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Report of the individual review of the annual submission of the European Community submitted in 2009*

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of the European Community, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 21 to 26 September 2009 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Inga Konstantinviciute (Lithuania) and Ms. Batima Punsalmaa (Mongolia); energy – Mr. Takeshi Enoki (Japan) and Mr. Pavel Fott (Czech Republic); industrial processes – Ms. Pia Forsell (Finland) and Mr. Kiyoto Tanabe (Japan); agriculture – Ms. Yauheniya Bertosh (Belarus) and Mr. Tom Wirth (United States of America); land use, land-use change and forestry (LULUCF) – Ms. Ana Morales (Canada) and Mr. Richard Volz (Switzerland); and waste – Mr. Philip Acquah (Ghana) and Mr. Qingxian Gao (China). Mr. Acquah and Mr. Tanabe were the lead reviewers. The review was coordinated by Mr. Tomoyuki Aizawa (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), a draft version of this report was communicated to the European Community, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Emission profiles and trends

3. In 2007, the main greenhouse gas (GHG) in the European Community was carbon dioxide (CO_2) accounting for 83.7 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (7.5 per cent) and nitrous oxide (N_2O) (7.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.7 per cent of the overall GHG emissions in the European Community. The energy sector accounted for 79.8 per cent of the total GHG emissions, followed by agriculture (9.2 per cent), industrial processes (8.2 per cent), solvent and other product use (0.3 per cent) and waste (2.6 per cent). Total GHG emissions amounted to 4,051,963.90 Gg CO_2 eq and decreased by 4.6 per cent between the base year[2] and 2007. However, CO_2 increased by 0.9 per cent since 1990, while CH_4 and N_2O decreased by 30.2 per cent and 24.6 per cent respectively over the same time period. HFCs increased by 38.4 per cent while PFCs and SF_6 decreased by 77.7 and 35.7 per cent respectively since the base year.

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[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which for CO_2, CH_4 and N_2O is 1990 for all member States, and for HFCs, PFCs and SF_6 is 1990 for Austria, France and Italy, and 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland. The base year emissions include emissions from Annex A sources only.

Table 1. Total greenhouse gas emissions by gas, 1990–2007[a]

Greenhouse gas	Gg CO_2 eq							Change base year–2007 (%)
	Base year[b]	1990	1995	2000	2005	2006	2007	
CO_2	3 360 246.68	3 360 246.68	3 286 054.93	3 353 536.27	3 458 891.67	3 452 008.52	3 391,148.16	0.9
CH_4	433 579.69	433 579.69	407 455.12	362 715.91	311 169.24	305 930.55	302 507.31	–30.2
N_2O	383 328.30	383 328.30	366 633.55	327 155.54	304 841.12	290 830.26	289 115.07	–24.6
HFCs	40 916.64	28 013.65	41 291.94	46 187.56	53 422.96	54 237.35	56 635.24	38.4
PFCs	15 008.61	16 824.70	10 949.57	7 278.98	4 053.18	3 614.11	3 349.11	–77.7
SF_6	14 329.20	10 906.74	15 456.39	10 764.34	8 969.47	9 341.16	9 209.01	–35.7

[a] "Total greenhouse gas emissions" includes emissions from Annex A sources only (excludes emissions/removals from the LULUCF sector).
[b] "Base year" refers to the base year under the Kyoto Protocol, which for CO_2, CH_4 and N_2O is 1990 for all member States, and for HFCs, PFCs and SF_6 is 1990 for Austria, France and Italy, and 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland. The base year emissions include emissions from Annex A sources only.

Table 2. Greenhouse gas emissions by sector, 1990–2007

Sector	Gg CO_2 eq							Change base year–2007 (%)
	Base year[a]	1990	1995	2000	2005	2006	2007	
Energy	3 256 686.47	3 256 686.47	3 178 087.00	3 227 617.13	3 313 111.55	3 301 149.63	3 233 036.45	–0.7
Industrial processes	386 946.41	372 437.05	371 124.98	329 598.65	332 190.16	324 834.73	332 331.63	–10.8
Solvent and other product use	13 722.51	13 722.51	12 011.59	11 577.28	10 431.92	10 399.24	10 468.53	–23.7
Agriculture	418 904.77	418 904.77	401 910.34	402 999.15	376 988.19	372 824.33	371 481.83	–11.3
LULUCF	NA	–216 592.70	–254 801.46	–259 921.21	–296 130.50	–287 811.83	–259 415.86	19.8
Waste	171 148.97	171 148.97	164 707.57	135 846.41	108 625.83	106 754.04	104 645.46	–38.9
Other	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
Total (with LULUCF)	NA	4 016 307.07	3 873 040.02	3 847 717.40	3 845 217.15	3 828 150.13	3 792 548.05	–5.9
Total (without LULUCF)	4 247 409.13	4 232 899.77	4 127 841.49	4 107 638.61	4 141 347.65	4 115 961.96	4 051 963.90	–4.6

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.
[a] "Base year" refers to the base year under the Kyoto Protocol, which for CO_2, CH_4 and N_2O is 1990 for all member States, and for HFCs, PFCs and SF_6 is 1990 for Austria, France and Italy, and 1995 for Belgium, Denmark, Finland, Germany, Greece, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom of Great Britain and Northern Ireland. The base year emissions include emissions from Annex A sources only.

4. Tables 1 and 2 show total GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector, including the emissions from deforestation that were included in the European Community's initial report under the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount.

C. Annual submission and other sources of information

5. The 2009 annual inventory submission was submitted on 15 April 2009 and resubmitted on 27 May 2009; it contains a complete set of common reporting format (CRF) tables for the period 1990–2007, and a national inventory report (NIR). The European Community also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: accounting of Kyoto Protocol units, and changes in the national system and in the national registry. The standard electronic format (SEF) tables were submitted on 7 August 2009. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

6. In addition, the expert review team (ERT) used the Standard Independent Assessment Report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[3]

7. During the review, the European Community provided the ERT with additional information. The documents concerned are not part of the annual submission. The full list of materials used during the review is provided in annex I to this report.

Completeness of the inventory

8. The European Community's GHG inventory comprises the direct sum of the national inventories compiled by the member States making up the EU-15 and the EU-27. The EU-15 took on a common commitment to reduce emissions by 8 per cent between 2008 and 2012 compared with emissions in the base year; the EU-27 does not have a common Kyoto Protocol target. The inventory covers almost all source and sink categories for the period 1990–2007 and is complete in terms of years and geographical coverage, and direct and indirect GHGs. The European Community has provided inventory data in all CRF tables and a complete and detailed NIR. Explanations for the categories that are reported as not estimated ("NE") are provided in CRF table 9(a) and an analysis of the completeness of the inventory is presented in the NIR. Some of the categories in the industrial processes sector are reported as "NE" (see para. 44).

