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METHODOLOGICAL ISSUES

GREENHOUSE GAS INVENTORIES

Report on the national greenhouse gas inventory data from Annex I Parties for the period 1990–2001

Note by the secretariat*

Summary

The quality and timing of submissions of greenhouse gas (GHG) inventories by Annex I Parties has improved. However, several Parties have not provided an inventory in 2003, and other Parties have made submissions that were late and/or incomplete. Although the data are preliminary, they indicate that total aggregate GHG emissions for Annex I Parties as a whole have declined by 6.6 per cent between 1990 and 2001; total aggregate emissions for Parties with economies in transition have decreased by 40 per cent; and emissions from Annex II Parties as a whole have increased by 7.5 per cent. The Conference of the Parties and Subsidiary Body for Scientific and Technological Advice may wish to consider the information contained in this document and provide guidance to the Parties and secretariat, as appropriate.

* In an effort to include information from the latest submissions of Parties, this document has been submitted later than originally expected.

CONTENTS

I. INTRODUCTION

A. Mandate

1. The Conference of the Parties (COP), by its decisions 9/CP.2 and 3/CP.5, requested Parties included in Annex I to the Convention (Annex I Parties) to submit national inventory data on emissions from sources and removals by sinks by 15 April of each year. Decision 19/CP.8 requested the secretariat to prepare an annual report on the greenhouse gas (GHG) inventory data submitted by Annex I Parties for consideration by the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the COP.[1]

B. Scope of the note

2. This note presents the latest available data on GHG emissions and removals from 40 Annex I Parties for the period 1990–2001, including changes in estimates from previous submissions. The document also shows the status of reporting of annual GHG emission inventories, highlighting the timeliness of reporting and completeness of the data reported. More detailed data, complementing this document, will be published on the secretariat web site (FCCC/WEB/2003/3) before COP 9.

3. The information on the status of reporting as contained in chapter II is based on reports received as of 6 October 2003. The data presented in chapters III and IV are only those data received as of 1 September, due to the complexity of importing, consistency checking, consulting with Parties and re-importing data.[2] For analytical purposes, where data are not available, the secretariat has carried forward the latest reported data. The trends identified in chapter III should be thus be considered preliminary.

C. Possible action by the Conference of the Parties and the Subsidiary Body for Scientific and Technological Advice

4. The COP and SBSTA may wish to take note of the information contained in this document and provide guidance to the Parties and secretariat, as appropriate.

II. STATUS OF REPORTING

5. The UNFCCC reporting guidelines on annual inventories require Annex I Parties to submit a national inventory report (NIR) and the tables of the common reporting format (CRF), covering data from the base year to the last but one year before the year of submission.[3] As table 1 shows, 36 Annex I Parties[4] submitted an annual inventory submission in 2003. Of these, 23 Parties provided their submission by the due date of 15 April, 18 reported for all years using the tables of the CRF and 30 submitted an NIR. Four Parties have not reported national GHG inventories in 2003 (see table 3).

6. In processing the inventory submissions the secretariat performed data consistency checks on the information contained in the CRF tables and reported possible inconsistencies to the respective Parties within the time period stipulated in decision 19/CP.8. As a result, 20 Parties submitted a revised version of their inventory, correcting data inconsistencies.

[1] For the full text of the technical review guidelines adopted by decision 19/CP.8, see document FCCC/CP/2002/8

[2] The latest inventory data from Australia, Belarus, France (version 2) and Hungary (version 2) are not included in the tables and figures of chapters III and IV because they were received after 1 September 2003. The resubmission of Hungary (version 2) provided updated data for its base year.

[3] For the full text of the "UNFCCC reporting guidelines on annual inventories", including the tables of the CRF, see FCCC/CP/1999/7. Revised UNFCCC reporting guidelines on annual inventories were adopted in 2002 by decision 18/CP.8 (FCCC/CP/2002/8), but Parties have not started reporting under these guidelines.

[4] Croatia submitted a report in response to a request by the SBI at its eighteenth session (FCCC/SBI/2003/8, paras. 61–62) that is considered in this document as an NIR.

Table 1. Timing and completeness of 2003 GHG inventory submissions from Annex I Parties

Party	Date[a]	Submission[b]	Years[c]	NIR
Australia	18 September	CRF	1990–2001	✓
Austria	15 April	CRF	1990–2001	✓
Belarus	27 September	CRF	2001	✓[d]
Belgium	15 April	CRF	1990–2001	✓
Bulgaria	23 May	CRF	2000 and 2001	✓
Canada	15 April	CRF	1990–2001	✓
Croatia	6 October	Non-CRF tables included in NIR	1990–2001	✓
Czech Republic	15 April	CRF	1994, 2001	✓
Denmark	15 April	CRF	1990–2001	✓
Estonia	14 April	CRF	2001	
European Community	15 April	Only CRF summary and trend tables[e]	1990–2001	✓
Finland	4 April	CRF	1990–2001	✓
France	31 March	CRF	1990–2001	✓
Germany	14 April	Only CRF summary and trend tables	1990–2001	✓
Greece	24 April	CRF	2001	
Hungary	14 August	CRF	1985-1987, 1990, 2000-2001	✓
Iceland	5 May	CRF	2001	
Ireland	15 April	CRF	1990–2001	✓
Italy	15 April	CRF	2001	✓
Japan	25 August	CRF	1990–2001	✓
Latvia	15 April	CRF	1990–2001	✓
Luxembourg	15 April	Only CRF summary tables, table 7	2001	
Monaco	4 August	CRF	2001	
Netherlands	14 April	CRF	1990–2001	✓
New Zealand	15 April	CRF	2001	✓
Norway	5 May	CRF	1990, 1998–2001	✓
Poland	15 April	CRF	2001	✓
Portugal	9 April	CRF	1990–2001	✓
Romania	14 May	CRF	2001	✓
Slovakia	16 April	CRF	2000, 2001	✓
Slovenia	15 April	IPCC summary and sectoral tables	1986, 1990–1996	✓
Spain	29 April	CRF	1990–2001	✓
Sweden	15 April	CRF	1990–2001	✓
Switzerland	15 April	CRF	1990, 2001	
United Kingdom of Great Britain and Northern Ireland	14 April	CRF	1990–2001	✓
United States of America	11 April	CRF	1990–2001	✓

[a] The annual submission due date is 15 April. In some cases, the submission received by the date indicated in this column does not include the NIR (see table 3).

[b] CRF indicates that for each year reported by the Party most of the CRF tables were provided. For more details on the provision of specific CRF tables and the completeness of submissions refer to the status reports of 2003 submissions available on the secretariat web site at http://unfccc.int/program/mis/ghg/statrep2003.html

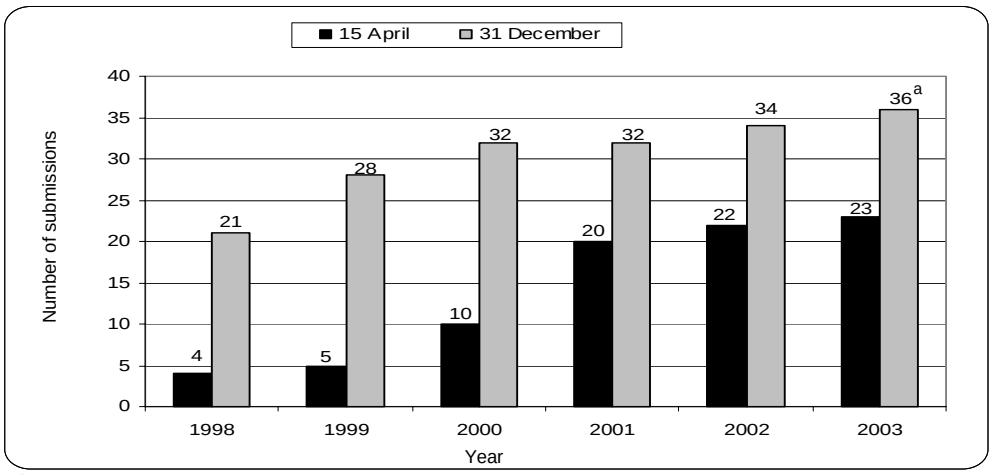
[c] Indicates years for which CRF tables were submitted. The UNFCCC reporting guidelines require the reporting of information on any recalculations of previously submitted estimates. In such instances, Parties should ensure consistency in the estimates over time. Of the Parties that did not report CRF tables for all years, the following provided information on recalculations of estimates: Bulgaria (1990–2000), Czech Republic (1994), Hungary (2000), Italy (explanation of recalculations), New Zealand (1990–2000), Norway (1990, 1998–2000), Slovakia (2000) and Switzerland (1990–2000).

