.3	38.5	63.7	8.5%
Côte d'Ivoire	6.1	0.2	0.3	138.2	144.8	4.3%	2.6	2.2	2.1	7.3	14.2	18.6%
Egypt	101.3	3.4	11.2	1.1	117.0	89.5%	15.1	13.3	7.5	0.0	35.8	42.0%
Eritrea	0.6	-	0.0	0.0	0.7	91.3%	0.3	2.0	0.4	-	2.7	12.3%
Ethiopia	3.2	-	0.4	0.5	4.1	77.6%	7.1	33.3	5.8	-	46.2	15.4%
Gabon	1.4	4.5	0.1	2.2	8.2	71.5%	3.7	0.1	0.3	0.0	4.1	89.9%
Ghana	5.1	-	0.8	8.6	14.6	35.1%	2.8	4.0	2.5	0.3	9.6	28.9%
Kenya	6.8	-	0.7	3.2	10.6	63.7%	6.5	12.5	3.3	-	22.3	29.0%
Libya	39.7	8.0	1.5	0.1	49.3	96.7%	11.1	0.8	1.0	0.0	13.0	85.6%
Morocco	29.4	-	3.5	0.3	33.3	88.5%	0.4	5.4	3.8	-	9.6	4.2%
Mozambique	1.3	-	0.1	41.5	43.0	3.1%	2.1	6.1	1.9	2.9	13.0	15.9%
Namibia	1.8	-	0.0	0.0	1.8	97.6%	0.1	4.3	0.2	-	4.6	2.3%
Nigeria	42.0	48.0	1.1	9.0	100.2	89.9%	44.8	24.9	12.5	0.4	82.6	54.3%
Senegal	3.6	-	0.4	0.1	4.1	87.3%	1.1	4.7	1.3	-	7.1	15.4%
South Africa	296.7	12.8	4.9	2.6	317.0	97.6%	27.2	18.9	11.1	2.2	59.4	45.8%
Sudan	5.5	0.0	0.1	4.1	9.7	57.1%	6.7	53.4	4.3	-	64.4	10.3%
United Rep. of Tanzania	2.6	-	0.4	47.6	50.5	5.1%	3.7	19.4	3.5	2.5	29.1	12.8%
Togo	1.0	-	0.3	6.1	7.3	13.1%	1.3	1.3	0.6	0.3	3.4	38.8%
Tunisia	18.0	0.4	2.8	0.1	21.4	86.1%	3.4	2.1	1.4	0.0	6.9	49.0%
Zambia	1.7	-	0.3	110.8	112.8	1.5%	2.2	10.5	1.0	4.4	18.1	12.1%
Zimbabwe	12.7	0.3	0.4	0.9	14.4	90.3%	1.2	7.1	1.3	0.0	9.7	12.8%
Other Africa	19.2	2.1	0.7	235.2	257.3	8.3%	20.2	99.1	15.1	9.3	143.7	14.1%
Africa	678.8	110.8	34.6	1 656.5	2 480.8	31.8%	222.3	363.4	95.7	73.6	755.1	29.4%

* For 2000, Serbia includes Montenegro for all greenhouse gases and Kosovo for all emissions other than CO₂ from fuel combustion.

2000 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
116.0	69.7	1 286.1	363.4	1 835.2	6.3%	70.6	50.0	35.8	22 720.5	53.3%	1.36	Non-OECD Total
0.1	-	0.7	0.5	1.3	5.6%	0.0	-	-	7.7	46.6%	0.52	Albania
0.0	-	0.4	0.1	0.5	1.1%	0.0	-	-	6.9	68.3%	0.98	Armenia
0.1	-	1.6	0.4	2.0	3.9%	0.0	0.0	-	42.4	81.3%	2.12	Azerbaijan
0.5	1.7	8.1	0.6	10.8	4.2%	0.1	0.0	-	127.4	47.2%	2.19	Belarus
0.2	-	0.7	0.9	1.7	9.7%	0.1	0.3	-	18.9	77.4%	1.02	Bosnia-Herzegovina
0.3	1.0	2.2	0.9	4.4	6.8%	0.1	0.0	-	64.4	69.2%	1.11	Bulgaria
0.2	0.9	1.5	0.3	2.9	7.6%	0.0	0.1	-	26.2	75.7%	0.48	Croatia
0.0	-	0.2	0.1	0.3	9.7%	0.1	-	-	7.8	81.4%	0.49	Cyprus
0.1	0.6	1.1	0.2	2.0	3.4%	0.0	-	-	11.2	54.0%	1.01	Georgia
0.0	-	-	0.0	0.0	28.9%	-	-	-	0.4	97.1%	0.51	Gibraltar
1.9	-	9.8	4.2	16.0	12.0%	0.1	-	-	183.8	82.5%	2.28	Kazakhstan
..	..	..	..	..	..	..	..	..	..	..	..	Kosovo
0.1	-	1.2	0.3	1.6	8.0%	0.0	-	-	10.2	47.2%	1.39	Kyrgyzstan
0.1	-	0.9	0.2	1.2	11.5%	0.2	0.0	-	15.9	52.7%	0.78	Latvia
0.1	1.3	2.0	0.2	3.7	3.0%	0.2	0.0	-	26.4	49.9%	0.79	Lithuania
0.1	-	0.4	0.2	0.7	8.5%	0.1	-	-	10.9	81.6%	0.73	FYR of Macedonia
0.0	-	0.0	0.0	0.1	10.3%	0.1	-	-	2.5	85.8%	0.31	Malta
0.0	-	0.6	0.2	0.8	5.2%	0.0	-	-	10.0	74.0%	1.65	Republic of Moldova
..	..	..	..	..	..	..	..	..	..	..	..	Montenegro
0.7	3.2	6.0	1.5	11.3	6.5%	0.1	0.7	0.0	130.9	76.6%	0.85	Romania
7.3	10.2	36.1	39.6	93.2	7.8%	16.8	24.9	9.0	2 606.5	73.6%	2.07	Russian Federation
0.4	0.5	2.5	0.7	4.2	10.7%	1.7	0.3	-	59.2	78.1%	1.11	Serbia
0.0	-	0.9	0.2	1.1	1.0%	0.0	0.8	-	7.4	35.4%	1.25	Tajikistan
0.1	0.5	2.1	0.2	2.9	2.1%	0.0	-	-	62.2	86.4%	5.95	Turkmenistan
1.1	8.8	12.0	2.7	24.6	4.5%	0.1	0.2	0.2	457.3	83.0%	2.52	Ukraine
0.6	0.1	7.5	1.0	9.2	6.7%	0.2	-	-	169.7	84.4%	4.22	Uzbekistan
14.1	28.8	98.3	55.1	196.4	7.2%	19.8	27.4	9.2	4 071.1	74.7%	1.90	Non-OECD Europe and Eurasia
0.4	0.6	2.7	0.8	4.5	8.3%	0.1	-	0.3	131.0	87.2%	0.71	Algeria
0.2	-	2.5	0.3	3.0	6.1%	0.0	-	-	40.7	63.9%	1.11	Angola
0.1	-	2.0	1.3	3.3	3.5%	-	-	-	34.6	6.8%	4.06	Benin
0.1	-	2.3	0.2	2.5	2.9%	-	-	-	11.2	42.1%	0.67	Botswana
0.2	-	7.5	3.0	10.7	2.1%	-	0.5	-	88.5	8.6%	3.05	Cameroon
0.1	-	1.4	1.9	3.4	1.8%	0.0	-	-	58.7	13.7%	6.00	Congo
1.1	-	16.6	40.7	58.5	2.0%	-	-	-	1 036.6	0.8%	80.27	Dem. Rep. of Congo
0.2	-	2.0	6.2	8.5	2.5%	-	-	-	167.5	5.5%	5.58	Côte d'Ivoire
0.6	3.3	12.2	2.1	18.2	3.4%	0.1	1.4	1.1	173.5	69.3%	0.62	Egypt
0.0	-	1.3	0.1	1.4	3.3%	-	-	-	4.7	20.8%	2.00	Eritrea
1.5	-	23.5	1.8	26.7	5.4%	0.0	-	-	77.0	15.3%	2.23	Ethiopia
0.0	-	0.1	0.1	0.3	18.0%	0.0	-	-	12.5	76.4%	0.77	Gabon
0.4	-	3.8	1.0	5.3	8.4%	0.0	0.1	-	29.6	28.2%	1.45	Ghana
0.6	-	8.1	0.6	9.2	6.0%	-	-	-	42.2	32.7%	1.05	Kenya
0.2	-	0.7	0.4	1.3	13.3%	-	-	0.2	63.8	92.5%	0.97	Libya
0.4	-	4.5	0.7	5.6	7.2%	-	-	-	48.5	62.4%	0.57	Morocco
0.3	-	6.6	2.7	9.6	3.2%	0.0	0.0	-	65.6	5.6%	7.12	Mozambique
0.1	-	3.2	0.2	3.5	2.4%	-	-	-	9.9	19.7%	1.16	Namibia
1.9	-	16.2	2.9	21.0	8.9%	0.1	-	0.2	204.0	67.0%	1.12	Nigeria
0.1	-	3.3	0.3	3.8	3.0%	-	-	-	15.0	32.0%	1.03	Senegal
2.6	1.5	13.7	5.4	23.2	11.1%	0.3	0.5	1.0	401.3	84.5%	1.19	South Africa
0.6	-	40.3	2.8	43.8	1.4%	-	-	-	118.0	10.9%	2.47	Sudan
0.5	-	14.9	3.2	18.6	2.7%	-	-	-	98.2	6.9%	3.42	United Rep. of Tanzania
0.1	-	1.3	0.4	1.8	5.9%	-	-	-	12.6	19.1%	3.01	Togo
0.2	0.4	1.5	0.3	2.4	8.4%	-	-	-	30.7	71.6%	0.53	Tunisia
0.2	0.5	15.2	5.8	21.7	1.0%	0.0	-	-	152.6	2.7%	14.54	Zambia
0.2	-	5.0	0.4	5.6	4.4%	-	-	-	29.6	48.8%	5.27	Zimbabwe
2.6	-	73.1	15.6	91.3	2.8%	0.0	-	-	492.3	9.0%	3.57	Other Africa
15.6	6.2	285.6	101.3	408.8	3.8%	0.5	2.5	2.8	3 650.5	28.1%	2.13	Africa

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for DR of Congo and Zambia is due to high levels of forest fires and subsequent post-burn decay.

2000 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Bangladesh	25.3	-	1.6	7.5	34.5	73.5%	7.9	65.7	15.5	0.1	89.2	8.9%
Brunei Darussalam	4.6	0.3	0.1	7.5	12.5	39.4%	3.8	0.0	0.1	-	3.9	97.6%
Cambodia	2.0	-	-	3.2	5.2	38.0%	1.1	12.5	1.3	0.1	15.0	7.5%
Chinese Taipei	218.4	1.0	9.4	0.8	229.7	95.5%	1.3	1.1	5.3	0.0	7.7	16.6%
India	972.5	7.7	42.0	57.3	1 079.5	90.8%	82.1	376.0	101.1	2.4	561.6	14.6%
Indonesia	272.9	8.5	12.9	890.7	1 184.9	23.7%	45.6	78.9	39.9	3.4	167.8	27.2%
DPR of Korea	68.6	-	2.3	2.7	73.6	93.2%	10.2	3.9	3.1	0.1	17.3	58.7%
Malaysia	112.7	2.5	5.3	90.0	210.5	54.7%	17.8	5.6	4.8	1.0	29.2	60.8%
Mongolia	8.8	-	0.1	38.6	47.5	18.5%	0.3	8.5	0.3	0.2	9.2	2.9%
Myanmar	9.4	0.0	0.2	455.3	464.9	2.0%	6.2	44.3	5.7	10.9	66.9	9.2%
Nepal	3.1	-	0.1	0.1	3.4	91.2%	1.4	17.6	2.2	-	21.2	6.6%
Pakistan	97.3	2.0	4.7	0.4	104.3	95.2%	24.6	76.9	15.4	0.1	117.1	21.0%
Philippines	67.5	0.0	5.4	2.9	75.8	89.0%	6.1	31.5	12.2	0.0	49.9	12.3%
Singapore	47.7	0.2	0.6	0.4	48.8	98.1%	0.9	0.0	0.8	0.0	1.7	52.9%
Sri Lanka	10.6	-	0.5	0.6	11.7	91.2%	0.6	6.2	2.8	-	9.6	6.7%
Thailand	158.1	0.0	11.9	8.7	178.7	88.5%	16.4	54.5	12.5	0.1	83.4	19.6%
Vietnam	44.0	1.3	6.8	6.8	58.8	77.0%	14.4	51.4	9.6	0.0	75.4	19.1%
Other Asia	11.2	0.3	0.3	51.8	63.6	18.1%	2.4	16.0	4.0	0.9	23.3	10.3%
Asia	2 134.8	23.8	104.0	1 625.3	3 887.9	55.5%	243.1	850.5	236.5	19.4	1 349.6	18.0%
People's Rep. of China	3 037.3	14.9	352.4	100.5	3 505.1	87.1%	377.3	485.7	176.8	3.5	1 043.4	36.2%
Hong Kong, China	39.8	1.3	0.6	0.1	41.8	98.4%	0.8	-	1.9	-	2.7	28.9%
China	3 077.2	16.2	353.0	100.5	3 546.9	87.2%	378.1	485.7	178.8	3.5	1 046.1	36.1%
Argentina	139.0	1.9	4.2	9.2	154.3	91.3%	16.3	71.6	9.2	2.0	99.1	16.4%
Bolivia	7.1	0.7	0.4	131.2	139.4	5.6%	3.2	10.6	1.2	4.8	19.8	16.0%
Brazil	303.5	4.6	20.8	606.8	935.7	32.9%	27.7	245.5	53.8	16.0	343.0	8.1%
Colombia	58.7	1.4	5.1	41.4	106.6	56.4%	10.7	36.7	5.9	1.8	55.1	19.5%
Costa Rica	4.5	-	0.5	0.1	5.1	88.2%	0.2	2.2	0.5	-	2.9	6.9%
Cuba	27.1	1.3	0.7	3.5	32.6	86.9%	1.1	7.0	2.5	-	10.6	10.3%
Dominican Republic	17.4	-	1.3	0.4	19.1	91.4%	1.0	3.7	1.5	-	6.2	16.5%
Ecuador	18.2	2.2	1.1	0.9	22.4	91.0%	2.9	8.4	1.6	0.0	12.8	22.3%
El Salvador	5.2	-	0.4	0.2	5.9	88.7%	0.4	1.4	1.0	-	2.8	14.1%
Guatemala	8.5	0.0	0.8	108.5	117.7	7.2%	1.0	8.1	1.3	9.0	19.4	5.1%
Haiti	1.4	-	0.2	0.0	1.6	86.6%	0.7	2.3	1.2	-	4.1	17.5%
Honduras	4.4	-	0.4	3.3	8.2	54.0%	0.3	2.5	0.7	-	3.4	9.2%
Jamaica	9.7	-	0.4	0.1	10.2	95.0%	0.3	0.6	0.5	-	1.4	19.6%
Netherlands Antilles	4.1	-	-	0.0	4.1	98.9%	0.1	0.0	0.0	-	0.1	55.6%
Nicaragua	3.5	-	0.2	0.4	4.1	85.4%	0.4	4.2	1.0	-	5.6	6.5%
Panama	4.9	-	0.3	0.4	5.7	87.2%	0.2	2.1	0.5	-	2.8	5.8%
Paraguay	3.3	-	0.3	26.3	29.9	10.9%	0.7	12.4	1.0	1.1	15.2	4.8%
Peru	26.5	0.3	1.6	20.7	49.2	54.6%	1.5	10.1	3.7	1.0	16.3	9.3%
Trinidad and Tobago	21.1	0.2	0.4	0.0	21.6	98.2%	4.3	0.1	1.0	0.1	5.5	77.6%
Uruguay	5.3	0.0	0.3	0.4	6.0	87.8%	0.2	17.2	0.8	-	18.2	0.8%
Venezuela	126.7	6.7	3.9	38.6	175.9	75.9%	28.4	22.2	5.3	1.6	57.5	49.4%
Other Non-OECD Americas	15.1	-	0.9	16.8	32.8	46.1%	0.2	2.4	2.5	0.2	5.2	3.8%
Non-OECD Americas	815.3	19.3	44.4	1 009.3	1 888.3	44.2%	101.6	471.3	96.6	37.5	707.1	14.4%
Bahrain	14.1	0.0	0.0	0.1	14.3	98.8%	2.1	0.0	0.3	0.0	2.4	86.6%
Islamic Rep. of Iran	315.1	19.4	12.4	0.8	347.6	96.2%	48.6	19.8	11.3	0.0	79.7	61.0%
Iraq	70.3	12.6	0.9	3.3	87.1	95.2%	16.1	2.8	3.4	0.0	22.3	72.3%
Jordan	14.4	-	1.1	0.0	15.5	92.4%	0.2	0.4	0.8	-	1.4	16.5%
Kuwait	49.1	3.5	0.7	0.0	53.4	98.6%	9.4	0.1	0.7	0.0	10.2	91.9%
Lebanon	14.1	-	1.2	0.1	15.4	91.7%	0.1	0.2	0.6	-	0.9	12.1%
Oman	20.2	4.1	0.6	18.0	42.8	56.6%	9.4	0.5	0.4	-	10.3	90.9%
Qatar	23.7	6.0	0.5	0.0	30.1	98.3%	12.6	0.1	0.4	0.0	13.1	96.0%
Saudi Arabia	252.8	6.8	8.2	0.3	268.1	96.8%	34.8	1.9	4.9	0.2	41.8	83.2%
Syrian Arab Republic	39.8	5.4	2.1	0.2	47.5	95.2%	8.0	2.7	1.9	-	12.6	63.1%
United Arab Emirates	85.6	2.6	2.7	0.1	91.0	96.9%	18.6	0.5	0.8	-	19.9	93.5%
Yemen	13.2	1.2	0.7	0.0	15.2	95.0%	1.9	2.7	1.5	-	6.1	31.5%
Middle East	912.3	61.6	31.1	23.0	1 028.1	94.7%	161.7	31.7	27.0	0.3	220.7	73.3%

