

Annual European Community greenhouse gas inventory 1990–2006 and inventory report 2008

Submission to the UNFCCC Secretariat

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**The full report and annex 1–13 are available on [www:](http://reports.eea.europa.eu/technical_report_2008_6/en)
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Executive summary

ES.1 Background information on greenhouse gas inventories and climate change

The European Community (EC), as a party to the United Nations Framework Convention on Climate Change (UNFCCC), reports annually on greenhouse gas (GHG) inventories within the area covered by its Member States.

This submission also constitutes the voluntary submission under the Kyoto Protocol.

The legal basis of the compilation of the EC inventory is Council Decision No 280/2004/EC concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol ⁽¹⁾. The purpose of this decision is to: (1) monitor all anthropogenic GHG emissions covered by the Kyoto Protocol in the Member States; (2) evaluate progress towards meeting GHG reduction commitments under the UNFCCC and the Kyoto Protocol; (3) implement the UNFCCC and the Kyoto Protocol as regards national programmes, greenhouse gas inventories, national systems and registries of the Community and its Member States, and the relevant procedures under the Kyoto Protocol; (4) ensure the timeliness, completeness, accuracy, consistency, comparability and transparency of reporting by the Community and its Member States to the UNFCCC Secretariat.

The EC GHG inventory is compiled on the basis of the inventories of the EC Member States for EU-15 and EU-27. It is the direct sum of the national inventories. For EU-15 energy data from Eurostat is used for the reference approach for CO₂ emissions from fossil fuels, developed by the Intergovernmental Panel on Climate Change (IPCC). The main institutions involved in the compilation of the EC GHG inventory are the Member States, the European Commission (DG ENV), the European Environment Agency (EEA)

and its European Topic Centre on Air and Climate Change (ETC/ACC), Eurostat, and the Joint Research Centre (JRC).

The process of compiling the EC GHG inventory is as follows: Member States submit their annual GHG inventories by 15 January each year to the European Commission, DG Environment. Then, the EEA's ETC/ACC, Eurostat and JRC perform initial checks on the submitted data. The draft EC GHG inventory and inventory report are circulated to Member States for reviewing and commenting by 28 February. Member States check their national data and information used in the EC GHG inventory report, send updates, if necessary, and review the EC inventory report itself by 15 March. The final EC GHG inventory and inventory report are prepared by the ETC/ACC by 15 April for submission by the European Commission to the UNFCCC Secretariat; a resubmission is prepared by 27 May, if needed.

ES.2 Summary of greenhouse gas emission trends in the EC

EU-27: Total GHG emissions, without LULUCF, in the EU-27 decreased by 7.7 % ⁽²⁾ between 1990 and 2006 (430 million tonnes CO₂-equivalents). Emissions decreased by 0.3 % (– 14 million tonnes CO₂-equivalents) between 2005 and 2006.

In 2007 the EU made a firm independent commitment to achieve at least a 20 % reduction of greenhouse gas emissions by 2020 compared to 1990 ⁽³⁾.

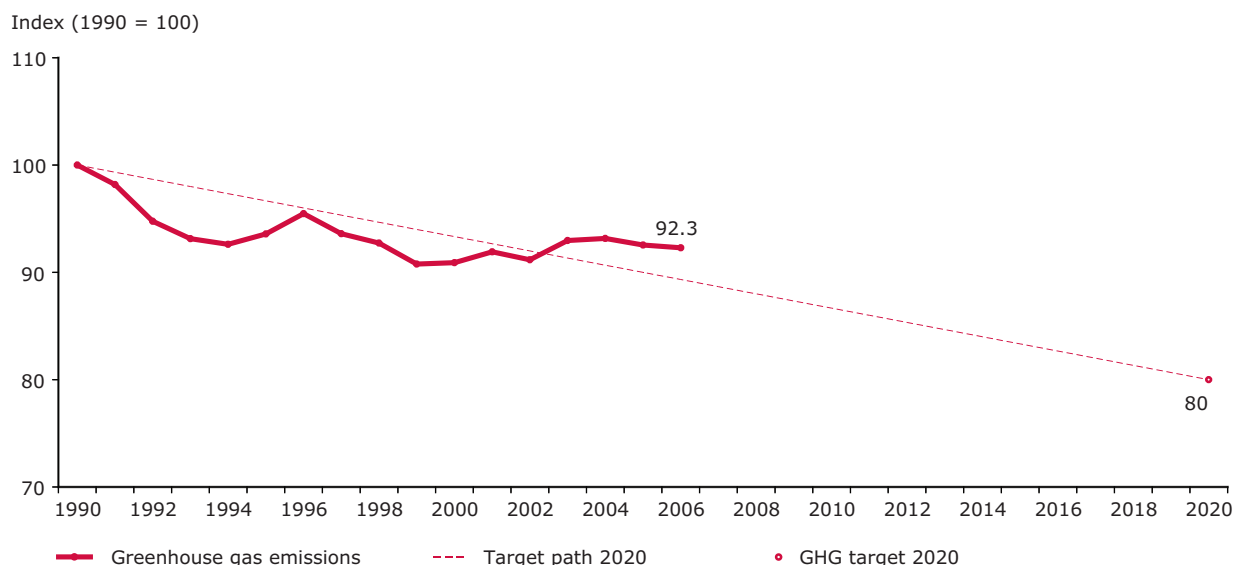
Assuming a linear target path from 1990 to 2020, in 2006 total EU-27 GHG emissions were 2.9 index points above this target path (Figure ES.1).

