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Report of the individual review of the annual submission of Hungary submitted in 2011*

* In the symbol for this document, 2011 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2011 annual submission of Hungary, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 12 to 17 September 2011 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Karin Kindbom (Sweden) and Ms. Riitta Pipatti (Finland); energy – Mr. Pierre Boileau (Canada); industrial processes – Mr. Jos Olivier (Netherlands) and Ms. Sonia Petrie (New Zealand); agriculture – Mr. Donald Kamdonyo (Malawi) and Mr. Marcelo Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Mr. Mattias Lundblad (Sweden) and Mr. Richard Volz (Switzerland); and waste – Mr. Seungdo Kim (Republic of Korea). Ms. Pipatti and Mr. Rocha were the lead reviewers. The review was coordinated by Ms. Kyoko Miwa and Mr. Javier Hanna (UNFCCC secretariat).

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

B. Emission profiles and trends

3. In 2009, the main greenhouse gas (GHG) in Hungary was carbon dioxide (CO_2), accounting for 75.7 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (12.6 per cent) and nitrous oxide (N_2O) (10.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.6 per cent of the overall GHG emissions in the country. The energy sector accounted for 75.2 per cent of total GHG emissions, followed by the agriculture sector (12.4 per cent), the industrial processes sector (6.3 per cent), the waste sector (5.6 per cent) and the solvent and other product use sector (0.5 per cent). Total GHG emissions amounted to 66,783.94 Gg CO_2 eq and decreased by 41.4 per cent between the base year[2] and 2009. The reported decreasing trend between the base year and 2009 is reasonable given Hungary's transformation from a centralized economy to a market economy in the 1990s.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include 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 is the average of the period 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

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, by gas, of the Kyoto Protocol, by gas, base year to 2009[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A sources		CO_2	84 746.75	72 237.56	61 364.08	58 417.32	60 774.68	57 659.99	56 229.75	50 566.86	–40.3
		CH_4	12 197.23	11 684.22	9 426.48	9 567.01	8 986.94	8 753.37	8 554.40	8 385.22	–31.3
		N_2O	16 820.96	12 710.06	7 325.25	8 266.08	8 759.81	8 038.53	7 201.84	6 759.18	–59.8
		HFCs	0.74	NA, NO	0.74	221.97	600.35	807.56	936.06	851.29	114 939.2
		PFCs	166.82	270.83	166.82	211.26	209.39	2.38	2.41	1.72	–98.9
		SF_6	70.15	39.87	70.15	140.11	201.02	171.65	231.89	219.66	213.1
KP-LULUCF	Article 3.3[b]	CO_2							–1 118.7	–1 073.44	
		CH_4							0.27	0.36	
		N_2O							0.28	0.30	
	Article 3.4[c]	CO_2	NA						–2 806.76	–1 914.00	NA
		CH_4	NA						20.64	20.13	NA
		N_2O	NA						2.10	2.04	NA

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is the average of the period 1985–1987 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is the average of the period 1985–1987.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 2
Greenhouse gas emissions by sector and activity, base year to 2009[a]

			Gg CO_2 eq								*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2007*	*2008*	*2009*	*Base year–2009 (%)*
Annex A		Energy	82 286.53	70 009.88	60 407.20	57 362.37	59 281.16	56 062.49	55 048.72	50 203.53	–39.0
		Industrial processes	10 910.01	8 860.42	5 467.92	6 301.99	7 073.36	6 180.87	5 058.86	4 195.66	–61.5
		Solvent and other product use	284.54	226.27	205.16	213.71	366.33	366.15	406.30	340.09	19.5
		Agriculture	17 549.53	14 555.20	8 724.51	9 124.01	8 853.39	8 953.09	8 829.68	8 309.69	–52.7
		Waste	2 972.03	3 290.77	3 548.72	3 821.66	3 957.95	3 870.88	3 812.80	3 734.96	25.7
		LULUCF	NA	–1 949.68	–5 781.38	–363.77	–4 221.10	–2 688.33	–3 933.39	–3 018.60	NA
		Total (with LULUCF)	**NA**	**94 992.86**	**72 572.13**	**76 459.97**	**75 311.09**	**72 745.15**	**69 222.96**	**63 765.35**	**NA**
		Total (without LULUCF)	**114 002.64**	**96 942.54**	**78 353.52**	**76 823.74**	**79 532.18**	**75 433.48**	**73 156.35**	**66 783.94**	**–41.4**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation & reforestation							–1 159.71	–1 154.26	
		Deforestation							41.49	81.47	
		Total (3.3)							**–1 118.22**	**–1 072.78**	
	Article 3.4[d]	Forest management							–2 784.02	–1 891.82	
		Cropland management	NA						NA	NA	NA
		Grazing land management	NA						NA	NA	NA
		Revegetation	NA						NA	NA	NA
		Total (3.4)	**NA**						**–2 784.02**	**–1 891.82**	**NA**

Abbreviations: LULUCF = land use, land-use change and forestry, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is the average of the period 1985–1987 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The "base year" for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is the average of the period 1985–1987.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in the national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

5. Table 3 provides information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

Table 3
Information to be included in the compilation and accounting database in t CO_2 eq

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	333 299 158	333 919 725		333 919 725	
Annex A emissions for current inventory year					
CO_2	50 442 751	50 566 864		50 566 864	
CH_4	8 385 221			8 385 221	
N_2O	6 759 183			6 759 183	
HFCs	851 290			851 290	
PFCs	1 725			1 725	
SF_6	219 663			219 663	
Total Annex A sources	66 659 832	66 783 945		66 783 945	
Activities under Article 3, paragraph 3, for current inventory year					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	–1 107 721			–1 107 721	–1 107 721
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	–46 538			–46 538	–46 538
3.3 Deforestation for current year of commitment period as reported	81 473			81 473	81 473
Activities under Article 3, paragraph 4, for current inventory year[d]					
3.4 Forest management for current year of commitment period	–1 891 824			–1 891 824	–1 891 824
3.4 Cropland management for current year of commitment period					
3.4 Cropland management for base year					
3.4 Grazing land management for current year of commitment period					
3.4 Grazing land management for base year					
3.4 Revegetation for current year of commitment period					
3.4 Revegetation for base year					

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.
[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The Party's 2011 annual inventory submission was submitted on 21 April 2011 (containing the common reporting format (CRF) tables), and the national inventory report (NIR) was submitted on 24 May 2011. The annual submission contains a complete set of CRF tables for the period 1985–2009 and for the base year, which is the average of the period 1985–1987. On 24 May 2011, Hungary also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2011. The annual submission was submitted in accordance with decision 15/CMP.1. Due to the recurring late annual submissions to the UNFCCC, the expert review team (ERT) reiterates the recommendation in the previous review report that Hungary revise the functions of its national system that would enable the timely submission of its annual submission, and that the Party submit its next annual submission by 15 April 2012 as required by decision 15/CMP.1.

7. On 16 September 2011, Hungary officially submitted revised emission estimates in response to questions raised by the ERT during the review. Revised estimates were submitted for CO_2 emissions from oil and natural gas in the energy sector. As a result of the revised estimates, emissions from the energy sector increased by 124.11 Gg CO_2 eq for 2009 (corresponding to an increase of 0.2 per cent in total GHG emissions); by 128.20 Gg CO_2 eq for 2008 (an increase of 0.2 per cent in total GHG emissions); and by 164.61 Gg CO_2 for the base year (an increase of 0.1 per cent in total GHG emissions). The KP-LULUCF estimates for deforestation were also revised for 2008, leading to an increase in emissions from this activity by 6.79 Gg CO_2 eq (or by 19.6 per cent) for 2008 (see para. 117 below).

8. Where necessary, the ERT also used the previous year's submission 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 tables and their comparison report) and on the national registry[3].

9. During the review, Hungary provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

10. The inventory is generally complete in terms of years, geographical coverage, sectors and generally categories. Improvements have been made since the previous

[3] The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 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 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

submission, such as the inclusion of HFC emissions from fire extinguishers, as well as the inclusion of emission estimates for several categories in the LULUCF sector that were previously reported as not estimated ("NE"). Nevertheless, some categories are still reported as "NE" (see para. 94 below). The ERT recommends that Hungary improve the completeness of its reporting by reducing the number of categories reported as "NE" under the LULUCF sector, in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) in its next annual submission.

11. In annex 5 to the NIR, Hungary has reported that no detailed information is available on the assessment of the completeness of the inventory and on potentially excluded categories of GHG emissions. In order to obtain an overview of the completeness of the Hungarian inventory, and in order to facilitate future reviews, the ERT recommends that the Party include, in annex 5 to the NIR, a discussion on and an assessment of the categories reported as "NE" in its annual submission. This could include an assessment of the potential impact on emission levels of the categories reported as "NE", the reasons why they are not estimated, and plans for acquiring and reporting the missing data. For the subcategory refrigeration and air-conditioning equipment under consumption of halocarbons and SF_6 in the industrial processes sector, the ERT recommends that Hungary use the notation key "IE" (included elsewhere) instead of the notation key "NO" (not occurring) when the subcategories have been calculated in a more aggregated way than the subcategories presented in the CRF tables or when the subcategories have been reported elsewhere together with another (sub)category.

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

Overview

12. The ERT concluded that the national system and institutional arrangements continue to perform their required functions.

13. In the NIR, the Party describes the changes to the ministerial structure and the amended legislation resulting in changes to the national system since the previous annual submission. These changes are discussed in paragraph 141 below.

Inventory planning

14. The NIR describes the national system for the preparation of the inventory. The Ministry of Environment and Water has overall responsibility for the national inventory, and also supervises the national system and officially approves the inventory prior to its submission. The Greenhouse Gas Inventory Division (GHG Division) of the Hungarian Meteorological Service (OMSZ) is responsible for the preparation, compilation and development of the GHG inventory, with the involvement of external institutions and experts on a contractual basis. The GHG Division prepares the inventories for the energy, industrial processes and waste sectors. The inventories for the agriculture and LULUCF sectors are prepared and compiled with contributions from contracted external experts/institutions. The GHG Division also supervises the maintenance of the national inventory system and is responsible for contracting consultants, and for the coordination of quality assurance/quality control (QA/QC) activities and the archiving system.

15. Since late 2009, following the entry into force of a Governmental Decree, the Forestry Directorate of the Central Agricultural Office and the Forest Research Institute are responsible for the forestry part of the LULUCF sector inventory, including data collection and the choice of methods and emission factors (EFs), and for the supplementary reporting

of KP-LULUCF activities. The Karcag Research Institute of the University of Debrecen (Department of Soil Utilization and Rural Development) and the Research Institute for Animal Breeding and Nutrition are responsible for the agricultural sector of the inventory, including data collection, the choice of methods and EFs as well as background research and the development of country-specific parameters.

16. In response to a question raised by the ERT during the review, Hungary provided an overview of the annual inventory cycle, including information on the responsibilities of the institutions involved in the preparation of the inventory, and a timeline for the application of QA/QC procedures during the inventory preparation process. The ERT encourages the Party to provide a transparent overview of the inventory preparation process, including the QA/QC procedures performed, in the NIR of its next annual submission, in line with the information provided to the ERT during the review.