D. Main findings

9. The NIR is prepared in accordance with the structure outlined in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), with the exception of annexes that are missing because of the special conditions of the European Community inventory. These special conditions are explained in table 1.31 of the NIR. The NIR provides sufficient information and references on the national system, key categories,

[3] The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paragraphs 5(a), 6(c) and 6(k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry. The SIAR is not publicly available.

uncertainty analyses, recalculations, activity data (AD) and methodologies for estimating emissions and removals. The European Community has provided separate CRF tables for the submission of the EU-15 under the Kyoto Protocol and the submission of the EU-27 under the Convention. The inventory is generally in line with the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). However, the ERT noted that the Party's inventory is not fully in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for certain categories because some EU-15 member States do not follow these guidelines. This is the case, for example, in the allocation of emissions from iron and steel production between the energy and industrial processes sectors (see para. 53).

10. The 2009 inventory submission is generally of a high quality and shows significant improvement in response to recommendations made during the individual review of the GHG inventories submitted by the European Community in 2007 and 2008. However, the ERT identified the need for further improvements, given some of the recommendations have not been implemented (see paras. 45, 75 and 86).

11. The European Community has submitted on a voluntary basis supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with Part I of the annex to decision 15/CMP.1. The European Community did not report on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, or information on adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol.

12. The European Community has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the SEF tables as required by decision 14/CMP.1.

13. The European Community's national system continues to perform the general and specific functions as required by the national systems guidelines set out in the annex to decision 19/CMP.1. The European Community has reported no change in the national system since its previous submission.

14. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

15. The ERT encourages the European Community to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, which can be found on the UNFCCC website.[4]

16. In the course of the review, the ERT formulated a number of recommendations[5] relating to the completeness (see paras. 44 and 95) and transparency (see paras. 20, 26, 46, 52, 72, 73 and 75) of the annual submission of the European Community.

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[4] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

[5] For a complete list of recommendations, the relevant chapters of this report should be consulted.

E. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

1. Overview

17. The ERT concluded that the national system continued to perform its required functions. The NIR and additional information submitted by the European Community describe the institutional arrangements for the preparation of the inventory. The European Commission Directorate-General for the Environment has overall responsibility for the inventory of the European Community. The main institutions involved in the compilation of the inventory are the member States. The European Environment Agency (EEA) and its European Topic Centre on Air and Climate Change (ETC/ACC), Eurostat, and the Joint Research Centre (JRC) are also involved in the preparation of the inventory. There were no changes in the national system since the previous annual submission. The legal arrangement for the compilation of the European Community inventory is Council Decision No. 280/2004/EC, concerning a mechanism for monitoring the European Community's GHG emissions and for implementing the Kyoto Protocol.

2. Inventory planning

18. The NIR provides a description of the legal and procedural aspects of the national system. Sub-chapter 1.2 of the NIR describes the responsibilities of participating organizations and national systems of each member State. The NIR provides sufficient information on the annual process of submitting and reviewing member State inventories and on the compilation of the European Community inventory. Member States are responsible for the selection of AD, emission factors (EFs) and other parameters to be used for their national inventories as well as the correct application of methodologies provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Member States submit their annual GHG inventories by 15 January of each year to the European Commission Directorate-General for the Environment, with a copy submitted to the EEA. EEA, ETC/ACC, Eurostat and JRC then perform initial checks on the submitted data. The draft European Community GHG inventory and inventory report are circulated to member States for review and comments are submitted by 28 February. Member States check their national data and the information presented in the European Community GHG inventory report, send updates if necessary and review the European Community inventory report itself by 15 March. The EEA prepares the final European Community GHG inventory and inventory report through ETC/ACC by 15 April for submission by the European Commission to the UNFCCC secretariat.

3. Inventory preparation

Key categories

19. The European Community has reported key category tier 1 and tier 2 analyses, both level and trend assessment, as part of its 2009 submission. The key category analyses performed by the European Community and that performed by the secretariat[6] produced similar results. The European Community has included the LULUCF sector in its key category tier 1 analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT noted that the disaggregation of categories is not the same for tier 1 and tier 2. During the review, the European Community indicated that tier 1 uncertainty analysis does not have the uncertainty estimates for all categories at the required level of detail. In addition to this, the key category tier 2 analysis does not include the LULUCF sector. The European Community plans to include the LULUCF sector in its next submission. The ERT appreciates the planned improvement and recommends that it be implemented in the next annual submission.

[6] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change

Uncertainties

20. The European Community has performed a specific tier 1 uncertainty analysis for the GHG inventory, according to the tier 1 uncertainty estimates of the EU-15. The NIR provides information on the trend uncertainty analysis based on each member State's individual uncertainties for each category. The uncertainty analysis is complicated because it uses correlations between uncertainties of individual member States. The uncertainty estimates are provided in sub-chapter 1.7 NIR; however, sectoral chapters do not provide uncertainty estimates at the level of disaggregation same as key category analysis. The ERT recommends that the European Community perform an uncertainty estimates at the same level of disaggregation as for the key category analysis. Furthermore the ERT encourages the European Community to illustrate how the uncertainties were calculated from underlying member States' uncertainty data by showing examples of such calculation for some categories for the purpose of transparency.

Recalculations and time-series consistency

21. The European Community has provided recalculations for the time series 1990–2006. The major changes, and the magnitude of the impact, include: a decrease in the estimate of total GHG emissions in 1990 (0.3 per cent) and a decrease in 2006 (0.8 per cent). The rationale for these recalculations is provided in the NIR and in CRF table 8(b). According to this information, the reductions were mainly due to Germany's revised energy balance and its use of a revised EF for N_2O emissions from nitrogen leaching and run-off). Another important reason was the more widespread use of the COPERT IV model for estimating N_2O emissions from road transport. The N_2O EF in COPERT IV is lower than in COPERT III. This has the effect of reducing N_2O emissions in later years.

Verification and quality assurance/quality control approaches

22. The European Community's inventory is based on the annual inventories of its member States. Therefore, the quality of the European Community's inventory depends on the quality of the inventories of the member States. The European Community has established a quality assurance/quality control (QA/QC) programme in accordance with the UNFCCC reporting guidelines, and based on the IPCC good practice guidance, including general and specific QC procedures.

23. This QA/QC programme describes the quality objectives and the QA/QC plan for the European Community inventory, including the responsibilities of each member State and relevant agencies and schedule for the performance of the QA/QC procedures. It is reported in the NIR that the European Community's QA/QC programme is reviewed annually and modified or updated if necessary. Member States are also responsible for establishing QA/QC programmes for their inventories. The QA/QC activities of each member State are summarized in the European Community's NIR. However, the ERT noted there is still room to improve the implementation of QA/QC procedures in order to ensure consistent and correct compilation of member State inventories.

24. The NIR includes an analysis of the use of data and emissions reported under the European Union emissions trading scheme (EU ETS) for preparing the national GHG inventories of the EU-15. This analysis shows that most member States used the EU ETS data to improve and refine the estimation and reporting of CO_2 emissions from the energy and industrial processes sectors. Fourteen member States used the EU ETS data for QA/QC purposes and checked for data consistency between national inventory data and EU ETS data.

Good Practice Guidance for Land Use, Land-Use Change and Forestry. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

Transparency

25. The 2009 annual submission of the European Community is generally transparent. The information contained in the NIR is sufficiently detailed. The NIR indicates that the European Community cannot provide all data in the sectoral background data tables of the CRF tables. The main reasons for not completing all sectoral background data tables of the CRF tables include:

(a) The limited availability of data reported in sectoral background data tables of the CRF tables in the member States' CRF tables, due in part to confidentiality issues;

(b) The use of different types of AD by member States.

