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# SYNTHESIS AND ASSESSMENT REPORT ON THE GREENHOUSE GAS INVENTORIES SUBMITTED IN 2001[1]

**Note by the secretariat**

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[1] In the symbol of this document, 2001 refers to the year the inventories were submitted and not to the year of publication.

# I. INTRODUCTION

## A. Mandate

1. The Conference of the Parties (COP), by its decision 6/CP.5, adopted the guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention,[2] (referred to below as "the review guidelines"), for a trial period covering inventory submissions due in 2000 and 2001 (FCCC/CP/1999/6/Add.1).

2. By its decision 3/CP.5, the COP also adopted guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories,[2] (referred to below as "the reporting guidelines"). These guidelines should be used by Parties included in Annex I to the Convention (Annex I Parties) for reporting inventories due by 15 April each year, beginning in the year 2000.[3]

3. By its decision 6/CP.5, the COP requested the secretariat to conduct an annual synthesis and assessment of greenhouse gas (GHG) inventories for all Annex I Parties, in accordance with the provisions of the review guidelines. The purposes of the synthesis and assessment are to facilitate the consideration of inventory data and other information across Parties, and to identify issues for further consideration during the review of individual inventories, namely desk reviews, centralized reviews and in-country reviews.

4. In accordance with the review guidelines the synthesis and assessment should be conducted by the secretariat in two phases, with the assistance of experts selected for the second phase. The results of this stage of the review will be published on the UNFCCC web site as a synthesis and assessment report, divided into two sections and an addendum. The review guidelines state that the first section should provide information allowing comparisons across Annex I Parties and describe common methodological issues. The second section should contain a preliminary analysis of individual Annex I Party inventories, in particular, to identify outstanding issues requiring clarification during the individual review stage of the process. In addition, an addendum should be prepared containing tables and graphs based on Annex I Party inventory data.

## B. Scope of the note

5. This synthesis and assessment report responds to the mandate described in paragraphs 3 and 4 above. It contains the first and second sections of the synthesis and assessment report, covering the national GHG inventories submitted in 2001 by those Annex I Parties that used the common reporting format (CRF) in accordance with the reporting guidelines. An addendum to this report was not prepared, as a document with similar inventory data, in tabular and graphical format, was prepared by the secretariat on the basis of the submissions of Parties for the year 2001(FCCC/SBI/2001/13).[4] This document can be regarded as a substitute for the addendum to this report.[5]

6. This synthesis and assessment report focuses on the inventory information submitted in the CRF and does not provide a comprehensive assessment of the national inventory reports, which have been provided by some Annex I Parties as part of their annual inventory submission.

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[2] The full text of the guidelines is contained in document FCCC/CP/1999/7.

[3] The Subsidiary Body for Implementation (SBI), at its tenth session, set up a two-year trial period beginning in early 2000 to assess those guidelines, particularly the common reporting format, with a view to revising them at COP 7, taking into consideration, inter alia, experience gained by Parties and the secretariat, and the input of the Intergovernmental Panel on Climate Change (FCCC/SBI/1999/8).

[4] See also FCCC/SBI/2001/13/Corr.1.

[5] These documents contain information from all Annex I Parties that submitted inventories in the year 2001 irrespective of whether they reported the inventory data using the CRF or not.

7. The preliminary findings included in the second section are the result of the analysis of the CRF data, taking into account additional information in the national inventory report (NIR) where applicable, performed by the secretariat and the experts who participated in the second phase of the synthesis and assessment. The comments and questions are not intended as a judgement of whether inventory problems exist, but are provided as an indication of potential issues that need to be considered further during the third stage of the review process (individual review of inventories) by the expert review teams.

8. The synthesis and assessment of GHG inventories should also assist in assessing the usefulness of the reporting guidelines, in particular the CRF for supporting the technical review of GHG inventories and will provide useful input to the possible revision of these reporting guidelines by the COP.

## C. Possible action by Parties

9. Parties may wish to communicate to the secretariat their views on the content, extent and layout of the synthesis and assessment report on GHG inventories and consider possible changes.

