COMPLIANCE COMMITTEE **CC/ERT/ARR/2010/10**
9 February 2010

Report of the individual review of the annual submission of Hungary submitted in 2009

Note by the secretariat

The report of the individual review of the annual submission of Hungary submitted in 2009 was published on 8 February 2010. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2009/HUN, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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Report of the individual review of the annual submission of Hungary 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.

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I. Overview

A. Introduction

1. This report covers the centralized review of the 2009 annual submission of Hungary, 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. Kristina Saarinen (Finland) and Mr. Marius Țăranu (Republic of Moldova); energy – Mr. Pascal Bellavance (Canada), Mr. Tomas Gustafsson (Sweden) and Mr. Benon Bibbu Yassin (Malawi); industrial processes – Mr. Afshin Matin (Canada) and Ms. Suvi Monni (European Community); agriculture – Mr. Leonard Brown (New Zealand) and Ms. Hongmin Dong (China); land use, land-use change and forestry (LULUCF) – Ms. Tracy Johns (United States of America) and Mr. Harry Vreuls (Netherlands); and waste – Ms. Maryna Bereznytska (Ukraine) and Mr. Carlos Lopez (Cuba). Mr. Brown and Mr. Țăranu were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova and Mr. Matthew Dudley (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 Government of Hungary, which made no comment on it.

B. Emission profiles and trends

3. In 2007, the main greenhouse gas (GHG) in Hungary was carbon dioxide (CO_2), accounting for 76.0 per cent of total national GHG emissions[1] expressed in CO_2 eq, followed by nitrous oxide (N_2O) (11.7 per cent), methane (CH_4) (11.3 per cent), hydrofluorocarbons (HFCs) (0.8 per cent), sulphur hexafluoride (SF_6) (0.2 per cent) and perfluorocarbons (PFCs) (0.003 per cent). The energy sector accounted for 75.0 per cent of the total GHG emissions, followed by agriculture (12.5 per cent), industrial processes (6.9 per cent), waste (5.4 per cent) and solvent and other product use (0.2 per cent). Total GHG emissions amounted to 75,943.52 Gg CO_2 eq and decreased by 34.7 per cent between the base year[2] and 2007.

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.

[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 Hungary is the average of 1985–1987 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

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

Greenhouse gas	Gg CO_2 eq							Change base year–2007 (%)
	Base year [b]	1990	1995	2000	2005	2006	2007	
CO_2	84 863.46	72 470.79	61 501.84	58 491.75	61 098.91	59 757.46	57 751.80	–31.9
CH_4	11 890.96	11 153.12	9 224.50	9 368.32	8 797.74	8 710.45	8 545.31	–28.1
N_2O	19 348.67	15 275.31	8 880.22	9 598.61	9 557.58	9 544.29	8 857.87	–54.2
HFCs	1.74	NA,NE,NO	1.74	205.73	517.58	606.85	614.50	35 123.2
PFCs	166.82	270.83	166.82	211.26	209.39	1.53	2.38	–98.6
SF_6	70.15	39.87	70.15	140.11	201.02	244.45	171.65	144.7

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.

[a] Total greenhouse gas emissions includes emissions from Annex A sources only (exclude emissions/removals from the LULUCF sector).

[b] Base year refers to the base year under the Kyoto Protocol, which is the average of 1985–1987 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 2. Greenhouse gas emissions by sector, base year –2007

Sector	Gg CO_2 eq							Change base year–2007 (%)
	Base year [a]	1990	1995	2000	2005	2006	2007	
Energy	82 758.39	70 887.06	61 375.23	58 188.19	60 622.64	59 241.92	56 936.00	–31.2
Industrial processes	10 726.83	8 650.26	4 990.85	5 812.06	6 071.01	5 695.50	5 236.43	–51.2
Solvent and other product use	384.14	290.33	250.12	235.58	148.22	343.84	158.09	–58.8
Agriculture	19 399.14	16 026.27	9 575.66	9 922.24	9 398.28	9 417.27	9 477.10	–51.1
LULUCF	NA	–4 210.02	–8 618.44	–827.56	–4 615.75	–4 109.18	–4 137.55	NA
Waste	3 073.30	3 355.99	3 653.41	3 857.71	4 142.09	4 166.51	4 135.89	34.6
Other	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	94 999.90	71 226.82	77 188.22	75 766.48	74 755.85	71 805.97	NA
Total (without LULUCF)	116 341.80	99 209.91	79 845.27	78 015.77	80 382.23	78 865.03	75 943.52	–34.7

Abbreviation: LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] Base year refers to the base year under the Kyoto Protocol, which is the average of 1985–1987 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

C. Annual submission and other sources of information

5. Hungary submitted a complete set of common reporting format (CRF) tables for the period 1985–2007 on 15 April 2009 and a national inventory report (NIR) on 16 April 2009. Hungary also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on accounting of Kyoto Protocol units, and information on changes in the national system and in the national registry. The standard electronic format (SEF) tables were submitted on 15 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. Hungary indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

6. Where necessary, the expert review team (ERT) also used previous submissions during the review. In addition, the 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 and its comparison report) and on the national registry.[3]

7. During the review, Hungary provided the ERT with additional information. The full list of materials used during the review is provided in annex I to this report.

Completeness of inventory

8. The inventory is complete in terms of geographical coverage, years and sectors. Some categories are reported as not estimated ("NE"), e.g. CH_4 emissions from distribution of oil products, HFC emissions from foam blowing (disposal of hard foams), some of the estimates in the LULUCF sectors, CH_4 emissions from waste incineration (see also paras. 38, 53, 62, 78, 91 and 99 below). The ERT reiterates the recommendation of the previous review and encourages Hungary to prepare and report estimates for the missing categories. The ERT encourages Hungary to explore approaches available in the scientific literature, to estimate emissions for categories that do not have methodologies prescribed in the Revised 1996 IPCC guidelines nor the IPCC good practice guidance, with a view to enhance further, to the extent possible, the completeness and accuracy of its inventory The ERT also recommends that the Party, when reporting emissions data for the first time for a given category, ensure that emissions data are provided for the entire inventory time series, and that the choice of methods and EFs are clearly explained in the NIR. The ERT also recommends that Hungary include a discussion of the categories that were not estimated and the possibility of including them in future submissions in the NIR.

D. Main findings

9. 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). The minor exceptions are that the uncertainty analysis was performed without including the LULUCF categories (see para. 19 below) and the misallocation of process emissions in the energy sector (see para. 63 below).

[3] The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (para. 5 (a), 6 (c) and 6 (k)), under the auspices of the international transaction log 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 the 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.

10. The 2009 inventory submission shows significant improvements on the 2008 submission. Particular emphasis was placed on determining country-specific emission factors (EFs), moving to higher tier methodologies, improving inventory transparency by providing thorough descriptions of background data and methods used to calculate GHG emissions, ensuring consistency by performing recalculations for the time series from the base year to 2006, and improving the quality assurance/quality control (QA/QC) system. Most of the improvements have been made based on the recommendations from the previous reviews. However, Hungary has not implemented all the recommendations from the previous ERT (see para. 33).

11. Hungary has submitted, in part, 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. Hungary did not provide on a voluntary basis information on reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol and information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. Hungary 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. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1 (see para. 111 below) and 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) (see para. 112 below).

