Annual European Community greenhouse gas inventory 1990–2000 and inventory report 2002

Submission to the UNFCCC secretariat

Prepared by:
Bernd Gugele and Manfred Ritter
ETC on air and climate change

With input from:
European Commission (Eurostat,
Joint Research Centre)

Project manager:
André Jol
European Environment Agency

European Environment Agency

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

Legal notice

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server (http://europa.eu.int)

Printed in Denmark

Printed on recycled and chlorine-free bleached paper

ISBN: 92-9167-417-6

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

Contents

Title of Inventory	Annual European Community greenhouse gas inventory 1990–2000 and inventory report 2002
Contact Names	Jos Delbeke, Marianne Wenning, Lars Müller (Environment DG) André Jol, Andreas Barkman (EEA), Manfred Ritter, Bernd Gugele (ETC/ACC)
Organisation	European Commission, Environment DG European Environment Agency, EEA
Address European Commission	European Commission Directorate-General for the Environment BU9 5/163 B-1049 Brussels Belgium
Fax:	(32-2) 296 99 70
Tel:	(32-2) 299 05 65
E-mail:	env-climate@cec.eu.int
Address European Environment Agency	Kongens Nytorv 6 DK–1050 Copenhagen Denmark
Tel :	(45) 33 36 71 00
Fax :	(45) 33 36 71 99
E-mail :	andre.jol@eea.eu.int

1. Introduction

1.1. Aim of the EC inventory report

This report serves as the annual submission of the European Community (EC) to the UNFCCC. It presents the greenhouse gas (GHG) inventory of the EC, the EC GHG inventory process and methods and GHG inventory data of its individual Member States (MS) for 1990–2000. The GHG inventory data of the EC MS are the basis of the EC GHG inventory; they are provided in this report in order to make the data basis of the EC GHG inventory transparent. Each EC Member State is Party to the UNFCCC and provides its annual national submission to the UNFCCC secretariat separately. The data published in this report are also the basis of the progress evaluation report of the European Commission (due in October 2002), required under Council Decision 99/296/EC for a monitoring mechanism of Community CO_2 and other greenhouse gas emissions.

Apart from making the data basis transparent, this report aims to present transparent information on the process and methods of compiling the EC GHG inventory. It addresses the relevant aspects at EU level, but does not provide much details of the methodologies of the MS GHG inventories. Detailed information on methodologies is available in the national MS inventory reports, submitted separately to the UNFCCC secretariat. However, several chapters in this report refer to information provided by the MS, where considered appropriate and feasible. In many cases this MS information is presented in summary overview tables.

The EC GHG inventory has been compiled under Council Decision 99/296/EC for a monitoring mechanism of Community CO_2 and other greenhouse gas emissions ([1]) and is based on data delivered by the Member States by 5 April 2002. The EC GHG inventory is the direct sum of the 15 national inventories, except for the IPCC reference approach for CO_2 from fossil fuels. Since the data are revised and updated for all years, they replace EC data previously published, in particular, in the 2001 submission by the European Commission to the UNFCCC secretariat 'Annual European Community greenhouse gas inventory 1990–99' (EEA, 2001a) and in the report 'European Community and Member States greenhouse gas emission trends 1990–99' (EEA, 2001b).

1.2. Structure of the EC inventory report

Chapter 2 presents the institutional, legal and procedural arrangements of the EC GHG inventory system. First, the Council Decision 1999/296/EC as the legal basis of the compilation of the EC GHG inventory is described. Then the institutions involved in the compilation of the EC GHG inventory and their roles are explained. Finally, future foreseen improvements of the EC inventory are addressed.

Chapter 3 presents the main trends of the GHG emissions in the European Union, by presenting GHG emissions by gases, sources and Member States.

Chapter 4 addresses the main methodological issues related to the compilation of the EC inventory. The chapter includes information on the data basis of the EC inventory, recalculations, the reference approach, international bunkers, emissions and removals from LUCF, methodologies used by MS, uncertainty estimates, EC key source categories and the contribution of each MS to these key sources, quality assurance/quality control, reasons for differences between the EC submission and MS submissions in 2001, software tools, and completeness of the EC submission.

(1) OJ L 117, 5.5.1999, p. 35.

Annex A presents the CRF tables for the EU. Annex B includes the status reports for the MS submissions to the European Commission under Council Decision 99/296/EC in order to show the information basis for the EC GHG inventory 2002. Annex C includes the CRF Table Summary 1.A for the MS, as submitted by 5 April 2002, in order to make the data basis of the EC inventory transparent. Finally, Annex D includes the MS submissions in 2002 (both CRF tables and inventory reports).

1.3. Changes with respect to previous years

The EC submission 2002 has been extended as regards the number of CRF tables included and the amount of background information provided. Some important changes are as follows.

- The complete set of CRF tables is provided for the EC. The summary tables and the tables on the reference approach, recalculations, quality of emission estimates, emission trends are filled in for the EC. The tables on sectoral emission and sectoral background activity data are not estimated for the EC (but filled in with 'NE' – the notation key for 'not estimated'). The submission of the complete set of CRF tables is meant to increase the transparency of data availability for the EC. Also the status reports of the MS submissions to the European Commission are included in this report in order to provide an overview of the completeness of MS submissions.

- Tables on recalculations have been compiled for the EC as a whole and an overview on sector and MS contribution to the GHG recalculations at EC level are provided in this report.

- The IPCC reference approach for CO_2 from fossil fuels has been calculated for the EU as a whole on the basis of Eurostat energy balance data.

- Overview tables are presented in this report in order to summarise the information provided by the MS in their CRF and national inventory reports. This applies mainly to information on methods, emission factors, quality of emission estimates, uncertainty estimates, and QA/QC procedures.

- A key source analysis has been carried out for the EC in order to prioritise those source categories, for which overview information of MS methodologies is provided in this report. This analysis does not replace key source analysis performed by MS separately in their annual submission to the UNFCCC secretariat.

- The CRF tables on emission trends have been compiled for the EC and a chapter on overall GHG trends has been included in the inventory report which briefly describes emission trends by gases, sources and Member States.

2. EC GHG inventory system

2.1. The EC monitoring mechanism

The legal basis of the compilation of the EC inventory is Council Decision 99/296/EC amending Council Decision 93/389/EC for a monitoring mechanism of Community CO_2 and other greenhouse gas emissions ([2]). The purpose of this decision is to monitor all anthropogenic greenhouse gas emissions not controlled by the Montreal Protocol in the EC Member States and to evaluate progress towards meeting greenhouse gas reduction commitments under the UNFCCC and the Kyoto Protocol (KP).

Under the provisions of Article 3.2 of Council Decision 99/296/EC, the Member States shall report to the Commission each year, not later than 31 December:

- their anthropogenic CO_2 emissions by sources and removals by sinks for the previous calendar year;
- final national inventory data on emissions by sources and removals by sinks for the other greenhouse gases for the previous year but one and provisional emission data (inventories) for the previous year.

Other greenhouse gases include the five other Kyoto Protocol greenhouse gases: methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). In addition, annual information on emissions of the following gases shall be provided: carbon monoxide (CO), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOCs) and sulphur oxides, in line with the reporting requirements under the UNFCCC.

The reporting requirements for the Member States under Council Decision 99/296/EC are elaborated in guidelines under this decision, in particular 'Part 1: Guidelines for Member States and EC annual inventories' (European Commission, 2000). According to the decision and these guidelines the reporting requirements are exactly the same as for the UNFCCC, regarding content and format. The EC and its Member States use the 'UNFCCC guidelines on reporting and review' (document FCCC/CP/1999/7), and prepare inventory information in the common reporting format (CRF) and the 'national inventory report' that contains background information.

In accordance with UNFCCC guidelines, the EC and its Member States use the IPCC 'Good practice guidance and uncertainty management in national greenhouse gas inventories' (IPCC, 2000), which is consistent with the 'Revised 1996 IPCC guidelines for national greenhouse gas inventories' (IPCC, 1997). The use of this report by countries is expected to lead to higher quality inventories and more reliable estimates of the magnitude of absolute and trend uncertainties in reported greenhouse gas inventories.

Based on the data provided by the Member States, the Commission prepares the Community greenhouse gas inventory and circulates this to all Member States by 1 March each year. This procedure aims at achieving the best available Member States' data on greenhouse gas emissions and removals for the compilation of the final annual EC greenhouse gas inventory (due 15 April each year). Updating of inventory information after 31 December until 1 April is preferably limited to the following situations: to remove major inconsistencies, to fill major gaps or to provide essential additional information.

(2) OJ L 117, 5.5.1999, p. 35.

The annual EC greenhouse gas inventory is required for two purposes.

1. The annual greenhouse gas inventory submission to the UNFCCC: The European Community, as the only regional economic integration organisation having joined the UNFCCC as a Party, has to report annually on greenhouse gas inventories within the area covered by its Member States.

2. The progress evaluation report under Decision 99/296/EC: Under the monitoring mechanism, the European Commission has to assess annually, whether the actual and projected progress of Member States is sufficient to ensure fulfilment of the EC's commitments under the UNFCCC and the Kyoto Protocol. For this purpose, the Commission has to prepare a progress evaluation report, which has to be forwarded to the European Parliament and the Council by October each year. The annual EC inventory is an important element for the evaluation of actual progress.

The annual process of compilation of the EC inventory is summarised in Table 1. The time schedule of this process ensures the timely submission of the annual EC inventory. In addition, it helps to ensure consistency between the annual MS inventories submitted to the UNFCCC and the annual MS inventories submitted to the Commission.

Annual process of submission and review of MS inventories and compilation of the EC inventory[1]) Table 1

Element	Who	When	What
1. Submission of annual inventory by MS	Member States	31 December annually	Anthropogenic CO_2 emissions and CO_2 removals by sinks, for the year n-1 Emissions by source and removals by sinks of the other greenhouse gases; final data for the year n-2 and provisional data for the year n-1 [2])
2. Initial check of MS submissions	European Commission (DG ENV, Eurostat, JRC), assisted by EEA/ ETC-ACC	Up to 1 March	Initial checks (by EEA/ETC-ACC) Comparison of energy data in MS IPCC reference approach with Eurostat energy data (by Eurostat and MS) and comparison of MS and JRC's LULUCF inventory estimates
3. Compilation and circulation of draft EC inventory and inventory report	European Commission (DG ENV), assisted by EEA/ETC-ACC	1 March	Draft EC inventory (by EEA), based on MS inventories and additional information where needed Circulation of the draft EC inventory on 1 March
4. Submission of updated or additional data by MS	Member States	Up to 1 April	Updated or additional data submitted by MS [3])
5. Final annual EC inventory	European Commission (DG ENV), assisted by EEA/ETC-ACC	15 April	Submission of the final annual EC inventory to UNFCCC. This inventory will also be used to evaluate progress as part of the monitoring mechanism
6. Additional review of MS submissions and EC inventory	European Commission (DG ENV, Eurostat, JRC), assisted by EEA/ ETC-ACC	June to December	Additional review aimed at improving the next annual MS and EC inventories In November Eurostat makes available to MS energy balance data (1990 to inventory year)

[1]) In accordance with Council Decision 1999/296/EC.
[2]) In accordance with Article 3(1) and 3(2) of Council Decision 1999/296/EC.
[3]) Preferably updating is limited to the following situations: to remove major inconsistencies, to fill major gaps or to provide essential additional information. Documentation should be included describing which data are updated or are additional, compared to the submission of 31 December.

2.2. Institutional arrangements for the compilation of the EC GHG inventory

The main institutions involved in the compilation of the EC GHG inventory are the EC Member States, the European Commission — Environment DG (DG ENV), the European Environment Agency (EEA) and its European Topic Centre on Air and Climate Change (ETC-ACC), Eurostat, and the Joint Research Centre (JRC). Table 2 shows the main institutions and persons involved in the compilation and submission of the EC inventory.

Table 2 **List of institutions and experts responsible for the compilation of MS inventories and for the preparation of the EC inventory**

	Contact address
Austria	Manfred Ritter Federal Environment Agency Spittelauer Laende 5, A-1090 Vienna
Belgium	Peter Wittoeck Federal Department of the Environment Pachecolaan 19 PB 5, B-1010 Brussels
Denmark	Jytte Boll Illerup Danish National Environmental Research Institute PO Box 358, DK-4000 Roskilde
Finland	Outi Berghäll Ministry of the Environment PO Box 380, FIN-00131 Helsinki Jouko Petäjä Finnish Environment Institute PB 140, FIN-00251 Helsinki Kari Grönfors Statistics Finland PB 6B, FIN-00022 Tilastokeskus
France	Ministère de l'Aménagement du Territoire et de l'Environnement (MATE) 20 avenue de Ségur, F-75007 Paris Jean-Pierre Fontelle Centre Interprofessionel Technique d'Etudes de la Pollution Atmosphérique (CITEPA) 10 rue de Faubourg Poissonnière, F-75010 Paris
Germany	Michael Strogies Federal Environmental Agency Bismarckplatz 1, D-14193 Berlin Grunewald
Greece	Dimitra Koutendaki Institute of Environmental Research and Sustainable Development GR-Athens
Ireland	Michael McGettigan Environmental Protection Agency St Martins House, Waterloo Road, IRL-Dublin 4
Italy	M. Contaldi, R. de Lauretis, D. Romani National Environment Protection Agency (ANPA) Via Vitaliano Brancati 48, I-00144 Roma
Luxembourg	Frank Thewes Administration de l'Environment, Division Air-Bruit 16 rue Eugène Ruppert, L-2453 Luxembourg
Netherlands	Jos Olivier RIVM PO Box 1, 3720 BA Bilthoven, Netherlands
Portugal	Teresa Costa Pereira Direccao-Geral do Ambiente Rua da Murgueira - Bairro do Zambujal, P-2721-865 Amadora
Spain	Ángleles Cristóbal Ministerio de Medio Ambiente Plaza de San Juan de la Cruz s/n, Madrid, Spain
Sweden	Charlotta Sörqvist Ministry of the Environment, S-103 33 Stockholm Susanna Fink Swedish Environmental Protection Agency Blekholmsterassen 36, S-106 48 Stockholm
United Kingdom	AG Salway National Environmental Technology Centre AEA Technology, Culham, Abingdon OX14 3ED, Oxon, United Kingdom
European Commission	Jos Delbeke, Marianne Wenning, Lars Müller European Commission, Directorate-General for the Environment Rue de la Loi 200, B-1049 Brussels
European Environment Agency (EEA)	Andre Jol, Andreas Barkman European Environment Agency Kongens Nytorv 6, DK-1050 Copenhagen

European Topic Centre on Air and Climate Change (ETC-ACC)	Manfred Ritter, Bernd Gugele European Topic Centre on Air and Climate Change Federal Environment Agency Spittelauer Laende 5, A-1090 Vienna
Eurostat	Nikolaos Roubanis Statistical Office of the European Communities, Eurostat Jean Monnet Building, L-2920 Luxembourg
Joint Research Centre (JRC)	Frank Raes Joint Research Centre, Institute for Environment and Sustainability, Climate Change Unit Via Enrico Fermi, I-21020 Ispra (VA)

2.2.1. The EC Member States

All EC Member States are Parties to the UNFCCC. Therefore, all MS have to prepare individual GHG inventories in accordance with UNFCCC reporting guidelines and to submit those inventories to the Commission in accordance with the timeliness described above.

Apart from submitting their national GHG inventories and inventory reports the MS take part in the reviewing and commenting phase of the draft EC inventory report, which is sent to the MS by 1 March each year. The purpose of circulating the draft EC inventory report is to improve the quality of the EC inventory. The MS check their national data and information used in the EC inventory report and send updates, if necessary. In addition, they comment on the general aspects of the EC inventory report.

In addition, the MS take part in the Monitoring Committee established under Council Decision 99/296/EC. The purpose of the Monitoring Committee is to assist the European Commission in its tasks under Council Decision 99/296/EC.

2.2.2. The European Commission, Directorate-General for the Environment (DG ENV)

The entity with overall responsibility for the EC inventory is the European Commission, Directorate-General for the Environment (DG ENV), in consultation with the EC Member States. The European Commission is the official receiver of the MS national inventories and inventory reports under Council Decision 99/296/EC and the official supplier of the EC inventory and inventory report to the UNFCCC secretariat. In the actual compilation of the EC inventory and inventory report, DG ENV is assisted by the European Environment Agency (EEA) including its European Topic Centre on Air and Climate Change (ETC-ACC) and by Eurostat and the Joint Research Centre (JRC).

The consultation between DG ENV and the Member States takes place in the Monitoring Committee, established under Article 8 of Council Decision 99/296/EC. The Monitoring Committee is composed of the representatives of the Member States and chaired by the representative of the Commission (DG ENV). Procedures within the Committee for decision-making, adoption of measures and voting are also outlined in Council Decision 99/296/EC. In order to facilitate decision making in the Monitoring Committee, two working groups have been established: Working Group 1 'Annual inventories' and Working Group 2 'Assessment of progress (effect of policies and measures, projections)'.

The objectives and tasks of Working Group 1 under the Monitoring Mechanism Committee include:

- the promotion of the timely delivery of national annual greenhouse gas inventories as required under the monitoring mechanism;
- the improvement of the quality of greenhouse gas inventories on all relevant aspects (transparency, consistency, comparability, completeness, accuracy and use of good practices);
- the exchange of practical experience on inventory preparation, on all quality aspects and on the use of national methodologies for GHG estimation;
- the evaluation of the current organisational aspects of the preparation process of the EC inventory and the preparation of proposals for improvements where needed.

2.2.3. The European Environment Agency (EEA)

The European Environment Agency (EEA) assists the Commission in the compilation of the annual EC inventory through the work of the European Topic Centre on Air and Climate Change (ETC-ACC). The activities of the EEA/ETC-ACC include:

- preparation and circulation of the draft EC inventory and inventory report by 1 March based on Member States' submissions;
- initial check of Member States' submissions in cooperation with Eurostat, and JRC, up to 1 March and compilation of results from initial checks (status reports);
- preparation of the final EC inventory and inventory report by 15 April (to be submitted by the Commission to the UNFCCC secretariat);
- consultation with Member States in order to clarify data and other information provided;
- assisting Member States in their reporting of greenhouse gas inventories by means of supplying software tools (see also Chapter 4.11).

The tasks of the EEA and the ETC-ACC are facilitated by the European environmental information and observation network (EIONET), which consists 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. (see http://eionet.eea.eu.int/).

2.2.4. The European Topic Centre on Air and Climate Change (ETC-ACC)

The European Topic Centre on Air and Climate Change (ETC-ACC) was established by a contract between the lead organisation RIVM (The Netherlands) and EEA in March 2001. The ETC-ACC involves 13 organisations and institutions in nine European countries. The technical annex for the 2002 work plan for the ETC-ACC and an implementation plan specify the specific tasks of the ETC-ACC partner organisations with regard to the preparation of the EC inventory. UBA Vienna is the task leader for the compilation of the EC annual inventory in the ETC-ACC, including all tasks mentioned above. ETC-ACC transfers the nationally submitted data from the spreadsheet format of the CRF tables into the ETC-ACC database maintained and managed by UBA Vienna. For the compilation of the EC inventory, the ETC-ACC extracts the required data from this database into the EC CRF.

The EC inventory and inventory report are sent by the ETC-ACC to the EEA on 1 March (Draft EC inventory for further distribution to the European Commission and the EC MS) and in early April (Final EC inventory, for submission to the European Commission and the UNFCCC secretariat). The final EC GHG inventory and the EC inventory report are published on the EEA web site (http://www.eea.eu.int) and the data are made available through the EEA data warehouse (http://dataservice.eea.eu.int/dataservice). In addition, the EC inventory report is published by EEA as a printed report, with a CD-ROM including the data.

2.2.5. Eurostat

Based on Eurostat energy balance data, Eurostat compiles annually by 31 March estimates of the EC CO_2 emissions from fossil fuels using the IPCC reference approach. Eurostat compares these estimates with national estimates of CO_2 emissions from fossil fuels prepared by Member States and provides information summarising and explaining these differences. In order to improve the consistency of MS and Eurostat energy data a project on harmonisation of energy balances has started between Eurostat and national statistical offices (see Chapter 4.3.3). In addition, Eurostat is leading an EU project aimed at improving estimates of GHG emissions from international aviation.

2.2.6. Joint Research Centre (JRC)

The Joint Research Centre (JRC) assists in the improvement of methodologies for the LULUCF sector. It does so (1) by intercomparing methodologies used by the MS for estimating emissions and removals with a focus on LULUCF and (2) by providing EU-wide

estimates with various models/methods for emissions and removals with a focus on LULUCF (including inverse modelling using measurement of ambient air concentrations of GHGs).

2.3. Further improvements of the EC inventory system

2.3.1. Actions taken in response to the UNFCCC review

Apart from a general extension of the EC inventory report 2002, the following issues are included in the 2002 inventory report in response to the draft UNFCCC synthesis and assessment report and the draft UNFCCC centralised review report of the EC GHG inventory 2001.

1. Chapter 4.10 provides an explanation for differences between the sum of MS submissions to the UNFCCC and the EC UNFCCC submission in 2001. The comparison shows that the differences are due to late submissions of Belgium and Luxembourg and, to a smaller extent, to the reporting methods of emissions and removals from LUCF.

2. A chapter on overall GHG trends has been included in the inventory report, in order to facilitate the review process. This chapter covers sections on aggregate emissions in relation to the Kyoto target, and trends by gases, sources and Member States.

3. A key source analysis has been carried out for the EC in order to select those source categories, for which overview tables on MS information are provided in this report. The overview tables include information on MS contribution to EC key sources regarding level and trend and on methodologies, emission factors and quality estimates of the MS. The EC key source analysis is not intended to replace key source analysis by MS which should be the basis for national priorities regarding methodological choices.

4. The results of the initial checks are provided in Annex B in order to give an overview of the completeness of MS submissions to the Commission.

5. Overview tables are produced in order to summarise the information provided by the MS in their CRF and national inventory reports. For example, overview tables are produced from MS CRF Table Summary 3 and Table 7, and from the information on uncertainty and quality assurance/quality control of the MS national inventory reports.

6. The CRF Table 8 on recalculations has been compiled for the EC as a whole. In addition, Chapter 4.2 provides an overview on sector and MS contribution to the EC GHG recalculations.

2.3.2. Future plans regarding improvements of the EC inventory system

Several activities are ongoing at EU level with a view to improve the EC GHG inventory system.

- A proposal for an EU 'Greenhouse gas inventory system' under the Kyoto Protocol has been drafted and discussed in the Monitoring Committee under Council Decision 99/296/EC.

- In 2002, the Commission and the MS will discuss the process of revision of Council Decision 99/296/EC to be fully in accordance with the Kyoto Protocol and the Marrakech Accords of November 2001.

- Eurostat is working with national statistical offices on harmonisation of energy balance data (see Chapter 4.3.3). In addition, Eurostat is involved in an EU project aimed at improving estimates of emissions from international aviation. The JRC is working with MS on the quality improvement of estimates of emissions and removals from LUCF.

3. EC GHG emission trends

This chapter presents the main GHG emission trends in the European Community. First, aggregate results are described as regards total GHG emissions and progress towards fulfilling the EC Kyoto target. Then, emission trends are briefly analysed at gas and source level. Finally, a short overview of MS contribution to EC greenhouse gas trends is given.

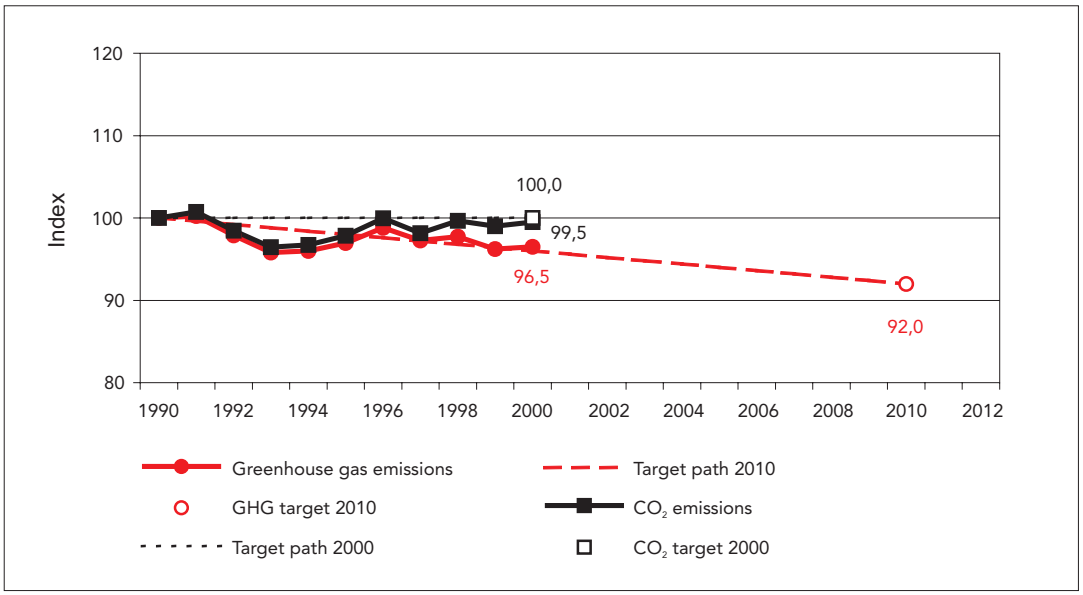
3.1. Total GHG emissions

The European Community increased greenhouse gas emissions in 2000 compared to 1999, but was well below 1990 levels. In 2000, total EC greenhouse gas emissions without LUCF were 4 059 Tg (CO_2 equivalents), which was 0.3 % above 1999 and 3.5 % below 1990 levels.