26. The sum of GHG emissions submitted by individual member States did not correspond to the total GHG emissions reported by the European Community; emissions differed by 4,274.45 Gg CO_2 eq in 2006. During the review, the European Community informed the ERT that this is because the geographical coverage of Denmark and the United Kingdom of Great Britain and Northern Ireland under the Kyoto Protocol is different than that under the European Community. The ERT recommends that the European Community clarify this difference in the NIR of its next annual submission in order to increase transparency.

4. Inventory management

27. The European Community has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes documentation on QA/QC procedures, internal and external reviews, annual key categories and key category identification, and planned inventory improvements. The EEA manages and maintains the European Community GHG inventory database and associated documentation on behalf of the Directorate-General of the Environment.

F. Follow-up to previous reviews

28. The European Community has made some improvements in response to the recommendations made during the previous review: the inclusion of the LULUCF sector in the uncertainty analysis; the extended quality checks for the agriculture and LULUCF sectors; the additional explanations of trends and outliers in the sector chapters of the NIR; and the provision of additional information on the allocation of emissions between sectors of member States. However, the ERT noted that some of the recommendations have not been implemented in some sectors, such as industrial processes, LULUCF and waste (see paras. 45, 75 and 86).

G. Areas for further improvement

1. Identified by the Party

29. The 2009 NIR identified several areas for improvement. The following activities are planned at the European Community level with a view to improving the GHG inventory:

(a) Implement outstanding recommendations from previous reviews;

(b) Continue to undertake sector-specific QA/QC activities during the European Community internal review;

(c) Further develop the European Community QA/QC activities along the experience in 2008/2009;

(d) Improve the uncertainty analysis in the context of comparability of uncertainty estimates across different member States and prepare a key category tier 2 analysis including LULUCF.

2. Identified by the expert review team

30. The ERT identifies the following cross-cutting issues for improvement:

(a) Implement the recommendations from the previous reviews that have not yet been implemented for the 2009 submission in some sectors, such as industrial processes, LULUCF and waste (see paras. 45, 75 and 86);

(b) Provide quantified uncertainty estimates at the same level of disaggregation as for the key category analysis;

(c) Further improve consistency between the NIR and the CRF tables;

(d) Further enhance QA/QC activities as planned in close cooperation with each member State;

(e) Further make efforts to improve consistency or harmonization across member States with regard to reporting of emissions and relevant background information (e.g., see paras. 53 and 83).

31. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

II. Energy

A. Sector overview

32. The energy sector is the main sector in the GHG inventory of the European Community. In 2007, emissions from the energy sector amounted to 3,233,036.45 Gg CO_2 eq, or 79.8 per cent of total GHG emissions. Since 1990, emissions from the energy sector have decreased by 0.7 per cent. The largest decreases in the energy sector between 1990 and 2007 were a 15.5 per cent decrease in manufacturing industries and construction (from 621,022.24 Gg CO_2 eq to 524,952.15 Gg CO_2 eq) and a 13.6 per cent decrease in other sectors (655,881.89 Gg CO_2 eq to 566,652.83 Gg CO_2 eq), while emissions from transport increased by 23.7 per cent (698,690.36 Gg CO_2 eq to 863,981.24 Gg CO_2 eq). Emission reduction from manufacturing industries mainly occurred in Germany after the reunification whereas emissions from road transport increased in most member States. Within the energy sector, 37.7 per cent of the emissions were from energy industries, followed by 26.7 per cent from transport, 17.5 per cent from other sectors and 16.2 per cent from manufacturing industries and construction. CO_2 emissions accounted for 97.6 per cent of total GHG emissions from the energy sector, CH_4 emissions accounted for 1.3 per cent and N_2O emissions accounted for the remaining 1.1 per cent.

33. In the 2009 submission, recalculations led to an increase in emissions of 939.24 Gg CO_2 eq in 1990 and a decrease of 25,790.69 Gg CO_2 eq in 2006, representing an increase of 0.03 per cent and decrease of 0.8 per cent, respectively, compared to the 2008 submission. The largest recalculations in 2006 in terms of absolute emissions were reported by Germany for the manufacturing and construction, transport and other sectors categories, amounting to decreases of 8,906 Gg CO_2 eq, 5,356 Gg CO_2 eq and 4,319 Gg CO_2 eq, respectively.

34. The submission for the energy sector is largely complete, covering all major categories and gases. However, there are some blank cells in CRF table 1.A(b) that should contain values or notation keys. For example, the cells for carbon stored in crude oil, natural gas liquids, other kerosene, refinery

feedstocks, anthracite, other bituminous coal, sub-bituminous coal, lignite, oil shale, peat, and coke oven/gas coke have been left blank but have comments in the CRF tables containing the respective values for all member States. During the review, the European Community explained that the problem on blank cells with comments which include each member State's value is due to the comment function of the software tool used by the European Community (CRF Aggregator), which will be corrected for the next submission. The ERT recommends that the European Community implement proper QC checks to look for blank cells in its next annual submission.

B. Reference and sectoral approaches

1. Comparison of the reference approach with the sectoral approach and international statistics

35. The IPCC reference approach for estimating CO_2 emissions from fossil fuels for the European Community is based on Eurostat energy data. Energy statistics are submitted to Eurostat by member States on an annual basis with the five joint Eurostat/International Energy Agency/United Nations Economic Commission for Europe questionnaires (solid fuels, oil, natural gas, electricity and heat, and renewables and waste. Using this information, Eurostat compiles the annual energy balances which are used for the estimation of member State CO_2 emissions. The sectoral approach for estimating CO_2 emissions is based on member State CRF table submissions. For the year 2008, the difference between the reference and sectoral approaches was 1.2 per cent and the reasons for the difference are explained in the NIR.

36. In CRF table 1.A(b), there are cells with the notation key "NE" and comments indicating member States consumption values, for example, the apparent consumption of orimulsion, natural gas liquids, other kerosene, shale oil, other oil, anthracite, coking coal, sub-bituminous coal, oil shale, BKB and patent fuel, and biomass. The cells are reported as "NE" because the figures in table 1.A(b) are taken from the Eurostat database which groups fuels and reports average net calorific values. However, the CRF Aggregator has aggregated member States' comments in their CRF tables. During the review, the Party informed the ERT that the main impact of the energy statistics regulation will be the availability of higher quality energy statistics data for inventory compilers and also improved timeliness because there is now a legal requirement to report energy statistics to Eurostat (which did not exist before). The ERT looks forward to these changes in future submissions.

2. International bunker fuels

37. Emissions from bunkers for international aviation and maritime transport are estimated as the sum of the bunker emissions of each member State. Between 1990 and 2007, GHG emissions from international bunker fuels increased by 82 per cent. Between 1990 and 2007 emissions from aviation bunker fuels increased by 115.2 per cent and emissions from marine bunker fuels increased by 63.0 per cent.