## D. Approach

10. The analysis of the inventory data was done according to the sectors, subsectors and source categories which are specified in the CRF and which correspond to those of the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, (the IPCC Guidelines). The synthesis and assessment report for 2000 did not include tables for comparing inventory data from the land-use change and forestry sector due to the limited disaggregated data provided by Parties. However, following input from experts during the review process of 2000 submissions on the presentation of data for this sector, the 2001 synthesis and assessment report incorporates tables comparing data from Annex I Parties which provided data in CRF tables 5 A-D.

11. To facilitate the analysis of the inventory data, the secretariat considers, for each individual Party, those source categories that are *key sources* in terms of their absolute level of emissions and impact on the trend, applying the tier 1 level and trend assessment as described in the IPCC good practice guidance.[6] With regard to categories, this identification has been performed at the level of detail recommended in that guidance.[7] The land-use change and forestry sector has not been included in the calculation of the key source calculations.[8]

## E. Limitations of the synthesis and assessment report

12. The completeness and the scope of this report are affected by the fact that only 30 out of 40 Annex I Parties submitted their inventory using the CRF and by the limited information provided by some of these Parties using the CRF for the first time (see page 9 of this report).

13. Generally, in section II of the report, more issues were identified for those Parties that provided a more complete inventory submission than for those Parties that provided fewer data. The number of issues requiring clarification that are raised for any particular Party in this report does not indicate a lower level of quality of the Party's submission. On the contrary, in the instances where Parties provided more complete submissions and subsequently more issues may have been identified, the synthesis and assessment report will be more useful to the expert review teams in performing their tasks.

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[6] Chapter 7, "Methodological choice and recalculations" of the IPCC Good Practice Guidance and Uncertainty Management, referred to in this report as the IPCC good practice guidance.

[7] For some Parties, identification of key sources at that level of detail was not possible due to insufficient reporting of disaggregated data. For these Parties, key sources have been identified at the level of category disaggregation provided in Summary table 1.A of the CRF (corresponding to summary Table 7A of the IPCC Guidelines).

[8] Emissions and removals associated with carbon stocks in land-use, land-use change and forestry are not covered in the current edition of the IPCC good practice guidance. A separate IPCC report on good practice for this sector is in preparation.

Phase I of the synthesis and assessment

14. To facilitate the review of the GHG inventory data reported by Annex I Parties, the secretariat developed a database for processing and storing data submitted electronically in the CRF tables. Other software tools and specific queries for retrieving and viewing the data stored in the database were also developed in order to facilitate the process of analysing the inventory data during the various stages of the review process. The secretariat continues to improve its data management and processing tools, and has benefited from the suggestions of experts in the course of the review process.

15. During the first phase of the synthesis and assessment, the secretariat compiled the information provided by Parties using the CRF and prepared the preliminary synthesis and assessment report. This included a draft of section I of the report, that consisted of a set of data tables to allow comparison of inventory information across Parties, and a draft country-by-country analysis for section II of the report.

16. *Key sources*, implied emission factors and other methodological information were compared across Parties and, where possible, against default emission factors from the IPCC. For the detection of potential issues in the inventory data comparisons, a preliminary statistical analysis of the data has been performed. For some source categories for which international data sources are available, activity data reported by Parties were compared with data from international data sources, such as United Nations, International Energy Agency (IEA), and Food and Agriculture Organization (FAO) statistics. An assessment of emission trends and implied emission factors from 1990 to 1999 was performed where possible. Furthermore, the inventory data submitted in 2001 were compared with data in previous inventory submissions. Where possible, the national inventory report, or any other accompanying textual information, was used to assess the consistency of the information provided. Specific data checks were also carried out to verify the consistency of the reported data, and to detect omissions and other problems related to inappropriate use of the CRF.

Phase II of the synthesis and assessment

17. The second phase of the synthesis and assessment exercise was conducted with the participation of seven national inventory experts from the roster of experts and one expert from an international organization. The experts invited were Mario Contaldi (Italy), László Gáspár (Hungary), Gabriel Hernández (Latin American Energy Organization (OLADE)), Thelma Krug (Brazil), Carlos Lopez (Cuba), Joe Mangino (United States of America), Martiros Tsarukyan (Armenia), and Risto Sievänen (Finland). These experts were selected according to their expertise in inventory preparation, taking into account geographical balance.

18. The main task of the experts was to assist the secretariat in facilitating the consideration of inventory data and other information across Parties, and in identifying potential issues for further consideration during the review of individual inventories. Mainly, they were asked to provide advice on:

(a) The content of the preliminary draft of section I of the synthesis and assessment report;

(b) The potential problems identified in the preliminary country-by-country analysis of section II of the report.

