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] (hereinafter referred to as the review guidelines) for a trial period covering inventory submissions due in 2000 and 2001 (FCCC/CP/1999/6/Add.1). The COP, by its decision 34/CP.7, extended the trial period to include inventory submissions due in 2002.

2. In accordance with decision 6/CP.5 a revision of the review guidelines was undertaken, and the COP, by its decisions 19/CP.8, adopted revised guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention.[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 reviews of individual inventories (desk reviews, centralized reviews and in-country reviews). The review guidelines state that the synthesis and assessment should contain two parts: Part I should provide information allowing comparisons across Annex I Parties and descriptions of common methodological issues; and Part II 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.

4. In accordance with decision 19/CP.8, Part I will be published on the UNFCCC web site as a synthesis and assessment report. Part II will be sent to the respective Party for comments and, together with the comments provided by the respective Party, will be provided to the corresponding expert review team as input for the individual review; Part II will not be published on the UNFCCC web site.

B. Scope of the note

5. This document contains Part I of the synthesis and assessment report, covering the national GHG inventories submitted in 2002 by those Annex I Parties that used the common reporting format (CRF) in accordance with the reporting guidelines (FCCC/CP/1999/7).

C. Approach

6. For inventory submissions due in 2002, which is the last year of the trial period, this synthesis and assessment report was prepared using elements of decisions 6/CP.5 and 19/CP.8. In accordance with the decision 6/CP.5 the synthesis and assessment was conducted by the secretariat, with the assistance of experts. In accordance with decision 19/CP.8 only Part I of the synthesis and assessment will be published.

7. This synthesis and assessment report covers only the inventory information submitted in the CRF and not information contained in the national inventory reports. 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 completeness and the scope of this report are limited by the fact that only 27 out of 40 Annex I Parties submitted their inventory within six weeks from the due date for submissions. Accordingly, this report covers inventories submitted by: Austria, Belgium, Canada, Czech Republic,

[2] The full text of the guidelines is contained in document FCCC/CP/1999/7.
[3] The full text of the guidelines is contained in document FCCC/CP/2002/8.

Denmark, Estonia, European Community, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom and United States.[4]

9. The inventory data were analyzed according to the sectors, subsectors and source categories specified in the CRF and which correspond to those of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines).

10. The secretariat compiled the information provided by Parties using the CRF and prepared the preliminary synthesis and assessment report. This included a draft of Part I of the report, that consisted of a set of data tables to allow comparison of inventory information across Parties, and a draft Part II, containing a preliminary analysis of inventories of individual Annex I Parties.

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 chapter 7 "Methodological choice and recalculations" of the *IPCC Good Practice Guidance and Uncertainty Management* (hereinafter referred to as the IPCC good practice guidance).[5] This identification has been performed at the level of detail recommended in that guidance.[6] The land-use change and forestry sector has not been included in the calculation of the key source calculations.

12. The secretariat also conducted a number of data analyses and comparisons:

- *Key sources*, implied emission factors and other methodological information were compared across Parties. Where possible, implied emission factors were compared against default emission factors from the IPCC.
- A preliminary statistical analysis of the data was performed, in order to detect potential issues in the inventory data comparisons.
- 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, for source categories for which international data sources are available.
- An assessment of trends in emissions and implied emission factors from 1990 to 2000 was performed, where possible.
- The inventory data submitted in 2002 were compared with data in previous inventory submissions.
- The national inventory report, or any other accompanying textual information, was used to assess the consistency of the information provided, where possible.
- Specific data checks were carried out to verify the consistency of the reported data, and to detect omissions and other problems relating to inappropriate use of the CRF.

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[4] Australia, Belarus, Germany, Japan and Romania also submitted inventories in the CRF format but after the established timeframe of six weeks from the due date for submissions. Monaco and the Russian Federation submitted inventories in 2002 but not using the CRF format. Bulgaria, Croatia, Liechtenstein, Lithuania, Slovenia and Ukraine did not submit an inventory in 2002.

[5] 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).

[6] Emissions and removals associated with 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 land use, land-use change and forestry is in preparation.

13. Five national inventory experts from the roster of experts were invited to assist the secretariat in finalizing the synthesis and assessment. The experts were: Ms. Maria Paz Cigaran (Peru), Mr. Wojciech Galinski (Poland), Ms. Anke Herold (Germany), Mr. Alexander Nakhutin (Russian Federation), and Mr. Minxing Wang (China).