38. The NIR includes a brief summary of a study conducted on the bunker fuel emissions conducted in 2007 by The European Topic Centre on Air and Climate Change comparing the aviation emissions reported by member States with modeling results provided by Eurocontrol. The purpose of the study was to assess the quality of the emissions estimates and help identify areas in need of improvement. One of the conclusions of the study was that comparing country estimates for fuel burned and CO_2 emissions with Eurocontrol is a good QA exercise that can help both parties improve the quality of their data. Although there are some issues to be resolved before Eurocontrol data can be used in estimating emissions from international bunker fuels of each member State in their respective inventories, it is in the Party's interest to continue work to move in this direction, as one of the other conclusions in this study was that, in general, member States tend to overestimate domestic aviation emissions. The ERT recommends that the European Community continue QA exercises that will lead to improvements in aviation emission estimates and to provide feedback to member States to facilitate the harmonization of methodologies among member States.

C. Key categories

1. Stationary combustion: solid, gaseous and other – CO_2

39. The CO_2 implied emission factor (IEF) for solid, gas, and other fuels in the other manufacturing and construction category has fluctuated between 1990 and 2007 (80.60–90.56 t/TJ for solid, 55.91–56.28 t/TJ for gas, 77.2–80.71 t/TJ for other). The European Community has responded to this issue, indicating that this fluctuation is mainly due to the fluctuating contribution of some countries to the weighted average which is reported as EFs and different allocations of emissions between member States. During the review, the European Community informed the ERT that work is being conducted at the European Community level on the unification of energy statistics. The ERT welcomes this activity and recommends that the European Community utilize the results accordingly.

2. Road transportation: liquid – CO_2

40. The CO_2 IEF for gasoline decreased by 0.2 percent between 1990 (71.49 t/TJ) and 2007 (71.33 t/TJ), which was one of the highest changes in the CO_2 IEF between 1990 and 2007 among the reporting Parties. There was also a decreasing trend in the CO_2 IEF over the course of the time series. During the review, the European Community explained that the main reason for the decline in the IEF is the changing contribution to gasoline consumption in Germany and France, the two largest contributing countries. The contribution to gasoline consumption in Germany and France, both of which have a higher IEF than the average member State, declined between 1990 and 2007 (Germany from 26 per cent to 23 per cent; France from 16 per cent to 11 per cent). On the other hand, the contribution to gasoline consumption in Italy, which has a lower IEF than the average member State, increased from 11 per cent in 1990 to 13 per cent in 2007. The ERT recommends that the European Community provide a brief discussion in the NIR on the IEF trend for this category.

41. The CO_2 IEF for diesel oil decreased by 0.5 per cent between 1990 (73.74 t/TJ) and 2007 (73.39 t/TJ), which was one of the highest changes among the reporting Parties. Similar to gasoline, there was a decreasing trend in the CO_2 IEF for diesel oil over the course of the time series. During the review, the European Community explained that the main reason for the decline in the IEF is the changing contribution of some countries to the weighted average. The contribution to diesel consumption in Germany, which has a high IEF, declined from 20 per cent in 1990 to 15 per cent in 2007. On the other hand, the contribution to diesel consumption in Spain, which has a low IEF, increased from 9 per cent in 1990 to 15 per cent in 2007. In addition, a few member States (e.g. Austria) show declining IEFs for the time-series 1990–2007 because of the increased use of diesel blended with biofuels. The ERT recommends that the European Community provide a brief discussion in the NIR on the IEF trend for this category. The ERT also recommends that the European Community provide some discussion in the NIR on the member State methodologies (COPERT III/IV model or other models) and facilitate the harmonization of member State methodologies without compromising the accuracy of member State inventories.

3. Coal mining and handling – CH_4

42. There is a discrepancy between the CH_4 IEF reported in the CRF tables and that reported in the NIR for underground mines for the years 1990 to 1992. Figure 3.90 of the NIR shows a relatively stable IEF throughout these years, at approximately 10 kg/t, but the IEF in the CRF tables for 1990 to 1992 are raging between 1.75 kg/t to 5.02 kg/t. During the review, the European Community explained that the IEF in the NIR is correct, while the IEF in the CRF tables is incorrect because it is based on an error in Belgian AD for 1990–1992 (which has been corrected in the NIR). The European Community explained that it is in contact with Belgium and working to correct this error for the next submission. The ERT recommends that the European Community make the appropriate corrections and ensure that the values in the NIR and the CRF tables are consistent.

III. Industrial processes and solvent and other product use

A. Sector overview

43. In 2007, emissions from the industrial processes sector amounted to 332,331.63 Gg CO_2 eq, or 8.2 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 10,468.53 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 10.8 per cent in the industrial processes sector, and decreased by 23.7 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are N_2O from adipic acid production, HFCs as by-product emissions from the production of halocarbons and SF_6, and CO_2 from iron and steel production. Within the industrial processes sector, 26.2 per cent of the emissions were from cement production, followed by 20.7 per cent from iron and steel production, 18.7 per cent from the consumption of halocarbons and SF_6, and 7.8 per cent from nitric acid production. Lime production accounted for 5.4 per cent and other (chemical industry) accounted for 5.3 per cent.

44. Some of the categories in the industrial processes sector (e.g. CH_4 from chemical industries such as the production of ethylene and dichloroethylene, HFCs from other applications using ozone-depleting substance (ODS) substitutes, and PFCs from foam blowing, aerosols/metered dose inhalers, solvents and other applications using ODS substitutes) were reported as "NE". The ERT recommends that the Party improve the completeness of its inventory by providing emission estimates for categories that have not currently been estimated, especially for those categories that are included in either the Revised 1996 IPCC Guidelines or the IPCC good practice guidance, and for which methods for estimating emissions are prescribed therein.

45. A review of potential HFC emissions shows that Greece and Luxembourg reported these emissions as "NE" and Spain reported them as confidential and "NE". In the case of potential PFC emissions, the following member States did not report emissions: Greece ("NE"), Luxembourg (not occurring ("NO")), the Netherlands (confidential, "NO" and "NE") and Spain ("NE"). These remain unchanged from the previous inventory submission in spite of the recommendation made by the previous ERT that the European Community encourages these countries to comply with the UNFCCC reporting guidelines and prepare estimates of potential emissions. The current ERT reiterates this recommendation.

46. In the NIR, information on sector-specific QA/QC is provided for the industrial processes sector; conversely, the NIR indicates that there is no sector-specific QA/QC for the solvent and other product use sector. The ERT recommends that the European Community conduct sector-specific QA/QC for the solvent and other product use sector in the same way as conducted for the industrial processes sector. The information on sector-specific recalculations is provided for both the industrial processes and solvent and other product use sectors in the NIR. However, the largest recalculation in the industrial processes sector in 2006 is incorrectly reported to be for CO_2 emissions, when it was actually performed for HFCs. The ERT recommends that the European Community provide in its next annual submission correct information on sector-specific recalculations, along with an explanation of the major reasons underlying the largest recalculations, in order to improve transparency.

B. Key categories

1. Cement production – CO_2

47. In 2007, cement production was the largest key category in the industrial processes sector, with CO_2 emissions from this category amounting to 87,105.69 Gg. These emissions accounted for 2.1 per cent of total EU-15 GHG emissions, and represented an 8.4 per cent increase from the 1990 level. Following the recommendation made during the previous review, the European Community provided in the NIR a detailed explanation of the trends in the individual member States where large decreases in

IEFs were observed over the period 1990–2007. The ERT commends the European Community for this improvement in transparency.