[d] Belarus submitted NIR in Russian language.

[e] The CRF background data tables were reported only with notation keys, and information on the completeness was provided in the NIR.

7. The information provided in figure 1 and table 2 demonstrates that the timing, adherence to deadlines and completeness in reporting have improved steadily and substantially since 1998. However, as shown in table 3, some Parties have not submitted annual GHG inventories at all, and there are delays in submissions, and in some instances incomplete reporting in terms of years covered and CRF tables, as well as no submission of, or delays in submitting, the NIR.

Figure 1. Receipt of GHG inventory submissions from Annex I Parties, 1998–2003



[a] As of 6 October.

Table 2. GHG inventory submissions from Annex I Parties, 2000 and 2003

	Parties	
	2000	**2003[a]**
CRF submissions	24	34
CRF tables for all required years	5	18
Non-CRF submission	8	2
NIR submissions	8	30
No submission provided	7	4

[a] As of 6 October.

8. The most serious gaps in the reporting of the CRF are the absences of the requested tables for all years, in particular for the base year. Some Parties do not report all sectoral background tables, or omit information on the recalculations performed and their underlying reasons. Some Parties have changed methods and have updated data in last reported years, but have not recalculated inventories for all years of the time series and the base year. Some Parties have reported NIRs that are incomplete or not transparent.

Table 3. Reporting problems (as of 6 October 2003)

Problem	Parties
No annual GHG inventory in 2003	Lithuania, Liechtenstein, Russian Federation, Ukraine
Reporting Parties	
No NIR in submissions	Estonia, Greece, Iceland, Luxembourg, Monaco, Switzerland
CRF not submitted within six weeks of the due date of 15 April	Australia, Belarus, Hungary, Japan, Monaco, Croatia
NIR not submitted within six weeks of the due date of 15 April	Australia, Belarus, Croatia, Germany, Hungary, Italy, Japan, Poland, Portugal, Slovakia
No base year information or explanations for changes in base year	Czech Republic, Estonia, Greece, Iceland, Latvia, Luxembourg, Monaco, Poland, Romania, Slovakia
Information provided does not encompass all years	Estonia, Greece, Hungary, Iceland, Italy, Luxembourg, Monaco, New Zealand[a], Norway, Poland, Romania, Slovakia, Slovenia, Switzerland

[a] Party provided information for all years in previous submissions and provided information on recalculations in the latest submissions.

9. The quality of reporting of inventories by Annex I Parties has also continuously improved since the implementation of the annual technical review of GHG inventories under decisions 3/CP.5 and 19/CP.8. The annual reporting and review process has been instrumental in this improvement. Generally those Parties whose inventories have been reviewed earlier and/or more frequently have improved the most. However, more effort will be needed to meet the reporting requirements under the Convention, and in particular under the Kyoto Protocol.

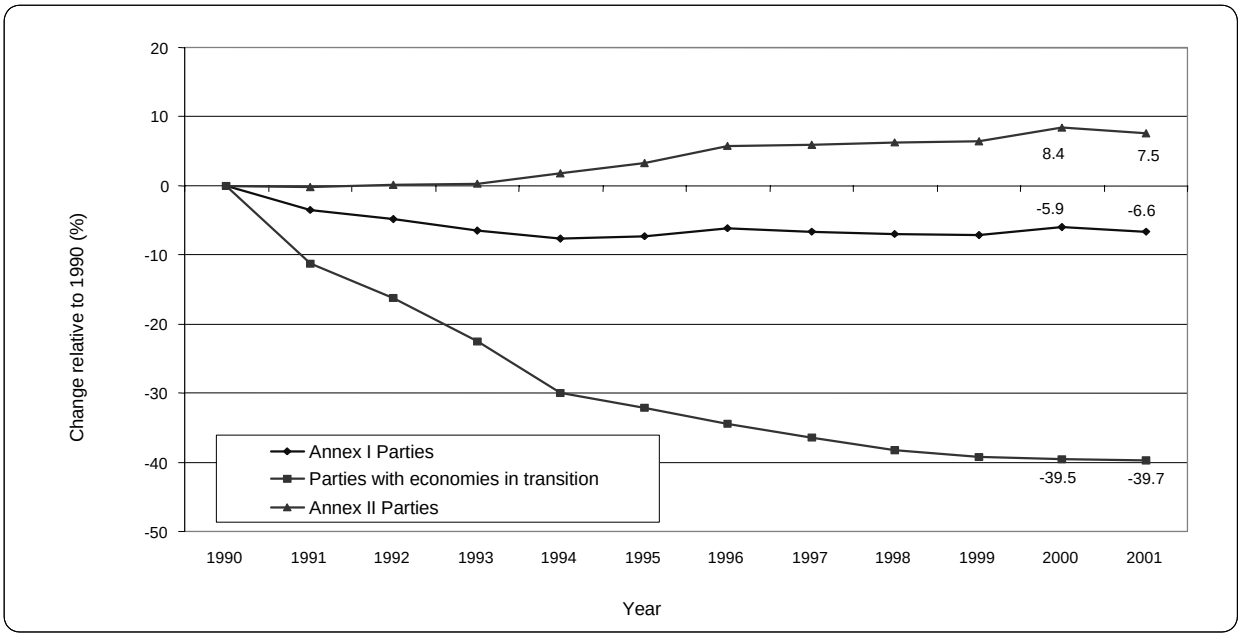
III. OVERVIEW OF EMISSION TRENDS AND SOURCES

10. This document updates information in document FCCC/SBI/2003/7, based on the most recent information provided by Parties in their 2003 inventory submissions. The differences between the present document and document FCCC/SBI/2003/7 are due to the inclusion of new data from more Annex I Parties and the recalculations of earlier estimates.

11. Total aggregate GHG emissions for Annex I Parties as a whole have declined by 6.6 per cent over the period 1990–2001 (figure 2). Total aggregate emissions for the eight Parties with economies in transition (EIT Parties) have decreased by almost 40 per cent, although seven of these Parties reported increasing CO_2 emissions in 2001. Emissions from Annex II Parties as a whole have increased by 7.5 per cent. These aggregate estimates are based on carrying forward the last reported values for those Parties where 2001 data were not reported.

12. Table 4 provides a gas-by-gas presentation of the relative increase or decrease in emissions over the period and tables 5–9 present the trends for aggregate GHG emissions, as well as for emissions of specific gases. Changes in emissions for individual Annex I Parties are shown in figures 3 and 4. Figures 3 and 4, and table 5, show that for a number of Parties the emissions have increased over the period, in some instances following a slight decline initially.

Figure 2. Trends in aggregate GHG emissions, 1990–2001



Note: Data gaps due to incomplete reporting by some Annex I Parties have been filled in using simple interpolation or the latest available data. For this reason, the values presented should be considered as preliminary, but this should not alter the trends presented.

13. Figure 5 presents information on trends in aggregate GHG emissions by sector and trends for Annex I Parties as a whole. With respect to emissions by sectors, domestic transport emissions and emissions from international aviation have increased substantially for most Annex I Parties. For international marine bunker emissions there has been a notable decrease in emissions growth since 1998 for Annex I Parties as a whole due to a large decrease (34 per cent) in marine bunker emissions reported by the United States. Emissions from energy production have increased over the period despite the large decline in this sector in EIT Parties in the earlier 1990s. The decrease of 32 per cent in fugitive fuel emissions for Annex I Parties was influenced by the decline in these emissions from EIT Parties. Agriculture, waste and industrial processes emissions declined over the period, but these rates of decline have slowed.

14. Figure 6 presents information on trends and emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) for Annex I Parties as a whole. Across Parties, the trend in aggregate emissions of HFCs, PFCs and SF_6 varied, with the exception of HFC emissions which increased over the period for most Parties. Annex I Party HFC emissions declined between 1998 and 1999, due to considerable declines in certain HFC emissions from several Parties (e.g. Netherlands 56 per cent HFC-23, United States 24 per cent HFC-23, United Kingdom 59 per cent unspecified HFCs). As a whole, emissions of HFCs have increased by more than 120 per cent since 1990, emissions of PFCs have decreased by 17 per cent, and emissions of SF_6 have decreased 30 per cent, although only fewer than half of the Parties individually reported lower SF_6 emissions.

15. Table 10 presents the trend in emissions and removals from the land-use change and forestry (LUCF) sector as reported by Annex I Parties. Developments in this sector differ across Parties, with 11 Parties reporting a decrease in removals of more than 17 per cent over the period and 17 Parties reporting an increase in removals, or decrease in emissions, of more than 15 per cent. For Annex I Parties as a whole there was an 18 per cent decrease in the level of removals.