14. The main task of the experts was to assist the secretariat in considering 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 Part I of the synthesis and assessment report;

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

15. Part 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 (Part II). However, the tables in Part I do not reflect corrections by the Parties to the data.

16. For those Parties whose GHG inventory was subject to an individual review,[7] responses by the Party to the preliminary findings were provided to the expert review teams for their consideration.

17. A separate document with a compilation of the emissions and trends for the period 1990–2000, in tabular and graphical format, was prepared by the secretariat mainly on the basis of the submissions of Parties for the year 2002 (FCCC/WEB/2002/10). A summary of this document can be found in document FCCC/SB/2002/INF.2.[8] This synthesis and assessment report may be read in conjunction with these documents.

II. COMPARISON OF GREENHOUSE GAS INVENTORY INFORMATION ACROSS PARTIES

A. Overview

1. General notes

18. This synthesis and assessment report contains greenhouse gas inventory information, compiled in tabular format, from the 27 Annex I Parties that provided information in the common reporting format as part of their annual inventory submission in 2002, within six weeks from the due date for submissions. 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 relating to GHG inventory estimates. Where possible, this information is provided for all 27 Parties and for all years from 1990 to 2000. 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.

19. Default emission factors and other parameters from the IPCC Guidelines 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.

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[7] The following Parties' GHG inventories submitted in 2002 were subjected to an individual review: Canada (centralized review), Czech Republic (desk review), Denmark (centralized review), Finland (centralized review), Hungary (in-country review), Latvia (in-country review), Netherlands (centralized review), New Zealand (desk review), Norway (in-country review), Spain (desk review), Sweden (centralized review) and United Kingdom (desk review).

[8] This document contain information from all Annex I Parties that submitted inventories in the year 2002 irrespective of whether they reported the inventory data using the CRF or not.

20. 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 for the tier 1 level assessment.[9] Table 1 includes a summary of key sources in 2000 calculated in accordance with the IPCC good practice guidance.

Table 1. Summary of key sources (2000) – tier 1 level assessment (disaggregation level of sources as recommended in IPCC good practice guidance)[a)]

Source	GHG	Parties	Number of Parties
Enteric fermentation in domestic livestock	CH_4	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States	24 (all)
Solid waste disposal sites	CH_4	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States	24 (all)
Stationary combustion – oil	CO_2	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States	24 (all)
Mobile combustion – Road vehicles	CO_2	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States	24 (all)
Stationary combustion – coal	CO_2	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, United Kingdom, United States	23 (all except Switzerland)
Stationary combustion – gas	CO_2	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States	23 (all except Iceland)
Direct emissions from agricultural soils	N_2O	Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States	23 (all except Austria)
Cement production	CO_2	Austria, Canada, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, United Kingdom, United States	21
Indirect emissions from agricultural soils	N_2O	Canada, Czech Republic, Denmark, Finland, France, Hungary, Ireland, Italy, Latvia, New Zealand, Norway, Portugal, Spain, Switzerland, United Kingdom, United States	16

a) Belgium, European Community and Luxembourg are not included in this table as 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. Key sources identified for these Parties based on summary table 1.A of the CRF are included in table 2.

