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Report of the individual review of the annual submission of Hungary submitted in 2010*

* In the symbol for this document, 2010 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

1. This report covers the in-country review of the 2010 annual submission of Hungary, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 20 to 25 September 2010 in Budapest, Hungary, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Tomas Gustafsson (Sweden); energy – Mr. Simon Wear (New Zealand); industrial processes – Mr. Dušan Vacha (Czech Republic); agriculture – Mr. Michael Anderl (Austria); land use, land-use change and forestry (LULUCF) – Mr. Nagmeldin Elhassan (Sudan); and waste – Mr. Qingxian Gao (China). Mr. Elhassan and Mr. Gustafsson were the lead reviewers. The review was coordinated by Ms. Astrid Olsson (UNFCCC secretariat). Ms. Marianna Bolshakova (UNFCCC secretariat) participated in the review as an observer.

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

3. In 2008, the main greenhouse gas (GHG) in Hungary was carbon dioxide (CO_2), accounting for 76.8 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (11.7 per cent) and nitrous oxide (N_2O) (10.2 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.3 per cent of the overall GHG emissions in the country. The energy sector accounted for 75.7 per cent of total GHG emissions, followed by agriculture (12.0 per cent), industrial processes (6.6 per cent), waste (5.2 per cent) and solvent and other product use (0.6 per cent). Total GHG emissions amounted to 73,426.12 Gg CO_2 eq and decreased by 36.1 per cent between the base year[2] and 2008.

4. The main driver for the large decrease in emissions between the base year and 2008 is the transition from a centrally planned economy to a market economy in the late 1980s and early 1990s, which led to a sharp decline in the Hungarian economy.

5. 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, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector, 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.

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

[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, of the Kyoto Protocol, by gas, base year to 2008[a]

			Gg CO_2 eq								*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A sources		CO_2	84 938.32	72 496.23	61 434.96	58 541.68	60 984.79	59 666.83	57 905.34	56 376.45	–33.6
		CH_4	12 376.27	11 756.43	9 486.05	9 607.40	9 051.71	8 968.80	8 790.67	8 613.60	–30.4
		N_2O	17 394.35	13 239.45	7 685.72	8 540.27	9 066.84	8 859.87	8 373.57	7 498.39	–56.9
		HFCs	0.78	0.00	0.78	211.34	537.77	592.05	621.18	703.38	90 077.4
		PFCs	166.82	270.83	166.82	211.26	209.39	1.53	2.38	2.41	–98.6
		SF_6	70.15	39.87	70.15	140.11	201.02	244.45	171.65	231.89	230.6
KP-LULUCF	Article 3.3[b]	CO_2								–1 125.56	
		CH_4								0.27	
		N_2O								0.20	
	Article 3.4[c]	CO_2	NA							–2 806.76	NA
		CH_4	NA							20.64	NA
		N_2O	NA							2.10	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.

[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 2008

			Gg CO_2 eq								*Change*
		Sector	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A		Energy	83 382.67	70 933.57	60 950.80	57 864.89	59 928.12	58 805.68	56 736.48	55 610.37	–33.3
		Industrial processes	10 796.53	8 850.90	5 454.87	6 276.70	6 995.62	6 415.21	5 979.09	4 812.20	–55.4
		Solvent and other product use	284.54	226.27	205.16	213.71	366.33	334.66	366.15	406.30	42.8
		Agriculture	17 510.91	14 501.30	8 684.92	9 075.10	8 803.51	8 845.99	8 905.69	8 783.08	–49.8
		Waste	2 972.03	3 290.77	3 548.72	3 821.66	3 957.95	3 931.99	3 877.38	3 814.18	28.3
		Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
		LULUCF	NA	–2 002.89	–5 843.79	–422.33	–4 121.72	–2 162.24	–2 428.75	–3 628.65	NA
		Total (with LULUCF)	**NA**	**95 799.91**	**73 000.68**	**76 829.73**	**75 929.82**	**76 171.30**	**73 436.04**	**69 797.48**	**–39.3**
		Total (without LULUCF)	**114 946.68**	**97 802.80**	**78 844.48**	**77 252.06**	**80 051.53**	**78 333.54**	**75 864.79**	**73 426.12**	**–36.1**
KP-LULUCF	Article 3.3[b]	Afforestation & reforestation								–1 159.71	
		Deforestation								34.61	
		Total (3.3)								**–1 125.09**	
	Article 3.4[c]	Forest management								–2 784.02	
		Cropland management	NA							NA	NA
		Grazing land management	NA							NA	NA
		Revegetation	NA							NA	NA
		Total (3.4)	**NA**							**–2 784.02**	**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] 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 3
Information to be included in the compilation and accounting database in t CO_2 eq