19. Experts were allocated to work according to inventory sectors in accordance with their expertise. In reviewing all 30 inventory submissions for their specific sector in order to perform the above-mentioned task, they assessed the results of the data comparisons of section I of the report to determine potential inventory issues and developed additional specialized data comparison queries by sector where needed. The potential issues included in the preliminary country-by-country analysis of section II were considered, assessed and completed based on any new findings identified during this second phase.

20. Section I of the draft synthesis and assessment report was sent to Parties for comment, together with the corresponding preliminary findings on the individual Party's GHG inventory (section II ). Twenty-one Parties (Australia, Austria, Belgium, Czech Republic, Estonia, Finland, France, Hungary, Ireland, Japan, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom and United States of America) responded to the draft synthesis and assessment report. Any additional information and clarifications contained in the Party's comment in response to the findings have been added below the original finding using ***bold italic*** font, quoting as closely as possible the text provided by the Party. However, retroactive corrections by the Parties to the data have not been taken into account in the respective tables of section I, but have been reflected accordingly in section II of this report.

21. For those Parties whose GHG inventory was subject to an individual review,[9] the answers to the preliminary findings were provided to the expert review teams for their consideration.

[9] The following Parties' GHG inventories submitted in 2001were subjected to an individual review using one or more of the various approaches: Austria (centralized and in-country reviews), Belgium (centralized review), Bulgaria (desk review), Czech Republic (desk review), Denmark (desk review), Estonia (centralized review), European Community (centralized review), Finland (desk and in-country reviews), France (desk and in-country reviews), Germany (centralized review), Greece (centralized review), Iceland (desk review), Ireland (desk review), Italy (desk review), Latvia (desk review), Luxembourg (desk review), Norway (desk review), Portugal (desk review), Slovakia (desk review), Spain (centralized review), Sweden (desk and in-country reviews), Switzerland (desk review).

# II. SECTION I

# COMPARISON OF GREENHOUSE GAS INVENTORY INFORMATION ACROSS PARTIES

## A. Overview

### 1. Introductory notes

General notes

This section of the synthesis and assessment report contains greenhouse gas inventory information, compiled in tabular format, from the 30 Annex I Parties, referred to below simply as Parties, that provided information in the common reporting format as part of their annual inventory submission in 2001. The tables provide comparisons of implied emission factors and activity data as reported in the CRF, data from international sources, emissions, information on methods used and emission factors as reported by Parties in Summary table 3 of the CRF and other information related to GHG inventory estimates. Where possible, this information is provided for all 30 Parties and for all years from 1990 to 1999. For some sectors and categories, however, trend comparisons across all Parties were not possible due to the lack of data for some or all of these years (see subsection 2 below).

Some of the tables indicate whether a source category is a key source, in terms of its absolute level of emissions or trend assessment, as calculated by the secretariat in accordance with the definitions given in chapter 7 of the IPCC good practice guidance[10] for the tier 1 level assessment[11]. This is indicated by an "L" for level and "T" for trend assessments in the 'key source' columns. The column "Per cent of national total" indicates the contribution of that key source category to the Party's national total of GHG emissions in terms of $CO_2$ equivalent, excluding emissions and removals from land-use change and forestry.

Default emission factors and other parameters from the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, have been included in the tables, as appropriate, to facilitate comparison with implied emission factors reported by Parties. In addition, where updated default emission factors were available from the IPCC good practice guidance, these have been provided in the relevant footnotes.

Explanatory notes

Blank cells in the tables indicate that a Party did not report information for a given source and gas in the appropriate table of the CRF.

The differences in activity data between the CRF and international data sources were calculated as percentage deviations from the activity data in the CRF. A positive number indicates that the data from the international data source are higher than the data reported in the CRF. Similarly, a negative number indicates that data from the international data source are lower than the data reported in the CRF.

References to the base year refer to 1990, except for the following Parties with economies in transition which, in accordance with decision 9/CP.2, use base years other than 1990: Bulgaria (1988) and Hungary (average 1985-1987).

[10] Good practice guidance refers to the IPCC report "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories".

[11] Emissions and removals from land-use change and forestry have not been included in the calculations for the identification of key sources.