Table 4. Percentage change in Annex I Party GHG emissions by gas, 1990–2001

	Decrease			Between +1 % and –1%	Increase		
	>10%	10–5 %	5%		1–5%	5–10%	>10%
GHG (excl. LUCF)	BGR, BLR, CZE, DEU, EST, GBR, HRV, HUN, LTU, LUX, LVA, POL, ROM, RUS, SVK, UKR		ISL SWE EC	CHE, DNK, FRA, LIE, SVN	FIN, NLD	AUT BEL ITA JPN NOR	AUS CAN GRC IRL MCO NZL, PRT, ESP, USA
CO_2	BGR, BLR, CZE,DEU, EST, HRV,HUN, LTU, LUX,LVA, POL, ROM,RUS, SVK, UKR		GBR, SWE	LIE,	CHE EC DNK FRA ISL SVN	BEL, FIN, ITA, JPN	AUS, AUT, CAN, ESP, GRC, IRL, MCO, NLD, NOR, NZL, PRT, USA
CH_4	AUT, BGR, BLR, CHE, CZE, DEU, EST, EC, FIN, GBR, HRV, HUN, JPN, LIE, LTU, LVA, NLD, POL, ROM, RUS, SVK, SWE, UKR	BEL FRA, LUX ISL, ITA SVN, USA	DNK		AUS	IRL NOR NZL PRT	CAN ESP GRC MCO
N_2O	BGR, BLR, CZE, DEU, DNK, EST, EC, FIN, FRA, GBR, HRV, JPN, LTU, LUX, LVA, ROM, RUS, SVK,UKR	ISL SVN SWE	BEL CAN NLD		AUT CHE GRC NOR	IRL ITA POL PRT USA	AUS, ESP HUN LIE MCO NZL

	Decrease	Increase		
	>20 %	2–30 %	31–100 %	>100 %[a]
HFCs, PFCs, SF_6	AUS, GBR, HRV, ISL, NLD, NOR, NZL, SVK	AUT, CAN, DEU, EC, RUS,USA	ESP, FRA, SWE	BEL, BGR, CHE, CZE, DNK, FIN, GRC, HUN, IRL, ITA, , JPN, LVA, LUX, POL, PRT, ROM, SVN

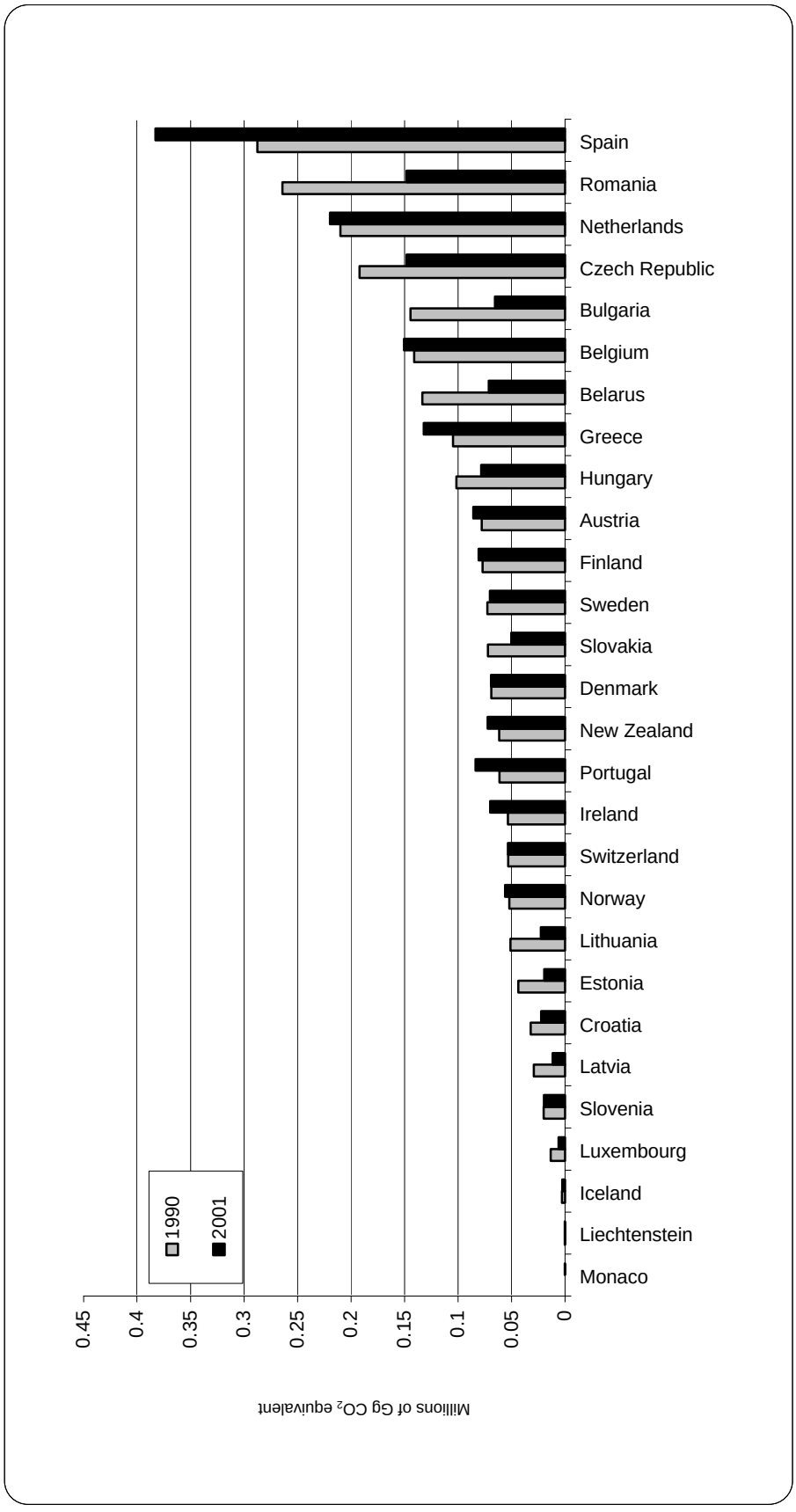
	Decrease			Increase	
	>50	50–21%	20–1%	5–50%	>50%
Net CO_2 emissions from LUCF	AUS, BGR, CZE, GBR, ISL, IRL, NOR, POL, PRT, ROM, RUS ,SVK, SVN, SWE	BLR, HUN, UKR	BEL, DNK, EC, FRA, JPN, LTU, NZL	AUT, DEU, FIN, ITA, USA	CAN, CHE, EST, GRC, LVA,

Note: Changes are with respect to 2001 or the most recent year for which data were available (see tables 5–9).

AUS (Australia), AUT (Austria), BLR (Belarus), BEL (Belgium), BGR (Bulgaria), CAN (Canada), HRV (Croatia), CZE (Czech Republic), DNK (Denmark), EST (Estonia), EC (European Community), FIN (Finland), FRA (France), DEU (Germany), GRC (Greece), HUN (Hungary), ISL (Iceland), IRL (Ireland), ITA (Italy), JPN (Japan), LVA (Latvia), LIE (Liechtenstein), LTU (Lithuania), LUX (Luxembourg), MCO (Monaco), NLD (Netherlands), NZL (New Zealand), NOR (Norway), POL (Poland), PRT (Portugal), ROM (Romania), RUS (Russian Federation), SVK (Slovakia), SVN (Slovenia), ESP (Spain), SWE (Sweden), CHE (Switzerland), UKR (Ukraine), GBR (United Kingdom of Great Britain and Northern Ireland), USA (United States of America)