2000 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
1.5	-	16.2	1.9	19.6	7.4%	-	-	-	143.3	24.2%	1.14	Bangladesh
0.0	-	0.1	0.3	0.4	2.6%	0.1	-	-	16.9	51.6%	1.06	Brunei Darussalam
0.2	-	2.6	0.4	3.3	6.2%	-	-	-	23.4	14.0%	1.82	Cambodia
0.9	0.5	2.1	1.2	4.7	19.9%	0.1	4.1	1.6	247.9	89.4%	0.49	Chinese Taipei
23.4	1.6	149.9	24.6	199.5	11.7%	8.1	2.0	3.4	1 854.1	58.6%	1.03	India
4.2	0.2	59.9	26.3	90.7	4.7%	-	0.2	0.8	1 444.4	22.9%	2.58	Indonesia
0.4	-	2.0	0.8	3.3	12.9%	1.8	-	-	96.0	82.5%	0.90	DPR of Korea
0.5	0.5	8.4	3.6	12.9	3.7%	0.0	0.1	0.4	253.2	52.7%	1.06	Malaysia
0.1	-	4.6	0.4	5.1	2.7%	-	-	-	61.8	14.9%	11.61	Mongolia
0.7	-	10.0	20.5	31.2	2.3%	-	-	-	563.1	2.9%	2.10	Myanmar
0.6	-	3.2	0.4	4.2	13.4%	-	-	-	28.8	17.5%	1.31	Nepal
3.1	0.7	17.8	3.2	24.8	12.4%	-	-	0.3	246.6	51.5%	0.92	Pakistan
1.2	0.0	8.9	2.2	12.2	9.6%	-	-	0.2	138.2	54.2%	0.66	Philippines
0.1	5.6	0.0	0.3	6.0	1.5%	0.7	0.4	0.3	57.9	84.4%	0.38	Singapore
0.3	-	1.4	0.4	2.0	12.4%	-	-	-	23.3	49.4%	0.41	Sri Lanka
3.7	0.4	13.5	2.5	20.1	18.7%	-	-	0.5	282.7	63.1%	0.81	Thailand
1.2	-	16.6	1.8	19.6	6.1%	-	-	-	153.9	39.6%	1.24	Vietnam
0.5	-	8.3	2.1	10.8	4.5%	0.0	-	-	97.7	14.7%	1.66	Other Asia
42.6	9.5	325.5	93.0	470.6	9.0%	10.8	6.8	7.6	5 733.2	42.6%	1.18	Asia
29.3	15.6	303.6	44.0	392.4	7.5%	38.1	8.0	10.8	4 997.8	69.2%	1.48	People's Rep. of China
0.2	-	-	0.3	0.5	32.9%	-	-	0.2	45.2	93.2%	0.23	Hong Kong, China
29.5	15.6	303.6	44.3	392.9	7.5%	38.1	8.0	10.9	5 042.9	69.4%	1.41	China
1.4	0.1	36.0	4.4	42.0	3.4%	0.1	0.1	0.2	295.8	53.6%	0.78	Argentina
0.1	-	5.5	5.8	11.3	0.8%	-	-	-	170.5	6.5%	5.75	Bolivia
5.1	7.7	122.7	32.1	167.6	3.0%	0.1	4.1	0.8	1 451.4	23.5%	1.05	Brazil
0.6	0.3	17.1	2.9	20.9	3.1%	-	0.0	0.0	182.6	39.1%	0.69	Colombia
0.1	0.1	1.3	0.2	1.7	5.0%	0.0	-	-	9.7	49.3%	0.30	Costa Rica
0.4	0.6	5.7	0.6	7.3	5.5%	0.0	-	-	50.5	59.0%	1.34	Cuba
0.2	-	1.6	0.4	2.2	8.4%	-	-	-	27.5	67.7%	0.55	Dominican Republic
0.2	-	3.5	0.4	4.1	3.8%	0.0	-	-	39.3	59.5%	0.59	Ecuador
0.1	-	1.0	0.2	1.4	7.8%	0.0	-	-	10.1	56.7%	0.33	El Salvador
0.3	-	8.2	6.0	14.4	1.8%	0.2	-	-	151.6	6.4%	3.41	Guatemala
0.1	-	1.2	0.1	1.4	5.3%	-	-	-	7.2	30.8%	0.73	Haiti
0.1	-	2.6	0.4	3.1	2.8%	-	-	-	14.8	32.7%	0.82	Honduras
0.1	-	0.4	0.2	0.6	8.9%	0.0	-	-	12.3	82.0%	0.72	Jamaica
0.0	-	0.0	0.1	0.1	15.5%	-	-	-	4.3	96.3%	2.04	Netherlands Antilles
0.1	-	2.9	0.3	3.3	2.7%	-	-	-	13.0	30.6%	1.20	Nicaragua
0.0	-	0.9	0.1	1.0	4.7%	-	-	-	9.5	54.2%	0.40	Panama
0.2	-	6.1	1.5	7.8	1.9%	-	-	-	52.9	7.8%	2.61	Paraguay
0.2	0.0	5.9	1.6	7.7	3.1%	0.1	-	-	73.3	39.0%	0.51	Peru
0.0	-	0.1	0.1	0.2	10.5%	-	-	-	27.4	93.3%	1.53	Trinidad and Tobago
0.1	-	6.1	0.1	6.3	1.6%	0.0	-	-	30.6	18.2%	0.96	Uruguay
0.5	0.0	10.1	2.6	13.2	3.7%	0.5	0.5	0.2	247.8	65.5%	1.07	Venezuela
0.1	-	2.4	0.8	3.2	3.2%	0.0	0.0	0.0	41.3	37.4%	1.19	Other Non-OECD Americas
9.9	8.9	241.2	61.0	320.9	3.1%	1.1	4.7	1.2	2 923.3	32.4%	1.02	Non-OECD Americas
0.0	-	0.0	0.1	0.1	26.8%	-	0.2	-	17.0	95.3%	1.12	Bahrain
2.1	0.5	18.4	3.1	24.1	8.8%	-	0.1	1.7	453.2	85.0%	0.92	Islamic Rep. of Iran
0.3	-	3.3	0.8	4.5	7.4%	-	-	0.2	114.0	87.1%	1.02	Iraq
0.1	-	0.3	0.2	0.6	8.5%	0.0	-	-	17.6	83.4%	1.02	Jordan
0.1	-	0.1	0.3	0.5	27.9%	0.1	-	0.4	64.6	96.2%	0.87	Kuwait
0.1	-	0.3	0.2	0.6	14.0%	-	-	-	16.9	84.6%	0.52	Lebanon
0.1	-	0.3	0.1	0.5	14.8%	0.0	-	-	53.6	62.8%	1.25	Oman
0.1	-	0.1	0.1	0.3	26.9%	-	-	-	43.5	97.2%	1.14	Qatar
0.9	-	2.8	2.4	6.0	14.4%	0.1	-	1.3	317.2	93.1%	0.78	Saudi Arabia
0.3	0.2	3.6	0.6	4.7	6.1%	-	-	-	64.8	82.5%	1.08	Syrian Arab Republic
0.2	-	0.5	0.5	1.1	15.5%	-	0.2	0.7	112.9	94.8%	0.54	United Arab Emirates
0.2	-	2.1	0.4	2.7	9.2%	-	-	-	24.0	69.1%	0.64	Yemen
4.5	0.7	31.8	8.7	45.7	9.8%	0.3	0.6	4.1	1 299.5	87.7%	0.85	Middle East

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for Mongolia is due to high levels of peat decay.