EU-15: In 2006 total GHG emissions in the EU-15, without LULUCF, were 2.2 % (93 million tonnes

⁽¹⁾ OJ L 49, 19.2.2004, p. 1. Note that Council Decision No 280/2004/EC entered into force in March 2004. Therefore, the compilation of the inventory report 2004 started under the previous Council Decision 1999/296/EC.

⁽²⁾ Compared to the EC inventory report from 2007 the 1990 emission figures have dropped significantly by approximately 48 million tonnes CO₂ equivalents due to recalculations. The result is that the overall decrease for EU-27 since 1990 in this year's submissions is ca 0.5 percentage points less than in the 2007 submission despite a decrease of 0.3 % between 2005 and 2006.

⁽³⁾ All emission information for EU-27 in this report uses 1990 as the starting point when addressing emission reductions. EU-27 does not have a common target under the Kyoto Protocol in the same way as EU-15.

Figure ES.1 EU-27 GHG emissions 1990–2006 (excl. LULUCF)

Note: The linear target path is not intended as an approximation of past and future emission trends. It provides a measure of how close the EU-27 emissions in 2006 are to a linear path of emissions reductions from 1990 to the unilateral commitment by the EU-27 for 2020, assuming that only domestic measures will be used. Therefore, it does not deliver a measure of (possible) compliance of the EU-27 with its GHG targets in 2020, but aims at evaluating overall EU-27 GHG emissions in 2006. The unit is index points with 1990 emissions being 100.

GHG emission data for the EU-27 as a whole do not include emissions and removals from LULUCF. In addition, no adjustments for temperature variations or electricity trade are considered.

CO₂-equivalents) below 1990. Compared to the base year ⁽⁴⁾, emissions in 2006 were 2.7 % or 114 million tonnes CO₂-equivalents lower. Emissions decreased by 0.8 % (– 34.9 million tonnes CO₂-equivalents) between 2005 and 2006.

Under the Kyoto Protocol, the EC agreed to reduce its GHG emissions by 8 % by 2008–2012, from base year levels. Assuming a linear target path from 1990 to 2010, in 2006 total EU-15 GHG emissions were 3.7 index points above this target path (Figure ES.2).

EU-27/15 trends: In 1990 EU-15 was responsible for 76.2 % of EU-27's total GHG emissions. In 2006 EU-15 was responsible for 80.7% of EU-27 emissions. Emissions in the EU-27 decreased more between 1990 and 2006 compared to the EU-15. This was mainly due to decreases in emissions from public electricity and heat production (– 72.2 million tonnes) whereas emissions in this

