

Annual European Community CLRTAP emission inventory 1990–2000

**Submission to the Executive Body of the UNECE
Convention on Long-Range Transboundary Air Pollution**

**Prepared by:
Bernd Gugele
Manfred Ritter**

European Topic Centre on Air and Climate Change

**Project managers:
Andreas Barkman and André Jol
European Environment Agency**



Cover design: Rolf Kuchling, EEA
Layout: Brandenburg a/s

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European Environment Agency
Kongens Nytorv 6
DK-1050 Copenhagen K
Tel. (45) 33 36 71 00
Fax (45) 33 36 71 99
E-mail: eea@eea.eu.int
Internet: <http://www.eea.eu.int>

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4 Annual European Community CLRTAP emission inventory 1990–2000

Title of inventory	Annual European Community CLRTAP emission inventory 1990–2000
Contact names	<i>Peter Wicks (Environment DG) Andreas Barkman (EEA) Bernd Guegle (ETC/ACC)</i>
Organisation	<i>European Commission, Environment DG European Environment Agency</i>
European Commission address	<i>Directorate-General for Environment European Commission Rue de la Loi/Wetstraat 200 B-1049 Brussels</i>
Phone	
Fax	
E-mail	<i>peter.wicks@cec.eu.int</i>
European Environment Agency address	<i>Kongens Nytorv 6 DK-1050 Copenhagen</i>
Phone	<i>(45) 33 36 71 00</i>
Fax	<i>(45) 33 36 71 99</i>
E-mail	<i>andreas.barkman@eea.eu.int</i>

1. Reporting by the European Community

This report was prepared by the European Commission on behalf of the European Community (EC) in fulfilment of its obligations as a party to the Convention on Long-Range Transboundary Air Pollution (CLRTAP). It is submitted to the Environment and Human Settlements Division of the United Nations Economic Commission for Europe (UNECE) in its function as Secretariat for the Executive Body of the Convention. UNECE requests parties to report their 2000 emission data on SO_x (as SO₂), NO_x (as NO₂), NH₃, NMVOCs, CO, heavy metals (HMs), and persistent organic pollutants (POPs) and for CO₂ and CH₄ the same data as that reported under the United Nations Framework Convention on Climate Change (UNFCCC).

The European Community is party to the CLRTAP Convention and is furthermore party to the 1988 NO_x Protocol, and the 1994 Protocol on Further Reduction of Sulphur Emissions. In addition, the European Community has signed but not yet ratified the 1991 Protocol on Volatile Organic Compounds, the 1998 Heavy Metals Protocol, and the 1998 Protocol on Persistent Organic Pollutants. The EC has not yet signed the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone.

Apart from the European Community, all of its Member States are individual parties to CLRTAP. The Member States of the European Union and the European Communities are Austria, Belgium,

Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. The Member States also report their emission data directly to UNECE.

The EC CLRTAP emission inventory is based on data that EC Member States submit to the European Commission and European Environment Agency (EEA) in the framework of the European Environmental Information and Observation Network (EIONET). EIONET is an extended network consisting of the EEA as central node (supported by European topic centres) and national institutions in the EEA member countries that supply and/or analyse national data on the environment. The main aim of EIONET is to collect and provide objective, reliable and comparable information on the environment at European level. The EEA assists the Commission in the compilation of the annual EC CLRTAP inventory, based on the Member States' data, through the work of its European Topic Centre on Air and Climate Change (ETC/ACC) within the EIONET framework.

This report presents air emission inventories for the European Community as a whole (EU-15) for 1990–2000 (and 1980 to 1990 where available). It contains data on CO₂, CH₄, SO_x (as SO₂), NO_x (as NO₂), NH₃, NMVOCs and CO. Since the data have been revised and updated, this submission replaces any previous EC inventory data submitted to UNECE/CLRTAP.

2. Methodology and data basis of the EC inventory

Methodology and use of EIONET

The EC inventory is based on the data provided by the EC Member States within the EIONET framework. In addition, for Member States that did not submit data under EIONET, data provided by EMEP (Co-operative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe) in June 2002 were used, if available. The legal basis of EIONET is Council Regulation (EC) No 933/99 of 29 April 1999 ⁽¹⁾ amending Regulation (EEC) No 1210/90 on the establishment of the European Environment Agency and the European Environmental Information and Observation Network (EIONET).

Several priority data flows have been agreed within EIONET to provide complete, consistent, comparable, transparent, accurate and timely data sets needed for effective and efficient framing, implementation, monitoring and evaluation of environmental policies at EU and Member State level. In addition, these data sets are needed to fulfil the international reporting requirements of the European Community. In order for the EEA and ETC/ACC to prepare the EC CLRTAP submission, EC Member States are requested to post a copy of their official submission to CLRTAP on their EIONET servers (web sites) or on a named web site. ETC/ACC collects the data from these web sites and compiles the EC CLRTAP inventory database.

Although the European Community fully recognises the reporting obligations under the CLRTAP Convention, reporting complete EC inventories has been difficult. The main reasons for this are that:

- the EC inventory relies on the availability and submission of Member States' data; and
- there is no officially agreed data gap procedure within the EC that can be applied to those Member States that reported incomplete or no emission data for a certain year.

Complete EC inventories can therefore only be provided for a limited number of air pollutants and years (see Annexes A and B).

However, in order to provide a more complete picture, the emissions of air pollutants reported by the EC and its Member States under UNFCCC (SO_x, NO_x, CO and NMVOC) have been used (see the latest EC submission to UNFCCC as compiled by the EEA and ETC/ACC: *Annual European Community greenhouse gas inventory 1990–2000 and inventory report 2002*, EEA technical report No 75, April 2002), available at http://reports.eea.eu.int/technical_report_2002_75/en. The advantage of using the EC inventory to UNFCCC is that the data availability is better and that an officially agreed data gap procedure is defined in the 'Guidelines to the EC greenhouse gas monitoring mechanism' (Council Decision 99/296/EC). Furthermore, for CO₂ and CH₄ emissions, the UNECE/CLRTAP request is for the same data as reported under UNFCCC.

Therefore, in summary, the data basis for this report is as follows.

1. For NH₃, heavy metals (HMs) and persistent organic pollutants (POPs) all EIONET submissions of the Member States have been used. In addition, for Member States that did not submit data under EIONET, data provided by EMEP in June 2002 were used, if available. Because of lack of data and lack of a data gap procedure, EU totals can only be provided for NH₃ for the years 1990 and 1995 to 1998 (see Annexes A and B).
2. For CO₂, CH₄, SO_x, NO_x, CO and NMVOC data as compiled for the inventory submission by the European Community to UNFCCC have been used (see Annex B).

Future improvements of the EC CLRTAP inventory

A main future challenge for the European Community is to improve the data reporting procedures in place, in order to obtain more

(1) OJ L 117, 5.5.1999, p. 1.

complete and timelier UNECE/CLRTAP emission inventories at EU level. For this purpose, the possibilities of further streamlining and harmonising emission reporting, especially with UNFCCC and the EC greenhouse gas monitoring mechanism, should be explored. The final goal of emission reporting within the European Community should be to have one system at national and EU level for both main international reporting requirements (UNECE/CLRTAP and UNFCCC).

Therefore, EC Member States and the Commission will investigate how to make use

of the experiences gained over the past years within the EC greenhouse gas monitoring mechanism. The monitoring mechanism has been very successful in improving the timeliness and completeness of Member States' greenhouse gas submissions. In addition, the possible use of the foreseen EU greenhouse gas inventory system required under the Kyoto Protocol will be investigated. Furthermore, the adoption and implementation of Directive 2001/81/EC on national emission ceilings for certain atmospheric pollutants ⁽²⁾ is also expected to contribute to improvement in the timeliness and quality of the EC CLRTAP inventory.