In the Kyoto Protocol, the EC agreed to reduce its greenhouse gas emissions by 8 % by 2008–12, from 1990 levels. Assuming a linear target path from 1990 to 2010, total EC greenhouse gas emissions were 0.5 index points above this target path in 2000 (Figure 1). Note that the trend changes slightly, if the EC selects a base year other than 1990 for fluorinated gases, as allowed for under the Kyoto Protocol.

CO_2 is by far the most important greenhouse gas, accounting for 82% of total EC emissions in 2000. In 2000, EC CO_2 emissions without LUCF were 3 325 Tg, which was 0.5 % above 1999 but 0.5 % below 1990 levels. In the UNFCCC, the EC agreed to stabilise its CO_2 emissions at 1990 levels by 2000. This target was achieved by the EC (Figure 1).

Figure 1 **EC greenhouse gas emissions 1990–2000 compared with targets for 2000 and 2008–12 (excluding LUCF)**



Note (1): The linear target path is not intended as an approximation of past and future emission trends. It provides a measure of how close the EC emissions in 2000 are to a linear path of emissions reductions from 1990 to the Kyoto target for 2008–12, assuming that only domestic measures will be used. The unit is index points with 1990 emissions being 100. Therefore, it does not deliver a measure of (possible) compliance of the EC with its greenhouse gas targets in 2008–12, but aims at evaluating overall EC greenhouse gas emissions in 2000.

Note (2): Greenhouse gas emission data for the EC as a whole do not include emissions and removals from LUCF. In addition, no adjustments for temperature variations or electricity trade are considered.

3.3. Trends by gases

Table 3 gives an overview of the main trends in EC greenhouse gas emissions and removals for 1990–2000. It shows the importance of CO_2 emissions, which account for 82 % of total GHG emissions and reduced slightly since 1990 (–0.5 %). CO_2 emissions increased by 0.5 % in 2000 compared to 1999 mainly in the source categories 1.A.1 'Energy industries' and, to a smaller extent, in 1.A.2 'Manufacturing industries'.

CH_4 emissions account for 8 % of total EC greenhouse gas emissions and decreased by 20 % between 1990 and 2000. In 2000, CH_4 emissions decreased by 2.7 % compared to 1999. The emission reductions in 2000 were mainly achieved in the source categories 1.B.1 'Fugitive emissions from solid fuels', 4.A. 'Enteric fermentation' and 6.A. 'Solid waste disposal on land'.

N_2O emissions are responsible for 8 % of total greenhouse gas emissions and decreased by 16 % between 1990 and 2000. Compared to 1999, N_2O emissions decreased by 0.6 % in 2000. The main source categories reducing N_2O emission in 2000 were 2.B. 'Chemical industry', 1.A.4. 'Other sectors', 4.D. 'Agricultural soils' and 4.B. 'Manure management'.

HFC emissions account for 1.2 % of total EC greenhouse gas emissions and increased by 94 % between 1990 and 2000. In 2000, HFC emissions increased by 16 % compared to 1999. The increases occurred in source category 2.F. 'Consumption of halocarbons and SF_6'.

PFC emissions account for 0.2 % of total EC greenhouse gas emissions and decreased by 49 % between 1990 and 2000. Also in 2000, PFC emissions decreased by 7 % compared to 1999. The decreases were achieved in source category 2.C. 'Metal production'.

SF_6 emissions account for 0.2 % of EC greenhouse gas emissions and increased by 6 % between 1990 and 2000. In 2000, SF_6 emissions decreased by 1 % compared to 1999.

Overview of EC greenhouse gas emissions and removals from 1990 to 2000 in CO_2 equivalents (Gg) Table 3

GREENHOUSE GAS EMISSIONS	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	CO_2 equivalent (Gg)										
Net CO_2 emissions/removals	3.142.800	3.143.456	3.081.363	3.003.776	3.025.494	3.072.137	3.133.856	3.073.187	3.132.504	3.102.360	3.144.119
CO_2 emissions (without LUCF) [6]	3.341.803	3.366.897	3.290.290	3.223.445	3.232.829	3.270.286	3.340.775	3.280.294	3.330.477	3.308.494	3.324.800
CH_4	426.506	415.935	405.076	393.458	383.084	380.897	373.975	363.742	357.818	350.744	341.770
N_2O	400.948	396.960	386.944	375.590	380.672	380.715	390.379	389.499	361.044	340.047	338.111
HFCs	24.426	24.514	24.806	27.250	31.815	35.830	39.974	47.141	51.975	40.672	47.285
PFCs	13.545	11.949	9.788	8.403	7.717	7.765	7.754	7.505	7.405	7.331	6.846
SF_6	8.440	9.074	9.744	10.513	11.361	12.271	12.073	11.986	11.330	9.045	8.955
Total (with net CO_2 emissions/removals)	**4.016.664**	**4.001.889**	**3.917.720**	**3.818.989**	**3.840.143**	**3.889.614**	**3.958.011**	**3.893.060**	**3.922.075**	**3.850.199**	**3.887.086**
Total (without LUCF)	**4.207.624**	**4.217.324**	**4.118.410**	**4.030.489**	**4.039.374**	**4.079.753**	**4.156.875**	**4.092.107**	**4.111.560**	**4.048.197**	**4.059.276**

3.3. Trends by sources

Table 4 gives an overview of EC greenhouse gas emissions in the main source categories for 1990–2000. Source category 1 'Energy' is by far the most important source category with a share of 81 % in total EC greenhouse emissions (without LUCF). Emissions from source category 1 'Energy' decreased by 1.3 % between 1990 and 2000, but increased in 2000 compared to 1999 by 0.3 %.

Agriculture is the second largest source category accounting for 10 % of total EC greenhouse gas emissions (without LUCF). Emissions from source category 4 'Agriculture' decreased by 6 % between 1990 and 2000 and by 1 % from 1999 to 2000.

Source category 2 'Industrial processes' has a share of 6 % in total EC greenhouse gas emissions and decreased emissions by 15 % between 1990 and 2000. In 2000, emissions increased by 3 % compared to 1999.

Emissions from source category 6 'Waste' account for 3 % of total EC greenhouse gas emissions and reduced by 21 % between 1990 and 2000. Also in 2000, emissions decreased further by 1.5 % compared to 1999.

Table 4 **Overview of EC greenhouse gas emissions in the main source categories 1990 to 2000 in CO_2 equivalents (Gg)**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	CO_2 equivalent (Gg)										
1. Energy	3.320.359	3.352.346	3.278.313	3.212.871	3.207.851	3.243.215	3.315.077	3.248.410	3.293.799	3.268.313	3.276.742
2. Industrial processes	305.039	297.207	286.934	276.046	290.402	296.755	302.954	310.307	287.405	252.639	260.547
3. Solvent and other product use	9.065	8.990	8.794	8.427	8.460	8.498	8.544	8.617	8.662	8.646	8.796
4. Agriculture	416.343	405.557	396.459	390.461	391.371	391.599	395.423	395.150	394.100	393.066	389.535
5. Land-use change and forestry [7]	-190.960	-215.434	-200.690	-211.500	-199.232	-190.139	-198.864	-199.046	-189.485	-197.997	-172.190
6. Waste	154.949	151.386	146.079	140.905	139.373	137.761	132.959	127.845	125.649	123.555	121.702
7. Other	1.865	1.835	1.828	1.776	1.918	1.937	1.929	1.777	1.945	1.977	1.954

3.4. Trends by Member States

Table 5 gives an overview of MS contribution to the EC greenhouse gas emissions for 1990–2000. The largest emitters in the EU are Germany and the United Kingdom accounting for 24 % and 16 % respectively. France and Italy account for 13 % of EC greenhouse gas emissions each, Spain is responsible for 10 %.

Emission trends vary considerably between MS. Over the whole period 1990 to 2000, seven MS achieved GHG emissions reductions, in particular Germany (–19 %) and the United Kingdom (–13 %) achieved large emission reductions. Eight MS increased emissions with Spain having the largest increases in absolute and relative terms. In 2000, eight EC Member States achieved emission reductions compared to 1999, but seven MS increased emissions.

A more detailed analysis of EC greenhouse gas trends will be published by the EEA in October 2002 (see also Chapter 4.9.3).

Table 5 **Overview of MS contribution to EC greenhouse gas emissions excluding LUCF from 1990 to 2000 in CO_2 equivalents (Gg)**

Member State	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Austria	77.388	81.314	74.893	74.770	76.159	78.606	79.951	81.319	79.458	79.731	79.754
Belgium	143.125	148.442	147.351	145.737	149.651	153.543	155.801	150.927	154.196	151.202	151.930
Denmark	69.360	80.157	73.591	76.332	80.152	77.379	90.937	81.106	75.982	72.916	68.505
Finland	77.093	74.809	71.369	71.667	77.751	75.168	80.536	79.377	76.833	76.131	73.958
France	551.805	574.273	563.240	540.990	537.252	547.090	562.727	553.669	566.973	548.553	542.299
Germany	1.222.765	1.169.013	1.116.027	1.095.819	1.074.128	1.071.181	1.084.357	1.048.155	1.026.475	993.819	991.421
Greece	104.755	104.760	106.172	106.714	109.238	110.429	114.220	119.504	124.343	123.697	129.652
Ireland	53.430	54.096	54.712	54.470	56.366	57.246	58.847	61.295	63.653	65.275	66.277
Italy	522.132	523.063	519.499	506.951	500.495	528.105	521.787	525.854	536.389	539.519	543.464
Luxembourg	10.836	11.380	11.204	11.353	12.661	7.745	7.805	6.804	5.872	5.982	5.949
Netherlands	210.342	221.528	218.515	220.672	222.607	223.608	234.215	223.951	226.533	217.827	216.916
Portugal	65.106	66.938	70.167	68.811	69.115	73.299	71.672	73.800	77.780	85.605	84.700
Spain	286.428	293.570	302.773	287.638	304.672	318.135	310.899	331.168	341.930	370.920	385.987
Sweden	70.566	70.940	69.127	69.183	73.634	72.744	76.423	71.424	72.545	70.505	69.356
United Kingdom	742.492	743.041	719.771	699.383	695.493	685.474	706.699	683.752	682.597	646.514	649.106
EU15	**4.207.624**	**4.217.324**	**4.118.410**	**4.030.489**	**4.039.374**	**4.079.753**	**4.156.875**	**4.092.107**	**4.111.560**	**4.048.197**	**4.059.276**

4. Methodologies

The EC greenhouse gas inventory is compiled in accordance with the recommendations for inventories set out in the 'UNFCCC guidelines for the preparation of national communications by Parties included in Annex 1 to the Convention, Part 1: UNFCCC reporting guidelines on annual inventories', to the extent possible. In addition, the 'Revised IPCC 1996 guidelines for national greenhouse gas inventories' have been applied. At EU level, Council Decision 99/296/EC and the guidelines thereunder have been used for the compilation of the EC GHG inventory.

4.1. Data basis

4.1.1 Member States GHG submissions 2002

The EC greenhouse gas inventory is compiled on the basis of the inventories of the 15 EC Member States. Therefore, the quality of the EC inventory depends on the timeliness and the quality of the Member States' submissions.

Table 6 summarises timeliness and completeness of the Member States' submissions as by 5 April 2002. It shows that seven MS submitted their GHG inventories in time to the European

Date of submissions (updates submitted), years covered and CRF tables available from Member States by 5 April 2002 Table 6

Member State	Submission dates	Latest data available	Years covered	CRF tables [1])
Austria	31 Jan. 2002	2000	1990– 2000	All
Belgium	21 Dec. 2001	2000	1990–2000	Sectoral report tables, summary tables
	28 Mar. 2002	2000	1999– 2000	Sectoral report tables, summary tables
Denmark	30 Dec. 2001	2000	1990–2000	All
	27 Mar. 2002	2000	1990–2000	All
Finland	14 Dec. 2001	2000	1990–2000	All
	22 Mar. 2002	2000	1990–2000	All
France	31 Dec. 2001	2000	1990–2000	Full CRF only for 2000
	13 Feb. 2002	2000	1990–2000	All
Germany	28 Mar. 2002	2000	1990–2000	Summary and trend tables only
Greece	29 Mar. 2002	2000	1990–2000	All
Ireland	30 Jan. 2002	2000	1990–2000	Full CRF only for 2000 No F-gases
Italy	29 Mar. 2002	2000	1990–2000	Full CRF only for 2000
Luxembourg	21 Feb. 2002	2000	2000	Summary Table 1.A No F-gases
Netherlands	14 Dec. 2001	2000	1990–2000	All
	8 Mar. 2002	2000	1990–2000	All
Portugal	28 Mar. 2002	2000	1990–2000	All
Spain	5 Apr. 2002	2000	1990–2000	All
Sweden	21 Dec. 2001	2000	1990–2000	All
	28 Mar. 2002	2000	2000	All
United Kingdom	21 Dec. 2001	2000	1990–2000	All
	27 Mar. 2002	2000	1990–2000	All

[1]) All = all or almost all (more than approx. 90 %) of the CRF tables (see Annex B for more details)

Commission, i.e. by 31 December 2001. Ten MS submitted all or almost all tables (i.e. more than 90 %) of the CRF tables for 1990–2000. Two MS provided a complete submission for the year 2000. Two MS did not provide information on F-gases. The completeness of national submissions with regard to individual CRF tables in the 2002 submission can be found in the status reports in Annex B.

Table 7 shows the availability of Member States' national inventory reports and additional inventory information. For nine Member States national inventory reports are available either for 2001 and/or 2002.

Table 7 **National inventory reports and additional information available from Member States as by 5 April 2002**

	2001	2002
Austria	Umweltbundesamt *Austria's national inventory report 2001. Submission under the United Nations Framework Convention on Climate Change 2001*, Vienna, July 2001	
Denmark	National Environmental Research Institute *Denmark's national inventory report. Submitted under the United Nations Framework Convention on Climate Change 1990–99*, Ministry of Environment and Energy, April 2001	
Finland	Ministry of the Environment *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–99. Summary*, Helsinki, 27 March 2001 R. Pipatti *Greenhouse gas emissions and removals in Finland. Emission trends 1990 – 99. Key sources. Methodologies, activity data and emission factors.* VTT Energy, Technical Research Centre of Finland, 9 April 2001	Ministry of the Environment *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–2000. Summary*, Helsinki, 14 December 2001 Ministry of the Environment *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–2000. Summary*, Helsinki, 22 March 2001
France	CITEPA *Inventaire des émissions de gaz à effet de serre en France au cours de la periode 1990–99*, Décembre 2000	CITEPA *Inventaire des émissions de gaz à effet de serre en France au titre de la convention cadre des Nations Unies sur le changement climatique*, Décembre 2001
Germany		Bericht 2001 der Bundesrepublik Deutschland über ein System zur Beobachtung der Emissionen von CO_2 und anderen Treibhausgasen entsprechend der Ratsentscheidung 1999/296/EG
Netherlands	J.G.J. Olivier, et al.: *Greenhouse gas emissions in the Netherlands 1990–99. National inventory report 2001*, RIVM report 773201 005, April 2001	J.G.J. Olivier and P.W.H.G. Coenen: *Greenhouse gas emissions in the Netherlands 1990–2000. National inventory report 2002. EU summary report 1990–2000*, EU Draft, RIVM, December 2001
Spain	Ministerio de Medio Ambiente *Spain's greenhouse gases inventory report. Submission 2001. Council Decision 1999/296/EC*, Madrid, February 2001	Ministry of the Environment *Greenhouse gas emissions inventories report from Spain 1990–2000. Communication to the European Commission (Decision 1999/296/CE)* Ministry of the Environment, Directorate-General for Environmental Quality and Assessment, Madrid, March 2002
Sweden	*Sweden's national inventory report 2001. Submitted under the United Nations Convention on Climate Change*, April 2001	Swedish Environmental Protection Agency: *Report to the European Commission on carbon dioxide and other greenhouse gases in accordance with Council Decision 1999/296/EC. Part 1 Sweden's national inventory report 2002* Sweden, 21 December 2001 S. Fink, et al. *Sweden's national inventory report. Submitted under the United Nations Convention on Climate Change* Swedish Environmental Protection Agency, April 2002
UK	AG Salway, et al.: *UK greenhouse gas inventory,1990 to 1999 annual report for submission under the Framework Convention on Climate Change*, March 2001	AG Salway and R Milne *Methodological Changes to the UK greenhouse gas inventory,* December 2001 AG Salway *Changes to the UK greenhouse gas inventory since the provisional inventory,* March 2002

4.1.2. Data gaps and gap filling procedures

The EC greenhouse gas inventory is compiled by adding the estimates from inventory submissions of the 15 EC Member States. For data gaps in Member States' inventory submissions the following procedure is applied by EEA/ETC-ACC:

1. If emission data are available for previous years.

   - For CH_4, N_2O, HFCs, PFCs and SF_6, emissions reported for the most recent previous year are taken as an approximated estimate for the missing year.

   - For CO_2 emissions of all CRF categories except category 1 'Energy' also the emissions reported for the most recent previous year are taken as an approximated estimate for the missing year.

   - For CO_2 emissions of CRF source category 1 'Energy' the latest data reported by the Member State are used and extrapolated on the basis of percentage changes of CO_2 emissions from fossil fuel combustion as estimated for more recent years by Eurostat for this Member State. The Eurostat estimates are compiled using the IPCC reference approach and energy balance data provided annually by Member States.

2. If emission data is not available for any year between 1990 and 2000, data gaps are not filled.

For the following Member States, data gaps existed by 5 April 2002:

Overview of data gaps by 5 April 2002 Table 8

Member State	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Belgium				1990–1994	1991–1994	1991–1994
Greece						1990–2000
Luxembourg	1991–1993	1991–1993	1991–1993	1990–2000	1990–2000	1990–2000
Ireland				1990–2000	1990–2000	1990–2000
Portugal				1990–2000	1990–1994	1990–1994

For the EC inventory 2002, the data gap procedure has been applied for the following MS, years and gases:

- For Belgium, HFC emissions for 1990–94 were estimated on basis of 1995 data; PFC and SF_6 emissions were estimated for 1991–94 on basis of 1990 data (Table 9).

- For Luxembourg, emissions of CO_2, CH_4 and N_2O were estimated for 1991–93 on basis of 1990 data (Table 10).

- For Portugal, emissions of PFCs and SF_6 were estimated for 1990–94 on the basis of 1995 data (Table 11).

No gaps were filled for Greece for SF_6, Ireland and Luxembourg for HFCs, PFC,s and SF_6, and for Portugal for HFCs since emission data were not available for any of the years 1990–2000.

Data gap filling for Belgium for HFCs, PFCs and SF_6 (Gg of CO_2 equivalents) Table 9

	1990	1991	1992	1993	1994	1995
HFC	332	332	332	332	332	332
PFC	63	63	63	63	63	0
SF_6	335	335	335	335	335	239

Note: Values are shaded for emission estimates derived by gap filling.

Table 10 **Data gap filling for Luxembourg for CO_2, CH_4 and N_2O for 1991–1993 (Gg of CO_2 equivalents)**

	Most recent previous year reported	Data gap filling for years:		
	1990	1991	1992	1993
CH_4	498	498	498	498
N_2O	208	208	208	208
Total CO_2 emissions without LUCF and without CRF category 1 'Energy'	1.470	1.470	1.470	1.470
CO_2 CRF category 1 'Energy'	8.683	9.226	9.050	9.199
Total CO_2 emissions without LUCF	10.152	10.695	10.520	10.669
Percentage change of CO_2 emissions from fossil fuels based on Eurostat estimation		6,3 %	-1,9 %	1,6 %

Note: Values are shaded for emission estimates derived by gap filling.

Table 11 **Data gap filling for Portugal for PFCs and SF_6 (Gg of CO_2 equivalents)**

	1990	1991	1992	1993	1994	1995
PFC	157	157	157	157	157	157
SF_6	1	1	1	1	1	1

Note: Values are shaded for emission estimates derived by gap filling.

4.1.3.Data basis of the EC GHG inventory

The EC GHG inventory 2002 is based on:

1. the GHG submissions of the MS to the Commission in 2002;
2. previous GHG submissions, in cases where MS did not provide the complete time series for each gas in 2002; and
3. emission estimates derived from data gap filling as described above, in cases where no data were available for a specific gas and year (this applies to a very small part of the EC GHG inventory).

Tables 12–15 aim at making the data basis of the EC GHG inventory 2002 transparent and also showing that only a very small part of the EC GHG inventory was prepared using either previous GHG submissions or gap filling. Values in white cells without a frame are data provided by MS in 2002. Shaded values derive from gap filling. Framed cells indicate that the emission data have been taken from MS submissions in previous years. 'NE' ('not estimated') indicates that data are not available and that no gap filling has been made.

Table 12 **Data basis of CO_2 emissions without LUCF in Gg**

EC Member State	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Austria	62.297	66.174	60.349	60.717	61.995	64.015	65.386	67.012	65.464	66.025	66.102
Belgium	117.966	123.571	122.714	120.887	124.072	127.647	130.367	125.579	128.607	125.639	127.040
Denmark	52.635	63.460	57.523	59.884	63.855	61.001	74.514	65.161	60.006	57.245	52.852
Finland	62.466	61.071	58.670	59.172	65.468	62.684	68.130	66.842	64.601	64.073	62.305
France	394.067	417.406	408.233	388.491	384.050	390.492	404.177	398.310	419.453	407.004	401.923
Germany	1.014.500	975.951	928.307	918.268	904.111	903.665	923.085	892.649	885.963	859.246	857.908
Greece	84.336	84.230	85.774	85.847	87.479	87.644	90.163	94.668	99.419	98.626	103.727
Ireland	31.508	32.185	32.821	32.350	33.916	34.430	35.629	38.000	39.957	41.825	43.815
Italy	441.133	440.160	439.152	426.839	420.586	445.925	440.296	442.737	456.489	459.077	461.822
Luxembourg	10.152	10.695	10.520	10.669	11.998	7.078	7.098	6.086	5.179	5.432	5.399
Netherlands	159.630	167.489	165.702	167.934	168.764	172.659	179.706	168.973	175.057	172.061	173.527
Portugal	44.109	45.951	49.569	48.620	48.713	52.688	50.986	53.102	56.894	64.062	63.150
Spain	227.233	234.518	243.023	229.942	242.657	254.411	242.215	261.369	270.130	295.233	306.632
Sweden	56.065	56.735	54.958	54.879	59.233	58.574	62.062	57.087	58.142	56.458	55.855
United Kingdom	583.705	587.299	572.975	558.945	555.933	547.374	566.961	542.718	545.116	536.490	542.743
EU15	**3.341.803**	**3.366.897**	**3.290.290**	**3.223.445**	**3.232.829**	**3.270.286**	**3.340.775**	**3.280.294**	**3.330.477**	**3.308.494**	**3.324.800**

Note: Values in white cells without a frame are data provided by MS in 2002. Shaded values derive from gap filling. Framed cells indicate that the emission data has been taken from MS submissions in previous years. 'NE' ('not estimated') indicates that data are not available and that no gap filling has been made.