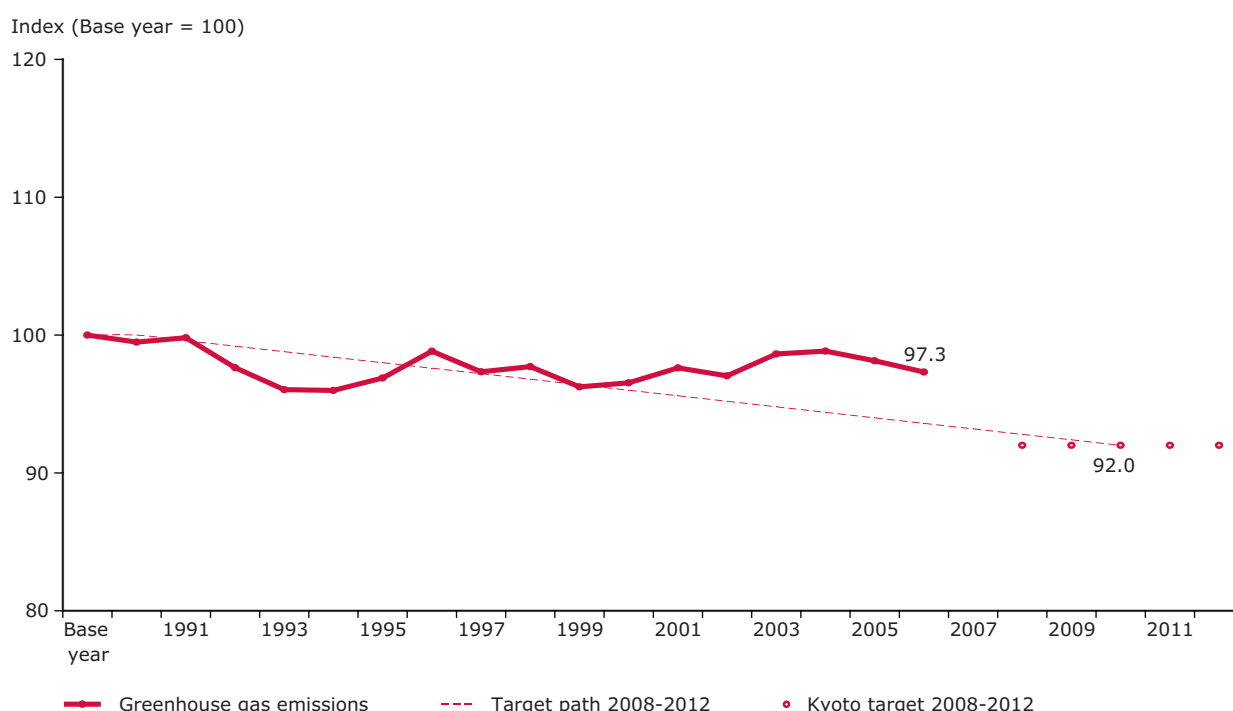
sector increased in the EU-15 (+ 69.3 million tonnes). Significant differences can also be observed for energy-related CO₂ emissions from manufacturing industries and construction excl. iron and steel (decreases in the EU-27 were by 69.6 million tonnes higher than in the EU-15), for CO₂ emissions from households and services (difference of 45.6 million tonnes) and for N₂O emissions from agricultural soils. In contrast, CO₂ emissions from road transport increased more strongly in the EU-27 than in the EU-15 (difference of 40.1 million tonnes).

EU-27/15 — main reasons for emissions changes 2005–2006

Between 2005 and 2006, relative emission decreases were higher in the EU-15 (– 0.8 %) than in the EU-27 (– 0.3 %). This was mainly due to larger increases of CO₂ emissions from public electricity and heat production, iron and steel production and road transport in the EU-27.

⁽⁴⁾ For EU-15 the base year for CO₂, CH₄ and N₂O is 1990; for the fluorinated gases 12 Member States have selected 1995 as the base year, whereas Austria, France and Italy have chosen 1990. As the EC inventory is the sum of Member States' inventories, the EC base year estimates for fluorinated gas emissions are the sum of 1995 emissions for 12 Member States and 1990 emissions for Austria, France and Italy. The EU-15 base year emissions also include emissions from deforestation for the Netherlands, Portugal and the United Kingdom (see Tables 1.4 and 1.5).

Figure ES.2 EU-15 GHG emissions 1990–2005 compared with target for 2008–2012 (excl. LULUCF)



Note: The linear target path is not intended as an approximation of past and future emission trends. It provides a measure of how close the EU-15 emissions in 2006 are to a linear path of emissions reductions from 1990 to the Kyoto target for 2008–2012, assuming that only domestic measures will be used. Therefore, it does not deliver a measure of (possible) compliance of the EU-15 with its GHG targets in 2008–2012, but aims at evaluating overall EU-15 GHG emissions in 2006. The unit is index points with base year emissions being 100.

GHG emission data for the EU-15 as a whole do not include emissions and removals from LULUCF. In addition, no adjustments for temperature variations or electricity trade are considered.

For the fluorinated gases the EU-15 base year is the sum of Member States base years. 12 Member States have selected 1995 as the base year under the Kyoto Protocol, Austria, France and Italy use 1990. Therefore, the EU-15 base year estimates for fluorinated gas emissions are the sum of 1995 emissions for 12 Member States and 1990 emissions for Austria, France and Italy. The EU-15 base year emissions also include emissions from due to deforestation for the Netherlands, Portugal and the United Kingdom (see Table 1.4).

The index on the y axis refers to the base year (1995 for fluorinated gases for all Member States except Austria, France and Italy, 1990 for fluorinated gases for Austria, France and Italy and for all other gases). This means that the value for 1990 needs not to be exactly 100.