(2) OJ L 309, 27.11.2001, p. 22.

3. Reporting format and data provided

Reporting format

The report tries to follow the data request as outlined in the letter of the UNECE Environment and Human Settlements Division of 23 November 2001.

As required under the UNECE/CLRTAP reporting procedures, for CO₂ and CH₄ the same data as reported under the United Nations Framework Convention on Climate Change (UNFCCC) are presented, following the UNFCCC reporting guidelines (common reporting format) (FCCC/CP/1999/7) and the IPCC 1996 guidelines for national greenhouse gas inventories (UNFCCC Summary Table 1A which corresponds to IPCC Table 7A).

Emissions of SO_x, NO_x, CO and NMVOC are also reported in the UNFCCC/IPCC format because of improved data availability (see

Chapter 2) and the new reporting format (EB.AIR/GE.1/2001/6). These new guidelines aim for consistency with the category split of the IPCC sectoral tables as applied by UNFCCC.

Overview of data provided in annexes

Annex A provides an overview of the completeness of data made available to the EEA by EC Member States by 1 May 2002 and by EMEP in June 2002 (for NH₃, HMs and POPs).

Annex B includes summary tables for EC emissions for the period 1990 to 2000 for the pollutants SO₂, NO_x, NH₃, NMVOC, CO, CH₄ and CO₂. The EC totals for HMs and POPs could not be prepared for any year due to incomplete national data reporting (see Annex A).

Completeness of data made available to the EEA by EC Member States by 1 May 2002 and by EMEP in June 2002 (for NH₃, HMs and POPs).

✓ submitted for UNECE 2002 inventory (due 31 January 2002) with copy to the EEA.

- submitted for UNECE 2001 inventory (due 31 December 2000) with copy to the EEA

o provided by EMEP in June 2002

[illegible]

Data availability of Pb, Cd and Hg

[illegible]

Data availability of POPs — EU15

Table 3[illegible]

Data availability of POPs — Austria

Table 4[illegible]

Data availability of POPs — Belgium

Table 5[illegible]

Table 6	Data availability of POPs — Denmark
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ANNEX I	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Aldrin (CAS: 309-00-2)											
Chlordane (CAS: 57-74-9)											
Chlordecone (CAS: 143-50-0)											
Dieldrin (CAS: 60-57-1)											
Endrin (CAS: 72-20-8)											
Heptachlor (CAS: 76-44-8)											
Hexabromobiphenyl (CAS: 36355-01-8)											
Mirex (CAS: 2385-85-5)											
Toxaphene (CAS: 8001-35-2)											
ANNEX II											
Hexachlorocyclohexane (HCH) (CAS: 608-73-1)					•						
DDT (CAS:50-29-3)											
Polychlorinated biphenyls (PCBs)											
ANNEX III											
Dioxins & Furans								•		√	√
Polycyclic aromatic hydrocarbons (PAHs)	√	√	√	√	√	√	√	√	√	√	√
Hexachlorobenzene (HCB) (CAS: 118-74-1)											
OTHER											
Pentachlorophenol (PCP) (CAS: 87-86-5)											
Short chained chlorinated paraffins (CAS: 85535-84-8)					•						

Table 7	Data availability of POPs — Finland
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[illegible]

Table 8 Data availability of POPs — France

[illegible]

Data availability of POPs — Germany

Table 9

ANNEX I	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Aldrin (CAS: 309-00-2)											
Chlordane (CAS: 57-74-9)											
Chlordecone (CAS: 143-50-0)											
Dieldrin (CAS: 60-57-1)											
Endrin (CAS: 72-20-8)											
Heptachlor (CAS: 76-44-8)											
Hexabromobiphenyl (CAS: 36355-01-8)											
Mirex (CAS: 2385-85-5)											
Toxaphene (CAS: 8001-35-2)											
ANNEX II											
Hexachlorocyclohexane (HCH) (CAS: 608-73-1)					•						
DDT (CAS:50-29-3)											
Polychlorinated biphenyls (PCBs)	•				•						
ANNEX III											
Dioxins & Furans	•					•					
Polycyclic aromatic hydrocarbons (PAHs)	•				•						
Hexachlorobenzene (HCB) (CAS: 118-74-1)	•										
OTHER											
Pentachlorophenol (PCP) (CAS: 87-86-5)					•						
Short chained chlorinated paraffins (CAS: 85535-84-8)					•						

Data availability of POPs — Greece

Table 10[illegible]

Data availability of POPs — Ireland

Table 11[illegible]

Table 12 Data availability of POPs — Italy

ANNEX I	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Aldrin (CAS: 309-00-2)											
Chlordane (CAS: 57-74-9)											
Chlordecone (CAS: 143-50-0)											
Dieldrin (CAS: 60-57-1)											
Endrin (CAS: 72-20-8)											
Heptachlor (CAS: 76-44-8)											
Hexabromobiphenyl (CAS: 36355-01-8)											
Mirex (CAS: 2385-85-5)											
Toxaphene (CAS: 8001-35-2)											
ANNEX II											
Hexachlorocyclohexane (HCH) (CAS: 608-73-1)											
DDT (CAS:50-29-3)											
Polychlorinated biphenyls (PCBs)											
ANNEX III											
Dioxins & Furans											
Polyaromatic hydrocarbons (PAHs)											
Hexachlorobenzene (HCB) (CAS: 118-74-1)											
OTHER											
Pentachlorophenol (PCP) (CAS: 87-86-5)											
Short chained chlorinated paraffins (CAS: 85535-84-8)											

Table 13 Data availability of POPs — Luxembourg

ANNEX I	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Aldrin (CAS: 309-00-2)											
Chlordane (CAS: 57-74-9)											
Chlordecone (CAS: 143-50-0)											
Dieldrin (CAS: 60-57-1)											
Endrin (CAS: 72-20-8)											
Heptachlor (CAS: 76-44-8)											
Hexabromobiphenyl (CAS: 36355-01-8)											
Mirex (CAS: 2385-85-5)											
Toxaphene (CAS: 8001-35-2)											
ANNEX II											
Hexachlorocyclohexane (HCH) (CAS: 608-73-1)											
DDT (CAS:50-29-3)											
Polychlorinated biphenyls (PCBs)											
ANNEX III											
Dioxins & Furans	•				•	•	•	•	•	•	
Polyaromatic hydrocarbons (PAHs)					•	•	•	•	•	•	
Hexachlorobenzene (HCB) (CAS: 118-74-1)											
OTHER											
Pentachlorophenol (PCP) (CAS: 87-86-5)											
Short chained chlorinated paraffins (CAS: 85535-84-8)											

Table 14 Data availability of POPs — Netherlands

ANNEX I	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Aldrin (CAS: 309-00-2)	•		•		•	•					
Chlordane (CAS: 57-74-9)	•		•		•	•					
Chlordecone (CAS: 143-50-0)	•		•		•	•					
Dieldrin (CAS: 60-57-1)	•		•		•	•					
Endrin (CAS: 72-20-8)	•		•		•	•					
Heptachlor (CAS: 76-44-8)	•		•		•	•					
Hexabromobiphenyl (CAS: 36355-01-8)	•		•		•	•					
Mirex (CAS: 2385-85-5)	•		•		•	•					
Toxaphene (CAS: 8001-35-2)	•		•		•	•					
ANNEX II											
Hexachlorocyclohexane (HCH) (CAS: 608-73-1)	•		•		•	•	•	•			
DDT (CAS:50-29-3)	•		•		•	•					
Polychlorinated biphenyls (PCBs)	•		•		•	•					
ANNEX III											
Dioxins & Furans	✓		•		•	✓	•	•	✓	•	
Polyaromatic hydrocarbons (PAHs)	✓		•		•	✓	•	•	✓	•	
Hexachlorobenzene (HCB) (CAS: 118-74-1)	•				•	•	•	•	•	•	
OTHER											
Pentachlorophenol (PCP) (CAS: 87-86-5)	✓		•		•	✓	•	•	✓	•	
Short chained chlorinated paraffins (CAS: 85535-84-8)	✓				•	✓	•	•	✓	•	