Inventory preparation

Key categories

17. Hungary has reported key category tier 1 and tier 2 analyses, both level and trend assessment, as part of its 2011 annual submission. The key category analysis performed by the Party (tier 1) and that performed by the secretariat[4] produced different results owing to the different level of disaggregation of the categories used by the Party. Hungary has included the LULUCF sector in its tier 1 key category analysis, which was performed in accordance with 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 LULUCF. However, Hungary has not included the LULUCF sector in its tier 2 key category analysis due to the unavailability of uncertainty estimates for the LULUCF sector.

18. In response to a recommendation in the previous review report, Hungary has identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the 2011 submission.

19. In CRF table 7, Hungary has reported 29 key categories (level and trend) for 2009. In NIR table 1.2, the Party has also reported a tier 1 key category analysis, where the key categories are identified at a more disaggregated level than in the analysis presented in the CRF table 7. In response to a question raised by the ERT during the review regarding the different levels of aggregation and the use of the results of the key category analyses, Hungary explained that the more detailed key category analysis was introduced in order to be more consistent with the key category analysis required by the European Union. The Party also explained that it uses this more detailed key category analysis to prioritize its inventory improvements. The ERT agrees that this is a reasonable approach. The ERT recommends that Hungary reports key categories in CRF table 7 using the same disaggregated level that the Party reports in its NIR.

[4] 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.

Uncertainties

20. Hungary has reported a tier 1 uncertainty analysis in accordance with the IPCC good practice guidance. The Party has not included the LULUCF sector in its uncertainty analysis due to a lack of uncertainty estimates for the activity data (AD) in this sector. The uncertainties are provided both on a summary level and at the individual category level. According to the information provided in the NIR, the uncertainty estimates for individual categories are mainly taken from the IPCC good practice guidance, but country-specific information from industry and expert estimates are also used, where available, for the key categories. The ERT encourages Hungary to investigate the possibility of developing country-specific uncertainty estimates for the key categories in cases where information from the IPCC good practice guidance is currently used.

21. Both in the 2010 and in the 2011 NIR, Hungary has reported the results of the uncertainties for selected categories in the LULUCF sector. In response to a question raised by the ERT during the review, the Party explained that work is in progress regarding the uncertainty estimates for the LULUCF sector, and that information will be presented in the NIR as results become available. Hungary also reported that this work will continue, and that it will report on the progress made in the next annual submission, even though the Party expects that comprehensive final results will not be available by the time of its annual submission in 2012. The ERT strongly recommends that Hungary include uncertainty estimates for the LULUCF sector in the overall uncertainty analysis in its next annual submission, at least the preliminary estimates if comprehensive final results are not available at the time of the preparation of the annual submission.

22. The ERT noted that the combined total uncertainty estimate (excluding the LULUCF sector) for 2009 was higher (17.6 per cent) than that reported for 2007 and 2008 in the 2009 and 2010 submissions (8.0 per cent and 8.2 per cent, respectively). The ERT recommends that Hungary explain the reasons for these variations in its next annual submission.

Recalculations and time-series consistency

23. Not all recalculations have been performed and reported in accordance with the IPCC good practice guidance (e.g. the industrial processes sector, where in some cases the rationale for the recalculations and a description of the specific changes are not clearly provided). In addition, the time series of the original and recalculated emission estimates and the differences in each subcategory (e.g. for ammonia production and nitric acid production under chemical industry; the subcategory other (metal production); and the subcategories of consumption of halocarbons and SF_6) are not reported in accordance with the IPCC good practice guidance. The ERT noted that the recalculations reported by the Party of the time series 1990–2008 and the base year (the average of the period 1985–1987) have been undertaken to take into account changes and/or improvements in AD (e.g. in the energy and industrial processes sectors where errors in AD were corrected, and in the agriculture sector) and EFs (e.g. in the energy sector, where extensive changes were made to the country-specific EFs, which the previous ERT considered to be too low compared to the IPCC default CH_4 and N_2O EFs, and in the agriculture sector). Recalculations were also undertaken in the LULUCF sector due to the reallocation of emissions and removals in carbon pools to other land-use categories and due to newly available data for the estimation of the carbon stock changes in pools (see para. 90 below). The magnitude of the impact of the recalculations is a decrease in estimated total GHG emissions (excluding LULUCF) of 1.0 per cent for the base year, and a decrease of 0.5 per cent for 2008. The impact of the recalculations on the LULUCF sector is a decrease in net removals of 3.4 per cent for the base year and an increase in net removals of 8.4 per cent for 2008. The rationale for the recalculations is not always provided in the NIR and/or in CRF table 8(b). The ERT

recommends that Hungary always include a detailed description of and rationale for all recalculations, in line with the IPCC good practice guidance, both in the NIR and in the CRF tables, in its next annual submission.

Verification and quality assurance/quality control approaches

24. Hungary has provided information in the NIR regarding its QA/QC procedures, which are in line with the IPCC good practice guidance. OMSZ has an International Organization for Standardization (ISO) Quality Management System which also covers the GHG Division and the GHG inventory preparation process. Internal ISO audits are conducted every year, and the ISO System, including the activities of the GHG Division, is subject to regular external audits.

25. Hungary has a QA/QC plan, which is an audited ISO document. The plan includes the specification of roles and responsibilities, the requirements for documentation, and the QA/QC activities. In addition to the QA/QC plan, under the umbrella of the ISO Quality Management System at OMSZ, there are other ISO documents which describe, for example, various registers related to data handling and management, including records of data sources, sector-specific QC procedures and a register of recalculations for the inventory. The registers used for documenting the QA/QC activities are presented in annex 6 to the NIR. In response to a question raised by the ERT during the review as to whether all sectors are subject to the QC procedures described in the NIR, Hungary informed the ERT that the QA/QC plan applies to all sectors and also provided examples of completed QC registers.

26. The ERT commends Hungary for improving its sector-specific QA/QC procedures, particularly for the agriculture and waste sectors, since the 2010 submission. The NIR states that there is a QA procedure in place for the LULUCF sector, which includes the institutions involved in the preparation of the inventory for the LULUCF sector.

27. In the previous review report, the ERT recommended that Hungary include, in its QA/QC plan, information on the handling of confidential information. The ERT asked the Party during the review if this recommendation had been implemented, and also if Hungary could provide a copy of the updated QA/QC plan. In its response to the ERT, the Party explained that there is a general record management regulation in force at OMSZ, which contains specific rules on the handling of confidential information, and that these rules also apply to the GHG inventory. Hungary further stated that, unfortunately, the QA/QC plan is in Hungarian only. The Party explained that it will consider preparing an English version of the QA/QC plan during the annual revision process of the QA/QC plan in October 2011, and will include this version (or a translation of the most important parts of the QA/QC plan) as an annex to its next NIR. The ERT welcomes this initiative and is confident that it will contribute to the increased transparency of the QA/QC procedures and the verification activities applied to the Hungarian GHG inventory. The ERT reiterates the recommendation from the previous review report that the Party include information on the procedures for the handling of confidential information as a part of its QA/QC plan.

Transparency

28. Hungary's NIR follows the annotated outline of the NIR, and information has been provided in accordance with 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).

29. In response to the recommendation made in the previous review report, additional information on the agriculture sector regarding sectoral trends and uncertainties has been included in the NIR, as well as information regarding specific categories. Additional

information regarding QA/QC activities has also been included; copies of forms for documenting data sources, data used, recalculations and identified errors, as well as the inventory development plan and QC procedures have been included in annex 6 to the NIR. The ERT welcomes the improvements made in relation to the transparency of the NIR in response to recommendations from the previous review report, and commends Hungary for its efforts. However, the ERT identified room for further improvement, especially with regard to the provision of information in the NIR on the methodological tiers used per subcategory (e.g. for the subcategories under consumption of halocarbons and SF_6, for which CRF table summary 3 only provides information on a mixture of methods and EFs used), as well as justification and references for the country-specific parameters and EFs used (e.g. for the industrial processes sector and other sectoral sections of the NIR). Recommended improvements relating to the enhancement of transparency are further described in the respective sectoral chapters of this report.

Inventory management

30. Hungary has a centralized archiving system, which includes the archiving of documents (explained in annex 6 to the NIR) describing the data sources, data used, calculation methods and recalculations. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on corrective actions and planned inventory improvements.

31. The centralized archiving system is maintained by OMSZ. Within the GHG Division of OMSZ, a nominated archive manager is responsible for the maintenance of the archiving system. According to the NIR, a procedural manual for the management and maintenance of the archiving system is under preparation. Documentation from external institutions involved in the inventory preparation process is, as a minimum, archived in hard copy. The ERT reiterates the encouragement from the previous review report that Hungary finalize and formalize the archiving manual and report on the progress made in its next annual submission.

3. Follow-up to previous reviews

32. The ERT commends Hungary for the improvements implemented in its 2011 submission in response to the previous review report. The Party has made efforts to implement many of the recommendations from the previous review report, such as: the inclusion of several categories in the LULUCF sector that were previously reported as "NE" (e.g. soil organic carbon in forest land converted to cropland and all pools in land converted to settlements); the inclusion of information in the NIR explaining and justifying the recalculations; the removal of almost all inconsistencies between the CRF tables and the NIR; and the improvement of transparency in the NIR. However, the ERT noted that there are some issues that have still not been addressed, including: the provision of estimates for the categories that are still reported as "NE" in the LULUCF sector (see para. 97 below); the completion of the uncertainty analysis for the LULUCF sector; the finalization and formalization of the archiving manual; and the provision of updated information in the NIR.

33. In the 2011 NIR, the Party did not provide explicit information regarding its actions in response to the recommendations of the 2010 review report. In annex 8 to the NIR, Hungary stated that it had not received the review report of the 2010 review at the time of compiling and submitting the NIR. In response to questions raised by the ERT during the review, the Party provided a list of actions taken in response to recommendations from the list of potential problems raised by the ERT, as well as the presentations made by the ERT during the review. Hungary also stated its intention to include information on its responses to the review process in its next annual submission. The ERT welcomes this intention and recommends that Hungary implement, in its next annual submission, the completion of

annex 8 to the NIR and include information on the actions taken in response to the review of the 2011 submission.

4. Areas for further improvement

Identified by the Party

34. The 2011 NIR identifies several areas for improvement:

(a) In the energy sector:

(i) The recalculation, planned for 2011–2012 within the framework of a contract with the Energy Centre (a not-for-profit company responsible for compiling Hungary's national energy balance), of the real fuel consumption of each category under manufacturing industries and construction according to the energy statistics database;

(ii) The separation of the amount of mined brown and hard coal to underground and surface types;

(iii) The inclusion of fugitive emissions from the distribution of oil products that are currently reported as "NE", as soon as appropriate EFs are available;

(b) In the industrial processes sector:

The further refinement of the consumption data for fluorinated gases (F-gases);

(c) In the agriculture sector:

(i) The ongoing multistage, methodological development programme on the "Development and regular review of country-specific emission factors for the agricultural greenhouse gas (methane, nitrous oxide) inventory", conducted jointly with the Research Institute for Animal Breeding and Nutrition to revise or develop country-specific EFs;

(ii) The revision of data on the distribution of manure management systems;

(d) In the LULUCF sector:

(i) The further verification of the AD and EFs used, the refinement of the definitions of the dead organic matter (DOM) pools for forest land and the development of accumulation models for dead wood in afforestation and reforestation areas;

(ii) The development of country-specific values for the reference carbon stocks of mineral soils for cropland and grassland;

(e) In the waste sector:

The provision of more detailed information regarding wastewater, which is expected to become available in the future, and the improvement of time-series consistency.