Table ES.0 EU-27/15: Overview of Top decreasing/increasing source categories 2005–2006 (+/– 4 Million tonnes CO₂-equivalents)

Source category	EU-27	EU-15
	Million tonnes (CO ₂ -equivalent)	
Households and services (CO ₂ from 1A4)	– 16.6	– 18.8
Public electricity and heat production (CO ₂ from 1A1a)	+ 15.4	+ 6.1
Road transport (CO ₂ from 1A3b)	+ 6.5	+ 2.1
Nitric acid production (N ₂ O from 2B2)	– 6.3	– 5.4
Manufacturing industries (excl. iron and steel) (Energy-related CO ₂ from 1A2 excl. 1A2a)	– 6.1	– 2.6
Petroleum refining (CO ₂ from 1A1b)	– 5.4	– 5.5
Adipic acid production (N ₂ O from 2B3)	– 5.1	– 5.1
Iron and steel production (CO ₂ from 1A2a+2C1)	+ 5.0	– 1.2
Total change 2005–2006	– 14.2	– 34.9

Note: As the table only presents sectors that has increased/decreased equal or more than 4 Mt CO₂-equivalents the sum for each country grouping EU-27/15 does not necessarily match the total change listed at the bottom of the table

EU-15 — main reasons for emission changes 2005–2006

The 34.9 million tonnes (CO₂-equivalents) decrease in GHG emissions between 2005–2006 was mainly due to:

- Lower CO₂ emissions from households and services (– 18.8 million tonnes or – 2.9 %). One important reason for the decrease are warmer weather conditions. The number of heating degree days decreased by 3.3 % between 2005 and 2006. Important decreases in CO₂ emissions from households and services were reported by France, Italy and the United Kingdom, while Germany reported substantial increases.
- Lower CO₂ emissions from petroleum refining (– 5.5 million tonnes or – 4.5 %) mainly in Italy and the United Kingdom.
- Lower N₂O emissions from nitric acid production (– 5.4 million tonnes or – 16.3 %) mainly in Germany due to a decreased production rate.
- Lower N₂O emissions from adipic acid production (– 5.1 million tonnes or – 43.6 %). The decrease of N₂O emissions from adipic acid production is mainly caused by Italy due to abatement techniques.

Substantial increases in GHG emissions between 2005–2006 took place in the following source categories:

- CO₂ emissions from public electricity and heat production (+ 6.1 million tonnes or + 0.6 %). CO₂ emissions from public electricity and heat production increased mainly in Denmark, Finland and the United Kingdom. In Denmark and Finland, this was mainly due to increased electricity production in coal-fired powerstations and decreased net imports of electricity. In Finland, reduced electricity production from hydropower was another reason for the emission reduction. In the United Kingdom, the decrease in CO₂ emissions was mainly caused by a fuel shift from gas to coal.
- HFC emissions from refrigeration and air conditioning (+ 2.9 million tonnes or + 8.1 %) mainly in France and Germany.

EU-27 — main reasons for emission changes 2005–2006

Between 2005 and 2006, decreases in the EU-27 were mainly due to:

- CO₂ from households and services (– 16.6 million tonnes or – 2.2 %). Reductions in the EU-27 were lower than in the EU-15 due to a substantial increase in Poland's households (+ 2.6 million tonnes). Especially the consumption of solid fuels increased.
- N₂O from nitric acid production (– 6.3 million tonnes or – 13.1 %) significantly in the EU-15 only.
- CO₂ from manufacturing industries excl. iron and steel (– 5.4 million tonnes or – 4.0 %). Emission decreases were mainly due to decreases in chemical industry in France and Hungary. Emissions from 'other' industries decreased in Poland, Romania and the United Kingdom. Significant increases in chemical industries occurred in the Czech Republic.

Substantial emission increases were due to:

- CO₂ from public electricity and heat production (+ 15.4 million tonnes or + 1.1 %). In Poland, emissions increased by 7.6 million tonnes due to increased electricity production in thermal power plants.
- CO₂ from road transportation (+ 6.5 million tonnes or + 0.7 %). Emissions from road transport increased in Spain and Poland, while they decreased in Germany. In Spain, the use of gasoline decreased by 4.6 %, whereas diesel consumption increased by 5.1 %. In Poland, both gasoline and diesel consumption increased by 6.1 % and 7.2 %, respectively. The German emissions reductions were mainly due to decreased gasoline consumption (– 5.6 %).
- CO₂ from iron and steel production (+ 5.0 million tonnes or + 4.6 %). Emissions increased mainly in Poland and Italy. In Italy, this was mainly due to an increase in solid fuel consumption (+ 8.6 %). In Germany and France, emissions decreased.