	As reported	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	365 693 265		367 130 614	
Annex A emissions for current inventory year				
CO_2	51 652 332		52 691 719	
CH_4	8 501 011		8 634 943	
N_2O	7 532 447		7 533 132	
HFCs	703 384		703 384	
PFCs	2 410		2 410	
SF_6	231 887		231 887	
Total Annex A sources	**73 138 653**		**73 426 123**	
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	–1 183 307		–1 134 287	–1 134 287
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	–904		–25 422	–25 422
3.3 Deforestation for current year of commitment period as reported	43 509		34 614	34 614
Activities under Article 3, paragraph 4, for current inventory year[d]				
3.4 Forest management for current year of commitment period	–3 861 859		–2 784 023	–2 784 023
3.4 Cropland management for current year of commitment period	NA		NA	0
3.4 Cropland management for base year	NA		NA	
3.4 Grazing land management for current year of commitment period	NA		NA	0
3.4 Grazing land management for base year	NA		NA	
3.4 Revegetation for current year of commitment period	NA		NA	0
3.4 Revegetation in base year	NA		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.

[a] "Adjustment" is relevant only for Parties for which the ERT has calculated one or several adjustment(s).

[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.

7. The GHG inventory is generally in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The most important cross-cutting issues identified during the review by the expert review team (ERT) relate to transparency, completeness, consistency and the accuracy of the reported information, as indicated in more detail in paragraph 8 below.

8. The 2010 inventory submission covers most sectors and categories, shows significant improvement in the major issues since the previous submission and is generally of a sufficiently high quality, but the ERT identified a need for further improvements in the following areas:

(a) The timeliness of the submission of the annual submission;

(b) Justifications for the methodological choices in the energy and agriculture sectors;

(c) Justification for the use of the emission factors (EFs) from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) for the following categories in the energy sector:

(i) Public electricity and heat production, gaseous fuels – CH_4;

(ii) Petroleum refining, liquid fuels – CH_4;

(iii) Manufacturing industries and construction, gaseous fuels – CH_4;

(iv) Railways, liquid fuels – CH_4;

(v) Commercial/institutional, liquid and biomass fuels – CH_4;

(vi) Residential, solid fuels, diesel oil, liquefied petroleum gas and residual fuel oil – CH_4;

(vii) Agriculture/forestry/fisheries, solid fuels, diesel oil, liquefied petroleum gas, biomass and residual fuel oil – CH_4;

(viii) Agriculture/forestry/fisheries, biomass – N_2O;

(d) Ensuring the completeness and correct allocation of carbon pools in the LULUCF sector;

(e) The provision of an explanation for the significant differences between the reference and sectoral approaches;

(f) Improving the methods used for estimating CH_4 emissions from manure management of poultry and CH_4 emissions from enteric fermentation for non-dairy cattle

(g) Ensuring that all waste is included in the inventory, especially CH_4 emissions from solid waste disposal on land;

(h) Ensuring time-series consistency in the energy, industrial processes and waste sectors;

(i) Improving the use of notation keys in the energy, industrial processes and waste sectors;

(j) The lack of transparency in the national inventory report (NIR) in the agriculture, LULUCF and waste sectors;

(k) The implementation and provision of information on quality assurance/quality control (QA/QC) procedures for all categories;

(l) The lack of uncertainty estimates in the LULUCF sector.

9. Hungary acknowledged these findings at the time of the review and undertook measures to resolve the potential problems raised in paragraph 8(b), (c), (e) and (g) above by submitting revised estimates on 8 November 2010. In addition, the submission of 8 November 2010 also contains revised estimates for KP-LULUCF activities as well as an updated NIR with information on KP-LULUCF activities. The values in this report are those submitted by the Party on 8 November 2010.

10. By submitting the revised inventory and supplying the additional information requested by the ERT, Hungary has demonstrated sufficient capacity to comply 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) and the IPCC good practice guidance.

11. The Party has submitted most of the supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol in accordance with chapter I of the annex to decision 15/CMP.1. Hungary did not submit any documentation in the NIR on KP-LULUCF activities in accordance with decisions 15/CMP.1 and 16/CMP.1. In its submission of revised estimates (8 November 2010), Hungary also provided a revised NIR including all information required under Article 7, paragraph 1, of the Kyoto Protocol (see para. 19 below).