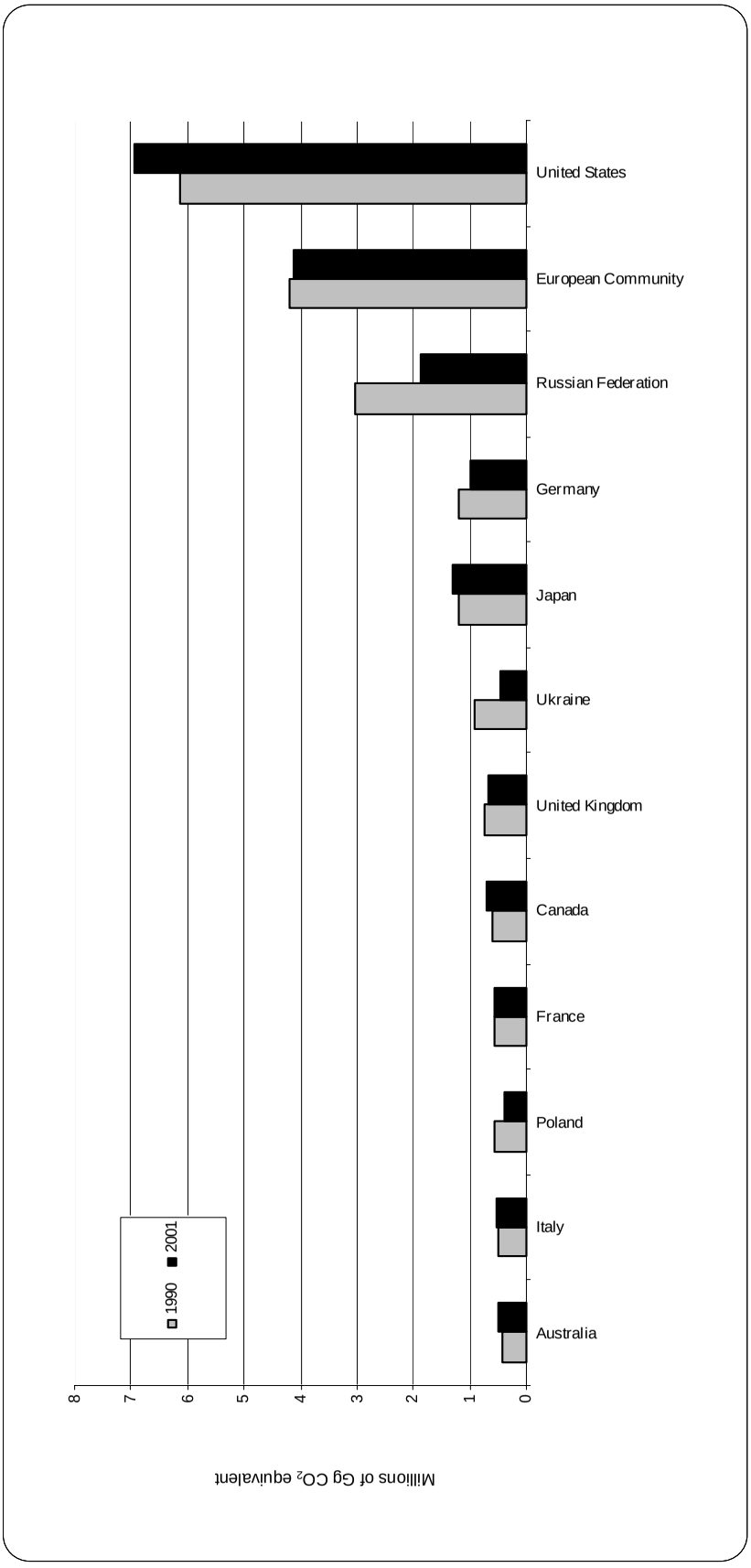
[a] Includes Parties that did not report emissions of these gases for 1990, but reported emissions for later years.

Figure 3. a. Total aggregate GHG emissions of individual Annex I Parties, 1990 and 2001



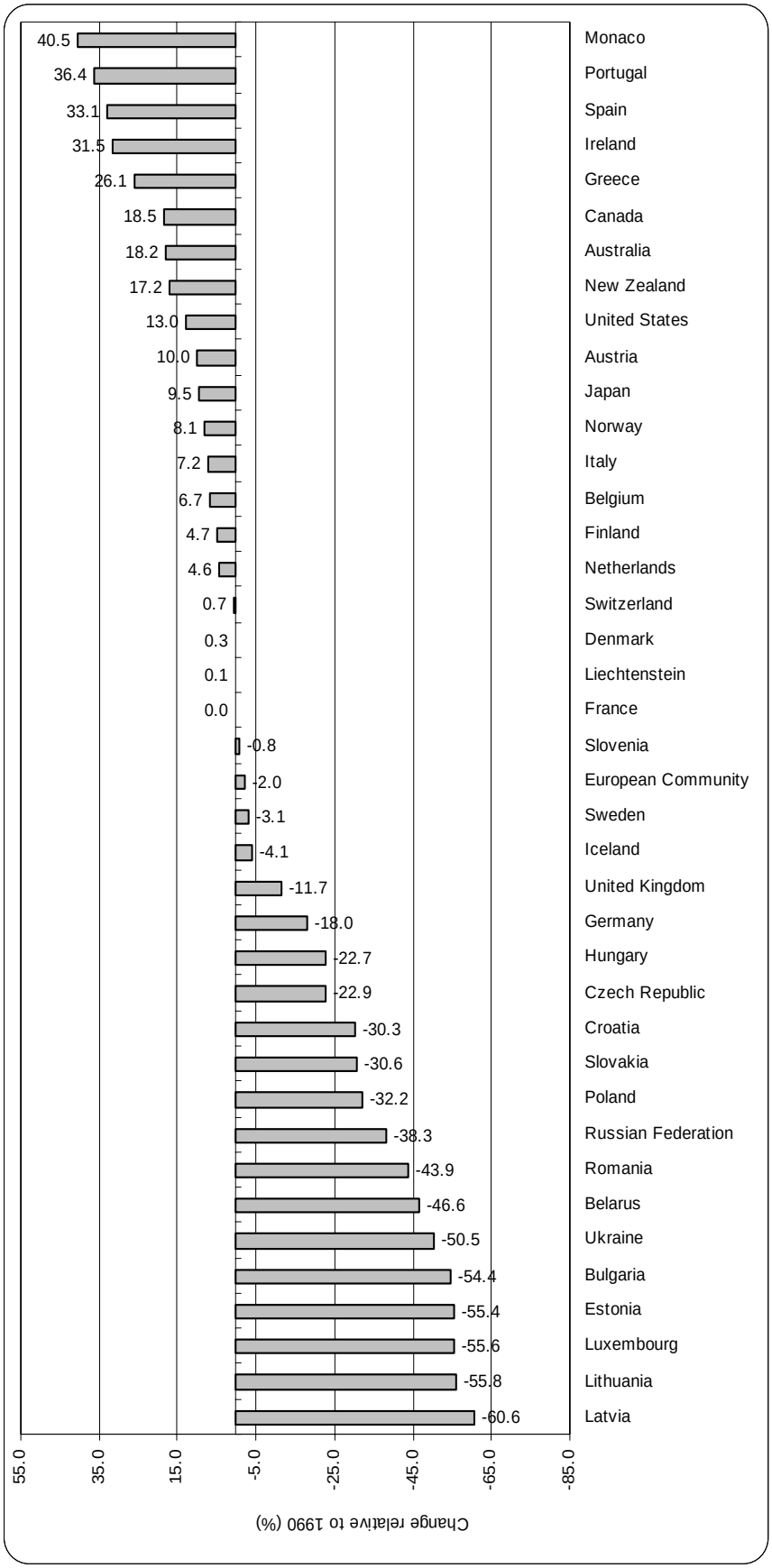
Note: The 2001 values are for 2001 or the most recent year for which data were available (see table 5).

Figure 3.b. Total aggregate GHG emissions of individual Annex I Parties, 1990 and 2001



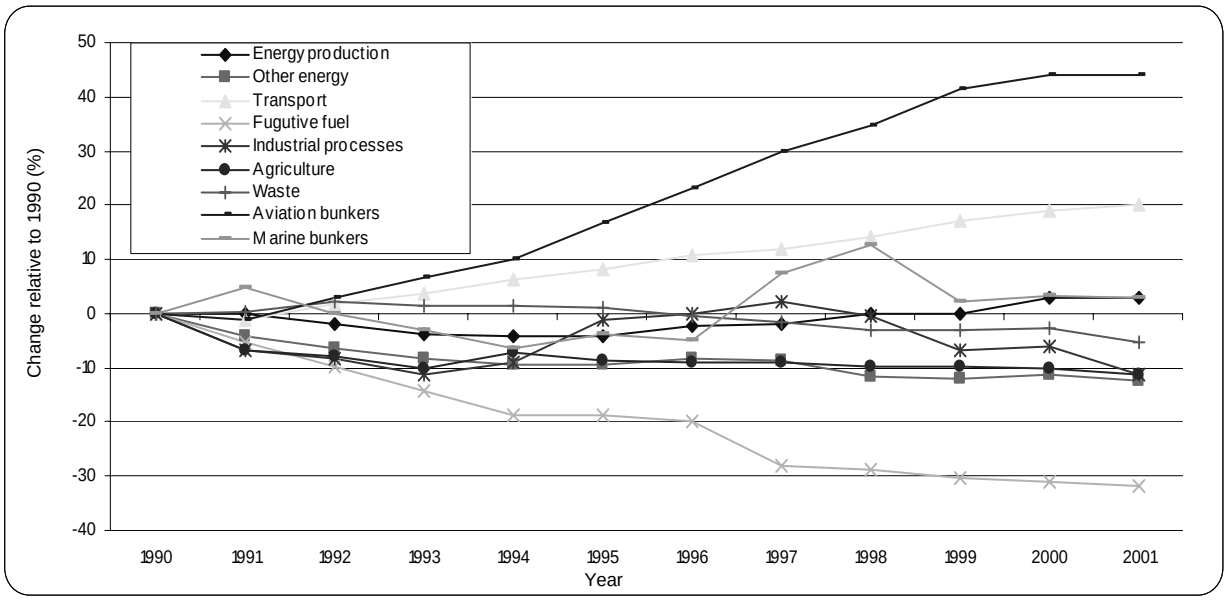
Note: The 2001 values are for 2001 or the most recent year for which data were available (see table 5).