2005 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
World *	27 187.4	452.9	1 311.6	7 084.9	36 036.8	76.7%	2 533.7	3 170.3	1 225.4	283.9	7 213.3	35.1%
<i>Annex I Parties</i>	14 129.1	177.7	412.3	667.7	15 386.8	93.0%	912.3	663.2	446.3	20.9	2 042.7	44.7%
<i>Annex II Parties</i>	11 305.2	49.8	282.2	333.6	11 970.8	94.9%	404.7	526.0	306.1	11.4	1 248.2	32.4%
<i>North America</i>	6 331.0	22.0	87.8	111.9	6 552.8	97.0%	256.5	216.7	162.9	6.4	642.5	39.9%
<i>Europe</i>	3 350.4	18.5	131.1	163.3	3 663.3	92.0%	106.0	184.1	122.1	1.8	414.0	25.6%
<i>Asia Oceania</i>	1 623.8	9.3	63.3	58.4	1 754.7	93.1%	42.1	125.2	21.2	3.2	191.8	22.0%
<i>Annex I EIT</i>	2 604.9	125.6	106.8	332.7	3 169.9	86.1%	497.2	115.5	107.7	9.4	729.8	68.1%
<i>Non-Annex I Parties</i>	12 078.7	275.2	899.3	6 417.3	19 670.5	62.8%	1 620.3	2 507.1	779.1	263.0	5 169.5	31.3%
<i>Annex I Kyoto Parties</i>	8 076.4	156.4	309.1	554.6	9 096.5	90.5%	690.4	442.8	277.2	17.7	1 428.2	48.3%
Int. marine bunkers	565.8	-	-	-	565.8	100.0%	1.0	-	-	-	1.0	100%
Int. aviation bunkers	413.8	-	-	-	413.8	100.0%	0.1	-	-	-	0.1	100%
Non-OECD Total	13 175.3	381.1	936.8	6 658.6	21 151.8	64.1%	2 013.1	2 522.7	827.1	269.9	5 632.9	35.7%
OECD Total	13 032.5	71.9	374.8	426.3	13 905.5	94.2%	519.5	647.6	398.3	14.0	1 579.3	32.9%
Canada	559.4	3.0	10.2	42.8	615.4	91.4%	46.0	26.1	31.2	3.3	106.7	43.2%
Chile	58.2	0.4	1.9	0.3	60.8	96.3%	4.5	7.2	6.4	0.2	18.2	24.6%
Mexico	385.5	3.7	19.8	52.0	460.9	84.4%	36.5	54.3	20.4	2.1	113.3	32.2%
United States	5 771.7	19.0	77.7	69.1	5 937.4	97.5%	210.5	190.6	131.7	3.1	535.8	39.3%
OECD Americas	6 774.7	26.1	109.5	164.2	7 074.6	96.1%	297.5	278.2	189.6	8.7	774.0	38.4%
Australia	369.2	3.5	6.1	22.6	401.5	92.9%	37.7	70.1	11.4	2.8	122.0	30.9%
Israel	58.7	0.0	2.3	0.2	61.2	95.9%	0.7	1.1	1.7	0.0	3.5	19.6%
Japan	1 220.7	5.7	56.6	30.7	1 313.7	93.4%	3.5	30.2	8.3	0.3	42.2	8.2%
Korea	469.1	11.0	27.8	0.5	508.4	94.4%	6.4	12.3	13.2	0.1	32.0	20.0%
New Zealand	33.9	0.1	0.5	5.1	39.6	85.7%	1.0	24.9	1.6	0.0	27.5	3.6%
OECD Asia Oceania	2 151.6	20.3	93.4	59.1	2 324.4	93.4%	49.2	138.6	36.1	3.3	227.2	21.7%
Austria	74.6	0.5	3.8	0.5	79.5	94.5%	1.8	4.1	2.4	0.0	8.4	21.9%
Belgium	112.6	0.1	5.2	0.6	118.5	95.1%	1.2	5.7	2.7	0.0	9.6	12.7%
Czech Republic	119.6	3.7	3.9	1.0	128.1	96.2%	5.0	3.9	3.2	0.0	12.0	41.4%
Denmark	48.3	0.4	1.6	3.0	53.3	91.3%	1.3	5.2	1.5	-	8.0	16.4%
Estonia	16.9	-	0.4	10.3	27.5	61.3%	0.9	0.6	0.7	-	2.2	41.3%
Finland	55.2	0.5	1.3	51.3	108.3	51.5%	0.8	2.0	6.9	0.0	9.8	8.3%
France	388.4	2.8	21.3	7.6	420.2	93.1%	34.4	36.9	11.5	0.1	82.9	41.5%
Germany	809.0	3.7	20.9	35.4	869.1	93.5%	16.5	29.6	15.4	0.2	61.7	26.7%
Greece	95.0	0.0	7.6	0.4	103.0	92.2%	1.9	3.6	2.6	0.0	8.2	23.3%
Hungary	56.4	0.3	2.0	1.0	59.7	94.9%	2.3	2.6	2.9	0.0	7.9	29.4%
Iceland	2.2	-	0.1	17.6	19.8	11.0%	0.0	0.2	0.1	0.0	0.3	1.2%
Ireland	43.6	-	2.4	8.9	54.9	79.5%	1.8	11.8	1.4	0.0	15.0	12.1%
Italy	460.8	0.6	25.3	2.3	489.1	94.4%	6.1	16.2	17.7	0.1	40.1	15.2%
Luxembourg	11.4	-	0.5	0.0	12.0	95.4%	0.1	0.9	0.1	0.0	1.1	10.6%
Netherlands	182.7	0.7	1.5	6.5	191.3	95.8%	5.0	9.2	6.9	0.1	21.3	23.7%
Norway	36.3	1.2	0.9	0.7	39.2	95.8%	12.4	2.1	2.3	0.1	16.9	73.2%
Poland	292.9	0.5	7.3	25.4	326.2	90.0%	46.2	15.4	9.0	0.0	70.6	65.4%
Portugal	62.8	0.0	4.5	0.3	67.7	92.8%	1.6	4.3	6.9	0.8	13.6	11.8%
Slovak Republic	38.1	0.2	2.2	0.4	40.8	93.6%	0.8	1.5	1.7	0.0	4.1	20.4%
Slovenia	15.6	-	1.7	0.3	17.6	88.8%	1.1	1.1	0.7	0.0	3.0	37.4%
Spain	339.4	1.1	20.9	1.5	362.9	93.8%	4.0	20.6	11.3	0.4	36.3	11.0%
Sweden	50.3	0.9	2.1	14.6	67.9	75.4%	1.2	3.2	7.1	0.0	11.5	10.3%
Switzerland	44.6	0.0	1.9	0.4	46.9	95.1%	0.9	3.2	0.8	0.0	5.0	19.2%
Turkey	216.4	2.3	23.3	1.4	243.3	89.9%	10.4	21.6	32.3	0.1	64.4	16.2%
United Kingdom	533.0	5.9	9.4	11.4	559.6	96.3%	14.8	25.1	24.4	0.0	64.4	23.0%
OECD Europe	4 106.2	25.4	171.9	203.0	4 506.5	91.7%	172.8	230.8	172.6	2.0	578.1	29.9%
<i>European Union - 27</i>	3 977.3	22.9	157.5	195.3	4 353.0	91.9%	165.9	217.5	153.9	2.0	539.3	30.8%

* Total World includes Non-OECD total, OECD total as well as international bunkers.

Sources: IEA, Sectoral Approach for CO₂ emissions from fuel combustion. EDGAR 4.2 FT2010 database for other emissions. In general, estimates for emissions other than CO₂ from fuel combustion are subject to significantly larger uncertainties.

2005 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
313.1	163.7	1 953.7	566.9	2 997.4	10.4%	534.8	93.3	131.2	47 006.8	64.9%	0.81	World
144.6	123.0	537.2	141.5	946.3	15.3%	347.2	64.2	73.5	18 860.7	81.5%	0.54	Annex I Parties
122.5	78.1	420.7	103.6	724.8	16.9%	312.3	35.4	62.0	14 353.5	82.8%	0.47	Annex II Parties
80.4	27.5	202.6	50.3	360.8	22.3%	198.2	15.2	46.1	7 815.7	85.6%	0.57	North America
27.8	45.7	148.6	35.9	258.0	10.8%	67.4	11.5	10.9	4 425.0	79.2%	0.36	Europe
14.3	4.9	69.4	17.4	106.0	13.5%	46.6	8.7	5.0	2 112.8	80.0%	0.45	Asia Oceania
18.5	41.1	94.8	34.4	188.8	9.8%	32.0	28.2	9.8	4 158.6	78.1%	1.17	Annex I EIT
139.5	40.7	1 416.5	425.4	2 022.0	6.9%	187.6	29.1	57.7	27 136.5	52.0%	1.19	Non-Annex I Parties
67.3	91.6	328.0	94.3	581.1	11.6%	157.5	54.6	29.9	11 347.8	79.2%	0.53	Annex I Kyoto Parties
22.7	-	-	-	22.7	100%	-	-	-	589.5	100.0%	..	Int. marine bunkers
6.4	-	-	-	6.4	100%	-	-	-	420.2	100.0%	..	Int. aviation bunkers
142.6	68.2	1 440.1	442.8	2 093.7	6.8%	201.7	53.7	61.7	29 195.5	53.8%	1.30	Non-OECD Total
141.4	95.5	513.6	124.1	874.6	16.2%	333.2	39.6	69.5	16 801.6	81.9%	0.48	OECD Total
7.2	2.1	23.6	7.2	40.2	18.0%	11.9	6.2	4.2	784.6	78.5%	0.69	Canada
0.8	0.9	6.0	0.9	8.6	9.6%	-	0.0	0.0	87.6	72.9%	0.44	Chile
3.4	1.2	31.9	7.1	43.6	7.8%	7.1	-	0.4	625.4	68.6%	0.48	Mexico
73.1	25.4	179.0	43.1	320.6	22.8%	186.3	9.0	42.0	7 031.0	86.4%	0.56	United States
84.6	29.6	240.5	58.4	413.0	20.5%	205.3	15.2	46.5	8 528.7	84.2%	0.56	OECD Americas
4.7	1.8	48.9	7.7	63.0	7.4%	5.1	0.8	0.5	593.0	70.0%	0.82	Australia
0.3	0.2	0.9	0.6	2.0	14.0%	1.3	0.1	0.6	68.7	86.9%	0.42	Israel
9.2	3.1	8.3	9.4	30.0	30.6%	40.8	7.6	4.5	1 438.8	86.1%	0.37	Japan
3.3	2.2	4.9	3.6	14.0	23.3%	4.9	2.5	4.6	566.4	86.5%	0.52	Korea
0.5	-	12.2	0.3	13.0	3.5%	0.7	0.2	0.1	81.0	43.6%	0.77	New Zealand
17.9	7.4	75.2	21.6	122.0	14.6%	52.9	11.2	10.2	2 747.9	81.5%	0.46	OECD Asia Oceania
0.8	0.3	2.3	0.8	4.2	19.1%	1.9	0.2	0.2	94.4	82.4%	0.34	Austria
0.8	3.9	2.9	1.2	8.8	8.9%	1.9	0.0	0.1	138.9	82.6%	0.41	Belgium
2.4	1.1	3.3	0.9	7.6	31.2%	1.1	0.0	0.0	148.8	87.8%	0.68	Czech Republic
0.6	-	4.6	0.6	5.8	10.1%	1.2	0.0	0.0	68.4	73.9%	0.38	Denmark
0.2	-	0.6	0.2	1.0	23.3%	0.0	0.0	0.0	30.7	58.6%	1.38	Estonia
1.9	1.6	3.0	0.6	7.1	26.5%	0.8	0.0	0.1	126.0	46.4%	0.78	Finland
4.0	6.9	32.8	4.6	48.2	8.2%	12.7	0.7	1.6	566.3	75.9%	0.30	France
5.9	10.4	29.5	5.7	51.5	11.4%	14.7	1.4	5.4	1 003.8	83.2%	0.39	Germany
1.0	0.5	3.5	1.0	6.0	16.0%	1.9	0.1	0.1	119.4	82.0%	0.44	Greece
0.3	1.8	4.2	0.7	7.0	4.8%	1.2	0.3	0.0	76.1	78.0%	0.44	Hungary
0.0	0.0	0.3	0.0	0.4	10.2%	0.0	0.1	0.0	20.7	10.7%	2.00	Iceland
0.3	-	6.8	0.4	7.5	4.4%	0.9	0.2	0.1	78.5	58.3%	0.49	Ireland
3.3	7.5	12.5	5.3	28.7	11.6%	9.1	0.4	0.9	568.2	82.9%	0.34	Italy
0.1	-	0.3	0.1	0.5	20.0%	0.1	0.0	-	13.6	85.5%	0.43	Luxembourg
0.9	5.6	5.8	1.3	13.5	6.4%	3.1	0.4	0.1	229.7	82.4%	0.40	Netherlands
0.4	1.9	1.8	0.8	5.0	7.4%	0.3	4.6	0.3	66.3	75.9%	0.30	Norway
4.1	4.8	17.4	2.6	29.0	14.2%	1.7	0.6	0.2	428.3	80.2%	0.81	Poland
0.7	0.5	2.6	2.1	6.0	11.8%	0.6	0.0	0.1	88.1	73.9%	0.39	Portugal
0.4	1.2	1.3	0.3	3.3	13.4%	0.3	0.1	-	48.6	81.4%	0.56	Slovak Republic
0.2	-	0.8	0.2	1.1	13.3%	0.4	0.1	0.0	22.1	76.1%	0.47	Slovenia
3.0	1.7	16.6	5.0	26.3	11.4%	6.3	2.0	0.7	434.6	80.0%	0.37	Spain
1.1	0.5	3.5	0.8	5.9	19.0%	1.1	0.7	0.2	87.4	61.3%	0.30	Sweden
0.4	0.1	1.4	0.5	2.5	17.5%	1.6	0.1	0.3	56.4	81.6%	0.21	Switzerland
3.6	3.9	21.8	3.4	32.6	10.9%	2.9	0.5	1.6	345.4	67.4%	0.44	Turkey
2.7	4.1	18.4	5.0	30.2	9.0%	9.0	0.6	0.6	664.4	83.7%	0.34	United Kingdom
39.0	58.5	197.9	44.1	339.6	11.5%	75.0	13.1	12.7	5 525.1	78.6%	0.39	OECD Europe
35.9	58.4	184.4	41.8	320.5	11.2%	72.7	8.2	10.4	5 304.2	79.2%	0.40	European Union - 27

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD.

