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Agenda item 9

NATIONAL COMMUNICATIONS FROM PARTIES INCLUDED IN ANNEX I TO THE CONVENTION: GREENHOUSE GAS INVENTORY DATA FROM 1990 TO 1998

Report on progress with the implementation of decision 6/CP.5

Note by the secretariat

I. INTRODUCTION

A. Mandate

1. At its fifth session, the Conference of the Parties (COP) adopted decision 6/CP.5, which established a trial period for the technical review of greenhouse gas (GHG) inventories, covering inventory submissions due in 2000 and 2001 and using the guidelines for the technical review of GHG inventories from Parties included in Annex I to the Convention (Annex I Parties) (FCCC/CP/1999/7). The COP requested the secretariat to conduct, during the trial period, annual initial checks and an annual synthesis and assessment of GHG inventories for all Annex I Parties, beginning in 2000, and individual reviews of the GHG inventories for a limited number of Annex I Parties.

2. The COP also requested the secretariat to report to the Subsidiary Body for Implementation (SBI) at its thirteenth session, on progress with the implementation of this decision.

B. Scope of the note

3. This note was prepared in response to the above mandate. It covers the progress, to date, with the technical inventory review, including development of the database required for storage, processing and presentation of the GHG inventory data. The note briefly describes the results of the initial checks and suggests possible approaches to the next stages of the technical review of GHG inventories, namely the synthesis and assessment and individual reviews. Although the

figures presented in this note are based on inventory submissions from Annex I Parties received in 2000, they are shown for illustrative purposes only hence the individual Parties concerned are not identified.

C. Possible action by the SBI

4. The SBI may wish to consider the information contained in this note and provide additional guidance to the secretariat on the conduct of initial checks, the synthesis and assessment and individual reviews for Annex I Parties.

II. REVIEW OF GREENHOUSE GAS INVENTORIES

A. Background

5. By its decision 3/CP.5, the COP adopted UNFCCC reporting guidelines on annual inventories for the preparation of national communications by Annex I Parties. These guidelines include the common reporting format (CRF). It decided that Annex I Parties should use these guidelines for reporting inventories due by 15 April each year, beginning in 2000. By the date of publication of this note, the secretariat had received 23 submissions from Annex I Parties using these guidelines and these were used as the basis for the initial checks. Initial checks were not conducted for submissions based on earlier reporting guidelines.

6. In preparation for the technical inventory review and, in particular, the initial checks, the secretariat began the development of a new database in October 1999 and has continued to work on its development. This is being designed to store, process and retrieve data submitted electronically in the numerous CRF tables and to analyse data for the purposes of technical review at different levels of detail.

7. A simplified diagram of the database structure is given in figure 1 (see the figures at the end of the document). Apart from storing the data submitted in the CRF format, the database is also designed to store various elements of administrative information, such as date of submission, version (draft, revision, final submission, etc.), name and address of the responsible national official, and year for which the inventory was submitted. The database is being designed in such a way that, if required, it will be able to store summary information derived from national registries, although national registries have not yet been designed. A prototype of the database was presented to Parties during the twelfth sessions of the subsidiary bodies.

B. Initial checks and status reports

8. In accordance with the guidelines for the technical review of GHG inventories from Annex I Parties, the first stage of the review process consists of the initial check of annual inventories, covering the national inventory submission and, in particular, the data electronically submitted in the CRF. The guidelines describe the coverage of the initial checks and what they should identify, including what the assessment of completeness should determine, and state that the results should be published on the UNFCCC web site as a status report for each Annex I Party, mainly in tabular format, within four weeks of the date of receipt of the submission by the secretariat. In May 2000, the secretariat invited eight inventory experts involved in the preparation of national inventories using the new reporting guidelines and the CRF to provide

advice on the more precise nature and scope of the initial checks, whilst following the requirements of the guidelines.