Data availability of POPs — Portugal

Table 15[illegible]

Data availability of POPs — Spain

Table 16[illegible]

Data availability of POPs — Sweden

Table 17[illegible]

Annex B — European Community CLRTAP emission data

Summary tables for EC emissions for the period 1990 to 2000 for the pollutants SO₂, NO_x, NH₃, NMVOC, CO, CH₄, CO₂, HMs and POPs

Anthropogenic annual emissions SO₂, NO_x, NH₃, NMVOC, CO, CH₄, CO₂ 1990–2000

Party: European Community, Sector: All sectors

Table 19

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SO _x (as SO ₂)	16363	14825	13652	12429	11277	10198	8885	8071	7665	6932	5750
NO _x (as NO ₂)	13389	13281	12977	12341	11951	11567	11360	10896	10556	10215	9497
NH ₃	3780					3549	3527	3587	3582		
NMVOC	16231	15687	15187	14540	14376	13043	13525	13336	12511	12103	11562
CO	50205	48326	46474	44154	42041	40490	39029	37423	35673	33848	30817
CH ₄	20310	19806	19289	18736	18242	18138	17808	17321	17039	16702	16275
CO ₂	3342	3367	3290	3223	3233	3270	3341	3280	3330	3308	3325

Notes: SO₂, NO₂, NMVOCs, NH₃, CO and CH₄ in thousands of tonnes per year; CO₂ in millions of tonnes per year. For SO₂, NO₂, NMVOCs, CO, CH₄ and CO₂ data have been used from the 2002 submission of the European Community to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

Anthropogenic annual emissions of CO₂, CH₄, NO_x, CO, NMVOCs and SO₂, 1990–2000

Summary 1.A: Summary report for national greenhouse gas inventories (IPCC Table 7A)

Table 20		EU-15 1990												
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
					P	A	P	A	P	A				
		(Gg)				CO ₂ equivalent (Gg)						(Gg)		
Total National Emissions and Removals	3 341 803	-199 004	20 310	1293	-	24 426	-	13 545	-	0	13 389	50 205	16 231	16 363
1. Energy	3 173 031		4 771	152							13 130	45 618	8 785	15 992
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 146 887		831	152							13 104	45 452	7 405	15 513
1. Energy Industries	1 147 013		38	46							2 877	497	63	10 094
2. Manufacturing Industries and Construction	649 732		59	32							1 726	4 171	139	2 959
3. Transport	694 767		231	38							7 033	32 336	6 072	683
4. Other Sectors	635 943		500	36							1 372	8 305	1 104	1 526
5. Other	19 431		3	0							96	143	26	252
B. Fugitive Emissions from Fuels	26 144		3 940	0							26	166	1 380	479
1. Solid Fuels	9 283		2 396	0							1	87	12	164
2. Oil and Natural Gas	16 861		1 544	0							26	80	1 367	314
2. Industrial Processes	152 883		26	339	-	24 426	-	13 545	-	0	127	3 237	931	349
A. Mineral Products	111 937		1	0							15	29	214	65
B. Chemical Industry	12 729		18	339	-	2 340	-	70	-	0	76	86	404	147
C. Metal Production	25 663		7	0				11 825		0	19	3 104	22	65
D. Other Production	1 303										16	13	253	71
E. Production of Halocarbons and SF6						21 373		560		0				
F. Consumption of Halocarbons and SF6					-	362	-	855	-	0				
G. Other	1 251		0	0	-	0	-	0	-	0	1	5	39	1
3. Solvent and Other Product Use	5 725			11							0	2	4283	0
4. Agriculture	3 215	0	8 628	748							78	430	578	0
A. Enteric Fermentation			6 857											
B. Manure Management			1 576	108									1	
C. Rice Cultivation			110	0									0	
D. Agricultural Soils	3 215	0	66	639							29		532	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			20	1							50	430	45	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-199 004	107	19							8	186	1 551	1
A. Changes in Forest and Other Woody Biomass Stocks	-	-235 706												
B. Forest and Grassland Conversion	8 274		19	1							5	186	19	1
C. Abandonment of Managed Lands	-	-150												
D. CO ₂ Emissions and Removals from Soil	28 887	-												
E. Other	-	-308	89	18							2	0	1 531	0
6. Waste	6 309		6 776	20							46	731	103	21
A. Solid Waste Disposal on Land	263		6 334	0							0	41	38	0
B. Wastewater Handling			354	18							0	0	5	
C. Waste Incineration	5 545		38	2							45	691	44	20
D. Other	500		49	0							1	0	16	1
7. Other	640	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	155 857		9	4							1 473	274	184	955
Aviation	56 516		4	1							215	158	62	15
Marine	99 341		4	3							1 258	116	122	940
Multilateral Operations	0		0	0							0	0	0	0
CO ₂ Emissions from Biomass	118 899													

Note: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

EU-15 1991

Tabel 21

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NM VOC	SO ₂
					P	A	P	A	P	A				
	(Gg)				CO ₂ equivalent (Gg)				(Gg)					
Total National Emissions and Removals	3 366 897	-223 441	19 806	1 281	-	24 514	-	11 949	-	0	13 281	48 326	15 687	14 825
1. Energy	3 206 067		4 650	157							13 023	44 040	8 435	14 496
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 181 942		829	157							12 997	43 879	7 106	14 189
1. Energy Industries	1 151 715		39	47							2 797	483	66	9 518
2. Manufacturing Industries and Construction	626 131		56	31							1 706	3 885	139	2 580
3. Transport	709 478		222	41							7 012	31 323	5 783	647
4. Other Sectors	677 812		510	37							1 396	8 091	1 103	1 242
5. Other	16 807		2	1							85	97	15	202
B. Fugitive Emissions from Fuels	24 126		3 821	0							26	161	1 330	306
1. Solid Fuels	8 557		2 285	0							1	91	11	20
2. Oil and Natural Gas	15 568		1 536	0							26	71	1 318	286
2. Industrial Processes	145 825		25	340	-	24 514	-	11 949	-	0	124	2 870	968	309
A. Mineral Products	106 748		1	0							15	26	247	57
B. Chemical Industry	12 138		14	339	-	2 340	-	70	-	0	62	85	352	130
C. Metal Production	23 027		6	0				10 290		0	19	2 619	18	62
D. Other Production	1 130										16	13	231	37
E. Production of Halocarbons and SF ₆						21 433		479		0				
F. Consumption of Halocarbons and SF ₆					-	386	-	878	-	0				
G. Other	2 782		4	0	-	0	-	0	-	0	13	127	121	22
3. Solvent and Other Product Use	5 684			11							0	2	4 112	0
4. Agriculture	2 815	0	8 402	730							76	419	554	0
A. Enteric Fermentation			6 679											
B. Manure Management			1 531	101									1	
C. Rice Cultivation			107	0									0	
D. Agricultural Soils	2 815	0	66	628							27		513	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			19	1							49	419	40	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-223 441	104	19							5	102	1 504	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-259 934												
B. Forest and Grassland Conversion	7 459		15	1							3	102	11	
C. Abandonment of Managed Lands	-	-152												
D. CO ₂ Emissions and Removals from Soil	29 484	-												
E. Other	-	-297	89	18							2	0	1 493	0
6. Waste	5 890		6 623	21							53	893	113	21
A. Solid Waste Disposal on Land	321		6 192								0	45	39	0
B. Wastewater Handling			334	18							0	0	5	
C. Waste Incineration	5 568		45	3							53	847	51	21
D. Other	0		52	0							0	1	18	0
7. Other	615	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	156 368		9	4							1 440	262	183	914
Aviation	55 672		4	1							216	155	60	16
Marine	100 696		4	3							1 225	107	122	898
Multilateral Operations	0		0	0							0	0	0	0
CO₂ Emissions from Biomass	125 226													

Notes: In order to obtain a complete EC inventory, the following data gap filling procedure was used for Luxembourg: emissions reported for 1990 were taken as first estimates. However, for CO₂ emissions from fossil fuel combustion (CRF category 1 'Energy'), the 1990 estimates in combination with trend information for 1991 from latest calculations of CO₂ emissions from fossil fuels by Eurostat have been used (Eurostat, 2000).

Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA Technical Report No 75/2002.

Table 22

EU-15 1992

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
					P	A	P	A	P	A				
		(Gg)				CO ₂ equivalent (Gg)				(Gg)				
Total National Emissions and Removals	3 290 290	-208 927	19 289	1 248	-	24 806	-	9 788	-	0,4	12 977	46 474	15 187	13 652
1. Energy	3 134 217		4 528	158							12 735	42 387	8 201	13 355
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 110 444		779	158							12 709	42 241	6 915	13 052
1. Energy Industries	1 116 445		40	47							2 635	461	60	8 805
2. Manufacturing Industries and Construction	601 231		53	30							1 621	3 751	137	2 408
3. Transport	733 572		218	45							7 023	30 534	5 662	623
4. Other Sectors	646 189		467	35							1 350	7 405	1 043	1 025
5. Other	13 007		2	1							80	91	14	192
B. Fugitive Emissions from Fuels	23 773		3 748	0							26	146	1 286	303
1. Solid Fuels	8 357		2 213	0							0	85	10	18
2. Oil and Natural Gas	15 416		1 535	0							26	61	1 276	285
2. Industrial Processes	141 609		26	324	-	24 806	-	9 788	-	0,4	111	2 754	972	275
A. Mineral Products	105 033		1	0							14	26	247	56
B. Chemical Industry	11 550		16	324	-	2 340	-	70	-	0,0	52	82	353	115
C. Metal Production	21 221		6	0				8 231		0,1	18	2 532	18	54
D. Other Production	1 422										15	13	240	32
E. Production of Halocarbons and SF ₆						21 559		380		0,0				
F. Consumption of Halocarbons and SF ₆					-	547	-	901	-	0,3				
G. Other	2 383		4	0	-	0	-	0	-	0,0	13	101	115	19
3. Solvent and Other Product Use	5 461			11							0	2	3 947	0
4. Agriculture	2 321	0	8 263	712							72	333	514	0
A. Enteric Fermentation			6 542											
B. Manure Management			1 534	101									1	
C. Rice Cultivation			106	0									0	
D. Agricultural Soils	2 321	0	66	610							26		483	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			15	1							46	333	31	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-208 927	112	19							7	173	1 439	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-247 539												
B. Forest and Grassland Conversion	9 329		23	1							5	173	12	
C. Abandonment of Managed Lands	-	-167												
D. CO ₂ Emissions and Removals from Soil	29 758	-												
E. Other	-	-308	90	18							2	0	1 427	0
6. Waste	6 075		6 359	21							51	825	114	21
A. Solid Waste Disposal on Land	369		5 936								0	48	41	0
B. Wastewater Handling			325	18							0	0	5	
C. Waste Incineration	5 706		43	3							51	776	48	21
D. Other	0		55	0							0	1	20	0
7. Other	608	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	160 625		9	4							1 472	273	186	889
Aviation	60 102		4	1							236	168	66	18
Marine	100 524		4	3							1 237	106	120	871
Multilateral Operations	0		0	0							0	0	0	0
CO ₂ Emissions from Biomass	123 678													

Notes: In order to obtain a complete EC inventory, the following data gap filling procedure was used for Luxembourg: emissions reported for 1990 were taken as first estimates. However, for CO₂ emissions from fossil fuel combustion (CRF category 1 'Energy'), the 1990 estimates in combination with trend information for 1992 from latest calculations of CO₂ emissions from fossil fuels by Eurostat have been used (Eurostat, 2000).

Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

EU-15 1993

Table 23

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NM VOC	SO ₂
					P	A	P	A	P	A				
	(Gg)				CO ₂ equivalent (Gg)				(Gg)					
Total National Emissions and Removals	3 223 445	-219 669	18 736	1 212	-	27 250	-	8 403	-	0	12 341	44 154	14 540	12 429
1. Energy	3 073 699		4 289	158							12 116	40 410	7 770	12 157
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 050 317		762	158							12 089	40 286	6 573	11 832
1. Energy Industries	1 059 905		42	45							2 382	443	58	7 892
2. Manufacturing Industries and Construction	579 877		52	28							1 526	3 670	128	2 171
3. Transport	738 008		210	49							6 765	28 881	5 352	638
4. Other Sectors	658 456		457	35							1 340	7 210	1 022	957
5. Other	14 070		1	1							77	82	13	173
B. Fugitive Emissions from Fuels	23 382		3 527	0							27	124	1 197	326
1. Solid Fuels	7 700		1 985	0							1	74	8	18
2. Oil and Natural Gas	15 683		1 542	0							27	50	1 188	308
2. Industrial Processes	135 694		26	302	-	27 250	-	8 403	-	0	101	2 585	964	251
A. Mineral Products	100 403		1	0							13	25	263	50
B. Chemical Industry	10 487		14	302	-	2 340	-	70	-	0	42	79	345	102
C. Metal Production	21 669		6	0				6 758		0	18	2 369	17	52
D. Other Production	1 246										15	13	239	30
E. Production of Halocarbons and SF ₆						22 480		281		0				
F. Consumption of Halocarbons and SF ₆					-	2 075	-	1 091	-	0				
G. Other	1 889		5	0	-	0	-	0	-	0	13	99	100	17
3. Solvent and Other Product Use	5 075			11							0	2	3 860	0
4. Agriculture	2 230	0	8 205	697							65	171	462	0
A. Enteric Fermentation			6 490											
B. Manure Management			1 536	97									1	
C. Rice Cultivation			106										0	
D. Agricultural Soils	2 230	0	66	598							25		450	
E. Prescribed burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			8	1							41	171	11	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-219 669	110	19							7	177	1 370	1
A. Changes in Forest and Other Woody Biomass Stocks	-	-256 550												
B. Forest and Grassland Conversion	8 830		20	1							5	177	16	1
C. Abandonment of Managed Lands	-	-180												
D. CO ₂ Emissions and Removals from Soil	28 550	-												
E. Other	-	-319	90	18							2	0	1 353	0
6. Waste	6 191		6 104	21							51	809	115	20
A. Solid Waste Disposal on Land	357		5 686								0	47	41	0
B. Wastewater Handling			317	18							0	0	5	
C. Waste Incineration	5 834		43	3							50	761	47	20
D. Other	0		58	0							0	1	21	0
7. Other	556	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	171 238		9	4							1 548	296	189	959
Aviation	67 305		4	2							268	180	70	18
Marine	103 933		4	3							1 280	116	119	940
Multilateral Operations	0		0	0							0	0	0	0
CO₂ Emissions from Biomass	127 921													

Notes: In order to obtain a complete EC inventory, the following data gap filling procedure was used for Luxembourg: emissions reported for 1990 were taken as first estimates. However, for CO₂ emissions from fossil fuel combustion (CRF category 1 'Energy'), the 1990 estimates in combination with trend information for 1993 from latest calculations of CO₂ emissions from fossil fuels by Eurostat have been used (Eurostat, 2000).

Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

Table 24

EU-15 1994

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
					P	A	P	A	P	A				
		(Gg)				CO ₂ equivalent (Gg)				(Gg)				
Total National Emissions and Removals	3 232 829	-207 335	18 242	1 228	-	31 815	-	7 717	-	0	11 951	42 041	14 376	11 277
1. Energy	3 076 539		3 849	163							11 738	38 128	7 424	11 012
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 051 119		717	162							11 712	37 993	6 233	10 721
1. Energy Industries	1 065 962		48	46							2 276	460	67	7 088
2. Manufacturing Industries and Construction	598 780		54	29							1 506	3 710	127	1 995
3. Transport	745 853		202	53							6 551	27 032	5 071	661
4. Other Sectors	627 881		412	33							1 305	6 711	956	803
5. Other	12 643		1	1							74	79	13	174
B. Fugitive Emissions from Fuels	25 420		3 133	1							26	135	1 190	291
1. Solid Fuels	7 246		1 609	0							1	78	7	15
2. Oil and Natural Gas	18 174		1 523	1							25	57	1 183	276
2. Industrial Processes	142 319		29	312	-	31 815	-	7 717	-	0	94	2 814	939	245
A. Mineral Products	104 386		1	0							13	25	244	51
B. Chemical Industry	10 560		16	311	-	2 340	-	20	-	0	37	80	344	99
C. Metal Production	22 523		7	0				5 902		0	18	2 582	16	54
D. Other Production	1 228										16	12	247	25
E. Production of Halocarbons and SF ₆						25 738		228		0				
F. Consumption of Halocarbons and SF ₆					-	3 109	-	1 355	-	0				
G. Other	3 622		6	0	-	0	-	0	-	0	11	115	89	16
3. Solvent and Other Product Use	5 034			11							0	2	3 856	0
4. Agriculture	2 069	0	8 222	699							63	170	503	0
A. Enteric Fermentation			6 492											
B. Manure Management			1 542	97									1	
C. Rice Cultivation			115	0									0	
D. Agricultural Soils	2 069	0	65	601							23		492	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			8	1							40	170	10	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-207 335	108	19							6	143	1 541	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-243 275												
B. Forest and Grassland Conversion	8 584		19	1							4	143	13	
C. Abandonment of Managed Lands	-	-190												
D. CO ₂ Emissions and Removals from Soil	27 757	-												
E. Other	-	-211	89	18							2	0	1 528	0
6. Waste	6 176		6 031	21							50	784	114	19
A. Solid Waste Disposal on Land	290		5 612								0	41	40	0
B. Wastewater Handling			317	18							0	0	5	
C. Waste Incineration	5 886		42	3							50	741	46	19
D. Other	0		61	0							0	1	24	0
7. Other	692	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	169 495		9	4							1 507	297	181	908
Aviation	68 334		5	2							271	185	73	19
Marine	101 161		4	2							1 236	113	108	889
Multilateral Operations	0		0	0							0	0	0	0
CO ₂ Emissions from Biomass	128 478													

Note: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

EU-15 1995

Table 25

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
					P	A	P	A	P	A				
	(Gg)				CO ₂ equivalent (Gg)						(Gg)			
Total National Emissions and Removals	3 270 286	-198 149	18 138	1 228	-	35 830	-	7 765	-	1	11 567	40 490	13 043	10 198
1. Energy	3 111 262		3 811	167							11 363	36 527	7 085	9 939
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 088 442		680	167							11 334	36 399	5 949	9 661
1. Energy Industries	1 072 576		56	46							2 182	444	64	6 350
2. Manufacturing Industries and Construction	616 996		55	31							1 490	3 630	125	1 966
3. Transport	752 232		197	58							6 275	25 939	4 808	557
4. Other Sectors	635 873		371	31							1 314	6 310	940	623
5. Other	10 766		1	1							74	76	13	165
B. Fugitive Emissions from Fuels	22 821		3 130	0							28	127	1 136	278
1. Solid Fuels	7 122		1 681	0							1	82	7	11
2. Oil and Natural Gas	15 698		1 449	0							27	45	1 129	267
2. Industrial Processes	145 788		25	305	-	35 830	-	7 765	-	1	84	2 918	933	241
A. Mineral Products	105 298		1	0							13	24	255	60
B. Chemical Industry	11 032		17	305	-	1 170	-	0	-	0	36	84	378	106
C. Metal Production	24 714		6	0				5 793		0	18	2 797	19	50
D. Other Production	1 212										16	13	254	24
E. Production of Halocarbons and SF ₆						28 152		175		0				
F. Consumption of Halocarbons and SF ₆					-	5 576	-	1 525	-	0				
G. Other	3 532		0	0	-	0	-	0	-	0	0	1	26	1
3. Solvent and Other Product Use	5 053			11							0	2	3 779	0
4. Agriculture	1 726	0	8 222	701							63	160	502	0
A. Enteric Fermentation			6 487											
B. Manure Management			1 550	96									1	
C. Rice Cultivation			114										0	
D. Agricultural Soils	1 726	0	65	603							25		492	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			7	1							39	160	9	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-198 149	105	19							5	108	630	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-233 391												
B. Forest and Grassland Conversion	7 970		16	1							3	108	11	
C. Abandonment of Managed Lands	-	-196												
D. CO ₂ Emissions and Removals from Soil	27 619	-												
E. Other	-	-150	89	18							2	0	619	0
6. Waste	5757		5 973	21							51	775	114	18
A. Solid Waste Disposal on Land	124		5 548									28	37	
B. Wastewater Handling			317	19							0	0	5	
C. Waste Incineration	5 518		42	3							51	747	45	18
D. Other	115		66	0							0	0	27	1
7. Other	699	0	2	4	0	0	0	0	0	0	0	0	1	0
Memo Items:														
International Bunkers	173 310		9	4							1 537	307	183	935
Aviation	70 934		5	2							284	190	72	16
Marine	102 375		4	2							1 253	117	111	919
Multilateral Operations	0		0	0							0	0	0	0
CO₂ Emissions from Biomass	134 391													