2005 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Non-OECD Total	13 175.3	381.1	936.8	6 658.6	21 151.8	64.1%	2 013.1	2 522.7	827.1	269.9	5 632.9	35.7%
Albania	4.1	0.0	0.2	0.6	4.9	83.6%	0.6	1.7	0.2	0.0	2.5	22.2%
Armenia	4.1	-	0.3	0.3	4.7	87.0%	1.5	1.1	0.4	0.0	3.0	50.8%
Azerbaijan	32.8	0.3	0.7	0.3	34.2	97.1%	5.5	5.0	1.6	0.0	12.1	45.6%
Belarus	62.1	0.0	2.2	42.6	106.9	58.1%	1.0	8.1	4.9	0.0	14.0	6.8%
Bosnia-Herzegovina	15.6	0.2	0.5	0.4	16.7	95.1%	1.2	1.2	0.3	0.0	2.7	45.2%
Bulgaria	45.9	0.4	4.2	0.4	50.9	90.9%	1.4	2.1	9.2	0.1	12.8	11.3%
Croatia	20.8	0.0	1.8	0.0	22.6	91.9%	2.2	1.3	1.0	0.0	4.5	48.9%
Cyprus	7.0	-	0.7	0.0	7.7	90.5%	0.0	0.3	0.3	-	0.6	2.2%
Georgia	4.3	0.0	0.2	0.3	4.8	89.5%	1.6	2.2	0.6	0.0	4.4	36.1%
Gibraltar	0.5	-	-	0.0	0.5	99.9%	0.0	-	0.0	-	0.0	6.7%
Kazakhstan	157.1	16.2	4.5	0.4	178.1	97.2%	35.1	11.9	4.7	2.2	53.9	65.2%
Kosovo *	6.5	..	..	..	..	..	..	..	..	..	..	..
Kyrgyzstan	5.0	0.0	0.4	0.5	5.9	85.4%	0.2	2.6	0.7	0.0	3.6	6.8%
Latvia	7.6	-	0.3	4.3	12.2	61.8%	1.7	0.9	0.6	0.0	3.1	53.7%
Lithuania	13.6	0.0	0.4	6.1	20.1	67.6%	1.8	1.9	1.4	0.0	5.0	35.1%
FYR of Macedonia	8.8	-	0.3	0.1	9.2	95.6%	0.5	0.7	0.3	0.0	1.4	32.7%
Malta	2.7	-	0.0	0.0	2.7	99.6%	0.0	0.0	0.2	-	0.2	0.8%
Republic of Moldova	6.8	-	0.3	0.1	7.2	93.9%	1.7	1.0	0.8	0.0	3.5	47.8%
Montenegro *	1.4	..	..	..	..	..	..	..	..	..	..	..
Romania	93.8	0.7	6.0	1.5	102.0	92.6%	11.9	8.8	5.2	0.0	26.0	46.0%
Russian Federation	1 516.2	98.7	52.5	233.1	1 900.4	85.0%	376.7	51.0	57.2	8.8	493.8	76.3%
Serbia *	49.1	0.0	1.3	0.7	51.0	96.2%	3.0	3.4	1.1	0.0	7.6	39.8%
Tajikistan	2.3	0.0	0.1	0.0	2.5	93.0%	0.5	2.7	0.7	0.0	3.9	12.5%
Turkmenistan	45.1	2.6	0.3	0.5	48.5	98.4%	22.6	6.1	0.9	0.0	29.5	76.5%
Ukraine	305.6	21.2	21.8	6.2	354.8	92.1%	44.2	16.4	10.0	0.3	70.9	62.4%
Uzbekistan	107.8	4.6	2.4	1.5	116.3	96.6%	25.4	13.4	3.5	0.0	42.4	60.0%
Non-OECD Europe and Eurasia	2 526.5	144.9	101.5	300.1	3 072.9	86.9%	540.3	143.5	105.8	11.6	801.3	67.4%
Algeria	79.6	11.3	5.5	0.2	96.5	94.1%	36.5	4.5	4.7	0.0	45.6	80.0%
Angola	7.2	8.5	0.5	5.6	21.8	71.8%	10.6	3.9	1.9	0.0	16.4	64.6%
Benin	2.7	-	0.1	20.2	23.0	11.5%	0.9	2.0	1.0	0.5	4.4	20.5%
Botswana	4.4	-	0.2	0.4	5.0	88.4%	0.5	3.9	0.3	0.0	4.7	10.2%
Cameroon	2.9	1.7	0.4	35.6	40.6	11.5%	2.2	8.0	2.5	0.9	13.7	16.3%
Congo	0.8	3.2	0.0	37.6	41.6	9.6%	3.8	1.8	0.5	1.5	7.7	49.9%
Dem. Rep. of Congo	2.3	0.0	0.2	833.8	836.3	0.3%	5.9	14.1	6.3	31.3	57.7	10.3%
Côte d'Ivoire	5.8	0.1	0.3	114.3	120.5	4.9%	3.3	2.0	2.4	4.8	12.5	26.4%
Egypt	152.6	3.1	14.4	1.1	171.1	91.0%	24.7	14.8	8.3	0.0	47.8	51.6%
Eritrea	0.6	-	0.0	0.0	0.6	94.6%	0.4	1.8	0.4	-	2.6	16.1%
Ethiopia	4.5	-	0.7	0.6	5.7	77.7%	7.8	38.3	6.9	-	53.0	14.7%
Gabon	2.1	4.2	0.1	6.2	12.6	50.2%	3.5	0.1	0.3	0.4	4.3	81.5%
Ghana	6.4	-	0.8	9.6	16.8	38.3%	2.9	3.7	2.9	0.4	10.0	29.6%
Kenya	7.2	-	1.1	3.8	12.1	59.6%	7.2	14.5	3.9	-	25.6	28.2%
Libya	42.5	8.3	1.7	0.1	52.6	96.5%	14.3	0.8	1.1	0.0	16.3	87.7%
Morocco	40.1	-	4.6	0.3	45.0	89.1%	0.9	5.5	4.2	0.0	10.6	8.3%
Mozambique	1.5	-	0.2	34.9	36.6	4.1%	3.4	6.0	2.3	2.0	13.7	25.0%
Namibia	2.5	-	0.0	0.0	2.5	98.2%	0.1	4.9	0.2	0.0	5.3	2.3%
Nigeria	55.2	37.6	1.1	8.1	102.0	91.0%	43.3	26.1	14.5	0.2	84.1	51.5%
Senegal	4.7	-	1.1	0.1	5.8	80.0%	1.2	5.0	1.6	-	7.7	15.0%
South Africa	329.2	15.6	6.3	4.7	355.8	96.9%	30.5	20.0	12.5	2.4	65.3	46.6%
Sudan	9.2	0.0	0.1	4.1	13.4	68.6%	6.6	58.9	5.2	-	70.7	9.3%
United Rep. of Tanzania	5.1	0.0	0.6	65.1	70.9	7.3%	5.1	20.7	4.2	3.6	33.6	15.3%
Togo	1.0	-	0.3	7.4	8.7	11.2%	1.5	1.2	0.7	0.4	3.7	39.6%
Tunisia	20.2	0.5	3.1	0.2	23.9	86.3%	3.6	2.1	1.5	0.0	7.2	50.0%
Zambia	2.1	-	0.3	124.2	126.6	1.6%	2.4	12.3	1.2	5.4	21.2	11.1%
Zimbabwe	10.4	0.4	0.3	1.0	12.0	89.6%	1.1	7.1	1.5	0.0	9.7	11.4%
Other Africa	23.3	2.5	1.1	246.7	273.5	9.4%	26.1	105.7	17.3	9.6	158.6	16.4%
Africa	826.0	96.8	45.1	1 565.8	2 533.7	36.4%	250.3	389.7	110.2	63.4	813.6	30.8%

* For 2005, Serbia includes Kosovo and Montenegro for all emissions other than CO₂ from fuel combustion.

2005 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
142.6	68.2	1 440.1	442.8	2 093.7	6.8%	201.7	53.7	61.7	29 195.5	53.8%	1.30	Non-OECD Total
0.1	-	0.8	0.2	1.0	7.2%	0.1	-	-	8.5	55.8%	0.44	Albania
0.0	-	0.5	0.1	0.6	1.0%	0.3	-	-	8.6	65.4%	0.69	Armenia
0.2	-	2.0	0.4	2.6	6.2%	0.1	0.2	-	49.1	79.1%	1.30	Azerbaijan
0.6	2.2	8.5	0.6	11.9	5.1%	0.4	0.0	-	133.3	47.7%	1.60	Belarus
0.1	-	0.7	0.2	1.0	12.7%	0.4	0.1	-	21.0	82.1%	0.89	Bosnia-Herzegovina
0.3	0.9	2.0	0.6	4.0	8.8%	0.4	0.0	-	68.1	70.7%	0.90	Bulgaria
0.2	0.8	1.5	0.3	2.8	8.5%	0.0	0.0	-	30.0	77.4%	0.44	Croatia
0.0	-	0.2	0.1	0.3	13.0%	0.2	-	-	8.8	79.8%	0.48	Cyprus
0.1	0.7	1.1	0.2	2.0	3.2%	0.0	-	-	11.3	53.1%	0.72	Georgia
0.0	-	-	0.0	0.0	34.4%	-	-	-	0.5	97.4%	0.52	Gibraltar
2.6	-	11.0	4.5	18.1	14.2%	0.3	-	-	250.4	84.2%	1.90	Kazakhstan
..	..	..	..	..	..	..	..	..	..	..	..	Kosovo
0.2	-	1.1	0.2	1.5	11.0%	0.0	-	-	11.0	49.4%	1.24	Kyrgyzstan
0.2	-	1.0	0.2	1.3	12.0%	0.9	0.0	-	17.5	53.5%	0.58	Latvia
0.1	2.0	2.1	0.2	4.5	2.7%	0.6	0.0	-	30.2	51.2%	0.62	Lithuania
0.1	-	0.4	0.1	0.6	17.6%	0.1	-	-	11.3	82.5%	0.71	FYR of Macedonia
0.0	-	0.0	0.0	0.1	11.6%	0.1	-	-	3.1	86.3%	0.37	Malta
0.1	-	0.6	0.2	0.9	6.0%	0.0	-	-	11.7	73.2%	1.37	Republic of Moldova
..	..	..	..	..	..	..	..	..	..	..	..	Montenegro
0.7	2.9	6.5	1.3	11.4	6.0%	0.4	0.3	0.0	140.1	76.5%	0.69	Romania
7.3	13.5	33.7	23.5	78.1	9.4%	24.2	26.6	9.3	2 532.4	78.9%	1.49	Russian Federation
0.2	0.5	2.9	0.4	4.1	5.0%	4.3	0.1	-	67.1	78.0%	1.06	Serbia
0.0	-	1.2	0.2	1.4	1.1%	0.0	0.4	-	8.2	34.8%	0.84	Tajikistan
0.1	0.6	3.3	0.3	4.3	1.8%	0.1	-	-	82.4	85.4%	3.64	Turkmenistan
1.4	9.8	11.9	2.9	26.0	5.6%	0.2	0.2	0.3	452.4	82.3%	1.72	Ukraine
0.5	0.1	8.4	1.1	10.1	5.0%	0.6	-	-	169.4	81.6%	3.23	Uzbekistan
15.1	34.0	101.6	37.8	188.5	8.0%	33.9	28.0	9.6	4 134.2	78.1%	1.41	Non-OECD Europe and Eurasia
0.4	0.7	2.9	0.9	4.9	8.2%	0.2	-	0.3	147.5	86.6%	0.63	Algeria
0.2	-	2.6	0.3	3.1	6.6%	0.0	-	-	41.3	64.1%	0.69	Angola
0.1	-	1.8	1.0	2.9	4.2%	-	-	-	30.3	12.1%	2.94	Benin
0.1	-	2.8	0.2	3.1	2.9%	-	-	-	12.8	39.1%	0.59	Botswana
0.2	-	6.8	2.0	9.0	2.6%	-	0.4	-	63.8	11.2%	1.83	Cameroon
0.1	-	1.8	1.7	3.6	1.9%	0.0	-	-	52.9	14.9%	4.43	Congo
1.3	-	16.3	37.1	54.7	2.3%	-	-	-	948.7	1.0%	60.38	Dem. Rep. of Congo
0.2	-	2.1	5.1	7.5	3.1%	-	-	-	140.4	6.7%	4.68	Côte d'Ivoire
1.3	3.2	15.2	2.3	22.0	6.0%	0.3	1.7	1.1	244.1	74.4%	0.73	Egypt
0.0	-	1.1	0.1	1.2	4.1%	-	-	-	4.4	24.1%	1.66	Eritrea
1.6	-	26.8	1.9	30.3	5.3%	0.0	-	-	89.0	15.5%	1.88	Ethiopia
0.0	-	0.1	0.3	0.5	10.2%	0.0	-	-	17.4	56.9%	0.97	Gabon
0.4	-	3.4	1.0	4.8	9.3%	0.0	0.0	-	31.6	31.1%	1.21	Ghana
0.6	-	9.4	0.6	10.6	5.7%	-	-	-	48.3	31.1%	1.01	Kenya
0.2	-	0.7	0.5	1.3	11.9%	-	-	0.3	70.5	92.5%	0.87	Libya
0.5	-	4.8	0.8	6.1	8.0%	-	-	-	61.7	67.2%	0.57	Morocco
0.3	-	6.5	2.5	9.3	3.5%	0.1	0.2	-	60.0	8.8%	4.31	Mozambique
0.1	-	3.5	0.2	3.9	3.4%	-	-	-	11.6	23.4%	1.07	Namibia
2.0	-	16.6	3.0	21.6	9.4%	0.3	-	0.3	208.4	66.3%	0.85	Nigeria
0.1	-	3.6	0.4	4.0	3.0%	-	-	-	17.5	33.8%	0.96	Senegal
2.9	2.1	14.4	5.8	25.2	11.5%	0.5	0.5	1.5	448.8	84.3%	1.11	South Africa
0.6	-	44.8	3.3	48.7	1.3%	-	-	-	132.7	12.3%	2.14	Sudan
0.6	-	16.7	4.2	21.4	2.7%	-	-	-	125.9	8.6%	3.12	United Rep. of Tanzania
0.1	-	1.1	0.5	1.7	6.7%	-	-	-	14.2	18.1%	3.06	Togo
0.2	0.3	1.6	0.3	2.4	9.0%	-	-	-	33.5	73.0%	0.47	Tunisia
0.2	0.4	17.4	6.7	24.7	1.0%	0.0	-	-	172.5	2.7%	13.00	Zambia
0.2	-	5.1	0.4	5.7	3.9%	-	-	-	27.4	44.1%	7.26	Zimbabwe
3.0	-	77.4	16.6	97.1	3.1%	0.1	-	-	529.3	10.4%	2.82	Other Africa
17.9	6.8	306.9	99.7	431.3	4.1%	1.6	2.9	3.6	3 786.6	31.5%	1.75	Africa

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for DR of Congo and Zambia is due to high levels of forest fires and subsequent post-burn decay.