Data basis of CH_4 emissions in CO_2 equivalents (Gg) Table 13

EC Member State	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Austria	11.298	11.078	10.814	10.685	10.511	10.289	10.118	9.872	9.642	9.537	9.402
Belgium	11.557	11.596	11.660	11.610	11.745	11.594	11.507	11.399	11.410	11.269	10.995
Denmark	5.845	5.905	5.915	6.034	6.070	6.142	6.235	6.128	6.026	5.653	5.753
Finland	6.141	5.778	5.378	4.988	4.658	4.644	4.466	4.283	4.061	3.931	3.930
France	66.559	67.577	68.021	68.797	69.187	70.118	69.482	64.299	63.572	61.870	60.296
Germany	110.741	99.606	92.401	84.365	79.208	75.934	68.994	67.359	65.243	63.868	60.583
Greece	8.744	8.706	9.008	9.108	9.365	9.497	9.814	9.924	10.442	10.413	10.890
Ireland	12.836	12.992	13.030	13.099	13.159	13.311	13.559	13.747	13.631	13.307	12.800
Italy	39.252	39.653	37.895	37.503	38.006	38.591	38.405	38.453	38.068	37.663	37.676
Luxembourg	498	498	498	498	460	464	501	507	480	483	478
Netherlands	27.137	27.487	26.399	25.747	25.262	24.571	24.635	23.115	22.357	21.793	20.638
Portugal	12.903	12.912	12.764	12.474	12.723	12.694	12.712	12.795	12.764	13.121	13.134
Spain	29.648	30.038	30.860	31.281	32.080	32.822	34.760	35.443	36.552	37.306	38.363
Sweden	6.810	6.745	6.878	6.829	6.724	6.644	6.633	6.527	6.375	6.169	5.874
United Kingdom	76.535	75.363	73.556	70.438	63.926	63.582	62.153	59.891	57.195	54.361	50.960
EU15	**426.506**	**415.935**	**405.076**	**393.458**	**383.084**	**380.897**	**373.975**	**363.742**	**357.818**	**350.744**	**341.770**

Note: Values in white cells without a frame are data provided by MS in 2002. Shaded values derive from gap filling. Framed cells indicate that the emission data have been taken from MS submissions in previous years. 'NE' ('not estimated') indicates that data are not available and that no gap filling has been made.

Data basis of N_2O emissions in CO_2 equivalents (Gg) Table 14

EC Member State	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Austria	2.308	2.399	2.420	2.485	2.550	2.566	2.561	2.552	2.561	2.544	2.515
Belgium	13.216	12.889	12.590	12.850	13.442	14.068	13.639	13.551	13.880	13.822	13.422
Denmark	10.837	10.730	10.060	10.184	9.964	9.891	9.748	9.335	9.373	9.317	9.083
Finland	8.414	7.911	7.287	7.480	7.591	7.796	7.847	8.067	7.912	7.749	7.183
France	91.078	90.671	89.174	86.624	87.080	89.134	90.707	91.724	83.978	78.396	76.891
Germany	88.593	84.415	85.835	82.023	79.369	80.445	82.047	77.455	63.808	60.209	60.080
Greece	10.623	10.521	10.467	10.143	10.258	9.899	10.337	10.628	10.625	10.418	11.010
Ireland	9.086	8.919	8.860	9.021	9.291	9.505	9.660	9.548	10.066	10.143	9.661
Italy	40.826	42.305	41.526	41.676	40.676	41.915	41.594	42.765	39.802	40.759	41.644
Luxembourg	208	208	208	208	214	213	216	233	236	90	94
Netherlands	16.524	19.195	19.669	19.696	20.204	18.173	20.258	21.109	17.822	17.362	16.980
Portugal	7.937	7.917	7.677	7.558	7.522	7.759	7.815	7.745	7.964	8.265	8.258
Spain	26.260	25.987	25.282	23.295	25.616	25.372	27.730	26.942	27.715	28.988	30.497
Sweden	7.167	6.942	6.785	6.953	7.118	6.892	7.103	7.075	7.335	7.112	6.916
United Kingdom	67.873	65.953	59.103	55.396	59.779	57.085	59.119	60.772	57.967	44.874	43.878
EU15	**400.948**	**396.960**	**386.944**	**375.590**	**380.672**	**380.715**	**390.379**	**389.499**	**361.044**	**340.047**	**338.111**

Note: Values in white cells without a frame are data provided by MS in 2002. Shaded values derive from gap filling. Framed cells indicate that the emission data have been taken from MS submissions in previous years. 'NE' ('not estimated') indicates that data are not available and that no gap filling has been made.

Table 15 **Data availability of actual HFC, PFC and SF_6 emissions in CO_2 equivalents (Gg)**

EC Member State		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Austria	HFC	4	6	9	12	17	546	625	718	816	870	1.033
	PFC	963	974	576	48	54	16	15	18	21	25	25
	SF_6	518	683	725	823	1.033	1.175	1.246	1.148	955	730	677
Belgium	HFC	332	332	332	332	332	332	418	527	631	804	804
	PFC	63	63	63	63	63	0	0	0	0	0	0
	SF_6	335	335	335	335	335	239	206	206	0	0	0
Denmark	HFC	0	0	4	96	141	237	376	401	503	616	730
	PFC	0	0	0	0	0	1	3	7	15	20	28
	SF_6	43	62	89	135	122	107	61	73	59	65	59
Finland	HFC	0	0	0	0	7	30	78	168	246	317	502
	PFC	1	1	1	1	1	1	1	1	1	29	22
	SF_6	71	48	32	26	26	14	14	16	12	32	17
France	HFC	2.252	1.510	1.067	807	821	1.302	2.186	3.095	3.751	4.816	6.973
	PFC	3.192	2.472	2.142	1.641	1.415	1.331	1.450	1.503	1.662	1.919	1.672
	SF_6	2.195	2.216	2.238	2.262	2.288	2.314	2.350	2.368	2.291	2.283	2.279
Germany	HFC	2.340	2.340	2.470	3.750	3.980	3.130	2.580	3.450	4.278	5.250	7.700
	PFC	2.694	2.352	2.138	2.012	1.676	1.764	1.830	1.554	1.709	1.709	1.709
	SF_6	3.896	4.350	4.876	5.401	5.784	6.243	5.822	5.688	5.473	3.537	3.442
Greece	HFC	935	1.107	908	1.638	2.209	3.369	3.916	4.194	4.053	4.156	4.281
	PFC	258	258	252	153	94	83	72	165	204	132	148
	SF_6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Ireland	HFC	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	PFC	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	SF_6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Italy	HFC	351	355	359	355	628	932	788	1.154	1.374	1.556	1.786
	PFC	237	231	206	204	212	272	177	184	201	190	209
	SF_6	334	358	360	373	388	470	527	562	455	274	328
Luxembourg	HFC	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	PFC	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	SF_6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Netherlands	HFC	4.432	4.820	4.540	5.066	6.339	5.978	7.209	8.214	9.201	4.826	3.913
	PFC	2.432	2.437	2.099	2.118	1.890	1.867	2.042	2.154	1.727	1.449	1.531
	SF_6	187	100	106	110	148	361	365	386	369	336	327
Portugal	HFC	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	PFC	157	157	157	157	157	157	157	157	157	157	157
	SF_6	1	1	1	1	1	1	1	1	1	1	1
Spain	HFC	2.403	2.179	2.763	2.258	3.458	4.645	5.334	6.507	6.643	8.513	9.878
	PFC	828	787	782	794	785	790	759	784	750	696	409
	SF_6	56	61	64	67	76	94	101	122	141	184	209
Sweden	HFC	3	6	8	30	69	124	173	266	297	346	369
	PFC	440	427	414	402	390	389	343	316	306	329	266
	SF_6	81	84	84	90	100	120	109	153	90	91	77
United Kingdom	HFC	11.374	11.859	12.346	12.905	13.814	15.205	16.290	18.447	20.183	8.601	9.316
	PFC	2.281	1.790	959	811	980	1.094	905	661	652	678	668
	SF_6	724	776	833	889	1.061	1.133	1.270	1.263	1.485	1.510	1.540
Total	**HFC**	**24.426**	**24.514**	**24.806**	**27.250**	**31.815**	**35.830**	**39.974**	**47.141**	**51.975**	**40.672**	**47.285**
	PFC	**13.545**	**11.949**	**9.788**	**8.403**	**7.717**	**7.765**	**7.754**	**7.505**	**7.405**	**7.331**	**6.846**
	SF_6	**8.440**	**9.074**	**9.744**	**10.513**	**11.361**	**12.271**	**12.073**	**11.986**	**11.330**	**9.045**	**8.955**

Note: Values in white cells without a frame are data provided by MS in 2002. Shaded values derive from gap filling. Framed cells indicate that the emission data have been taken from MS submissions in previous years. 'NE' ('not estimated') indicates that data are not available and that no gap filling has been made.

4.2.Recalculations

Table 16 provides the absolute differences of total EC greenhouse gas emissions between the latest submission and the previous submission. The percentage difference of total EC GHG emissions without LUCF between latest and previous submission is 0.21 % in 1990 and 0.46 % in 1999.

Table 16 **Overview of recalculations of EC total GHG emissions (difference between latest submission and previous submission in Gg CO_2 equivalents)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Total CO_2 equivalent emission with LUCF	9435	6549	5210	9666	982	-1450	-5717	-5275	-2258	13766
Total CO_2 equivalent emission without LUCF	8932	8269	7069	10693	3431	-267	-3926	-2732	70	18620

Table 17 provides an overview of the recalculations of GHG emissions for the EC at the most aggregate gas and sector level for 1990 and 1999.

Overview of recalculations of EC GHG emissions at gas and sector level (difference between latest submission and previous submission in Gg CO_2 equivalents) Table 17

1990	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Total emissions and removals	17281	-13557	6713	-1201	43	157
Energy	13493	-1281	-468	NO	NO	NO
Industrial processes	3883	94	-5248	-1201	43	157
Solvent and other product use	-271	0	68	NO	NO	NO
Agriculture	0	-9435	10320	NO	NO	NO
LUCF (net)	847	-305	-38	NO	NO	NO
Waste	765	-2631	2073	NO	NO	NO
Other	-1436	1	3	NO	NO	NO
1999	**CO_2**	**CH_4**	**N_2O**	**HFCs**	**PFCs**	**SF_6**
Total emissions and removals	32824	-15609	1560	-1949	-1030	-2031
Energy	32879	-3227	-2772	NO	NO	NO
Industrial processes	5470	37	-709	-1949	-1030	-2031
Solvent and other product use	-418	0	-5	NO	NO	NO
Agriculture	0	-6436	2526	NO	NO	NO
LUCF (net)	-5150	22	275	NO	NO	NO
Waste	1836	-6006	2237	NO	NO	NO
Other	-1794	0	8	NO	NO	NO

Table 18 provides an overview of recalculations for the EC key source categories 2000 (see Chapter 4.8 for information on identification of EC key sources).

Recalculations for the EC key source categories 2000 (difference between latest submission and previous submission in Gg of CO_2 equivalents and in percent) Table 18

Greenhouse gas source categories	Gas	Recalculations 1990		Recalculations 1999	
		(Gg CO_2 equivalents)	%	(Gg CO_2 equivalents)	%
1.A.1.Energy industries	CO_2	-17	0,00	22.008	2,11
1.A.2.Manufacturing industries	CO_2	11.287	1,77	8.036	1,38
1.A.3.Transport	CO_2	-2.915	-0,42	-1.808	-0,22
1.A.3.Transport	N_2O	-494	-4,05	-1.568	-6,34
1.A.4.Other sectors	CO_2	5.358	0,85	4.707	0,75
1.A.4.Other sectors	CH_4	-10	-0,10	-311	-3,89
1.A.4.Other sectors	N_2O	68	0,61	-875	-9,04
1.A.5.Other	CO_2	-400	-2,02	323	4,54
1.B.1.Fugitive emissions from solid fuels	CH_4	-446	-0,88	-304	-1,25
1.B.2.Fugitive emissions from oil and gas	CH_4	-1.263	-3,75	-3.164	-9,91
2.B. Chemical industry	HFC	0	0,00	0	0,00
2.A. Mineral products	CO_2	3.867	3,58	1.884	1,75
2.B. Chemical industry	N_2O	-5.252	-4,76	-572	-1,19
2.C. Metal production	CO_2	527	2,09	-297	-1,24
2.C. Metal production	PFC	43	0,37	-1.126	-17,95
2.E. Production of halocarbons and SF_6	HFC	-1.203	-5,33	-1.968	-9,63
2.F. Consumption of halocarbons and SF_6	HFC	1	0,40	-1.537	-6,93
4.A. Enteric fermentation	CH_4	2.279	1,61	2.999	2,30
4.B. Manure management	CH_4	-9.122	-21,61	-6.783	-16,99
4.B. Manure management	N_2O	5.890	21,36	561	1,92
4.D. Agricultural soils	N_2O	4.420	2,28	2.134	1,13
6.A. Solid waste disposal on land	CH_4	-3.031	-2,23	-4.728	-4,48

Table 19 gives an overview of MS contribution to EC recalculations for 1990–2000. The percentage differences of total GHG recalculations between latest and previous submissions vary: in 1990 the range was between +4.67 % (Belgium) and –6.34 % (Spain); in 1999, the range was between +7.94 (Portugal) and –5.33 (Netherlands). The reasons for the recalculations vary for Member States and source categories. For more details see the information provided by the MS in Annex D.

Table 19 **Contribution of MS to EC recalculations of total GHG emissions without LUCF for 1990–1999 (difference between latest submission and previous submission Gg of CO_2 equivalents)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Austria	448	439	489	1.115	538	562	801	492	255	507
Belgium	6.381	4.537	3.480	3.466	2.693	4.727	2.666	6.321	8.842	10.824
Denmark	-592	-385	-972	-198	50	488	734	853	-485	-38
Finland	0	0	0	0	0	0	0	-68	0	-112
France	6.140	5.464	6.450	9.796	8.358	8.619	9.570	10.012	10.043	4.037
Germany	16.128	14.082	13.976	13.045	10.069	9.681	7.986	8.713	6.827	11.411
Greece	-587	-545	-386	-594	-246	-325	-126	130	293	507
Ireland	-67	-71	-71	-71	-71	-71	-71	-71	-62	-62
Italy	3.850	4.109	3.963	3.576	2.880	3.099	2.337	1.293	149	-1.549
Luxembourg	0	0	0	0	0	0	0	0	0	-160
Netherlands	-5.456	-1.013	-1.318	-1.191	-1.474	-9.289	-6.904	-13.432	-10.546	-12.258
Portugal	462	-42	-289	-30	-446	324	331	17	699	6.301
Spain	-19.404	-18.933	-19.041	-18.916	-19.487	-18.604	-21.181	-17.873	-16.439	-9.272
Sweden	1.020	276	120	30	41	103	-885	50	6	-166
UK	610	351	669	666	526	416	816	832	488	8.649
EU15	**8.932**	**8.269**	**7.069**	**10.693**	**3.431**	**-267**	**-3.926**	**-2.732**	**70**	**18.620**

4.3. Reference approach

4.3.1. Reference approach for EC

The IPCC reference approach for CO_2 from fossil fuels for the EC is based on Eurostat energy data (New Cronos database, version June 2001), which provides comparable data for all Member States. Energy statistics are submitted to Eurostat by Member States on an annual basis with the five joint Eurostat/IEA/UNECE questionnaires on solid fuels, oil, natural gas, electricity and heat, and renewables and wastes. The national administration responsible for filling in these questionnaires is the national statistical office, a ministry or a national agency responsible for energy. On the basis of this information Eurostat compiles the annual energy balances which are used for the estimation of CO_2 emissions from fossil fuels by Member States and for the EU as a whole.

The IPCC reference approach for the EC is based on annual energy data of Eurostat, which are available for 1990–99. For the year 2000, no IPCC reference approach could be calculated, as for 2000 only monthly data are available. Monthly data cannot be compared with annual data for several reasons: (1) monthly data on feedstocks and non-energy use are not available; (2) adjustments for exports, imports and stock changes are made when compiling annual data; (3) there is no fuel breakdown for secondary petroleum products in monthly data; (4) there is no estimation for international marine bunkers in monthly data.

The data basis for the EC IPCC reference approach as regards activity data, net calorific values and carbon emission factors are the Eurostat New Cronos database (version June 2001). In the CRF Table 1.A(b) some fuel categories are grouped and average net calorific values are used: 'Orimulsion' is included in 'Residual fuel oil'. 'Natural gas liquids' is included in 'Crude oil'. 'Other kerosene' is included in 'Total kerosene'. 'Anthracite' and 'Coking coal' are included in 'Other bituminous coal'. 'Sub-bitumenous coal' and 'Peat' are included in 'Lignite'. For international bunkers, only fuel consumption for international navigation is available separately; data on international aviation are not estimated separately. Therefore,

total CO_2 emissions as estimated with the IPCC reference approach on the basis of Eurostat data include CO_2 emissions from international aviation. For the calculation of CO_2 emissions, the IPCC default carbon emission factors adjusted for the fraction non-oxidised are used in the Eurostat New Cronos database.

The method of using the IPCC reference approach at EU level is a three-step process:

Step 1: For each MS, annual data on energy production, imports, exports, international bunkers and stock changes are available in the Eurostat database in fuel specific units (i.e. kt (=1 000 tons) for solid fuels and petroleum products, TJ for natural gas). The apparent consumption in TJ is calculated for each MS by using country-specific net calorific values. These net calorific values are updated annually together with the energy data in the New Cronos database. For a group of fuels (e.g. 'Other bituminous coal') average net calorific values are used.

Step 2: The EC CRF Table 1.A(b) are calculated by adding the relevant MS activity and emission data, as calculated under step 1. The net calorific values provided for the EU in CRF Table 1.A(b) are calculated from dividing apparent consumption in TJ by apparent consumption in fuel specific units for each fuel. Therefore, these net calorific values are 'implied calorific values'; there are no fuel specific net calorific values at EU level.

Step 3: For the calculations of carbon stored in Table 1.A(d), Eurostat data on feedstocks and non-energy use of fuels were used (New Cronos database, version June 2001). For the fraction of carbon stored and carbon emission factors IPCC default values were taken (IPCC, 1997).

Table 20 shows the apparent energy consumption and CO_2 emissions from fossil fuel combustion from 1990–99 as provided in Table 1.A(b) in the annex. Total fossil fuel energy consumption increased by 7.2 % between 1990 and 1999, whereas CO_2 emissions from fossil fuel combustion increased by 1.1 %.

Apparent EC energy consumption (in TJ) and EC CO_2 emissions from fossil fuel combustion (in Gg) Table 20

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Liquid fuels	22.613.526	23.037.371	23.894.424	23.232.205	23.554.678	23.612.779	24.278.466	24.464.826	25.442.626	24.751.903
Solid fuels	12.540.613	11.904.350	11.100.074	10.280.192	10.127.640	9.894.503	9.752.346	9.309.862	9.299.170	8.686.497
Gaseous fuels	10.330.081	11.150.719	11.030.682	11.733.928	11.799.079	12.716.292	14.194.976	14.074.155	14.677.016	15.329.872
Total energy consumption	45.484.220	46.092.440	46.025.181	45.246.325	45.481.396	46.223.574	48.255.788	47.798.842	49.418.812	48.768.272
CO_2 emissions	3.230.268	3.236.412	3.210.973	3.134.402	3.135.815	3.165.603	3.291.325	3.233.550	3.333.507	3.265.543

4.3.2. Comparison of EC reference approach with MS sectoral approach

Table 21 summarises the percentage deviation of CO_2 emissions from the IPCC reference approach applied to the EC and the sectoral approach available from MS. The main reason for this difference is that Eurostat energy data does not separate fuel combustion from international aviation. If fuel combustion from international aviation is added to the sectoral approach (from MS), the percentage differences are much smaller.

Differences between IPCC reference approach based on Eurostat data and sectoral approach based on MS data. Table 21

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Percentage difference	2.65	1.71	3.23	2.76	2.78	2.50	4.11	4.38	5.94	4.58
Percentage difference with sectoral approach including emissions from international aviation	0.84	-0.04	1.28	0.54	0.52	0.20	1.68	1.74	3.09	1.57

4.3.3. Comparison of EC reference approach with MS reference approaches

Differences are also observed when comparing the estimates for CO_2 emissions from fossil fuels from the IPCC reference approach of the EC Member States with the estimates from the reference approach calculated using Eurostat energy balance data. Most of the differences are due to the use of different calorific values (CV) mainly for oil products, and BKB (lignite briquettes) and patent fuels. The differences in the CV for oil products are minor but as the quantities are often large, their relative impact is significant. For BKB and patent fuels, Eurostat is using the same CV for all countries which differs from the calorific values used by the Member States.

A minor reason for diverging MS and Eurostat estimates are small differences in the basic energy balance data reported by Member States to Eurostat (in the joint questionnaires) and to the Commission and the UNFCCC (in the CRF tables).

To resolve these differences Eurostat launched a project for harmonisation of the two (joint questionnaires and CRF) reporting systems of energy data and for revision of reported energy data back to 1990. The energy data used by the two submissions (joint questionnaires and As a

result of the project, Eurostat will update information in its database and will produce CO_2 emission estimates from fossil fuels with minimum deviation from those reported by the Member States and a full understanding of any remaining discrepancies. This will help to improve the quality of the EC GHG inventory for source category 1 'Energy'.

4.4. International bunkers

International bunker emissions of the EC inventory are the sum of the international bunker emissions of the Member States. A project shared between Eurostat, EEA and Eurocontrol has been initiated to improve the quality of the estimates of CO_2 emissions from international aviation.

4.5. Emissions and removals from LUCF

Emissions and removals from LUCF of the EC are the sum of MS emissions and removals. In accordance with IPCC guidelines, Member States use different methodologies, including data collection methods and frequencies, definitions and conversion factors in the estimation of LUCF data.

The EU initiated an action under the intergovernmental framework for European cooperation in the field of scientific and technical research (COST E21) 'Contribution of forests and forestry to mitigate greenhouse effects' with the objective to exchange experience and knowledge to improve the quality of greenhouse gas inventory compilation for forests in Europe.

In addition, the JRC is working with the Member States on a separate complementary project to facilitate the above objectives.

4.6. Methodologies, emission factors and activity data

The EC greenhouse gas inventory is compiled on the basis of the inventories of the 15 EC Member States. Since MS use different national methodologies, background activity data or emission factors in accordance with IPCC guidelines, these methodologies are reflected in the EC GHG inventory data. No additional methodological information can be provided at EC level except summaries of methodologies used by MS. However, in some areas possibilities of quality improvement were defined for the estimation at MS level, and work was started in these areas including energy background data, emissions from international bunkers and emissions and removals from LUCF.

The EC CRF Table Summary 3 in Annex A provides information on methodologies and emission factors used by the Member States. These tables have been compiled on the basis of the information provided by the MS in their CRF Table Summary 3. Chapter 4.8 lists the

methodologies and emission factors used by the Member States for each EC key source. Annex D includes the CRF Table Summary 3 for those MS that submitted these tables in 2002.

4.7. Uncertainties

The CRF Table 7 in Annex A shows information on completeness and quality of GHG emissions for the EC key sources. These estimates are based on the information provided by the MS in their CRF Table 7; the information basis for each key source can be seen in Chapter 4.8. Annex D includes the CRF Table 7 for those MS that submitted these tables in 2002.

Table 22 gives an overview of information provided by Member States on uncertainty estimates in their national inventory reports 2002 or 2001 and presents summarised results of these estimates. The overview table provides general information on uncertainty estimates of the Member States and quantified uncertainty estimates at total gas level, if available.