12. The ERT encourages Hungary 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, that can be found on the UNFCCC website.[4]

13. In the course of the review, the ERT formulated a number of recommendations relating to transparency; time-series consistency; methodological choices; and uncertainties (see para. 35 below).

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

1. Overview

14. The ERT concluded that the national system continued to perform its required functions.

15. The NIR describes the national system for the preparation of the inventory. The Ministry of Environment and Water (MEW) has overall responsibility for the national inventory and national system for climate reporting and is the designated single national entity. The Hungarian Meteorological Service (OMSZ), through its Greenhouse Gas Inventory Division (GHG Division), is responsible for the preparation and development of the inventory on a contractual basis. Other organizations, including the National Inspectorate for Environment, Nature and Water; the Hungarian Central Statistical Office; the Forestry Directorate of the Central Agricultural Office (CAO); the Research Institute for Animal Breeding and Nutrition; and the Karcag Research Institute of the University of Debrecen are also involved in the preparation of the inventory. The NIR provides information on a change to the national system since the previous annual submission as discussed in chapter VII.B of this report.

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

2. Inventory planning

16. The MEW, through its Climate Change and Energy Department, is responsible for the institutional, legal and procedural arrangements for the national system and the strategic development of the national inventory. The OMSZ, through its GHG Division, is responsible for all inventory-related tasks. These tasks involve preparing the GHG inventory and compiling the CRF tables and NIR with the involvement of external institutions and experts on a contractual basis. The OMSZ supervises the maintenance of the system. The division of labor and the sectoral responsibilities within the team are documented in the QA/QC plan and other official documents of the OMSZ. Within the GHG Division of the OMSZ, there are coordinators for the different sectors, as well as a QA/QC coordinator and an archive manager. The GHG Division coordinates with other ministries, government agencies, consultants, universities and companies to compile the annual inventory and other reports to the UNFCCC and the European Commission.

17. The energy, industrial processes and waste sectors are prepared by experts from the GHG Division. The agriculture sector is prepared by the Research Institute for Animal Breeding and Nutrition. The LULUCF sector is prepared by the Forestry Directorate of the CAO and the Karcag Research Institute of the University of Debrecen. The ERT concluded that the overall organization of the national system is effective and reliable in terms of the institutional, procedural and legal arrangements for the estimation and timely reporting of the GHG emissions and that Hungary ensures enough capacity for timely performance of its functions.

3. Inventory preparation

Key categories

18. Hungary has reported a tier 1 key category analysis (both including and excluding LULUCF) and tier 2 analysis (excluding LULUCF), for both the level and trend assessment as part of its 2009 submission. The tier 1 key category analysis performed by the Party and that performed by the secretariat[5] produced slightly different results owing to the different level of disaggrgation of the categories used by the Party. Hungary's key category analysis was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. Due to recalculations, there were some changes in the key categories between the 2008 and 2009 submissions: e.g. CO_2 emissions from other mineral products and CO_2 from cropland remaining cropland were identified as key categories in the 2008 submission but are not key categories in the 2009 submission; CH_4 from manure management was identified as a key category in the 2009 submission but was not a key category in the 2008 submission.

Uncertainties

19. Hungary has provided a tier 1 uncertainty analysis for 43 categories and for the overall inventory. The uncertainty analysis excludes the LULUCF sector categories, as uncertainty estimates for activity data (AD) are not available for this sector. In the other sectors, information on uncertainties is reported quantitatively for some categories and qualitatively for others. Some categories do not have information on uncertainties. The ERT recommends Hungary to complete the uncertainty analysis by including quantitative estimates for all categories (including LULUCF sector).

[5] 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 IPCC good practice guidance for LULUCF. 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.

20. The ERT noted that the quantitative uncertainty for total national GHG emissions in 2007 was estimated to be 8.0 per cent, while the uncertainty introduced by the trend, was estimated to be 2.3 per cent. The uncertainty analysis is mainly based on the default uncertainties included in the IPCC good practice guidance and in the CORINAIR Guidebook; on country-specific information obtained directly from AD providers (factories, plants and associations); and on expert judgments. The ERT encourages the Party to use more country-specific information and to request the institutions providing AD or those institutions in charge of estimating emissions, especially for the LULUCF sector, to estimate the relevant uncertainty data as well as emissions. Hungary used the results of the uncertainty analysis to prioritize further improvements in the inventory.

Recalculations and time-series consistency

21. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by Hungary of the time series from the base year to 2006 have been performed to take into account reallocations between sectors, more accurate and revised AD, improved EFs and other parameters, and the implementation of higher tier methodologies within the agriculture and LULUCF sectors. The rationale for these recalculations is provided in the NIR and in CRF table 8(b).

22. The recalculations resulted in an increase in the estimate of total emissions (excluding LULUCF) by 0.52 per cent in the base year (average 1985-1987) and by 0.31 per cent in 2006. The most significant increases as a result of recalculations were in the agriculture sector where estimates of CH_4 emissions increased by 41.2 per cent in the base year and by 46.1 per cent in 2006, and in the LULUCF sector where estimates of CO_2 removals decreased by 12.2 per cent in the base year and by 30.3 per cent in 2006.

23. Overall, the recalculations improved the inventory, however the ERT noted that there were cases when the time series were not consistent (e.g. for CH_4 emissions from industrial wastewater handling) (see para. 98 below). The ERT recommends that Hungary ensures the time series is consistent when performing recalculations in its next submission.

24. The ERT noted significant inter-annual fluctuations in part of the emissions estimates (e.g. industrial processes, LULUCF). The NIR provides explanations of the trend, but does not cover all of the large fluctuations. The ERT recommends Hungary to include further documentation on the large inter-annual changes in its emissions/removals in its next annual submission.

Verification and quality assurance/quality control approaches

25. The ERT noted that Hungary had performed major improvements to the inventory QA/QC procedures. The OMSZ passed the ISO 9001:2000 audit in March 2007 and the relevant ISO certification was renewed in January 2009. The NIR stated that the GHG inventory complies with ISO 9001:2008 and that the QA/QC plan has been developed as an audited ISO document. Hungary provided descriptions of the inventory preparation process, the QA/QC plan and the implementation of QA/QC activities in the NIR. An inventory core team member is responsible for QC of the activity data.

26. However, the ERT noted that information on QA/QC procedures is not available for all categories (e.g. for limestone and dolomite use; other mineral products (glass, bricks and ceramic production); iron and steel production; and solvent and other product use). The ERT recommends that Hungary include in the next NIR and its annexes information on implemented QA/QC procedures for all key categories, inclusive for those categories in which significant methodological and/or data changes have occurred.

27. Two external QA audits were undertaken in 2009 for those sectors where new sectoral experts have taken over the tasks of inventory preparation: one in the LULUCF sector and one in the industrial

processes sector. For the LULUCF sector, the audit comments and the actions taken are documented in the NIR and archived. For the industrial processes sector, the relevant information will be included in the 2010 submission. The ERT welcomes Hungary's inclusion of additional information on QA/QC procedures for the data supplied by external sources in its 2009 annual submission. The information includes explanations on the involvement of external experts who are not directly involved in the inventory compilation/development process.