2005 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Bangladesh	36.5	-	2.3	7.6	46.4	78.7%	9.7	66.5	17.9	0.1	94.2	10.3%
Brunei Darussalam	5.1	0.2	0.1	12.1	17.5	30.1%	3.9	0.0	0.1	0.5	4.5	86.2%
Cambodia	2.6	-	-	31.1	33.7	7.8%	1.2	15.5	1.6	2.3	20.5	5.6%
Chinese Taipei	262.5	0.7	10.0	0.9	274.2	96.0%	1.4	1.1	5.8	0.0	8.3	17.0%
India	1 164.8	19.5	60.4	48.7	1 293.5	91.6%	93.5	375.9	113.3	1.8	584.5	16.0%
Indonesia	335.7	5.6	15.4	2 054.9	2 411.7	14.2%	49.0	98.3	50.8	61.6	259.7	18.9%
DPR of Korea	73.8	-	3.0	2.7	79.5	92.9%	11.8	4.3	3.2	0.1	19.3	60.9%
Malaysia	152.0	3.2	8.1	113.2	276.6	56.1%	22.1	5.8	5.7	2.8	36.5	60.7%
Mongolia	9.5	0.0	0.1	42.8	52.4	18.1%	0.4	5.6	0.3	0.0	6.3	5.9%
Myanmar	10.6	0.0	0.2	387.8	398.7	2.7%	9.7	54.3	6.4	7.8	78.2	12.4%
Nepal	3.0	-	0.1	0.2	3.4	89.4%	1.4	18.4	2.5	0.0	22.3	6.4%
Pakistan	117.8	2.0	7.7	0.4	128.0	93.6%	34.1	87.0	17.6	0.1	138.7	24.6%
Philippines	70.7	0.0	6.9	2.2	79.8	88.6%	5.6	33.6	14.0	0.0	53.2	10.5%
Singapore	50.6	0.2	0.1	0.4	51.3	99.0%	1.4	0.0	0.9	0.0	2.3	60.7%
Sri Lanka	13.4	-	0.7	0.5	14.6	92.2%	0.6	6.7	3.0	-	10.3	6.1%
Thailand	216.6	0.0	17.4	13.0	247.0	87.7%	19.1	56.1	13.7	0.5	89.4	21.3%
Vietnam	79.8	1.1	14.9	9.9	105.7	76.5%	28.1	55.1	10.9	0.3	94.3	29.8%
Other Asia	15.4	0.6	0.4	68.7	85.0	18.8%	2.9	18.6	5.1	1.9	28.4	10.1%
Asia	2 620.6	33.2	147.8	2 797.0	5 598.8	47.4%	295.8	902.8	272.5	79.7	1 550.8	19.1%
People's Rep. of China	5 062.4	28.3	556.1	109.6	5 756.3	88.4%	606.0	516.9	201.6	3.3	1 327.8	45.6%
Hong Kong, China	40.7	1.5	0.4	0.1	42.8	98.8%	0.8	-	2.1	-	2.8	26.8%
China	5 103.1	29.7	556.5	109.7	5 799.0	88.5%	606.8	516.9	203.7	3.3	1 330.6	45.6%
Argentina	151.0	0.9	5.1	9.7	166.8	91.1%	17.9	71.9	8.7	1.5	100.0	17.9%
Bolivia	9.5	0.3	0.6	219.3	229.7	4.2%	7.2	10.4	1.3	10.9	29.8	24.1%
Brazil	322.5	4.2	19.2	1 462.7	1 808.5	18.1%	37.9	302.6	58.8	92.9	492.2	7.7%
Colombia	57.5	1.0	4.9	24.5	88.0	66.5%	11.1	39.6	6.5	0.5	57.7	19.3%
Costa Rica	5.7	-	0.6	0.1	6.3	89.7%	0.3	1.7	0.4	-	2.4	10.5%
Cuba	25.1	1.3	0.7	3.2	30.4	87.1%	0.9	5.9	2.5	-	9.3	9.4%
Dominican Republic	17.5	-	1.1	0.3	18.9	92.6%	1.1	3.9	1.7	-	6.7	16.2%
Ecuador	24.2	2.5	1.4	2.1	30.3	88.3%	3.4	9.9	1.8	0.1	15.1	22.2%
El Salvador	6.1	-	0.4	0.2	6.8	89.9%	0.4	1.7	1.1	-	3.2	13.0%
Guatemala	10.5	0.0	1.2	37.5	49.2	21.3%	1.1	4.1	1.5	1.7	8.4	12.6%
Haiti	2.0	-	0.2	0.0	2.2	89.0%	0.7	2.3	1.3	-	4.3	17.2%
Honduras	6.9	-	0.5	2.7	10.2	68.4%	0.4	4.1	0.7	-	5.2	7.5%
Jamaica	10.4	-	0.5	0.1	11.1	94.2%	0.2	0.7	0.5	-	1.3	11.7%
Netherlands Antilles	4.2	-	-	0.0	4.3	98.9%	0.1	0.0	0.1	-	0.1	55.6%
Nicaragua	4.0	-	0.2	0.4	4.7	85.9%	0.4	4.5	1.1	-	6.0	6.8%
Panama	6.8	-	0.4	0.4	7.6	89.2%	0.1	2.5	0.5	-	3.2	4.2%
Paraguay	3.4	-	0.3	20.5	24.2	14.2%	0.9	13.0	1.1	0.8	15.8	5.6%
Peru	28.9	0.2	2.0	11.4	42.5	68.4%	1.8	10.5	4.0	0.3	16.6	10.5%
Trinidad and Tobago	33.9	0.3	0.3	0.0	34.5	99.0%	9.4	0.1	1.3	0.2	11.1	85.3%
Uruguay	5.3	-	0.3	0.4	6.0	88.3%	0.5	18.4	0.8	0.0	19.8	2.5%
Venezuela	148.2	4.8	2.8	48.5	204.2	74.9%	25.2	24.6	5.6	2.1	57.5	43.9%
Other Non-OECD Americas	16.7	-	1.0	16.7	34.3	48.5%	0.2	2.5	2.7	0.2	5.7	3.6%
Non-OECD Americas	900.2	15.5	43.9	1 861.0	2 820.6	32.5%	121.0	534.9	104.1	111.4	871.4	13.9%
Bahrain	18.1	0.0	0.2	0.1	18.5	98.3%	2.5	0.0	0.3	0.0	2.8	88.7%
Islamic Rep. of Iran	421.6	21.8	15.9	0.7	460.1	96.4%	66.2	20.9	12.6	0.1	99.8	66.3%
Iraq	74.9	12.6	1.3	3.4	92.2	94.9%	14.0	3.0	3.7	0.0	20.6	67.9%
Jordan	18.0	-	1.7	0.0	19.7	91.3%	0.5	0.4	1.0	-	1.8	26.5%
Kuwait	70.1	4.4	0.9	0.1	75.5	98.7%	11.8	0.2	0.8	0.0	12.8	92.6%
Lebanon	14.5	-	1.9	0.0	16.5	88.0%	0.1	0.3	0.7	-	1.0	11.6%
Oman	28.2	4.7	1.2	20.0	54.0	60.8%	13.5	0.5	0.5	-	14.5	92.7%
Qatar	37.6	4.2	0.7	0.0	42.4	98.3%	18.0	0.1	0.5	0.0	18.6	96.8%
Saudi Arabia	333.8	7.3	11.3	0.3	352.7	96.7%	43.4	1.9	5.7	0.2	51.3	84.6%
Syrian Arab Republic	54.9	2.3	2.0	0.2	59.3	96.4%	6.2	3.5	2.3	0.0	11.9	51.7%
United Arab Emirates	108.4	1.9	4.1	0.1	114.5	96.3%	20.7	0.6	1.0	-	22.3	92.8%
Yemen	18.8	1.8	0.8	0.0	21.4	96.3%	2.2	3.7	1.9	-	7.8	28.6%
Middle East	1 198.9	60.9	41.9	25.1	1 326.8	95.0%	198.9	35.0	30.8	0.4	265.1	75.0%

2005 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
1.6	-	17.8	2.1	21.5	7.4%	-	-	-	162.1	29.5%	0.99	Bangladesh
0.0	-	0.1	0.6	0.7	1.7%	0.3	-	-	22.9	40.1%	1.31	Brunei Darussalam
0.3	-	3.8	2.0	6.1	4.1%	-	-	-	60.2	6.7%	2.99	Cambodia
1.3	0.7	1.7	1.4	5.1	25.9%	0.1	3.2	3.3	294.2	90.4%	0.48	Chinese Taipei
26.0	1.8	156.3	27.2	211.2	12.3%	9.8	1.1	4.6	2 104.7	61.9%	0.84	India
4.5	0.2	80.8	71.1	156.6	2.9%	-	0.1	0.9	2 829.0	14.0%	4.01	Indonesia
0.5	-	2.1	0.8	3.4	13.7%	2.8	-	-	104.9	82.0%	0.94	DPR of Korea
0.7	0.4	9.7	4.5	15.3	4.6%	0.0	0.3	0.6	329.4	54.1%	1.09	Malaysia
0.1	-	3.3	0.2	3.5	3.4%	-	-	-	62.2	16.0%	8.53	Mongolia
0.8	-	13.2	17.7	31.7	2.5%	-	-	-	508.6	4.2%	1.03	Myanmar
0.6	-	3.5	0.5	4.5	13.1%	-	-	-	30.2	16.8%	1.16	Nepal
3.3	0.7	19.9	3.2	27.1	12.2%	-	-	0.8	294.6	53.4%	0.87	Pakistan
0.8	0.0	9.5	2.1	12.4	6.2%	-	-	0.4	145.7	52.9%	0.56	Philippines
0.1	0.7	0.0	0.3	1.1	7.9%	1.4	0.8	0.3	57.2	91.4%	0.30	Singapore
0.3	-	1.3	0.5	2.1	13.0%	-	-	-	26.9	53.1%	0.39	Sri Lanka
4.5	0.5	14.6	3.0	22.6	20.1%	-	-	1.1	360.0	66.7%	0.81	Thailand
1.4	-	19.1	2.3	22.8	6.1%	-	-	-	222.9	49.5%	1.25	Vietnam
0.5	-	10.5	3.0	14.0	3.9%	0.1	-	-	127.4	15.2%	1.59	Other Asia
47.2	5.0	367.1	142.4	561.7	8.4%	14.5	5.6	12.0	7 743.3	38.7%	1.18	Asia
45.8	17.9	347.1	52.3	463.2	9.9%	146.7	10.6	29.0	7 733.5	74.3%	1.44	People's Rep. of China
0.2	-	-	0.3	0.4	39.7%	-	-	0.1	46.1	93.6%	0.19	Hong Kong, China
46.0	17.9	347.1	52.6	463.6	9.9%	146.7	10.6	29.1	7 779.6	74.4%	1.39	China
1.7	0.2	44.4	3.7	50.0	3.4%	0.2	0.1	0.3	317.3	54.0%	0.76	Argentina
0.1	-	5.5	9.7	15.3	0.7%	-	-	-	274.8	6.2%	7.96	Bolivia
5.9	2.5	157.5	72.4	238.2	2.5%	1.8	5.6	1.2	2 547.6	14.5%	1.61	Brazil
0.6	0.3	18.3	2.1	21.3	3.0%	-	0.0	0.1	167.1	42.1%	0.53	Colombia
0.1	0.0	1.1	0.2	1.4	5.0%	0.1	-	-	10.2	58.8%	0.26	Costa Rica
0.3	0.7	5.0	0.5	6.4	4.2%	0.1	-	-	46.2	59.7%	0.96	Cuba
0.2	-	1.7	0.4	2.3	8.6%	-	-	-	27.9	67.2%	0.47	Dominican Republic
0.2	-	3.9	0.5	4.6	3.8%	0.1	-	-	50.0	60.5%	0.57	Ecuador
0.1	-	1.0	0.2	1.4	8.3%	0.1	-	-	11.4	58.1%	0.33	El Salvador
0.3	-	3.0	2.1	5.4	5.6%	0.5	-	-	63.5	18.7%	1.23	Guatemala
0.1	-	1.2	0.1	1.5	6.7%	-	-	-	7.9	35.4%	0.83	Haiti
0.1	-	2.5	0.5	3.1	3.4%	-	-	-	18.4	40.3%	0.82	Honduras
0.1	-	0.4	0.2	0.7	11.1%	0.1	-	-	13.1	81.5%	0.70	Jamaica
0.0	-	0.0	0.0	0.1	17.7%	-	-	-	4.4	96.6%	1.98	Netherlands Antilles
0.1	-	3.1	0.3	3.5	3.2%	-	-	-	14.2	32.0%	1.12	Nicaragua
0.1	-	1.0	0.1	1.2	4.9%	-	-	-	12.1	58.1%	0.41	Panama
0.2	-	7.4	1.5	9.0	1.8%	-	-	-	49.0	9.2%	2.13	Paraguay
0.2	-	6.2	1.3	7.7	2.8%	0.3	-	-	67.1	46.3%	0.38	Peru
0.0	-	0.1	0.1	0.3	11.7%	-	-	-	45.9	95.2%	1.74	Trinidad and Tobago
0.1	-	6.8	0.1	7.0	1.5%	0.1	-	-	32.8	17.9%	1.03	Uruguay
0.6	0.0	11.2	3.1	14.9	4.3%	0.7	0.3	0.2	277.9	64.3%	1.05	Venezuela
0.1	-	2.4	0.8	3.3	3.7%	0.0	0.0	0.0	43.3	39.2%	1.11	Other Non-OECD Americas
11.2	3.6	283.7	100.0	398.5	2.8%	4.0	6.0	1.9	4 102.4	25.5%	1.23	Non-OECD Americas
0.0	-	0.0	0.1	0.1	27.2%	-	0.3	-	21.6	95.4%	1.06	Bahrain
2.5	0.6	20.1	4.0	27.2	9.1%	-	0.1	2.4	589.5	86.9%	0.92	Islamic Rep. of Iran
0.4	-	2.2	0.9	3.5	10.8%	-	-	0.1	116.4	87.6%	1.41	Iraq
0.1	-	0.4	0.2	0.7	9.4%	0.1	-	-	22.3	83.1%	0.95	Jordan
0.2	-	0.1	0.4	0.7	27.6%	0.5	-	0.4	89.8	96.3%	0.81	Kuwait
0.1	-	0.4	0.2	0.6	12.9%	-	-	-	18.1	81.0%	0.47	Lebanon
0.1	-	0.4	0.1	0.6	16.5%	0.2	-	-	69.3	67.0%	1.36	Oman
0.1	-	0.0	0.1	0.3	29.2%	-	-	-	61.3	97.6%	1.07	Qatar
1.0	-	3.0	2.5	6.4	14.8%	0.2	-	2.0	412.6	93.4%	0.84	Saudi Arabia
0.3	0.3	4.3	0.7	5.5	4.8%	-	-	-	76.7	82.9%	1.00	Syrian Arab Republic
0.2	-	0.5	0.7	1.4	16.7%	-	0.3	0.8	139.3	94.2%	0.51	United Arab Emirates
0.4	-	2.4	0.5	3.3	12.3%	-	-	-	32.4	71.6%	0.70	Yemen
5.2	0.9	33.7	10.4	50.2	10.4%	1.0	0.7	5.6	1 649.4	88.8%	0.86	Middle East

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for Mongolia is due to high levels of peat decay.