Overview of uncertainty estimates available from Member States (mainly excerpts from MS national inventory reports) Table 22

	Uncertainty estimates extracted from MS national inventory reports	Information source
Austria	Uncertainty analysis including systematic and random uncertainty was carried out for CO_2, CH_4 and N_2O for 1990 and 1997. The results of the calculations are as follows: Total uncertainty — CO_2 — CH_4 — N_2O — Total GHG emissions (excluding F-gases) 1990 — 2,3 % — 48,3 % — 89,6 % — 9,8 % 1997 — 2,1 % — 47,4 % — 85,9 % — 8,9 %	Umweltbundesamt *Austria's national inventory report 2001. Submission under the United Nations Framework Convention on Climate Change 2001*, Vienna, July 2001
Denmark	The national inventory report refers to Denmark's second national communication where the uncertainty of NMVOC, CH_4 and N_2O is assumed to be the highest (perhaps with an uncertainty factor 2). The uncertainty of CO and NOx inventories is assumed to be less than 30–40 % and the uncertainty of CO_2 may be as low as 1–2 %. Applying the methodology mentioned in Annex 1 to the Reporting Instructions of the Revised 1996 IPCC guidelines for national greenhouse gas inventories these estimates lead to an overall uncertainty of the GHG emissions in CO_2 equivalents of +/- 23 %. This estimate does not take into account the 35 % uncertainty of the GWP-factors. Sensitivity analysis shows that it is the huge uncertainty of N_2O emissions from agricultural soils, which are the key factor for overall uncertainty of the Danish GHG inventory.	National Environmental Research Institute *Denmark's national inventory report. Submitted under the United Nations Framework Convention on Climate Change 1990–99,* Ministry of Environment and Energy, April 2001
Finland	The approach to estimate the uncertainties of the Finnish inventory is based entirely on expert judgement. The procedures for expert elicitation and methods for encoding expert judgement described in Chapter 6 of the Good Practice Guidance (IPCC, 2000) have not yet been implemented. Also the level of desegregation in estimating the uncertainties and the methods used in combining them may need further consideration and improvement. The uncertainty estimates given in CRF Table 7 should therefore to be considered as preliminary. The uncertainty of total emissions and removals is estimated to be below 10 %. The uncertainty estimates are based on combined uncertainty of activity data and emissions factors.	Ministry of the Environment *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–2000. Summary*, Helsinki, 22 March 2002
France	Work is underway for estimating uncertainties of GHG emissions according to the Good Practice Guidance (IPCC, 2000). The uncertainties of CO_2 and SO2 from energy use are assumed to be less than 5 %.	CITEPA *Inventaire des émissions de gaz à effet de serre en France au titre de la convention cadre des Nations Unies sur le changement climatique*, Décembre 2001
Germany	The report states that partly emission uncertainties are considerable. This is due to uncertainties of activity data and emission factors and — to a much lesser extent — to a lack of information on emission causing activities. In general, the uncertainty of combustion–related emissions is considerably lower than uncertainty of non–combustion related emissions. For qualitative estimates of emission uncertainties the report refers to CRF Table Summary 3 and Table 7.	Bericht 2001 der Bundesrepublik Deutschland über ein System zur Beobachtung der Emissionen von CO_2 und anderen Treibhausgasen entsprechend der Ratsentscheidung 1999/296/EG
Nether-lands	The Netherlands estimated uncertainty in annual emissions and in emission trends by applying the IPCC Tier 1 uncertainty approach at the level of the IPCC list of possible key sources. The results of the uncertainty estimates for 1999 CO_2 equivalent emissions are as follows: Total GHG — CO_2 — CH_4 — N_2O — HFCs — PFCs — SF_6 ±5 % — ±3 % — ±25 % — ±50 % — ±50 % — ±50 % — ±50 % The results of the uncertainty estimates for the trend 1990-1999 CO_2 equivalent emissions are as follows: Total GHG — CO_2 — CH_4 — N_2O — F-gases ±3 % — ±3 % — ±7 %±12 % — ±11 %	J.G.J. Olivier, et al.: *Greenhouse gas emissions in the Netherlands 1990–99. National inventory report 2001*, RIVM report 773201 005, April 2001 Updated information was provided from: Olivier, et al.: Netherlands' national inventory report 2002

<table>
<tr><td>Spain</td><td>The Spanish report mentions that the assessment of uncertainty (estimation of emission quality) is shown in Table 7 of the CRF using the quality codes H (high), M (medium), and L (low). This ordinal classification of quality is only a first stage in the analysis of the uncertainty associated with the inventory estimations. Spain is currently beginning work on the implementation of a quantitative estimation of uncertainty in accordance with the approach recommended in IPCC (2000).</td><td>Ministry of the Environment Greenhouse gas emissions inventories report from Spain 1990–2000. Communication to the European Commission (Decision 1999/296/CE) Ministry of the Environment, Directorate-General for Environmental Quality and Assessment, Madrid, March 2002</td></tr>
<tr><td>Sweden</td><td>It is assumed that the uncertainty is largest for the inventories of NMVOC, CH_4 and N_2O, perhaps with an uncertainty factor of 2, while the uncertainty on the CO, SO_2 and NO_x inventories is assumed to be less than 30–40 % and the uncertainty with the CO_2 may be as low as 1–2 %.</td><td>S. Fink, et al. Sweden's national inventory report. Submitted under the United Nations Convention on Climate Change, Swedish Environmental Protection Agency, April 2002</td></tr>
<tr><td></td><td>Uncertainty estimates extracted from MS national inventory reports</td><td>Information source</td></tr>
<tr><td>UK</td><td>Uncertainty estimates for the UK GHG inventory were calculated corresponding to Tiers 1 and 2 approaches of the Good Practice Guidance (IPCC, 2000). Uncertainties were calculated for emissions and for emission trends 1990–99.
Quantitative estimates of the uncertainties in GHG emissions were calculated using direct simulation, a technique similar to Monte Carlo Simulation. This corresponds to the IPCC Tier 2 approach. The results for the United Kingdom are as follows:

<table>
<tr><td></td><td>Total GHG</td><td>CO_2</td><td>CH_4</td><td>N_2O</td><td>HFCs</td><td>PFCs</td><td>SF_6</td></tr>
<tr><td>Emissions 1999</td><td>17 %</td><td>2 %</td><td>20 %</td><td>b</td><td>25 %</td><td>19 %</td><td>13 %</td></tr>
<tr><td>Range of likely % change 1990–99</td><td>-12 % / -16 %</td><td>-8,3 % / -10,6 %</td><td>-15 % / -38 %</td><td>-13 % / -72 %</td><td>-22 % / -62 %</td><td>-62 % / -77 %</td><td>52 % / 118 %</td></tr>
</table>
b Not quoted because distribution is highly skewed

The Tier 1 approach based on the error propagation equations suggests an uncertainty of 18 % in the combined GWP total emissions in 1999. The analysis also estimates an uncertainty of 2 % in the trend between 1990 and 1999.</td><td>AG Salway, et al.: UK greenhouse gas inventory,1990 to 1999. Annual report for submission under the Framework Convention on Climate Change, March 2001</td></tr>
</table>

4.8. Key source analysis and additional CRF information

A key source analysis has been carried out according to the Tier 1 method (quantitative approach) described in IPCC (2000). A key source category is defined as an emission source that has a significant influence on a country's GHG inventory in terms of the absolute level of emissions, the trend in emissions, or both. The basis of the analysis is IPCC (2000), but the source categories adopted are more aggregated than those suggested in IPCC (2000) because of lack of data at a more disaggregated level.

In addition to the key source analysis at EC level, the MS provide a national key source analysis which can differ from the assessment at EC level. The EC key source analysis is not intended to replace key source analysis by MS which should be the basis for priorities regarding methodological choices or distribution of resources at MS level. The key source analysis at EC level is carried out in order to identify those source categories for which overviews of MS methodologies, emission factors and quality estimates are provided in this chapter.

In order to identify key source categories of the EC, the following procedure has been applied (based on IPCC, 2000).

1. Starting point for the key source identification for this report was the CRF Table Summary 1.A. of the EC greenhouse gas inventory. (A more detailed split, e.g. by fuels as provided for by IPCC (2000) is not available at European level.) All source categories where greenhouse gas emissions occur were listed, at the most disaggregated level available at EU level and split by gas. This way, a list of 66 source categories was identified.

2. The source categories were ranked in descending order according to their level contribution to total EC greenhouse gas emissions in 2000. Those source categories contributing together 95 % of total greenhouse emissions are defined as key source categories in the first stage (level assessment). For the EC, 15 key source categories were identified in this stage.

3. The source categories were ranked in descending order according to their trend contribution to the overall EC trend of greenhouse gas emissions 1990 to 2000 (deviation from average trend multiplied by share). Again, those source categories contributing 95 % to the trend of total EC greenhouse emissions are defined as key source categories in this stage (trend assessment). For the EC, 19 key source categories were identified in this stage.

This procedure resulted in the identification of 22 key source categories for the EC for 2000. The EC key sources are listed in Table 23 and ranked according to their level contribution to total EC GHG emissions in 2000. The last column of Table 23 indicates if the source category was identified as key source in the level or trend assessment, or both.

EC greenhouse gas source categories identified as key sources (emissions in Gg of CO_2 equivalents) Table 23

Greenhouse gas source categories	Gas	GHG emissions in 1990 (Gg)	GHG emissions in 1990 (Gg)	Cumulative total in 2000 (%)	Key source assessment
1.A.1.Energy industries	CO_2	1.147.013	1.092.146	26,9	L, T
1.A.3.Transport	CO_2	694.767	822.954	47,2	L, T
1.A.4.Other sectors	CO_2	635.943	619.478	62,4	L, T
1.A.2.Manufacturing industries and construction	CO_2	649.732	594.615	77,1	L, T
4.D. Agricultural soils	N_2O	198.043	189.726	81,8	L
4.A. Enteric fermentation	CH_4	143.991	131.367	85,0	L, T
2.A. Mineral products	CO_2	111.937	111.009	87,7	L, T
6.A. Solid waste disposal on land	CH_4	133.016	98.641	90,2	L, T
2.B. Chemical industry	N_2O	105.126	46.422	91,3	L, T
4.B. Manure management	CH_4	33.095	33.118	92,1	L
2 .F. Consumption of halocarbons and SF_6	HFC	362	29.723	92,9	L, T
4.B. Manure management	N_2O	33.457	29.100	93,6	L, T
1.B.2. Oil and natural gas	CH_4	32.429	27.962	94,3	L, T
2.C. Metal production	CO_2	25.663	24.024	94,9	L
1.A.3.Transport	N_2O	11.681	23.721	95,4	L, T
1.B.1. Solid fuels	CH_4	50.310	20.601	95,9	T
2 .E. Production of halocarbons and SF_6	HFC	21.373	17.562	96,4	T
1.A.4.Other sectors	N_2O	11.217	7.926	96,6	T
1.A.4.Other sectors	CH_4	10.508	7.251	96,7	T
1.A.5.Other	CO_2	19.431	7.091	96,9	T
2.C. Metal production	PFC	11.825	4.613	97,0	T
2.B. Chemical industry	HFC	2.340	0	97,0	T

Note: The last column indicates if the source category was identified as key source in the level (L) or trend (T) assessment, or both.

The tables in the following chapters show for each EC key source category the contribution of the MS to the EC emissions in terms of level and trend according to the good practice guidance (IPCC, 2000). In addition, the tables include information on methods applied, emission factors, completeness and quality derived from the MS submissions. For the EC, the MS information is summarised in the bottom row of each table. The tables in the following chapters are also the basis for filling in CRF Table Summary 3 and CRF Table 7 for the EC. Within the following chapters, which are equivalent to the CRF source categories 'Energy', 'Industrial processes', 'Agriculture' and 'Waste', the tables are listed according to CRF source categories.

4.8.1.Energy

Table 24 **MS contribution to CO_2 emissions from 1.A.1. 'Energy industries' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Germany	412.896	337.466	30,90	32,09	CS	CS	ALL	H
United Kingdom	228.089	190.833	17,47	15,19	T2	CS	ALL	H
Italy	142.927	152.078	13,92	9,22				
France	76.717	103.542	9,48	17,58	CS, C	PS, C	ALL	H
Spain	65.492	60.173	5,51	1,26	C	CS	ALL	H
Netherlands	51.513	59.085	5,41	5,78	CS	PS, CS	ALL/IE	H
Belgium	43.302	55.058	5,04	7,97	C	C, CS	ALL	
Finland	28.572	27.357	2,50	0,09	CS, T1	CS, D	ALL	
Sweden	26.202	25.250	2,31	0,17	C	CS	FULL	H
Austria	15.884	22.377	2,05	4,18	C, T2	C	ALL	H
Greece	18.517	19.815	1,81	1,26	CS (T2)	CS, PS, D	ALL	H
Portugal	11.057	16.016	1,47	3,16	T1	PS, CS	ALL	H
Denmark	14.395	12.137	1,11	0,90	C	CS	ALL	H
Ireland	10.170	10.704	0,98	0,59	CS	CS	ALL	H
Luxembourg	1.277	255	0,02	0,55				
EU15	**1.147.013**	**1.092.146**	**100,00**	**100,00**	**C, CS, T1, T2**	**C, CS, D, PS**	**ALL**	**H**

Table 25 **MS contribution to CO^2 emissions from 1.A.2. 'Manufacturing industries and construction' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Germany	196.457	139.425	23,45	46,46	CS	CS	ALL	H
United Kingdom	94.133	86.510	14,55	0,42	T2	CS	ALL	H
Italy	86.908	82.159	13,82	3,02				
France	84.924	81.081	13,64	3,87	C	CS	ALL	H
Spain	44.530	58.203	9,79	20,08	CS, C	PS, C	ALL	H
Netherlands	41.889	43.003	7,23	5,37	CS	PS, CS	ALL	M
Belgium	33.023	32.344	5,44	2,44	C, T1	C, CS, D	ALL	
Finland	14.358	15.956	2,68	3,24	CS (T2)	CS/PS/D	ALL	H
Sweden	11.776	12.558	2,11	2,05	CS	CS	ALL	H
Austria	8.450	10.607	1,78	3,31	C	CS	ALL	H
Greece	9.792	10.415	1,75	1,67	C	C	ALL	
Portugal	8.797	10.056	1,69	2,31	C, T2	C	ALL	H
Denmark	5.605	5.823	0,98	0,80	C	CS	FULL	H
Ireland	3.833	4.743	0,80	1,42	T1	PS, CS	ALL	H
Luxembourg	5.258	1.734	0,29	3,54				
EU15	**649.732**	**594.615**	**100,00**	**100,00**	**C, CS, D, PS**	**C, CS, D, PS**	**ALL**	**H, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000

MS contribution to CO_2 emissions from 1.A.3. 'Transport' and information on methods applied and quality of these emission estimates Table 26

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
Germany	162.281	182.910	22,23	14,11	CS	CS	ALL	H
France	119.159	137.783	16,74	5,09	C/CS	C/M/CS	ALL	H
United Kingdom	116.581	123.046	14,95	22,79	T2	CS	ALL	H
Italy	101.769	121.189	14,73	0,97				
Spain	57.656	85.118	10,34	25,49	C	C	ALL	H
Netherlands	29.085	35.120	4,27	1,01	CS	CS	ALL	H
Belgium	19.610	23.999	2,92	1,17	C, M, T1, T2	C, D, M	PART	
Greece	18.039	21.678	2,63	0,47	C	C	ALL	
Portugal	11.221	19.633	2,39	9,61	C	C	ALL	H
Sweden	18.736	19.568	2,38	3,98	CS	CS	ALL	H
Austria	11.944	16.937	2,06	4,23	M	CS	ALL	H
Finland	12.475	12.379	1,50	3,63	CS (M)	CS	ALL	M
Denmark	10.381	12.028	1,46	0,41				
Ireland	4.961	10.115	1,23	6,42	T1	CS	ALL	H
Luxembourg	870	1.451	0,18	0,64				
EU15	**694.767**	**822.954**	**100,00**	**100,00**	**C, CS, M, T1, T2**	**C, CS, D, M**	**ALL, PART**	**H, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

MS contribution to N_2O emissions from 1.A.3. 'Transport' and information on methods applied and quality of these emission estimates Table 27

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
Germany	3.193	5.175	21,81	22,51	CS	CS	ALL	M
United Kingdom	1.345	4.202	17,72	25,28	T2/T3	D	ALL	L
France	1.626	3.668	15,46	6,30	C/CS	C/M/CS	ALL	L
Italy	1.734	3.386	14,27	2,32				
Spain	851	2.080	8,77	6,05	C	C	ALL	L
Belgium	267	730	3,08	3,21	C, M	C, M	PART	
Finland	631	685	2,89	10,25	CS (M)	CS/M	ALL	L
Greece	515	676	2,85	6,36	C	C	ALL	
Sweden	451	625	2,63	5,01	CS	CS	ALL	L
Netherlands	376	621	2,62	2,45	CS/T3 (road)	CS	ALL	L
Austria	307	558	2,35	1,11	M	CS	ALL	M
Portugal	137	508	2,14	3,96	C	C	ALL	M
Denmark	150	384	1,62	1,38				
Ireland	87	373	1,57	3,38	T1	C	ALL	L
Luxembourg	12	51	0,21	0,44				
EU15	**11.681**	**23.721**	**100,00**	**100,00**	**C, CS, M, T1, T2, T3**	**C, CS, D, M**	**ALL, PART**	**L, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

Table 28 **MS contribution to CO_2 emissions from 1.A.4. 'Other sectors' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
Germany	203.439	170.159	27,47	40,70	CS	CS	ALL	H
United Kingdom	112.538	118.322	19,10	12,64	T2	CS	ALL	H
France	94.375	97.258	15,70	7,74	CS	CS	ALL	H
Italy	75.914	76.197	12,30	3,27				
Spain	25.953	34.436	5,56	13,30	CS	C	ALL	H
Netherlands	34.643	32.935	5,32	1,18	CS	CS	ALL	H
Belgium	28.005	30.425	4,91	4,57	C, T1	C, D	ALL	
Austria	13.908	13.638	2,20	0,13	CS	CS	ALL	H
Ireland	9.726	10.364	1,67	1,29	T1	CS	ALL	H
Greece	5.341	8.530	1,38	4,83	C	C	ALL	
Sweden	10.673	7.627	1,23	4,02	CS	CS	ALL	H
Denmark	8.959	7.482	1,21	1,81	C	CS	FULL	H
Finland	7.571	5.796	0,94	2,29	CS (T2, T1)	CS/D	ALL	M
Portugal	3.621	5.040	0,81	2,20	C, T2	C	ALL	H
Luxembourg	1.277	1.268	0,20	0,03				
EU15	**635.943**	**619.478**	**100,00**	**100,00**	**C, CS, T1,T2**	**C, CS, D**	**ALL**	**H, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

Table 29 **MS contribution to CH_4 emissions from 1.A.4 'Other sectors' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
France	3.043	2.741	37,81	20,01	C	CS	ALL	L
United Kingdom	1.468	700	9,65	9,78	T2	CS/C/D	ALL	L
Spain	838	695	9,58	3,65	C	C	ALL	L
Germany	2.684	603	8,32	38,97	CS	CS	ALL	M
Italy	326	486	6,71	8,16				
Netherlands	420	400	5,52	3,45	CS	CS	ALL	M
Portugal	406	305	4,21	0,78	C+T2	C	ALL	M
Finland	268	303	4,18	3,68	CS (T2, T1)	CS/PS	ALL	L
Denmark	127	244	3,37	4,90	C	CS/C/D		
Sweden	221	215	2,96	1,95	CS	CS	ALL	M
Austria	351	211	2,91	0,96	CS	CS	ALL	L
Greece	163	209	2,89	3,02	C	C	ALL	
Belgium	91	76	1,04	0,39	C	C, O	ALL	
Ireland	90	53	0,72	0,29	T1	C	ALL	L
Luxembourg	12	9	0,12	0,02				
EU15	**10.508**	**7.251**	**100,00**	**100,00**	**C, CS, T1, T2**	**C, CS, D, O, PS**	**ALL**	**L, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

MS contribution to N_2O emissions from 1.A.4 'Other sectors' and information on methods applied and quality of these emission estimates Table 30

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
France	3.043	2.741	37,81	20,01	C	CS	ALL	L
United Kingdom	1.468	700	9,65	9,78	T2	CS/C/D	ALL	L
Spain	838	695	9,58	3,65	C	C	ALL	L
Germany	2.684	603	8,32	38,97	CS	CS	ALL	M
Italy	326	486	6,71	8,16				
Netherlands	420	400	5,52	3,45	CS	CS	ALL	M
Portugal	406	305	4,21	0,78	C+T2	C	ALL	M
Finland	268	303	4,18	3,68	CS (T2, T1)	CS/PS	ALL	L
Denmark	127	244	3,37	4,90	C	CS/C/D		
Sweden	221	215	2,96	1,95	CS	CS	ALL	M
Austria	351	211	2,91	0,96	CS	CS	ALL	L
Greece	163	209	2,89	3,02	C	C	ALL	
Belgium	91	76	1,04	0,39	C	C, O	ALL	
Ireland	90	53	0,72	0,29	T1	C	ALL	L
Luxembourg	12	9	0,12	0,02				
EU15	**10.508**	**7.251**	**100,00**	**100,00**	**C, CS, T1, T2**	**C, CS, D, O, PS**	**ALL**	**L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

MS contribution to CO_2 emissions from 1.A.5 'Other' and information on methods applied and quality of these emission estimates Table 31

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
United Kingdom	5.265	2.902	40,93	19,61	T2	CS	ALL	M
Germany	11.760	1.798	25,36	49,85	CS	CS	ALL	H
Finland	972	986	13,91	12,62	CS (T2, T1)	CS/D	ALL	M
Italy	1.210	900	12,69	9,16				
Sweden	84	394	5,56	7,27	CS	CS	PART	L
Denmark	119	111	1,56	1,34				
Netherlands	12	0	0,00	0,09	CS	CS	ALL/IE	M
Portugal	8	0	0,00	0,06	C+T2	C		
Spain	0	0	0,00	0,00	NE		IE	
France	0	0	0,00	0,00	C	CS	NO	
Greece	0	0	0,00	0,00			NO	
Belgium	0	0	0,00	0,00			PART	
Ireland	0	NO	0,00	0,00	NA	NA	NE	NE
Austria	0	0	0,00	0,00			NO	NO
Luxembourg	0	0	0,00	0,00				
EU15	**19.431**	**7.091**	**100,00**	**100,00**	**C, CS, T1, T2**	**C, CS, D**	**ALL, NE, PART**	**H, L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

Table 32 **MS contribution to 1.B.1. 'Fugitive CH_4 emissions from solid fuels' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
Germany	25.767	9.968	48,39	13,95	CS	CS	ALL	L
United Kingdom	17.203	5.565	27,01	35,40	T2	CS	ALL	M
France	4.331	2.564	12,45	18,91	C	CS	ALL	M
Spain	1.789	1.209	5,87	11,40	T1	CS	ALL	M
Greece	926	1.140	5,54	18,21	T1	IPCC	ALL	
Denmark	69	70	0,34	0,99				
Italy	111	51	0,25	0,14				
Finland	21	21	0,10	0,30	CS	CS	ALL	L
Belgium	25	13	0,06	0,06	C	C	PART	
Sweden	0	0	0,00	0,00	CS	CS	ALL	L
Portugal	66	0	0,00	0,65	C, T2	C	PART	M
Ireland	0	0	0,00	0,00	NA	NA	NO	NA
Austria	0	0	0,00	0,00	C	CS	PART	L
Netherlands	0	0	0,00	0,00	IE		IE	
Luxembourg	0	0	0,00	0,00				
EU15	**50.310**	**20.601**	**100,00**	**100,00**	**C, CS, T1, T2**	**C, CS, D**	**ALL, PART**	**L, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

Table 33 **MS contribution to 1.B.2. 'Fugitive CH_4 emissions from oil and natural gas' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contributed to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
United Kingdom	10.779	8.268	29,57	25,93	T3	CS	ALL	M
Germany	7.014	7.358	26,31	33,12	CS	CS	ALL	M
Italy	6.665	5.513	19,72	5,91				
Netherlands	3.754	2.756	9,86	12,16	CS	CS	ALL	L
France	2.471	1.916	6,85	5,44	C	CS	ALL	M
Belgium	747	892	3,19	6,28	C, CS, O	CS, O	ALL	
Spain	514	577	2,06	3,37			ALL	M
Denmark	193	249	0,89	2,09				
Portugal	35	142	0,51	2,81	C, T2	C	PART	M
Austria	95	120	0,43	0,97	C	CS	ALL	L
Ireland	127	87	0,31	0,56	T1	CS	PART	M
Luxembourg	28	44	0,16	0,52				
Greece	5	32	0,11	0,71	C	C	ALL	
Finland	4	8	0,03	0,12	CS	PS	PART	M
Sweden	0	0	0,00	0,10	CS	CS	ALL	L
EU15	**32.429**	**27.962**	**100,00**	**100,00**	**C, CS, O, T1, T2, T3**	**C, CS, O, PS**	**ALL, PART**	**L, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

4.8.2. Industrial processes

MS contribution to CO_2 emissions from 2.A. 'Mineral products' and information on methods applied and quality of these emission estimates Table 34

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Germany	24.664	23.502	21,17	6,73	CS	CS	ALL	H
Italy	24.193	22.722	20,47	8,93				
Spain	14.289	17.488	15,75	23,33	CS, C, D, T2	CS, C, D, T2	PART	H
France	13.612	10.935	9,85	18,03	C	CS	ALL	H
United Kingdom	9.629	8.534	7,69	7,13	T2	D	PART	H
Greece	6.984	7.625	6,87	4,91	C	C	ALL	
Belgium	4.569	5.298	4,77	5,39	CS	CS	PART	
Portugal	3.426	4.511	4,06	7,83	D,C	D,C	PART	M
Austria	3.975	3.056	2,75	6,23	C,CS	CS	PART	M
Ireland	941	1.693	1,53	5,34	D	D	PART	M
Sweden	1.765	1.592	1,43	1,11	CS	CS	ALL	H
Denmark	1.005	1.453	1,31	3,21				
Finland	1.175	1.072	0,97	0,66	D	PS/D	PART	H
Sweden	1.124	981	0,88	0,94	CS	PS, CS	ALL	M
Luxembourg	585	547	0,49	0,23				
EU15	**111.937**	**111.009**	**100,00**	**100,00**	**C, CS, D, T2**	**C, CS, D, PS, T2**	**ALL, PART**	**H, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

MS contribution to N_2O emissions from 2.B. 'Chemical industry' and information on methods applied and quality of these emission estimates Table 35

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
France	24.745	9.662	20,81	4,47	C	CS/PS	ALL	M
Italy	6.748	7.804	16,81	17,05				
Netherlands	7.554	7.119	15,33	13,37	CS/T1	PS	CS	L
United Kingdom	29.270	6.182	13,32	23,84	PS	CS/PS	ALL	M
Germany	25.420	5.089	10,96	21,69	CS	CS/PS	ALL	M
Belgium	3.559	4.130	8,90	9,04	C,CS	C,CS	ALL	
Spain	2.884	2.307	4,97	3,65	C	CS,C	ALL	M
Finland	1.595	1.321	2,85	2,18	D	PS	ALL	M
Ireland	1.035	812	1,75	1,26	D	CS	PART	L
Sweden	814	643	1,38	1,00	C	CS	PART	M
Portugal	603	606	1,31	1,20	D,C	D,C	ALL	M
Greece	713	567	1,22	0,89	C	C	ALL	
Austria	186	180	0,39	0,35	C	PS	PART	M
Denmark	0	0	0,00	0,00				
Luxembourg	0	0	0,00	0,00				
EU15	**105.126**	**46.422**	**100,00**	**100,00**	**C, CS, D, PS, T1**	**C, CS, D, PS**	**ALL, PART**	**L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

An overview table on MS contribution to HFC emissions from 2.B. 'Chemical industry' is not given here, because HFC emissions from 2.B 'Chemical industry' were only reported by Germany.