9. All of the experts consulted were of the opinion that the initial check should be based upon both the CRF and the national inventory report submitted by each Annex I Party. They indicated that, due to the time constraint, the purpose of the initial check should be to provide a simplified and, ideally, fully automated status report, which would summarize information related to the completeness of the submission. They unanimously agreed that, during this stage of the review, the secretariat should not determine whether the national inventory report fulfils the requirements of the UNFCCC reporting guidelines on national inventories, but instead should focus on a general description of its contents. To a large extent, the secretariat followed the advice provided by this group in conducting the initial checks.

10. The secretariat, following the advice of the experts who participated in the May 2000 meeting, developed a standard format for the status reports of all Annex I Parties that submitted their annual inventories using the CRF (see figure 2). Status reports consist of three parts that each provide an assessment of the completeness of the CRF tables submitted. The first part concentrates on the information provided for the latest inventory year, which was 1998 in the case of submissions in 2000, and the second on the information provided in relation to recalculations whilst the third provides information on the CRFs for all years submitted to the secretariat. In addition, the status report provides information on the date and format of submission (i.e. electronic, hard copy), base year, gases covered and, if submitted, a brief description of the national inventory report.

11. Responding to the request contained in decision 6/CP.5, the secretariat completed the initial checks for 23[1] Annex I Parties that provided GHG data using the CRF, in 2000, and published the status reports on its web site (www.unfccc.int/resource/statrep00.html). In general, Annex I Parties made substantial efforts to present data in the required format and as complete as possible, although in a number of cases there were gaps and inconsistencies, which is probably unavoidable at the initial stage of using the new reporting guidelines. Detailed information on the results of the initial checks as well as suggestions on further improvement of the CRF will be presented in a report on the technical review as soon as practicable after the end of the trial period, as requested by decision 6/CP.5, paragraph 5.

12. Whilst it is intended that the initial checks should be virtually fully automated in the future, at this stage, it was necessary to perform many of the checks and cross-checks manually. However, even at the present stage of the database development it is already possible to conduct some automatic checks on electronic submissions. Thus the software tool performs a simple consistency check, i.e. allows verification if all the tables and sheets required by the CRF have been submitted and if any of the in-built calculation formulas have been modified or deleted. Figure 3 provides an example of the quantitative results of automatic checks performed on the actual CRF submitted by an Annex I Party in 2000.

[1] An additional seven Annex I Parties submitted greenhouse gas data in 2000 but not in the CRF format (see document FCCC/SBI/2000/11).

C. Synthesis and assessment and individual reviews

13. According to the guidelines for the technical review of GHG inventories from Annex I Parties, initial checks should be followed by the synthesis and assessment and individual reviews, following the outline provided in the guidelines. It is envisaged that, to the largest extent possible, the synthesis and assessment should use information generated by the database based on the information submitted in the CRF. Simple statistical analysis could be included in the database such as the calculation of means and standard deviations for data sets in order to detect outliers whilst other tests could identify anomalies or inconsistencies in emission trends for a particular Annex I Party.

14. It is envisaged that the results of this stage would be incorporated in a synthesis and assessment report that would provide comparisons of emissions and emission factors for various sectors and categories across Annex I Parties and possibly comparisons of activity data from other sources. A comprehensive synthesis and assessment report would serve as a basis for the first and subsequent individual reviews.

15. The third phase of the review process, the individual reviews, would aim to be as detailed as possible. It is expected that the expert review teams would not limit their task to identifying problems only, but would examine methodologies and the process of inventory compilation, especially the identification of key source categories as defined by the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (GPG) which, as the Subsidiary Body for Scientific and Technological Advice (SBSTA) concluded at its twelfth session, should be applied by Annex I Parties to the extent possible for inventories due in 2001 and 2002 and should be used for inventories due in 2003 and beyond (FCCC/SBSTA/2000/5, para. 40 (c)).