Note: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

Table 26

EU-15 1996

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
					P	A	P	A	P	A				
		(Gg)				CO ₂ equivalent (Gg)				(Gg)				
Total National Emissions and Removals	3 340 775	-206 919	17 808	1 259	-	39 974	-	7 754	-	1	11 360	39 029	13 525	8 885
1. Energy	3 184 876		3 680	171							11 142	35 293	6 914	8 623
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 161 380		704	170							11 115	35 164	5 787	8 358
1. Energy Industries	1 082 515		64	47							2 111	483	69	5 420
2. Manufacturing Industries and Construction	603 417		54	28							1 464	3 416	125	1 698
3. Transport	767 183		196	62							6 093	24 662	4 578	470
4. Other Sectors	697 624		390	32							1 380	6 540	1 004	606
5. Other	10 641		1	1							67	62	10	166
B. Fugitive Emissions from Fuels	23 496		2 976	0							27	128	1 128	265
1. Solid Fuels	7 356		1 505	0							1	83	7	12
2. Oil and Natural Gas	16 140		1 470	0							26	45	1 121	253
2. Industrial Processes	142 269		28	324	-	39 974	-	7 754	-	1	97	2 683	918	246
A. Mineral Products	102 618		1	0							13	23	221	62
B. Chemical Industry	11 366		20	323	-	0	-	0	-	0	43	116	377	99
C. Metal Production	23 670		6	0				5 694		0	25	2 525	19	60
D. Other Production	1 270										15	13	250	24
E. Production of Halocarbons and SF ₆						30 264		175		0				
F. Consumption of Halocarbons and SF ₆					-	8 922	-	1 709	-	0				
G. Other	3 345		0	0	-	0	-	0	-	0	0	5	52	1
3. Solvent and Other Product Use	5 069			11							0	2	3 710	0
4. Agriculture	1 825	0	8 263	710							65	173	462	0
A. Enteric Fermentation			6 519											
B. Manure Management			1 550	97									1	
C. Rice Cultivation			121	0									0	
D. Agricultural Soils	1 825	0	65	612							24		451	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			8	1							41	173	11	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-206 919	106	19							5	102	1 403	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-242 555												
B. Forest and Grassland Conversion	7 989		16	1							3	102	10	
C. Abandonment of Managed Lands	-	-199												
D. CO ₂ Emissions and Removals from Soil	28 077	-												
E. Other	-	-231	90	18							2	0	1 393	0
6. Waste	6 038		5 729	21							50	777	116	16
A. Solid Waste Disposal on Land	82		5 295									24	36	
B. Wastewater Handling			320	19							0	0	5	
C. Waste Incineration	5 956		42	3							50	753	47	16
D. Other	0		73	0							0	0	29	0
7. Other	698	0	2	4	0	0	0	0	0	0	0	0	1	0
Memo Items:														
International Bunkers	185 379		10	4							1 630	316	194	989
Aviation	75 473		5	2							299	198	76	16
Marine	109 905		4	3							1 331	118	118	973
Multilateral Operations	0		0	0							0	0	0	0
CO ₂ Emissions from Biomass	140 777													

Note: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

EU-15 1997

Table 27

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NM VOC	SO ₂
					P	A	P	A	P	A				
	(Gg)				CO ₂ equivalent (Gg)						(Gg)			
Total National Emissions and Removals	3 280 294	-207 107	17 321	1 256	-	47 141	-	7 505	-	1	10 896	37 423	13 336	8 071
1. Energy	3 121 403		3 481	174							10 677	33 406	6 583	7 803
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 097 815		674	174							10 650	33 283	5 463	7 546
1. Energy Industries	1 045 861		64	46							1 944	400	63	4 897
2. Manufacturing Industries and Construction	613 732		54	30							1 473	3 467	125	1 606
3. Transport	777 733		184	66							5 832	22 940	4 296	316
4. Other Sectors	651 076		371	31							1 335	6 415	969	546
5. Other	9 414		1	1							66	62	10	180
B. Fugitive Emissions from Fuels	23 588		2 807	0							26	123	1 120	257
1. Solid Fuels	8 073		1 405	0							1	83	7	9
2. Oil and Natural Gas	15 515		1 402	0							25	41	1 114	248
2. Industrial Processes	145 533		24	315	-	47 141	-	7 505	-	1	95	2 891	984	254
A. Mineral Products	105 896		1	0							11	22	287	64
B. Chemical Industry	11 111		17	315	-	0	-	0	-	0	33	82	354	95
C. Metal Production	24 062		6	0				5 466		0	19	2 634	17	55
D. Other Production	1 185										16	14	254	24
E. Production of Halocarbons and SF ₆						33 282		175		0				
F. Consumption of Halocarbons and SF ₆					-	12 705	-	1 680	-	0				
G. Other	3 284		0	0	-	0	-	0	-	0	15	140	72	16
3. Solvent and Other Product Use	5 141			11							0	2	3 713	0
4. Agriculture	2 065	0	8 203	712							67	160	451	0
A. Enteric Fermentation			6 436											
B. Manure Management			1 575	96									1	
C. Rice Cultivation			121	0									0	
D. Agricultural Soils	2 065	0	65	615							24		441	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			7	1							43	160	9	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-207 107	106	19							6	120	1 491	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-243 855												
B. Forest and Grassland Conversion	8 102		16	1							3	120	13	
C. Abandonment of Managed Lands	-	-201												
D. CO ₂ Emissions and Removals from Soil	29 133	-												
E. Other	-	-285	90	18							2	0	1 478	0
6. Waste	5 594		5 505	21							52	844	116	14
A. Solid Waste Disposal on Land	65		5 059									22	33	
B. Wastewater Handling			328	19							0	0	6	
C. Waste Incineration	5 384		45	3							50	821	50	13
D. Other	145		73	0							2	1	27	1
7. Other	558	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	200 982		10	5							1 793	336	210	1 080
Aviation	80 478		6	2							319	212	80	19
Marine	120 505		5	3							1 474	124	130	1 061
Multilateral Operations	0		0	0							0	0	0	0
CO₂ Emissions from Biomass	141 911													

Note: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

Table 28

EU-15 1998

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
					P	A	P	A	P	A				
		(Gg)				CO ₂ equivalent (Gg)				(Gg)				
Total National Emissions and Removals	3 330 477	-197 973	17 039	1 165	-	51 975	-	7 405	-	0	10 556	35 673	12 511	7 665
1. Energy	3 170 616		3 328	172							10 356	31 844	6 080	7 418
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 146 705		673	172							10 329	31 735	5 075	7 147
1. Energy Industries	1 087 327		68	47							1 861	408	65	4 622
2. Manufacturing Industries and Construction	598 785		59	26							1 434	3 308	130	1 430
3. Transport	802 565		178	71							5 654	21 715	3 945	398
4. Other Sectors	649 316		367	28							1 338	6 249	927	512
5. Other	8 712		1	0							43	55	8	185
B. Fugitive Emissions from Fuels	23 911		2 655	0							27	110	1 005	272
1. Solid Fuels	7 970		1 268	0							1	70	6	9
2. Oil and Natural Gas	15 941		1 387	0							26	40	999	262
2. Industrial Processes	146 055		22	226	-	51 975	-	7 405	-	0	79	2 604	924	233
A. Mineral Products	108 432		1	0							12	23	282	60
B. Chemical Industry	11 010		15	226	-	0	-	0	-	0	32	70	331	95
C. Metal Production	22 692		6	0				5 294		0	20	2 497	19	57
D. Other Production	1 202										15	14	268	20
E. Production of Halocarbons and SF ₆						34 188		175		0				
F. Consumption of Halocarbons and SF ₆					-	16 413	-	1 734	-	0				
G. Other	2 724		0	0	-	0	-	0	-	0	0	0	23	0
3. Solvent and Other Product Use	5 194			11							0	2	3 646	0
4. Agriculture	2 031	0	8 184	710							63	158	434	0
A. Enteric Fermentation			6 408											
B. Manure Management			1 589	96									1	
C. Rice Cultivation			115	0									0	
D. Agricultural Soils	2 031	0	64	613							25		423	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			7	1							38	158	9	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-197 973	120	19							9	240	1 311	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-237 380												
B. Forest and Grassland Conversion	11 572		29	1							7	240	14	
C. Abandonment of Managed Lands	-	-202												
D. CO ₂ Emissions and Removals from Soil	28 432	-												
E. Other	-	-396	91	18							2	0	1 298	0
6. Waste	5 861		5 383	22							49	825	116	13
A. Solid Waste Disposal on Land	59		4 928									21	32	
B. Wastewater Handling			335	19							0	0	6	
C. Waste Incineration	5 245		44	3							49	803	50	13
D. Other	557		76	0							0	0	28	1
7. Other	720	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	212 630		11	5							1 768	350	221	1 097
Aviation	86 876		6	2							361	226	84	21
Marine	125 754		5	3							1 407	124	137	1 076
Multilateral Operations	0		0	0							0	0	0	0
CO ₂ Emissions from Biomass	144 357													