Transparency

28. Hungary's inventory is generally transparent and the NIR contains information on key categories, methods, data sources, uncertainty estimates, QA/QC procedures, and verification activities. However, there are still gaps in information, including an assessment of inventory completeness, methodological descriptions for some categories (e.g. degreasing and dry cleaning), descriptions of the IPCC tier used (e.g. consumption of halocarbons and SF_6), and sufficient justification for some EFs and parameters used in calculations (e.g. CO_2 EF for solid fuels in public electricity and heat production, CO_2 EF for liquid fuels in chemicals, CH_4 and N_2O EFs for liquid fuels in road transportation, enteric fermentation, and solid waste disposal on land).

29. In the industrial processes sector, several categories are reported as included elsewhere ("IE"). In some cases, for example, CH_4 emissions from glass production, CO_2 emissions from road paving with asphalt, it is explained that the emissions are included in the energy sector, but due to a high level of aggregation in the energy sector, it is not clear where these emissions are included. In other cases, such as asphalt roofing, no information is provided on to which categories the emissions have been allocated in CRF table 9(a).

30. The ERT recommends that Hungary include in its next NIR, detailed methodological descriptions for all categories, state the tier used to estimate emissions, provide more justification supporting plant-specific emissions, and that Hungary include an assessment of inventory completeness.

4. Inventory management

31. Hungary has an 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 internal documentation on QA/QC procedures and external and internal reviews, and documentation on annual key categories and planned inventory improvements. The OMSZ maintains the archive and has designated an archive manager. Historical data are also archived by the organizations contracted to perform the calculations for each sector and at the MEW. Hungary plans to move all relevant information gradually to the centralized archiving system established at the OMSZ. The ERT reiterates the recommendation made during the review of the initial report, and encourages Hungary to continue the process of transferring all the relevant inventory information into the centralized archiving system at the OMSZ. The ERT recommends that the transfer of information for the base year and the most recent year be prioritized. The ERT also reiterates the recommendation made by the previous ERT that Hungary expedite the completion of its archiving system, provide updated information in its next NIR, and that the Party ensure that it archives the supplementary information related to Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

F. Follow-up to previous reviews

32. Hungary has systematically addressed issues raised in previous reviews and followed the recommendations when appropriate or possible. Following recommendations from the review of the 2008 submission, Hungary has:

(a) Improved the transparency of the NIR by providing more thorough descriptions of the data and methods used to calculate GHG emissions, in particular for the industrial processes and LULUCF sectors. The ERT noted the additional explanations and background data on the new method for estimating land-use area;

(b) Included additional information on the implementation of QA/QC activities, including information on QA/QC procedures for data supplied by external sources, such as explanations for the involvement of external experts who are not directly involved in the inventory development process, in particular for the LULUCF sector;

(c) Identified priority areas for inventory improvements on the basis of the key category analysis;

(d) Recalculated the time series from the base year to 2006 in order to take into account reallocations between sectors, more accurate and revised AD, improved EFs and other parameters, and the implementation of higher tier methodologies for enteric fermentation and manure management within the agriculture sector.

33. However, the ERT noted that Hungary has not implemented all the recommendations made during the previous review, such as:

(a) Providing quantified uncertainty estimates for the LULUCF sector and including this sector in the overall inventory uncertainty;

(b) Ensuring time-series consistency by recalculating CO_2 emissions from categories using coke oven gas (e.g. iron and steel), CH_4 and N_2O emissions from road transportation (liquid fuels), and CO_2, CH_4 and N_2O emissions from civil aviation (gasoline);

(c) Including information in the NIR on the categories reported as not estimated ("NE") and how the Party plans to report these categories in future submissions;

(d) Correcting some transparency and methodological issues at the category level, as provided in the sectoral sections of this report.

G. Areas for further improvement

1. Identified by the Party

34. The 2009 NIR identifies several areas for improvement:

(a) Revision of the LULUCF sector with a view to addressing Kyoto Protocol reporting requirements and to facilitate use of a tier 2 methodology;

(b) Development of a common central database to ensure consistency between different emission databases;

(c) Streamlining climate change and air pollution reporting by adopting a new government regulation to facilitate data collection for different emissions for inventory purposes;

(d) Ensuring that the OMSZ inventory division has direct access to emission reports from facilities, as stipulated in Governmental Decree 21/2001;

(e) Implementing methodological improvements, such as investigating the relationship between fugitive emissions from natural gas pipelines and emissions from residential and commercial/institutional natural gas consumption and a methodological development

programme for development and regular review of country-specific EF in the agriculture sector;

(f) Analyzing current consistency problems (e.g. in transport (CH_4 and N_2O), cement production and industrial wastewater categories);

(g) Refining uncertainty estimates.

2. Identified by the expert review team

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

(a) Address the recommendations outstanding from the previous reviews (see para. 33 above);

(b) Improve the transparency of the inventory by including methodological descriptions for all categories, and clearly state the tier used to estimate emissions, the identification of country-specific EFs, explanations for the selection of methodologies, and justification for and clear reference to the sources of AD;

(c) Improve the transparency of the inventory by including further information on the use of EU ETS data and provide justification and documentation supporting that its use is in line with the IPCC good practice guidence in the the next annual submission;

(d) Ensure that the use of methods, parameters, EFs and other information from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) is adequately justified and shown to be suitable for the national circumstances;

(e) Improve the time-series consistency by recalculating categories for which the EFs used currently are not consistent for the whole time series and providing better documentation on EFs, AD, methodologies and assumptions used;

(f) Improve the comparability of the inventory by following the allocation of emissions in the Revised 1996 IPCC Guidelines and report transparently in the NIR how emissions are allocated across the energy, industrial processes and waste sectors;

(g) Complete in a timely manner, any improvements that are still in progress, such as finalizing the project started with the Institute of Geodesy, Cartography and Remote Sensing (FÖMI) to improve the land-use area system, and being able to apply tier 2 methodologies and report the activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;

(h) Explore the possibility of applying higher tier methods for key categories;

(i) Explore the possibility to prepare and report estimates for the missing categories and provide in the NIR further discussion on any categories reported as “NE” and the possibility of including them in future submissions;

(j) Provide quantified uncertainty estimates for all categories, including the LULUCF sector and include the LULUCF sector in the overall inventory uncertainty analysis;

(k) Implement QA/QC procedures for all key categories including categories where data are received directly from plants and for categories where new methodologies have been applied. The QA/QC procedures should be reported in the next annual submission; and

(l) Remove the inconsistencies between the CRF tables and the NIR by improving QC in the final stages of preparation of the NIR.

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

II. Energy

A. Sector overview

37. The energy sector is the main sector in the GHG inventory of Hungary. In 2007, emissions from the energy sector amounted to 56,936.00 Gg CO_2 eq, or 75.0 per cent of total GHG emissions. Since the base year, emissions have decreased by 31.2 per cent. Within the sector, 36.2 per cent of the emissions were from energy industries, followed by 23.6 per cent from other sectors, 22.5 per cent from transport and 13.8 per cent were from manufacturing industries and construction. The remaining 3.8 per cent were from fugitive emissions. Emissions of CO_2 accounted for 94.4 per cent of the sectoral emissions; followed by CH_4 (4.1 per cent), and N_2O (1.5 per cent).

38. All the main IPCC categories and gases are covered in the energy sector. The sectoral background data tables are essentially complete for 2007. The notation key "NE" is used for CH_4 emissions from distribution of oil products. During the review, Hungary provided the ERT with background information about CH_4 from distribution of oil products and expressed its intention to include emissions from this category in future submissions.