16. Using the prototype GHG database, the secretariat tested some possible approaches to the presentation of data for the purposes of the synthesis and assessment and individual reviews. For example, changes in implied emission factors (IEF) for a given Annex I Party from year to year can be examined at a very detailed level (see figure 4). Comparisons of implied emission factors (IEF) across Annex I Parties for a given category would be another way of detecting possible discrepancies in the reported data (see figure 5).

17. In accordance with the tasks outlined in the part of the guidelines related to the review of individual GHG inventories, the secretariat is developing a checklist of issues that would require consideration by expert review teams. Part of the draft checklist is presented in figure 6. It should be noted that figure 6 does not include issues related to the review of individual sectors, since checklists would differ depending on the sector (see also figure 7 as an example). Furthermore, a review of, *inter alia*, quality assurance and quality control procedures, of methods for estimating uncertainties, and of the recalculation of earlier estimates for previous years, where methodologies or national systems have changed, would also occur at this stage, but for the sake of brevity these are not indicated in figure 6.

18. It should be noted that, when developing the draft checklist for review by sector, the secretariat relied on some elements of the GPG although it is understood that no Party has yet prepared its inventory submission using the GPG, given that the document was only approved by the IPCC in mid-2000. Nevertheless, it was felt that the GPG would serve as a reliable guide for designing the individual review process, as well as other stages of the review.

19. Individual reviews would require detailed examination of methodologies and analysis of data submitted for various activities within sectors. The secretariat is preparing preliminary outlines for the review of individual sectors. An excerpt from such an outline developed for the agricultural sector is presented in figure 7. It is envisaged that both the checklist and outlines for the review of individual sectors, including methodologies, will be tested and refined as necessary during the individual review stage in 2001 (see section D below).

D. Future work

20. The time constraints faced by the secretariat due to the scheduling of subsidiary body and COP meetings during 2000 as well as the complexity of the database's design and implementation prevented the secretariat from conducting the synthesis and assessment and individual reviews in the first half of 2000. Nevertheless, the secretariat intends to start preparing the synthesis and assessment for some Annex I Parties in early December 2000 with a view to finalizing the trial period technical review in 2001.

21. The secretariat is determined to fully implement decision 6/CP.5, namely to conduct during the trial period five to seven desk reviews, two centralized reviews, each covering five to ten inventories, and three or four in-country reviews.