Note: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

EU-15 1999

Table 29

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NM VOC	SO ₂
					P	A	P	A	P	A				
	(Gg)				CO ₂ equivalent (Gg)						(Gg)			
Total National Emissions and Removals	3 308 494	-206 134	16 702	1 097	-	40 672	-	7 331	-	0	10 215	33 848	12 103	6 932
1. Energy	3 146 623		3 184	177							10 023	30 302	5 681	6 701
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 122 673		673	177							9 994	30 213	4 775	6 455
1. Energy Industries	1 066 494		76	46							1 758	397	71	4 273
2. Manufacturing Industries and Construction	589 543		60	27							1 414	3 416	130	1 321
3. Transport	823 166		170	75							5 451	20 078	3 626	378
4. Other Sectors	636 026		367	28							1 333	6 277	943	475
5. Other	7 444		1	0							38	45	6	8
B. Fugitive Emissions from Fuels	23 950		2 511	0							28	89	906	246
1. Solid Fuels	8 087		1 141	0							1	54	5	8
2. Oil and Natural Gas	15 863		1 369	0							27	35	900	238
2. Industrial Processes	147 684		22	153	-	40 672	-	7 331	-	0	78	2 418	888	219
A. Mineral Products	109 608		1	0							12	22	285	54
B. Chemical Industry	10 458		14	153	-	0	-	0	-	0	31	61	299	92
C. Metal Production	23 586		6	0				5 146		0	19	2 319	19	54
D. Other Production	1 293										16	13	266	19
E. Production of Halocarbons and SF ₆						18 464		84		0				
F. Consumption of Halocarbons and SF ₆					-	20 652	-	1 911	-	0				
G. Other	2 739		0	0	-	0	-	0	-	0	0	2	20	0
3. Solvent and Other Product Use	5 197			11							0	2	3 610	0
4. Agriculture	2 016	0	8 125	711							56	153	453	0
A. Enteric Fermentation			6 365											
B. Manure Management			1 578	96									1	
C. Rice Cultivation			111	0									0	
D. Agricultural Soils	2 016	0	64	614							26		443	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			7	1							30	153	9	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-206 134	106	19							5	117	1 355	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-241 706												
B. Forest and Grassland Conversion	8 438		16	1							3	117	12	
C. Abandonment of Managed Lands	-	-207												
D. CO ₂ Emissions and Removals from Soil	27 619	-												
E. Other	-	-278	91	18							2	0	1 342	0
6. Waste	6 225		5 263	22							52	856	117	12
A. Solid Waste Disposal on Land	54		4 800									21	31	
B. Wastewater Handling			338	19							0	0	5	
C. Waste Incineration	5 718		45	3							52	835	51	12
D. Other	453		81	0							0	0	30	1
7. Other	750	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	212 127		10	5							1 726	350	220	1 042
Aviation	92 443		5	2							381	236	88	20
Marine	119 683		5	3							1 345	114	132	1 023
Multilateral Operations	0		0	0							0	0	0	0
CO₂ Emissions from Biomass	146 054													

Notes: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

Table 30

EU-15 2000

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO ₂ emissions	CO ₂ removals	CH ₄	N ₂ O	HFCs		PFCs		SF ₆		NO _x	CO	NMVOC	SO ₂
					P	A	P	A	P	A				
		(Gg)				CO ₂ equivalent (Gg)				(Gg)				
Total National Emissions and Removals	3 324 800	-180 681	16 275	1 091	-	47 285	-	6 846	-	0	9 497	30 817	11 562	5 750
1. Energy	3 159 695		2 954	177							9 297	27 455	5 143	5 536
A. Fuel Combustion Reference approach	-													
Sectoral approach	3 136 284		641	177							9 271	27 368	4 273	5 296
1. Energy Industries	1 092 146		79	48							1 608	366	78	3 527
2. Manufacturing Industries and Construction	594 615		63	27							1 163	2 992	110	1 058
3. Transport	822 954		154	77							5 149	17 896	3 178	285
4. Other Sectors	619 478		345	26							1 311	6 061	900	418
5. Other	7 091		1	0							41	53	7	8
B. Fugitive Emissions from Fuels	23 411		2 313	0							26	87	870	240
1. Solid Fuels	8 098		981	0							1	55	6	8
2. Oil and Natural Gas	15 313		1 332	0							25	32	864	232
2. Industrial Processes	150 528		22	150	-	47 285	-	6 846	-	0	80	2 358	910	202
A. Mineral products	111 009		1	0							12	23	298	48
B. Chemical Industry	11 136		14	150	-	0	-	0	-	0	33	59	299	83
C. Metal Production	24 024		6	0				4 613		0	20	2 261	20	53
D. Other Production	1 225										16	14	274	18
E. Production of Halocarbons and SF ₆						17 562		85		0				
F. Consumption of Halocarbons and SF ₆					-	29 723	-	2 148	-	0				
G. Other	3 134		0	0	-	0	-	0	-	0	0	0	18	0
3. Solvent and Other Product Use	5 353			11							0	2	3 619	0
4. Agriculture	2 046	0	8 015	707							64	153	452	0
A. Enteric Fermentation			6 256											
B. Manure Management			1 577	94									1	
C. Rice Cultivation			111	0									0	
D. Agricultural Soils	2 046	0	64	612							26		441	
E. Prescribed Burning of Savannas			0	0							0	0	0	
F. Field Burning of Agricultural Residues			7	1							38	153	10	0
G. Other			0	0							0	0	0	0
5. Land-Use Change and Forestry	-	-180 681	122	19							5	94	1 325	0
A. Changes in Forest and Other Woody Biomass Stocks	-	-220 739												
B. Forest and Grassland Conversion	12 108		31	1							3	94	0	
C. Abandonment of Managed Lands	-	-208												
D. CO ₂ Emissions and Removals from Soil	28 442	-												
E. Other	-	-284	91	18							2	0	1 325	0
6. Waste	6 447		5 161	22							49	755	113	13
A. Solid Waste Disposal on Land	32		4 697									19	30	
B. Wastewater Handling			337	19							0	0	5	
C. Waste Incineration	5 962		43	3							49	736	47	12
D. Other	453		84	0							0	0	32	1
7. Other	730	0	2	4	0	0	0	0	0	0	0	0	0	0
Memo Items:														
International Bunkers	232 247		11	5							1 902	368	235	1 111
Aviation	103 156		5	2							408	247	94	21
Marine	129 092		6	3							1 494	120	141	1 090
Multilateral Operations	0		0	0							0	0	0	0
CO ₂ Emissions from Biomass	143 768													

Notes: Category 5 'Land-use change and forestry' provides 'net' emissions (Member States' emissions minus Member States' removals) of CO₂ following CRF recommendations.

Source: EC submission to the UNFCCC Secretariat's *Annual EC greenhouse gas inventory 1990–2000*, EEA technical report No 75/2002.

Anthropogenic annual emissions of heavy metals, 1990–2000

Party: European Community. Sector: All sectors

Table 31

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Lead (Pb)											
Cadmium (Cd)											
Mercury (Hg)											
Arsenic (As)											
Chromium (Cr)											
Copper (Cu)											
Nickel (Ni)											
Selenium (Se)											
Zinc (Zn)											

Pb, Cd and Hg are the heavy metals referred to in Article 3, paragraph 1, and in Annex I to the 1998 Protocol on Heavy Metals. The rest are to be reported on a voluntary basis.

Units: tonnes per year.