Overview of GHG emissions in EU Member States

Table ES.1 Greenhouse gas emissions in CO₂-equivalents (excl. LULUCF) and Kyoto Protocol targets for 2008–2012

Member State	1990	Kyoto Protocol base year ¹⁾	2006	Change 2005–2006	Change 2005–2006	Change 1990–2006	Change base year–2006	Targets 2008–2012 under Kyoto Protocol and 'EU burden sharing'
	(million tonnes)	(million tonnes)	(million tonnes)	(million tonnes)	(%)	(%)	(%)	(%)
Austria	79.2	79.0	91.1	– 2.2	– 2.3 %	15.1 %	15.2 %	– 13.0 %
Belgium	144.5	145.7	137.0	– 5.4	– 3.8 %	– 5.2 %	– 6.0 %	– 7.5 %
Denmark	69.0	69.3	70.5	6.9	10.9 %	2.1 %	1.7 %	– 21.0 %
Finland	70.9	71.0	80.3	11.3	16.3 %	13.2 %	13.1 %	0.0 %
France	563.3	563.9	541.3	– 13.8	– 2.5 %	– 3.9 %	– 4.0 %	0.0 %
Germany	1 227.7	1 232.4	1 004.8	– 0.2	0.0 %	– 18.2 %	– 18.5 %	– 21.0 %
Greece	104.6	107.0	133.1	– 0.7	– 0.5 %	27.3 %	24.4 %	25.0 %
Ireland	55.5	55.6	69.8	– 0.6	– 0.8 %	25.6 %	25.5 %	13.0 %
Italy	516.9	516.9	567.9	– 10.0	– 1.7 %	9.9 %	9.9 %	– 6.5 %
Luxembourg	13.2	13.2	13.3	0.03	0.2 %	1.0 %	1.2 %	– 28.0 %
Netherlands	211.7	213.0	207.5	– 4.3	– 2.0 %	– 2.0 %	– 2.6 %	– 6.0 %
Portugal	59.1	60.1	83.2	– 4.2	– 4.8 %	40.7 %	38.3 %	27.0 %
Spain	287.7	289.8	433.3	– 7.5	– 1.7 %	50.6 %	49.5 %	15.0 %
Sweden	72.0	72.2	65.7	– 1.2	– 1.7 %	– 8.7 %	– 8.9 %	4.0 %
United Kingdom	768.5	776.3	652.3	– 3.0	– 0.5 %	– 15.1 %	– 16.0 %	– 12.5 %
EU-15	4 243.8	4 265.5	4 151.1	– 34.9	– 0.8 %	– 2.2 %	– 2.7 %	– 8.0 %
Bulgaria	116.7	132.6	71.3	0.8	1.2 %	– 38.9 %	– 46.2 %	– 8.0 %
Cyprus	6.0	Not applicable	10.0	0.2	1.6 %	66.0 %	Not applicable	Not applicable
Czech Republic	194.2	194.2	148.2	2.5	1.7 %	– 23.7 %	– 23.7 %	– 8.0 %
Estonia	41.6	42.6	18.9	– 0.4	– 2.3 %	– 54.6 %	– 55.7 %	– 8.0 %
Hungary	98.2	115.4	78.6	– 1.6	– 2.0 %	– 20.0 %	– 31.9 %	– 6.0 %
Latvia	26.5	25.9	11.6	0.5	4.4 %	– 56.1 %	– 55.1 %	– 8.0 %
Lithuania	49.4	49.4	23.2	0.5	2.4 %	– 53.0 %	– 53.0 %	– 8.0 %
Malta	2.2	Not applicable	3.2	– 0.01	– 0.3 %	45.0 %	Not applicable	Not applicable
Poland	453.6	563.4	400.5	14.1	3.7 %	– 11.7 %	– 28.9 %	– 6.0 %
Romania	247.7	278.2	156.7	4.7	3.1 %	– 36.7 %	– 43.7 %	– 8.0 %
Slovakia	73.7	72.1	48.9	– 0.4	– 0.9 %	– 33.6 %	– 32.1 %	– 8.0 %
Slovenia	18.6	20.4	20.6	0.1	0.6 %	10.8 %	1.2 %	– 8.0 %
EU-27	5 572.2	Not applicable	5 142.8	– 14.0	– 0.3 %	– 7.7 %	Not applicable	Not applicable

¹⁾ The base year under the Kyoto Protocol for each Member State and EU-15 is further outlined in Table 1.4 and 1.5. As Cyprus, Malta and EU-27 do not have targets under the Kyoto Protocol and they do not have applicable Kyoto Protocol base years.

ES.3 Summary of emissions and removals by main greenhouse gas

EU-27: Table ES.2 gives an overview of the main trends in EU-27 GHG emissions and removals for 1990–2006. The most important GHG by far is CO₂, accounting for 83 % of total EU-27 emissions in 2006 excluding LULUCF. In 2006, EU-27 CO₂

emissions without LULUCF were 4 258 Tg, which was 3.1 % below 1990 levels. Compared to 2005, CO₂ emissions increased by 0.002 %.