Figure 1. Simplified database structure

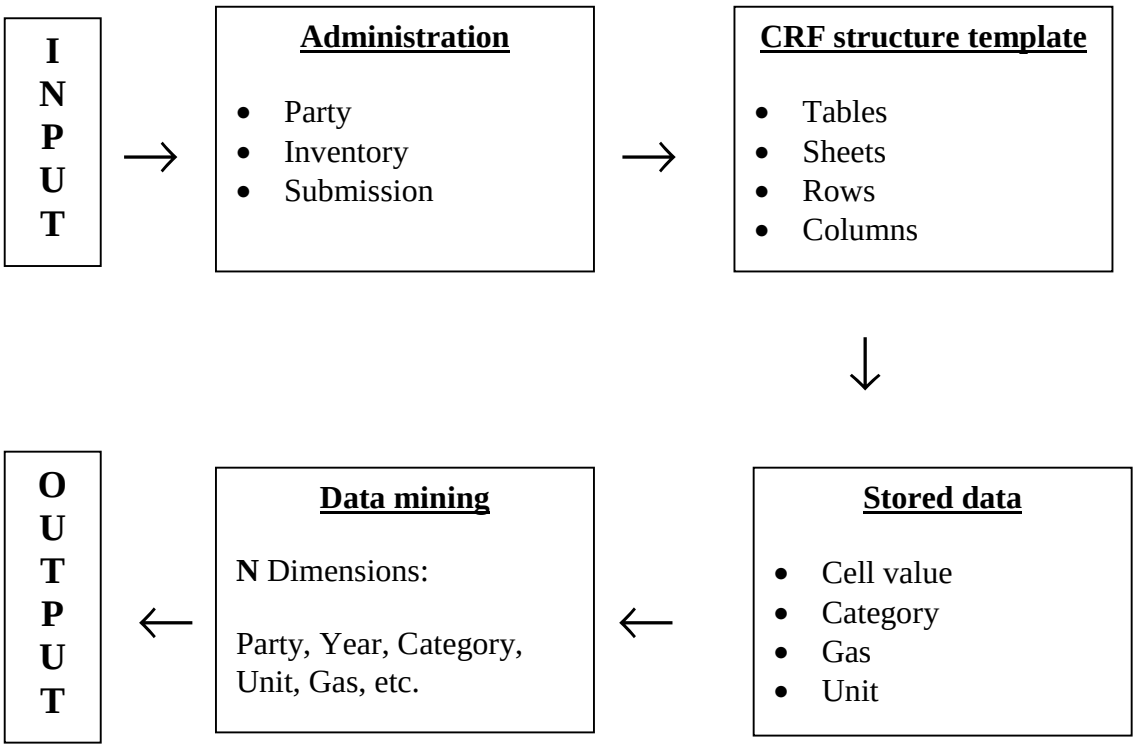


Figure 2. Status report for Annex I Party

Status report for

Annex I Party

General information											
Date of submission:	**29 April 2000**										
Format:	Electronic: ☑						Hardcopy: ☑				
Base year or period:	**1990**										
CRF provided for years:	**1990-1998**										
Gases covered:	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	NOx	CO	NMVOCs	SO_2	
	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	

National Inventory Report	
Description:	**A National Inventory Report has been submitted. The report provides information on methodologies, activity data, emission factors, differences compared to previous submissions and uncertainty estimates in the calculations for all source categories.**
Language:	**English**

PART I:
Provision of information for the latest reported inventory year in the CRF: 1998

Tables							
		Energy	Industrial Processes	Solvent Use	Agriculture	Land-Use Change and Forestry	Waste
	Sectoral report tables:	1 ☑	2(I) ☑ 2(II) ☑	3 ☑	4 ☑	5 ☑	6 ☑
	Sectoral background data tables:	1.A(a) ☑	2(I).A-G ☑	3.A-D ☑	4.A ☑	5.A* ☐	6.A ☑
		1.A(b) ☑	2(II).C,E ☑		4.B(a) ☑	5.B* ☐	6.B ☑
		1.A(c) ☑	2(II).F ☑		4.B(b) ☑	5.C* ☐	6.C ☑
		1.A(d) ☑			4.C ☑	5.D* ☐	
		1.B.1 ☑			4.D ☑		
		1.B.2 ☑			4.E ☑		
		1.C ☑			4.F ☑		
	Summary tables (emission totals):	Summary 1A ☑		Summary 1B ☑		Summary 2 ☑	
	Other tables:	Summary 3 ☑		Table 7 (Overview) ☑		Table 9 (Completeness) ☑	
		Table 10 (Trends) ☑		Table 11 (Checklist) ☑			
	Comments:						

Trends							
	Totals provided for:	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
		☑	☑	☑	☑	☑	☑
	Totals provided for years:	**1990-1998**	**1990-1998**	**1990-1998**	**1993-1998**	**1990-1998**	**1990-1998**

CO_2					
Comparison of CO_2 from fuel combustion:	Reference approach	Sectoral (national) approach	Difference more than 2 per cent	If difference is more than 2 per cent	
	☑	☑	☐	Explanation provided	☐

HFCs, PFCs, SF_6						
		HFCs		PFCs		SF_6	
	Disaggregation by species:	☑		☑			
	Reporting of Actual and/ or Potential estimates in the consumption of Halocarbons and SF_6:	Actual	Potential	Actual	Potential	Actual	Potential
		☐	☑	☐	☑	☑	☑

Indicators						
	Used in:	Summary tables 1A & 1B ☑		Sectoral report tables ☑		Sectoral background data tables ☑
	Comments:					