Figure 4. Total aggregate GHG emissions of individual Annex I Parties, 1990–2001



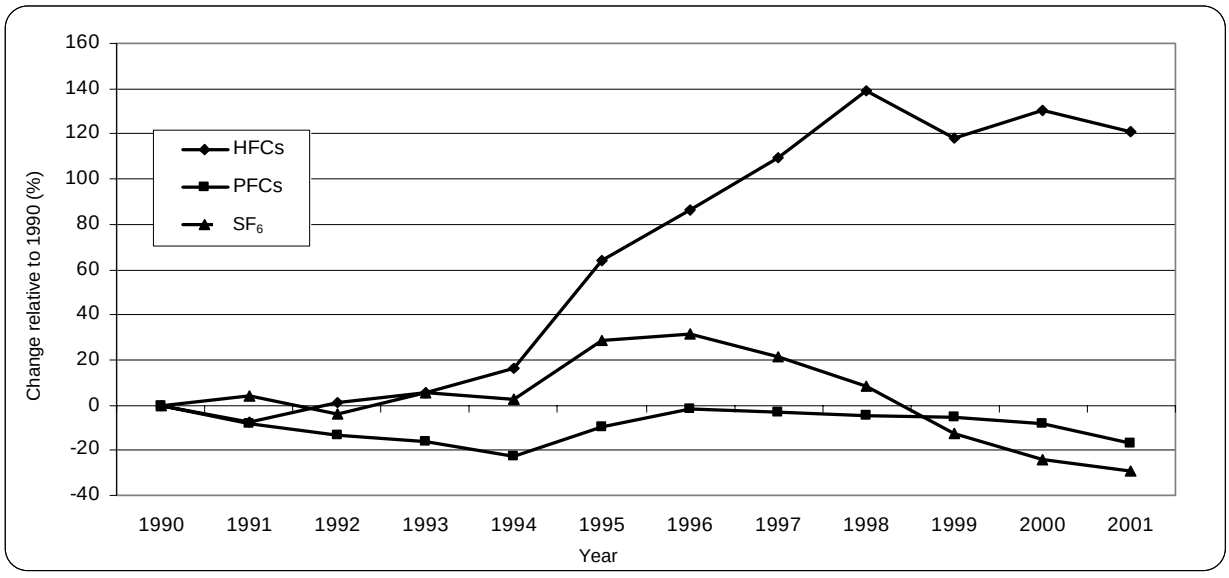
Note: The changes are with respect to 2001 or the most recent year for which data were available (see table 5).

Figure 5. Trends in Annex I Party GHG emissions by sector, 1990–2001



Note: Data gaps due to incomplete reporting by some Annex I Parties have been filled in using simple interpolation or the latest available data. For this reason, the values presented should be considered as preliminary, but this should not alter the trends presented.

Figure 6. Trends in Annex I Party emissions of HFCs, PFCs and SF_6, 1990–2001



Note: Data gaps due to incomplete reporting by some Annex I Parties have been filled in using simple interpolation or the latest available data. For this reason, the values presented should be considered as preliminary, but this should not alter the trends presented.

Table 5. Aggregate anthropogenic emissions of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, 1990 and 1995–2001, excluding CO_2 emissions/removals from land-use change and forestry

Party	Gg CO_2 equivalent								Change from 1990 to latest reported estimate (%)
	1990	1995	1996	1997	1998	1999	2000	2001	
Australia	425 175	444 742	454 697	465 349	484 860	491 079	502 406		18.2
Austria	78 073	80 797	84 624	84 146	83 819	82 123	81 951	85 880	10.0
Belarus	133 555	83 397	84 198	85 477	83 241	80 292	71 343		-46.6
Belgium	141 125	152 117	154 512	149 578	153 735	150 673	150 291	150 516	6.7
Bulgaria[a]	144 398	87 146	84 196	79 558	71 001	65 091	64 495	65 791	-54.4
Canada	607 589	657 587	672 503	681 778	689 519	705 982	729 664	720 136	18.5
Croatia	31 944	22 259							-30.3
Czech Republic	192 019	148 272	154 907	158 879	148 602	140 421	147 681	148 056	-22.9
Denmark	69 217	77 335	90 778	80 945	75 797	72 750	68 181	69 410	0.3
Estonia	43 494	22 287	23 454	23 663	21 502	19 659	19 746	19 416	-55.4
Finland	77 233	76 652	82 122	81 056	78 512	77 831	75 391	80 888	4.7
France	568 152	565 438	581 236	573 913	589 482	571 474	565 311	568 159	0.0
Germany	1 213 520	1 060 695	1 079 471	1 041 939	1 017 811	984 759	983 301	995 337	-18.0
Greece	104 895	110 488	114 299	119 576	124 740	123 739	130 053	132 234	26.1
Hungary[a]	101 633	77 916	79 184	76 853	83 687	86 546	83 348	78 536	-22.7
Iceland	2 838	2 722	2 794	2 934	2 961	3 082	2 859	2 721	-4.1
Ireland	53 239	57 583	59 249	62 031	64 128	66 257	68 252	70 018	31.5
Italy	508 629	520 385	514 671	521 598	532 608	538 627	543 751	545 358	7.2
Japan	1 187 108	1 323 383	1 343 891	1 339 056	1 301 599	1 323 580	1 332 945	1 299 443	9.5
Latvia	29 181	13 677	12 911	12 327	11 854	10 577	9 857	11 497	-60.6
Liechtenstein	218					218			0.1
Lithuania[b]	50 933				22 520				-55.8
Luxembourg	13 448	10 223				6 004	5 971	6 052	-55.0
Monaco	100	124	129	129	125	133	135	140	40.5
Netherlands	210 004	223 314	232 901	220 330	225 157	216 446	216 816	219 695	4.6
New Zealand	61 754	65 313	66 841	68 431	67 300	69 119	70 348	72 379	17.2
Norway	52 013	51 763	54 879	55 103	55 523	56 218	55 661	56 222	8.1
Poland[a]	564 419	417 353	437 388	427 243	403 516	401 583	386 186	382 791	-32.2
Portugal	61 441	69 972	67 496	69 670	74 577	82 880	82 256	83 823	36.4
Romania[a]	264 281	212 323	206 913	201 113	179 068	155 068	155 846	148 262	-43.9
Russian Federation	3 040 062	2 068 045	1 965 346	1 915 086	1 889 987	1 877 181			-38.3
Slovakia	72 181	53 386	53 240	53 240	51 622	50 341	47 900	50 128	-30.6
Slovenia[a]	19 905	18 896	19 709						-1.0
Spain	287 609	319 363	311 373	332 546	343 082	371 057	387 104	382 789	33.1
Sweden	72 756	75 085	78 687	73 772	74 907	72 239	68 949	70 485	-3.1
Switzerland	53 056	52 038	52 671	51 907	53 162	53 287	52 409	53 453	0.7
Ukraine	919 189	538 833	499 634	466 471	454 934				-50.5
United Kingdom	744 139	687 417	709 075	684 952	683 543	646 537	649 107	657 232	-11.7
United States	6 139 636	6 514 898	6 706 987	6 782 591	6 801 349	6 849 545	7 047 365	6 936 209	13.0
European Community[c]	4 199 608	4 082 617	4 166 547	4 101 100	4 126 010	4 061 332	4 074 832	4 116 085	-2.0

Note: See tables 6–9 for emissions of CO , CH , N O and HFCs, PFCs and SF .

[a] In accordance with decision 9/CP.2, some Parties with economies in transition use base years other than 1990: Bulgaria (1988); Hungary (1985–87); Poland (1988); Romania (1989); Slovenia (1986).

[b] Party reported only emissions of CO_2 and CH_4, not N_2O, for 1995–1997, so no aggregate emissions for these years are given here.

[c] Emission estimates of the European Community are reported separately from those of its member States.