Table 36 **MS contribution to CO_2 emissions from 2.C. 'Metal production' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
Austria	8.461	8.591	35,76	16,42	C	CS,PS	PART	M
United Kingdom	3.161	3.187	13,27	5,58	T2	CS	ALL	H
France	4.520	3.012	12,54	29,89	C	CS	ALL	H
Sweden	2.445	2.976	12,39	16,85	CS	CS	ALL	H
Spain	1.579	1.812	7,54	8,18	C	C	ALL	H
Belgium	1.671	1.601	6,67	0,91	CS	CS	ALL	
Italy	1.804	1.592	6,63	2,37				
Germany	904	787	3,28	1,45	CS	CS	ALL	H
Greece	232	252	1,05	0,85	C	C	ALL	
Luxembourg	850	131	0,55	16,29				
Portugal	35	60	0,25	0,68	D+C	D+C	ALL	H
Netherlands	0	22	0,09	0,53	CS	PS, CS	ALL	M
Denmark	0	0	0,00	0,00				
Finland	0	0	0,00	0,00	NO	NO	IE	IE
Ireland	0	0	0,00	0,00	NA	NA	NO	NA
EU15	**25.663**	**24.024**	**100,00**	**100,00**	**C, CS, D, T2**	**C, CS, S, PS**	**ALL, PART**	**H, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

Table 37 **MS contribution to PFC emissions from 2.C. 'Metal production' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1])	EF [1])	Estimate [2])	Quality [2])
Netherlands	2.398	1.390	30,14	22,87	CS	PS	NO	
Germany	2.486	1.167	25,30	9,91	T1	CS	ALL	M
France	2.290	854	18,51	1,98			ALL	H
Spain	828	367	7,96	2,22	NO		ALL	H
Sweden	440	264	5,72	4,64	T2	PS	ALL	M
United Kingdom	2.031	203	4,40	29,64	T2/PS	CS	ALL	M
Portugal	157	157	3,40	4,81	D	D	PART	L
Greece	258	148	3,22	2,41			ALL	
Italy	0	62	1,35	3,13				
Austria	937	0	0,00	18,39			NO	NO
Denmark	0	0	0,00	0,00				
Belgium	0	0	0,00	0,00			ALL	
Finland	0	0	0,00	0,00	NO	NO	NP	NO
Ireland	NE	0	0,00	0,00	NA	NA	NE	NE
Luxembourg	0	0	0,00	0,00				
EU15	**11.825**	**4.613**	**100,00**	**100**	**CS, D, PS, T1, T2**	**CS, D, PS**	**ALL, NE, PART**	**H, L, M**

[1]) Information source: CRF Summary Table 3 for 2000.
[2]) Information source: CRF Table 7 for 2000.

MS contribution to HFC emissions from 2.E. 'Production of halocarbons and SF_6' and information on methods applied and quality of these emission estimates Table 38

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Spain	2.403	6.395	36,41	29,79	D,CS,T2	D,PS,T2	ALL	H
United Kingdom	11.373	4.317	24,58	33,89	T2/PS	CS	ALL	H
Greece	935	3.744	21,32	20,06	T1	D	ALL	
Netherlands	4.432	2.834	16,14	5,44	CS/T2	PS	ALL	M
France	2.230	251	1,43	10,66	CS	CS	ALL	M
Italy	0	22	0,13	0,15				
Germany	NE	NE	0,00	0,00	NE		NE	
Denmark	0	0	0,00	0,00				
Belgium	0	0	0,00	0,00			ALL	
Finland	0	0	0,00	0,00	NO	NO	NO	NO
Portugal	0	0	0,00	0,00			ALL	H
Ireland	NE	0	0,00	0,00	NA	NA	NE	NE
Austria	0	0	0,00	0,00			NO	NO
Sweden	NO	NO	0,00	0,00	NO		NO	
Luxembourg	–	0	0,00	0,00				
EU15	**21.373**	**17.562**	**100,00**	**100,00**	**CS, D, PS, T1, T2**	**CS, S, PS, T2**	**ALL, NE**	**H, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

MS contribution to HFC emissions from 2.F. 'Consumption of halocarbons and SF_6' and information on methods applied and quality of these emission estimates Table 39

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Germany	0	7.700	25,91	14,54	T2	D,CS	PART	L
France	23	6.723	22,62	9,20	CS/T2	CS	ALL	M
United Kingdom	1	5.000	16,82	9,34	T2	D/CS	ALL	H
Spain	0	3.483	11,72	6,58	D, CS, T2	D,PS,T2	ALL	L
Italy	0	1.763	5,93	3,33				
Netherlands	0	1.079	3,63	2,04	M, CS/T2	CS	ALL	M
Austria	4	1.033	3,48	1,38	CS	CS	PART	M
Belgium	332	804	2,71	50,00			ALL	
Denmark	0	730	2,46	1,38				
Greece	0	537	1,81	1,01			PART	
Finland	0	502	1,69	0,90	T2, T1a & T1b	D	ALL	M
Sweden	3	369	1,24	0,30	T2	D,CS	ALL	M
Portugal	0	0	0,00	0,00			NE	
Ireland	NE	0	0,00	0,00	NA	NA	NE	NE
Luxembourg	–	0	0,00	0,00				
EU15	**362**	**29.723**	**100,00**	**100,00**	**CS, D, M, T1a, T1b**	**CS, D, PS, T2**	**ALL, NE, PART**	**H, L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

4.8.3.Agriculture

Table 40 **MS contribution to CH_4 emissions from 4.A. 'Enteric fermentation' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
France	30.836	29.133	22,18	7,87	C	CS	ALL	M
Germany	28.035	20.890	15,90	36,83	CS	CS	ALL	M
United Kingdom	19.078	18.138	13,81	5,75	T2	D/CS	ALL	M
Spain	12.490	14.070	10,71	21,01	CS, T1, T2	T1, T2	ALL	M
Italy	13.625	12.744	9,70	2,46				
Ireland	9.506	9.664	7,36	7,80	D	CS, D	ALL	M
Netherlands	8.439	6.708	5,11	7,79	cattle 90: T2; rest: T1	cattle: CS; rest: T1	ALL	M
Belgium	4.617	4.384	3,34	1,35	CS, M	CS	ALL	
Sweden	3.219	2.995	2,28	0,46	T1, CS	D, CS	ALL	H
Greece	2.976	2.920	2,22	1,61	T1, D	D	ALL	
Denmark	3.152	2.673	2,03	1,59				
Austria	3.243	2.597	1,98	2,84	C	D, CS	ALL	L, M
Portugal	2.606	2.581	1,96	1,60	T1	D	ALL	M
Finland	1.824	1.543	1,17	0,95	T2	CS/D	ALL	M
Luxembourg	346	327	0,25	0,09				
EU15	**143.991**	**131.367**	**100,00**	**100,00**	**C, CS, D, T1, T2**	**CS, D, T1, T2**	**ALL**	**H, L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

Table 41 **MS contribution to CH_4 emissions from 4.B. 'Manure management' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Spain	5.827	7.843	23,68	43,86	CS, T1, T2	T1, T2	ALL	M
Germany	5.665	4.425	13,36	27,14	CS	CS	ALL	M
Italy	3.990	3.895	11,76	2,14				
France	3.518	3.635	10,98	2,49	CS/T2	CS	ALL	M
Portugal	3.464	3.098	9,35	8,04	T2	D (CS)	ALL	M
Belgium	2.385	2.412	7,28	0,55	CS, M	CS	ALL	
United Kingdom	2.329	2.208	6,67	2,67	T2	D/CS	ALL	M
Netherlands	2.173	1.855	5,60	6,96	CS	D/CSCS (=D,corrected)	ALL	L
Ireland	1.294	1.396	4,21	2,20	D	CS, D	ALL	M
Denmark	898	858	2,59	0,88				
Austria	577	504	1,52	1,60	C	CS	ALL	L
Greece	497	472	1,43	0,54	T1	D	ALL	
Sweden	254	285	0,86	0,68	T1, T2	D, CS	ALL	H
Finland	199	209	0,63	0,22	T2	CS/D	ALL	M
Luxembourg	24	23	0,07	0,04				
EU15	**33.095**	**33.118**	**100,00**	**100,00**	**C, CS, D, M. T1, T2**	**CS, D, T1, T2**	**ALL**	**H, L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

MS contribution to N_2O emissions from 4.B. 'Manure management' and information on methods applied and quality of these emission estimates Table 42

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Germany	17.771	13.838	47,55	46,37	NE		NE	
Italy	3.846	3.856	13,25	14,63				
France	2.960	2.836	9,74	7,48	T2	T2		
Belgium	1.900	1.905	6,55	7,23	M	CS		
Spain	1.444	1.450	4,98	5,56	CS, D	D	ALL	M
United Kingdom	1.514	1.434	4,93	3,36	T1	D/CS	ALL	M
Portugal	1.127	1.212	4,17	6,63	T2	D (CS)	ALL	M
Ireland	645	680	2,34	3,41	D	CS, D	ALL	M
Sweden	727	586	2,01	1,34	T1, T2	D, CS	ALL	M
Denmark	462	440	1,51	1,09				
Finland	554	402	1,38	2,29	D	D/CS	ALL	L
Greece	301	266	0,91	0,11	T1	D	ALL	
Netherlands	205	195	0,67	0,50	CS, D	CS	ALL	L
Austria	0	0	0,00	0,00			NE	NE
Luxembourg	0	0						
EU15	**33.457**	**29.100**	**100,00**	**100,00**	**CS, D, M, T1, T2**	**CS, D, T2**	**ALL, NE**	**L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

MS contribution to N_2O emissions from 4.D. 'Agricultural soils' and information on methods applied and quality of these emission estimates Table 43

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
France	51.975	51.571	26,65	5,62	T2	T2	ALL	L
Germany	30.926	27.351	14,42	16,45	CS	CS	ALL	M
United Kingdom	30.353	26.829	14,14	16,25	T1a/T1b	D	ALL	L
Italy	20.337	20.554	10,83	7,73				
Spain	16.023	18.570	9,79	23,26	CS, D	CS, D	ALL	L
Denmark	9.797	7.853	4,14	11,07				
Netherlands	6.650	7.352	3,87	7,09	CS	CS	ALL	L
Ireland	6.445	6.666	3,51	3,55	D	CS, D	PART	M
Greece	6.501	6.370	3,36	1,03	T1	D	ALL	
Belgium	4.910	4.891	2,58	1,35	CS, M	CS, M	ALL	
Portugal	4.791	4.634	2,44	0,31	D	D	ALL	M
Sweden	3.792	3.603	1,90	0,21	D, C	CS	ALL	M
Finland	4.373	3.496	1,84	5,01	D	D/CS	ALL	L
Austria	1.024	987	0,52	0,04	CS	CS	ALL	L
Luxembourg	146	0	0,00	1,01				
EU15	**198.043**	**190.726**	**100,00**	**100,00**	**C, CS, D, M, T1a, T1b, T2**	**CS, D, M, T2**	**ALL, PART**	**L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

4.8.4. Waste

Table 44 **MS contribution to CH_4 emissions from 6.A 'Solid waste disposal on land' and information on methods applied and quality of these emission estimates**

Member State	GHG emissions in 1990 (Gg CO_2 equivalents)	GHG emissions in 2000 (Gg CO_2 equivalents)	Percentage contribution to level	Percentage contribution to trend	Methods applied [1)]	EF [1)]	Estimate [2)]	Quality [2)]
Germany	38.678	16.674	16,90	35,59	CS	CS	ALL	L
France	17.819	15.768	15,99	7,57	CS/T2	CS/T2	ALL	L
United Kingdom	23.457	13.860	14,05	10,48	M	CS	ALL	L
Spain	5.391	10.099	10,24	18,08	T2	CS/T2	ALL	M
Italy	9.526	9.434	9,56	7,02				
Netherlands	11.805	8.480	8,60	0,81	CS	CS	ALL	M
Portugal	5.550	6.224	6,31	6,25	D	D(CS)	ALL	H
Greece	2.811	4.767	4,83	7,95	T1	D	ALL	
Austria	5.438	4.424	4,48	1,16	CS	CS	ALL	L
Belgium	3.189	2.434	2,47	0,20			ALL	
Sweden	2.554	2.034	2,06	0,42	T2	D, CS	ALL	M
Finland	3.643	1.650	1,67	3,12	D	D/CS	ALL	L
Ireland	1.780	1.540	1,56	0,65	D	CS, D	ALL	M
Denmark	1.310	1.197	1,21	0,67				
Luxembourg	64	56	0,06	0,02				
EU15	**133.016**	**98.641**	**100,00**	**100,00**	**CS, D, M, T1, T2**	**CS, D, T2**	**ALL**	**H, L, M**

[1)] Information source: CRF Summary Table 3 for 2000.
[2)] Information source: CRF Table 7 for 2000.

4.9. Quality assessment/quality control

The EC GHG inventory is based primarily on the annual inventories of the EC Member States. Therefore, the quality of the EC inventory depends: (1) on the quality of the MS inventories and the QA/QC procedures in place at MS level; and (2) the quality of the process of compilation of the EC inventory at EU level.

4.9.1. The procedure of initial checks

The initial checks of MS submissions performed by ETC-ACC, on behalf of EEA, are an essential component of the annual QA/QC procedure at EU level. The initial checks basically include two elements: (1) checks of MS submissions in terms of completeness of CRF tables (2) checks of consistency and comparability of MS GHG data.

The checks of completeness of MS submissions are carried out by using a similar status report form as used by the UNFCCC secretariat. The completed status reports are made available to MS (through the EIONET) and MS can check the status reports and update information, if needed. The status reports of the MS submissions as by 5 April 2002 are included in Annex B to this report.

The consistency check of MS data primarily aims at the identification of main problems in time series or subcategory sums. The ETC identifies problems mainly by comparison with the previous year's inventory submission of the Member State. The ETC communicates main problems with specific source categories with the Member State's officially nominated national expert (and/or national reference centre for air emissions) in order to obtain, if needed, a revised estimate for that source category before 1 March or latest before 1 April.

After the initial checks of the emission data, the ETC-ACC transfers the national data from the CRF tables into the ETC-ACC database on emissions of greenhouse gases and air pollutants. The version of the data received by ETC-ACC is numbered, in order to be traced back to their source. The ETC-ACC database is a relational database (MS ACCESS) and maintained and managed by UBA Vienna.

Additional annual checks are performed by Eurostat for CO_2 emissions from fossil fuels (see Chapter 4.3).

4.9.2. Review by EC Member States

On 1 March, the draft EC GHG inventory and inventory report are circulated to the EC Member States for reviewing and commenting. The purpose of this review and commenting phase is to improve the quality of the EC inventory and inventory report. The MS check their national data and information used in the EC inventory report and send updates, if necessary, and review the EC inventory report. This procedure should assure the timely submission of the EC GHG inventory and inventory report to the UNFCCC secretariat and it should guarantee that the EC submission to the UNFCCC secretariat is consistent with the MS UNFCCC submissions.

4.9.3. The EC GHG trends report

A further element of the EC QA/QC procedure is the detailed analysis of GHG emission trends of the EC and each EC Member State after the submission of the EC inventory to the UNFCCC. This analysis is carried out in the annual EC GHG trend report (see EEA, 2001b). The purpose of the EC GHG trend report is not only to enhance the QA/QC of the EC GHG inventory, but also the following.

- To identify and present progress of the EC as a whole towards fulfilling its greenhouse gas emission commitments under the UNFCCC and the Kyoto Protocol and the contribution of each Member State to the EC targets (distance-to-target assessment).

- To present trends of greenhouse gas emissions in the EC and its Member States by gas and by key sources (sectoral assessment). Sectoral indicators, for socio-economic driving forces of greenhouse gas emissions, are identified and presented by using data from Eurostat or from Member States' detailed inventories.

- To identify decreasing or less increasing emission trends by comparing and analysing Member States' key source emissions and, to provide main explanations, either socio-economic developments or policies and measures, for these trends in some Member States (policy effectiveness assessment).

4.9.4. Overview of QA/QC procedures in place at MS level

The following Table 45 gives an overview of QA/QC procedures in place at MS level. The information is taken from the Member States national inventory reports 2002 and 2001. From the information available to EEA/ETC-ACC, the most advanced Member States are the United Kingdom and the Netherlands having quality management systems according to the ISO 9000 series in place for several years. Austria is about to implement a quality management system according to the EN 45000 series and is expected to be accredited in 2003.

Overview of QA/QC procedures in place at MS level as by 28 February 2002 (mainly excerpts from MS national inventory reports) Table 45

	Short description of the QA/QC procedures in place extracted from MS national inventory reports	Information source
Austria	The Austrian Federal Environment Agency as the responsible body for compiling the national greenhouse gas emissions inventory is currently implementing a quality management following EN 45000, a series of European standards similar to the ISO 9000 series. The Federal Environment Agency has decided to implement a quality management system based on the European standard EN 45004, which specifies general criteria for the operation of various types of bodies performing inspections. The full implementation of the system is foreseen for June 2001, the accreditation of the Federal Environment Agency as inspection body according to EN 45004 is foreseen for 2003. The QA/QC system which is currently implemented at the Federal Environment Agency is fully compatible with the requirements of the IPCC Good Practice Guidance (IPCC, 2000).	Umweltbundesamt *Austria's national inventory report 2001. Submission under the United Nations Framework Convention on Climate Change 2001*, Vienna, July 2001

Denmark	In the preparation of Denmark's annual emission inventories some quality control (QC) is performed. Apart from UNFCCC's in-depth-reviews, quality assurance (QA) with independent review of the inventories has not yet been carried out. Future work to improve the Danish emission inventories will include further elaboration of how formal QA/QC procedures could be implemented.	National Environmental Research Institute *Denmark's national inventory report. Submitted under the United Nations Framework Convention on Climate Change 1990–99* Ministry of Environment and Energy, April 2001
Finland	The quality-management system for the Finnish greenhouse gas inventory is currently under development and will be implemented in the inventory of the year 2002 emissions. The inventory of the year 2000 emissions is not verified by a third party.	Ministry of the Environment *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–2000. Summary*, Helsinki, 22 March 2002
France	All actions concerning the improvement of QA/QC will be reinforced, in particular by adaptation of QA/QC instruments and procedures, extended consultation with experts in different fields, the ISO 9001 certification of the institution compiling the inventory, etc.	CITEPA *Inventaire des émissions de gaz à effet de serre en France au titre de la convention cadre des Nations Unies sur le changement climatique*, Décembre 2001
Nether-lands	In 1997, the quality-assurance system ISO 9001 was introduced to ascertain the quality of the monitoring process related to the pollutant emission register (PER). All procedural activities by the Inspectorate for Environmental Protection of the Ministry of Housing, Spatial Planning and the Environment (VROM/HIMH), the Netherlands Organisation for Applied Scientific Research (TNO) and the National Institute of Public Health and Environment (RIVM) are subject to this quality control as well as the maintenance of the PER database by RIVM. However, the activities of actual data collection and emission calculations by the task groups are not yet part of the formal ISO quality-assurance programme. A number of external reviews have been conducted regarding GHG emission data in recent years, although the contents of the PER as a whole is not subject to regular external reviews. An inventory improvement programme was started with the creation of the working group emission monitoring of greenhouse gases.	J.G.J. Olivier, et al.: *Greenhouse gas emissions in the Netherlands 1990–99. National inventory report 2001*, RIVM report 773201 005, April 2001
Sweden	In the preparation of Sweden's annual emission inventories some quality control (QC) is performed. Apart from the UNFCCC's in-depth-reviews, quality assurance (QA) with independent review of the inventories has not yet been carried out. For some parts of the Swedish emission inventories good practice has been implemented, except for QA. Sweden will during the next years improve the Swedish emission inventories and will include further elaboration of how formal QA/QC procedures could be implemented upon the IPCC's good practice guidance.	S. Fink, et al. *Sweden's national inventory report. Submitted under the United Nations Convention on Climate Change* Swedish Environmental Protection Agency, April 2002
United Kingdom	The UK QA/QC system complies with the Tier 1 procedures outlined in the good practice guidance (IPCC, 2000). Plans are underway to develop the system and extend the range of activities so that the system complies with Tier 2. A detailed QA/QC activities schedule until 2004 is presented with external peer reviews for key sources starting in 2001. The inventory has been subject to ISO 9000 since 1994 and is liable to audit by Lloyds and the AEAT internal QA auditors. The national atmospheric emissions inventory has been audited favourably by Lloyds on two occasions in the last three years. The emphasis of these audits was on authorisation of personnel to work on inventories, document control, data tracking and spreadsheet checking. As part of the inventory management structure there is a nominated officer responsible for the QA/QC system —the QA/QC coordinator.	AG Salway, et al.: *UK greenhouse gas inventory,1990 to 1999. Annual report for submission under the Framework Convention on Climate Change*, March 2001

4.10. Differences between EU submission and MS submissions in 2001

In the draft synthesis and assessment report 2001 and the draft centralised review report 2001, inconsistencies between the EC submission and the sum of the EC MS submissions to the UNFCCC secretariat were identified (Table 46).

Inconsistencies between the EC submission 2001 and the sum of the EC MS submissions 2001 Table 46

	Sum of MS submissions 2001	EC submission 2001	Differential
CO_2	3284922	3270520	14402
CO_2 removals	-139918	-200984	61066
CH_4	17387	17445	58
N_2O	1098	1092	6

Note: All values are in Gg and for the inventory year 1999.

In December 2001, the UNFCCC secretariat sent the GHG data of the EC MS from the UNFCCC database to the ETC-ACC. A comparison of these data with the data submitted by the EC revealed the reasons for the inconsistencies. The most important reason for the inconsistencies in 2001 was late submissions of Belgium and Luxembourg after (15 April 2001). For these MS, data gap filling as described in Chapter 4.1.2 was performed in order to compile a complete EC GHG inventory by 15 April 2001. Table 47 shows that for Belgium the data gap filling procedure produced CO_2 emissions of 116 998 Gg, whereas in the Belgian submission to the UNFCCC secretariat CO_2 emissions were 126 491 Gg, which is a difference of 9 493 Gg.

A second reason is the reporting in category 5 of CRF Table Summary 1.A. Footnote five requires Parties to report net emissions (emissions – removals) from LUCF in each subcategory 5 and in the total sum of category 5. Only a single number should be placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Thirteen Member States reported net removals from LUCF for 1999, two Member States (Greece and the United Kingdom) reported net CO_2 emissions. At EU level, CO_2 removals were larger than CO_2 emissions. Therefore, net removals were reported that resulted from adding the net removals of the 13 MS and deducting the net emissions of Greece and the United Kingdom. This means that total CO_2 emissions at EU level do not include net emissions from LUCF of Greece and the United Kingdom. (In turn, net emissions from LUCF of Greece and the United Kingdom reduce net removals of the EU.) The sum of CO_2 emissions of the national submissions to the UNFCCC secretariat includes net emissions of Greece and the United Kingdom and therefore is higher. (Then, also the sum of CO_2 removals should be higher.)

The reasons for differences in CO_2 removals referred to in Table 46 could not be identified, since net CO_2 emissions/removals from LUCF as provided by the Member States and the EC submission are almost consistent (see Table 47). The slight inconsistencies in net CO_2 emissions/removals from LUCF are due to the late submission of Belgium.

The differences in CH_4 and N_2O emissions are due to late reporting of Belgium and Luxembourg.