Identified by the expert review team

35. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 156 below.

36. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report and summarized in paragraph 157 below.

B. Energy

1. Sector overview

37. The energy sector is the main sector in the GHG inventory of Hungary. In 2009, emissions from the energy sector amounted to 50,203.53 Gg CO_2 eq, or 75.2 per cent of total GHG emissions. Since the base year (the average of the period 1985–1987), emissions have decreased by 39.0 per cent. The key driver for the fall in emissions is Hungary's transformation from a centralized economy to a market economy, resulting in a reduction in emissions from manufacturing industries and construction (from a contribution of 23.4 per cent of sectoral emissions in the base year to only 10.9 per cent in 2009), while the biggest increase in emissions has occurred in the transportation category (from a contribution of 9.5 per cent of sectoral emissions in the base year to 25.3 per cent in 2009). Within the sector, 32.6 per cent of the emissions were from energy industries, followed by 26.9 per cent from other sectors, 25.3 per cent from transport and 10.9 per cent from manufacturing industries and construction. The remaining 4.4 per cent were from fugitive emissions from fuels.

38. Hungary has performed recalculations for the energy sector following updates in AD and the revision of EFs, and in order to rectify identified errors. The impact of these recalculations on the energy sector is a decrease in emissions of 0.38 per cent for 2008 and a decrease of 0.41 per cent for the base year. The main recalculations took place in the categories fugitive emissions from fuels and manufacturing industries and construction.

39. The ERT commends Hungary for improving the transparency of the energy sector chapter of its NIR and for the improvements made in response to previous review reports. The ERT notes that the Party has begun to incorporate facility-level emissions data into its GHG inventory since 2006. To further improve transparency and ensure time-series consistency, the ERT encourages Hungary to include the following elements in future NIRs: information on the methods for incorporating the emissions data into the inventory; details of how the energy data are reconciled with the national energy balance; and information on how the Party ensures the correspondence of the estimation methods used by the facilities with those of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC good practice guidance. In particular, the ERT recommends that Hungary pay more attention to the carbon balances in categories where there is non-energy use of fuels, where recovered gases are used for energy purposes and where there are backflows or transfers of secondary energy products to other facilities. This increased transparency will assist future ERTs to determine whether appropriate QA/QC procedures are in place for these facility-level data and whether the uncertainty in the overall inventory is being reduced.

40. During the review, the ERT noted that emissions of raw CO_2 venting from natural gas processing had been omitted from the inventory. In response to a question raised by the ERT during the review, Hungary explained that an estimate could be calculated using default figures provided in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, and subsequently submitted revised figures. The ERT reviewed and accepted the calculations provided by Hungary for raw CO_2 venting from natural gas production, which were added by the country to the inventory totals when the revised CRF tables were submitted.

41. The ERT commends Hungary for having implemented the recommendation of the previous review report regarding the provision of precise information on the estimation methods used in the energy sector chapter of the NIR. However, the transparency of the NIR could be further improved through the greater disaggregation of the references to the different methodological approaches within the chapter, so that it is clear which method is applied to which category or major emission source. The ERT recommends that Hungary

further disaggregate its references to the estimation methods used in the energy sector in its next annual submission.

42. The ERT noted that Hungary has reported emissions from non-ferrous metals as included under the iron and steel category. In response to questions raised by the ERT during the review, the Party explained that its national energy balance does not provide disaggregated AD for these two categories, but that the energy data reported to the International Energy Agency (IEA) may be more disaggregated. The ERT recommends that Hungary confirm that the national data reported to IEA are disaggregated into these two categories and that these data can be used for its emission estimates and, where necessary, that the Party use interpolation or extrapolation techniques to complete the time series, as recommended in the IPCC good practice guidance.

2. Reference and sectoral approaches

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

43. The difference in the CO_2 estimates calculated using the reference approach and the sectoral approach falls within the expected range (i.e. less than 2 per cent) for most years of the time series. Larger differences (from 2.6 to 3.5 per cent) are reported for the years 1995–2000. However, for 2009, the difference was only 1.33 per cent, well within the accepted range. Differences between the two approaches are explained by the different approaches used for the calculation of emissions from non-energy use and the treatment of fugitive emissions in the calculations.

International bunker fuels

44. Hungary has reported all emissions associated with jet kerosene under aviation as international aviation bunkers. In response to questions raised by the ERT during the review, the Party explained that this assumption is used because Hungary is a small country and that it is expected that jets would not engage in domestic flights (see also para. 52 below). Hungary has reported all marine transport emissions as domestic navigation and all marine bunker emissions as "NA", since Hungary is a land-locked country. However, the ERT notes there could be international shipping through the River Donube. Therefore, the ERT encourages the Party to further explore this possibility.

Feedstocks and non-energy use of fuels

45. Hungary uses facility-level emission estimates from the European Union emissions trading scheme (EU ETS) for some sectors where there is non-energy use of fuels (e.g. petroleum refining, petrochemicals, iron and steel). The Party does not explain how the reporting facilities ensure that the non-energy use of fuels is accounted for within these EU ETS GHG inventories. The ERT encourages Hungary to increase the transparency of its reporting by explaining how non-energy fuel use data from the reporting facilities are accounted for within these facility-level emission inventories and how these data are consistent with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

3. Key categories

Stationary combustion: liquid fuels – CO_2

46. The inter-annual change in the value of the CO_2 implied emission factors (IEFs) for liquid fuels used in public electricity and heat production between 2008 (80.66 kg/TJ) and 2009 (76.81 kg/TJ) has been identified as significant. Hungary explained, in response to questions raised by the ERT during the review, that the use of EU ETS facility-specific data leads to this variation in the value of the CO_2 IEFs. The ERT considers that this should not

normally occur unless there is a wide variability in the different fuels used in this category. Therefore, the ERT recommends that Hungary provide more detailed information on the fuel mix for this category to explain the inter-annual difference in the value of the IEFs by enhancing the transparency of the NIR of its next annual submission.

47. The inter-annual fluctuations in the value of the CO_2 IEFs for liquid fuels used in petroleum refining are significant for several years of the time series (ranging between –4.5 and 2.3 per cent). The inter-annual change between 2008 (77.07 t/TJ) and 2009 (76.94 t/TJ) is 2.2 per cent. In response to questions raised by the ERT during the review, the Party explained that these inter-annual changes are probably due to fluctuations in the fuel type and quality, leading to variations in the net calorific values, but that it intends to investigate this issue further. The ERT recommends that Hungary further investigate this issue, as stated by the Party during the review, and focus the investigation on the methods to determine the EFs for refinery gas.

48. The inter-annual changes in the value of the CO_2 IEFs for liquid fuels used in iron and steel are significant for several years of the time series (ranging between –8.1 and 30.8 per cent). In response to questions raised by the ERT during the review, Hungary explained that the EU ETS facility-level GHG inventory data used in the Party's inventory show this variability. The ERT considers that these variations could be caused by changes in the fuel mix at the facilities but that there is not sufficient information in the NIR or in the answers to the questions raised during the review to determine if this is the case. The ERT recommends that Hungary increase the transparency of the explanations for the significant variations in the fuel mix of liquid fuels used in iron and steel leading to the fluctuations in the value of the CO_2 IEFs.

49. The inter-annual changes in the value of the CO_2 IEFs for liquid fuels used in food processing, beverages and tobacco are significant for several years of the time series (ranging between –4.7 and 1.8 per cent). In response to questions raised by the ERT during the review, Hungary explained that these fluctuations are due to changes in the mix of liquid fuels used in this category. The ERT considers that these variations are sufficiently significant to require further explanation in the NIR. The ERT recommends that Hungary explain this issue more transparently in the NIR of its next annual submission.

Stationary combustion: solid fuels – CO_2

50. The inter-annual changes in the value of the CO_2 IEFs for solid fuels used in iron and steel are significant for several years of the time series (e.g. 2005 (93.94 t/TJ) and 2006 (87.25 t/TJ) – the 2006 value is 7.1 per cent lower than the 2005 value, and between 2008 (85.72 t/TJ) and 2009 (90.17 t/TJ) – the 2009 value is 5.2 per cent higher than the 2008 value). The following variations are also significant: the 2009 value (90.17 t/TJ) is 3.3 per cent lower than the 1990 value, and 4.67 per cent lower than the base year value (the average of the period 1985–1987 (94.58 t/TJ)). In response to questions raised by the ERT during the review, Hungary explained that the EU ETS facility-level GHG inventory data used in the Party's inventory show this variability. The ERT considers that these variations could be caused by changes in the fuel mix at the facilities but that there is not enough information in the Party's NIR to determine if this is the case. The ERT recommends that Hungary increase the transparency of the explanations for the significant variations in the fuel mix of solid fuels used in iron and steel leading to the fluctuations in the value of the CO_2 IEFs.

51. The inter-annual changes in the value of the CO_2 IEFs for solid fuels used in food processing, beverages and tobacco are significant for several years of the time series (e.g. in 2007/2008 the change in the value of the IEF was 4.0 per cent). In 2008 and 2009, the value of the CO_2 IEF (106.0033 t/TJ) is one of the highest among the values reported by Parties for those years (ranging from 79.20 t/TJ to 106.92 t/TJ). The inter-annual change in the

value of the CO_2 IEF between 1990 (99.76 t/TJ) and 2009 (106.00 TJ) is 6.3 per cent. All the inter-annual changes except for 1991/1992, 1996/1997 and 1998/1999 are significant (ranging from –7.5 per cent to +8.2 per cent), and the trend is unstable. In response to questions raised by the ERT during the review, Hungary explained that these variations are due to changes in the mix of solid fuels used in this category (e.g. in more recent years coke has been used in the industry, while in previous years lower grades of coal and brown coal briquettes were used). The ERT considers that these variations are sufficiently significant to require further explanation in Hungary's NIR. The ERT recommends that the Party explain this issue more transparently in the NIR of its next annual submission.

4. Non-key categories

Civil aviation: liquid fuels – CO_2

52. Hungary has reported domestic aviation gasoline emissions for some years of the time series (e.g. the base year, 1990, 1991, 2000, 2001 and 2006), but has included these emissions under road transportation for other years. The ERT recommends that the Party make efforts to increase the transparency of its reporting by separating aviation gasoline from road transportation for all years of the time series. Hungary has also reported domestic jet kerosene use as "NO" for all years of the time series. In response to questions raised by the ERT during the review, Hungary explained that all flights by jets (using jet kerosene) can be considered international flights, since Hungary is a small country (see also para. 44 above). The ERT recommends that the Party increase the transparency of the estimates for this category by examining the arrival and departure information for flights within Hungary to confirm that all flights that use jet kerosene are international flights, in line with the IPCC good practice guidance, and provide this information in the NIR of its next annual submission.

Other transportation: gaseous fuels – CO_2

53. The ERT noted that pipeline transport emissions are reported as "NO", even though there is natural gas production in the country and a natural gas pipeline network. In response to questions raised by the ERT during the review, Hungary informed the ERT that fuel-use data are not reported separately for this activity in the national energy statistics. The ERT strongly recommends that the Party investigate equipment-based methods consistent with the IPCC good practice guidance to estimate fuel consumption combined with country-specific or IPCC default EFs for the estimation of emissions from pipeline transport, in order to properly allocate these emissions under the category other transportation.