EU-15: Table ES.3 gives an overview of the main trends in EU-15 GHG emissions and removals for 1990–2006. Also in the EU-15 the most important GHG is CO₂, accounting for 84 % of total EU-15

Table ES.2 Overview of EU-27 GHG emissions and removals from 1990 to 2006 in CO₂-equivalents (Tg)

Greenhouse gas emissions	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Net CO ₂ emissions/removals	3 984	3 732	3 789	3 732	3 726	3 672	3 688	3 746	3 699	3 790	3 814	3 827	3 755
CO ₂ emissions (without LULUCF)	4 392	4 141	4 242	4 154	4 142	4 076	4 100	4 179	4 155	4 263	4 283	4 258	4 258
CH ₄	603	546	539	522	508	497	484	469	459	449	436	429	424
N ₂ O	525	464	470	468	445	423	422	416	405	405	409	404	392
HFCs	28	41	47	54	55	48	47	46	48	53	54	58	62
PFCs	20	14	13	11	10	10	8	8	9	8	6	6	5
SF ₆	11	16	15	14	13	11	11	11	10	9	9	9	10
Total (with net CO ₂ emissions/removals)	5 171	4 812	4 873	4 800	4 757	4 661	4 660	4 695	4 631	4 714	4 729	4 733	4 647
Total (without CO ₂ from LULUCF)	5 579	5 221	5 326	5 222	5 174	5 065	5 072	5 128	5 087	5 187	5 198	5 163	5 150
Total (without LULUCF)	5 572	5 214	5 320	5 216	5 167	5 058	5 066	5 121	5 080	5 180	5 191	5 157	5 143

Table ES.3 Overview of EU-15 GHG emissions and removals from 1990 to 2006 in CO₂-equivalents (Tg)

Greenhouse gas emissions	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Net CO ₂ emissions/removals	3 085	3 006	3 032	3 009	3 062	3 042	3 056	3 119	3 089	3 147	3 183	3 197	3 109
CO ₂ emissions (without LULUCF)	3 353	3 277	3 355	3 301	3 347	3 321	3 349	3 418	3 409	3 488	3 508	3 486	3 466
CH ₄	439	413	407	395	385	377	366	353	343	331	320	314	308
N ₂ O	400	379	385	384	365	345	343	336	328	328	328	324	311
HFCs	28	41	47	53	54	47	46	44	46	49	50	53	56
PFCs	18	11	11	10	9	9	7	6	8	7	5	4	4
SF ₆	11	15	15	14	13	11	11	10	9	9	9	9	9
Total (with net CO ₂ emissions/removals)	3 981	3 866	3 897	3 864	3 888	3 831	3 829	3 869	3 823	3 870	3 895	3 902	3 798
Total (without CO ₂ from LULUCF)	4 249	4 137	4 220	4 156	4 172	4 109	4 122	4 168	4 143	4 212	4 220	4 190	4 155
Total (without LULUCF)	4 244	4 133	4 216	4 152	4 168	4 105	4 118	4 164	4 139	4 207	4 216	4 186	4 151

emissions in 2006. In 2006, EU-15 CO₂ emissions without LULUCF were 3 466 Tg, which was 3.4 % above 1990 levels. Compared to 2005, CO₂ emissions decreased by 0.6 %. The largest four key sources account for 79 % of total CO₂ emissions in 2006. The main reason for increases between 1990 and 2006 was growing road transport demand. The large increase in road transport-related CO₂ emissions was only partly offset by reductions mainly in energy-related emissions from Manufacturing Industries.

ES.4 Summary of emissions and removals by main source category

EU-27: Table ES.4 gives an overview of EU-27 GHG emissions in the main source categories for 1990–2006. The most important sector by far is Energy accounting for 80 % of total EU-27 emissions in 2006. The second largest sector is Agriculture (9 %), followed by Industrial Processes (8 %).

EU-15: Table ES.5 gives an overview of EU-15 GHG emissions in the main source categories for 1990–2006.

More detailed trend descriptions are included in Chapters 3 to 9.