Where Parties used indicators (NO, NE, NA, IE, C, 0) these have been reproduced verbatim from the CRF tables provided by Parties. The standard indicators, as described in the UNFCCC reporting guidelines (FCCC/CP/1999/7), are as follows:

| | |
|---|---|
| NO | Not occurring |
| NE | Not estimated |
| NA | Not applicable |
| IE | Included elsewhere |
| C | Confidential |
| "0" | Estimates that are less than one half the unit being used to record the inventory table |

To indicate the methods and emission factors used by Parties the following abbreviations have been used (see also footnotes to Summary table 3 of the CRF):

| Methods: | | Emission factors: | |
|---|---|---|---|
| D | IPCC default | D | IPCC default |
| RA | Reference approach | C | CORINAIR |
| T1 | IPCC tier 1 | CS | Country specific |
| T1a, T1b, T1c | IPCC tier 1a, tier 1b, and tier 1c, respectively | PS | Plant specific |
| | | M | Model |
| T2 | IPCC tier 2 | | |
| T3 | IPCC tier 3 | | |
| C | CORINAIR | | |
| CS | Country specific | | |
| M | Model | | |

Tables on energy indicate whether implied emission factors given in the CRF are based on gross calorific value (GCV) or net calorific value (NCV). The difference between the NCV and the GCV for each fuel is the latent heat of vaporization of the water produced during combustion of the fuel. For coal and oil, NCV is 5 per cent less than GCV, and for most forms of natural and manufactured gas the difference is 9 to 10 per cent.

For greenhouse gases the following chemical symbols and abbreviations have been used:

| | |
|---|---|
| $CF_4$ | perfluoromethane |
| $C_2F_6$ | perfluoroethane |
| $C_3F_8$ | perfluoropropane |
| $C_4F_{10}$ | perfluorobutane |
| c-$C_4F_8$ | perfluorocyclobutane |
| $C_5F_{12}$ | perfluoropentane |
| $C_6F_{14}$ | perfluorohexane |
| $CH_4$ | methane |
| $CO_2$ | carbon dioxide |
| HFCs | hydrofluorocarbons |
| $N_2O$ | nitrous oxide |
| PFCs | perfluorocarbons |
| $SF_6$ | sulphur hexafluoride |

The following units have been used:

| | |
|---|---|
| kg | kilogram ($10^3$ grams) |
| t | tonne ($10^6$ grams) |
| kt | kilotonne ($10^9$ grams) |
| Gg | gigagram ($10^9$ grams) |

| | |
|---|---|
| Mt | megatonne ($10^{12}$ grams) |
| TJ | terajoule ($10^{12}$ joules) |
| PJ | petajoule ($10^{15}$ joules) |
| Gg $CO_2$ equ | Gg of $CO_2$ equivalent |
| Mha | million hectares |
| NGL | natural gas liquids |
| FAO | Food and Agriculture Organization of the United Nations |

The following other abbreviations have been used:

| | |
|---|---|
| CRF | common reporting format |
| NIR | national inventory report |
| A | actual emissions |
| P | potential emissions |
| AD | activity data |
| EF | emission factor |
| IEF | implied emission factor |
| GHG | greenhouse gas |
| GWP | global warming potential |
| N | nitrogen |
| NCV | net calorific value |
| GCV | gross calorific value |
| yr | year |
| L | level (key source applying the IPCC good practice tier 1 level assessment) |
| T | trend (key source applying the IPCC good practice tier 1 trend assessment) |

## 2. Status of reporting of GHG inventories in the year 2001

### Inventories from Annex I Parties submitted in 2001 in accordance with decision 3/CP.5

Parties that submitted their inventories using the CRF were:

Australia, Austria, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, European Community,[12] Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland, the United Kingdom and the United States.

[12] The European Community reported Summary table 1.A only but in addition it included in its submission inventory data, in the common reporting format or other formats, for 14 member States individually.