2010 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
World *	30 276.1	420.0	1 776.0	5 129.8	37 601.9	81.6%	2 980.4	3 389.5	1 291.9	151.6	7 813.4	38.1%
<i>Annex I Parties</i>	13 398.1	125.8	403.5	440.0	14 367.4	94.1%	972.3	639.9	446.4	3.9	2 062.5	47.1%
<i>Annex II Parties</i>	10 519.3	40.1	271.1	208.8	11 039.3	95.7%	409.9	520.2	287.8	3.2	1 221.1	33.6%
<i>North America</i>	5 905.3	19.2	67.8	43.0	6 035.2	98.2%	254.2	222.6	150.6	1.7	629.2	40.4%
<i>Europe</i>	3 056.6	17.1	125.5	145.0	3 344.3	91.9%	106.8	177.7	115.9	0.6	401.0	26.6%
<i>Asia Oceania</i>	1 557.4	3.8	77.8	20.8	1 659.9	94.1%	48.9	119.9	21.3	0.9	190.9	25.6%
<i>Annex I EIT</i>	2 610.5	82.8	102.3	230.8	3 026.4	89.0%	547.3	96.5	119.5	0.6	763.8	71.6%
<i>Non-Annex I Parties</i>	15 779.0	294.2	1 372.6	4 689.8	22 135.5	72.6%	2 006.4	2 749.6	845.6	147.7	5 749.3	34.9%
<i>Annex I Kyoto Parties</i>	7 695.8	108.4	311.9	362.5	8 478.6	92.0%	745.0	412.6	283.5	2.7	1 443.8	51.6%
Int. marine bunkers	643.7	-	-	-	643.7	100.0%	1.6	-	-	-	1.6	100%
Int. aviation bunkers	455.3	-	-	-	455.3	100.0%	0.1	-	-	-	0.1	100%
Non-OECD Total	16 736.8	361.0	1 409.1	4 854.8	23 361.7	73.2%	2 448.3	2 744.7	910.0	147.2	6 250.2	39.2%
OECD Total	12 440.3	58.9	367.0	275.0	13 141.2	95.1%	530.4	644.8	382.0	4.4	1 561.6	34.0%
Canada	536.6	4.7	9.3	7.3	558.0	97.0%	43.2	27.0	33.7	0.5	104.5	41.3%
Chile	69.7	0.4	2.4	0.2	72.7	96.4%	4.3	7.9	5.6	0.2	18.0	24.0%
Mexico	416.9	4.2	16.8	31.3	469.3	89.7%	40.3	55.4	19.4	0.8	115.9	34.8%
United States	5 368.6	14.5	58.4	35.7	5 477.2	98.3%	211.1	195.6	116.9	1.1	524.7	40.2%
OECD Americas	6 391.9	23.8	86.9	74.6	6 577.2	97.5%	298.9	285.9	175.6	2.7	763.0	39.2%
Australia	383.5	1.3	7.6	12.2	404.7	95.1%	44.1	65.0	12.9	0.6	122.5	36.0%
Israel	68.1	0.1	2.3	0.1	70.5	96.6%	1.1	1.1	1.1	-	3.4	32.3%
Japan	1 143.1	2.4	69.6	4.5	1 219.6	93.9%	3.3	29.5	7.2	0.3	40.3	8.1%
Korea	563.1	6.3	22.4	0.0	591.7	96.2%	7.3	13.2	11.4	0.1	32.0	22.8%
New Zealand	30.9	0.1	0.6	4.1	35.6	87.0%	1.5	25.4	1.2	0.0	28.1	5.3%
OECD Asia Oceania	2 188.6	10.2	102.5	20.9	2 322.1	94.7%	57.2	134.2	33.8	1.0	226.3	25.3%
Austria	69.3	0.2	4.0	0.3	73.8	94.2%	2.1	4.0	2.2	0.0	8.4	25.6%
Belgium	106.4	0.3	5.1	0.3	112.2	95.2%	1.5	5.5	2.6	0.0	9.6	15.8%
Czech Republic	114.5	3.3	4.5	0.5	122.7	96.0%	5.2	3.4	3.4	0.0	12.0	43.4%
Denmark	47.0	0.2	1.8	2.7	51.7	91.2%	1.2	5.2	1.3	-	7.8	15.5%
Estonia	18.5	0.8	0.6	9.2	29.1	66.2%	1.0	0.6	0.7	-	2.3	42.8%
Finland	62.9	0.4	1.0	50.7	115.1	55.0%	0.9	1.9	6.0	0.0	8.9	10.4%
France	357.8	2.5	22.4	2.8	385.5	93.5%	36.1	35.2	12.3	0.1	83.8	43.1%
Germany	761.6	4.3	19.1	31.4	816.3	93.8%	14.8	28.6	13.7	0.2	57.2	25.9%
Greece	84.3	0.0	7.7	0.1	92.1	91.5%	1.7	3.6	3.1	0.0	8.4	19.8%
Hungary	48.9	0.5	2.3	0.7	52.4	94.3%	2.2	2.3	2.8	0.0	7.3	30.8%
Iceland	1.9	-	0.1	17.6	19.6	9.8%	0.0	0.2	0.2	0.0	0.4	0.8%
Ireland	38.7	-	2.7	8.0	49.4	78.3%	2.1	10.9	0.9	0.0	13.9	14.9%
Italy	398.5	1.9	21.6	0.4	422.4	94.8%	7.0	15.6	15.0	0.0	37.5	18.5%
Luxembourg	10.6	-	0.5	0.0	11.1	95.6%	0.1	1.0	0.1	0.0	1.2	11.4%
Netherlands	187.0	0.7	1.1	5.4	194.2	96.7%	5.7	9.7	4.9	0.0	20.3	27.9%
Norway	39.2	0.6	1.5	1.0	42.3	94.0%	13.1	2.1	1.9	0.1	17.1	76.3%
Poland	305.1	0.0	10.2	23.3	338.6	90.1%	41.7	15.1	8.6	0.0	65.5	63.8%
Portugal	48.2	0.1	4.3	0.1	52.5	91.8%	1.5	4.1	6.9	0.0	12.6	12.0%
Slovak Republic	35.0	0.5	2.8	0.2	38.5	92.2%	0.9	1.3	1.7	0.0	4.0	23.8%
Slovenia	15.3	-	1.6	0.2	17.1	89.5%	1.2	1.0	0.6	0.0	2.9	42.2%
Spain	268.3	0.6	18.8	0.1	287.8	93.4%	3.2	20.0	13.5	0.1	36.8	8.8%
Sweden	47.6	1.2	2.0	14.4	65.1	74.9%	1.3	3.1	6.4	0.0	10.8	12.0%
Switzerland	43.8	0.0	2.1	0.3	46.3	94.8%	1.2	3.1	0.7	0.0	5.0	23.0%
Turkey	265.9	2.9	30.1	0.3	299.2	89.8%	15.2	23.2	38.9	0.0	77.3	19.6%
United Kingdom	483.5	4.1	9.8	9.5	506.9	96.2%	13.3	23.7	24.2	0.0	61.2	21.7%
OECD Europe	3 859.8	25.0	177.6	179.5	4 241.9	91.6%	174.3	224.7	172.6	0.7	572.3	30.5%
<i>European Union - 27</i>	3 659.5	22.2	156.4	171.6	4 009.7	91.8%	162.4	209.1	147.5	0.7	519.8	31.2%

* Total World includes Non-OECD total, OECD total as well as international bunkers.

Sources: IEA, Sectoral Approach for CO₂ emissions from fuel combustion. EDGAR 4.2 FT2010 database for other emissions. In general, estimates for emissions other than CO₂ from fuel combustion are subject to significantly larger uncertainties.

2010 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
291.6	115.1	2 166.5	510.9	3 084.1	9.5%	761.7	75.1	166.8	49 503.1	68.6%	0.72	World
126.4	82.8	515.3	113.3	837.9	15.1%	545.7	46.9	72.7	17 933.1	81.5%	0.49	Annex I Parties
106.8	47.5	396.6	88.3	639.1	16.7%	493.0	24.9	60.4	13 477.8	82.2%	0.42	Annex II Parties
69.9	25.3	199.2	42.7	337.1	20.7%	324.4	10.6	45.2	7 381.7	84.6%	0.52	North America
25.9	17.5	137.3	32.8	213.5	12.1%	98.6	7.3	10.8	4 075.5	78.7%	0.32	Europe
11.1	4.6	60.1	12.7	88.5	12.5%	70.0	7.0	4.3	2 020.7	80.2%	0.42	Asia Oceania
16.5	33.2	93.0	21.1	163.8	10.1%	47.9	21.4	10.3	4 033.6	80.7%	0.97	Annex I EIT
156.2	32.4	1 651.2	397.6	2 237.4	7.0%	216.0	28.2	94.1	30 460.5	59.9%	0.96	Non-Annex I Parties
59.4	53.2	302.1	70.7	485.4	12.2%	237.5	39.9	29.5	10 714.7	80.3%	0.47	Annex I Kyoto Parties
4.9	-	-	-	4.9	100%	-	-	-	650.2	100.0%	..	Int. marine bunkers
4.0	-	-	-	4.0	100%	-	-	-	459.4	100.0%	..	Int. aviation bunkers
157.9	60.3	1 668.0	403.0	2 289.2	6.9%	241.7	45.7	96.7	32 285.1	61.0%	1.03	Non-OECD Total
124.7	54.9	498.5	107.9	786.0	15.9%	520.0	29.5	70.1	16 108.5	81.7%	0.43	OECD Total
6.6	0.7	21.0	4.6	33.0	20.1%	21.6	4.2	4.0	725.3	81.5%	0.60	Canada
0.6	0.7	6.5	1.0	8.8	6.6%	-	-	0.0	99.5	75.4%	0.43	Chile
3.7	0.6	32.5	6.3	43.1	8.6%	10.0	1.5	0.5	640.3	72.6%	0.46	Mexico
63.2	24.6	178.2	38.1	304.1	20.8%	302.8	6.4	41.2	6 656.4	85.0%	0.51	United States
74.1	26.6	238.2	50.1	389.0	19.1%	334.4	12.1	45.8	8 121.5	83.6%	0.51	OECD Americas
3.7	2.0	41.9	3.9	51.5	7.2%	8.0	0.6	0.5	587.7	73.6%	0.71	Australia
0.3	0.0	0.9	0.6	1.7	16.6%	2.0	0.1	0.7	78.4	88.6%	0.40	Israel
7.1	2.6	7.5	8.5	25.7	27.5%	60.8	6.2	3.8	1 356.4	85.2%	0.35	Japan
3.8	1.1	6.6	3.2	14.7	25.6%	0.9	1.8	6.2	647.3	89.7%	0.49	Korea
0.3	-	10.8	0.3	11.3	2.5%	1.2	0.2	0.1	76.5	42.8%	0.68	New Zealand
15.1	5.8	67.6	16.4	104.9	14.4%	72.9	9.0	11.2	2 746.4	82.7%	0.43	OECD Asia Oceania
0.7	0.1	2.2	0.8	3.8	19.4%	2.8	1.0	0.2	89.9	80.5%	0.30	Austria
0.7	5.4	2.8	1.2	10.1	7.0%	2.7	0.0	0.1	134.7	80.9%	0.38	Belgium
1.5	0.5	4.5	0.8	7.3	20.0%	3.6	0.0	0.0	145.7	85.4%	0.59	Czech Republic
0.6	-	4.3	0.6	5.4	10.4%	1.7	0.0	0.0	66.7	73.4%	0.37	Denmark
0.1	-	0.6	0.2	0.9	15.0%	0.1	0.0	0.0	32.4	62.9%	1.45	Estonia
2.4	0.2	2.6	0.7	5.8	41.5%	1.2	0.0	0.1	131.1	50.9%	0.78	Finland
3.5	1.8	29.0	4.3	38.7	9.2%	19.8	0.4	1.4	529.6	75.5%	0.28	France
5.6	3.6	27.7	5.6	42.4	13.1%	20.6	0.9	5.3	942.8	83.4%	0.35	Germany
0.7	0.4	3.1	0.9	5.1	13.7%	1.2	0.1	0.1	107.0	81.0%	0.39	Greece
0.3	0.0	3.3	0.6	4.2	7.4%	1.7	0.0	0.0	65.7	79.1%	0.39	Hungary
0.0	0.0	0.3	0.0	0.4	3.8%	0.1	0.1	0.0	20.5	9.4%	1.97	Iceland
0.3	-	7.0	0.4	7.7	3.7%	1.2	0.0	0.1	72.3	56.7%	0.45	Ireland
3.1	0.9	10.6	5.0	19.6	15.9%	14.1	0.5	1.0	495.1	82.9%	0.30	Italy
0.1	-	0.3	0.1	0.5	17.1%	0.1	0.0	-	13.0	83.6%	0.37	Luxembourg
0.8	1.6	5.6	1.2	9.2	8.8%	4.4	0.3	0.2	228.6	85.0%	0.37	Netherlands
0.3	0.4	1.8	0.8	3.3	10.2%	0.5	1.2	0.2	64.5	82.4%	0.28	Norway
4.0	1.5	18.7	2.6	26.8	15.0%	2.0	0.3	0.3	433.4	80.9%	0.65	Poland
0.5	0.4	2.5	0.9	4.3	11.5%	1.1	0.5	0.2	71.1	70.6%	0.31	Portugal
0.4	0.9	1.7	0.3	3.4	12.2%	1.5	0.1	-	47.4	77.7%	0.43	Slovak Republic
0.1	-	0.9	0.2	1.2	11.5%	0.5	0.1	0.0	21.8	76.6%	0.42	Slovenia
2.4	0.7	15.1	4.3	22.6	10.8%	9.9	1.2	0.9	359.3	76.4%	0.29	Spain
1.2	0.5	3.1	0.8	5.6	22.0%	1.6	0.4	0.2	83.8	61.2%	0.26	Sweden
0.4	0.2	1.4	0.5	2.4	16.2%	2.3	0.1	0.4	56.4	80.5%	0.19	Switzerland
3.1	2.1	25.7	3.9	34.9	9.0%	4.7	0.7	2.0	418.7	68.6%	0.46	Turkey
2.4	1.4	17.9	4.8	26.5	9.2%	13.3	0.5	0.6	608.9	82.7%	0.30	United Kingdom
35.5	22.5	192.7	41.5	292.1	12.1%	112.8	8.4	13.1	5 240.6	78.1%	0.35	OECD Europe
32.7	21.9	177.8	38.4	270.7	12.1%	109.8	6.6	10.6	4 927.2	78.7%	0.35	European Union - 27

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD.