Table 47 **Breakdown of the inconsistencies between the EC submission 2001 and the sum of the EC MS submissions 2001**

	Total CO_2 emissions			Net CO_2 emissions/removals from LUCF [1)]		
	MS submission 2001	EC submission 2001	Differential	MS submission 2001	EC submission 2001	Differential
Austria	65.778	65.778	0	-7.633	-7.633	0
Belgium	126.491	116.998	9.493	-1.845	-977	-868
Denmark	56.976	56.976	0	-976	-976	0
Finland	64.186	64.186	0	-10.821	-10.821	0
France	404.695	404.695	0	-68.995	-68.995	0
Germany	858.511	858.511	0	-33.430	-33.430	0
Greece	98.646	98.452	194	194	194	0
Ireland	41.887	41.887	0	-6.734	-6.734	0
Italy	456.533	456.533	0	-16.099	-16.099	0
Luxembourg	5.432	5.449	-17	-295	-295	0
Netherlands	174.126	174.126	0	-1.700	-1.700	0
Portugal	57.882	57.882	0	-4.692	-4.692	0
Spain	281.059	281.059	0	-29.252	-29.252	0
Sweden	56.458	56.458	0	-24.305	-24.305	0
UK	536.261	531.529	4.732	4.732	4.732	0
EU	**3.284.922**	**3.270.519**	**14.402**	**-201.851**	**-200.983**	**-868**

	Total CH_4 emissions			Total N_2O emissions		
	MS submission 2001	EC submission 2001	Differential	MS submission 2001	EC submission 2001	Differential
Austria	454	454	0	7	7	0
Belgium	523	581	-58	40	34	6,5
Denmark	269	269	0	31	31	0
Finland	187	187	0	25	25	0
France	2.841	2.841	0	254	254	0
Germany	3.271	3.271	0	141	141	0
Greece	513	514	0	33	33	0
Ireland	634	634	0	33	33	0
Italy	1.965	1.965	0	129	129	0
Luxembourg	23	23	0	0,3	0,8	-0,5
Netherlands	1.034	1.034	0	73	73	0
Portugal	604	604	0	28	28	0
Spain	2.145	2.145	0	142	142	0
Sweden	294	294	0	23	23	0
UK	2.631	2.631	0	138	138	0
EU	**17.387**	**17.445**	**-58**	**1.098**	**1.092**	**6**

[1)] Remaining inconsistencies in CO_2 removals referred to in Table 46 could not be explained by comparing MS and EU data.

Note: All values are in Gg and for the inventory year 1999.

4.11. Software tools provided by EEA

The EEA/ETC-ACC provides software tools to MS to compile national GHG inventories and to convert their national inventory from Corinair-SNAP source category codes into the required CRF source categories. The main software tools are CollectER, for compiling and updating national emission inventories, and ReportER, for reporting the emissions in the required format, e.g. CRF. In addition, separate software tools are available to prepare estimates of emissions from agriculture and road transport. These tools are being used by several EU MS. The EEA/ETC-ACC adapts the tools regularly to latest changes in reporting requirements. The tools are available at http://etc-acc.eionet.eu.int/.

4.12. Completeness of the EC inventory

The EC inventory report 2002 includes the complete CRF tables for 1990–2000 for the EU. All tables that can be filled in at EU level on the basis of MS submissions have been filled in (CRF Table Summary 1.A, Summary 1.B, Summary 2, Summary 3, Table 7, Table 8(a), Table 10, and Table 11). The tables on the reference approach (Table 1.A(b), Table 1.A(c) and Table 1.A(d)) have been compiled on the basis of Eurostat energy data as described in Chapter 4.3.

All sectoral emission and sectoral background activity tables (except Table 1.A(b), Table 1.A(c), Table 1.A(d)) are also provided in the CRF, but filled in with NE. These tables cannot be compiled at EU level, since not all MS provided these tables. More detailed information on the completeness of the EC inventory is included in CRF Table 11 in Annex A.

References

Bericht 2001 der Bundesrepublik Deutschland über ein System zur Beobachtung der Emissionen von CO_2 und anderen Treibhausgasen entsprechend der Ratsentscheidung 1999/296/EG

CITEPA 2000. *Inventaire des émissions de gaz à effet de serre en France au cours de la periode 1990–99.* Décembre 2000

CITEPA 2001. *Inventaire des émissions de gaz à effet de serre en France au titre de la convention cadre des Nations Unies sur le changement climatique.* Décembre 2001

EEA 2001a. *Annual European Community greenhouse gas inventory 1990–99. Submission to the Secretariat of the UNFCCC.* Technical report No. 60. European Environment Agency, Copenhagen

EEA 2001b. *European Community and Member States greenhouse gas emission trends 1990–99.* Topic report 10/2001. European Environment Agency, Copenhagen

European Commission 2000. *Guidelines under the Council Decision 1999/296/EC for a monitoring mechanism of Community CO_2 and other greenhouse gas emissions. Part I: Guidelines for Member States and EC annual inventories.* 1 September 2000

Fink, S. et al. 2002 *Sweden's national inventory report. Submitted under the United Nations Convention on Climate Change,* Swedish Environmental Protection Agency, April 2002

IPCC 1997. *Revised 1996 IPCC guidelines for national greenhouse gas inventories,* Intergovernmental Panel on Climate Change

IPCC 2000. *Good practice guidance and uncertainty management in national greenhouse gas inventories,* Intergovernmental Panel on Climate Change

Ministerio de Medio Ambiente 2001. *Spain's greenhouse gases inventory report. Submission 2001. Council Decision 1999/296/EC.* Madrid, February 2001

Ministry of the Environment 2001a. *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–99. Summary.* Helsinki, 27 March 2001

Ministry of the Environment 2001b. *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–2000. Summary.* Helsinki, 14 December 2001

Ministry of the Environment 2002a. *Finland's national inventory report on greenhouse gases to the United Nations Framework Convention on Climate Change. Common reporting formats (CRF): 1990–2000. Summary.* Helsinki, 22 March 2002

Ministry of the Environment 2002b.*Greenhouse gas emissions inventories report from Spain 1990–2000. Communication to the European Commission (Decision 1999/296/CE)* Ministry of the Environment, Directorate-General for Environmental Quality and Assessment, Madrid, March 2002

National Environmental Research Institute 2001 *Denmark's national inventory report. Submitted under the United Nations Framework Convention on Climate Change 1990–99.* Ministry of Environment and Energy, April 2001

Olivier, J.G.J. and Coenen, P.W.H.G. 2001. *Greenhouse gas emissions in the Netherlands 1990–2000. National inventory report 2002. EU summary report 1990–2000.* EU Draft, RIVM, December 2001

Olivier, J.G.J. et al. 2001. *Greenhouse gas emissions in the Netherlands 1990–99. National inventory report 2001.* RIVM report 773201 005, April 2001

Pipatti, R. 2001. *Greenhouse gas emissions and removals in Finland. Emission trends 1990–99. Key sources. Methodologies, activity data and emission factors.* VTT Energy, Technical Research Centre of Finland, 9 April 2001

Salway, A.G. *Changes to the UK greenhouse gas inventory since the provisional inventory,* March 2002

Salway, A.G. and Milne, R. 2001. *Methodological changes to the UK greenhouse gas inventory,* December 2001

Salway, A.G. et al. 2001. *UK greenhouse gas inventory,1990 to 1999. Annual report for submission under the framework convention on climate change,* March 2001

Sweden's national inventory report 2001. Submitted under the United Nations Convention on Climate Change, April 2001

Swedish Environmental Protection Agency 2001. *Report to the European Commission on carbon dioxide and other greenhouse gases in accordance with Council Decision 1999/296/EC. Part 1 Sweden's national inventory report 2002.* Sweden, 21 December 2001

Umweltbundesamt 2001. *Austria's national inventory report 2001, Submission under the United Nations Framework Convention on Climate Change 2001.* Vienna, July 2001

Units and abbreviations

t	1 tonne (metric) = 1 megagram (Mg) = 10^6 g
Mg	megagram =10^6 g = 1 tonne (t)
Gg	1 gigagram =10^9 g = 1 kilotonne (kt)
Tg	1 teragram = 10^{12} g = 1 megatonne (Mt)
TJ	1 terajoule
BKB	lignite briquettes
CH_4	methane
CO_2	carbon dioxide
COP	Conference of the Parties
CRF	Common reporting format
CV	calorific value
DG ENV	European Commission, Directorate-General of the Environment
EC	European Community
EEA	European Environment Agency
EIONET	European Environmental Information and Observation Network
ETC-ACC	European Topic Centre on Air and Climate Change
EU	European Union
GHG	greenhouse gas
GWP	global warming potential
HFCs	hydrofluorocarbons
JRC	Joint Research Centre
F-gases	fluorinated gases (HFCs, PFCs, SF_6)
IE	included elsewhere
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
LUCF	land-use change and forestry
LULUCF	land-use, land-use change and forestry

MS	member state
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
RIVM	National Institute of Public Health and the Environment (The Netherlands)
SF_6	sulphur hexafluoride
UBA Vienna	Federal Environment Agency Austria
UNFCCC	United Nations Framework Convention on Climate Change

Annex A: CRF tables for the European Community

The following tables are included in this report in printed form:

CRF tables		Years
Summary 1.A	Summary report for national GHG inventories	2000
Summary 1.B	Short summary report for national GHG inventories	2000
Summary 2	Summary report for CO_2 equivalent emissions	2000
Summary 3	Summary report for methods and emission factors used	2000
Table 1.A(b)	CO_2 from fuel combustion activities – Reference approach	1999
Table 1.A(c)	Comparison of CO_2 emissions from fossil fuel combustion	1999
Table 1.A(d)	Feedstocks and non-energy use of fuels	1999
Table 7	Overview table for national GHG inventories	2000
Table 8(a)	Recalculation – recalculated data	1999
Table 10	Emission trends	2000

These tables and also all other CRF tables are available electronically on CD-ROM and on the EEA website. For the completeness of the EC GHG submission see Chapter 4.11.

Summary 1.A **Summary report for national GHG inventories. Year: 2000**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		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		**3.324.799,65**	**-180.681,00**	**16.274,78**	**1.090,68**	**NE**	**47.284,75**	**NE**	**6.845,78**	**NE**	**0,37**	**9.496,50**	**30.817,28**	**11.562,11**	**5.750,40**
1. Energy		**3.159.695,38**		**2.953,63**	**177,48**							**9.297,33**	**27.455,26**	**5.143,26**	**5.536,27**
A. Fuel combustion	Reference approach [2]	NE													
	Sectoral approach [2]	3.136.284,09		641,11	177,31							9.271,45	27.368,18	4.273,31	5.296,12
1. Energy industries		1.092.146,22		78,84	47,64							1.607,93	365,56	78,35	3.526,84
2. Manufacturing industries and construction		**594.615,34**		**62,53**	**27,28**							**1.162,89**	**2.992,01**	**110,29**	**1.058,25**
3. Transport		822.954,46		153,67	76,52							5.148,73	17.895,96	3.177,66	285,12
4. Other sectors		619.477,52		345,28	25,57							1.311,21	6.061,18	899,86	418,40
5. Other		7.090,54		0,79	0,30							40,69	53,47	7,15	7,51
B. Fugitive emissions from fuels		**23.411,29**		**2.312,52**	**0,17**							**25,88**	**87,08**	**869,95**	**240,15**
1. Solid fuels		8.098,30		981,02	0,01							1,09	54,90	5,90	7,66
2. Oil and natural gas		15.313,00		1.331,50	0,16							24,79	32,19	864,05	232,48
2. Industrial processes		**150.528,17**		**21,57**	**149,94**	**NE**	**47.284,75**	**NE**	**6.845,78**	**NE**	**0,37**	**80,44**	**2.357,81**	**910,05**	**201,54**
A. Mineral products		111.009,09		0,76	0,00							11,65	22,90	298,33	48,13
B. Chemical industry		11.136,03		14,18	149,75	NE	0,00	NE	0,00	NE	0,00	32,61	59,32	299,39	83,09
C. Metal production		24.023,82		6,37	0,03				4.613,46		0,09	20,00	2.261,31	20,05	52,57
D. Other production [3]		1.224,73										16,19	14,28	274,01	17,75
E. Production of halocarbons and SF_6							17.561,99		84,70		0,00				
F. Consumption of halocarbons and SF_6						NE	29.722,76	NE	2.147,62	NE	0,29				
G. Other		3.134,50		0,25	0,16	NE	0,00	NE	0,00	NE	0,00	0,00	0,00	18,26	0,00
3. Solvent and other product use		**5.353,34**			**11,11**							**0,08**	**2,02**	**3.619,25**	0,02
4. Agriculture		**2.045,62**	**0,00**	**8.015,08**	**707,01**							64,48	152,83	451,53	0,01
A. Enteric fermentation				6.255,55											
B. Manure management				1.577,06	93,87									0,65	
C. Rice cultivation				111,22										0,09	
D. Agricultural soils		[4] 2.045,62	[4] 0,00	63,92	612,02							26,49		441,14	
E. Prescribed burning of savannas				0,00	0,00							0,00	0,00	0,00	
F. Field burning of agricultural residues				7,33	1,12							37,98	152,83	9,65	0,01
G. Other				0,00	0,00							0,00	0,00	0,00	0,00

Summary report for national GHG inventories. Year: 2000, cont. Summary 1.A

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions		CO_2 removals		CH_4	N_2O	HFCs [1]		PFCs [1]		SF_6		NO_x	CO	NMVOC	SO_2
								P	A	P	A	P	A				
		(Gg)						CO_2 equivalent (Gg)						(Gg)			
5. Land-use change and forestry		[5]	**-**	[5]	**-180.681,00**	**121,94**	**19,13**							**4,85**	**94,39**	**1.324,58**	**0,00**
A. Changes in forest and other woody biomass stocks		[5]	-	[5]	-220.738,67												
B. Forest and grassland conversion			12.107,98			31,21	0,91							2,68	94,39	0,00	
C. Abandonment of managed lands		[5]	-	[5]	-208,27												
D. CO_2 emissions and removals from soil		[5]	28.441,88	[5]	-												
E. Other		[5]	-	[5]	-283,92	90,73	18,22							2,17	0,00	1.324,58	0,00
6. Waste			**6.447,14**			**5.160,67**	**22,20**							**49,33**	**754,96**	**113,45**	**12,56**
A. Solid waste disposal on land		[6]	31,99			4.697,20									19,13	29,67	
B. Wastewater handling						336,76	19,45							0,00	0,00	4,60	
C. Waste incineration		[6]	5.962,41			42,66	2,74							49,04	735,69	46,95	11,93
D. Other			452,74			84,05	0,00							0,29	0,14	32,22	0,64
7. **Other** *(please specify)*			**730,00**		**0,00**	**1,90**	**3,82**	**NE**	**0,00**	**NE**	**0,00**	**NE**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
Memo items: [7]																	
International bunkers			**23.2247,49**			**11,36**	**4,59**							**1.902,07**	**367,86**	**234,58**	**1.111,49**
Aviation			103.155,97			5,18	1,86							407,74	247,42	93,85	21,00
Marine			129.091,52			6,17	2,73							1.494,33	120,44	140,72	1.090,50
Multilateral operations			**0,00**			**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	**0,00**
CO_2 Emissions from biomass			**14.3768,08**														

P = Potential emissions based on Tier 1 approach of the IPCC guidelines.
A = Actual emissions based on Tier 2 approach of the IPCC guidelines.

1) The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

2) For verification purposes, countries are asked to report the results of their calculations using the reference approach and to explain any differences with the sectoral approach. Where possible, the calculations using the sectoral approach should be used for estimating national totals. Do not include the results of both the reference approach and the sectoral approach in national totals.

3) Other production includes pulp and paper and food and drink production.

Note: The numbering of footnotes to all tables containing more than one sheet continue to the next sheet. Common footnotes are given only once at the first point of reference.

4) According to the IPCC guidelines (Volume 3. Reference manual, pp. 4.2, 4.87), CO_2 emissions from agricultural soils are to be included under land-use change and forestry (LUCF). At the same time, the Summary report 7A (Volume 1. Reporting instructions, Table 27) allows for reporting CO_2 emissions or removals from agricultural soils, either in the agriculture sector, under D. Agricultural soils or in the land-use change and forestry sector under D. Emissions and removals from soil. Parties may choose either way to report emissions or removals from this source in the common reporting format, but the way they have chosen to report should be clearly indicated, by inserting explanatory comments to the corresponding cells of Summary 1.A and Summary 1.B. Double-counting of these emissions or removals should be avoided. Parties should include these emissions or removals consistently in Table 8(a) (Recalculation – recalculated data) and Table 10 (Emission trends).

5) Please do not provide an estimate of both CO_2 emissions and CO_2 removals. 'Net' emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

6) Note that CO_2 from waste disposal and incineration source categories should only be included if it stems from non-biogenic or inorganic waste streams.

7) Memo items are not included in the national totals.

Summary 1.B **Short summary report for national GHG inventories. Year: 2000**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		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		**3.324.799,65**	**-180.681,00**	**16.274,78**	**1.090,68**	-	**47.284,75**	-	**6.845,78**	-	**0,37**	**9.496,50**	**30.817,28**	**11.562,11**	**5.750,40**
1. Energy		**3.159.695,38**		**2.953,63**	**177,48**							**9.297,33**	**27.455,26**	**5.143,26**	**5.536,27**
A. Fuel combustion	Reference approach[2]	NE													
	Sectoral approach[2]	3.136.284,09		641,11	177,31							9.271,45	27.368,18	4.273,31	5.296,12
B. Fugitive emissions from fuels		23.411,29		2.312,52	0,17							25,88	87,08	869,95	240,15
2. Industrial processes		**150.528,17**		**21,57**	**149,94**	-	**47.284,75**	-	**6.845,78**	-	**0,37**	**80,44**	**2.357,81**	**910,05**	**201,54**
3. Solvent and other product use		**5.353,34**			**11,11**							**0,08**	**2,02**	**3.619,25**	**0,02**
4. Agriculture [3]		**2.045,62**	**0,00**	**8.015,08**	**707,01**							**64,48**	**152,83**	**451,53**	**0,01**
5. Land-use change and forestry		[4] -	[4] **-18.0681,00**	**121,94**	**19,13**							**4,85**	**94,39**	**1.324,58**	**0,00**
6. Waste		**6.447,14**		**5.160,67**	**22,20**							**49,33**	**754,96**	**113,45**	**12,56**
7. Other		**730,00**	**0,00**	**1,90**	**3,82**	**NE**	**0,00**	**NE**	**0,00**	**NE**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
Memo items:															
International bunkers		**232.247,49**		**11,36**	**4,59**							**1.902,07**	**367,86**	**234,58**	**1.111,49**
Aviation		103.155,97		5,18	1,86							407,74	247,42	93,85	21,00
Marine		129.091,52		6,17	2,73							1.494,33	120,44	140,72	1.090,50
Multilateral operations		**0,00**		**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	**0,00**
CO_2 emissions from biomass		**143.768,08**													

P = Potential emissions based on Tier 1 approach of the IPCC guidelines.
A = Actual emissions based on Tier 2 approach of the IPCC guidelines.

1) The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.
2) For verification purposes, countries are asked to report the results of their calculations using the reference approach and to explain any differences with the sectoral approach in document box of Table1.A(c). Where possible, the calculations using the sectoral approach should be used for estimating national totals. Do not include the results of both the reference approach and the sectoral approach in national totals.
3) See footnote 4 to Summary 1.A.
4) Please do not provide an estimate of both CO_2 emissions and CO_2 removals. 'Net' emissions (emissions – removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

Summary report for CO_2 equivalent emissions. Year: 2000

Summary 2

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (net emissions) [1]	**3.144.118,65**	**341.770,48**	**338.111,25**	**47.284,75**	**6.845,78**	**8.955,00**	**3.887.085,92**
1. Energy	**3.159.695,38**	**62.026,33**	**55.019,82**				**3.276.741,53**
A. Fuel combustion (sectoral approach)	3.136.284,09	13.463,37	54.966,58				3.204.714,03
1. Energy industries	1.092.146,22	1.655,65	14.769,15				1.108.571,02
2. Manufacturing industries and construction	594.615,34	1.313,23	8.456,10				604.384,67
3. Transport	822.954,46	3.227,03	23.721,31				849.902,81
4. Other sectors	619.477,52	7.250,93	7.926,01				634.654,46
5. Other	7.090,54	16,53	94,01				7.201,08
B. Fugitive emissions from fuels	23.411,29	48.562,96	53,24				72.027,49
1. Solid fuels	8.098,30	20.601,41	2,37				28.702,08
2. Oil and natural gas	15.313,00	27.961,55	50,87				43.325,41
2. Industrial processes	**150.528,17**	**452,96**	**46.480,79**	**47.284,75**	**6.845,78**	**8.955,00**	**260.547,45**
A. Mineral products	111.009,09	16,02	0,00				111.025,11
B. Chemical industry	11.136,03	297,88	46.422,22	0,00	0,00	0,00	57.856,13
C. Metal production	24.023,82	133,81	8,97		4.613,46	2.046,34	30.826,40
D. Other production	1.224,73						1.224,73
E. Production of halocarbons and SF_6				17.561,99	84,70	0,00	17.646,69
F. Consumption of halocarbons and SF_6				29.722,76	2.147,62	6.908,65	38.779,03
G. Other	3.134,50	5,26	49,60	0,00	0,00	0,00	3.189,36
3. Solvent and other product use	**5.353,34**		**3.443,04**				**8.796,38**
4. Agriculture	**2.045,62**	**168.316,69**	**219.172,77**				**389.535,08**
A. Enteric fermentation		131.366,52					131.366,52
B. Manure management		33.118,34	29.100,08				62.218,42
C. Rice cultivation		2.335,67					2.335,67
D. Agricultural soils [2]	2.045,62	1.342,23	189.726,41				193.114,26
E. Prescribed burning of savannas		0,00	0,00				0,00
F. Field burning of agricultural residues		153,94	346,28				500,22
G. Other		0,00	0,00				0,00
5. Land-use change and forestry [1]	**-18.0681,00**	**2.560,66**	**5.930,06**				**-172.190,27**
6. Waste	**6.447,14**	**108.374,02**	**6.880,88**				**121.702,04**
A. Solid waste disposal on land	31,99	98.641,21					98.673,21
B. Wastewater handling		7.071,95	6.030,46				13.102,41
C. Waste incineration	5.962,41	895,81	850,36				7.708,58
D. Other	452,74	1.765,05	0,06				2.217,84
7. Other *(please specify)*	**730,00**	**39,82**	**1.183,90**	**0,00**	**0,00**	**0,00**	**1.953,72**
							0,00
Memo items:							
International bunkers	**232.247,49**	**238,47**	**1.423,31**				**23.3909,27**
Aviation	103.155,97	108,81	577,06				10.3841,84
Marine	129.091,52	129,66	846,26				13.0067,43
Multilateral operations	**0,00**	**0,00**	**0,00**				**0,00**
CO_2 Emissions from biomass	**143.768,08**						**14.3768,08**

1) For CO_2 emissions from land-use change and forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

2) See footnote 4 to Summary 1.A of this common reporting format.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-use change and forestry	CO_2 equivalent (Gg)					
A. Changes in forest and other woody biomass stocks	-	-220.738,67	-220.738,67			-220.738,67
B. Forest and grassland conversion	12.107,98		12.107,98	655,41	283,32	13.046,71
C. Abandonment of managed lands	-	-208,27	-208,27			-208,27
D. CO_2 emissions and removals from soil	28.441,88	-	28.441,88			28.441,88
E. Other	-	-283,92	-283,92	1.905,25	5.646,73	7.268,07
Total CO_2 equivalent emissions from land-use change and forestry	40.549,86	-221.230,86	-180.681,00	2.560,66	5.930,06	-172.190,27

Total CO_2 equivalent emissions without land-use change and forestry [a]	4.059.276,19
Total CO_2 equivalent emissions with land-use change and forestry [a]	3.887.085,92

a) The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from land-use change and forestry. Note that these totals will differ from the totals reported in Table 10s5 if Parties report non-CO_2 emissions from LUCF.