39. The inventory in the energy sector is broadly transparent and the Party has made some improvements in transparency since the 2008 submission. However, the ERT noted that there is still a lack of explanation for some inter-annual changes in the implied emission factors (IEFs) in the NIR, which are attributed to the changes in the fuel mix over the years. In order to improve transparency, the ERT recommends that Hungary, in its next annual submission, include all available underlying AD at the subcategory level and further information on the fluctuation in fuel mix that results in large fluctuations in IEF values.

40. Hungary stated that, for 2005 onwards, it has used data from the EU ETS for energy industries and manufacturing industries and construction. However there is no explicit information in the NIR regarding the verification procedures applied to the data or to the methods used to ensure time-series consistency. In addition, for some EFs, Hungary reports changes to the default values in the 2006 IPCC Guidelines. The ERT recommends that Hungary assess the use of EU ETS and 2006 IPCC Guidelines data, and provide proper justification and documentation supporting their use in the next submission. Furthermore, the ERT recommends that Hungary use the methods elaborated in the IPCC good practice guidance to ensure time-series consistency.

41. Recalculations in the energy sector were made in response to the recommendations from the previous expert review. The recalculations involved a reallocation of emissions to the industrial processes sector, the inclusion of new subcategories, and the use of updated AD. The recalculations mainly affected the manufacturing industries and construction category, but also affected the oil and natural gas category. The recalculations decreased emissions estimates from the energy sector by 621.36 Gg CO_2 eq (–1.0 per cent) in 2006. The ERT commends Hungary's efforts to document recalculations.

42. The ERT commends the effort made by Hungary to apply the recommendations of the previous review, such as reporting the values of net calorific values in the NIR, including a transition matrix between the energy balance and IPCC categories, and by removing natural gas used as feedstock from the energy sector and reporting it under the industrial processes sector.

B. Reference and sectoral approaches

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

43. In 2007, Hungary reported a difference of 3.18 per cent in CO_2 emissions and a 1.81 per cent difference in energy consumption between the reference and the sectoral approaches. Due to the reallocation of natural gas used as feedstocks, the differences in fuel consumption have decreased since the 2008 submission. The ERT encourages Hungary to follow the UNFCCC reporting guidelines and include explanations on causes for differences in CO_2 emissions higher than 2 per cent in the documentation box to CRF table 1.A(c).

2. International bunker fuels

44. Hungary's emissions from aviation bunkers are reported separately and are not included in total national emissions in line with the Revised 1996 IPCC Guidelines. Almost all aviation is assumed to be international. All jet kerosene consumption is considered to be used for international aviation, while all aviation gasoline is considered to be used for domestic aviation. The ERT noted that the figures for jet kerosene reported in the CRF tables are systematically lower than the data of the International Energy Agency. The ERT encourages Hungary to explore the reason for this difference and to include an explanation in its next NIR. Marine bunkers are not relevant in Hungary because the volume of international river transport is minimal.

3. Feedstocks and non-energy use of fuels

45. Hungary has removed natural gas used as feedstock and for non-energy purposes from the energy sector. The ERT reiterates the recommendation from the previous review that Hungary reallocate the AD for feedstocks and non-energy use of fuel for all fuels to the industrial processes sector. The change should include the implementation of appropriate QA/QC procedures.

C. Key categories

1. Stationary combustion: liquid, solid fuel – CO_2

46. The ERT noted that the inter-annual changes of the CO_2 IEF for chemicals for liquid fuel show large variations (ranging from -34.4 to 52.6 per cent) over the entire time series. The CO_2 IEF (18.18 t/TJ) reported by Hungary for 2007 is the lowest of reporting Parties (ranging from 18.18–78.30 t/TJ) and below the IPCC default range (63.1–100.8 t/TJ), attributed to the inclusion of feedstocks in the AD. The ERT recommends that Hungary include available underlying AD for the subcategory in its next submission and to exclude feedstocks from the energy sector and report it in the industrial processes sector in line with the Revised 1996 IPCC Guidelines.

47. Hungary reported a decrease in the CO_2 IEF for solid fuels in the iron and steel category between 2005 (105.99 t/TJ) and 2006 (98.58 t/TJ). In response to a question by the ERT, Hungary explained that coke oven gas, which was reported under energy industries, was reallocated for 2006 and 2007 to the iron and steel industry. Hungary informed the ERT that it intends to correct this inconsistency for the years prior to 2006. The ERT recommends that Hungary make this correction to ensure time-series consistency and include sufficient documentation on EFs, AD, methodologies and any assumptions used, in the next annual submission.

2. Road transportation: liquid fuel – N_2O, CH_4[6]

48. The ERT noted that the time series for the N_2O IEF for gasoline and diesel used in road transportation as well as the CH_4 IEF for gasoline used in road transportation are not consistent for the years 1988–2003. Hungary stated that it is waiting for more information to correct the emissions data for previous years. There were no changes in this category since the previous submission, so the ERT reiterates the recommendation of the previous review that Hungary update the entire time series for gasoline and diesel used in road transportation. The ERT encourages Hungary to use the recalculation approaches suggested by the IPCC good practice guidance (e.g. trend extrapolation), until better data are available.

D. Non-key categories

1. Stationary combustion: gaseous fuel – N_2O

49. The N_2O EFs for gaseous fuels in stationary combustion are from different data sources and do not appear to be fully consistent and comparable. For example, the country-specific natural gas N_2O EFs for power stations and direct heating stations are 3.0 kg/TJ and 5.0 kg/TJ, respectively, while the N_2O EF for petroleum refining is taken from the 2006 IPCC Guidelines and is 30 and 50 times lower (i.e. 0.1 kg/TJ). The ERT recommends that Hungary provide documentation in the NIR to support their selection of N_2O EFs for stationary combustion.

2. Civil aviation: all fuels – CO_2, CH_4 and N_2O

50. The previous ERT noted that emissions and AD for civil aviation are only reported for the base year, 1999, 2000, 2001 and 2006. Hungary reported that, in recent years, aviation gasoline has not been separated from other gasoline due to a lack of information in national statistics. Emissions from civil aviation are reported with road transportation in the missing years. The ERT recommends Hungary to report both fuels separately and suggests that aviation data could be used to correlate energy statistics data with actual aviation activity. During the review the ERT noted inconsistencies in the aviation gasoline EF for the entire time series. In response to a question by the ERT, Hungary stated that it is aware of the inconsistencies and will correct the data in the next submission. The ERT recommends that Hungary recalculate the emissions from domestic aviation for the entire time series and document in the next NIR the EFs, methodology and any assumptions made. The ERT also noted that there is no information in the NIR and CRF tables on where aviation fuel used for military activity is allocated. The ERT recommends that Hungary include such information in the next annual submission.

3. Oil and natural gas: liquid fuel – CH_4

51. The ERT commends Hungary's efforts to improve completeness of reporting of this category, including CH_4 and N_2O emissions from flaring. The ERT noted that Hungary reports fugitive CH_4 emissions from the distribution of oil products as "NE". The ERT encourages Hungary to explore the possibility of reporting these emissions in its next submission.