Anthropogenic annual emissions of persistent organic pollutants, 1990–2000

Party: European Community

Table 32

ANNEX I ¹⁾	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Aldrin (CAS: 309-00-2)											
Chlordane (CAS: 57-74-9)											
Chlordecone (CAS: 143-50-0)											
Dieldrin (CAS: 60-57-1)											
Endrin (CAS: 72-20-8)											
Heptachlor (CAS: 76-44-8)											
Hexabromobiphenyl (CAS: 36355-01-8)											
Mirex (CAS: 2385-85-5)											
Toxaphene (CAS: 8001-35-2)											
ANNEX II ²⁾											
Hexachlorocyclohexane (HCH) (CAS: 608-73-1)											
DDT (CAS:50-29-3)***											
Polychlorinated biphenyls (PCBs)****											
ANNEX III ³⁾											
Dioxins & Furans											
Polyaromatic hydrocarbons (PAHs)*											
Hexachlorobenzene (HCB)** (CAS: 118-74-1)											
OTHER ⁴⁾											
Pentachlorophenol (PCP) (CAS: 87-86-5)											
Short chained chlorinated paraffins (CAS: 85535-84-8)											

Units in kg per year except for dioxins and furans, which are reported in grams toxic equivalents (Teq) per year (as defined by NATO CCMS international toxic equivalent scheme). For PAHs, units are tonnes per year. Please list PAHs and sources included in this inventory. All air emissions should be reported in this table (e.g. HCB can be used as pesticide but can also be emitted as a by-product of combustion and as a contaminant in other pesticides).

Notes:

- 1) The POPs listed in Annex I to the Protocol on POPs are substances scheduled for elimination.
- 2) The POPs listed in Annex II to the Protocol on POPs are substances scheduled for restriction on use.
 *** DDT is also listed in Annex I.
 **** PCBs are also listed in Annex I.
- 3) The POPs listed in Annex III to the Protocol on POPs are substances referred to in Article 3, paragraph 5(a), of the Protocol.
 * Polycyclic aromatic hydrocarbons (PAHs): For the purposes of the emission inventories, the following four indicator compounds shall be used: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene.
 ** HCB is also included in Annex I to the Protocol as a substance scheduled for elimination.
- 4) See Article 8 of the Protocol (research, development and monitoring; reporting voluntary).

Anthropogenic annual use and production of persistent organic pollutants, 1990–2000

Table 33 Party: European Community

ANNEX I ¹⁾	1990		1991		1992		1993		1994		1995		1996		1997		1998		1999		2000	
	use	prod.	use	prod.	use	prod.	use	prod.	use	prod.	use	prod.	use	prod.	use	prod.	use	prod.	use	prod.	use	prod.
Aldrin (CAS: 309-00-2)																						
Chlordane (CAS: 57-74-9)																						
Chlordecone (CAS: 143-50-0)																						
Dieldrin (CAS: 60-57-1)																						
Endrin (CAS: 72-20-8)																						
Heptachlor (CAS: 76-44-8)																						
Hexabromobiphenyl (CAS: 36355-01-8)																						
Mirex (CAS: 2385-85-5)																						
Toxaphene (CAS: 8001-35-2)																						
ANNEX II ²⁾																						
Hexachlorocyclohexane (HCH) (CAS: 608-73-1)																						
DDT (CAS:50-29-3)***																						
Polychlorinated biphenyls (PCBs)****																						
ANNEX III ³⁾																						
Dioxins & Furans																						
Polycyclic aromatic hydrocarbons (PAHs)*																						
Hexachlorobenzene (HCB)** (CAS: 118-74-1)																						
OTHER ⁴⁾																						
Pentachlorophenol (PCP) (CAS: 87-86-5)																						
Short chained chlorinated paraffins (CAS: 85535-84-8)																						

Units in kg per year except for dioxins and furans, which are reported in grams toxic equivalents (Teq) per year (as defined by NATO CCMS international toxic equivalent scheme). For PAHs, units are tonnes per year. Please list PAHs and sources included in this inventory. State use and/or production with X in the table if exact quantity uncertain.

Notes:

- 1) The POPs listed in Annex I to the Protocol on POPs are substances scheduled for elimination.
- 2) The POPs listed in Annex II to the Protocol on POPs are substances scheduled for restriction on use.
 *** DDT is also listed in Annex I.
 **** PCBs are also listed in Annex I.
- 3) The POPs listed in Annex III to the Protocol on POPs are substances referred to in Article 3, paragraph 5(a), of the Protocol.
 * Polycyclic aromatic hydrocarbons (PAHs): For the purposes of the emission inventories, the following four indicator compounds shall be used: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene.
 ** HCB is also included in Annex I to the Protocol as a substance scheduled for elimination.
- 4) See Article 8 of the Protocol (research, development and monitoring; reporting voluntary).

Annex C — European Community NO_x emissions, 1987–89

— Note to the EC submission to the Executive Body of the UNECE Convention on Long-Range Transboundary Air Pollution

1. The purpose of this annex

As a party to the 1988 NO_x Protocol and in response to the fourth report of the Implementation Committee of UNECE/CLRTAP (EB.AIR/2001/3), in this annex the European Community submits total annual NO_x emissions for 1987–89. Therefore, this note provides supplemental information to the official UNECE/CLRTAP submission of the European Community, *Annual European Community CLRTAP emission inventory 1990–2000*.

The data on NO_x emissions 1987–89 are given in this separate annex because the time series 1987–89 is not entirely consistent with the time series 1990–2000 provided in the submission to the Executive Body of UNECE/CLRTAP. The inconsistencies are due to the lack of consistent Member State data and the subsequent use of different databases:

(1) For the time series 1987–89, data as submitted under the Environmental Information and Observation Network (EIONET) have been used. As no officially agreed data gap filling procedure exists, data gaps were filled by EMEP data and EEA interpolations.

(2) For the time series 1990–2000, data as compiled for the EC UNFCCC submission were used (*Annual European Community greenhouse gas inventory 1990–2000 and inventory report 2002*, EEA technical report No 75, April 2002). The reason for using the EC inventory to UNFCCC is that the data availability is better and that an officially agreed procedure for data gap filling exists. The two time series differ slightly due to different treatment of overseas territories and international bunkers.

2. Data availability

Table 1 shows the data basis for the time series 1987–89 of EC NO_x emissions as of 1

December 2001. For Member States where no data were available under EIONET, EMEP data were used. If no EMEP data were available, data were estimated by the EEA. EEA data estimations were made for Greece (1988–89), Luxembourg (1987–89) and Portugal (1989).

Data availability of NO_x

Table 34

	1987	1988	1989
Austria	√	√	√
Belgium	•	•	•
Denmark	√	√	√
Finland	√	√	√
France	√	√	√
Germany	√	√	√
Greece	E	I	I
Ireland	o	o	o
Italy	•	•	•
Luxembourg	I	I	I
Netherlands	√	√	√
Portugal	E	E	I
Spain	√	√	√
Sweden	√	√	√
United Kingdom	E	E	E

- o submitted for UNECE 1999 (due 31 December 1998) with copy to EEA
- submitted for UNECE 2000 (due 31 December 1999) with copy to EEA
- √ submitted for UNECE 2001 (due 31 December 2000) with copy to EEA
- I EEA interpolation
- E EMEP data (homepage)

3. European Community CLRTAP emission data

Table 2 shows the time series 1987–89 of EC NO_x emissions as of 1 December 2001.

Anthropogenic annual emissions of NO_x, 1987–89, in 1 000 tonnes

Table 35

	1987	1988	1989
EU15	13446	13464	13563

Party: European Community
Sector: All sectors

Note: This time series is based on Member States' UNECE/CLRTAP data and EEA estimates and therefore slightly inconsistent with the time series 1990–2000 provided in the UNECE/CLRTAP submission of the European Community.