48. Despite the recommendations made during previous reviews, AD used for this category are not completely harmonized across member States. Specifically, Denmark uses cement production data as AD while the other member States use clinker production data. During the review, however, the European Community informed the ERT that Denmark would address this issue and use clinker production as AD in the next Danish inventory submission, and that the AD would therefore be harmonized across member States in the next EU-15 inventory submission. The ERT welcomes this plan, and recommends that the European Community carry it out.

2. Ammonia production – CO_2

49. In order to improve the accuracy of estimates for this category, the previous ERT recommended that the European Community encourage Germany to move from the default method to a higher tier method. Although this recommendation was not implemented by Germany in its 2009 inventory submission, the European Community explained that Germany would include emission estimates based on plant-specific information, which is regarded as a higher tier method, in its 2010 inventory submission. The ERT recommends that the European Community encourage Germany to carry out this planned improvement.

50. The previous ERT also recommended that the European Community encourage Greece to reallocate CO_2 emissions from ammonia (NH_3) production in the energy sector to this category. However, the ERT found that emissions from Greece have been reallocated as recommended only for recent years, while the notation key included elsewhere ("IE") is still used for 1990. The European Community explained during the review that Greece had difficulty implementing the reallocation throughout the time-series because of the lack of detailed fuel consumption data for NH_3 production prior to 1998; however, the European Community also explained that Greece is trying to solve this problem. The ERT recommends that the European Community encourage Greece to continue to make efforts to improve time-series consistency in the next annual submission.

3. Other (chemical industry) – CO_2 and N_2O

51. Following the recommendation made during the previous review, the European Community included in the NIR an explanation of the methodologies used to estimate CO_2 emissions from the largest emission sources in this category. The ERT commends the European Community for this improvement since it enhances transparency.

52. Estimated N_2O emissions were 62.4 per cent lower in 2007 than in 1990. According to the NIR, N_2O emission decreases in France resulting from the installation of catalytic treatment in glyoxylic acid production had the greatest influence on the reduction of N_2O emissions in the European Community. However, no additional explanation of the trends or inter-annual fluctuations of N_2O emissions are provided. Based on table 4.35 in the NIR, the ERT noted that France has not improved the transparency of the explanation of the method used to calculate emissions from the production of glyoxylic acid, although it was encouraged to do so during the previous review. The ERT recommends that the European Community encourage France to improve transparency of the explanation of the method used. The ERT also recommends that the European Community provide more information on the trends and inter-annual changes of N_2O emissions in its NIR.

4. Iron and steel production – CO_2

53. The European Community explained in the NIR that the allocation of emissions from pig iron production (the largest source in this category) between process- and combustion-related emissions differs between member States, in spite of the recommendation made by the previous ERT that these

emissions are allocated in a consistent manner. Some EU-15 member States do not follow the Revised 1996 IPCC Guidelines and the IPCC good practice guidance for reasons such as local traditions used historically. According to the explanation given by the European Community during the review, an internal review with five member States concluded that emissions from the production of sinter and coke had been allocated correctly; however, the notation keys and/or explanations for including the emissions "IE" were not presented correctly in the NIR. The European Community also informed the ERT that the internal review concluded that harmonization in this sector would be very difficult to achieve due to the complexity of the sector and the use of country-specific models. Noting the difficulty in achieving harmonization in this category, the ERT encourages the European Community to continue its efforts to improve consistency across member States with regard to the allocation and reporting of emissions for this category.

IV. Agriculture

A. Sector overview

54. In 2007, emissions from the agriculture sector amounted to 371,481.83 Gg CO_2 eq, or 9.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 11.3 per cent. The key drivers for the fall in emissions are a reduction in agricultural soil emissions from decreasing application of nitrogen fertilizer and manure, and reduced emissions from enteric fermentation resulting from a decreasing number of cattle, sheep and goats. Within the sector, 48.5 per cent of the emissions were from agricultural soils, followed by 32.4 per cent from enteric fermentation, 18.3 per cent from manure management, 0.6 per cent from rice cultivation and the remaining 0.1 per cent from field burning of agricultural residues. N_2O emissions accounted for 54.7 per cent of sector emissions, with CH_4 emissions accounting for the remaining 45.3 per cent.

55. Reporting of emissions in the sector is complete, with all categories and gases accounted for. Prescribed burning of savannah is reported by the EU-15 as "NO". Recalculations were performed for all categories in all years except for rice cultivation. Recalculations performed for the 2009 submission resulted in a 3.4 per cent decrease in total agricultural emissions in 1990 and a 3.0 per cent decrease in total agricultural emissions in 2006, compared to the 2008 submission. A detailed list of sector-specific recalculations is also provided in the NIR.

56. The NIR provides a general overview of the methodology of estimation of emissions, AD, EFs, relevant parameters, trends, and time-series consistency for all categories. The level of detail provided for each EU-15 member State varies.

57. Information on uncertainty is provided at the key category level for most member States, but no information is provided for rice cultivation and field burning of agricultural residues, neither of which are key categories. Uncertainties in the emission estimates of individual member States ranges from 6 per cent for enteric fermentation to 505 per cent for direct N_2O emissions from agricultural soils.

58. Most of the recommendations made by the previous ERT have been dealt with in the 2009 submission. The previous ERT mentioned that the NIR lacked a summary of the methods and trends for field burning of agricultural residues. This information is now included. Problems with the nitrogen excretion (Nex) rates for Sweden have also been resolved. Additionally, the previous ERT identified a problem with the reporting of the buffalo population in Germany. The AD for buffalo was only reported from 2000 onwards while the NIR indicated that buffalo were in Germany since 1996. The current submission now includes estimates and AD for buffalo in Germany from 1996 to 2007.

59. The issue of whether Germany may utilize the methods and defaults indicated in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) must be resolved as the differences in the methods and factors between those in the Revised 1996 IPCC Guidelines elaborated by the IPCC good practice guidance, and in the 2006 IPCC Guidelines

may potentially make it difficult to ensure consistency among the member States' inventories. It is the understanding of the ERT that this issue will be resolved by Germany and the European Community through discussions among the member States. In order for Germany to use the methods and factors in the 2006 IPCC Guidelines, it must provide evidence that the 2006 IPCC Guidelines are more appropriate to its particular circumstances than the Revised 1996 IPCC Guidelines elaborated by the IPCC good practice guidance.

60. There is a high degree of variability in the methods, choice of EFs and AD, and level of precision for the estimates among the various EU-15 member States. Because of this, the ERT proposes that, in addition to having the European Community develop an aggregated inventory using weighted averages, as is currently done, the EU-15 could also develop an alternate inventory using, for example, the IPCC tier 1 methods and default factors, along with data from readily available international sources. This estimate could be used as a verification tool by providing a comparison between the aggregated EU-15 inventory and an inventory which is prepared with the IPCC tier 1 methods and default factors. Based on the response provided by the EU-15, it appears that they are receptive to this suggestion, and the ERT encourages the European Community and its member States to examine this idea in future submissions.