12. Hungary has chosen to account for activities under Article 3, paragraph 3, of the Kyoto Protocol annually. The Party has elected forest management under Article 3, paragraph 4, of the Kyoto Protocol and has chosen annual accounting.

13. 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 has used the standard electronic format (SEF) tables as required by decision 14/CMP.1.

14. In general, the national system continues to perform its required functions as set out in the annex to decision 19/CMP.1; however, the ERT identified problems regarding the timeliness of the 2010 annual submission of the NIR and common reporting format (CRF) tables that will need to be addressed by Hungary. The 2010 annual submission was submitted on 25 May (CRF tables) and 26 May 2010 (NIR). This is within six weeks of the deadline for annual submissions of 15 April 2010, after which the consequences of late submission apply under decision 15/CMP.1. In the original submission, Hungary did not report all mandatory requirements relating to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

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

16. Hungary has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its NIR. The Party submitted this information on 26 May 2010. This is after 15 April which is the deadline for annual submissions.

17. In the course of the review, the ERT formulated a number of recommendations relating to completeness, transparency, time-series consistency, methodological choices, QA/QC and uncertainty (see paras. 8, 22–24, 28, 30, 32–33, 36–41, 43–44, 46 below).

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

18. The 2010 annual inventory submission was submitted on 25 May 2010 (CRF tables) and 26 May 2010 (NIR); it contains CRF tables for the period 1985–2008 and the base year, which is the average of the period 1985–1987, and an NIR. Hungary also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: accounting of Kyoto Protocol units, changes in the national system and in the national registry, and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The SEF tables were submitted on 15 April 2010. In its original submission, the Party did not report all mandatory requirements relating to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. This information was provided in the submission of 8 November 2010.

19. Hungary officially submitted revised emission estimates on 8 November 2010 in response to questions raised by the ERT during the course of the in-country review. The resubmission of information and data on 8 November 2010 included the accounting of Kyoto Protocol units and KP-LULUCF activities, revised estimates related to the difference between the reference and sectoral approaches, revisions to the use of the EFs provided in the 2006 IPCC Guidelines in the energy sector and revised CH_4 emissions from solid waste disposal on land. Where necessary, the ERT also used the previous year's submission during the review. The ERT strongly recommends that Hungary submit a complete annual submission by 15 April 2011 as required by decision 15/CMP.1.

20. 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]

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

Completeness of inventory

22. With the exception of the LULUCF sector, the 2010 annual submission is largely complete, covering all years of the time series (1985–2008), sectors, categories and gases.

23. A number of IPCC categories, especially in the LULUCF sector, are reported as not estimated ("NE") (for a complete list, see para. 111 below), mainly due to a lack of data.

[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 (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

The ERT recommends that Hungary provide estimates for the missing mandatory LULUCF categories in its next annual submission.

24. The CRF tables are almost completely filled in, with the exception of CRF table 9(a), where there is a lack of explanation for some categories reported as "NE". The ERT recommends that Hungary complete the reporting of the CRF tables in its next annual submission.

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

Overview

25. The ERT concluded that the national system continues to perform its required functions, but certain areas could be improved, as the 2010 annual submission was submitted late and information on KP-LULUCF activities was incomplete. The ERT recommends that Hungary review the elements 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 2011 and ensure that all required elements are included therein.

26. The Party described the changes to the national system since the previous annual submission, including the entry into force of Governmental Decree No. 345/2009 on data provision relating to GHG emissions. These changes are discussed in chapter II.G.3 of this report (see para. 165).

Inventory planning

27. The institutional arrangements are described in the NIR. During the review, Hungary explained that since the 2010 submission, the Ministry of Environment and Water has become the Ministry of Rural Development. The Ministry of Rural Development approves the inventory and the annual submission before submitting them to the UNFCCC; this process is described in the NIR.

28. In late 2009, Governmental Decree No. 345/2009 entered into force, confirming the Ministry of Environment and Water (later the Ministry of Rural Development) as the single national entity and the Hungarian Meteorological Service (OMSZ) as the body responsible for the compilation of the inventory and the annual submission. OMSZ is responsible for coordinating, compiling and archiving the inventory. It is also responsible for preparing the sections of the inventory on the energy, industrial processes and waste sectors. The decree also formalizes the roles of the Forestry Directorate of the Central Agricultural Office and the Forest Research Institute as the entities responsible for the LULUCF sector and the supplementary reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The decree also prescribes that organizations emitting at least 100 t CO_2 eq/year shall provide emissions data to the National Registration System. In addition, the Research Institute for Animal Breeding and Nutrition is responsible for preparing the agriculture sector of the inventory and the Karcag Research Institute of the University of Debrecen is responsible for preparing the information on soil carbon stock changes. The institutional arrangements are generally described in the Party's QA/QC plan.