Oil and natural gas: liquid fuels – CH_4 and CO_2

54. CH_4 and CO_2 emissions from the distribution of oil products are reported as "NE" and "NO", respectively. In response to questions raised by the ERT during the review, Hungary explained that these emissions will be estimated when appropriate EFs become available. The ERT encourages Hungary to explore the possibility of estimating emissions from this category in its next annual submission.

C. Industrial processes and solvent and other product use

1. Sector overview

55. In 2009, emissions from the industrial processes sector amounted to 4,195.66 Gg CO_2 eq, or 6.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 340.09 Gg CO_2 eq, or 0.5 per cent of total GHG emissions.

Since the base year, emissions have decreased by 61.5 per cent in the industrial processes sector, and increased by 19.5 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector was the economic crisis in the early 1990s and the subsequent transformation to a market economy, which was connected with the closure of some factories, an increase in energy efficiency and the use of modern technology (e.g. a joint implementation project on N_2O abatement technology in nitric acid production). Within the industrial processes sector, 23.2 per cent of the emissions were from cement production, followed by 20.4 per cent from feedstocks reported under other (industrial processes), 18.5 per cent from refrigeration and air-conditioning equipment, 10.3 per cent from ammonia production and 6.5 per cent from limestone and dolomite use. Lime production accounted for 4.9 per cent and iron and steel production accounted for 4.3 per cent. The remaining 11.9 per cent was (N_2O) from nitric acid production and (CH_4) from other (chemical industry), and foam blowing, fire extinguishers, and aerosols under the consumption of HFCs and SF_6.

56. Hungary has made recalculations for the industrial processes sector for the categories including ammonia production, nitric acid production, soda ash production, carbon black and consumption of halocarbons and SF_6. Recalculations to rectify identified errors were made for: CO_2 emissions from ammonia production for the years 1985–1990 only; CH_4 emissions from carbon black from 1994 onwards; HFC emissions from 1994 onwards; and PFC emissions from 1997 onwards. The recalculations were performed mainly due to the correction of errors in the AD for consumption of HFCs and due to the addition of fire extinguishers as a new source of HFC emissions. The impact of these recalculations on the industrial processes sector is an increase in emissions of 5.1 per cent for 2008. Total sectoral base year emissions (the average of the period 1985–1987) decreased by 1.0 per cent. The recalculations were performed partly in response to the recommendations of previous review reports.

57. The recalculations are briefly described in the NIR and the types of changes (e.g. in AD, EFs or methods) are summarized in CRF table 8(b). However, in some cases, the rationale for the recalculations and the description of the specific changes are not clearly provided. In addition, a time series of the original and recalculated emission estimates and the differences in each subcategory (e.g. for ammonia production, nitric acid production, iron and steel production and consumption of halocarbons and SF_6), as recommended by the IPCC good practice guidance, are not provided in the NIR. In response to a request made by the ERT during the review, Hungary provided this information. The ERT recommends that the Party provide detailed information on the recalculations, in particular the rationale for and description of the specific changes per subcategory, in the relevant sections of the NIR of its next annual submission, where applicable.

58. For consumption of halocarbons and SF_6, the NIR and CRF table summary 3 do not provide transparent and complete information per subcategory on the methodological tiers and data sources used, as well as the AD and EFs, and any relevant assumptions made. The ERT reiterates the recommendation of the previous review report that the Party further improve the transparency of its reporting by providing this information in the NIR for all subcategories under consumption of halocarbons and SF_6, with an emphasis on the largest subcategories, such as refrigeration.

59. In the NIR (section 3.2), Hungary lists key examples of plant closures, most of which were related to the economic transition during the 1990s, which is very useful to understand the significant changes in AD or IEFs. The ERT encourages the Party to include other significant plant closures or new start-ups in this list (e.g. cement plants).

60. Hungary has improved the use of the notation keys since the previous annual submission, and the reporting of emissions for this sector is complete. About half of the recommendations from the previous review report have been implemented, for which

Hungary is commended. For many, but not all, of the subcategories, uncertainty estimates have been provided, but often only for the resulting emissions, not for the AD and EFs. The ERT reiterates its recommendation that the Party provide quantitative uncertainty estimates for the AD and EFs for all categories. The ERT also reiterates its encouragement that Hungary provide more detailed descriptions of its QA/QC procedures in future annual submissions, in particular for the key categories.

61. For historical reasons, Hungary does not report CO_2 emissions from the use of coke as a reducing agent in blast furnaces for pig iron production under iron and steel production or ferroalloys production in the industrial processes sector but reports them under fuel combustion in the energy sector. The ERT observed that, according to the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, these emissions should be reported under metal production in the industrial processes sector. The ERT agrees that, in cases where secondary fuels such as blast furnace gas are produced, the associated combustion emissions of CO_2 are logically reported under the energy sector with all remaining emissions to be reported under the industrial processes sector. The ERT recommends that Hungary allocate these CO_2 emissions to the industrial processes sector in line with the IPCC good practice guidance, taking into account the reporting of CO_2 emissions from combustion of secondary fuels under the energy sector, and provide clear documentation in the NIR on the subcategories to which the emissions are allocated, the amount of CO_2 reported and how the consistency of the carbon balance is maintained. During the review, Hungary expressed its intention to implement this recommendation in the NIR of its next annual submission.

2. Key categories

Cement production – CO_2

62. To assess time-series consistency, during the review Hungary provided the ERT with additional plant-specific information on cement kiln dust factors and on the amount and composition of the limestone used. However, this information is not sufficient to explain why the values of the CO_2 IEFs in 2003 and 2004 (0.539 and 0.537 t CO_2/t cement, respectively) are about 2 per cent higher than in subsequent years (e.g. 0.51 t CO_2/t cement in 2005 and 0.52 t CO_2/t cement in 2009) and why the latter values are about 5 per cent lower than the 2004 value. Therefore, the ERT recommends that Hungary further investigate the time-series consistency of the EFs used, in particular for 2002 and 2005, and, if necessary, recalculate the entire time series as recommended by the IPCC good practice guidance.

Ammonia production – CO_2

63. The NIR states that some ammonia is produced from hydrogen which is produced in another chemical plant from natural gas, and that the resulting CO_2 emissions are reported under the energy sector. In response to an allocation issue raised by the ERT, the Party informed the ERT that no hydrogen production occurs in Hungary. The ERT recommends that Hungary clarify, in the NIR of its next annual submission, that the hydrogen used in ammonia production is produced abroad and, therefore, no hydrogen production emissions are reported.

Nitric acid production – CO_2

64. The ERT observed that the value of the N_2O IEFs for 2008 and 2009 was 0.000042 and 0.00011 t N_2O/t nitric acid, which is equivalent to about 0.3 per cent and 0.8 per cent, respectively, of the unabated EF of 0.0137 t/t for 2004. Thus, the value of the IEF is very low when compared to the reduction efficiency resulting from the abatement technology, as

reported in the IPCC good practice guidance and the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) and compared to other reporting Parties (the 2009 IEF value is lower by a factor of 10 compared to the lowest value of other reporting Parties). During the review, Hungary described how this low IEF was technically achieved and explained that the abated emissions are monitored continuously after the installation of the catalyst, also in periods with interruptions. The ERT concluded that the reported emissions are correct and that there is no underestimation. Although nitric acid production is a very small category since 2008, the ERT recommends that Hungary report a summary of the information provided to the ERT during the review in the NIR of its next annual submission.

Consumption of halocarbons and SF_6 – HFCs

65. In the subcategory refrigeration and air-conditioning equipment, the ERT observed that Hungary has reported zero HFC emissions from the manufacture of domestic refrigerators, in contrast to the default product manufacturing factor (PMF) values of 0.2 to 1 per cent of the initial charge referred to as the EF for initial emissions in the IPCC good practice guidance and the values of between 0.6 and 3 per cent of the initial charge reported by other reporting Parties. The Party has also reported product life factor (PLF) values for HFC emissions of 100 per cent. During the review, Hungary confirmed that, during the manufacture of refrigerators, the filling of the refrigerators is performed in a closed system and, therefore, it is assumed that no manufacturing emissions occur, except for some potential small handling emissions. The ERT recommends that Hungary check whether any other losses occur at the manufacturer and, if so, use a country-specific PMF value or a value from the IPCC good practice guidance and/or a value from a country with similar circumstances.

66. With regard to the unrealistic PLF values used for HFC emissions from domestic refrigeration of 100 per cent, the Party informed the ERT that no stock information on HFC emissions is available. The ERT recommends that Hungary estimates the stock for the large subcategory commercial refrigeration by calculating the PLF values as the number of appliances in use times the average amount contained per appliance and reports those values in the NIR, in order to facilitate comparison with other reporting Parties and for domestic verification. In addition, the ERT observed that no HFC emissions data were reported in the CRF tables for other refrigeration subcategories, which is not consistent with the information provided in the NIR. During the review, Hungary confirmed that it has estimated emissions from commercial, industrial and transport refrigeration, and mobile air-conditioning, as also suggested by the information provided in the NIR, but has not reported them in the CRF tables under these subcategories. The ERT recommends that Hungary use the notation key "IE" for the refrigeration subcategories in CRF table 2(II).F, where applicable, and explain where these emissions have been included. In addition, the ERT recommends that the Party use the notation key "IE" instead of "NO" for these subcategories, when the subcategories have been calculated in a more aggregated way than the subcategories defined in the CRF tables or when the subcategories have been reported elsewhere.

67. The ERT observed that CRF table summary 3 only reports the use of a tier 1 method for the category consumption of halocarbons and SF_6, but that Hungary actually uses a tier 2a method for the subcategory refrigeration and air-conditioning equipment. The ERT recommends that Hungary include, in the NIR, precise information on the methodological tiers used for its estimates per subcategory, as well as in the CRF table summary 3.

Other – CO_2

68. Hungary has reported in the CRF tables 2(I) and 2(I).A–G, CO_2 emissions from ethylene production under other (chemical industry) as "NO", while stating in section 4.9

of the NIR (on the category "other") that, for example, the natural gas used as feedstock in ammonia and nitric acid production, and ethylene and carbon black manufacturing is not reported in order to avoid the double counting of emissions as they are reported in the energy sector. The ERT recommends that Hungary correct the notation key to "IE" in CRF table 2(I).A-G, where applicable, for the relevant categories and improve the information provided on this subject in the NIR of its next annual submission.

3. Non-key categories

Other (mineral products) – CO_2

69. The ERT observed that the values of the CO_2 IEFs for 2008 and 2009 of 0.14 and 0.13 t CO_2/t glass production, respectively, were 14.6 per cent and 18.3 per cent lower than the fixed country-specific values of 1.64 t/t used for 2005 and previous years. In response to the recommendation from a previous review report, Hungary has made a comparison of the EU ETS data for the CO_2 emissions for 2006 and subsequent years, which were based on the amount of carbonate used, and the CO_2 emissions for the same years calculated using the old country-specific EF and glass production figures. In the NIR, Hungary concluded that the CO_2 emissions from the EU ETS data were higher in 2006 and 2007 by 10.6 per cent and 6.1 per cent, respectively, but lower in 2008 and 2009, by 14.4 per cent and 18.2 per cent, respectively. The lower value was due to the new data logging methodology of the Hungarian Central Statistical Office (i.e. the emission estimates were calculated using sales figures). From the additional information provided by the Party during the review, the ERT concludes that the AD for glass production in kt for 2008 and 2009 are not available but have been derived using glass sales data as a proxy instead of actual glass production data, which introduces a considerable uncertainty into the AD and thus into the IEF, which may explain the difference in the CO_2 emissions from this category for 2008 and 2009 compared with previous years, as reported in table 4.5 in the NIR. The ERT also concludes that the large uncertainty in the AD expressed as glass production does not affect the accuracy of the reported emissions for 2008 and 2009 since these were determined using the amount of carbonate used for glass production as AD, and that the time series 2005–2009 can therefore be considered as consistent. However, the ERT recommends that Hungary more clearly report in the NIR that the AD in the CRF table 2(I).A–G for 2008 onwards are proxy data only and, thus, the IEFs are not comparable with those of previous years.