B. Key categories

1. Manure management – N_2O

61. There are errors in reporting of emissions in CRF table 4.B.(b) for Sweden that result in incorrect quantities of manure being allocated to the various animal waste management systems. This also results in incorrect IEFs. Sweden has indicated that it will rectify the issue in the 2010 submission.
The incorrect Nex rates do not affect the emission calculations, only the reporting of Nex rates in the CRF tables.

2. Agricultural soils – N_2O

62. There is a great deal of variation in the $Frac_{GASF}$ value amongst the EU-15 member States. Some member States use the IPCC default value, others use CORINAIR values; some use country-specific values, while others use models that account for volatilization internally. In all cases the trend is toward higher $Frac_{GASF}$ values, with the 2007 value (0.058 NH_3-N+NO_x-N/kg of synthetic fertilizer N applied) being 7.1 per cent higher than the 1990 value, but still lower than the IPCC default value of 0.1 (NH_3-N+NO_x-N/kg of synthetic fertilizer N applied). The ERT recommends that further justification be provided for the use of values that are significantly different from the IPCC default value.

C. Non-key categories

Agricultural soils – CH_4

63. CH_4 emissions and removals from agricultural soils are reported for three member States. Austria accounts for CH_4 emissions from sludge applications, Belgium accounts for CH_4 emissions from manure deposited during grazing and Germany accounts for CH_4 sequestration in grassland and cropland soils. The ERT recommends that the Party review the reporting of CH_4 emissions and removals under this category. CH_4 emissions from grazing animals, reported by Belgium, should be reported under manure management, using the appropriate pasture, range and paddock methane conversion factors (cool = 1 per cent, temperate 1.5 per cent and warm = 2 per cent). CH_4 emissions from sewage sludge applications are not accounted for in the Revised 1996 IPCC Guidelines or in the IPCC good practice guidance, therefore further justification is necessary to understand the appropriateness of this estimate.

V. Land use, land-use change and forestry

A. Sector overview

64. In 2007, net removals from the LULUCF sector amounted to –259,415.86 Gg CO_2 eq. Between 1990 and 2007, net removals increased by 19.8 per cent (from –216,592.70 Gg CO_2 eq). The European Community's net sink has increased from 5.1 per cent in 1990 to 6.4 per cent in 2007. The key driver for the increase in net removal is a significant build-up of the carbon stocks in of forests due to the fact that harvest represents only 60 per cent of net annual wood increment. Furthermore, environmental policies implemented by the European Community since 1990 have resulted in less intensive agricultural practices and in an increase in forest and woodland conservation areas for the purpose of preserving biodiversity and landscapes. In 2007, the largest LULUCF carbon sink was France, the second largest was Italy, and the third largest was Spain. In most of member States, carbon sinks increased between 1990 and 2007, although there were notable decreases in the carbon sinks of Germany (41 per cent) and Sweden (36 per cent) between 1990 and 2007. The management of organic soils and the conversion of lands to cropland and settlements are the main drivers for emissions from the LULUCF sector in the European Community.

65. In response to recommendations made during previous reviews, the 2009 NIR of the European Community shows notable improvements in the completeness of reporting of forest land and cropland remaining cropland, and in providing further documentation on the LULUCF sector. Some subcategories are still reported as "NE" such as carbon stock changes and non-CO_2 emissions in land-use change transitions, as well as emissions due to biomass burning in several land-use categories for several member States. The European Community has indicated its continuous efforts to encourage all member States to improve their LULUCF inventories and prepare for reporting activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, for their 2010 submissions. The ERT welcomes the improvements in the reporting of the LULUCF sector and recommends that the European Community continue to encourage its member States to develop the ability of the various national systems to identify activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol and increase support to those member States that are still unable to fulfill the requirements of reporting a complete LULUCF inventory under the Convention.

66. In response to comments made during previous reviews and to concerns raised by the ERT with regard to the comparability and differences in definitions and methods between member States in terms of both land-use definitions and the reported time-series, the European Community indicates that some harmonization efforts have been made. However, the Party acknowledges that there are unavoidable differences in definitions and methodologies used by member States, due to statistics being developed in different ways in the member States and the type of data available. The European Community indicates that so long as the methodologies used by member States are consistent with the IPCC good practice guidance for LULUCF, comparability of the methods used for estimation has been achieved, and aggregated data can be used to assess trends. The ERT recognizes the difficulties in trying to harmonize the results presented by each member State. The ERT welcomes the efforts of the European Community and encourages the Party to continue its efforts to improve comparability and consistency between member States in future submissions.

67. Large discrepancies were observed between values of net CO_2 emissions and removals in the land-use change matrix of lands from forests presented in table 7.4 of the NIR for the years 1990 and 2007, and the corresponding totals in "information items" of CRF table 5 for the same years. In response to questions raised by the ERT, the European Community acknowledged that some member States do not always report the correct data in CRF table 5, especially for forest land converted to other land. The European Community indicated that this issue has been communicated to member States and will be approached more carefully next year. The ERT recommends that the European Community continue to encourage member States to improve consistency between the NIR and the CRF tables.

68. The total area of organic soil reported in the LULUCF sector does not match the area of cultivated organic soil reported in the agriculture sector (CRF table 4.D). For instance, the areas reported in the LULUCF sector for 2007 are 10,908.25 kha of forest land, 0 kha of cropland (reported as blank) and 1,324.30 kha of grassland, whereas the total area reported in the agriculture sector is 2,169 kha. In response to questions raised by the ERT, the European Community acknowledged that there are some inconsistencies between CRF tables 4.D1 and 5.B, which are small in the case of Finland and Sweden, but very large in the case of Germany. The European Community indicated that this will be reviewed carefully in its next annual submission. The ERT recommends that the European Community improve the consistency of reporting of the total area of organic soil.

69. Major recalculations have been made in the LULUCF sector. In the 2009 submission, the impact of the recalculations was a 16.9 per cent decrease in net removals for 1990 and a 17.7 per cent decrease in net removals for 2006. These large decreases in net removals resulted from problems with the Swedish inventory that were identified and corrected in the revised 2008 submission.

B. Key categories

1. Forest land remaining forest land – CO_2

70. In table 7.11 of the NIR for forest remaining forest, Germany reports a net sink of 74,064 Gg CO_2 that is constant for 1990, 2006 and 2007; with the highest share of 24.1 per cent of the European Community among all 15 members States. Despite the fact that Germany's total area of forest land remaining forest land is approximately 60 per cent less than that of Sweden; Sweden reports a sink of only 22,028 Gg CO_2 for 2007. This issue, which has already been identified in previous reviews, received too little attention in the current NIR. Thus, the ERT encourages the European Community to discuss differences in IEF among member States and provide more details in the NIR of its next annual submission. According to table 7.6 of the NIR, Germany only takes into account the carbon stock change in living biomass, while the carbon stock changes in dead organic matter and soils are either not reported, or reported as zero. In response to comments raised by the ERT, the European Community indicated that the constant value is the result of Germany's carbon stock change method for living biomass. The ERT recommends that the European Community continue to encourage member States such as Germany, which have the appropriate forest inventories and resources, and which have elected to report forest management under Article 3, paragraph 4, of the Kyoto Protocol, to improve the reporting of this category.