Table ES.4 Overview of EU-27 GHG emissions in the main source and sink categories 1990 to 2006 in CO₂-equivalents (Tg)

Ghg source and sink	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1. Energy	4 277	4 029	4 141	4 037	4 024	3 965	3 974	4 058	4 030	4 131	4 137	4 109	4 099
2. Industrial processes	478	455	452	459	432	392	404	393	389	400	412	416	417
3. Solvent and other product use	13	11	11	11	11	11	11	11	10	10	10	10	10
4. Agriculture	592	513	515	515	513	509	501	493	487	482	481	474	473
5. Land-use, land-use change and forestry	- 401	- 403	- 446	- 415	- 410	- 397	- 405	- 426	- 449	- 466	- 463	- 424	- 496
6. Waste	216	210	206	198	191	185	179	171	167	161	155	151	148
7. Other	- 3	- 4	- 4	- 4	- 4	- 4	- 4	- 4	- 4	- 3	- 3	- 3	- 3
Total (with net CO ₂ emissions/removals)	5 171	4 812	4 873	4 800	4 757	4 661	4 660	4 695	4 631	4 714	4 729	4 733	4 647
Total (without LULUCF)	5 572	5 214	5 320	5 216	5 167	5 058	5 066	5 121	5 080	5 180	5 191	5 157	5 143

Table ES.5 Overview of EU-15 GHG emissions in the main source and sink categories 1990 to 2006 in CO₂-equivalents (Tg)

Ghg source and sink	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1. Energy	3 256	3 175	3 261	3 195	3 237	3 215	3 232	3 304	3 292	3 365	3 375	3 352	3 327
2. Industrial processes	373	371	368	378	358	325	329	321	319	324	330	332	328
3. Solvent and other product use		9	9	9	9	9	9	9	9	8	8	8.067	8
4. Agriculture	434	413	417	417	417	416	413	404	399	395	393	387	384
5. Land-use, land-use change and forestry	- 263	- 267	- 319	- 287	- 280	- 275	- 289	- 295	- 316	- 337	- 321	- 284	- 353
6. Waste	175	169	165	157	151	144	139	130	125	118	113	110	107
7. Other	- 3	- 4	- 4	- 4	- 4	- 4	- 4	- 4	- 4	- 3	- 3	- 3	- 3
Total (with net CO ₂ emissions/removals)	3 981	3 866	3 897	3 864	3 888	3 831	3 829	3 869	3 823	3 870	3 895	3 902	3 798
Total (without LULUCF)	4 244	4 133	4 216	4 152	4 168	4 105	4 118	4 164	4 139	4 207	4 216	4 186	4 151

ES.5 Summary of the emission trends by EU Member States

Table ES.6 gives an overview of Member States' contributions to the EC GHG emissions for 1990–2006. Member States show large variations in GHG emission trends.

The overall EC GHG emission trend is dominated by the two largest emitters Germany and the United Kingdom, accounting for about one third of total EU-27 GHG emissions. These two Member States have achieved total GHG emission reductions of 339 million tonnes CO₂-equivalents compared to 1990⁽⁵⁾.

⁽⁵⁾ The EU-15 as a whole needs emission reductions of total GHG of 8 %, i.e. 341 million tonnes on the basis of the 2008 inventory in order to meet the Kyoto target.

The main reasons for the favourable trend in Germany are increasing efficiency in power and heating plants and the economic restructuring of the five new Länder after the German reunification. The reduction of GHG emissions in the United Kingdom was primarily the result of liberalising energy markets and the subsequent fuel switches from oil and coal to gas in electricity production and N₂O emission reduction measures in the adipic acid production.

Italy and France are the third and fourth largest emitters both with a share of 11 %. Italy's GHG emissions were about 10% above 1990 levels in 2006. Italian GHG emissions increased since 1990 primarily from road transport, electricity and heat production and petrol-refining. France's emissions were 4 %

below 1990 levels in 2006. In France, large reductions were achieved in N₂O emissions from the adipic acid production, but CO₂ emissions from road transport increased considerably between 1990 and 2006.

Spain and Poland are the fifth and sixth largest emitters in the EU-27, both accounting for about 8 % of total EU-27 GHG emissions. Spain increased emissions by 51 % between 1990 and 2006. This was largely due to emission increases from road transport, electricity and heat production, and manufacturing industries. Poland decreased GHG emissions by 12 % between 1990 and 2006 (– 29 % since the base year, which is 1988 in the case of Poland). Main factors for decreasing emissions in Poland — as for other new Member States — was the decline of energy inefficient heavy industry

Table ES.6 Overview of Member States' contributions to EC GHG emissions excluding LULUCF from 1990 to 2006 in CO₂-equivalents (Tg)