Inventory preparation

Key categories

29. Hungary has reported a key category tier 1 (both including and excluding LULUCF) and tier 2 (without LULUCF) analyses, both level and trend assessment, as part of its 2010

submission. The key category analysis performed by the Party 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 key category tier 1 analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT recommends Hungary to estimate uncertainties for the LULUCF sector (see para. 117 below) and encourages it to include the results in its key category tier 2 analysis for its next annual submission. In addition, Hungary has reported key categories using a qualitative approach.

30. Hungary uses the results of the key category analyses to structure the reporting of information in the NIR. During the in-country review, Hungary explained that it is planning to use the key category analyses for the prioritization of future inventory improvements as part of its QA/QC plan. The ERT recommends that Hungary continue with this planned improvement and include information on the progress made in the next annual submission.

31. Hungary has not identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT recommends that Hungary include this information in its next annual submission under the Kyoto Protocol, following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

Uncertainties

32. Hungary has provided a tier 1 uncertainty analysis including quantitative estimates for all categories, except the LULUCF sector. However, the ERT noted that Hungary provided a qualitative description of uncertainty for the LULUCF sector and for KP-LULUCF activities. The IPCC good practice guidance and expert judgements were used as the basis for the uncertainty analysis. The ERT noted that the quantitative uncertainty for total national GHG emissions in 2008 was estimated to be 8.2 per cent, while the uncertainty introduced by the trend was estimated to be 2.2 per cent. The estimated uncertainties are similar to those in the 2009 submission. The ERT also noted that uncertainties for nitric acid production were not estimated, although information on uncertainty estimates was provided in the NIR. During the review week, Hungary provided a revised tier 1 uncertainty analysis including an uncertainty estimate for nitric acid production and the ERT recommends that Hungary include this uncertainty estimate in its next annual submission. For the LULUCF sector, quantitative uncertainty estimates were provided in the NIR for a number of categories (cropland and grassland), whereas for some categories only qualitative uncertainty estimates were provided. The ERT reiterates the recommendation from the previous review report that Hungary complete its tier 1 uncertainty analysis, including estimates for the LULUCF sector. In addition, the ERT encourages the Party to use more country-specific information on uncertainty estimates, as provided during the in-country review.

33. The results of the tier 1 uncertainty analysis, excluding LULUCF, are used to perform a key category tier 2 analysis. During the review, Hungary explained that the results of the key category tier 2 analysis are not currently used as a tool to prioritize future

[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.

inventory developments and improvements. The ERT encourages Hungary to implement the results of the uncertainty tier 2 analysis when completed, as part of its QA/QC plan.

Recalculations and time-series consistency

34. Recalculations have generally been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the Party of the entire time series (base year to 2007) have been undertaken to take into account revisions of activity data (AD) (e.g. stationary combustion, cement production, use of N_2O in solvent and other product use, and forest land); improvements to EFs (e.g. transport and agricultural soils); and the reallocation of emissions (e.g. feedstocks and waste incineration). The major changes, and the magnitude of the impact, include: an decrease in estimated total GHG emissions in the base year (1.2 per cent), and a decrease in 2007 (0.1 per cent). The rationale for these recalculations is generally provided in CRF table 8(b) but for the agriculture, LULUCF and waste sectors limited explanations are provided in the NIR. During the review, the ERT concluded that these recalculations have resulted in substantial improvements to the inventory.

35. The ERT recommends that Hungary include information on and the rationale for all recalculations in CRF table 8(b) and improve the descriptions of the recalculations in the NIR of its next annual submission.

Verification and quality assurance/quality control approaches

36. Hungary has elaborated a QA/QC plan in accordance with the IPCC good practice guidance. It is described in an internal document in Hungarian. The QA/QC plan includes all mandatory elements as set out in the IPCC good practice guidance and decision 19/CMP.1. However, the implementation of QC procedures is not entirely satisfactory (e.g. there are several discrepancies between the CRF tables and the NIR). The ERT recommends that Hungary include more information on the QA/QC plan in its next NIR, especially on the inventory process cycle, and ensure that QC activities are in place to minimize any errors in data handling.