71. Another issue has been identified in previous reviews and continues to be observed in table 7.1 of the NIR. In this table, Italy's share of LULUCF sinks is reported to be 26.8 per cent of the total share of all 15 member States. According to Italy's 2007 inventory, submitted in 2009, the area of forest land remaining forest land category equals 10,782.32 kha, the implied carbon stock change factor for living biomass is 0.58 Mg C/ha, and the implied carbon stock change factor for soils is 0.64 Mg C/ha. By comparison, France's implied carbon stock change factor for soils is 0.01 Mg C/ha, and Sweden's is 0.07 Mg C/ha. Italy's approach assumes that soils build up their carbon stock almost as fast as vegetation. This assumption is not supported by adequate evidence and thus may lead to overestimation of the increase in soil carbon stocks under growing forest vegetation. Hence, the approach is not fully consistent with the IPCC good practice guidance for LULUCF. In response to comments made by the ERT, the European Community agrees to encourage Italy to use new data from the latest forest inventory to estimate carbon sinks in forest soils. The ERT recommends that the European Community continue to encourage member States like Italy, which have elected to report forest management under Article 3, paragraph 4, of the Kyoto Protocol, to improve the reporting of forest land remaining forest land.

2. Land converted to forest land – CO_2

72. Most of the member States report emissions from and removals by land converted to forest land. However, some member States (such as Belgium and Finland) report emissions and removals as "NE" or

"IE" for this category. On the other hand, almost half of the European Community's carbon fluxes in land converted to forest land occur in France and the United Kingdom. This implies that the reporting by these member States is not sufficiently harmonized. The ERT recommends that the European Community continue to encourage member States to improve their methodologies and make efforts to harmonize their reporting approaches with other Parties. Acknowledging that there may be methodological reasons for using country-specific allocations, the ERT recommends that the European Community continue to increase support to its member States to facilitate the estimation of emissions and removals for this land-use change category and increase the consistency and transparency of reporting where possible.

3. Land converted to cropland – CO_2

73. Most member States report emissions from and removals by land converted to cropland. Only Sweden reports a net carbon sink in land converted to cropland. All other member States report a net carbon sources. The EFs for this category are not provided in the NIR and the ERT notes that the lack of EFs in the NIR is not in accordance with transparent reporting. The ERT recommends that member States present EFs in their NIRs in order to improve the completeness and transparency of reporting.

4. Land converted to grassland – CO_2

74. The European Community indicates in its NIR (page 500) that the spike in CO_2 removals by grassland in 2003 is the result of the reporting methodology applied by Italy. Further explanation about it is briefly provided in section 7.3.3.2 of the NIR; however, the ERT considers that this explanation is not clear enough. Italy's 2009 NIR shows this spike in chapter 2, and tables 7.19 and 7.20 of chapter 7, but does not provide a clear explanation. In response to questions raised by the ERT, the European Community agreed with this point raised by the ERT and indicated that it has strongly encouraged member States to revise the way they use official statistics in order to avoid unrealistic spikes such as that for 2003 for Italy. The ERT welcomes the efforts of the European Community and recommends that it continue to encourage member States like Italy to improve reporting.

5. Land converted to settlements – CO_2

75. Most member States report emissions and removals from the conversion of land to settlements. Only Sweden reports a small net carbon sink resulting from its conversion of land to settlements; other member States report a net carbon sources. Member States have not provided EFs in the NIR. The ERT reiterates the recommendation from the previous review that member States present EFs in their NIRs in order to improve transparency of reporting.

VI. Waste

A. Sector overview

76. In 2007, the emissions from the waste sector in the EU-15 amounted to 104,645.46 Gg CO_2 eq, or 2.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 38.9 per cent. The key drivers of the fall in emissions are the early implementation of the 1999 European Union landfill waste directive, the reduction in the amount of solid waste disposal on land, the decline in the amount of biodegradable waste going to landfills, and the increase in landfill gas recovery. Within the sector, 75.2 per cent of the emissions were from solid waste disposal on land, followed by 19.5 per cent from wastewater handling, 3.0 per cent from waste incineration and 2.3 per cent from other (waste).

77. The waste inventory is generally transparent. However, there are some inconsistencies between the NIR and the CRF tables. For example, in the sector overview as well as in table 7 of CRF tables, the key categories in the waste sector are CH_4 emissions from solid waste disposal on land, and CH_4 and N_2O

emissions from domestic and commercial wastewater; however, in figure 8.2 in the NIR, N_2O emissions from domestic and commercial wastewater is not listed, while CO_2 emissions from waste incineration is listed as a key category. The ERT encourages the European Community to identify and correct these errors in its next annual submission.

78. Sector-specific QA/QC activities have been implemented by expert meetings under the Climate Change Committee of the European Community and have been well documented; however, there is room for improvements in the QA/QC activities. The modified tier 1 method and Monte Carlo simulation (tier 2) method were used for uncertainty estimates in the waste sector; however, an inconsistency in reporting was found between table 1.18 and table 8.29 of the NIR. The ERT encourages the European Community to correct this inconsistency at the European Community level and check for other inconsistencies in its next annual submission.

79. Sector-specific recalculations were carried out and explained in the NIR. The ERT noted, inter alia, that recalculations of CH_4 emissions made by France had the largest impact on the total amount of recalculations for waste sector of the EC inventory in 1990 and 2006. However, no explanation is provided in the NIR about why France made such recalculations. The ERT recommends that the European Community provide more information about the recalculations made by each member State that have the largest impact on the total amount of recalculations for the waste sector of the European Community inventory in the NIR of its next annual submission.

80. Given the number of member States in the European Community, the ERT encourages the European Community to not only collect and reorganize the information (NIR) and data (CRF tables) from member States, but to provide analysis for trend of emissions and relevant parameters for those member States influencing most the European Community's trends.

B. Key categories

1. Solid waste disposal on land – CH_4

81. CH_4 emissions from managed waste disposal on land account for 66.5 per cent of total GHG emissions in the waste sector, followed by 6.1 per cent from unmanaged solid waste disposal on land, and 2.6 per cent from other (solid waste disposal on land). It is a good practice to use the first order decay method (tier 2) to calculate the emissions and to display emissions trends over time. It was reported that all EU-15 member States applied the tier 2 methodology in order to estimate CH_4 emissions from managed solid waste disposal on land; however, in the CRF table 8.2, the method reported for Sweden was "tier 3". The ERT suggests that the European Community confirm this with Sweden and report on this accordingly in its next annual submission.

82. In general, CH_4 emissions from both managed and unmanaged solid waste disposal on land show decreasing trends from 1990 to 2007. Nine EU-15 member States reduced their CH_4 emissions from managed waste disposal on land between 1990 and 2007, and documented the reasons for the reductions in the NIR. The ERT recommends that the European Community address the increased CH_4 emissions from the other six member States, including Greece (+ 805 per cent), Portugal (+470 per cent) and Spain (+122 per cent).

83. There is a significant difference in the rate of waste generation per capita among the EU-15 member States (figure 8.3 of the NIR). The European Community explains in its NIR that the waste generation rate is not well defined in the additional information box of the CRF tables or in the NIR of each member State, and that therefore it is difficult to explain the difference in the waste generation rate for all member States. Noting the difficulty explained by the European Community, however, the ERT encourages the European Community to enhance cooperation with member States to collect relevant information with a view to better understanding the background of significant difference of waste generation rates among member States (ranging from 0.18 to 7.78 kg/capita/day), and also encourages the

European Community to provide an explanation about it in the NIR of its future annual submissions if possible.