Table 6. Total anthropogenic CO_2 emissions, excluding land-use change and forestry, 1990 and 1995–2001

Party	Gg CO_2 equivalent								Change from 1990 to latest reported estimate
	1990	1995	1996	1997	1998	1999	2000	2001	(%)
Australia	277 867	301 101	310 586	318 222	334 904	339 385	347 006		24.9
Austria	60 113	62 627	66 629	66 208	66 333	65 020	64 928	69 120	15.0
Belarus	102 471	61 455	60 885	61 448	58 738	56 591	52 019		-49.2
Belgium	117 749	127 454	130 233	125 728	129 322	126 472	126 331	126 803	7.7
Bulgaria[a]	103 011	61 701	60 142	58 242	51 868	48 032	46 842	49 089	-52.3
Canada	472 153	500 925	513 641	524 803	534 522	553 631	576 770	566 182	19.9
Croatia	23 305	16 251							-30.3
Czech Republic	163 990	128 817	132 780	137 357	128 268	121 093	127 902	127 996	-21.9
Denmark	52 659	61 130	74 556	65 209	60 050	57 279	52 764	54 355	3.2
Estonia	38 107	19 315	20 264	20 225	18 318	16 771	16 849	17 083	-55.2
Finland	62 459	62 676	68 123	66 832	64 594	64 065	62 283	67 692	8.4
France	395 272	394 869	408 732	403 076	425 366	412 793	407 199	411 354	4.1
Germany	1 014 439	898 758	920 871	889 597	881 384	854 741	857 969	870 762	-14.2
Greece	84 336	87 644	90 163	94 668	99 419	98 626	103 727	105 875	25.5
Hungary[a]	83 676	59 758	60 475	58 893	57 601	60 117	58 555	58 728	-29.8
Iceland	2 108	2 227	2 315	2 415	2 403	2 462	2 316	2 192	4.0
Ireland	31 797	34 759	35 954	38 312	40 250	42 133	44 160	46 460	46.1
Italy	428 178	438 985	434 115	439 523	451 095	456 587	460 965	460 763	7.6
Japan	1 122 117	1 210 908	1 231 208	1 226 819	1 195 039	1 228 242	1 238 699	1 213 658	8.2
Latvia	22 395	10 211	9 481	8 988	8 623	7 569	6 935	7 797	-65.2
Liechtenstein	195					196			0.8
Lithuania	38 920	14 679	15 365	14 146	15 364				-60.5
Luxembourg	12 750	9 545				5 432	5 399	5 482	-57.7
Monaco	98	120	126	125	121	129	131	136	39.2
Netherlands	159 270	172 402	180 304	168 669	173 788	170 686	173 840	179 855	12.9
New Zealand	25 267	27 206	28 223	30 210	28 684	30 331	30 662	32 430	28.4
Norway	34 863	37 509	40 673	40 929	41 091	41 559	41 120	41 589	19.3
Poland[a]	476 625	348 172	372 530	361 626	337 448	329 697	314 812	317 844	-33.3
Portugal	43 809	52 546	49 941	52 104	56 699	64 199	63 493	64 892	48.1
Romania[a]	194 826	161 892	158 301	155 349	138 049	115 403	112 150	111 395	-42.8
Russian Federation	2 372 300	1 590 420	1 495 920	1 529 465	1 504 600	1 508 921			-36.4
Slovakia	59 078	43 750	44 201	44 479	43 470	42 345	40 061	42 085	-28.8
Slovenia[a]	15 472	14 880	15 645						1.1
Spain	227 400	254 386	241 884	261 700	270 604	295 512	308 201	307 248	35.1
Sweden	56 489	59 031	62 464	57 623	58 775	56 649	53 766	55 269	-2.2
Switzerland	44 329	43 473	44 103	43 298	44 599	44 727	43 753	44 828	1.1
Ukraine	703 792	380 928	346 768	322 907	314 445				-55.3
United Kingdom	585 016	548 617	568 533	544 271	547 079	538 706	544 359	557 628	-4.7
United States	5 003 686	5 334 446	5 514 811	5 595 361	5 614 198	5 680 677	5 883 119	5 794 804	15.8
European Community[b]	3 329 139	3 262 960	3 339 599	3 279 607	3 329 937	3 308 900	3 329 314	3 383 556	1.6

[a] In accordance with decision 9/CP.2, some Parties with economies in transition use base years other than 1990: Bulgaria (1988); Hungary (1985–87); Poland (1988); Romania (1989); Slovenia (1986).

[b] Emission estimates of the European Community are reported separately from those of its member States.

Table 7. Total anthropogenic CH_4 emissions, 1990 and 1995–2001

Party	Gg CO_2 equivalent								Change from 1990 to latest reported estimate
	1990	1995	1996	1997	1998	1999	2000	2001	(%)
Australia	5 660	5 502	5 514	5 592	5 647	5 676	5 764		1.8
Austria	508	480	474	458	450	443	435	432	-15.0
Belarus	987	806	833	835	835	835	611		-38.1
Belgium	534	536	532	529	532	520	510	495	-7.2
Bulgaria[a]	1 166	770	717	611	560	482	485	447	-61.7
Canada	3 493	4 162	4 230	4 223	4 270	4 276	4 318	4 450	27.4
Croatia	182	148							-18.6
Czech Republic	798	600	600	575	544	509	510	499	-37.5
Denmark	270	284	287	282	276	261	264	267	-1.2
Estonia	208	122	133	144	131	120	118	94	-54.9
Finland	302	291	288	284	274	269	258	256	-15.3
France	3 345	3 368	3 345	3 196	3 177	3 137	3 127	3 082	-7.9
Germany	4 813	3 269	3 075	2 982	2 842	2 765	2 597	2 484	-48.4
Greece	416	452	467	472	497	496	518	530	27.2
Hungary[a]	664	792	815	790	680	683	553	496	-25.3
Iceland	14	14	14	14	14	14	13	13	-6.3
Ireland	567	600	608	617	618	614	609	598	5.6
Italy	1 841	1 803	1 796	1 794	1 768	1 748	1 740	1 734	-5.8
Japan	1 181	1 116	1 090	1 050	1 024	1 013	994	969	-18.0
Latvia	179	114	112	106	103	96	90	121	-32.6
Liechtenstein	0.8					0.7			-13.1
Lithuania	378	260	247	264	177				-53.2
Luxembourg	24	22				23	23	23	-5.7
Monaco	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	38.9
Netherlands	1 292	1 170	1 174	1 100	1 065	1 037	983	973	-24.7
New Zealand	1 219	1 258	1 273	1 253	1 265	1 269	1 292	1 289	5.7
Norway	306	328	332	334	329	327	332	332	8.5
Poland[a]	3 141	2 457	2 252	2 279	2 335	2 250	2 183	1 849	-41.1
Portugal	482	476	478	483	486	507	509	514	6.6
Romania[a]	2 332	2 007	1 961	1 824	1 671	1 615	1 659	1 360	-41.7
Russian Federation	26 500	19 064	18 544	14 379	14 722	13 846			-47.8
Slovakia	320	250	254	240	223	221	215	212	-33.7
Slovenia[a]	120	112	113						-6.2
Spain	1 442	1 608	1 687	1 736	1 795	1 814	1 872	1 920	33.2
Sweden	316	314	312	308	300	291	279	278	-11.8
Switzerland	237	225	223	219	214	211	208	207	-12.6
Ukraine	9 402	7 295	7 059	6 606	6 457				-31.3
United Kingdom	3 661	3 062	2 988	2 836	2 686	2 503	2 323	2 195	-40.0
United States	30 667	30 954	30 324	29 977	29 652	29 311	29 207	28 851	-5.9
European Community[b]	19 721	17 646	17 448	17 013	16 701	16 341	15 961	15 695	-20.4

[a] In accordance with decision 9/CP.2, some Parties with economies in transition use base years other than 1990: Bulgaria (1988); Hungary (1985–87); Poland (1988); Romania (1989); Slovenia (1986).

[b] Emission estimates of the European Community are reported separately from those of its member States.