III. Industrial processes and solvent and other product use

A. Sector overview

52. In 2007, emissions from the industrial processes sector amounted to 5,236.43 Gg CO_2 eq, or 6.9 per cent of total GHG emissions and emissions from the solvent and other product use sector amounted to 158.09 Gg CO_2 eq, or 0.2 per cent of total GHG emissions. Since the base year, emissions

[6] CH_4 from road transportation is not a key category. However, the issues identified for N_2O estimates are also relevant for CH_4.

have decreased by 51.7 per cent (50 per cent according to NIR) in the industrial processes sector, and by 58.8 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the closure and modernization of industrial plants. Within the industrial processes sector, 25.4 per cent of the emissions were from cement production, followed by 17.3 per cent from nitric acid production, 16.1 per cent from ammonia production and 11.5 per cent from refrigeration and air conditioning. Bricks and ceramics accounted for 6.8 per cent and the remaining 6.3 per cent were from limestone and dolomite use.

53. The industrial processes inventory is generally complete. However, potential emissions of HFCs from foam blowing are reported as "NE" and potential HFC emissions from aerosols/metered dose inhalers are reported as not occurring ("NO"), while actual emissions from these categories are reported. The HFC emissions from fire extinguishers are reported as "NE" for the years up to 2006 and "NO" for 2007, and HFC-134a emissions from hard foam disposal are reported as "IE" till 2004 and as "NO" for years 2004-2007. The ERT recommends that Hungary further examine the occurrence of the emission sources reported as "NO" and to provide estimates for the categories reported as "NE".

54. Hungary uses plant-specific data from EU ETS to estimate emissions from the production of cement, glass, brick and ceramics for the years 2005–2007. In the case of glass, brick and ceramics production, EFs are calculated based on 2005 data from the EU ETS and the resulting EFs are used for the years 1985–2004. The glass production EF is confidential for the year 2007. The previous ERT recommended that Hungary make further efforts to ensure time-series consistency and to ensure that the data from EU ETS conformed with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The present ERT reiterates this recommendation and further recommends Hungary to provide information whether used EU ETS data have been subjected to any QA and/or verification and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance. Furthermore, the ERT recommends that Hungary report transparently the method used to estimate plant-specific emissions, and the corresponding tier of the methodology.

55. In the 2009 submission, Hungary only recalculated nitric acid production for the years 2005 and 2006. This recalculation was due to the availability of new AD. The ERT concluded that most of the recommendations for the sector from previous reviews were still applicable and recommends that Hungary implement these recommendations in the next submission.

B. Key categories

1. Cement production – CO_2

56. CO_2 emissions from cement production are estimated based on plant-specific data from EU ETS for the years 2005–2007. The plant-specific data are derived from a derivatographic analysis of carbonates. This method corresponds to the IPCC tier 2 method. For the years before 2005, raw material consumption is used as a basis of the estimates. The EF in 2005 is 5.2 per cent lower than in 2004. As identified in the previous review and stated in the NIR, the time-series consistency needs further improvement. The ERT recommends that Hungary examine whether time-series consistency can be further improved by using recalculation approaches from the IPCC good practice guidance and to report the results in its next annual submission.

57. Following the recommendation of the previous ERT, Hungary reported emissions from calcium carbonate and magnesium carbonate separately in the NIR for the years in which the estimates were based on raw flour. The ERT commends Hungary for this improvement.

2. Nitric acid production – N_2O

58. EFs for nitric acid production are derived from measurement data. This method is in line with the IPCC tier 2 method. The IEF has decreased over time from 14.51 kg/t in the base year to 11.55 kg/t in 2005 and decreased further to 6.15 kg/t in 2007. Following the recommendations of the previous ERT, Hungary explained that the decrease since 2004 is due to closure of old factories and application of new nitrogen oxide (NO_X) control technologies. In response to a question by the ERT, Hungary explained that, since 2005 the emission estimates have been based on continuous monitoring, the results of which suggest that emissions in previous years may have been overestimated. The ERT recommends that Hungary include this information in the next annual submission and further explore any possible overestimates of emissions and recalculate the time series, if needed.

59. In the NIR, Hungary reports that no recalculations have occurred for this category since the previous inventory submission. However, the emissions for the years 2005 and 2006 are 10.7 and 12.2 per cent lower than in the previous inventory submission. In response to a question from the ERT, Hungary explained that these changes were from revised AD and not a new calculation methodology. The ERT recommends that Hungary report all recalculations in its next annual submission.

3. Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6

60. The NIR includes information on methodology, AD sources and EFs; however, the methodology and parameters used are not described transparently in the NIR. In response to a question by the ERT, Hungary clarified the principles on which the emissions are estimated. The ERT recommends that Hungary improve the transparency of the NIR by explaining which IPCC tiers are used for the estimation of emissions and by reporting the relevant parameters used for each subcategory.

61. The previous ERT recommended completing further analysis on fluctuations of emissions from HFC consumption. In response to a question from the ERT, Hungary explained that this is included in planned improvements. The ERT encourages Hungary to complete the analysis and report on its results in the next annual submission.

C. Non-key categories

1. Lime production – CO_2

62. Emissions from this category are estimated in accordance with the IPCC good practice guidance. It is reported in the NIR that the data are received directly from the operators. In response to a question from the ERT, the Party explained that there are some discrepancies between data sources and therefore the issue of completeness needs to be analyzed further. The ERT recommends that Hungary finalize the analysis of completeness, report its results and complete the inventory, if needed, before its next annual submission.

2. Iron and steel production – CO_2 and CH_4

63. As indicated in the previous review, process emissions from iron and steel production are included partly in the industrial processes, and partly in the energy sector. CO_2 emissions from steel production are reported in industrial processes sector, but CO_2 and CH_4 emissions from pig iron and sinter production and coke consumption are reported as included elsewhere ("IE"), as are CH_4 emissions from steel production. In CRF table 9, it is explained that these emissions are included in the chemicals category in the energy sector. The ERT recommends that Hungary correctly allocate the emissions from the consumption of the reducing agent to the industrial processes sector in accordance with the IPCC good practice guidance.

IV. Agriculture

A. Sector overview

64. In 2007, emissions from the agriculture sector amounted to 9,477.10 Gg CO_2 eq, or 12.5 per cent of total GHG emissions. Since the base year, emissions have decreased by 51.2 per cent. The key driver for the fall in emissions is a reduction of animal numbers and decline of synthetic fertilizer use in the early 1990s. Within the sector, 60.0 per cent of the emissions were from agricultural soil, followed by 23.4 per cent from manure management, 16.5 per cent from enteric fermentation and 0.1 per cent from rice cultivation. There are no burning of savannas and field burning of agricultural residues in Hungary and the appropriate "NO" notation key was used in the CRF tables.

65. The inventory for the agriculture sector is complete and the NIR included descriptions of the methods, uncertainty estimates and QA/QC procedures. Hungary applied higher tier methodologies to key categories. The ERT encourages Hungary to improve the transparency of the NIR by including additional information on assumptions and rationale for choices of parameters for developing EFs, particularly where tier 2 methodologies are used.

66. The ERT commends Hungary for following the recommendations of the previous review and providing a recalculated time series for the three main categories in the agriculture sector. The recalculations reflect the change to a tier 2 method for dairy and non-dairy cattle for enteric fermentation and manure management (CH_4 and N_2O), including rabbits and guinea fowls in the estimates, and revised AD for synthetic fertilizer application by the Hungarian Central Statistical Office. The recalculation resulted in an increase in CH_4 emissions estimates for the agriculture sector in 2006 by 46.1 per cent and an increase in N_2O emissions estimates from the agriculture by 2.6 per cent. In the base year, CH_4 emissions increased by 41.2 per cent and N_2O emissions increased by 1.2 per cent. The overall impact of the recalculations was an increase in emission estimates from the sector by 12.2 per cent in 2006 and 10.9 per cent in the base year.