2. Wastewater handling – CH_4 and N_2O

84. The methodology and parameters used by member States to estimate CH_4 and N_2O emissions are well documented in the NIR. The European Community reports that CH_4 emissions decreased by 19.2 per cent and N_2O emissions increased by 7.0 per cent between 1990 and 2007. The ERT recommends that the European Community provide more information about this decrease and increase in emissions in its next annual submission.

85. The methods used to calculate CH_4 and N_2O emissions from wastewater handling vary between member States, with some reporting methods as "confidential" and others reporting them as "tier 2". All EU-15 member States except Sweden ("IE") reported their CH_4 emissions from domestic and commercial wastewater handling. All EU-15 member States reported their N_2O emissions from commercial wastewater handling in accordance with the IPCC good practice guidance. Six member States (Finland, Greece, Italy, the Netherlands, Portugal and Spain) reported CH_4 emissions from industrial wastewater in 2007, while one member State (Denmark) reported these emissions as "IE" and the remaining member States reported these emissions as "NE". Six member States (Austria, France, Italy, Luxembourg, Portugal and Sweden) reported N_2O emissions from industrial wastewater, while the remaining member States reported these emissions as "not applicable" ("NA"), "NE" and "IE". The ERT recommends that the European Community encourage those member States reporting "NE" for this category to provide emission estimates.

3. Waste incineration – CO_2

86. Emissions from this category accounted for 0.1 per cent of total EU-15 GHG emissions and 2.3 per cent of waste sector emissions in 2007. Nine member States reported emissions from this category, while four member States (Denmark, Finland, Luxembourg and the Netherlands) reported these emissions as "IE", one member State (Ireland) reported them as "NE" and "NO", and one member State (Germany) incorrectly reported them as "NO" instead of "IE". This problem was raised by the ERT during the previous review. The current ERT recommends that the European Community clarify this issue with Germany and make the appropriate correction in its next annual submission.

C. Non-key categories

Other (waste) – CH_4 and N_2O

87. CH_4 emissions from this category accounted for 1.5 per cent of sector emissions in 2007, and were reported by eleven member States. N_2O emissions from this category accounted for 0.8 per cent of sectoral emissions in 2007 and were reported by seven member States.

VII. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

A. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

88. The European Community has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the

findings included in the SIAR on the SEF tables and their comparison report.[7] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

89. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with section I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraphs 88(a) to (j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

2. National registry

90. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its findings that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

3. Calculation of commitment period reserve

91. The European Community has reported its commitment period reserve in its 2009 annual submission. The European Community reported that its commitment period reserve has not changed since the initial report review (17,659,243,358 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

B. Changes to the national system

92. The European Community reported no change in its national system compared with the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

C. Changes to the national registry

93. The European Community reported changes in its national registry since the previous annual submission with regard to the completion of the live connection between the community independent transaction log, the ITL and member States' registries, as well as the change of name and contact information of the registry administrator designated by the Party. The ERT concluded that, taking into account the reported changes in the national registry as well as the SIAR, the European Community's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1. However, in response to a question from the ERT during the review, the Party stated that the name of the registry administrator designated by the Party has been reported incorrectly in the NIR. The ERT recommends that the Party report correctly in its next annual submission any changes in its national registry in accordance with section I.G of the annex to decision 15/CMP.1.

[7] The SEF tables comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

VIII. Conclusions and recommendations

94. The European Community made its annual submission on 15 April with a resubmission on 27 May 2009. The Party indicated that the 2009 annual submission is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (on Kyoto Protocol units), and changes to the national system and the national registry. This is in line with decision 15/CMP.1.

95. The ERT concludes that the inventory submission of European Community has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2007 and an NIR; these are complete in terms of gases, geographical coverage and years and generally complete in terms of source and sink categories. Some of the categories in the industrial processes sector (e.g. CH_4 from chemical industries such as the production of ethylene and dichloroethylene, HFCs from other applications using ODS substitutes and PFCs from foam blowing, aerosols/metered dose inhalers, and solvents, and other applications using ODS substitutes) were reported as "NE". The ERT recommends that the Party provide estimates for these categories in its next annual submission, in order to improve completeness.

96. The submission on a voluntary basis of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. The European Community did not report on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, or information on adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. In response to a question from the ERT during the review, the Party stated that the name of the registry administrator designated by the Party has been reported incorrectly in the NIR.

97. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the ERT noted that the Party's NIR is not fully in accordance with the UNFCCC reporting guidelines as some annexes are missing because of the special conditions of the European Community inventory (see para. 8). The ERT also noted that the Party's inventory is not fully in line with the Revised 1996 IPCC Guidelines or the IPCC good practice guidance for some categories because some EU-15 member States do not strictly follow these guidelines for all categories. This is the case, for example, in the allocation of emissions from iron and steel production between the energy and industrial processes sectors (see para. 53).

98. The European Community has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

99. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

100. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the CMP.

101. In the course of the review, the ERT formulated a number of recommendations[8] relating to the completeness and transparency of the annual submission of the European Community. The key recommendations are that the European Community:

(a) Implement the recommendations from the previous reviews that have not yet been implemented for the 2009 submission in some sectors, such as industrial processes, LULUCF and waste (see paras. 45, 75 and 86);

(b) Provide quantified uncertainty estimates at the same level of disaggregation as for the key category analysis;

(c) Further improve consistency between the NIR and the CRF tables;

(d) Further enhance QA/QC activities as planned in close cooperation with each member State;

(e) Further make efforts to improve consistency or harmonization across member States with regard to reporting of emissions and relevant background information (e.g., see paras. 53 and 83).

IX. Questions of implementation

102. No questions of implementation were identified by the ERT during the review.

[8] For a complete list of recommendations, the relevant chapters of this report should be consulted.

Annex I

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>.

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for the European Community 2009. Available at <http://unfccc.int/resource/docs/2009/asr/ec.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <http://unfccc.int/resource/webdocs/sai/2009.pdf>.

FCCC/ARR/2008/EC. Report of the individual review of the greenhouse gas inventories of the European Community submitted in 2007 and 2008. Available at <http://unfccc.int/resource/docs/2009/arr/ec.pdf>.

UNFCCC. *Standard Independent Assessment Report*, Parts I and II. Unpublished document.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Erasmia Kitou (The European Commission Directorate-General for the Environment), including additional material on the methodology and assumptions used.

Annex II

Acronyms and abbreviations

AD	activity data
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU ETS	European Community emissions trading scheme
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
Gg	gigagram (1 Gg = 10^9 gram)
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1 thousand grams)
kha	kilohectare (1 kha = 1 thousand hectares)
LULUCF	land use, land-use change and forestry
NA	not applicable
NE	not estimated
N_{ex}	nitrogen excretion
N_2O	nitrous oxide
NIR	national inventory report
NO	not occurring
ODS	ozone depleting substances
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
S&A	synthesis and assessment
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SO_2	sulphur dioxide
t	tonne
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change

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