PART II:
Provision of information related to recalculation

Recalculation							
	Table 8(a) (Recalculated data):	☑	Comments:				
	Recalculation for years:	**1990-1997**					
	Recalculated sectors/gases:	Energy	Industrial Processes	Solvent Use	Agriculture	Land-Use Change and Forestry	Waste
	CO_2:	☑	☐	☐	☐	☑	☐
	CH_4:	☑	☐	☐	☑	☑	☑
	N_2O:	☑	☐	☐	☑	☑	☑
	HFCs:		☐				
	PFCs:		☐				
	SF_6:		☑				
	Table 8(b) (Explanatory information):	☑	☑	☐	☑	☑	☑
	Full CRF for the recalculated base year:	☑	Percentage difference in aggregate GHG base year estimate			- with LUCF	**Not reported**
						- without LUCF	**Not reported**

LUCF: Land-use change and forestry

* According to the UNFCCC reporting guidelines on annual inventories (FCCC/CP/1999/7), these tables should be filled in only by Parties that use the IPCC default methodology.

Figure 2 *(continued)*

Status report for
Annex I Party

Part III:
Provision of CRF tables for years reported

			Base year	1990	1991	1992	1993	1994	1995	1996	1997	1998	Information gaps related to reporting*	Comments
Energy	Sectoral report -	Table 1		✔	✔	✔	✔	✔	✔	✔	✔	✔		
	SBDT	Table 1A(a)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 1A(b)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 1A(c)		✔	✔	✔	✔	✔	✔	✔	✔	✔		**No explanation of the difference (greater than 2 per cent) between the national and reference approach for the years 1990-1996**
		Table 1A(d)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 1B1		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 1B2		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 1C		✔	✔	✔	✔	✔	✔	✔	✔	✔		
Industrial processes	Sectoral reports -	Table 2(I)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 2(II)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
	SBDT	Table 2(I). A-G		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 2(II).C, E		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 2(II).F		✔	✔	✔	✔	✔	✔	✔	✔	✔		
Solvent use	Sectoral report -	Table 3		✔	✔	✔	✔	✔	✔	✔	✔	✔		
	SBDT	Table 3.A-D		✔	✔	✔	✔	✔	✔	✔	✔	✔		
Agriculture	Sectoral report -	Table 4		✔	✔	✔	✔	✔	✔	✔	✔	✔		
	SBDT	Table 4.A		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 4.B(a)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 4.B(b)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 4.C		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 4.D		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 4.E		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 4.F		✔		✔	✔	✔	✔	✔	✔	✔		
Land-use change and forestry	Sectoral report -	Table 5		✔	✔	✔	✔	✔	✔	✔	✔	✔		**Documentation for this sector has been provided in the National Inventory Report**
	SBDT	Table 5.A* *												
		Table 5.B* *												
		Table 5.C* *												
		Table 5.D* *												
Waste	Sectoral report -	Table 6		✔	✔	✔	✔	✔	✔	✔	✔	✔		
	SBDT	Table 6.A		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 6.B		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 6.C		✔	✔	✔	✔	✔	✔	✔	✔	✔		
Summary and other tables		Summary 1A		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Summary 1B		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Summary 2 (CO_2 equivalent emissions)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Summary 3 (Methods/Emission factors)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 7 (Overview)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 8(a) (Recalculation - Recalculated data)		✔	✔	✔	✔	✔	✔	✔	✔			**Recalculation data tables, covering all recalculated years (1990-1997), were included in the 1998 CRF**
		Table 8(b) (Recalculation - Explanatory information)		✔	✔	✔	✔	✔	✔	✔	✔			**Recalculation explanation tables, covering all recalculated years (1990-1997), were included in the 1998 CRF**
		Table 9 (Completeness)		✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Table 10 (Trends)										✔		**Table 10, covering 1990 to 1998, was provided once together with the 1998 CRF. HFC emission estimates were provided for 1993-1998 only (potential emissions).**
		Table 11 (Checklist)										✔		**Table 11 was provided once together with the 1998 CRF**

SBDT: Sectoral background data tables.