Consumption of halocarbons and SF_6 – SF_6

70. During the review, Hungary informed the ERT that it had not implemented the recommendation in the previous review report regarding the inclusion of specific information on potential SF_6 emissions from electrical equipment estimated with data from an import/export balance and on actual SF_6 emissions estimated with data from the energy distribution company on SF_6 use for filling in new equipment or refilling old equipment, as the 2010 draft review report was received one month after the submission deadline of 15 April 2011. Considering these circumstances, the ERT reiterates the recommendation that Hungary include this specific information in the NIR of its next annual submission.

Solvent and other product use – N_2O

71. During the review, Hungary informed the ERT that data on N_2O use is obtained from the manufacturers; however, no data on imported products are available. The ERT recommends that the Party check and collect appropriate data and report the results in the NIR of its next annual submission, including N_2O emissions from imported products, if applicable.

D. Agriculture

1. Sector overview

72. In 2009, emissions from the agriculture sector amounted to 8,309.69 Gg CO_2 eq, or 12.4 per cent of total GHG emissions. Since the base year, emissions have decreased by 52.7 per cent. The key driver for the fall in emissions is the economic and political transition to a market economy that took place in the country in the early 1990s, leading to a reduction, in particular, in the livestock population and the amount of fertilizer applied to soils. Within the sector, 58.0 per cent of the emissions were from agricultural soils, followed by 22.5 per cent from manure management, 19.4 per cent from enteric fermentation and 0.1 per cent from rice cultivation.

73. All relevant sector categories have been estimated, with the exception of emissions from prescribed burning of savannas and field burning of agriculture residues. These activities are reported as not occurring in the NIR; however, in the CRF table 4.E, Hungary has used the notation key "NA" instead of "NO". The ERT recommends that the Party use the correct notation key "NO" consistently in its next annual submission.

74. Hungary has performed recalculations for the agriculture sector between the 2010 and 2011 submissions following changes in AD (e.g. the change in the nitrogen excretion (Nex) rate for dairy cattle), and EFs (e.g. the CH_4 EFs for poultry due to the modification of volatile solids (VS) based on the 2006 IPCC Guidelines and in order to rectify identified errors (e.g. a calculation error in the Nex rate for dairy cattle). All recalculations have been explained for each subcategory level as recommended in the previous review report. The impact of these recalculations on the agriculture sector is an increase in emissions of 0.5 per cent for 2008 and an increase of 0.3 per cent for the base year. The main recalculations took place in the categories manure management (CH_4 and N_2O emissions) and agricultural soils (direct and indirect N_2O emissions).

75. In the 2011 submission, QC procedures have been undertaken for the agriculture sector, including: a check for transcription errors; a check of the reasons for data gaps; cross-checks across the subcategories; checks of country-specific EFs with the values reported by other Parties; a comparison of the applied country-specific methodologies with the default methods provided by the IPCC; and a comparison of the calculation sheets with the CRF tables for transcription errors. All findings were summarized in a special QC report ("Agricultural CH_4 and N_2O emissions in Hungary QC report") that was provided to the ERT during the review. The ERT welcomes the efforts of Hungary and recommends that the Party include the findings and some of the plans outlined in the QC report in the NIR of its next annual submission, as well more information about the QA procedures.

76. In response to recommendations in the previous review report, Hungary has made some improvements to increase the transparency of its NIR, including a more detailed description of AD trends for specific categories (see paras. 74 above and 85 below). The Party has also described several planned improvements (e.g. for the categories manure management and direct soil emissions) in the NIR of its 2011 submission. The ERT welcomes Hungary's plans, in particular the multistage, methodological development programme, conducted jointly with the Research Institute for Animal Breeding and Nutrition, entitled "Development and regular review of country-specific emission factors for the agricultural greenhouse gas (methane, nitrous oxide) inventory", which aims to revise the calculation method used to derive the country-specific EFs for dairy cattle and non-dairy cattle (both for enteric fermentation and manure management); and the country-specific Nex rates; and to develop country-specific parameters for the residue to crop product mass ratios and nitrogen (N) fractions for sunflower and rape.

77. Information about the uncertainties for each category in the sector has been provided and the values (based on expert judgement and/or the IPCC good practice guidance) are within the expected range.

2. Key categories

Enteric fermentation – CH_4

78. As indicated in the previous review report, there are some differences between the methods used for the development of country-specific EFs and the ones recommended by the IPCC. As a result, the gross energy (GE) intake of dairy cattle continues to be the highest among all reporting Parties (346.98 MJ/head/day, where the second highest is 343.21 MJ/head/day for Denmark). In response to the recommendations in the previous review report, Hungary has provided more detailed information related to the GE intake; however, country-specific conversion factors (net energy (NE)/GE) representing the Hungarian circumstances are not available and a Swiss factor continues to be used. During the review, the Party indicated that the development of a country-specific conversion factor is ongoing, and, although there are some differences between Hungarian and Swiss cattle husbandry, the nutrition of the high-yield cows tends to be similar; therefore, the ERT considers that the Swiss conversion factor is applicable to the Hungarian circumstances. Hungary also indicated that it plans to revise the calculation method used to derive the country-specific EFs for dairy cattle and non-dairy cattle. The ERT welcomes the efforts of Hungary and encourages the Party to report on these issues in its next annual submission.

79. During the review, Hungary also explained further the expert judgement used for the estimation of the dairy cattle average body mass and the use of the Italian EF for rabbits (0.08 kg CH_4/head/year), which is also used for CH_4 emissions from manure management. The explanation provided by the Party helps to increase the transparency of the NIR. The ERT, therefore, recommends that Hungary include such explanations in the NIR of its next annual submission.

Manure management – CH_4 and N_2O

80. Hungary indicated in the NIR that it plans to revise the country-specific CH_4 and N_2O EFs for dairy cattle, non-dairy cattle and poultry for manure management. The ERT welcomes this plan and recommends that, when applying the plan, the Party give special attention to the VS values and the amount of N excreted by the livestock for animals with a major share in the emissions (i.e. dairy cattle, non-dairy cattle and swine).

81. For poultry, the recalculation of the entire time series was calculated based on the overall VS weighted mean of the default values provided by the 2006 IPCC Guidelines. This method was used because a QC procedure revealed that the VS values for poultry used in the 2010 submission were approximately one seventh of the IPCC default values. Further research has been initiated to establish a country-specific VS value. The ERT agrees with the recalculations made and encourages Hungary to update the VS values as soon as possible.

82. The description of the animal waste management systems (AWMS) in the NIR, in particular “pit storage < 1 month” and “pit storage > 1 month”, continues to be not transparent. During the review, the Party provided the ERT with additional information on this issue that helped to understand the country’s AWMS. The ERT recommends that Hungary present this information in its next annual submission. In the previous review report, the ERT also recommended that the Party provide more information on AWMS in the documentation box of CRF table 4.B(a). However, during the review, the ERT was informed that Hungary had not received the 2010 review report at the time of the

preparation of the 2011 submission. The ERT reiterates its recommendation in the previous review report that the Party improve the transparency of its description of the AWMS.

83. In the NIR and during the review, Hungary informed the ERT that it plans to revise the AWMS distribution based on the General Agricultural Survey 2010. During the review, the Party also informed the ERT that, since the document had not yet been published by the Hungarian Central Statistical Office, the new results will be included in the next GHG inventory depending on the date of publication of the new results (probably at the beginning of 2012). The ERT welcomes Hungary's plan and encourages the Party to provide this information in future annual submissions as soon as it become available.

Direct and indirect emissions from agricultural soils – N_2O

84. Hungary has applied the tier 1b method to calculate direct and indirect N_2O emissions from agricultural soils in accordance with the IPCC good practice guidance.

85. In response to recommendations from the previous review report, Hungary has reported a time series of AD on synthetic fertilizer use with a trend description in the NIR of its 2011 submission.

86. The NIR states that planned improvements to this category include the elaboration of country-specific Nex rates for all livestock categories and the development of country-specific parameters for residue to crop product mass ratios and N fractions for sunflower and rape, since the IPCC good practice guidance does not provide default parameters for the estimation of emissions from the crop residues of these plants. The ERT welcomes this plan and encourages the Party to provide this information in future annual submissions as soon as it becomes available.

E. Land use, land-use change and forestry

1. Sector overview

87. In 2009, net removals from the LULUCF sector amounted to 3,018.60 Gg CO_2 eq. Since the base year, total net removals have increased by 39.6 per cent. The increase in removals was mainly due to the difference in net removals in forest land between the base year and 2009 caused by large inter-annual variations in the carbon stock changes in living biomass on forest land remaining forest land rather than a trend over the reported period. Trends towards increased emissions were observed in the grassland and settlements categories, which were explained by the Party as an effect of reduced grazing, which in turn was the effect of land-use changes to grassland and settlements over the reported period.

88. Within the sector, net removals of 3,192.60 Gg CO_2 eq and 229.75 Gg CO_2 eq were from forest land and cropland, respectively, and net emissions of 247.63 Gg CO_2 eq and 156.12 Gg CO_2 eq were from grassland and settlements, respectively. Emissions from land converted to wetlands categories have not been estimated due to a lack of reliable area data and a developed methodology, and other land is considered to be unmanaged, hence no emissions or removals were reported for these categories (the notation keys "NE" and "NO" were used).

89. For the LULUCF sector, forest land remaining forest land (CO_2), cropland remaining cropland (CO_2), grassland remaining grassland (CO_2), land converted to cropland (CO_2), and land converted to grassland (CO_2) were identified as key categories.

90. Hungary has made several recalculations in the LULUCF sector between the 2010 and 2011 submissions. The Party has described the rationale for the recalculations in the NIR. The recalculations were mainly performed due to the reallocation of emissions and removals from carbon pools to other land-use categories and the use of newly available data

for the estimation of carbon stock changes in pools. The ERT acknowledges these improvements, which include the reallocation of set-aside and abandoned areas of land to cropland remaining cropland and grassland remaining grassland, the calculation of emissions from cropland and grassland converted to settlements, and the calculation of the carbon stock changes in DOM from forest land converted to other land uses.

91. The impact of the recalculations on the LULUCF sector is a decrease in net removals of 3.4 per cent for the base year and an increase in net removals of 8.4 per cent for 2008. This has resulted in an increase in the overall trend; an increase in net removals of 62.1 per cent between the base year and 2008 was reported in the previous submission compared to an increase in net removals of 82.0 per cent reported in the 2011 submission. The main recalculations for the base year took place in the following categories:

(a) Cropland, resulting in an increase in net emissions of 8.3 per cent;

(b) Grassland, leading to a decrease in net emissions of 48.2 per cent;

(c) Settlements, resulting in an increase in net emissions of 553.9 per cent.