37. As part of its QA/QC activities, Hungary has performed peer reviews of the industrial processes and agriculture sectors and has proposed one for the energy sector. During the review, Hungary explained that it is planning to perform peer reviews of all sectors. The ERT encourages Hungary to continue performing peer reviews of all sectors and to include this information as part of its QA/QC plan.

38. The QA/QC plan does not currently contain information on the procedures for the handling of confidential information. During the review, Hungary explained that OMSZ has procedures in place to ensure the security of confidential information and that the QA/QC plan will be updated with this information. The ERT recommends that Hungary include, in its QA/QC plan, information on the procedures for the handling of confidential information.

39. The NIR provides general information on several QA/QC and verification activities. During the review, Hungary provided additional information on such activities (e.g. for European Union emissions trading scheme (EU ETS) data). The ERT recommends that Hungary include more information in its next annual submission on the QA/QC and verification activities for all key categories as provided during the review.

Transparency

40. Hungary's NIR generally follows the annotated outline of the NIR. However, the ERT concluded that the NIR provides limited information necessary to assess the inventory for several sectors, including the agriculture sector, whereas other sectors, such as the energy sector, are broadly transparent. Additional information could improve the

transparency of the inventory, such as: justifications for the use of national references, country-specific EFs, relevant parameters, EU ETS data or the 2006 IPCC Guidelines; further documentation on the large inter-annual changes in emissions/removals; and the correct use of notation keys. The ERT recommends that Hungary improve the transparency of the inventory, which in turn will facilitate future reviews.

Inventory management

41. Hungary has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. This enables the reproduction of submissions from specific years. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements.

42. The centralized archiving system is maintained by OMSZ. Documentation from external institutes involved in the inventory preparation process is, as a minimum, archived in hard copy. During the review, Hungary explained that the archiving procedures are described in an archiving manual (currently in draft form). Some components of the archive which are not available electronically, such as scientific papers and industry correspondence, are also kept in hard copy at OMSZ. During the review, Hungary was able to provide archived documents requested by the ERT, including confidential data according to national procedures. The ERT encourages Hungary to finalize and formalize the archiving manual and to report on the progress made in its next annual submission.

3. Follow-up to previous reviews

43. The ERT commends Hungary for performing several major improvements since the previous review report, including: the reallocation of emissions (waste incineration for energy purposes from the waste sector to the energy sector and feedstocks from the energy sector to the industrial processes sector); ensuring time-series consistency in CH_4 and N_2O emissions from road transportation; and recalculations of LULUCF categories (forest land remaining forest land, and land converted to forest land).

44. The ERT recommends that Hungary address the following issues from previous review reports:

(a) The provision of estimates for the categories in the LULUCF sector that are still reported as "NE" and the completion of the uncertainty analysis by including quantitative estimates for all categories (including the LULUCF sector);

(b) Ensuring time-series consistency (e.g. for CH_4 emissions from industrial wastewater handling, CO_2 emissions from lime production, and from categories using coke oven gas (e.g. iron and steel));

(c) The removal of the inconsistencies between the CRF tables and the NIR by improving the QC procedures in the final stages of the preparation of the NIR and the inclusion of information on QA/QC procedures for all categories that are currently not available (e.g. for limestone and dolomite use; other mineral products (glass, bricks and ceramic production); iron and steel production; and solvent and other product use);

(d) Expediting the completion of the archiving system, providing updated information in the next NIR, and ensuring that the supplementary information related to Article 3, paragraphs 3 and 4, of the Kyoto Protocol is archived;

(e) The improvement of the transparency of the inventory by including methodological descriptions and stating the tier used to estimate emissions/removals for all

categories, including further information on and justification for the use of EU ETS data in line with the IPCC good practice guidance, identifying country-specific EFs, providing explanations for all significant inter-annual changes in emissions/removals, providing explanations for the selection of methodologies, and providing justification for and clear reference to the sources of AD;

(f) Ensuring that the use of methods, parameters, EFs and other information from the 2006 IPCC Guidelines are adequately justified and shown to be appropriate to the national circumstances;

(g) The completion, in a timely manner, of any improvements that are still in progress; for example, finalizing the project started with the Institute of Geodesy, Cartography and Remote Sensing (FÖMI) to improve the land-use area system, applying tier 2 methodologies and reporting activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol;

(h) Exploring the possibility of applying higher-tier methods to key categories.