B. Key categories

1. Enteric fermentation – CH_4

67. In accordance with the recommendation of the previous review, Hungary has applied an IPCC tier 2 method to calculate CH_4 emissions from enteric fermentation from dairy cattle and non-dairy cattle.

68. For dairy cattle, the average gross energy intake was determined based on data from the Hungarian Nutrition Codex (2004). The time series for the methane conversion rate (Y_m) and gross energy intake (GE) were provided in NIR. However, there is insufficient information in the NIR describing how these time series were developed. In response to a question from the ERT, Hungary provided additional information and a calculation sheet on Y_m and GE. The ERT recommends that Hungary include this information in its next annual submission.

69. Using a tier 2 method for non-dairy cattle, Hungary used average values from the IPCC default ranges to develop EFs. There is no indication whether Eastern or Western Europe parameters on feed digestibility and average weight were applied for non-dairy cattle. In response to a question from the ERT, Hungary clarified that the default values for Western Europe were applied. Hungary stated that it plans to use country-specific data in its next submission. The ERT encourages Hungary's efforts to develop country-specific data.

2. Manure management – CH_4

70. The ERT commends Hungary's effort to improve the estimation of CH_4 emissions from manure management by using an IPCC tier 2 method for almost all livestock categories except rabbits.

71. The ERT noted inconsistencies with volatile solid values between CRF table 6.6 (for dairy) and CRF table 6.8 (for poultry) in the NIR and CRF table 4.B(a). For example, the volatile solid excretion rates for poultry in the NIR and CRF table were 0.014 kg dm/day and 0.10 kg dm/day, respectively, and the volatile solid excretion rates for dairy cattle in the NIR and CRF tables were 0.057–0.059 kg dm/day and 4.5–4.9 kg dm/day. In response to a question from the ERT, Hungary clarified that there are errors in the volatile solid excretion rates for dairy cattle in the NIR and in the volatile solid excretion rates for poultry in the CRF. The ERT recommends that Hungary improve category-specific QA/QC procedures for inventory preparation in order to remove inconsistencies in future submissions.

3. Manure management – N_2O

72. Hungary used an IPCC tier 1 method to estimate the N_2O emissions from manure management. The ERT noted there was insufficient information in the NIR to support the allocation of waste to animal waste management systems. In response to a question from ERT, Hungary explained that the allocation is based on a country-specific study. The ERT recommends that Hungary support the allocation of waste to animal waste management systems by including a summary of the country-specific study in its next submission.

4. Direct emissions from agricultural soil – N_2O

73. In accordance with the IPCC good practice guidance, a tier 1b method was applied to calculate the direct N_2O emissions from agricultural soil. The NIR includes a table that includes the EFs and most parameters used in the calculations. The ERT noted that there is no information supporting the parameters used for calculating emissions from nitrogen fixing crops and crop residues. The ERT recommends that Hungary include additional documentation and a justification of the parameters in its next submission.

5. Indirect emissions from agricultural soil – N_2O

74. Hungary uses IPCC tier 1 and default values to calculate indirect N_2O emissions from agricultural soil. The ERT noted that there is an inconsistency in the values of fraction of nitrogen input to soils that is lost through leaching and run-off ($Frac_{LEACH}$) between the NIR and CRF tables ($Frac_{LEACH}$ values in the NIR and CRF tables for 2006 and 2007 are 0.3 and 0.0, respectively). In response to a question from the ERT, Hungary clarified that it is due to an error in the CRF table. The ERT recommends that Hungary correct this in next submission and improve QA/QC for inventory preparation.

C. Non-key categories

Rice Cultivation – CH_4

75. Tier 1 method and an IPCC default EF were applied to estimate CH_4 emissions from rice cultivation without any explanation. The ERT recommends that Hungary include information to support its choice of EF and related parameters in the next NIR.

V. Land use, land-use change and forestry

A. Sector overview

76. In 2007, the LULUCF sector was a net sink of 4,137.55 Gg CO_2 eq. Net removals have increased by 15.1 per cent from the base year, mainly due to the increase in carbon stocks in forest land. The removals from this sector reduced the total emissions by 5.5 per cent in 2007 and approximately 3.1 per cent in the base year.

77. Within the sector, forest land is reported as a sink of 4,164.60 Gg CO_2 eq. Emissions from cropland amounted to 50.61 Gg CO_2 eq.

78. Carbon stock change in mineral soils for grassland is reported under cropland. Other carbon stock changes for grassland are reported as "IE", "NA", "NE" and "NO". Emissions/removals from wetlands are reported as "IE", "NE" and "NO", and "IE" and "NE" for settlements and other land. The ERT recommends that Hungary improve completeness of reporting by including estimates for emissions/removals from grassland and land-use change categories in the next annual submission.

79. In the 2009 submission, recalculations were conducted for cropland where AD were changed for 2005 and 2006; a new methodology was applied to calculate carbon stock change in mineral soils; and the sign of emission/removals was corrected for land converted to forest land. The overall removals from the sector in 2006 decreased by 30.3 per cent due to the recalculations.

80. While Hungary has made continuous improvements to reporting in this sector, it is still not reporting changes between land-use categories, aside from land converted to forest land. In the NIR Hungary references a new approach to estimate changes in land use. Hungary stated in its 2008 and 2009 NIR that improvements are planned for the identification of deforested areas, as well as inventory system improvements for reporting activities under Article 3, paragraphs 3 and 4 of the Kyoto Protocol. In the 2009 NIR, Hungary states that it is currently in the evaluation phase of a new data collection method that was initiated in 2008, and that this method should allow Hungary to describe the location and volume of deforested areas, including damage caused by fires.

81. In response to a question from the ERT, Hungary has described this new approach. However, the approach was only started in 2008 and Hungary states that the tracking of deforestation is only possible from 2008. The new land use of deforested land is not known. The ERT noted that an inability to estimate deforestation before 2008 will cause a problem with time-series consistency when the new method is implemented. The ERT encourages the Party to explore alternative means to estimate historical changes from forest land to other land uses so that time-series consistency can be ensured. Hungary noted the need to improve reporting of disaggregated land-use changes and has described plans for improved reporting of land-use changes from forest land to other land uses in its next submission.

82. The ERT recommends the timely finalization of the ongoing work in the sector, to allow Hungary to meet the reporting requirements under Article 3, paragraphs 3 and 4, of Kyoto Protocol.

B. Key categories

Forest land remaining forest land – CO_2

83. Hungary allocates afforested areas from land converted to forest land to forest land remaining forest land in a time frame less than the 20 year default value provided by the IPCC good practice guidance for LULUCF. Hungary stated that the length of time between category changes varies between species, and that the range is 2–15 years. In response to questions from the ERT, Hungary described an afforestation subsidy programme that uses these time ranges for verification for successful afforestation.

The ERT concluded that this explanation is not adequate justification of the country-specific values and recommends that Hungary use the IPCC default values in its calculation or that it supply additional justification supporting the use of country-specific values.

84. Hungary provided estimates of changes in carbon stocks of mineral soils for the first time in the 2009 submission. However, Hungary does not estimate disaggregated carbon stock change in forest land, but rather includes emissions/removals estimates of carbon stock change in mineral soils for all categories within the cropland category. The ERT welcomes the improvement in reporting on mineral soils, but recommends that, as a next step, Hungary estimate carbon stock change in mineral soils in forest land remaining forest land as a separate estimate, disaggregated from other mineral soil carbon stock changes.