The main recalculations for 2008 took place in the following categories:

(a) Cropland, resulting in a decrease in net emissions of 178.9 per cent, from net emissions of 285.16 Gg CO_2 eq to net removal of 225.03 Gg CO_2 eq;

(b) Grassland, leading to an increase in net emissions of 16.3 per cent;

(c) Settlements, resulting in an increase in net emissions of 1,034.9 per cent.

92. Since the impacts of the recalculations performed for many categories are relatively significant, the ERT recommends that Hungary include, in its next NIR, quantifications of the changes on a more disaggregated level (i.e. on the level at which the recalculations were made, especially for the base year and for the latest year of the inventory, but also for intermediate years, if necessary), in order to improve the transparency of the recalculations.

93. The ERT commends the Party for its efforts in reducing the number of categories reported using notation keys. During the review, Hungary explained to the ERT the rationale for using notation keys for certain categories. The ERT encourages Hungary to further improve the description in the NIR of its use of notation keys.

94. Even though the ERT noted considerable improvements in the NIR, several mandatory categories (including DOM and the soil organic carbon stock for forest land remaining forest land and land converted to forest land (see also paras. 101 and 104 below) are still reported as “NE”. Therefore, the ERT concludes that the reporting of the LULUCF sector is partially complete. The ERT recommends that Hungary continue its work to improve the reporting on the stock changes in carbon pools for mandatory land-use categories.

95. The ERT noted that Hungary has reported the carbon stock changes in organic soils as “NO”. According to the NIR, organic soils in Hungary are not cultivated. During the review, the Party provided some information on the amount of organic soils in forest land, which is relatively small (about 0.5 per cent). The ERT encourages Hungary to estimate the relative proportion of organic soils, to further explore the importance of carbon stock changes in organic soils for the mandatory reporting categories (i.e. forest land, cropland and grassland) and to report the carbon stock changes in organic soils separately in its next annual submission.

96. Some of the carbon stock change statistics (e.g. perennial croplands such as vineyards and orchards) for living biomass in cropland converted to settlements and cropland converted to other land are available only in aggregated form and are, therefore, reported under cropland remaining cropland. During the review, the ERT suggested that

Hungary use the standing stock per area to allocate the carbon stock changes to the relevant land use and land-use change categories. In its response, Hungary informed the ERT that the improvement plan for the LULUCF sector contains the development of the estimation methods for cropland, grassland and settlements (including the separate estimation of emissions from perennials on cropland in the appropriate land-use conversion category). Hungary also explained that the improvements would be implemented following the official approval of the improvement plan. The ERT welcomes this information and encourages the Party to implement the improvement plan in its next annual submission.

97. In the NIR (page 171), Hungary has reported the area and related emissions and removals from soils from forest land converted to other land uses from 1985 to 2009. These aggregated emissions and removals, as well as the emissions and removals associated with grassland converted to other land uses, should be reported under information items in CRF table 5, where Hungary currently reports these emissions and removals as "NE", citing a lack of data. Since data are available for the changes in the carbon pools for many of the land conversion categories included in the aggregated categories as described above, the ERT recommends that Hungary calculate the corresponding data and emissions and include them under information items in CRF table 5 in its next annual submission.

98. The ERT noted that uncertainty estimates have not been provided for all reported categories due to a lack of data. The ERT recommends that Hungary provide uncertainty estimates for all reported categories and gases as well as an aggregated uncertainty estimate for the entire LULUCF sector in its next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

99. Hungary has reported increases in the total forest area which are attributed to the fact that the forest inventory each year identifies additional forest areas (classified as "found forests") due to unregistered afforestation and the natural expansion of the forest area as explained in the NIR. The Party provided information during the review that clarified the issues related to the consistency of the description of land representation that were raised by the ERT during the review. The ERT encourages Hungary to further improve the description of its land representation and related issues in its next annual submission.

100. As noted in previous review reports, the inter-annual fluctuations in the net removals reported by Hungary are relatively large, mainly with regard to the carbon stock changes reported for living biomass on forest land. In the NIR, the Party has provided detailed information on how the national forest inventory is conducted and on how the information is used to estimate the annual carbon stock changes for the inventory years and for the years between different inventory years. The ERT found this information useful and encourages Hungary to further explore possible reasons for the inter-annual variations in net removals. For example, the Party could validate the carbon stock estimates predicted for the years between different inventory years using yield tables against interpolated data based on consecutive inventories. The ERT recommends that Hungary provide information on such efforts as well as justifications for the inter-annual fluctuations in the estimates in its next annual submission.

101. Hungary has reported the net carbon stock changes in DOM and soils under forest land remaining forest land using the notation key "NE", arguing that it is possible to verify that these pools are not net sources. The ERT notes that demonstrating that a pool is not a net source as a reason for not reporting a carbon pool is an accounting possibility given in the reporting under the Kyoto Protocol. The UNFCCC reporting guidelines require complete reporting, including all sources and sinks from categories, consistent with the

IPCC good practice guidance for LULUCF. The ERT, therefore, recommends that Hungary report estimates for these carbon pools in its next annual submission, or provide information in its NIR demonstrating that the net carbon stock change in DOM and soils can be assumed to be zero and, in that case, use the appropriate notation keys in the corresponding CRF table 5.A (see also paras. 94 above and 104 below).

3. Non-key categories

Land converted to forest land – CO_2

102. As in previous review reports, the ERT noted that the conversion period used by Hungary to estimate CO_2 emissions and removals from land converted to forest land differs from the IPCC default time frame of 20 years for reporting land under a conversion state. The Party uses different time frames ranging from two to 14 years based on the species and other growth conditions of the forests. The ERT acknowledges that a different time frame can be used based on national circumstances; however, it believes that Hungary has not transparently described how the long-term dynamics in carbon pools are taken into account when using the country-specific time frames. The ERT, therefore, recommends that Hungary provide additional justification for using these time frames to estimate the carbon stock changes associated with land-use conversions, or report land-use conversions using the 20-year time frame consistent with the IPCC good practice guidance for LULUCF in its next annual submission.

103. Hungary has aggregated the reporting of all land-use conversion to forest land (and the related carbon stock changes) under cropland converted to forest land with the explanation that the former land use is not known. During the review, the Party provided information on the allocation of afforestation to different land-use categories (81 per cent occurs on cropland and on grassland). To increase the transparency and comparability of the reporting, the ERT recommends that Hungary report these land conversion categories separately in its next annual submission.

104. Hungary has reported the net carbon stock changes in DOM and soils under land converted to forest land using the notation key "NE", arguing that it is possible to verify that these pools are not net sources. The ERT notes that demonstrating that a pool is not a net source as a reason for not reporting a carbon pool is an accounting possibility given in the reporting under the Kyoto Protocol. The UNFCCC reporting guidelines require complete reporting, including all sources and sinks from categories, consistent with the IPCC good practice guidance for LULUCF. The ERT therefore recommends that Hungary report estimates for these carbon pools in its next annual submission, or provide information in its NIR demonstrating that the net carbon stock change in DOM and soils can be assumed to be zero and, in that case, use the appropriate notation keys in the corresponding CRF table 5.A (see also paras. 94 and 101 above).

Direct N_2O emissions from N fertilization of forest land and other – N_2O

105. Direct N_2O emissions from N fertilization of forest land are reported as "NO". According to the NIR, very little fertilization of forest soils occurs in Hungary (in very intensively managed poplar stands), and it is not possible to separate fertilization statistics for forestry. In response to questions raised by the ERT during the review, the Party confirmed that the amount of fertilizer used in forest land is included under the agriculture sector. The ERT therefore recommends that Hungary report the direct fertilization of forest land as "IE" in its next annual submission.

CO_2 emissions from agricultural liming – CO_2

106. The ERT notes that the EF for dolomite used by Hungary to calculate the CO_2 emissions from agricultural lime application on cropland is incorrect. The Party uses a value of 0.122 (as provided in the IPCC good practice guidance for LULUCF); however, based on the stoichiometric formula this value should be 0.13. The ERT recommends that Hungary use the correct EF and revise its estimates for this category in its next annual submission.

Biomass burning – CO_2, CH_4 and N_2O

107. In its 2011 submission, Hungary has improved the reporting of biomass burning, which now also includes wildfires on cropland and grassland. In response to questions raised by the ERT during the review, Hungary provided information clarifying the assumptions used for the burned quantities of biomass and the allocation of the emissions in CRF table 5(V). The ERT encourages the Party to include such explanations in the NIR of its next annual submission, in order to make it consistent with the values reported in the CRF table 5(V).

F. Waste

1. Sector overview

108. In 2009, emissions from the waste sector amounted to 3,734.96 Gg CO_2 eq, or 5.6 per cent of total GHG emissions. Since the base year, emissions have increased by 25.7 per cent. The key driver for the rise in emissions is the increase of CH_4 emissions from solid waste disposal on land by 56.0 per cent due to the steadily increasing amounts in landfilled waste. Conversely, emissions from wastewater handling have decreased by 36.1 per cent due to a growing number of dwellings connected to the public sewage networks. Within the sector, 80.1 per cent of the emissions were from solid waste disposal on land, followed by 18.0 per cent from wastewater handling and 1.9 per cent from waste incineration.

109. Hungary has performed recalculations for the waste sector between the 2010 and 2011 submissions in response to the recommendations of the previous review report. The impact of these recalculations on the waste sector is a decrease in emissions of 0.04 per cent for 2008.

110. The ERT reiterates the recommendation from the previous review report that Hungary improve the transparency of the NIR by including justification and references for the parameters used in the calculations. The ERT noted that the Party has improved the sector-specific QA/QC activities since the previous annual submission. The ERT encourages Hungary to continue its efforts to improve the sector-specific QA/QC procedures.

2. Key categories

Solid waste disposal on land – CH_4

111. CH_4 emissions from this category amounted to 2,990.24 Gg CO_2 eq and were calculated by applying the waste model from the 2006 IPCC Guidelines, which is consistent with the tier 2 methodology provided in the IPCC good practice guidance. Hungary uses a weighted average value of the methane generation constant (k) of solid waste landfilled for its calculations. The ERT recommends that the Party revise its emission estimate by applying the waste composition k values instead of using the weighted average value. Also, the ERT reiterates the recommendation of the previous review reports that Hungary clarify the issues regarding unmanaged waste disposal sites, determine the

representative composition data of solid wastes, and estimate the recovery of CH_4 in a more complete manner in its next annual submission.

Wastewater handling – CH_4

112. CH_4 emissions from wastewater handling amounted to 475.82 Gg CO_2 eq and were calculated by applying country-specific AD and EFs. For industrial wastewater, the CH_4 IEF reported was constant (0.0325 kg/kg degradable organic component (DC)) until 1996 followed by fluctuations until 2002. The value of 0.01875 kg/kg DC was constant until 2007, followed by fluctuations in 2008 (0.0204 kg/kg DC) and 2009 (0.0196 kg/kg DC). During the review, Hungary explained that recalculations were performed for the period 2002–2006 and acknowledged the time-series inconsistency. The ERT recommends that the Party revise its CH_4 emission estimates for the entire time series to ensure consistency. The ERT also reiterates the recommendation of the previous review report that Hungary continue its efforts to collect more information on sludge in wastewater handling.