2010 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Non-OECD Total	16 736.8	361.0	1 409.1	4 854.8	23 361.7	73.2%	2 448.3	2 744.7	910.0	147.2	6 250.2	39.2%
Albania	3.8	-	0.4	0.6	4.7	79.9%	0.8	1.6	0.2	0.0	2.6	30.0%
Armenia	4.0	-	0.4	0.1	4.6	88.7%	2.0	1.1	0.3	-	3.3	59.5%
Azerbaijan	24.7	0.2	0.8	0.1	25.8	96.4%	10.9	5.7	1.8	0.0	18.4	59.5%
Belarus	65.3	0.0	3.0	41.5	109.9	59.5%	1.0	8.5	6.9	0.0	16.4	6.4%
Bosnia-Herzegovina	19.9	0.3	0.7	0.3	21.2	95.4%	1.4	1.3	0.3	-	3.1	47.2%
Bulgaria	43.8	0.0	3.5	0.2	47.5	92.3%	1.6	1.8	8.7	0.0	12.0	12.9%
Croatia	19.0	0.0	3.3	0.0	22.3	85.2%	2.4	1.3	1.3	0.0	5.0	47.4%
Cyprus	7.2	-	0.8	-	8.1	89.6%	0.0	0.2	0.4	-	0.6	2.1%
Georgia	4.9	0.0	0.2	0.2	5.4	92.3%	2.0	2.4	0.5	0.0	4.9	40.8%
Gibraltar	0.5	-	0.0	-	0.5	99.8%	0.0	-	0.0	-	0.0	4.7%
Kazakhstan	232.1	12.2	4.7	0.1	249.0	98.1%	45.7	14.7	5.5	1.7	67.5	67.6%
Kosovo *	8.5	..	..	..	..	..	..	..	..	..	..	..
Kyrgyzstan	7.0	-	0.6	0.4	8.0	87.2%	0.3	3.0	0.7	-	4.0	6.7%
Latvia	8.1	-	0.2	4.1	12.4	65.2%	1.8	0.8	0.6	0.0	3.2	57.2%
Lithuania	13.4	0.0	0.6	6.0	20.0	66.8%	1.8	1.8	1.4	0.0	5.1	35.0%
FYR of Macedonia	8.2	-	0.4	0.0	8.6	95.0%	0.5	0.6	0.3	0.0	1.4	33.6%
Malta	2.5	-	0.0	-	2.5	99.7%	0.0	0.0	0.2	-	0.2	0.3%
Republic of Moldova	6.1	-	0.4	0.0	6.5	94.2%	1.8	0.8	0.8	-	3.4	53.9%
Montenegro *	2.1	..	..	..	..	..	..	..	..	..	..	..
Romania	75.6	0.7	7.5	1.0	84.7	90.0%	12.3	8.5	5.3	0.0	26.1	47.1%
Russian Federation	1 581.4	64.7	45.8	139.3	1 831.2	89.9%	426.0	40.6	66.6	0.4	533.5	79.8%
Serbia *	46.0	-	1.5	0.6	48.1	95.7%	3.1	2.4	1.0	0.0	6.6	47.5%
Tajikistan	2.7	-	0.2	-	2.9	94.7%	0.5	3.6	0.8	-	4.9	10.9%
Turkmenistan	52.7	2.2	0.4	0.3	55.6	98.7%	19.5	6.1	1.0	-	26.5	73.4%
Ukraine	266.6	12.3	16.4	4.6	299.9	93.0%	48.0	9.5	10.8	0.1	68.4	70.2%
Uzbekistan	100.2	3.2	3.2	1.1	107.7	96.0%	25.6	17.4	3.8	-	46.9	54.6%
Non-OECD Europe and Eurasia	2 606.3	95.8	95.0	200.4	2 997.6	90.1%	609.0	133.6	119.3	2.3	864.2	70.5%
Algeria	98.6	10.6	7.7	0.0	116.9	93.4%	37.5	4.9	5.3	0.0	47.7	78.6%
Angola	16.6	7.2	0.6	7.4	31.8	74.8%	11.9	4.2	2.3	0.2	18.6	64.1%
Benin	4.5	-	0.7	30.8	36.0	12.5%	1.0	3.0	1.1	1.7	6.8	14.8%
Botswana	4.6	-	0.1	0.4	5.1	89.9%	0.5	3.5	0.3	0.0	4.4	11.1%
Cameroon	5.0	1.6	0.4	42.5	49.6	13.4%	2.6	11.6	2.2	1.8	18.2	14.4%
Congo	1.7	3.3	-	27.4	32.3	15.4%	3.9	1.6	0.6	0.8	7.0	55.4%
Dem. Rep. of Congo	3.1	-	0.2	969.0	972.4	0.3%	6.6	18.4	6.5	42.3	73.9	8.9%
Côte d'Ivoire	5.8	0.2	0.3	59.8	66.1	9.0%	3.5	2.4	1.9	8.2	15.9	22.2%
Egypt	177.6	2.7	19.6	0.0	199.9	90.2%	29.7	13.3	8.0	0.0	51.0	58.3%
Eritrea	0.5	-	0.0	-	0.5	95.7%	0.6	1.8	0.4	-	2.8	20.5%
Ethiopia	5.4	-	0.8	0.5	6.7	79.8%	10.7	44.6	7.9	-	63.2	16.9%
Gabon	2.7	3.0	0.1	11.3	17.0	33.0%	2.4	0.2	0.4	0.8	3.8	63.8%
Ghana	9.5	-	0.8	38.1	48.4	19.6%	3.1	11.8	2.9	2.9	20.7	15.1%
Kenya	10.9	-	1.6	4.2	16.7	65.0%	8.1	14.8	4.5	-	27.5	29.6%
Libya	51.6	6.7	2.8	0.0	61.1	95.4%	16.0	0.9	1.1	0.0	18.1	88.5%
Morocco	46.0	-	4.9	0.0	50.8	90.4%	1.6	5.8	4.3	0.0	11.8	13.9%
Mozambique	2.5	-	0.3	14.5	17.4	14.4%	4.9	2.1	2.8	0.0	9.8	50.5%
Namibia	3.3	-	0.0	0.0	3.4	98.8%	0.1	4.6	0.3	-	5.0	2.7%
Nigeria	45.9	26.6	2.2	23.8	98.5	73.6%	36.1	35.7	14.8	1.5	88.0	41.0%
Senegal	5.5	-	1.4	0.0	6.9	79.1%	1.8	6.2	1.7	-	9.7	19.0%
South Africa	346.8	12.8	6.9	0.6	367.2	97.9%	29.8	20.1	13.1	2.3	65.3	45.7%
Sudan	13.7	-	0.1	4.0	17.8	76.8%	7.2	81.2	6.3	-	94.6	7.6%
United Rep. of Tanzania	6.0	0.1	0.7	24.3	31.0	19.4%	7.0	15.7	4.6	0.1	27.4	25.4%
Togo	1.2	-	0.4	12.3	13.8	8.5%	1.7	2.0	0.8	0.8	5.2	32.6%
Tunisia	21.9	0.6	3.6	0.0	26.1	86.3%	4.5	2.2	0.8	0.0	7.5	60.0%
Zambia	1.9	-	0.4	59.4	61.8	3.1%	2.6	2.5	1.4	-	6.4	40.1%
Zimbabwe	9.1	0.4	0.2	1.0	10.6	88.7%	1.1	5.8	1.6	0.0	8.4	12.9%
Other Africa	27.9	2.0	1.3	570.2	601.4	5.0%	31.5	170.1	19.5	35.3	256.4	12.3%
Africa	929.7	77.5	58.4	1 901.8	2 967.3	33.9%	268.2	490.7	117.5	98.9	975.3	27.5%

* For 2010, Serbia includes Kosovo and Montenegro for all emissions other than CO₂ from fuel combustion.

2010 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
157.9	60.3	1 668.0	403.0	2 289.2	6.9%	241.7	45.7	96.7	32 285.1	61.0%	1.03	Non-OECD Total
0.1	-	0.9	0.1	1.1	6.1%	0.1	-	-	8.5	54.0%	0.35	Albania
0.0	-	0.9	0.1	1.0	2.3%	0.6	-	-	9.4	64.1%	0.62	Armenia
0.1	-	2.1	0.4	2.6	5.1%	0.1	0.2	-	47.2	76.3%	0.58	Azerbaijan
0.7	2.8	9.3	0.6	13.4	5.3%	0.5	0.0	-	140.3	47.8%	1.18	Belarus
0.1	-	0.8	0.2	1.1	11.7%	0.8	0.1	-	26.2	83.0%	0.95	Bosnia-Herzegovina
0.3	0.5	3.2	0.5	4.5	6.4%	0.6	0.0	-	64.7	70.7%	0.75	Bulgaria
0.2	0.9	1.6	0.3	2.9	6.5%	0.1	0.0	-	30.4	71.1%	0.43	Croatia
0.0	-	0.2	0.1	0.3	11.5%	0.3	-	-	9.3	78.2%	0.45	Cyprus
0.1	0.8	1.2	0.2	2.3	3.0%	0.0	-	-	12.5	55.9%	0.62	Georgia
0.0	-	-	0.0	0.0	37.5%	-	-	-	0.5	97.5%	0.60	Gibraltar
1.4	-	12.3	3.8	17.5	7.8%	0.6	-	-	334.6	87.1%	1.88	Kazakhstan
..	..	..	..	..	..	..	..	..	..	..	..	Kosovo
0.0	-	1.2	0.2	1.5	1.8%	0.0	-	-	13.5	54.0%	1.23	Kyrgyzstan
0.2	-	1.0	0.2	1.4	12.0%	1.4	0.0	-	18.4	55.0%	0.63	Latvia
0.1	0.5	3.8	0.2	4.6	2.5%	1.3	0.0	-	31.0	49.2%	0.61	Lithuania
0.0	-	0.4	0.1	0.5	8.7%	0.2	-	-	10.7	81.3%	0.57	FYR of Macedonia
0.0	-	0.0	0.0	0.1	8.9%	0.2	-	-	3.0	84.0%	0.31	Malta
0.1	-	0.5	0.1	0.6	8.7%	0.0	-	-	10.6	75.9%	1.06	Republic of Moldova
..	..	..	..	..	..	..	..	..	..	..	..	Montenegro
0.5	1.1	6.0	1.1	8.8	6.0%	0.8	0.2	0.0	120.7	73.8%	0.51	Romania
6.8	17.0	28.8	11.1	63.7	10.7%	33.2	20.6	9.6	2 491.9	83.4%	1.24	Russian Federation
0.3	0.2	6.5	0.5	7.4	4.0%	7.2	0.1	-	69.5	71.2%	0.99	Serbia
0.0	-	1.5	0.2	1.7	1.2%	0.0	0.3	-	9.9	33.2%	0.74	Tajikistan
0.1	0.9	3.7	0.3	5.0	1.8%	0.1	-	-	87.2	85.4%	2.33	Turkmenistan
1.2	7.5	9.5	2.4	20.7	5.9%	0.4	0.1	0.4	390.0	84.1%	1.41	Ukraine
0.3	0.1	10.5	1.1	12.0	2.8%	1.0	-	-	167.5	77.2%	2.13	Uzbekistan
12.7	32.3	105.9	23.8	174.7	7.3%	49.5	21.8	10.0	4 117.9	80.7%	1.17	Non-OECD Europe and Eurasia
0.5	1.6	3.1	1.1	6.3	8.0%	0.3	-	0.4	171.6	85.8%	0.64	Algeria
0.2	-	2.9	0.5	3.6	6.2%	0.0	-	-	54.0	66.6%	0.51	Angola
0.1	-	2.9	1.7	4.8	2.9%	-	-	-	47.6	11.9%	3.78	Benin
0.1	-	2.1	0.1	2.2	2.7%	-	-	-	11.7	44.1%	0.47	Botswana
0.3	-	10.6	2.8	13.6	1.8%	-	0.4	-	81.7	11.6%	2.03	Cameroon
0.1	-	1.6	1.3	2.9	2.9%	0.0	-	-	42.3	21.1%	2.74	Congo
1.4	-	21.3	43.9	66.6	2.1%	-	-	-	1 112.8	1.0%	54.20	Dem. Rep. of Congo
0.2	-	2.7	6.9	9.8	2.4%	-	-	-	91.9	10.6%	2.73	Côte d'Ivoire
1.7	5.7	14.9	2.4	24.6	6.8%	0.5	1.9	1.5	279.3	75.8%	0.62	Egypt
0.1	-	1.1	0.1	1.2	6.0%	-	-	-	4.6	25.0%	1.78	Eritrea
1.8	-	34.2	3.1	39.1	4.6%	0.0	-	-	109.0	16.4%	1.41	Ethiopia
0.0	-	0.2	0.6	0.8	5.3%	0.0	-	-	21.6	37.3%	1.07	Gabon
0.5	-	13.0	3.8	17.2	2.9%	0.0	-	-	86.3	15.2%	2.40	Ghana
0.7	-	9.9	0.8	11.4	6.0%	-	-	-	55.6	35.5%	0.93	Kenya
0.2	-	0.7	0.6	1.4	12.3%	-	-	0.4	81.0	91.9%	0.81	Libya
0.7	-	4.1	1.1	5.9	11.4%	-	-	-	68.5	70.5%	0.50	Morocco
0.4	-	1.1	0.7	2.2	16.0%	0.1	0.2	-	29.7	26.2%	1.50	Mozambique
0.1	-	2.8	0.1	3.0	4.5%	-	-	-	11.3	31.7%	0.86	Namibia
1.9	-	28.1	5.5	35.5	5.2%	0.6	0.0	0.4	223.0	49.5%	0.66	Nigeria
0.1	-	5.7	0.6	6.4	2.3%	-	-	-	23.1	32.4%	1.07	Senegal
2.2	0.0	14.1	5.6	21.9	10.2%	0.8	0.5	1.9	457.6	85.6%	0.97	South Africa
0.7	-	72.1	10.5	83.3	0.8%	-	-	-	195.8	11.0%	2.22	Sudan
0.7	-	10.7	1.6	12.9	5.2%	-	-	-	71.4	19.2%	1.27	United Rep. of Tanzania
0.1	-	2.0	0.8	3.0	5.0%	-	-	-	22.0	13.7%	4.08	Togo
0.2	0.3	2.1	0.3	2.9	7.0%	-	-	-	36.5	74.6%	0.40	Tunisia
0.2	0.3	5.4	2.3	8.2	2.8%	0.0	-	-	76.4	6.2%	4.22	Zambia
0.2	-	3.7	0.2	4.2	5.6%	-	-	-	23.2	46.3%	6.94	Zimbabwe
3.6	-	149.6	41.6	194.7	1.8%	0.2	-	-	1 052.7	6.2%	4.44	Other Africa
19.0	7.9	422.5	140.3	589.7	3.2%	2.6	3.0	4.6	4 542.4	28.5%	1.64	Africa

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for DR of Congo and Zambia is due to high levels of forest fires and subsequent post-burn decay.