85. The NIR reports that dead organic matter pools are assumed not to be sources. Hungary uses a tier 1 approach assuming that its carbon stock changes are zero and lists them as "NE" in the CRF tables. The assumptions listed in the NIR support the proposal that these pools are not sources. However, the ERT reiterates the recommendation made by the previous ERT that Hungary continue its efforts to improve information on dead organic matter. The ERT encourages Hungary to use tier 2 method for forest land remaining forest land, as a key category.

86. Hungary is still not reporting information on carbon stock changes due to wildfires, although it was noted in the last review report that Hungary intended to begin this reporting in 2009. In response to a question from the ERT, Hungary has provided preliminary information on a new database that will be used to estimate emissions from wildfires. This information suggests that data will only be available from 2007. Hungary states that these emissions will be included in the next inventory submission. The ERT welcomes this planned improvement and encourages its inclusion in the next submission and recommends that Hungary seek methods to estimate these emissions for the entire time-series.

87. Unmanaged forest land is no longer reported under the category other land. Through clarification of the definition of unmanaged land, all forest land is now reported as managed forest. The ERT welcomes this clarification and improvement of classification.

C. Non-key categories

Cropland remaining cropland – CO_2

88. Following the recommendations from the previous review, Hungary has greatly improved the transparency of reporting in this category by including in the NIR and its annex an expanded section defining the catgories under cropland and an explanation of the method used to determine AD for carbon stock change of living biomass in cropland. In addition, Hungary has increased transparency by providing more detailed information on estimation of changes in carbon stock of mineral soils, including the stratification of cropland and grassland by climate zone, soil type and land-use practice. The ERT welcomes the enhancement of the transparency of reporting and encourages Hungary to continue to improve disaggregation of reporting in this category in the next annual submission.

89. The estimates for carbon stock change of mineral soils were recalculated due to a revision in the AD by the Hungarian Central Statistical Office. Hungary also recalculated carbon stock change of living biomass of cropland remaining cropland. More detailed data on plantation and vineyard removals were used for this recalculation, which resulted in a decrease in the area of cropland compared to the previous submission. As a result, the removals for this category were significantly reduced and the category became a source of emissions and from a key category turned to a non-key category.

VI. Waste

A. Sector overview

90. In 2007, emissions from the waste sector amounted to 4,135.89 Gg CO_2 eq, or 5.5 per cent of total GHG emissions. From the base year to 2006, emissions increased by 34.6 per cent and decreased by 0.7 per cent from 2006 to 2007. The key driver for the growth in emissions is the increase of CH_4 emissions from solid waste disposal on land. Within the sector, 71.5 per cent of the emissions were from solid waste disposal on land, followed by 18.4 per cent from wastewater handling and 10.1 per cent from waste incineration.

91. The ERT encourages Hungary to improve the transparency of the NIR by including justification and references for the parameters used in the calculations. The ERT also encourages Hungary to enhance completeness of the sector by reporting CH_4 emissions from waste incineration and reporting separately CH_4 emissions from wastewater handling (sludge) that are currently reported as "IE" or "NE". The ERT further recommends that the Party further reduce the uncertainty of the estimates within the sector and that it verify the consistency of the reported time series.

92. Hungary has made only minor recalculations in the 2009 submission. The recalculations have resulted in an overall increase in emissions for the sector by 1.2 per cent for 2006. The changes include CH_4 emissions from solid waste disposal on land and wastewater handling for the period 1998–2006 and NO_2 emissions from wastewater handling for 2006 to reflect revised waste composition data and revised data on wastewater collected.

93. The ERT commends Hungary for its continuous improvement of the QA/QC in the sector, as well as for implementing some of the recommendations of the previous review (e.g. the revised notation key for CH_4 emissions from waste incineration and the provision of information on recalculations in CRF table 8(b)).

B. Key categories

1. Solid waste disposal on land – CH_4

94. Hungary applies the IPCC first order decay (FOD) tier 2 method from the 2006 IPCC Guidelines in combination with default and country-specific parameters to estimate CH_4 emissions from solid waste disposal on land.

95. The ERT found that for municipal solid waste (MSW) at unmanaged waste disposal sites (shallow), AD were reported for 1985–2005 in CRF table 6.A, but the category was reported as "NE" for 2006–2007. Furthermore, CH_4 emissions from this category were reported as "NO" and explained by the use of a country-specific waste disposal system. The ERT reiterates the recommendation of the previous review that Hungary justify the current assumption for 100 per cent aerobic conditions at unmanaged waste disposal sites (shallow) or provide estimates for these emissions in accordance with IPCC good practice guidance in the next annual submission.

96. The ERT noted that Hungary is still using waste composition data for Budapest only and reiterates the recommendation of the previous review that Hungary develop waste composition data for the whole country and that the Party provide improved waste composition data in the next submission. In order to improve transparency of inventory, the ERT also recommends that Hungary provide the half-life and/or the reaction constant k used in the FOD calculation in the NIR of its next annual submission.

97. The ERT noted some inconsistencies between the CRF tables and the NIR (different values for fraction of degradable organic carbon (DOC) in MSW and the DOC value for food and beverage) and recommends that Hungary remove these inconsistencies in its next annual submission.

2. Wastewater handling – CH_4

98. Hungary reported recalculations of CH_4 emissions from category wastewater handling due to revised AD. The revisions were only applied for the period after 1998 and resulted in 0.8 per cent decrease of emissions in 2006. In addition, the industrial wastewater emissions have an inconsistent time series, as they were only recalculated for the period 2002–2007. The ERT recommends that Hungary ensure time-series consistency and report recalculated emissions in its next annual submission.

99. The ERT reiterates the recommendation from the previous review that Hungary provide more detailed information on the expert judgement used for the biochemical oxygen demand value. The ERT also recommends that Hungary provide a detailed explanation of the wastewater and sludge treatment systems for domestic and commercial wastewater categories and explore the possibility of estimating CH_4 emissions from sludge, which are currently reported as "NE".

100. The ERT noted that Hungary used chemical oxygen demand (COD) values per wastewater streams for industrial wastewater for previous years. However, CRF table 6.B does not contain COD or wastewater output values, and the notation key "NE" is reported for 2007. The ERT recommends that Hungary include the additional information in CRF table 6.B for all years in next submission.

101. The ERT also recommends that Hungary improve transparency of reporting by providing justification for the use of the notation key "IE" for CH_4 emissions from industrial wastewater (sludge) and "NE" for domestic and commercial wastewater (sludge) subcategory in CRF table 9(a).

C. Non-key categories

1. Wastewater handling – N_2O

102. Hungary has recalculated N_2O emissions from wastewater handling for 2006 in the 2009 submission due to the availability of revised data on protein consumption for human sewage. The decrease in emissions estimates for the category is 1.3 per cent. However, the data source for protein consumption is not documented in the NIR. The ERT recommends that Hungary improve transparency by referencing the information source and including a justification of the parameters used in the calculations.