3. Non-key categories

Wastewater handling – N_2O

113. N_2O emissions from human sewage amounted to 197.91 Gg CO_2 eq and were calculated using the IPCC default method and parameters, except for country-specific protein consumption. Hungary has reported the N_2O emissions from industrial wastewater handling as "NE". The ERT encourages the Party to make efforts to estimate N_2O emissions from industrial wastewater handling in its next annual submission.

Waste incineration – CO_2, CH_4 and N_2O

114. CO_2, CH_4 and N_2O emissions from waste incineration amounted to 70.99 Gg CO_2 eq. The CO_2 emissions were estimated in accordance with the method provided in the IPCC good practice guidance with disaggregated AD (the amount of incinerated waste divided into different waste types). The N_2O emissions were calculated using the EF from the 2006 IPCC Guidelines, and the CH_4 emissions were estimated using an EF of 30 kg/TJ, as the same mass to energy conversion factors were used in the energy sector.

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

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

115. Hungary has reported emissions and removals from activities under Article 3, paragraph 3, of the Kyoto Protocol (afforestation and reforestation, and deforestation) as well as emissions and removals from forest management under Article 3 paragraph 4, of the Kyoto Protocol. The reporting has been prepared in line with the IPCC good practice guidance for LULUCF and the emissions and removals reported are clearly differentiated from the emissions from categories included under Annex A to the Kyoto Protocol. Hungary has chosen annual accounting for the activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

116. In its 2011 submission, Hungary has reported the emissions and removals for the mandatory and elected activities for 2008 and 2009. The ERT noted that the reported decrease in net removals for afforestation and reforestation (0.5 per cent) between 2008 and 2009 relates to harvests on afforested and reforested land in 2009. Net emissions from

deforestation were estimated to amount to 41.49 Gg CO_2 eq and 81.47 Gg CO_2 eq in 2008 and 2009, respectively. Net removals from forest management were estimated to amount to 2,784.02 Gg CO_2 eq and 1,891.82 Gg CO_2 eq in 2008 and 2009, respectively.

117. The ERT noted that Hungary did not report the carbon stock changes in dead wood and litter for deforestation for 2008. During the review week, the Party provided a full set of revised KP-LULUCF CRF tables, including updated information on deforestation in CRF table 5(KP-1)A.2 for 2008. The total emissions from deforestation for 2008, therefore, changed from 34.70 Gg CO_2 eq to 41.49 Gg CO_2 eq.

118. Hungary clearly describes in the NIR the land area related information and the process used to detect land use and land-use changes for all mandatory and elected activities.

119. The ERT noted that the Convention and the Kyoto Protocol reporting are not completely comparable with regard to the total forest land area. This is not uncommon due to the different rules for the reporting of land-use changes. During the review, Hungary provided information which clarified the issues raised by the ERT. However, the ERT encourages the Party to further improve the information on the differences in land use reported under the Convention and under the Kyoto Protocol.

120. Hungary has reported the carbon stock changes for dead wood, litter and soil organic carbon for afforestation and reforestation, and forest management activities as "NE", but has provided information in the NIR demonstrating that these pools are not net sources. The ERT found the information useful when assessing the relevance of the exclusion of these pools. The approach to verify that the soil organic carbon pool is not a net source is based on the stratification of the forest land area according to land-use status and management practices. For each strata, different sources of information are used to assess whether the soil organic carbon pool is not a net source, including literature describing the measurements of carbon stocks and models/equations developed to calculate the carbon stocks in soils. However, for the soil organic carbon pool, Hungary has provided estimates for the different forest land strata and has used the sum of those estimates to justify that the soil organic carbon pool for afforestation and reforestation, and forest management is not a net source, although soils under forest management result in a small source. Since these activities are of a slightly different nature and are accounted for differently under the Kyoto Protocol, the ERT recommends that Hungary report the estimates and/or provide potential information in the NIR demonstrating that the soil organic carbon pool is not a net source for afforestation and reforestation, and forest management activities separately. If no evidence is available to justify the exclusion of the pool by activity, the ERT strongly recommends that the Party study and use approaches adopted by other reporting Parties and report the carbon stock changes in soils for afforestation and reforestation, and forest management in the next annual submission.

121. Hungary generally fulfils the requirements regarding the provision of information set out in paragraphs 5–9 of the annex to decision 15/CMP.1. Hungary follows the annotated NIR for the provision of supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol. However, information to justify that activities under Article 3, paragraph 4, of the Kyoto Protocol are not accounted for under Article 3, paragraph 3, activities, and information on the possible offset of afforestation, reforestation and deforestation debits is missing. The ERT recommends that Hungary provide this information in its next annual submission.

122. In addition to the revised estimates provided during the review week (see para. 117 above), the ERT noted that Hungary made minor recalculations for deforestation in the inventory for 2008 in its 2011 annual submission. In the NIR, the Party refers to recalculations made to the LULUCF sector for the reporting under the Convention (chapter

7). However, since the reporting of the LULUCF sector under the Kyoto Protocol is not completely comparable to the reporting under the Convention, the ERT recommends that Hungary provide all the necessary information on the recalculations related to the KP-LULUCF activities in the relevant section in chapter 11 of the NIR.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

123. The supplementary information provided in chapter 11 of the NIR provides a detailed description of how the inventory methodologies have been applied in the estimation of removals from afforestation and reforestation activities. The ERT found that the methods and parameters used were appropriate and in accordance with the IPCC good practice guidance for LULUCF.

124. Hungary clearly describes the land area related information for afforestation and reforestation activities and the process used to detect the land use and land-use changes. For afforestation and reforestation, the Party identifies the areas by considering information in the National Forestry Database on certificates of identified forest stand that have been inspected and regarded as a "certified forest".

125. For afforestation and reforestation, Hungary has reported the dead wood, litter and soil organic carbon pools using the notation key "NE" and has provided relevant information to demonstrate that these pools are not a net source of emissions for afforestation and reforestation, and forest management activities. As noted in paragraph 120 above, the ERT strongly recommends that Hungary provide separate information for afforestation and reforestation, and forest management activities. The ERT further encourages the Party to improve the data and methods used to demonstrate that the soil organic carbon pool is not a net source. The ERT recommends that Hungary report the estimated carbon stock changes in soils for afforestation and reforestation in its next annual submission.

Deforestation – CO_2

126. Hungary clearly describes the land area related information for deforestation activities and the process used to detect the land use and land-use changes. For the identification of deforestation, the Party relies on certificates of deforestations (from 1990 onwards) from the National Forestry Database, accompanied by sample-based studies (for changes during the period 1990–2003).

127. Since the deforestation area is based on reliable (surveyed) data from the National Forestry Database for the years prior to 2003, it tends to be larger than the deforested area estimated using the certificates. Hungary has applied a correction factor of 1.18 to the statistics used to estimate the deforestation area for the years between 1990 and 2002 based on a comparison of the sample-based studies and the available certificates of deforestation.

128. The previous review report encouraged Hungary to undertake further efforts to identify current land use in areas deforested since 1990. Since the inclusion of information on the final land use after deforestation is important in correctly assessing the carbon stock changes, the ERT notes with appreciation that Hungary now includes such information in its NIR.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO_2

129. Hungary applies a broad definition to identify land under forest management activities. The area under forest management is estimated based on the known area of forest land on 31 December 1989 (this area is equal to the total forest land area at that time). For subsequent years, the forest management area is estimated by subtracting the accumulated area of deforestation from the initial forest management area. No new land areas have been added to the forest management area, which means that "found forests" (see para. 99 above) are not included in the accounting under the Kyoto Protocol, nor are they included in the estimate of afforestation and reforestation. The ERT notes that this implies that the area of forest management is underestimated.

130. The derivation of the area of forest management is described in section 11.2.2 of the NIR. However, the ERT believes that the transparency of the Convention reporting and the rationale for not including "found forests" in the forest management area can be further improved and encourages Hungary to do so in its next annual submission.

131. The methods and parameters used to estimate net removals in living biomass (above-ground and below-ground) for forest management are appropriate. Hungary has reported the soil, dead wood and litter pools as "NE" and has provided information to demonstrate that these pools are not a net source of emissions. The justification for omitting the dead wood and litter pools is appropriate, but the justification for omitting the soil organic carbon pool is provided only for the combined total of afforestation and reforestation, and forest management activities. For afforestation and reforestation (see paras. 120 and 125 above), the soil organic carbon pool is assumed not to be a net source. However, for forest management, the information provided by the Party does not prove that the pool is not a net source. In response to a question raised by the ERT during the review, Hungary agreed with the principle of the requirement to demonstrate that these pools are not a net source for each activity separately. However, the Party also reiterated that its approach to demonstrate that the soil organic carbon pool on forest management land is not a net source is conservative, and that the uncertainties related to the estimates are rather high. Taking into consideration the concerns raised by the Party, the ERT recommends that Hungary improve the information included in the NIR demonstrating that the soil organic carbon pool is not a net source for forest management activities, and include estimates of uncertainties associated with the emission estimates from this pool. If no evidence is available to prove that the soil organic carbon pool is not a net source, the ERT strongly recommends that Hungary report the carbon stock changes in soils for forest management in its next annual submission.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

132. Hungary 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 the SEF comparison report.[5] 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.

[5] The SEF 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.

133. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter 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 paragraph 88(a–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 non-replacement has occurred. The information reported by Hungary on records of any discrepancies was found to be consistent with the information provided to the secretariat by the ITL. The national registry has adequate procedures in place to minimize discrepancies. Hungary provided access to information from its national registry that substantiated or clarified the information reported in its annual submission.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

134. Hungary has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

135. Table 4 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 4
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

Activity	*2011 submission*[a]			*2010 submission*[b]	*"Net" accounting quantity*[c]
	As reported	*Revised estimates*	*Final*	*Final*	
Afforestation & reforestation	–2 313 967		– 2 313 967	–1 159 709	–1 154 258
Deforestation	116 168	122 963	122 963	34 614	88 349
Forest management	–4 675 847		–4 675 847	–2 784 023	–1 891 824
Article 3.3 offset[d]	0		0	0	0
Forest management cape	–4 675 847		–4 675 847	–2 784 023	–1 891 824
Cropland management	0		0	0	0
Grazing land management	0		0	0	0
Revegetation	0		0	0	0

Abbreviations: CRF = common reporting format, GHG = greenhouse gas, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

[a] The values included under the 2011 submission are the cumulative accounting values for 2008 and 2009 as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2009.

[b] The values included under the 2010 submission are the final accounting values as a result of the 2010 review and are included in table 4 of the 2010 annual review report (FCCC/ARR/2010/HUN, page 38).

[c] The "net" accounting quantity is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2011 submission and where the quantities issued or cancelled based on the 2010 review have been subtracted ("net" accounting quantity = final 2011 – final 2010).

[d] Article 3.3 offset: for the first commitment period, a Party included in Annex I that incurs a net source of emissions under the provisions of Article 3, paragraph 3, may account for anthropogenic GHG emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic GHG emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[e] In accordance with paragraph 11 of the annex to decision 16/CMP.1, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, after the application of paragraph 10 of the annex to decision 16/CMP.1 and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

136. Based on the information provided in table 4 for the activity afforestation and reforestation, Hungary shall issue 1,154,258 removal units in its national registry.