**Table 1. Status of reporting inventories in the CRF:[13]**

| Reporting | Parties |
|---|---|
| Parties that have submitted inventory data for all years (1990-1999) using the CRF | Austria, Canada, Denmark, European Community (Summary 1.A only), Finland, France, Germany (table 1A(b) & trend, summary tables), Greece, Japan, Netherlands, Portugal, Spain (no sectoral background tables provided except 1A(b) & 1A(c)), Sweden, United Kingdom, United States. |
| Parties that have submitted inventories using the CRF for one or more years | Australia (1990, 1999 & recalculation tables 1990-1998, trend tables), Belgium (1998, 1999), Bulgaria (1999 & trend tables), Czech Republic (1999), Estonia (1999), Hungary (1999 & trend tables), Iceland (1999 & trend tables), Ireland (1999 & trend tables), Italy (1998, 1999 & trend tables), Latvia (1999 & trend tables), Luxembourg (1999), New Zealand (1999 & recalculation tables 1990-1998, trend tables), Norway (1990, 1999 & recalculation tables 1990,1998, trend tables), Slovakia (1999 & trend tables), Switzerland (1999 & recalculation tables 1990-1998, trend tables) |
| Parties that have submitted inventories in a format other than the CRF | Monaco (1990-1999, summary tables), Poland (1999, IPCC summary tables) |
| Parties that did not submit an inventory in 2001 | Belarus, Croatia, Liechtenstein, Lithuania, Romania, Russian Federation, Slovenia, Ukraine |

**Table 2. Provision of national inventory report (NIR) or any other additional information together with the CRF**

| Reporting | Parties | Description |
|---|---|---|
| Parties that provided an NIR[14] | Australia | Information on activity data, emission factors and uncertainty Estimates for all sectors. In addition, methodology supplements, including modifications and additions to previously submitted methodologies for the compilation of the inventory and description of quality control checks performed, have been provided for each sector. The 1999 inventory report includes a more rigorous treatment of uncertainties of emission estimates for key sources than has previously been included. An indication of the quantified level of uncertainty for several sectors is also provided in the national inventory report. |
| | Austria | Indicates methods and activity data used (mentioned that an extended version of this report is in preparation). |
| | Bulgaria | Information on methodologies, activity data and emission factors used, and information on application of the IPCC good practice guidance. |
| | Canada | Information on methodologies, activity data sources and emission factors for all source categories; also describes QA/QC procedures employed. |

[13] Information regarding the degree of completeness and timeliness in reporting of inventories by each Party can be found in the status reports on the UNFCCC secretariat web site: http://www.unfccc.int/resource/ghg/statrep2001.html

[14] National inventory reports differ in content, scope and level of detail. The secretariat did not assess to what extent the information provided in the reports follows the reporting guidelines on this matter (see FCCC/CP/1999/7).

**Table 2. Provision of national inventory report (NIR) or any other additional information together with the CRF** *(continued)*

| Reporting | Parties | Description |
|---|---|---|
| Parties that provided an NIR | Denmark | Information on the methodologies used, recalculations, uncertainties and QA/QC. In appendices to the report, emission factors for fuel combustion and a brief description of the methodology regarding removals by sinks were also provided. An appendix included emission trends for the years 1990-1999 adjusted for electricity exchange and inter-annual temperature variations. Information on Greenland and the Faroe Islands was also provided. |
| | Finland | Information about the organization of the national inventory, methods used for the 1999 inventory and summary tables. Further includes a report that describes methodologies, emission factors and activity data in detail, as well as uncertainty estimates, changes compared to previous submission and information on key sources. |
| | France | Information on the methodologies used for calculation of emissions from all sectors. |
| | Latvia | Information on methodologies used, sources of information related to methodologies, recalculations, assumptions made and conventions used; also outlines the problems with the compilation of the GHG inventory, determination of uncertainties and QA/QC procedures. |
| | Netherlands | Information on methods and data used, changes in methods and data, uncertainty and key source assessments, quality assurance/quality control, trends in emissions, and country-specific circumstances and definitions. |
| | New Zealand | Information on methodologies, activity data, emission factors, Differences compared to previous submissions and uncertainty estimates in the calculations for all source categories. |
| | Norway | Information on methods used and explanations of major changes in the inventory compared to previous submissions. References to methodologies, emission factors, activity data and measurements were also included. |
| | Spain | Summary of emission estimates, a brief description of the methodologies used and an explanation of recalculated emission estimates. |
| | Sweden | Information on methodologies, activity data and emission factors for each sector. Further provides information on uncertainties, quality assurance/quality control, recalculations and upcoming improvements as well as an identification of key sources in the energy sector. |
| | United Kingdom | Explanations for the changes in the current emission estimates compared to previous submissions as well as a description of the methodologies and emission factors used for each IPCC sector. A description of the QA/QC procedures and uncertainty estimates were also provided. |
| | United States | Information on methodologies, activity data, emission factors, differences to previous submissions and uncertainty estimates for all categories. |