Summary 3 **Summary report for methods and emission factors used. Year: 2000**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6	
	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]	Method applied [1]	Emission factor [2]
1. Energy	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**						
A. Fuel combustion	NE	NE	NE	NE	NE	NE						
1. Energy industries	C, CS, T1, T2	C, CS, D, PS	NE	NE	NE	NE						
2. Manufacturing industries and construction	C, CS, T1, T2	C, CS, D, PS	NE	NE	NE	NE						
3. Transport	C, CS, M, T1, T2	C, CS, D, M	NE	NE	C, CS, M, T1, T2, T3	C, CS, D, M						
4. Other sectors	C, CS, T1, T2	C, CS, D	C, CS, T1, T2	C, CS, D, O, PS	C, CS, T1, T2	C, CS, D, O, PS						
5. Other	C, CS, T1, T2	C, CS, D	NE	NE	NE	NE						
B. Fugitive emissions from fuels	NE	NE	NE	NE	NE	NE						
1. Solid fuels	NE	NE	C, CS, T1, T2	C, CS, D	NE	NE						
2. Oil and natural gas	NE	NE	C, CS, O, T1, T2, T3	C, CS, O, PS	NE	NE						
2. Industrial processes	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
A. Mineral products	C, CS, D, T2	C, CS, D, PS, T2	NE	NE	NE	NE						
B. Chemical industry	NE	NE	NE	NE	C, CS, D, PS, T1	C, CS, D, PS	T1	CS	NE	NE	NE	NE
C. Metal production	C, CS, D, T2	C, CS, D, PS	NE	NE	NE	NE			CS, D, PS, T1, T2	CS, D, PS	NE	NE
D. Other production	NE	NE										
E. Production of halocarbons and SF_6							CS, D, PS, T1, T2	CS, D, PS, T2	NE	NE	NE	NE
F. Consumption of halocarbons and SF_6							CS, D, M, T1a, T1b, T2	CS, D, PS, T2	NE	NE	NE	NE
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3. Solvent and other product use	**NE**	**NE**			**NE**	**NE**						
4. Agriculture	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**						
A. Enteric fermentation			C, CS, D, T1, T2	CS, D, T1, T2								
B. Manure management			C, CS, D, M, T1, T2	CS, D, T1, T2	CS, D, M, T1, T2	CS, D, T2						
C. Rice cultivation			NE	NE								
D. Agricultural soils	NE	NE	NE	NE	C, CS, D, M, T1a, T1b, T2	CS, D, M, T2						
E. Prescribed burning of savannas			NE	NE	NE	NE						
F. Field burning of agricultural residues			NE	NE	NE	NE						
G. Other	NE	NE	NE	NE	NE	NE						
5. Land-use change and forestry	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**						
A. Changes in forest and other woody biomass stocks	NE	NE										
B. Forest and grassland conversion	NE	NE	NE	NE	NE	NE						
C. Abandonment of managed lands	NE	NE										
D. CO_2 emissions and removals from soil	NE	NE										
E. Other	NE	NE	NE	NE	NE	NE						
6. Waste	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**						
A. Solid waste disposal on land	NE	NE	CS, D, M, T1, T2	CS, D, T2								
B. Wastewater handling			NE	NE	NE	NE						
C. Waste incineration	NE	NE	NE	NE	NE	NE						
D. Other	NE	NE	NE	NE	NE	NE						
7. Other *(please specify)*	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**

1) Use the following notation keys to specify the method applied: D (IPCC default), RA (Reference approach), T1 (IPCC Tier 1), T1a, T1b, T1c (IPCC Tier 1a, Tier 1b and Tier 1c, respectively), T2 (IPCC Tier 2), T3 (IPCC Tier 3), C (Corinair), CS (Country specific). If using more than one method, enumerate the relevant methods. Explanations of any modifications to the default IPCC methods, as well as information on the proper use of methods per source category where more than one method is indicated, and explanations on the country specific methods, should be provided in the documentation box of the relevant sectoral background data table.

2) Use the following notation keys to specify the emission factor used: D (IPCC default), C (Corinair), CS (Country specific), PS (Plant specific). Where a mix of emission factors has been used, use different notations in one and the same cells with further explanation in the documentation box of the relevant sectoral background data table.

CO_2 from fuel combustion activities — reference approach. Year: 1999

Table 1.A (b)

FUEL TYPES			Unit	Production	Imports	Exports	International bunkers	Stock change	Apparent consumption	Conversion factor [1] (TJ/Unit)	(1)	Apparent consumption (TJ)	Carbon emission factor (t C/TJ)	Carbon content (Gg C)	Carbon stored (Gg C)	Net carbon emissions (Gg C)	Fraction of carbon oxidized	Actual CO_2 emissions (Gg CO_2)
Liquid fossil	Primary fuels	Crude oil & NGL	kt	164.976,00	530.200,00	102.152,00		1.565,00	594.589,00	41,87	NCV	24.894.644,98	19,80	492.913,97		492.913,97	1,00	1.807.351,23
		Orimulsion		IE	IE	IE		IE	IE		NCV	IE	0,00	IE		IE	1,00	IE
		Natural gas liquids		IE	IE	IE		IE	IE		NCV	IE	0,00	IE		IE	1,00	IE
	Secondary fuels	Gasoline	kt		26.202,00	44.502,00	0,00	2.863,00	-15.437,00	44,00	NCV	-679.228,00	18,70	-12.701,56		-12.701,56	1,00	-46.572,40
		Total kerosene	kt		13.879,00	11.328,00	NE	-121,00	2.430,00	43,00	NCV	104.490,00	19,30	2.016,66		2.016,66	1,00	7.394,41
		Other kerosene			IE	IE	NE	IE	IE		NCV	IE	0,00	IE		IE	1,00	IE
		Shale oil			0,00	0,00		0,00	0,00		NCV	0,00	0,00	0,00		0,00	1,00	0,00
		Gas / diesel oil	kt		69.159,00	57.527,00	8.571,00	5.142,00	8.203,00	42,30	NCV	346.986,90	20,00	6.939,74	2.002,48	4.937,26	1,00	18.103,27
		Residual fuel oil	kt		38.330,00	35.411,00	32.060,00	531,00	-28.610,00	42,82	NCV	-1.225.020,88	20,90	-25.602,94		-25.602,94	1,00	-93.877,43
		LPG	kt		10.477,00	5.123,00		-90,00	5.264,00	46,00	NCV	242.144,00	17,00	4.116,45	3.056,06	1.060,39	1,00	3.888,10
		Ethane & refinery gas	kt		2,00	17,00		-2,00	-17,00	50,00	NCV	-850,00	16,80	-14,28	0,00	-14,28	1,00	-52,36
		Naphtha	kt		25.355,00	16.827,00		-106,00	8.422,00	44,00	NCV	370.568,00	19,80	7.337,25	29.001,16	-21.663,91	1,00	-79.434,35
		Bitumen	kt		3.084,00	3.491,00		-133,00	-540,00	37,70	NCV	-20.358,00	21,80	-443,80	14.269,96	-14.713,76	1,00	-53.950,45
		Lubricants	kt		3.081,00	5.052,00	320,00	300,00	-1.991,00	42,30	NCV	-84.219,30	19,80	-1.667,54	2.124,42	-3.791,96	1,00	-13.903,86
		Petroleum coke	kt		8.709,00	1.396,00		519,00	7.832,00	31,40	NCV	245.924,80	27,20	6.689,15		6.689,15	1,00	24.526,90
		Refinery feedstocks	kt		20.362,00	7.744,00		-277,00	12.341,00	42,50	NCV	524.492,50	19,80	10.384,95		10.384,95	1,00	38.078,16
		White spirit	kt		830,00	771,00		13,00	72,00	44,00	NCV	3.168,00	19,80	62,73		62,73	1,00	230,00
		Other oil	kt		6.824,00	5.737,00		-115,00	972,00	30,00	NCV	29.160,00	19,80	577,37	6.963,49	-6.386,12	1,00	-23.415,77
Liquid fossil totals												24.751.903,00		490.608,13	57.417,56	433.190,58		1.588.365,44
Solid fossil	Primary fuels	Anthracite [2]		IE	IE	IE		IE	IE		NCV	IE		IE		IE	1,00	IE
		Coking coal		IE	IE	IE		IE	IE		NCV	IE		IE	0,00	IE	1,00	IE
		Other bit. coal	kt	99.983,00	154.404,00	9.718,00	NO	481,00	245.150,00	26,49	NCV	6.494.613,84	25,70	166.911,58		166.911,58	1,00	612.009,11
		Sub-bit. coal		IE	IE	IE	NO	IE	IE		NCV	IE		IE		IE	1,00	IE
		Lignite	kt	248.434,00	2.362,00	86,00		-3.520,00	247.190,00	8,06	NCV	1.991.549,92	27,10	53.971,00		53.971,00	1,00	197.893,68
		Oil shale		NO	0,00	0,00		0,00	0,00		NCV	0,00		0,00		0,00	1,00	0,00
		Peat		IE	IE	IE		IE	IE		NCV	IE		IE		IE	1,00	IE
	Secondary fuels	BKB	kt		334,00	454,00	NO	-33,00	-153,00	20,00	NCV	-3.060,00	25,30	-77,42		-77,42	1,00	-283,87
		Patent fuels	kt		160,00	91,00	NO	-12,00	57,00	29,30	NCV	1.670,10	25,30	42,25		42,25	1,00	154,93
		Coke oven/gas coke	kt		8.808,00	2.531,00		801,00	7.078,00	28,50	NCV	201.723,00	28,90	5.829,79		5.829,79	1,00	21.375,91
Solid fuel totals												8.686.496,87		226.677,21	0,00	226.677,21		831.149,77
Gaseous fossil		Natural gas (dry)	TJ	8.635.249,00	8.777.164,00	1.924.471,00		-158.070,00	15.329.872,00	1,00	NCV	15.329.872,00	15,20	233.014,05	2.279,21	230.734,84	1,00	846.027,75
Total												**48.768.271,87**		**950.299,40**	**59.696,77**	**890.602,63**		**3.265.542,97**
Biomass total												2.249.785,00		NE	0,00	NE		NE
		Total biomass	TJ	IE	0,00	0,00		0,00	0,00		NCV	IE		IE		IE	1,00	IE
		Liquid biomass	TJ	IE	0,00	0,00		0,00	0,00		NCV	IE		IE		IE	1,00	IE
		Gas biomass	TJ	IE	0,00	0,00		0,00	0,00		NCV	IE		IE		IE	1,00	IE

1) To convert quantities expressed in natural units to energy units, use net calorific values (NCV). If gross calorific values (GCV) are used in this table, please indicate this by replacing 'NCV' with 'GCV' in this column.

2) If anthracite is not separately available, include with other bituminous coal.

Table 1.A (c) **Comparison of CO_2 emissions from fossil fuel combustion. Year: 1999**

FUEL TYPES	Reference approach		National approach [1]		Difference [2]	
	Energy consumption (PJ)	CO_2 emissions (Gg)	Energy consumption (PJ)	CO_2 emissions (Gg)	Energy consumption (%)	CO_2 emissions (%)
Liquid fuels (excluding international bunkers)	24.751,90	1.588.365,44	NE	NE	100,00	100,00
Solid fuels (excluding international bunkers)	8.686,50	831.149,77	NE	NE	100,00	100,00
Gaseous fuels	15.329,87	846.027,75	NE	NE	100,00	100,00
Other [3]			NE	NE	100,00	100,00
Total [3]	**48.768,27**	**3.265.542,97**	**NE**	**3.122.672,89**	**100,00**	**4,58**

1) 'National approach' is used to indicate the approach (if different from the reference approach) followed by the Party to estimate its CO_2 emissions from fuel combustion reported in the national GHG inventory.
2) Difference of the reference approach over the national approach (i.e. difference = 100% x ((RA-NA)/NA), where NA = National approach and RA = Reference approach).
3) Emissions from biomass are not included.

Note: In addition to estimating CO_2 emissions from fuel combustion by sector, Parties should also estimate these emissions using the IPCC reference approach, as found in the IPCC guidelines, Worksheet 1-1(Volume 2. Workbook). The reference approach is to assist in verifying the sectoral data. Parties should also complete the above tables to compare the alternative estimates, and if the emission estimates lie more than 2 % apart, should explain the source of this difference in the documentation box provided.

Table 1.A (d) **Feedstocks and non-energy use of fuels. Year: 1999**

FUEL TYPE [1]	ACTIVITY DATA AND RELATED INFORMATION		IMPLIED EMISSION FACTOR	ESTIMATE
	Fuel quantity (TJ)	Fraction of carbon stored	Carbon emission factor (t C/TJ)	of carbon stored in non-energy use of fuels (Gg C)
Naphtha [2]	1.952.940,00	0,75	19,80	29.001,16
Lubricants	214.587,90	0,50	19,80	2.124,42
Bitumen	654.585,10	1,00	21,80	14.269,96
Coal oils and tars (from coking coal)	NA			
Natural gas[2]	454.388,40	0,33	15,20	2.279,21
Gas/diesel oil [2]	200.248,20	0,50	20,00	2.002,48
LPG [2]	224.710,00	0,80	17,00	3.056,06
Butane [2]	0,00			
Ethane [2]	0,00			
Other *(please specify)*				
Other oil	703.382,40	0,50	19,80	6.963,49
			0,00	

1) Where fuels are used in different industries, please enter in different rows.
2) Enter these fuels when they are used as feedstocks.

Note: The table is consistent with the IPCC guidelines. Parties that take into account the emissions associated with the use and disposal of these feedstocks could continue to use their methodology, and provide explanation notes in the documentation box below.

Overview table for national GHG inventories. Year: 2000 Table 7

	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		NO_x		CO		NMVOC		SO_2	
	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality	Estimate	Quality
Total national emissions and removals	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1 Energy	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
A. Fuel combustion activities																				
Reference approach	NE	NE																		
Sectoral approach	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
1. Energy industries	ALL	H	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
2. Manufacturing industries and construction	ALL	H, M	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
3. Transport	ALL, PART	H, M	NE	NE	ALL, PART	L, M							NE	NE	NE	NE	NE	NE	NE	NE
4. Other sectors	ALL	H, M	ALL	L, M	ALL, PART	L, M							NE	NE	NE	NE	NE	NE	NE	NE
5. Other	ALL, NE, PART	H, L, M	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
B. Fugitive emissions from fuels	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
1. Solid fuels	NE	NE	ALL, PART	L, M	NE	NE														
2. Oil and natural gas	NE	NE	ALL, PART	L, M	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
2 Industrial processes	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
A. Mineral products	ALL, PART	H, M	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
B. Chemical industry	NE	NE	NE	NE	ALL, PART	L, M	PART	L	NE	NE			NE	NE	NE	NE	NE	NE	NE	NE
C. Metal production	ALL, PART	H, M	NE	NE	NE	NE			ALL, NE, PART	H, L, M	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
D. Other production	NE	NE											NE	NE	NE	NE	NE	NE	NE	NE
E. Production of halocarbons and SF_6							ALL, NE	H, M	NE	NE	NE	NE								
F. Consumption of halocarbons and SF_6																				
Potential [2]							NE	NE	NE	NE	NE	NE								
Actual [3]							ALL, NE, PART	H, L, M	NE	NE	NE	NE								
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
3 Solvent and other product use	NE	NE			NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
4 Agriculture	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
A. Enteric fermentation			ALL	H, L, M																
B. Manure management			ALL	H, L, M	ALL, NE	L, M											NE	NE		
C. Rice cultivation			NE	NE													NE	NE		
D. Agricultural soils	NE	NE	NE	NE	ALL, PART	L, M											NE	NE		
E. Prescribed burning of savannas			NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
F. Field burning of agricultural residues			NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
G. Other			NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
5 Land-use change and forestry	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
A. Changes in forest and other woody biomass stocks	NE	NE																		
B. Forest and grassland conversion	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE		
C. Abandonment of managed lands	NE	NE																		
D. CO_2 emissions and removals from soil	NE	NE																		
E. Other	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
6 Waste	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
A. Solid waste disposal on land	NE	NE	ALL	H, L, M											NE	NE	NE	NE		
B. Wastewater handling			NE	NE	NE	NE							NE	NE	NE	NE	NE	NE		
C. Waste incineration	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
D. Other	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
7 Other *(please specify)*	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Memo items:																				
International bunkers	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
Aviation	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
Marine	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
Multilateral operations	NE	NE	NE	NE	NE	NE							NE	NE	NE	NE	NE	NE	NE	NE
CO_2 emissions from biomass	NE	NE																		

1) This table is intended to be used by Parties to summarize their own assessment of completeness (e.g. partial, full estimate, not estimated) and quality (high, medium, low) of major source/sink inventory estimates. The latter could be understood as a quality assessment of the uncertainty of the estimates. This table might change once the IPCC completes its work on managing uncertainties of GHG inventories. The title of the table was kept for consistency with the current table in the IPCC guidelines.

2) Potential emissions based on Tier 1 approach of the IPCC guidelines.

3) Actual emissions based on Tier 2 approach of the IPCC guidelines.

Note: To fill in the table use the notation key as given in the IPCC guidelines (Volume 1. Reporting instructions, Table 37).

Table 8 (a) **Recalculation — recalculated data. Year: 1999**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2			CH_4			N_2O		
		Previous submission	Latest submission	Difference[1]	Previous submission	Latest submission	Difference[1]	Previous submission	Latest submission	Difference[1]
		CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)
Total national emissions and removals		**3.069.536,04**	**3.102.360,31**	**1,07**	**366.353,10**	**350.743,65**	**-4,26**	**338.487,11**	**340.047,45**	**0,46**
1. Energy		**3.113.743,06**	**3.146.622,54**	**1,06**	**70.082,32**	**66.855,16**	**-4,60**	**57.607,14**	**54.835,61**	**-4,81**
1.A.	Fuel combustion activities	3.089.405,81	3.122.672,89	1,08	13.890,53	14.131,89	1,74	57.494,82	54.766,33	-4,75
1.A.1.	Energy industries	1.044.485,39	1.066.493,74	2,11	1.529,21	1.591,86	4,10	14.789,45	14.343,63	-3,01
1.A.2.	Manufacturing industries and construction	581.506,47	589.542,75	1,38	1.155,36	1.263,97	9,40	8.209,22	8.374,06	2,01
1.A.3.	Transport	824.973,74	823.165,84	-0,22	3.190,19	3.561,56	11,64	24.739,23	23.170,84	-6,34
1.A.4.	Other sectors	631.318,98	636.026,32	0,75	8.008,70	7.697,50	-3,89	9.673,12	8.798,62	-9,04
1.A.5.	Other	7.121,22	7.444,23	4,54	6,85	17,00	148,16	83,81	79,18	-5,52
1.B.	Fugitive emissions from fuels	24.337,26	23.949,66	-1,59	56.191,79	52.723,27	-6,17	112,31	69,29	-38,31
1.B.1.	Solid fuel	6.041,59	8.087,05	33,86	24.269,05	23.965,01	-1,25	1,93	2,27	18,03
1.B.2.	Oil and natural gas	18.295,67	15.862,61	-13,30	31.922,74	28.758,26	-9,91	110,39	67,01	-39,29
2. Industrial processes		**142.214,01**	**147.684,45**	**3,85**	**419,67**	**456,68**	**8,82**	**48.158,21**	**47.449,52**	**-1,47**
2.A.	Mineral products	107.723,98	109.607,63	1,75	3,54	16,12	356,08	0,00	20,77	-
2.B.	Chemical industry	9.410,27	10.458,46	11,14	276,80	303,42	9,61	47.933,97	47.361,66	-1,19
2.C.	Metal production	23.883,37	23.586,16	-1,24	129,56	130,95	1,08	29,12	9,39	-67,76
2.D.	Other production	735,09	1.293,03	75,90						
2.G.	Other	466,29	2.739,16	487,44	9,77	6,19	-36,70	195,12	57,70	-70,43
3. Solvent and other product use		**5.614,49**	**5.196,65**	**-7,44**				**3.454,93**	**3.449,72**	**-0,15**
4. Agriculture		**2.015,71**	**2.015,71**	**0,00**	**177.057,10**	**170.621,30**	**-3,63**	**217.903,19**	**220.429,30**	**1,16**
4.A.	Enteric fermentation				130.657,37	133.656,25	2,30			
4.B.	Manure management				39.919,69	33.137,10	-16,99	29.175,80	29.737,10	1,92
4.C.	Rice cultivation				2.351,01	2.340,26	-0,46			
4.D.	Agricultural soils [2]	2.015,71	2.015,71	0,00	3.880,26	1.345,12	-65,33	188.282,71	190.416,71	1,13
4.E.	Prescribed burning of savannas				0,00	0,00	-	0,00	0,00	-
4.F.	Field burning of agricultural residues				248,77	142,57	-42,69	111,66	275,50	146,73
4.G.	Other				0,00	0,00	-	0,00	0,00	-
5. Land-use change and forestry (net) [3]		**-200.983,62**	**-206.133,90**	**2,56**	**2.214,33**	**2.236,32**	**0,99**	**5.625,74**	**5.900,31**	**4,88**
5.A.	Changes in forest and other woody biomass stocks	-238.871,25	-241.705,83	1,19						
5.B.	Forest and grassland conversion	12.153,16	8.438,02	-30,57	331,38	331,07	-0,09	35,55	253,58	613,29
5.C.	Abandonment of managed lands	-202,36	-206,52	2,05						
5.D.	CO_2 emissions and removals from soil	26.788,33	27.618,83	3,10						
5.E.	Other	-851,50	-278,40	-67,30	1.882,95	1.905,25	1,18	5.590,19	5.646,73	1,01
6. Waste		**4.388,39**	**6.224,85**	**41,85**	**116.539,08**	**110.533,43**	**-5,15**	**4.559,90**	**6.796,92**	**49,06**
6.A.	Solid waste disposal on land	52,76	53,90	2,16	105.524,60	100.796,22	-4,48			
6.B.	Wastewater handling				6.001,67	7.092,84	18,18	3.717,20	5.947,60	60,00
6.C.	Waste incineration	4.151,18	5.718,21	37,75	1.012,08	946,10	-6,52	838,85	849,27	1,24
6.D.	Other	184,45	452,74	145,46	4.000,73	1.698,28	-57,55	0,14	0,06	-59,68
7. Other *(please specify)*		**2.544,00**	**750,00**	**-70,52**	**40,80**	**40,76**	**-0,10**	**1.178,00**	**1.186,05**	**0,68**
Memo items:										
International bunkers		**223.689,97**	**212.126,93**	**-5,17**	**214,90**	**212,90**	**-0,93**	**1.548,23**	**1.470,09**	**-5,05**
Multilateral operations		**0,00**	**0,00**	-	**0,00**	**0,00**	-	**0,00**	**0,00**	-
CO_2 emissions from biomass		**146.568,61**	**146.054,34**	**-0,35**						

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		HFCs			PFCs			SF_6		
		Previous submission	Latest submission	Difference[1]	Previous submission	Latest submission	Difference[1]	Previous submission	Latest submission	Difference[1]
		CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)	CO_2 equivalent (Gg)		(%)
Total actual emissions		**42.620,33**	**40.671,67**	**-4,57**	**8.361,24**	**7.331,31**	**-12,32**	**11.075,63**	**9.044,98**	**-18,33**
2.C.3.	Aluminium production				6.271,59	5.145,61	-17,95	1.993,98	1.874,48	-5,99
2.E.	Production of halocarbons and SF_6	20.431,54	18.463,94	-9,63	84,70	84,42	-0,33	0,00	0,00	-
2.F.	Consumption of halocarbons and SF_6	22.188,79	20.651,98	-6,93	2.004,94	1.911,25	-4,67	9.081,65	6.896,53	-24,06
	Other	0,00	0,00	-	0,00	0,00	-	0,00	0,00	-
Potential emissions from consumption of HFCs/PFCs and SF_6		-	-	-	-	-	-	-	-	-

	Previous submission	Latest submission	Difference[1]
	CO_2 equivalent (Gg)		(%)
Total CO_2 equivalent emissions with land-use change and forestry [4]	3.836.433,45	3.850.199,36	0,36
Total CO_2 equivalent emissions without land-use change and forestry [4]	4.029.576,99	4.048.196,63	0,46

1) Estimate the percentage change due to recalculation with respect to the previous submission (Percentage change = 100% x [(LS-PS)/PS], where LS = Latest submission and PS = Previous submission. All cases of recalculation of the estimate of the source/sink category, should be addressed and explained in Table 8 (b) of this common reporting format.

2) See footnote 4 to Summary 1.A of this common reporting format.

3) Net CO_2 emissions/removals to be reported

4) The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from land-use change and forestry.