137. Based on the information provided in table 4 for the activity deforestation, Hungary shall cancel 88,349 assigned amount units, emission reduction units and/or certified emission reduction units in its national registry.

138. Based on the information provided in table 4 for the activity forest management, Hungary shall issue 1,891,824 removal units in its national registry.

National registry

139. 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 finding 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.

Calculation of the commitment period reserve

140. Hungary has reported its commitment period reserve in its 2011 annual submission. Hungary originally reported its commitment period reserve to be 333,299,158 t CO_2 eq based on the national emissions in its most recently reviewed inventory (66,659.83 Gg CO_2 eq). The ERT disagrees with this figure. In response to questions raised by the ERT during the review and based on the submission of revised emission estimates on 16 September 2011, Hungary reported its commitment period reserve to be 333,919,725 t CO_2 eq based on the national emissions in its most recently reviewed inventory (66,783.94 Gg CO_2 eq). The ERT agrees with this figure.

3. Changes to the national system

141. Hungary reported that there has been a change to its national system since the previous annual submission. The reported change relates to a change in the ministerial structure relevant to the national system and the corresponding amendments to the relevant legislation. The ERT concluded that, taking into account the confirmed change to the

national system, Hungary's national system continues to be in accordance with the requirements of national systems set out in decision 19/CMP.1.

4. Changes to the national registry

142. Hungary has reported a change to its national registry since the previous annual submission. The Party stated that its registry administrator has not changed but the contact information for the administrator has changed. The ERT concluded 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, 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).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

143. Hungary reported that there have been no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission.

144. Hungary has reported that it fully supports and implements the regulations established by the European Union targeting the avoidance of adverse impacts and fostering sustainable development. In parallel, a policy framework has been put in place in Hungary and is laid down in Hungary's National Climate Change Strategy for the period 2008–2025. This policy framework guarantees that climate policy is integrated into development policy, thereby ensuring that climate change related projects will play an integral role in future development projects. At present, the Party does not participate in large-scale climate change projects. In response to a question raised by the ERT during the review regarding the activities undertaken by Hungary and its prioritization plans, the Party explained that it has made a commitment of EUR 6 million in the spirit of the Copenhagen Accord, where a collective commitment has been made by developed countries through international institutions to provide new and additional resources for adaptation and mitigation. The ERT concluded that the information provided by the Party continues to be complete and transparent.

III. Conclusions and recommendations

145. Hungary made its annual submission on 21 April 2011 (CRF tables) and 24 May 2011 (NIR). The annual submission also contains supplementary required information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

146. 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 largely complete and the Party has submitted a complete set of CRF tables for the years 1985–2009 and an NIR; these are complete in terms of geographical coverage, years, gases and sectors, and generally complete in terms of categories. Some of the categories, particularly the subcategories under consumption of halocarbons and SF_6, as well as HFC emissions from refrigeration and air-conditioning equipment and HFC emissions from commercial, industrial and transport refrigeration and mobile air-conditioning, have not

been reported in the CRF table 2(II).F, nor have they been reported using the notation key "IE". In the LULUCF sector, some categories (including DOM and soil organic carbon for forest land remaining forest land and land converted to forest land) have also been reported as "NE".

147. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1. Hungary has not included information to justify that activities under Article 3, paragraph 4, of the Kyoto Protocol are not accounted for under Article 3, paragraph 3, activities or information on the possible offset of afforestation and reforestation, and deforestation debits.

148. Hungary's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The transparency of the Party's reporting on the energy sector has also increased through the identification of the methodological approaches used to estimate emissions and the provision of additional information on how the EU ETS data are incorporated into the inventory. Many recommendations from the previous review report on the industrial processes sector have been implemented, such as those related to the use of notation keys and the inclusion of HFC emissions from fire extinguishers, for which Hungary is commended, since the draft 2010 review report was sent to the Party after it had compiled its annual submission. On 16 September 2011, Hungary officially submitted revised emission estimates in response to questions raised by the ERT during the review for oil and natural gas under the energy sector (see paras. 7 and 40 above). The impact of the revised estimates is an increase in total GHG emissions of 0.2 per cent for 2009, 0.2 per cent for 2008 and 0.1 per cent for the base year.

149. Hungary has made recalculations for the inventory between the 2010 and 2011 submissions in response to the recommendations in the 2010 annual review report, following changes in AD and EFs and in order to rectify identified errors. The impact of these recalculations on total GHG emissions is a decrease of 0.4 per cent for 2008 and a decrease of 0.8 per cent for the base year. The main recalculations took place in the following categories:

(a) Manufacturing industries and construction;

(b) Consumption of halocarbons and SF_6;

(c) Cropland and settlements.

150. Hungary has reported emissions and removals from afforestation and reforestation, and deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol as well as emissions and removals from forest management under Article 3, paragraph 4, of the Kyoto Protocol. The reporting has been prepared in line with the IPCC good practice guidance for LULUCF and the emissions and removals reported are clearly differentiated from the emissions from categories included under Annex A to the Kyoto Protocol. The ERT noted that Hungary has provided information in the NIR demonstrating that the dead wood, litter and soil organic carbon pools for afforestation and reforestation, and forest management activities are not net sources. However, the ERT noted that the Party has provided justification for the soil organic carbon pool only in an aggregated form for afforestation and reforestation, and forest management activities.

151. Hungary has made minor recalculations for deforestation under the KP-LULUCF activities between the 2010 and 2011 submissions. During the review, the ERT noted that the Party did not report the carbon stock changes in dead wood and litter for deforestation for 2008. During the review week, Hungary provided a full set of revised KP-LULUCF

CRF tables, including updated information on deforestation for 2008. The total emissions from deforestation for 2008 therefore changed from 34.70 Gg CO_2 eq to 41.49 Gg CO_2 eq.

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

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

154. 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.

155. Hungary has reported information under chapter I.H of the annex to decision 15/CMP.1, "Minimization of adverse impacts in accordance with Article 3, paragraph 14" as part of its 2011 annual submission. The ERT concluded that the information provided continues to be complete and transparent.

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

(a) The review of the elements of the national system that would enable the timely submission of the annual submission, and the submission of the next annual submission by 15 April 2012 (see para. 6 above);

(b) The provision of a transparent overview of the annual inventory preparation process in the NIR of the next annual submission, including information on the responsibilities of the institutions involved in the preparation of the inventory and the provision of a timeline for the application of QA/QC procedures during the inventory preparation process (see para. 16 above);

(c) The allocation of CO_2 emissions from non-energy use of fuels/feedstocks and coke as a reducing agent under the industrial processes sector in line with the IPCC good practice guidance and the UNFCCC reporting guidelines, taking into account the reporting of CO_2 emissions from combustion of secondary fuels under the relevant stationary combustion categories in the energy sector, and the inclusion of information, where relevant, on how the calculation and allocation of the CO_2 emissions was performed (see para. 61 above);

(d) The further improvement of the transparency of the inventory by including, where relevant, further information on the methodological tiers used, and justification and references for country-specific parameters and EFs, in particular for F-gas emissions under the industrial processes sector (see paras. 65, 66, and 67 above);

(e) The completion of the uncertainty analysis by including quantitative estimates for all categories, in particular for categories under the LULUCF sector;

(f) The finalization of the archiving manual and reporting on the progress made thereon in the next annual submission (see para. 32 above);

(g) The inclusion, in annex 8 to the NIR or in the relevant section, a table describing Hungary's responses and follow-up actions to the recommendations of previous review reports.

157. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of the information presented in Hungary's annual submission. The key recommendations are that Hungary:

(a) Increase the transparency of the explanation of how the EU ETS emissions data are used in the energy sector emission estimates, in particular how non-energy use and recovered gases are treated in relation to the estimates for the industrial processes sector;

(b) The implementation of sector-specific QA/QC procedures in the energy sector to reconcile the fuel quantities derived from the EU ETS data with the national energy balance and reporting on the progress of this procedure in the next annual submission (see para. 39 above);

(c) Update the historical time series to include emission estimates of raw CO_2 venting from natural gas processing under oil and natural gas in the next annual submission;

(d) Estimate emissions from domestic aviation, including any jet kerosene used for this activity. The emissions should be estimated following the methodological approaches recommended in the IPCC good practice guidance to identify which flights are domestic and international;

(e) Describe the methodologies used in the industrial processes sector in more detail, including the methodological tiers used, the sources of AD and EFs, and any relevant assumptions made;

(f) Improve the completeness in reporting F-gas emissions particularly from subcategories under consumption of halocarbons and SF_6 and refrigeration and air-conditioning equipment, in the CRF table 2(II).F;

(g) The further improvement of the data on the subcategories under consumption of halocarbons and SF_6 and of the use of the notation keys by using "IE" instead of "NO" when the subcategories have been calculated in a more aggregated way than the subcategories defined in the CRF table 2(II). For when the subcategories have been reported elsewhere (see para. 66 above);

(h) Revise the country-specific EFs for dairy cattle and non-dairy cattle for enteric fermentation and manure management, in accordance with the improvement plans described by the Party;

(i) Revise the AWMS distribution based on the General Agricultural Survey 2010, in accordance with the improvement plans described by the Party;

(j) Provide additional justification for using country-specific time frames to estimate the carbon stock changes associated with land-use conversions and/or investigate the possibilities of estimating the land area and stock volume of land converted to forest land using the 20-year IPCC default period of conversion, and consider replacing the Party's current approach in the next annual submission;

(k) The estimation of the remaining mandatory categories in the LULUCF sector that are still reported as "NE";

(l) Improve the information included in the NIR demonstrating that the soil organic carbon pool is not a net source for afforestation and reforestation, and forest management activities separately and, if no evidence is available to prove that the soil organic carbon pool is not a net source, report the carbon stock changes in soils for these activities in the next annual submission (see paras. 120 and 125 above).

IV. Questions of implementation

158. 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>.

"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>.

International Energy Agency, *Energy Statistics of OECD Countries*, online data service, 2011 edition. Available at <http://data.iea.org/>.

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Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <http://unfccc.int/resource/webdocs/sai/2011.pdf>.

FCCC/ARR/2010/HUN. Report of the individual review of the greenhouse gas inventory of Hungary submitted in 2010. Available at <http://unfccc.int/resource/docs/2011/arr/hun.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Gábor Kis-Kovács (Greenhouse Gas Inventory Division, Hungarian Meteorological Service), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by Hungary:

2010. *Agricultural CH_4 and N_2O emissions in Hungary QC report.*

Spreadsheet 'CALC_2.A.1_Cement_1985_2009 v1.xls' providing the input data and calculation of the CO_2 emissions per cement factory and of the emissions reported in CRF table 2A1.

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
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
DC	degradable organic component
DOM	dead organic matter
EF	emission factor
ERT	expert review team
EU	European Union
ETS	emissions trading scheme
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
GHG Division	Greenhouse Gas Inventory Division
GE	gross energy
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEFs	implied emission factors
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kg	kilogram (1 kg = 1,000 grams)
kt	kilotonne (1 kt = 1 million kg)
LULUCF	land use, land-use change and forestry
N	nitrogen
NA	not applicable
NE	Not estimated
Nex	nitrogen excretion
NO	not occurring
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
PLF	product life factor
PMF	product manufacturing factor
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
VS	volatile solids