Table 8. Total anthropogenic N_2O emissions, 1990 and 1995–2001

Party	Gg CO_2 equivalent								Change from 1990 to latest reported estimate
	1990	1995	1996	1997	1998	1999	2000	2001	(%)
Australia	74.8	82.1	82.8	87.8	91.6	97.0	102.9		37.6
Austria	18.7	20.5	19.9	20.8	20.2	19.9	19.8	19.2	2.5
Belarus	33.4	16.2	18.8	21.0	22.5	19.9	20.9		-37.3
Belgium	39.2	41.8	40.2	38.7	40.4	39.9	39.1	38.6	-1.5
Bulgaria[a]	54.5	29.8	29.0	27.4	23.5	22.3	24.0	23.5	-56.8
Canada	171.7	196.3	199.6	193.7	183.4	173.4	170.4	165.8	-3.5
Croatia	12.5	9.3							-25.5
Czech Republic	36.3	21.6	29.7	28.4	27.1	26.2	26.4	26.7	-26.4
Denmark	35.0	31.9	31.5	30.1	30.3	30.0	29.3	28.2	-19.3
Estonia	3.3	1.3	1.2	1.4	1.4	1.2	1.3	1.2	-64.5
Finland	26.9	25.0	25.2	25.9	25.3	24.9	22.9	22.9	-14.9
France	306.4	305.0	309.5	311.1	288.3	269.7	262.4	259.0	-15.5
Germany	283.6	253.4	258.6	244.3	200.8	190.3	191.4	194.3	-31.5
Greece	34.3	31.9	33.3	34.3	34.3	33.6	35.5	34.7	1.1
Hungary[a]	12.9	4.9	5.1	4.4	35.0	36.3	41.0	28.6	121.0
Iceland	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	-8.6
Ireland	30.8	32.4	33.1	33.6	34.3	34.9	34.7	33.5	9.0
Italy	131.8	135.5	134.0	137.9	136.8	139.7	140.4	143.1	8.5
Japan	129.7	131.6	134.5	136.0	131.7	113.3	121.9	114.1	-12.0
Latvia	9.8	3.5	3.5	3.6	3.4	3.2	3.3	3.8	-61.5
Liechtenstein	0.020					0.024			19.3
Lithuania	13.1				11.1				-15.5
Luxembourg	0.6	0.7				0.3	0.3	0.3	-50.7
Monaco	0.005	0.009	0.009	0.010	0.010	0.011	0.011	0.011	113.3
Netherlands	53.4	58.6	57.9	57.4	56.9	56.0	53.7	51.8	-2.9
New Zealand	33.2	36.7	37.1	37.2	37.7	38.2	39.7	40.6	22.3
Norway	17.7	16.8	16.8	16.6	17.5	18.2	17.9	18.0	1.3
Poland[a]	70.5	54.0	53.9	54.0	51.6	75.1	77.1	77.2	9.6
Portugal	24.2	23.9	24.3	24.0	24.7	25.8	25.9	26.0	7.5
Romania[a]	66.1	25.0	22.3	22.1	17.0	16.5	26.4	24.6	-62.8
Russian Federation	225.7	139.0	132.0	141.0	114.0	113.0			-49.9
Slovakia	19.7	13.7	11.7	11.6	11.0	10.5	10.4	10.9	-44.7
Slovenia[a]	5.9	5.3	5.4						-8.0
Spain	85.9	82.9	90.3	88.3	90.6	94.9	99.4	95.1	10.7
Sweden	29.4	28.5	29.1	28.8	29.4	28.1	27.7	27.8	-5.3
Switzerland	11.3	11.7	11.7	11.7	11.7	11.7	11.7	11.5	1.3
Ukraine	58.0	15.2	14.9	15.6	15.8				-72.8
United Kingdom	218.9	184.1	190.7	196.0	187.1	144.9	144.3	136.6	-37.6
United States	1 282.5	1 390.1	1 424.9	1 422.3	1 409.1	1 396.7	1 386.9	1 369.6	6.8
European Community[b]	1 319.2	1 256.2	1 278.3	1271.9	1 200.1	1 132.4	1 127.0	1 111.3	-15.8

[a] In accordance with decision 9/CP.2, some Parties with economies in transition use base years other than 1990: Bulgaria (1988); Hungary (1985–87); Poland (1988); Romania (1989); Slovenia (1986).

[b] Emission estimates of the European Community are reported separately from those of its member States.

Table 9. Aggregate anthropogenic emissions of hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride, 1990 and 1995–2001

	Gg CO_2 equivalent								Change from 1990 to latest reported estimate
Party	**1990**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**(%)**
Australia[a]	4 093	1 368	1 301	1 128	1 470	1 009	976		-76.2
Austria	1 485	1 736	1 886	1 884	1 791	1 626	1 735	1 735	16.9
Belarus									
Belgium[b]		442	624	733	735	908	1 122	1 333	
Bulgaria		50			69	44	31	16	
Canada	8 845	8 403	8 149	8 236	8 496	8 793	9 390	9 110	3.0
Croatia[c]	939	8							-99.2
Czech Republic		169	322	626	523	525	890	1283	
Denmark	43	344	435	472	564	683	793	700	1 526.8
Estonia									
Finland	94	98	150	244	299	399	576	732	674.8
France	7 639	5 289	6 313	7 277	8 038	9 200	11 102	11 791	54.4
Germany	10 102	14 752	13 850	14 006	14 499	12 941	11 438	12 178	20.6
Greece[c]	1 193	3 452	3 988	4 359	4 257	4 288	4 429	4 491	276.6
Hungary					952	829	459	540	
Iceland	309	87	56	103	151	199	145	138	-55.2
Ireland		179	262	342	257	411	547	594	
Italy	921	1 545	1 308	1 664	1 976	2 031	2 711	3 827	315.3
Japan		48 266	48 085	48 024	44 218	38 957	35 577	30 061	
Latvia[d]		0.007	0.008	0.012	0.014	0.017	0.021	0.024	
Liechtenstein									
Lithuania									
Luxembourg[e]								0.030	
Monaco									
Netherlands	7 050	8 160	10 003	10 772	11 383	6 606	5 670	3 337	-52.7
New Zealand	605	306	402	359	362	284	245	309	-48.9
Norway	5 218	2 166	2 036	2 013	2 094	2 142	2 022	2 091	-59.9
Poland		845	843	1 024	1 040	1 349	1 627	2 181	
Portugal[b]		5	5	7	11	24	43	69	
Romania[f]		532	536	607	652	648	671	678	
Russian Federation	41 565	34 191	39 082	39 952	40 885	42 464			2.2
Slovakia	272	148	91	114	80	105	103	108	-60.2
Slovenia[g]		26	21						
Spain	3 287	5 529	6 057	7 032	6 699	8 045	8 787	5 729	74.3
Sweden	527	640	639	750	701	772	721	740	40.3
Switzerland	215	208	253	377	446	521	662	711	231.2
Ukraine									
United Kingdom	14 379	17 433	18 676	20 349	22 072	10 346	11 240	11 146	-22.5
United States	94 365	99 480	113 646	116 817	127 633	120 344	120 956	110 959	17.6
European Community[h]	47 381	59 643	64 248	69 938	73 320	58 223	60 961	58 447	23.4

[a] Emissions of PFCs and SF_6 only.
[b] Emissions of HFCs and SF_6 only.
[c] Emissions of HFCs and PFCs only.
[d] Emissions of SF_6 only.
[e] Emissions of HFCs only.
[f] Emissions of PFCs only
[g] Reported emissions of HFCs and PFCs, but only in Gg, so it was not possible to convert to CO_2 equivalent.
[h] Emission estimates of the European Community are reported separately from those of its member States.

Table 10. Net anthropogenic CO_2 emissions and removals from land-use change and forestry, 1990 and 1995–2001