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

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

Source	GHG	Parties	Number of Parties
Mobile combustion – road vehicles	N_2O	Austria, Canada, Finland, France, Italy, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States	12
Fugitive emissions – oil and gas operations	CH_4	Canada, Estonia, Hungary, Italy, Latvia, Netherlands, Norway, Poland, Slovakia, United Kingdom, United States	11
Manure management	CH_4	Austria, Belgium, Canada, Denmark, European Community, France, Hungary, Ireland, Italy, Netherlands, Portugal, Spain	12
Nitric acid production	N_2O	Czech Republic, Finland, France, Ireland, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom	10
Animal production	N_2O	France, Greece, Ireland, New Zealand, Portugal, Spain, Sweden, United Kingdom, United States	9
Mobile combustion – aircraft	CO_2	Canada, France, Greece, New Zealand, Norway, Portugal, Spain, Sweden, United States	9
Ozone-depleting substances substitutes	HFCs and PFCs	Austria, Denmark, Finland, France, Spain, Sweden, Switzerland, United Kingdom, United States	9
Stationary combustion – other fuels	CO_2	Finland, France, Hungary, Italy, Netherlands, Slovakia, Sweden, Switzerland	8
Fugitive emissions – coal mining and handling	CH_4	Czech Republic, Estonia, Hungary, New Zealand, Poland, Slovakia, United Kingdom, United States	8
Manure management	N_2O	France, Hungary, Ireland, Italy, Latvia, Poland, Portugal, Sweden	8
Fugitive emissions – oil and gas operations	CO_2	Canada, Denmark, France, Netherlands, New Zealand, Norway, United Kingdom	7
Other transportation	CO_2	Canada, Finland, Greece, Hungary, Netherlands, Norway, United States	7
Iron and steel industry	CO_2	Austria, Canada, France, New Zealand, Sweden, United States	6
Mobile combustion – waterborne navigation	CO_2	Finland, Greece, Italy, Norway, Sweden, United States	6
Ammonia production	CO_2	Austria, Canada, France, Ireland, Norway	5
Waste-water handling	CH_4	Hungary, Latvia, Portugal, Slovakia, Spain	5
HCFC production	HFC-23	Greece, Netherlands, Spain	3
Stationary combustion – coal	N_2O	Czech Republic, Greece, Sweden	3
Stationary combustion – oil	N_2O	Italy, Spain, Sweden	3
Aluminium production	CF_4 and C_2F_6	Canada, Iceland, Norway	3
Aluminium production	CO_2	Iceland, Norway	2
Lime production	CO_2	Italy, Slovakia	2
Ferroalloys production	CO_2	Iceland, Norway	2
Adipic acid production	N_2O	France, Italy	2
Stationary combustion – biomass	CH_4	France, Latvia	2
Other (agricultural soils)	N_2O	Netherlands, Sweden	2
Railways	CO_2	Canada, Latvia	2

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

Source	GHG	Parties	Number of Parties
Agricultural soils	CH_4	Austria	1
Agricultural soils	CO_2	Finland	1
Limestone and dolomite use	CO_2	Slovakia	1
Other	CO_2	Finland	1
Other (by-product emissions; production of halocarbons and SF_6	HFCs, PFCs and SF_6	United Kingdom	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
Magnesium production	SF_6	Norway	1
Solid fuel transformation	CO_2	Spain	1
Solvent and other product use	CO_2	Austria	1
Waste incineration	CO_2	Switzerland	1
Waste water handling	N_2O	Portugal	1

Table 2. Summary of key sources for Belgium, European Community and Luxembourg – level assessment, based on summary table 1.A of the CRF[b)]

Source	GHG	Parties	Number of Parties
Enteric fermentation in domestic livestock	CH_4	Belgium, European Community, Luxembourg	3
Energy industries	CO_2	Belgium, European Community, Luxembourg	3
Manufacturing industries and construction	CO_2	Belgium, European Community, Luxembourg	3
Mineral products	CO_2	Belgium, European Community, Luxembourg	3
Other sectors	CO_2	Belgium, European Community, Luxembourg	3
Transport	CO_2	Belgium, European Community, Luxembourg	3
Agricultural soils	N_2O	Belgium, European Community	2
Manure management	CH_4	Belgium, European Community	2
Solid waste disposal sites	CH_4	Belgium, European Community	2
Chemical industry	N_2O	Belgium, European Community	2
Metal production	CO_2	European Community, Luxembourg	2
Manure management	N_2O	Belgium, European Community	2
Consumption of halocarbons and SF_6	HFCs	European Community	1
Fugitive emissions: oil and gas operations	CH_4	European Community	1
Other	CO_2	Belgium	1

b) Because these Parties have not submitted sectoral backgroud data tables, key sources have been assessed at the level of summary table 1.A of the CRF, rather than at the level of disaggregation recommended by the IPCC good practice guidance.

2. Explanatory notes

21. 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.

22. 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.

23. 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: Hungary (average 1985-1987) and Poland (1988).

24. Identified key sources are 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 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.

25. 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.

26. Where Parties used notation keys (NO, NE, NA, IE, C, 0) these have been reproduced verbatim from the CRF tables provided by Parties. The notation keys, 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 of the unit being used to record the inventory table

27. 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		

Greenhouse gases have the following chemical formulae and abbreviations:

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 guidance tier 1 level assessment)
T	trend (key source applying the IPCC good practice guidance tier 1 trend assessment)