* This column indicates that reporting gaps (blank cells) have been identified in a given table of the CRF. In most cases this was due to lack of use of indicators (NO, NE, NA, IE, C, 0).

** According to the UNFCCC reporting guidelines on annual inventories (FCCC/CP/1999/7), these tables should be filled in only by Parties that use the IPCC default methodology.

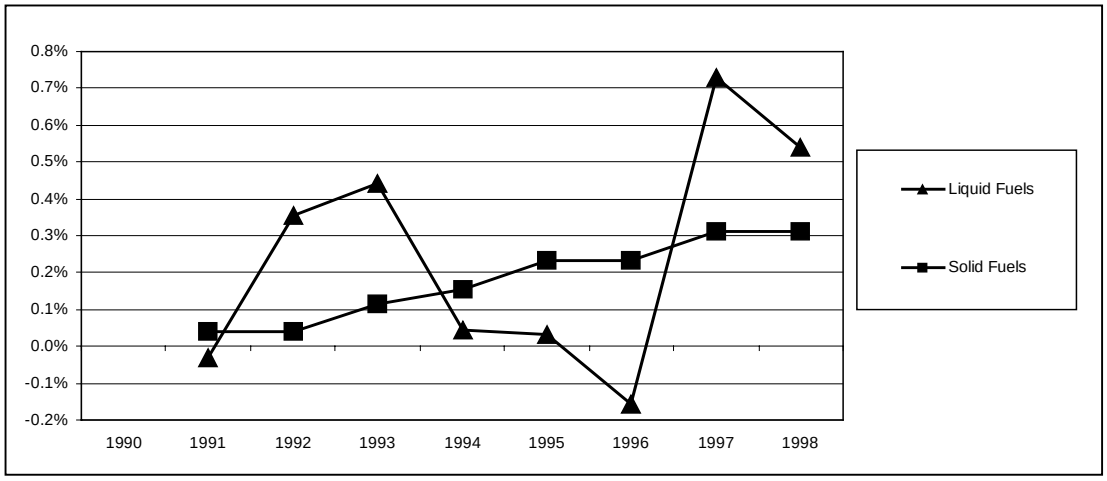
Figure 3. Overview of the quantitative completeness check

	An Annex I Party
Inventory year	*1990*
Title of inventory	*National Greenhouse Gas Inventory*
Status	*Revised submission*
Submission	*Submission 2000*
Comments	*Rounding errors have resulted in a small difference between the resubmitted CRF tables for 1990-1997 and the trends in the 1998 CRF tables*
Required number of sheets	62
Number of sheets in this submission	45
Number of missing sheets:	17
Number of added sheets:	0
Number of overwritten formulas	723
Number of added cell comments	0

Worksheet	**Cell Address**	**Standard formula**	**Overwritten with**
Table1s1	H9	=SUM(H10:H12)	NE
Table1s1	H13	=SUM(H14:H19)	NE
Table1s2	H7	=SUM(H8:H10)	NE
Table1s2	H16	=SUM(H17,H22)	NA
Table1s2	B17	=SUM(B18:B20)	NE
Table1s2	D17	=SUM(D18:D20)	NE
Table1s2	E17	=SUM(E18:E20)	NE
Table1s2	F17	=SUM(F18:F20)	NE
Table1s2	G17	=SUM(G18:G20)	NE
Table1s2	H17	=SUM(H19:H20)	NA
Table1s2	B18	=Table1.B.1!F9	NE
Table1s2	B20	=Table1.B.1!F17	NA
Table1s2	C20	=Table1.B.1!E17	NA
		Etc.	

Figure 4. CO_2 implied emission factors for an Annex I Party (percentage difference from 1990)[2]

Energy → Fuel Combustion → Energy Industries → Public Electricity and Heat Production



[2] Implied emission factors are obtained by dividing estimated aggregate emissions by underlying aggregate activity data.