Member State	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Austria	79	81	84	83	83	81	81	85	87	93	92	93	91
Belgium	145	150	154	146	151	145	146	145	143	146	146	142	137
Denmark	69	76	90	80	76	73	68	69	69	74	68	64	70
Finland	71	71	77	76	72	72	70	75	77	85	81	69	80
France	563	555	571	564	577	561	556	558	549	552	552	555	541
Germany	1 228	1 095	1 115	1 077	1 052	1 021	1 019	1 036	1 017	1 030	1 028	1 005	1 005
Greece	105	110	114	119	124	124	128	130	129	134	134	134	133
Ireland	56	59	61	63	66	67	69	71	69	69	69	70	70
Italy	517	530	523	530	541	547	552	558	559	574	578	578	568
Luxembourg	13	10	10	10	9	10	10	10	11	12	13	13	13
Netherlands	212	224	232	225	227	214	214	215	215	216	218	212	207
Portugal	59	70	68	71	76	84	82	83	88	83	85	87	83
Spain	288	319	311	332	342	371	385	385	403	410	426	441	433
Sweden	72	74	77	73	73	70	68	69	70	71	70	67	66
United Kingdom	768	707	727	704	699	668	670	673	653	659	658	655	652
EU-15	4 244	4 133	4 216	4 152	4 168	4 105	4 118	4 164	4 139	4 207	4 216	4 186	4 151
Bulgaria	117	88	86	83	74	69	69	69	66	71	71	70	71
Cyprus	6	7	8	8	8	8	9	9	9	10	10	10	10
Czech Republic	194	153	160	153	145	140	147	149	145	146	147	146	148
Estonia	42	21	22	21	20	18	18	18	18	20	20	19	19
Hungary	98	79	81	80	79	79	78	79	77	81	79	80	79
Latvia	26	12	13	12	11	11	10	11	11	11	11	11	12
Lithuania	49	22	23	23	24	21	19	20	21	21	22	23	23
Malta	2	3	3	3	3	3	3	3	3	3	3	3	3
Poland	454	441	448	443	414	401	389	386	373	385	384	386	400
Romania	248	184	190	170	152	135	139	144	150	157	159	152	157
Slovakia	74	53	51	50	51	50	48	50	49	50	50	49	49
Slovenia	19	19	19	20	19	19	19	20	20	20	20	20	21
EU-27	5 572	5 214	5 320	5 216	5 167	5 058	5 066	5 121	5 080	5 180	5 191	5 157	5 143

Note: For some countries the data provided in this table is based on gap filling (see Chapter 1.8.2 for details.).

and the overall restructuring of the economy in the late 1980s and early 1990s. The notable exception was transport (especially road transport) where emissions increased.

ES.6 Information on Indirect Greenhouse Gas Emissions for EU-15

Emissions of CO, NO_x, NMVOC and SO₂ have to be reported to the UNFCCC Secretariat because they influence climate change indirectly: CO, NO_x and NMVOC are precursor substances for

ozone which itself is a greenhouse gas. Sulphur emissions produce microscopic particles (aerosols) that can reflect sunlight back out into space and also affect cloud formation. Table ES.7 shows the total indirect GHG and SO₂ emissions in the EU-15 between 1990–2006. All emissions were reduced significantly from 1990 levels: the largest reduction was achieved in SO₂ (– 73 %), followed by CO (– 56 %), NMVOC (– 44 %) and NO_x (– 34 %).

In the EU-27, SO₂ emissions decreased by 69 %, followed by CO (– 53 %), NMVOC (– 39 %) and NO_x (– 34 %) (Table ES.8).

Table ES.7 Overview of EU-15 indirect GHG and SO₂ emissions for 1990–2006 (Gg)

Greenhouse gas emissions	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
(Gg)													
NO _x	13 575	11 911	11 639	11 222	11 016	10 734	10 423	10 189	9 884	9 708	9 463	9 205	8 893
CO	52 470	42 069	40 540	38 551	36 871	34 619	32 128	30 573	28 485	27 543	26 538	24 716	23 261
NMVOC	16 181	13 331	12 836	12 621	12 178	11 711	10 982	10 500	9 988	10 039	9 495	9 247	9 093
SO ₂	16 497	9 934	8 874	8 159	7 625	6 752	6 039	5 803	5 583	5 146	4 940	4 622	4 410

Table ES.8 Overview of EU-27 indirect GHG and SO₂ emissions for 1990–2006 (Gg)

Greenhouse gas emissions	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
(Gg)													
NO _x	16 864	14 533	14 319	13 824	13 404	12 972	12 247	11 881	11 562	11 443	11 613	11 310	11 079
CO	64 480	51 517	50 622	48 187	45 914	43 391	38 087	35 928	33 755	32 811	34 789	32 512	30 443
NMVOC	18 240	15 144	14 751	14 488	14 005	13 459	12 219	11 982	11 611	11 598	11 428	11 144	11 079
SO ₂	24 976	16 620	15 434	14 412	12 751	11 294	9 947	9 634	9 145	8 698	8 515	8 002	7 795

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