**Table 2. Provision of national inventory report (NIR) or any other additional information together with the CRF** *(concluded)*

| Reporting | Parties | Description |
|---|---|---|
| Parties that did not provide any information additional to that in the CRF | Belgium<br>Czech Republic<br>Estonia<br>Germany<br>Greece<br>Hungary<br>Iceland<br>Ireland<br>Italy<br>Japan<br>Luxembourg<br>Portugal<br>Slovakia<br>Switzerland | |

## 3. Summary of key sources

**Table 3. Summary of key sources (1999) – tier 1 level assessment (disaggregation level of sources as recommended in IPCC good practice guidance)**

Note that Germany, Luxembourg, Poland and Spain are not included in this table because data from these Parties were not reported at the level of detail necessary to identify key sources according to the level of disaggregation recommended by the IPCC good practice guidance.

| Source | GHG | Parties | Total Parties |
|---|---|---|---|
| $CH_4$ from solid waste disposal sites | $CH_4$ | Australia, Austria, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Sweden, Switzerland, United Kingdom, United States | 25 |
| $CO_2$ stationary combustion - oil | $CO_2$ | Australia, Austria, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Sweden, Switzerland, United Kingdom, United States | 25 |
| Mobile combustion - road vehicles | $CO_2$ | Australia, Austria, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Sweden, Switzerland, United Kingdom, United States | 25 |
| $CH_4$ from enteric fermentation in domestic livestock | $CH_4$ | Australia, Austria, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Sweden, Switzerland, United Kingdom, United States | 24 (all except Japan) |
| $CO_2$ stationary combustion - coal | $CO_2$ | Australia, Austria, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Japan, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Sweden, Switzerland, United Kingdom, United States | 24 (all except Iceland) |
| $CO_2$ stationary combustion - gas | $CO_2$ | Australia, Austria, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Japan, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Sweden, Switzerland, United Kingdom, United States | 24 (all except Iceland) |

**Table 3. Summary of key sources – tier 1 level assessment (disaggregation level of sources as recommended in IPCC good practice guidance)** *(continued)*

| Source | GHG | Parties | Total Parties |
|---|---|---|---|
| Direct $N_2O$ emissions from agricultural soils | $N_2O$ | Australia, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Portugal, Slovakia, Sweden, United Kingdom, United States | 22 (all except Austria, Japan and Switzerland) |
| $CO_2$ from cement production | $CO_2$ | Austria, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Norway, Portugal, Slovakia, Sweden, Switzerland, United Kingdom | 19 |
| Indirect $N_2O$ from nitrogen used in agriculture | $N_2O$ | Bulgaria, Canada, Czech Republic, Denmark, Finland, France, Hungary, Ireland, Italy, Latvia, New Zealand, Norway, Portugal, United Kingdom, United States | 15 |
| Fugitive emissions: oil and gas operations | $CH_4$ | Australia, Bulgaria, Canada, Estonia, Hungary, Italy, Latvia, Netherlands, Norway, Slovakia, Switzerland, United Kingdom, United States | 13 |
| Mobile combustion - road vehicles | $N_2O$ | Austria, Canada, Finland, France, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States | 11 |
| $N_2O$ from nitric acid production | $N_2O$ | Bulgaria, Czech Republic, Finland, France, Ireland, Netherlands, Norway, Portugal, Sweden, Switzerland, United Kingdom | 11 |
| $CH_4$ from manure management | $CH_4$ | Austria, Canada, Denmark, France, Hungary, Ireland, Italy, Netherlands, Portugal, Switzerland | 10 |
| Mobile combustion-aircraft | $CO_2$ | Canada, France, Greece, Japan, New Zealand, Norway, Portugal, Sweden, Switzerland, United States | 10 |
| Animal production | $N_2O$ | Australia, Bulgaria, France, Greece, Ireland, New Zealand, Portugal, Sweden, United Kingdom | 9 |
| Mobile combustion - waterborne navigation | $CO_2$ | Canada, Finland, Greece, Italy, Japan, Norway, Portugal, Sweden, United States | 9 |
| Ozone-depleting substance substitutes | HFCs +PFCs | Austria, Denmark, France, Italy, Japan, Sweden, Switzerland, United Kingdom, United States | 9 |
| Fugitive emissions: oil and gas operations | $CO_2$ | Australia, Austria, Canada, Denmark, France, New Zealand, Norway, United Kingdom | 8 |
| $CO_2$ from iron and steel industry | $CO_2$ | Austria, Bulgaria, Canada, France, New Zealand, Sweden, United States | 7 |
| $CO_2$ stationary combustion - other fuels | $CO_2$ | Finland, France, Italy, Netherlands, Slovakia, Sweden, Switzerland | 7 |
| Fugitive emissions: coal mining and handling | $CH_4$ | Australia, Bulgaria, Czech Republic, Hungary, Slovakia, United Kingdom, United States | 7 |