2010 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

	CO ₂						CH ₄					
	Fuel comb.	Fugitive	Industrial processes	Other	Total	Share of energy	Energy	Agricult.	Waste	Other	Total	Share of energy
Bangladesh	53.0	0.2	2.4	5.4	60.9	87.3%	12.4	70.4	20.3	0.0	103.1	12.0%
Brunei Darussalam	8.2	0.3	0.1	5.5	14.1	60.2%	4.3	0.0	0.1	-	4.5	97.3%
Cambodia	3.8	-	0.0	138.6	142.3	2.6%	1.4	21.4	1.9	10.5	35.2	4.0%
Chinese Taipei	270.2	1.3	8.6	-	280.1	96.9%	1.4	1.2	6.3	0.0	8.9	16.0%
India	1 625.8	32.7	120.1	36.1	1 814.8	91.4%	116.1	377.6	125.3	2.5	621.5	18.7%
Indonesia	410.9	4.2	17.8	1 182.7	1 615.5	25.7%	68.2	94.3	56.2	0.3	218.9	31.1%
DPR of Korea	63.0	-	2.9	2.5	68.4	92.1%	10.9	4.4	3.4	0.0	18.6	58.5%
Malaysia	185.0	2.6	9.2	78.2	275.0	68.2%	21.6	5.5	5.9	0.5	33.6	64.4%
Mongolia	11.9	0.1	0.1	47.0	59.0	20.2%	1.0	4.8	0.3	0.0	6.1	16.4%
Myanmar	8.0	0.1	0.3	243.2	251.6	3.2%	10.7	59.3	7.2	1.9	79.1	13.5%
Nepal	3.7	-	0.1	0.2	4.0	91.1%	1.5	19.2	2.8	0.0	23.5	6.4%
Pakistan	134.6	2.2	12.7	0.1	149.5	91.5%	40.5	95.0	19.8	0.0	155.2	26.1%
Philippines	76.4	0.1	6.1	1.0	83.7	91.5%	6.1	34.7	15.2	0.0	56.0	10.9%
Singapore	62.9	0.2	0.3	0.1	63.5	99.3%	1.3	0.0	1.0	0.0	2.3	57.5%
Sri Lanka	13.3	-	0.8	0.2	14.4	92.5%	0.6	7.8	3.3	-	11.6	5.0%
Thailand	248.5	-	13.3	36.7	298.4	83.2%	23.2	64.2	14.2	2.7	104.4	22.3%
Vietnam	130.5	0.9	22.2	8.9	162.4	80.9%	40.9	58.0	12.1	0.2	111.3	36.8%
Other Asia	20.9	0.1	0.5	115.9	137.4	15.3%	3.3	20.4	6.0	6.1	35.8	9.3%
Asia	3 330.6	44.9	217.4	1 902.2	5 495.1	61.4%	365.5	938.2	301.3	24.8	1 629.8	22.4%
People's Rep. of China	7 217.1	68.7	918.5	73.7	8 278.0	88.0%	819.3	589.9	229.2	3.9	1 642.3	49.9%
Hong Kong, China	41.5	1.3	0.5	-	43.3	98.9%	0.8	-	2.3	-	3.1	24.6%
China	7 258.5	70.0	919.0	73.7	8 321.3	88.1%	820.1	589.9	231.5	3.9	1 645.3	49.8%
Argentina	170.2	0.8	5.6	3.4	180.1	95.0%	15.8	62.6	7.9	0.4	86.7	18.3%
Bolivia	14.1	0.1	0.7	97.2	112.1	12.7%	10.3	10.6	1.4	0.5	22.8	45.1%
Brazil	387.7	3.0	27.6	523.7	942.0	41.5%	43.3	327.2	62.8	10.0	443.3	9.8%
Colombia	60.7	1.2	5.2	15.4	82.5	75.0%	13.6	43.8	6.5	2.8	66.7	20.4%
Costa Rica	6.5	-	0.6	0.0	7.2	91.3%	0.3	1.5	0.5	-	2.3	11.4%
Cuba	30.0	1.5	0.8	3.1	35.4	89.1%	0.8	5.1	2.5	-	8.4	9.9%
Dominican Republic	18.6	-	1.7	0.1	20.3	91.3%	0.8	4.0	2.0	-	6.7	11.6%
Ecuador	30.1	3.1	1.6	0.7	35.6	93.3%	3.4	10.3	1.7	0.0	15.5	22.2%
El Salvador	5.9	-	0.5	0.1	6.5	90.5%	0.4	1.6	1.0	-	3.0	12.5%
Guatemala	10.3	-	1.3	20.0	31.6	32.6%	1.7	3.5	1.5	0.1	6.7	24.7%
Haiti	2.1	-	0.2	0.0	2.3	90.9%	0.9	2.2	1.4	-	4.5	19.2%
Honduras	7.3	-	0.7	2.4	10.4	69.9%	0.5	4.4	0.9	-	5.7	8.3%
Jamaica	8.0	-	0.4	0.1	8.5	93.9%	0.1	0.6	0.5	-	1.3	9.9%
Netherlands Antilles	3.8	-	-	-	3.8	100.0%	0.1	0.0	0.1	-	0.1	51.3%
Nicaragua	4.5	-	0.2	0.4	5.1	87.3%	0.4	4.7	1.3	-	6.4	6.6%
Panama	8.4	-	0.4	0.4	9.2	90.9%	0.1	2.7	0.5	-	3.3	3.7%
Paraguay	4.7	-	0.3	11.6	16.6	28.2%	1.4	13.2	1.3	0.1	15.9	8.7%
Peru	41.9	0.1	2.9	6.6	51.5	81.6%	3.9	11.5	3.5	0.0	18.9	20.6%
Trinidad and Tobago	42.8	0.1	0.4	0.0	43.3	99.2%	12.6	0.1	1.5	0.4	14.5	86.6%
Uruguay	6.4	-	0.3	0.4	7.1	90.7%	0.7	17.8	0.7	0.0	19.2	3.6%
Venezuela	183.0	5.7	3.9	48.7	241.4	78.2%	23.9	25.8	5.5	1.9	57.1	41.8%
Other Non-OECD Americas	18.4	-	0.4	16.7	35.5	51.9%	0.2	2.6	1.1	0.4	4.3	5.1%
Non-OECD Americas	1 065.4	15.7	55.8	751.2	1 888.1	57.3%	135.1	555.7	105.9	16.7	813.4	16.6%
Bahrain	23.6	-	0.2	-	23.8	99.3%	3.0	0.0	0.2	0.0	3.3	91.9%
Islamic Rep. of Iran	509.0	20.5	23.6	0.2	553.4	95.7%	79.4	21.6	14.0	0.3	115.3	68.9%
Iraq	104.5	16.0	2.5	3.3	126.3	95.4%	16.6	3.2	4.1	0.0	23.9	69.4%
Jordan	18.6	-	1.9	-	20.5	90.7%	0.8	0.4	0.9	-	2.1	38.9%
Kuwait	87.4	2.6	1.0	-	91.0	98.9%	11.4	0.2	0.9	0.0	12.4	91.6%
Lebanon	18.6	-	2.2	0.0	20.8	89.3%	0.1	0.3	0.7	-	1.1	10.5%
Oman	40.3	3.1	1.8	22.0	67.2	64.6%	15.4	0.6	0.6	-	16.5	92.9%
Qatar	64.9	3.2	1.5	-	69.7	97.8%	39.6	0.1	0.6	0.0	40.3	98.2%
Saudi Arabia	446.0	5.9	17.8	-	469.6	96.2%	51.7	1.8	6.5	0.2	60.3	85.8%
Syrian Arab Republic	57.8	1.7	2.4	0.0	61.9	96.2%	6.2	3.8	2.5	0.0	12.5	49.7%
United Arab Emirates	154.0	1.5	7.1	0.0	162.6	95.6%	23.8	0.6	1.2	-	25.6	92.8%
Yemen	21.7	2.4	1.5	0.0	25.5	94.3%	2.4	4.1	2.3	-	8.8	27.2%
Middle East	1 546.3	57.1	63.4	25.5	1 692.3	94.7%	250.4	36.7	34.5	0.6	322.2	77.7%

2010 Greenhouse-gas emissions

million tonnes of CO₂ equivalent using GWP-100

N ₂ O						HFCs	PFCs	SF ₆	Total			
Energy	Industrial processes	Agriculture	Other	Total	Share of energy	Industrial processes			Total	Share of energy	GHG / GDP PPP *	
1.8	-	22.0	2.4	26.2	6.9%	-	-	-	190.2	35.4%	0.86	Bangladesh
0.0	-	0.1	0.2	0.3	5.0%	0.4	-	-	19.3	66.4%	1.05	Brunei Darussalam
0.3	-	8.1	8.0	16.4	1.7%	-	-	-	193.9	2.8%	6.97	Cambodia
1.4	0.7	1.7	1.2	5.0	27.2%	0.1	2.7	4.3	301.0	91.1%	0.41	Chinese Taipei
28.8	0.3	170.6	34.5	234.1	12.3%	16.0	1.7	5.8	2 693.9	66.9%	0.72	India
4.1	0.2	65.6	21.4	91.3	4.5%	-	0.1	1.1	1 927.0	25.3%	2.07	Indonesia
0.4	-	2.2	0.6	3.2	12.6%	4.2	-	-	94.5	78.7%	0.91	DPR of Korea
1.0	0.9	10.4	2.8	15.0	6.4%	0.0	0.4	0.8	324.8	64.7%	0.87	Malaysia
0.1	-	3.2	0.1	3.5	3.3%	-	-	-	68.6	19.0%	6.88	Mongolia
0.8	-	12.9	12.5	26.3	3.2%	-	-	-	357.0	5.5%	0.43	Myanmar
0.6	-	3.4	0.5	4.5	14.3%	-	-	-	32.0	18.2%	0.99	Nepal
3.7	0.0	23.0	3.3	30.1	12.3%	-	-	1.0	335.9	53.9%	0.80	Pakistan
0.8	0.0	9.4	2.3	12.5	6.1%	-	-	0.5	152.7	54.6%	0.46	Philippines
0.1	0.7	0.0	1.0	1.9	4.7%	2.2	0.7	0.4	71.0	90.9%	0.27	Singapore
0.3	-	1.3	0.5	2.1	13.7%	-	-	-	28.2	50.5%	0.30	Sri Lanka
3.2	0.6	20.0	6.5	30.2	10.5%	-	-	1.4	434.5	63.3%	0.82	Thailand
1.7	-	28.6	3.5	33.8	5.2%	-	-	-	307.5	56.6%	1.23	Vietnam
0.6	-	9.2	7.6	17.4	3.3%	0.1	-	-	190.7	13.1%	1.60	Other Asia
49.6	3.4	391.8	109.0	553.8	9.0%	23.1	5.6	15.2	7 722.6	49.1%	0.85	Asia
58.1	12.9	415.1	64.2	550.3	10.6%	157.2	8.4	57.1	10 693.3	76.3%	1.17	People's Rep. of China
0.2	-	-	0.3	0.5	41.0%	-	-	0.2	47.0	93.1%	0.16	Hong Kong, China
58.3	12.9	415.1	64.5	550.8	10.6%	157.2	8.4	57.2	10 740.3	76.4%	1.14	China
1.8	0.2	48.0	2.1	52.1	3.4%	0.4	0.1	0.4	319.9	59.0%	0.55	Argentina
0.2	-	5.2	4.2	9.5	1.8%	-	-	-	144.5	17.1%	3.34	Bolivia
7.4	1.9	165.0	33.2	207.6	3.6%	3.3	5.8	1.5	1 603.5	27.5%	0.82	Brazil
0.7	0.1	20.1	4.3	25.1	2.7%	-	-	0.1	174.4	43.6%	0.44	Colombia
0.1	0.0	1.3	0.2	1.5	5.2%	0.1	-	-	11.1	62.1%	0.23	Costa Rica
0.2	0.5	4.5	0.6	5.8	3.3%	0.2	-	-	49.8	65.4%	0.80	Cuba
0.2	-	1.5	0.4	2.1	10.2%	-	-	-	29.2	67.0%	0.35	Dominican Republic
0.2	-	4.6	0.5	5.3	3.6%	0.1	-	-	56.5	65.2%	0.54	Ecuador
0.1	-	1.0	0.2	1.4	7.2%	0.1	-	-	11.0	57.8%	0.30	El Salvador
0.4	-	2.9	1.2	4.5	8.5%	0.8	-	-	43.7	28.3%	0.71	Guatemala
0.1	-	1.2	0.2	1.5	7.2%	-	-	-	8.3	37.3%	0.83	Haiti
0.1	-	2.4	0.6	3.1	3.9%	-	-	-	19.3	40.9%	0.72	Honduras
0.1	-	0.4	0.2	0.6	10.8%	0.1	-	-	10.5	77.7%	0.56	Jamaica
0.0	-	0.0	0.1	0.1	18.4%	-	-	-	4.0	97.2%	1.67	Netherlands Antilles
0.1	-	3.0	0.3	3.4	3.4%	-	-	-	14.9	33.6%	0.98	Nicaragua
0.1	-	1.0	0.3	1.4	6.2%	-	-	-	13.9	61.8%	0.32	Panama
0.2	-	8.2	0.7	9.2	2.3%	-	-	-	41.7	15.1%	1.39	Paraguay
0.3	-	7.1	0.9	8.3	3.7%	0.5	-	-	79.3	58.3%	0.32	Peru
0.0	-	0.1	0.1	0.3	15.4%	-	-	-	58.1	95.6%	1.88	Trinidad and Tobago
0.1	-	7.7	0.1	7.9	1.7%	0.1	-	-	34.3	21.2%	0.79	Uruguay
0.8	0.0	11.7	3.3	15.8	5.1%	1.7	0.2	0.3	316.4	67.4%	1.00	Venezuela
0.1	-	2.2	0.9	3.3	4.4%	0.0	-	0.0	43.1	43.6%	1.05	Other Non-OECD Americas
13.4	2.6	299.2	54.8	370.0	3.6%	7.5	6.0	2.4	3 087.3	39.8%	0.74	Non-OECD Americas
0.0	-	0.0	0.1	0.1	25.0%	-	0.3	-	27.5	96.9%	1.03	Bahrain
1.9	0.9	18.6	2.5	23.9	8.0%	-	0.1	3.0	695.7	87.8%	0.90	Islamic Rep. of Iran
0.5	-	2.5	1.9	4.9	10.3%	-	-	0.1	155.2	88.7%	1.52	Iraq
0.1	-	0.3	0.2	0.6	10.5%	0.2	-	-	23.4	83.4%	0.75	Jordan
0.2	-	0.1	0.4	0.7	28.8%	0.9	-	0.5	105.6	96.2%	0.86	Kuwait
0.1	-	0.2	0.2	0.5	15.5%	-	-	-	22.4	83.9%	0.42	Lebanon
0.1	-	0.8	0.2	1.1	9.5%	0.3	0.0	-	85.2	69.1%	1.24	Oman
0.1	-	0.1	0.2	0.3	28.2%	-	-	-	110.4	97.7%	0.81	Qatar
1.1	-	2.2	2.9	6.2	17.5%	0.3	-	2.6	539.1	93.6%	0.96	Saudi Arabia
0.2	0.3	4.6	0.8	5.9	3.7%	-	-	-	80.3	82.1%	0.83	Syrian Arab Republic
0.2	-	1.4	0.7	2.4	8.2%	-	0.4	1.0	192.0	93.5%	0.60	United Arab Emirates
0.5	-	2.6	0.6	3.6	12.5%	-	-	-	37.9	71.0%	0.66	Yemen
4.9	1.2	33.5	10.7	50.3	9.8%	1.8	0.8	7.2	2 074.6	89.6%	0.88	Middle East

* GHG / GDP PPP ratio is expressed in kg of CO₂-equivalent per 2005 USD. The high GHG / GDP PPP ratio for Mongolia is due to high levels of peat decay.