Party	Gg CO_2 equivalent								Change from 1990 to latest reported estimate
	1990	1995	1996	1997	1998	1999	2000	2001	(%)
Australia	78 124	35 164	32 377	33 918	34 786	32 914	32 846		58.0
Austria	-9 215	-7 254	-5 385	-7 633	-7 633	-7 633	-7 633	-7 633	-17.2
Belarus	-12 720	-18 158	-18 155	-18 310	-18 520	-19 298	-18 981		49.2
Belgium	-1 600	-1 911	-1 889	-1 867	-1 845	-1 823	-1 822	-1 814	13.4
Bulgaria[a]	-4 657	-7 519	-7 190	-5 852	-6 233	-6 608	-8 976	-9 467	103.3
Canada	-106 988	-12 645	-40 207	-49 143	-34 584	-29 496	-53 343	-36 378	-66.0
Croatia	-6 505	-6 505							
Czech Republic	-2 128	-5 454	-4 486	-4 639	-3 757	-3 401	-4 016	-4 363	105.0
Denmark	-3 118	-3 128	-3 134	-3 142	-3 152	-3 161	-3 517	-3 531	13.2
Estonia	-6 320	-7 782	-9 607	-9 107	-8 522	-8 107	-8 365	-739	-88.3
Finland	-23 798	-14 687	-21 032	-12 637	-9 713	-10 821	-11 953	-16 851	-29.2
France	-55 702	-62 056	-64 800	-68 158	-67 680	-69 345	-63 096	-66 370	19.2
Germany	-33 689	-33 400	-33 400	-33 400	-33 400	-33 400	-23 695	-23 695	-29.7
Greece	1 441	-366	-75	-400	2 538	66	3 840	-1 328	-192.1
Hungary[a]	-3 097	-4 797	-3 931	-4 205	-4 411	-4 500	-4 377	-4 540	46.6
Iceland	-5	-56	-66	-80	-94	-112	-131	-145	2 577.4
Ireland	-66	-55	-4	-31	-161	-122	-47	-629	857.6
Italy	-23 532	-19 598	-20 222	-17 764	-17 426	-17 712	-15 633	-18 655	-20.7
Japan	-83 903	-96 705							15.3
Latvia	-18 948	-14 540	-14 755	-11 152	-9 332	-8 208	-8 222	-9 256	-51.1
Liechtenstein									
Lithuania	-8 848				-9 593				8.4
Luxembourg	-295	-295				-295	-295	-295	-0.025
Monaco									
Netherlands	-1 422	-1 232	-1 398	-1 180	-1 380	-1 236	-1 413	-1 413	-0.6
New Zealand	-21 769	-15 470	-15 727	-17 363	-20 288	-22 033	-23 706	-23 859	9.6
Norway	-9 765	-15 693	-17 607	-16 499	-17 588	-17 767	-18 743	-18 968	94.2
Poland[a]	-34 746	-42 880	-42 616	-40 521	-29 821	-43 464	-43 094	-53 639	54.4
Portugal	-3	-2 005	-2 091	-2 179	-2 258	-2 359	-2 152	-2 152	77 864.6
Romania[a]	-2 925	-8 034	-7 805	-7 713	-10 069	-8 946	-8 174	-9 031	208.7
Russian Federation	141 100	-337 700	-175 900	-131 557	-3 900	-211 742			250.1
Slovakia	-2 427	-2 683	-2 427	-1 411	-1 936	-1 651	-2 443	-5 264	116.9
Slovenia[a]	-2 950	-5 674	-5 560						88.5
Spain	-29 252	-29 252	-29 252	-29 252	-29 252	-29 252	-29 252	-29 252	
Sweden	-20 292	-21 293	-22 269	-27 288	-24 331	-27 305	-27 306	-33 083	63.0
Switzerland	-3 188	-4 310	-4 461	-4 637	-4 571	-4 226	-1 821	-1 529	-52.0
Ukraine	-52 107	-52 940	-66 151	-68 806	-68 708				31.9
United Kingdom	8 791	4 687	4 969	4 773	5 027	4 856	3 380	3 220	63.4
United States	-1 072 807	-1 064 173	-1 061 016	-840 622	-830 478	-841 054	-834 637	-838 137	-21.9
European Community[b]	-191 943	-191 554	-200 274	-200 325	-191 082	-199 413	-180 560	-203 481	6.0

Note: In this table negative values in Gg indicate net removals of CO_2 from the land-use change and forestry sector. In the change column negative values indicate a decrease in removals in relation to the year 1990 and positive values indicate an increase in removals, except for Australia, the Russian Federation and the United Kingdom for which positive values indicate less emissions.

[a] In accordance with decision 9/CP.2, some Parties with economies in transition use base years other than 1990: Bulgaria (1988); Hungary (1985-87); Poland (1988); Romania (1989); Slovenia (1986).

[b] Emission estimates of the European Community are reported separately from those of its member States.

IV. RECALCULATIONS AND REVISIONS

16. Of the 30 Parties that submitted estimates for their base year, 26 reported revised estimates.[5] Table 11 shows, for each of the 30 Parties, the percentage change from the previous submission that contained base year estimates to the estimates in the most recent submission. The most common reasons for the changes, to the extent this information was reported, were revised activity data and emissions factors. In some instances, methodology changes were also reported, but revisions for this reason usually concerned very few source categories. The recalculations varied from –94 per cent to 152 per cent for specific gases, mainly methane (CH_4) and nitrous oxide (N_2O) in the cases of large changes. The changes for aggregate GHG emissions varied between –16 per cent and 3 per cent (between –49 and 4 per cent with inclusion of LUCF), but for 20 of the 26 Parties the recalculations were within ± 2 per cent.

[5] In accordance with the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, it is considered good practice to recalculate historical emissions when methods are changed or refined, when new source categories are included in the national inventory, or when errors in the estimates are identified and corrected, and in order to assess emission trends it is important that the entire time series of emissions be calculated using the changed or refined methods.

Table 11. Percentage changes in GHG emissions for 1990 (or base year) compared with previous inventory submissions

Parties that revised 1990 (base year) inventories[a]	GHG	GHG with LUCF	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Explanation[b]
Austria*	0.89	1.01	-3.51	-5.55	151.52	0	0	0	Methods, emission factors, activity data
Belgium*	-1.14	-1.13	-0.19	-2.98	-7.97	0	0	0	No explanation
Bulgaria*	-8.08	-8.33	-0.85	-12.59	-32.99	0	0	0	Methods, emission factors, activity data
Canada*	0.07	-8.26	-10.95	-0.13	-0.17	0	0	0	Methods, activity data, addition/removal of source/sink
Czech Republic	0	0	0	0	0				
Denmark*	-0.21	-3.43	-4.21	-2.96	0.06	0	0	0	Methods, emission factors, activity data, addition/removal of source/sink
Estonia	0	0	0	0	0				
European Community*	-0.38	-0.22	-0.18	-2.90	2.00	5.08	-1.05	-1.52	No explanation in CRF, reference to NIR
Finland*	0.26	0.18	-0.02	3.22	-0.87	-94.20	-86.85	32.82	Methods, emission factors, activity data, addition/removal of source/sink
France*	1.63	1.86	0.51	5.54	4.30	0	0	0	Methods, emission factors, activity data, addition/removal of source/sink
Germany	-0.76	-0.77	-0.01	-8.73	-0.78	50.00	0.07	0	
Hungary[c]	0	0	0	0	0				
Iceland	1.39	1.39	2.09		-3.27		0	0	
Ireland*	-0.85	-0.81	0.70	-7.44	3.25	0	0	0	Activity data, addition/removal of source/sink
Italy	-2.29	-2.40	-2.57	-1.85	0.21	0	0	-0.19	Methods, emission factors, activity data, addition/removal of source/sink
Japan*[d]	0.19	0.20	0.27	-7.25	3.51				Methods, emission factors, activity data
Latvia	-6.03	-49.41	-4.81	-8.77	-11.12				
Monaco	-0.31		0	-43.69	11.10				
Netherlands*	-0.16	-0.16	-0.23	-0.01	0.12	0	0	0	Methods, activity data
New Zealand*	-15.59	-22.08		-27.66	-13.59		0	0	No explanation
Norway*	-0.32	-0.30	-0.90	-0.33	7.19	0	0	0	Emission factors, activity data, addition/removal of source/sink
Poland	0	0	0	0	0				
Portugal*	-5.40	0.39	8.55	-21.54	-5.40	0	0	0	Methods, emission factors, activity data, addition/removal of source/sink
Romania	-0.23	-0.23		-1.07	-0.33				
Slovakia	-1.04	-1.07	-1.12	-0.79	-0.55		0	0	
Spain*	0.41	0.46	0.08	2.15	1.43	0	0	0	Emission factors, activity data, addition/removal of source/sink
Sweden*	3.10	4.36	1.19	-2.64	27.10	51.02	0	2.65	Methods, emission factors, activity data, addition/removal of source/sink
Switzerland*[e]	0.10	0.10	-0.19	-2.50	1.18	>100	>100	>100	No explanation
United Kingdom*	0.22	0.22	0.22	0.46	-0.02	0	0	0	Emission factors, activity data, addition/removal of source/sink
United States*	0.15	0.67	0.77	-1.12	2.66	0	0	1.99	Methods, emission factors, activity data, addition/removal of source/sink

Note: The following Parties did not submit a 2003 inventory or did not provide estimates for the base year by 1 September 2003: Australia, Belarus, Croatia, Greece, Lichtenstein, Lithuania, Luxembourg, Russian Federation, Ukraine. Slovenia did not previously submit base year estimates. Where data were not reported for a certain gas, the table contains blank spaces. "0" indicates submitted base year but did not revise data or changes were less than 0.001 per cent.

[a] An asterisk (*) indicates those reporting Parties that provided recalculations in table 8 of the CRF (recalculation table) in their submissions. The secretariat calculated recalculations for other Parties on the basis of data previously submitted.

[b] The information here is based on that provided in table 8(b) of the CRF. In table 8b explanations for recalculations are given under one of the following headings, which are abbreviated in this table: changes in methods, changes in emission factors, changes in activity data, and addition/removal/replacement of source/sink categories.

[c] The resubmission of Hungary (version 2) provides new base year data and the consequent change is not included in this table.

[d] Party did not report actual emission of HFCs, PFCs and SF_6. The change given here is with respect to potential emission estimates.

[e] As the Party did not previously report emissions of HFCs, PFCs and SF_6, the percentage change is shown as >100.

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