103. The ERT noted inconsistencies in protein consumption per capita data; such data are missing for the periods 1991–1994, 1996–1999 in the NIR and there is a sharp increase in the value from 2002 to 2003 (from 93.5 to 103.0 g/capita/day). In response to a question by the ERT, Hungary explained that protein consumption decreased by around 15 per cent in the early 1990s, which the Party attributed to economic changes in the country. The increase at the beginning of this decade could be partly due to economic growth, but can also be attributed to the change in nutrient consumption data from the National Center for Epidemiology in 2004. The ERT recommends that Hungary analyze the time-series consistency in this category and provide further explanations on the background data used in its next submission.

2. Waste incineration – CO_2 and CH_4

104. There were no recalculations for this category. Therefore, the ERT reiterates the recommendations from the previous review for allocation of the emissions from incineration with energy recovery to the energy sector with clear explanation of the allocation of emissions in the NIR.

The transparency of reporting for the category could be further enhanced by the provision of more details on the composition of incinerated wastes.

105. Following the recommendation of the previous review, the notation key for CH_4 emissions from waste incineration was changed from "NO" to "NE". The ERT recommends that Hungary provide an explanation for the use of "NE" for the waste incineration categories in CRF table 9(a).

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

106. Hungary has reported information on its accounting of Kyoto Protocol units in the appropriate SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the SIAR on the SEF and the SEF 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.

107. Information on the accounting of Kyoto 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 CDM 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

108. The ERT took note of the SIAR and its findings 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.

109. The ERT recommends that Hungary enhance the user interface of its registry by providing the public information on the Hungarian National registry web page, as referred to in paragraphs 45–48 of the annex to decision 13/CMP.1. The ERT recommends that Hungary report on the changes made to the information that is publicly available in its next annual submission.

[7] The SEF comparison report is prepared by the international transaction log (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.

3. Calculation of the commitment period reserve

110. Hungary has reported its commitment period reserve (CPR) in its 2009 annual submission. The Party reported its CPR to be 379,717,586 t CO_2 eq based on the national emissions in its most recently reviewed inventory (75,943.52 Gg CO_2 eq). The ERT agrees with this figure.

B. Changes to the national system

111. Hungary reported a change in its national system since the previous annual submission and it is the involvement of a new institute (CAO) in the preparation of the forestry part of the LULUCF inventory. It is planned that the participation of the CAO will be formalized by a governmental decree which is expected to enter into force in 2009. The ERT concluded, taking into account the confirmed change in the national system, that Hungary's national system continues to be in accordance with the requirements of national systems as outlined in decision 19/CMP.1.

C. Changes to the national registry

112. Hungary reported no significant changes in its national registry since the previous annual submission. The only change reported in the national registry since the last submission and since Hungary's initial report is the plan to replace the GRETA v3.0 registry software that is currently used with the latest version of the Community Registry software. The migration is planned for 2009. Hungary plans to submit a complete updated "readiness document" to address all future changes required by the software change. The Party reported on the changes to the contact information of the registry administrator. The ERT concluded, taking into account the confirmed change in the national registry, that Hungary'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.

VIII. Conclusions and recommendations

113. Hungary made its annual submission of CRF tables on 15 April 2009 and the NIR on 16 April 2009. The Party indicated that the 2009 annual submission is its voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (CRF tables and NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on Kyoto Protocol units, information on changes to the national system and to the national registry). This is in line with decision 15/CMP.1.

114. The ERT concludes that the inventory submission of Hungary has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete in terms of geographical coverage, years and sectors, as well as generally complete in terms of categories and gases. The Party has submitted a complete set of CRF tables for the base year (an average of 1985–1987 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs and SF_6) and for the years 1985–2007 and an NIR. The ERT concluded that the completeness of the inventory submission could be improved in terms of the coverage of the categories that are currently reported as "NE" and encouraged Hungary to explore approaches to enhance further, to the extent possible, the completness and accuracy of its inventory.

115. 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.

116. The 2009 inventory submission shows significant improvement since the 2008 submission. Particular emphasis was placed on determining country-specific EFs, moving to higher tier methodologies, improving the transparency of the NIR through providing a more thorough description in of background

data and methods used to calculate GHG emissions, ensuring time-series consistency through undertaking recalculations from the base year to 2006, and improvements of the QA/QC system.

117. Hungary has submitted, in part, on a voluntary basis, supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, in accordance with section I of the annex to decision 15/CMP.1. Hungary did not report on a voluntary basis information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol and information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

118. Hungary 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 relevant reporting format tables as required by decision 14/CMP.1.

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

120. 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 CMP decisions. However, the ERT reiterates the findings in the SIAR and recommends that Hungary enhance the user interface of its registry by providing the public information (including in English) as referred to in paragraphs 45–48 of the annex to decision 13/CMP.1. and, in its next annual submission, report on the changes made to the publicly-available information.

121. In the course of the review, the ERT formulated a number of recommendations[8] relating to the completeness, transparency, QA/QC, time-series consistency and uncertainty. The key recommendations are that Hungary:

(a) Address the outstanding recommendations of previous reviews;

(b) Improve the transparency of the inventory by including methodological descriptions for all categories and clearly stating the tier used to estimate emissions, identifying country-specific EFs, providing explanations regarding the selection of methodologies, and providing justification of and clear reference to the sources of AD;

(c) Improve the transparency of the inventory by including further information on the use of EU ETS data and provide justification for and documentation supporting the use of these data in line with the IPCC good practice guidence in the the next annual submission;

(d) Ensure that the use of methods, parameters, EFs and other information from the 2006 IPCC Guidelines is adequately justified and shown to be suitable for the national circumstances;

(e) Improve the time-series consistency by using consistent EFs for the whole time series, and providing better documentation on EFs, AD, methodologies and assumption used;

(f) Improve the comparability of the inventory by following the allocation of emissions in the Revised 1996 IPCC Guidelines and report transparently in the NIR how emissions are allocated across the energy, industrial process and waste sectors;

(g) Complete in a timely manner, any improvements that are still in progress, for example, finalizing the project started with FÖMI to improve the land-use area system,

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

being able to apply tier 2 methodologies and reporting activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;

(h) Explore the possibility of applying higher tier methods for key categories;

(i) Provide quantified uncertainty estimates for all categories (including LULUCF sector) and include the LULUCF sector in the overall inventory uncertainty analysis;

(j) Implement QA/QC procedures for all key categories including categories where data are received directly from plants, and for categories where new methodologies have been applied. These QA/QC procedures should be reported in the next annual submission; and

(k) Remove the inconsistencies between the CRF tables and the NIR by improving QC in the final stages of preparation of the NIR.

IX. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

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

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.htm>.

"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>.

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FCCC/IRR/2007/HUN. Report of the review of the initial report of Hungary. Available at <http://unfccc.int/resource/docs/2007/irr/hun.pdf>.

FCCC/ARR/2008/HUN. Report of the individual review of the greenhouse gas inventory of Hungary submitted in 2007 and 2008. Available at <http://unfccc.int/resource/docs/2009/arr/hun.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 Mr. Gábor Kis-Kovács (Hungarian Meteorological Service, GHG Division), 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
CRF	common reporting format
EC	European Community
EIT	economy in transition
EF	emission factor
ERT	expert review team
EU	European Union
F-gas	fluorinated gas
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
GJ	gigajoule (1 GJ = 10^9 joule)
GWP	global warming potential
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	Implied emission factor
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1 thousand grams)
LULUCF	land use, land-use change and forestry
Mt	million tones
NA	not applicable
NE	not estimated
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change

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