Emission trends (CO_2) Table 10

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
1. Energy	**3.173.030,78**	**3.173.030,78**	**3.206.067,37**	**3.134.217,14**	**3.073.698,86**	**3.076.539,38**	**3.111.262,48**	**3.184.875,75**	**3.121.403,39**	**3.170.615,57**	**3.146.622,54**	**3.159.695,38**
A. Fuel combustion (sectoral approach)	3.146.886,72	3.146.886,72	3.181.941,51	3.110.444,01	3.050.316,52	3.051.119,44	3.088.441,77	3.161.379,87	3.097.815,22	3.146.704,96	3.122.672,89	3.136.284,09
1. Energy industries	1.147.012,64	1.147.012,64	1.151.714,70	1.116.445,32	1.059.905,20	1.065.962,31	1.072.575,53	1.082.514,52	1.045.860,55	1.087.327,15	1.066.493,74	1.092.146,22
2. Manufacturing industries and construction	649.732,23	649.732,23	626.130,85	601.231,10	579.876,58	598.780,06	616.995,61	603.416,66	613.731,55	598.785,33	589.542,75	594.615,34
3. Transport	694.767,42	694.767,42	709.477,85	733.571,97	738.008,13	745.853,00	752.232,01	767.183,43	777.732,86	802.565,01	823.165,84	822.954,46
4. Other sectors	635.943,02	635.943,02	677.811,51	646.188,61	658.456,41	627.881,41	635.872,88	697.624,10	651.075,94	649.315,94	636.026,32	619.477,52
5. Other	19.431,40	19.431,40	16.806,61	13.007,01	14.070,20	12.642,65	10.765,74	10.641,16	9.414,32	8.711,53	7.444,23	7.090,54
B. Fugitive emissions from fuels	26.144,06	26.144,06	24.125,86	23.773,13	23.382,33	25.419,94	22.820,70	23.495,87	23.588,17	23.910,61	23.949,66	23.411,29
1. Solid fuels	9.283,36	9.283,36	8.557,42	8.357,46	7.699,74	7.245,51	7.122,38	7.356,30	8.073,06	7.969,84	8.087,05	8.098,30
2. Oil and natural gas	16.860,70	16.860,70	15.568,44	15.415,67	15.682,60	18.174,43	15.698,32	16.139,58	15.515,11	15.940,77	15.862,61	15.313,00
2. Industrial processes	**152.883,27**	**152.883,27**	**145.825,29**	**141.608,80**	**135.694,36**	**142.319,07**	**145.787,89**	**142.268,83**	**145.533,11**	**146.055,32**	**147.684,45**	**150.528,17**
A. Mineral products	111.937,03	111.937,03	106.747,93	105.033,37	100.403,10	104.385,65	105.297,80	102.618,01	105.895,75	108.432,33	109.607,63	111.009,09
B. Chemical industry	12.728,58	12.728,58	12.138,04	11.550,01	10.486,59	10.559,98	11.032,43	11.365,79	11.111,01	11.009,75	10.458,46	11.136,03
C. Metal production	25.663,47	25.663,47	23.027,45	21.220,70	21.669,06	22.523,20	24.713,86	23.669,65	24.062,48	22.691,57	23.586,16	24.023,82
D. Other production	1.303,46	1.303,46	1.129,80	1.421,79	1.246,32	1.227,85	1.211,54	1.270,44	1.185,33	1.202,19	1.293,03	1.224,73
E. Production of halocarbons and SF_6												
F. Consumption of halocarbons and SF_6												
G. Other	1.250,74	1.250,74	2.782,09	2.382,94	1.889,30	3.622,40	3.532,26	3.344,94	3.283,54	2.724,49	2.739,16	3.134,50
3. Solvent and other product use	**5.725,48**	**5.725,48**	**5.684,23**	**5.460,90**	**5.075,46**	**5.034,29**	**5.053,26**	**5.068,61**	**5.140,62**	**5.193,84**	**5.196,65**	**5.353,34**
4. Agriculture	**3.214,94**	**3.214,94**	**2.815,18**	**2.320,68**	**2.229,85**	**2.069,12**	**1.726,47**	**1.825,07**	**2.064,96**	**2.031,25**	**2.015,71**	**2.045,62**
A. Enteric fermentation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Manure management	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
C. Rice cultivation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. Agricultural soils [2]	3.214,94	3.214,94	2.815,18	2.320,68	2.229,85	2.069,12	1.726,47	1.825,07	2.064,96	2.031,25	2.015,71	2.045,62
E. Prescribed burning of savannas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
F. Field burning of agricultural residues	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
G. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
5. Land-use change and forestry [3]	**-199.003,66**	**-199.003,66**	**-223.440,57**	**-208.927,19**	**-219.669,02**	**-207.334,92**	**-198.149,35**	**-206.918,61**	**-207.107,17**	**-197.973,28**	**-206.133,90**	**-180.681,00**
A. Changes in forest and other woody biomass stocks	-235.705,73	-235.705,73	-259.934,14	-247.538,81	-256.549,96	-243.275,08	-233.391,19	-242.554,97	-243.855,17	-237.379,69	-241.705,83	-220.738,67
B. Forest and grassland conversion	8.273,70	8.273,70	7.458,82	9.328,83	8.830,32	8.583,74	7.969,70	7.989,10	8.101,68	11.572,40	8.438,02	12.107,98
C. Abandonment of managed lands	-150,01	-150,01	-151,73	-167,25	-179,77	-189,82	-196,26	-199,17	-201,41	-201,52	-206,52	-208,27
D. CO_2 emissions and removals from soil	28.886,80	28.886,80	29.483,89	29.758,46	28.549,84	27.757,46	27.618,55	28.077,45	29.132,87	28.431,98	27.618,83	28.441,88
E. Other	-308,43	-308,43	-297,40	-308,43	-319,46	-211,21	-150,15	-231,02	-285,15	-396,45	-278,40	-283,92
6. Waste	**6.308,71**	**6.308,71**	**5.889,67**	**6.075,15**	**6.190,60**	**6.175,86**	**5.756,84**	**6.038,04**	**5.594,43**	**5.860,81**	**6.224,85**	**6.447,14**
A. Solid waste disposal on land	263,22	263,22	321,25	369,33	356,88	290,12	124,35	81,94	65,42	58,62	53,90	31,99
B. Waste-water handling	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
C. Waste incineration	5.545,06	5.545,06	5.568,42	5.705,82	5.833,71	5.885,74	5.517,52	5.956,10	5.384,02	5.245,18	5.718,21	5.962,41
D. Other	500,43	500,43	0,00	0,00	0,00	0,00	114,97	0,00	144,98	557,02	452,74	452,74
7. Other *(please specify)*	**640,29**	**640,29**	**614,76**	**607,51**	**555,98**	**691,52**	**699,49**	**698,46**	**557,64**	**720,05**	**750,00**	**730,00**
Total emissions/removals with LUCF [4]	**3.142.799,82**	**3.142.799,82**	**3.143.455,94**	**3.081.362,99**	**3.003.776,08**	**3.025.494,34**	**3.072.137,08**	**3.133.856,16**	**3.073.186,96**	**3.132.503,56**	**3.102.360,31**	**3.144.118,65**
Total emissions without LUCF[4]	**3.341.803,48**	**3.341.803,48**	**3.366.896,50**	**3.290.290,18**	**3.223.445,10**	**3.232.829,25**	**3.270.286,43**	**3.340.774,77**	**3.280.294,14**	**3.330.476,84**	**3.308.494,21**	**3.324.799,65**
Memo items:												
International bunkers	**155.857,14**	**155.857,14**	**156.368,37**	**160.625,44**	**171.237,90**	**169.495,34**	**173.309,91**	**185.378,67**	**200.982,46**	**212.629,78**	**212.126,93**	**232.247,49**
Aviation	56.515,97	56.515,97	55.672,30	60.101,69	67.304,78	68.334,04	70.934,48	75.473,32	80.477,91	86.876,15	92.443,50	103.155,97
Marine	99.341,17	99.341,17	100.696,07	100.523,75	103.933,12	101.161,30	102.375,43	109.905,35	120.504,55	125.753,63	119.683,43	129.091,52
Multilateral operations	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
CO_2 emissions from biomass	**118.899,11**	**118.899,11**	**125.226,38**	**123.677,69**	**127.921,17**	**128.478,33**	**134.391,18**	**140.777,19**	**141.911,39**	**144.356,76**	**146.054,34**	**143.768,08**

1) Fill in the base year adopted by the Party under the Convention, if different from 1990.
2) See footnote 4 to Summary 1.A of this common reporting format.
3) Take the net emissions as reported in Summary 1.A of this common reporting format. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).
4) The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report CO_2 emissions and removals from Land-Use Change and Forestry.

Table 10 **Emission trends (CH_4)**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
Total emissions	**20.309,81**	**20.309,81**	**19.806,43**	**19.289,35**	**18.736,07**	**18.242,09**	**18.137,94**	**17.808,31**	**17.321,06**	**17.038,93**	**16.702,08**	**16.274,78**
1. Energy	**4.770,89**	**4.770,89**	**4.649,51**	**4.527,51**	**4.289,16**	**3.849,45**	**3.810,86**	**3.679,77**	**3.481,30**	**3.327,93**	**3.183,58**	**2.953,63**
A. Fuel combustion (sectoral approach)	830,95	830,95	828,94	779,39	761,82	716,89	680,49	704,16	674,16	672,55	672,95	641,11
1. Energy industries	38,04	38,04	39,27	39,99	41,91	48,16	56,41	63,57	63,95	67,56	75,80	78,84
2. Manufacturing industries and construction	58,54	58,54	56,50	53,08	51,72	53,57	55,28	54,05	53,81	58,89	60,19	62,53
3. Transport	231,38	231,38	221,92	217,97	209,64	201,51	196,52	195,50	184,41	178,05	169,60	153,67
4. Other sectors	500,37	500,37	509,72	466,84	457,07	412,17	370,95	389,90	371,07	367,03	366,55	345,28
5. Other	2,62	2,62	1,53	1,51	1,49	1,48	1,33	1,14	0,92	1,01	0,81	0,79
B. Fugitive emissions from fuels	3.939,94	3.939,94	3.820,57	3.748,12	3.527,34	3.132,56	3.130,37	2.975,61	2.807,14	2.655,38	2.510,63	2.312,52
1. Solid fuels	2.395,69	2.395,69	2.285,02	2.213,10	1.985,35	1.609,31	1.681,27	1.505,46	1.404,66	1.268,12	1.141,19	981,02
2. Oil and natural gas	1.544,25	1.544,25	1.535,55	1.535,02	1.541,99	1.523,26	1.449,10	1.470,15	1.402,48	1.387,26	1.369,44	1.331,50
2. Industrial processes	**26,23**	**26,23**	**25,43**	**26,10**	**26,06**	**29,08**	**24,53**	**28,08**	**24,18**	**22,44**	**21,75**	**21,57**
A. Mineral products	1,37	1,37	0,95	0,85	0,73	0,82	0,91	0,87	0,89	0,88	0,77	0,76
B. Chemical industry	17,88	17,88	14,49	15,52	13,95	16,10	16,90	20,42	16,57	14,91	14,45	14,18
C. Metal production	6,72	6,72	6,26	5,80	6,25	6,65	6,44	6,42	6,35	6,27	6,24	6,37
D. Other production	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
E. Production of halocarbons and SF_6												
F. Consumption of halocarbons and SF_6												
G. Other	0,26	0,26	3,73	3,93	5,13	5,52	0,27	0,36	0,37	0,39	0,29	0,25
3. Solvent and other product use	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
4. Agriculture	**8.627,74**	**8.627,74**	**8.402,20**	**8.262,78**	**8.204,78**	**8.221,70**	**8.222,21**	**8.263,41**	**8.202,88**	**8.183,52**	**8.124,82**	**8.015,08**
A. Enteric fermentation	6.856,72	6.856,72	6.679,35	6.542,29	6.489,52	6.492,13	6.486,70	6.519,30	6.435,69	6.407,89	6.364,58	6.255,55
B. Manure management	1.575,93	1.575,93	1.531,26	1.533,94	1.535,98	1.541,57	1.549,61	1.550,08	1.574,52	1.589,23	1.577,96	1.577,06
C. Rice cultivation	109,61	109,61	106,69	105,67	105,87	115,05	113,86	121,42	120,67	114,90	111,44	111,22
D. Agricultural soils	65,55	65,55	65,54	65,62	65,78	65,34	64,91	64,87	64,84	64,45	64,05	63,92
E. Prescribed burning of savannas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
F. Field burning of agricultural residues	19,93	19,93	19,36	15,27	7,63	7,61	7,14	7,73	7,16	7,04	6,79	7,33
G. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
5. Land-use change and forestry	**107,32**	**107,32**	**104,39**	**112,36**	**109,88**	**108,25**	**105,01**	**105,58**	**105,54**	**120,14**	**106,49**	**121,94**
A. Changes in forest and other woody biomass stocks	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Forest and grassland conversion	18,72	18,72	15,29	22,62	20,20	19,12	15,77	16,01	15,98	29,42	15,77	31,21
C. Abandonment of managed lands	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. CO_2 emissions and removals from soil	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
E. Other	88,61	88,61	89,10	89,73	89,68	89,14	89,25	89,56	89,56	90,73	90,73	90,73
6. Waste	**6.775,56**	**6.775,56**	**6.622,90**	**6.358,61**	**6.104,19**	**6.031,31**	**5.973,25**	**5.729,48**	**5.505,18**	**5.382,96**	**5.263,50**	**5.160,67**
A. Solid waste disposal on land	6.334,08	6.334,08	6.192,22	5.935,81	5.686,14	5.611,70	5.548,19	5.294,79	5.058,96	4.927,51	4.799,82	4.697,20
B. Waste-water handling	354,21	354,21	333,52	324,72	317,06	316,80	317,06	319,55	327,54	335,35	337,75	336,76
C. Waste incineration	38,11	38,11	45,30	42,71	42,58	41,66	41,50	42,01	45,43	43,85	45,05	42,66
D. Other	49,16	49,16	51,87	55,38	58,41	61,16	66,49	73,15	73,26	76,25	80,87	84,05
7. *Other* *(please specify)*	**2,06**	**2,06**	**2,00**	**2,00**	**2,00**	**2,30**	**2,07**	**2,00**	**1,97**	**1,94**	**1,94**	**1,90**
Memo items:												
International bunkers	**8,60**	**8,60**	**8,50**	**8,78**	**8,54**	**8,72**	**9,16**	**9,71**	**10,33**	**11,02**	**10,14**	**11,36**
Aviation	4,44	4,44	4,37	4,46	4,48	4,75	4,96	5,24	5,53	5,86	4,92	5,18
Marine	4,17	4,17	4,13	4,33	4,06	3,97	4,21	4,47	4,80	5,17	5,22	6,17
Multilateral operations	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
CO_2 emissions from biomass												

[1]) Fill in the base year adopted by the Party under the Convention, if different from 1990.

Emission trends (N_2O) Table 10

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
Total emissions	**1.293,38**	**1.293,38**	**1.280,52**	**1.248,21**	**1.211,58**	**1.227,97**	**1.228,11**	**1.259,29**	**1.256,45**	**1.164,66**	**1.096,93**	**1.090,68**
1. Energy	**152,06**	**152,06**	**156,90**	**158,12**	**158,39**	**162,82**	**167,50**	**170,73**	**173,87**	**171,93**	**176,89**	**177,48**
A. Fuel combustion (sectoral approach)	151,75	151,75	156,62	157,86	158,14	162,09	167,25	170,47	173,64	171,71	176,67	177,31
1. Energy industries	45,62	45,62	46,91	46,84	44,90	45,58	46,10	47,29	46,30	46,68	46,27	47,64
2. Manufacturing industries and construction	31,88	31,88	30,80	30,18	28,03	29,07	31,25	28,46	29,80	25,82	27,01	27,28
3. Transport	37,68	37,68	40,84	44,70	49,43	53,34	57,93	62,35	66,24	70,93	74,74	76,52
4. Other sectors	36,18	36,18	37,39	35,47	35,11	33,42	31,29	31,65	30,64	27,96	28,38	25,57
5. Other	0,37	0,37	0,68	0,66	0,65	0,68	0,69	0,71	0,66	0,30	0,26	0,30
B. Fugitive emissions from fuels	0,32	0,32	0,28	0,26	0,25	0,73	0,25	0,27	0,23	0,22	0,22	0,17
1. Solid fuels	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
2. Oil and natural gas	0,31	0,31	0,27	0,25	0,24	0,72	0,24	0,26	0,22	0,21	0,22	0,16
2. Industrial processes	**339,34**	**339,34**	**339,71**	**324,00**	**302,06**	**311,55**	**305,12**	**323,53**	**314,95**	**226,35**	**153,06**	**149,94**
A. Mineral products	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,07	0,00
B. Chemical industry	339,12	339,12	339,49	323,79	301,84	311,33	304,89	323,30	314,71	226,12	152,78	149,75
C. Metal production	0,04	0,04	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
D. Other production	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
E. Production of halocarbons and SF_6												
F. Consumption of halocarbons and SF_6												
G. Other	0,13	0,13	0,14	0,13	0,14	0,14	0,14	0,14	0,15	0,15	0,19	0,16
3. Solvent and other product use	**10,77**	**10,77**	**10,66**	**10,75**	**10,81**	**11,05**	**11,11**	**11,21**	**11,21**	**11,19**	**11,13**	**11,11**
4. Agriculture	**748,21**	**748,21**	**729,99**	**711,68**	**696,55**	**698,86**	**700,67**	**709,89**	**712,34**	**710,37**	**711,06**	**707,01**
A. Enteric fermentation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Manure management	107,93	107,93	100,87	100,58	96,99	97,10	96,48	96,83	96,49	96,16	95,93	93,87
C. Rice cultivation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. Agricultural soils	638,85	638,85	627,70	609,77	598,38	600,59	603,05	611,86	614,60	613,12	614,25	612,02
E. Prescribed burning of savannas	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
F. Field burning of agricultural residues	1,44	1,44	1,42	1,34	1,18	1,17	1,13	1,20	1,25	1,09	0,89	1,12
G. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
5. Land-use change and forestry	**18,68**	**18,68**	**18,75**	**18,96**	**18,91**	**18,81**	**18,73**	**18,83**	**18,85**	**19,24**	**19,03**	**19,13**
A. Changes in forest and other woody biomass stocks	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Forest and grassland conversion	0,89	0,89	0,86	0,94	0,90	0,94	0,84	0,88	0,87	1,03	0,82	0,91
C. Abandonment of managed lands	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D. CO_2 emissions and removals from soil	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
E. Other	17,79	17,79	17,89	18,02	18,01	17,86	17,88	17,95	17,98	18,22	18,22	18,22
6. Waste	**20,50**	**20,50**	**20,70**	**20,88**	**21,05**	**21,10**	**21,18**	**21,29**	**21,43**	**21,76**	**21,93**	**22,20**
A. Solid waste disposal on land	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Waste-water handling	18,17	18,17	18,13	18,31	18,41	18,48	18,56	18,70	18,80	19,14	19,19	19,45
C. Waste incineration	2,34	2,34	2,58	2,58	2,65	2,62	2,62	2,60	2,63	2,63	2,74	2,74
D. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
7. Other *(please specify)*	**3,81**	**3,81**	**3,80**	**3,80**	**3,80**	**3,80**	**3,85**	**3,83**	**3,80**	**3,82**	**3,83**	**3,82**
Memo items:												
International bunkers	**3,91**	**3,91**	**4,23**	**3,98**	**4,05**	**3,86**	**4,07**	**4,28**	**4,61**	**5,28**	**4,74**	**4,59**
Aviation	1,39	1,39	1,35	1,39	1,52	1,56	1,71	1,74	1,84	1,97	1,64	1,86
Marine	2,51	2,51	2,88	2,59	2,52	2,31	2,36	2,54	2,77	3,31	3,10	2,73
Multilateral operations	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
CO_2 emissions from biomass												

1) Fill in the base year adopted by the Party under the Convention, if different from 1990.

Table 10 Emission trends (HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	(Gg)											
Emissions of HFCs[5] - CO_2 equivalent (Gg)	**24.426,04**	**24.426,04**	**24.514,50**	**24.805,52**	**27.249,58**	**31.814,59**	**35.830,21**	**39.973,94**	**47.140,85**	**51.974,67**	**40.671,67**	**47.284,75**
HFC-23	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-32	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-41	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-43-10mee	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-125	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-134	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-134a	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-152a	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-143	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-143a	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-227ea	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-236fa	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
HFC-245ca	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Emissions of PFCs[5] - CO_2 equivalent (Gg)	**13.545,39**	**13.545,39**	**11.949,18**	**9.788,08**	**8.402,89**	**7.716,99**	**7.764,87**	**7.754,16**	**7.505,04**	**7.404,65**	**7.331,31**	**6.845,78**
CF_4	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C_2F_6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C_3F_8	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C_4F_{10}	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
c-C_4F_8	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C_5F_{12}	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
C_6F_{14}	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Emissions of SF_6[5] - CO_2 equivalent (Gg)	**8.439,53**	**8.439,53**	**9.074,14**	**9.743,51**	**10.512,60**	**11.360,94**	**12.270,66**	**12.072,88**	**11.986,11**	**11.329,99**	**9.044,98**	**8.955,00**
SF_6	0,35	0,35	0,38	0,41	0,44	0,48	0,51	0,51	0,50	0,47	0,38	0,37

Chemical	GWP
HFCs	
HFC-23	11700
HFC-32	650
HFC-41	150
HFC-43-10mee	1300
HFC-125	2800
HFC-134	1000
HFC-134a	1300
HFC-152a	140
HFC-143	300
HFC-143a	3800
HFC-227ea	2900
HFC-236fa	6300
HFC-245ca	560
PFCs	
CF_4	6500
C_2F_6	9200
C_3F_8	7000
C_4F_{10}	7000
c-C_4F_8	8700
C_5F_{12}	7500
C_6F_{14}	7400
SF_6	23900

1) Fill in the base year adopted by the Party under the Convention, if different from 1990.
5) Enter information on the actual emissions. Where estimates are only available for the potential emissions, specify this in a comment to the corresponding cell. Only in this row the emissions are expressed as CO_2 equivalent emissions in order to facilitate data flow among spreadsheets.

Table 10 Emission trends (Summary)

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	CO_2 equivalent (Gg)											
Net CO_2 emissions/removals	3.142.799,82	3.142.799,82	3.143.455,94	3.081.362,99	3.003.776,08	3.025.494,34	3.072.137,08	3.133.856,16	3.073.186,96	3.132.503,56	3.102.360,31	3.144.118,65
CO_2 emissions (without LUCF) [6]	3.341.803,48	3.341.803,48	3.366.896,50	3.290.290,18	3.223.445,10	3.232.829,25	3.270.286,43	3.340.774,77	3.280.294,14	3.330.476,84	3.308.494,21	3.324.799,65
CH_4	426.506,11	426.506,11	415.935,09	405.076,44	393.457,56	383.083,98	380.896,74	373.974,53	363.742,20	357.817,57	350.743,65	341.770,48
N_2O	400.947,57	400.947,57	396.960,50	386.943,61	375.590,25	380.671,83	380.714,68	390.379,29	389.499,33	361.044,15	340.047,45	338.111,25
HFCs	24.426,04	24.426,04	24.514,50	24.805,52	27.249,58	31.814,59	35.830,21	39.973,94	47.140,85	51.974,67	40.671,67	47.284,75
PFCs	13.545,39	13.545,39	11.949,18	9.788,08	8.402,89	7.716,99	7.764,87	7.754,16	7.505,04	7.404,65	7.331,31	6.845,78
SF_6	8.439,53	8.439,53	9.074,14	9.743,51	10.512,60	11.360,94	12.270,66	12.072,88	11.986,11	11.329,99	9.044,98	8.955,00
Total (with net CO_2 emissions/ removals)	**4.016.664,46**	**4.016.664,46**	**4.001.889,35**	**3.917.720,15**	**3.818.988,96**	**3.840.142,67**	**3.889.614,23**	**3.958.010,95**	**3.893.060,48**	**3.922.074,59**	**3.850.199,36**	**3.887.085,92**
Total (without LUCF)	**4.207.624,02**	**4.207.624,02**	**4.217.323,70**	**4.118.410,47**	**4.030.488,98**	**4.039.374,41**	**4.079.753,43**	**4.156.875,22**	**4.092.106,53**	**4.111.560,06**	**4.048.196,63**	**4.059.276,19**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	CO_2 equivalent (Gg)											
1. Energy	3.320.358,88	3.320.358,88	3.352.346,03	3.278.313,00	3.212.871,27	3.207.850,69	3.243.214,78	3.315.077,47	3.248.410,48	3.293.798,94	3.268.313,31	3.276.741,53
2. Industrial processes	305.039,46	305.039,46	297.206,66	286.934,22	276.045,72	290.401,54	296.754,72	302.953,73	310.307,30	287.404,59	252.638,60	260.547,45
3. Solvent and other product use	9.065,50	9.065,50	8.989,74	8.794,35	8.427,40	8.460,40	8.497,74	8.543,61	8.616,94	8.662,21	8.646,38	8.796,38
4. Agriculture	416.343,05	416.343,05	405.557,30	396.459,22	390.460,67	391.371,15	391.599,14	395.423,30	395.149,52	394.099,98	393.066,31	389.535,08
5. Land-use change and forestry [7]	-190.959,56	-190.959,56	-215.434,36	-200.690,31	-211.500,02	-199.231,75	-190.139,19	-198.864,26	-199.046,04	-189.485,48	-197.997,26	-172.190,27
6. Waste	154.949,44	154.949,44	151.386,12	146.079,07	140.904,86	139.372,81	137.761,05	132.958,64	127.845,28	125.649,19	123.555,21	121.702,04
7. Other	1.864,59	1.864,59	1.834,76	1.827,51	1.775,98	1.917,82	1.936,54	1.929,00	1.777,01	1.945,16	1.976,82	1.953,72

1) Fill in the base year adopted by the Party under the Convention, if different from 1990.
6) The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report CO_2 emissions and removals from Land-Use Change and Forestry.
7) Net emissions.
8) The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry. Note that these totals will differ from the totals reported in Table Summary2 if Parties report non-CO_2 emissions from LUCF.