**Table 3. Summary of key sources – tier 1 level assessment (disaggregation level of sources as recommended in IPCC good practice guidance)** *(continued)*

| Source | GHG | Parties | Total Parties |
|---|---|---|---|
| Other transportation | $CO_2$ | Canada, Finland, Greece, Hungary, Netherlands, Norway, United States | 7 |
| Wastewater handling | $CH_4$ | Bulgaria, Estonia, Hungary, Italy, Latvia, Slovakia, Portugal | 6 |
| Ammonia production | $CO_2$ | Austria, Estonia, France, Hungary, Ireland, Norway | 6 |
| $N_2O$ from manure management | $N_2O$ | France, Italy, Latvia, Portugal, Sweden, Switzerland | 6 |
| PFCs from aluminium production | CF4+ C2F6 | Canada, Hungary, Iceland, Netherlands, Norway | 5 |
| Non-$CO_2$ stationary combustion - coal | $N_2O$ | Bulgaria, Czech Republic, Greece, Sweden | 4 |
| Ferroalloy production | $CO_2$ | Iceland, Norway, Sweden | 3 |
| Waste incineration | $CO_2$ | Hungary, Japan, Switzerland | 3 |
| Agricultural soils | $CH_4$ | Austria, Greece | 2 |
| Aluminium production | $CO_2$ | Iceland, Norway | 2 |
| HFC-23 from HCFC production | HFC23 | Greece, Netherlands | 2 |
| Limestone and dolomite use | $CO_2$ | Japan, Slovakia | 2 |
| $N_2O$ from adipic acid production | $N_2O$ | France, Italy | 2 |
| Non-$CO_2$ stationary combustion - biomass | $CH_4$ | France, Latvia | 2 |
| Other (chemical industry) | $N_2O$ | France, Iceland | 2 |
| Railways | $CO_2$ | Canada, Latvia | 2 |
| Wastewater handling | $N_2O$ | Portugal | 1 |
| Agricultural soils | $CO_2$ | Finland | 1 |
| $CH_4$ from savanna burning | $CH_4$ | Australia | 1 |
| $CO_2$ from lime production | $CO_2$ | Finland | 1 |
| $N_2O$ from savanna burning | $N_2O$ | Australia | 1 |
| Non-$CO_2$ stationary combustion - biomass | $N_2O$ | Finland | 1 |

**Table 3. Summary of key sources – tier 1 level assessment (disaggregation level of sources as recommended in IPCC good practice guidance)** *(concluded)*

| Source | GHG | Parties | Total Parties |
|---|---|---|---|
| Non-$CO_2$ stationary combustion - oil | $N_2O$ | Sweden | 1 |
| Other | $CO_2$ | Finland | 1 |
| Other (agricultural soils) | $N_2O$ | Sweden | 1 |
| Other (fugitive from solid fuels) | $CO_2$ | Finland | 1 |
| Other (industrial processes) | $CO_2$ | Canada | 1 |
| Other (mineral products) | $CO_2$ | Austria | 1 |
| Other (waste) | $CH_4$ | Austria | 1 |
| $SF_6$ from magnesium production | $SF_6$ | Norway | 1 |
| Solid waste disposal | $CO_2$ | Switzerland | 1 |
| Solvent and other product use | $N_2O$ | Switzerland | 1 |
| Waste incineration | $N_2O$ | Switzerland | 1 |