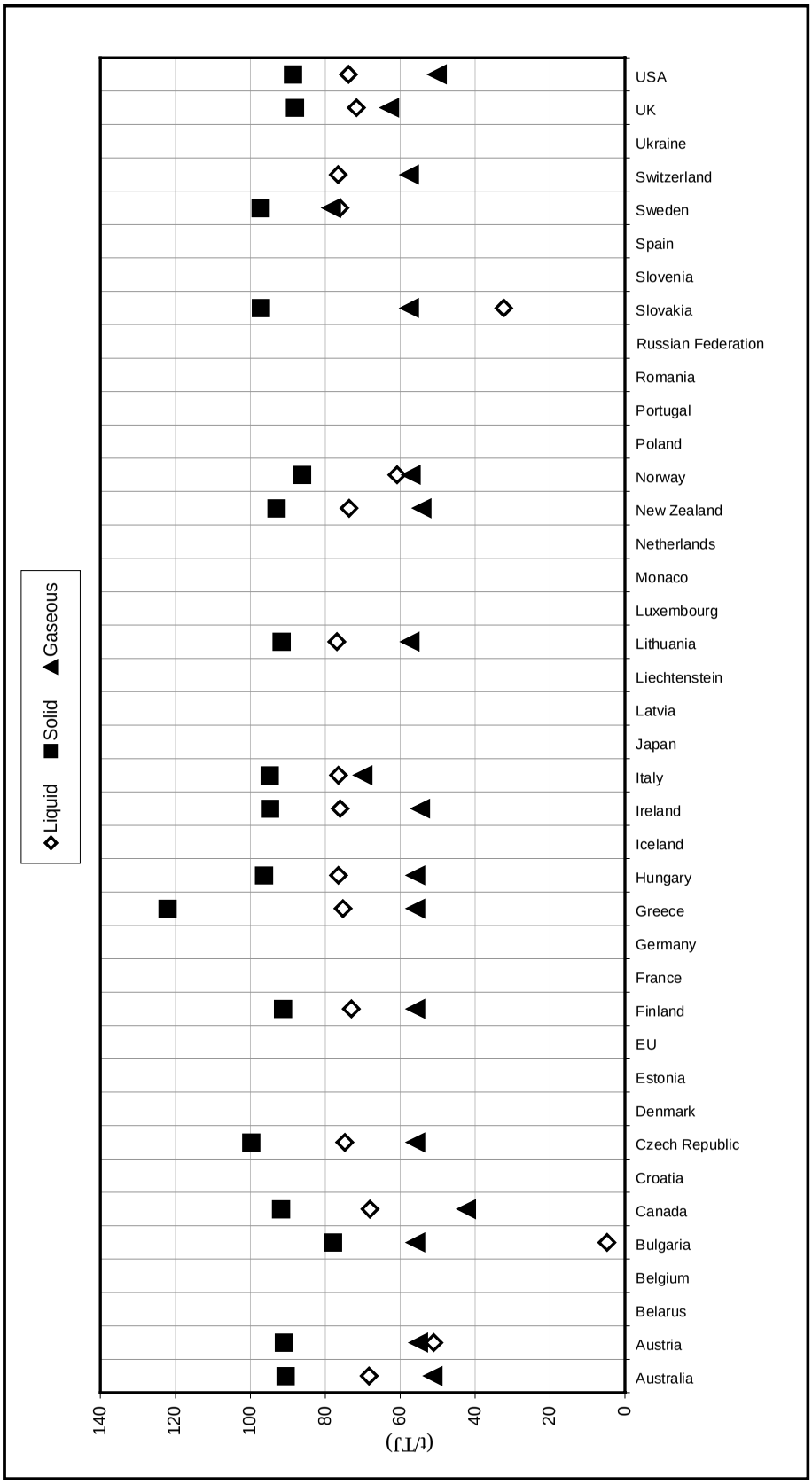


Figure 5. CO_2 implied emission factors: energy industries

Figure 6. Preliminary checklist for the individual review (excerpt)

Checklist for the individual review (draft outline)

I. Identification of materials to be considered during the review
(National inventory report, CRF, supplementary information, previous submissions, in-depth review reports, etc.)

II. Retrieval and presentation of data stored in the database in the form required for the review

General

(a) Identify the Party's key source categories according to tier 1 of the IPCC Guidelines

(b) Graphical presentation of the Party's GHG trends (gas-by-gas and aggregate) and percentage contributions of gases and source to the total
=> Check for any discontinuities

Analysis of key sources

(c) Emission factors: Graphical representation of cross-country comparison of implied emission factors over the time period (minimum, maximum and average values) for the identified key sources and comparison with any IPCC default values and ranges
=> Check if any further analysis is needed, if yes identify areas and conduct the analysis

(d) Time-series: For the base year and years prior to the latest reported inventory year: Comparison of current estimates with estimates provided in a previous submission – graphical presentation of the trends (per key source and aggregated)
=> Flag sources or subcategories that show a change greater than, e.g. 10 per cent compared to the previous year's inventory (for trends and possible recalculations)

(e) Activity data: Comparison of GHG emission trends with trends in underlying activity data (at the level provided in the CRF) for major key sources
=> Check for any discontinuities

III. Verification of data and estimates for key sources *(by experts with the assistance of the secretariat)*

(a) Activity data – cross-checks within the country

(b) Activity data – international comparisons

IV. Examination of the methodologies to calculate emission and removal estimates:

(a) Perform 'order of magnitude checks'

(b) Compare national estimates with estimates or analysis from the international scientific literature (where available) or from atmospheric measurements

Figure 7. Outline for GHG inventory review (excerpt)

AGRICULTURE – ENTERIC FERMENTATION

			Methodological issues			
Sector		**Source**	**Methods**	**Activity data (AD)**	**Emission factors (EF)**	**Completeness**
Common issues across sources:			Has the appropriate method and EF been chosen according to national circumstances? (See decision trees in GPG)			
AGRICULTURE	**Livestock**	Livestock population characterization	- Are characterizations and data for each livestock species used consistently across all livestock-related source categories [4.A (CH_4), 4.B (CH_4, N_2O), 4.D (N_2O)]? - Is the method used to estimate the average annual population fully documented? - Have additional tables for reporting detailed livestock characterization been provided (which include information per livestock species for estimating EF, such as type, weight (kg), weight gain (kg/day), feeding situation, milk (kg/day), work (hrs/day), % pregnant, digestibility of feed (%), CH_4 conversion (%), day weighted population mix (%), EF (kg/head/yr))? Have the sources for the data clearly been cited?			
		CH_4: enteric fermentation in domestic livestock	What method (tier 1/tier 2)? If tier 1: Are the animal characteristics (weight, growth rate, milk production) used to develop default EF similar to those in the country? ***Is the following documented?*** If <u>methods other than</u> those of the <u>IPCC</u> Guidelines were used: - Scientific basis (e.g. definitions of input parameters, process of development)	See above ***Is the following documented?*** - Animal population data by category and region - Full reference to the sources of all AD used - Information and assumptions used to develop AD (if AD not directly available from databases) - Frequency of data collection, estimates of accuracy & precision	<u>If tier 1</u>: default or country-specific EF? <u>If tier 2</u>: Have disaggregated EF for the most relevant subcategories been developed? Have the data developed through the livestock characterization been used for developing EF? Have differentiated, appropriate CH_4 conversion rates been used? (see table 4.8/4.9 GPG) ***Is the following documented?*** <u>If tier 1</u>: All default EF <u>If tier 2</u>: - Values for CH_4 conversion rate - Gross energy intake values (MJ/head/yr) - Documentation of data used, including references <u>If region- or country-specific EF</u>: - Scientific basis (e.g. definitions of input parameters, process of development)	If animals are included in the inventory for which no guidelines or default data are available: Are estimates developed using the same principles as for developing tier 2 EF?

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