4. Areas for further improvement

Identified by the Party

45. Chapter 10.2 of the 2010 NIR identifies several general areas for improvement, including:

(a) The consistency between emission databases, especially the GHG inventory, EU ETS data, National Account Matrices for Environmental Accounting (NAMEA) data, and European Pollutant Release and Transfer Register (E-PRTR) data;

(b) Further analysis of current consistency problems (e.g. in the industrial wastewater category);

(c) The fulfilment of all reporting requirements arising from the Kyoto Protocol, including a complete description of the Hungarian forestry and forest inventory system, in order to improve the completeness of the documentation provided.

Identified by the expert review team

46. The ERT identifies the following cross-cutting issues for improvement in the Party's 2010 submission:

(a) The implementation of the recommendations outstanding from previous review reports (see para. 44 above);

(b) The assessment of the Party's national system and ensuring that sufficient resources are available to enable its next annual submission to be in accordance with Article 5 and Article 7, paragraphs 1 and 2, of the Kyoto Protocol and relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) (see para. 25 above);

(c) The provision of information on QA/QC procedures for all categories (see para.39);

(d) The implementation of the key category analyses for the prioritization of future inventory improvements (see para. 30 above);

(e) The inclusion of explanations of the causes for differences in CO_2 emissions higher than 2 per cent between the reference and sectoral approaches in the energy sector (see para. 8(d) above);

(f) The identification of key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (see para. 31 above);

(g) The provision of information on recalculations in accordance with the IPCC good practice guidance (see para. 35 above);

(h) The assessment of the use of notation keys following the UNFCCC reporting guidelines (see para. 40 above);

(i) The improvement of the description and implementation of the QA/QC plan (e.g. ensuring that QC activities are in place to minimize any errors in data handling) (see paras. 36, 39 and 44 above);

(j) The provision of publicly available information relating to the national registry in English (see para. 163 below);

(k) The improvement of transparency by providing examples of actions and activities supporting the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in which Hungary is engaged, and their effects on developing countries (see para. 168 below).

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

B. Energy

1. Sector overview

48. The energy sector is the main sector in the GHG inventory of Hungary. In 2008, emissions from the energy sector amounted to 55,610.37 CO_2 eq, or 75.7 per cent of total GHG emissions. Since the base year (the average of the period 1985–1987), emissions from the energy sector have decreased by 33.3 per cent. The key driver for the reduction in emissions in the manufacturing industries and construction sector, as well as other sectors. Hungary's economy has been through significant transformation since the base year. Output has declined in many categories, thereby reducing emissions, and the year-on-year fuel mix has also fluctuated. Within the sector, 35.4 per cent of the emissions were from energy industries, followed by 24.9 per cent from other sectors, 23.2 per cent from transport and 12.6 per cent from manufacturing industries and construction. The remaining 3.9 per cent were from fugitive emissions.

49. All the main IPCC categories and gases are covered in the energy sector. The sectoral background data tables are essentially complete for 2008. The notation key "NE" is used for CH_4 emissions from the category distribution of oil products (1.B.2.a.v). There is no methodology for this category in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance. Emissions from civil aviation and domestic navigation are reported as not occurring ("NO"); however, emissions from this category are accounted for under road transportation. The correct notation key for these two categories should be reported as included elsewhere ("IE").

50. The inventory in the energy sector is generally transparent and the ERT commends the Party for revising the structure of the energy sector documentation in the 2010 NIR to conform to the annotated outline of the NIR. There were several subheadings with no corresponding text in the NIR (e.g. section 3.3.3.4 "Source-specific QA/QC and verification"), which should be provided in the next NIR. If there is nothing to report under the heading, then this should be stated. The ERT noted that there is still a lack of explanation for some significant inter-annual changes in the implied emission factors (IEFs) in the NIR. Hungary explained to the ERT that the changes in the fuel mix are due to the

economic transformation of Hungary since 1985. In order to improve transparency, the ERT recommends that Hungary, in its next annual submission, include available underlying AD at the subcategory level and further information on the fluctuation in the fuel mix that results in the large inter-annual changes in IEF values.

51. For most of the CH_4 EFs from combustion, Hungary reports the default values from sources other than the Revised 1996 IPCC Guidelines or the IPCC good practice guidance (e.g. the 2006 IPCC Guidelines and Tajthy, 1994[5]) and provides no justification for the choices of EFs. The ERT identified 16 instances where these EFs produced lower estimates of CH_4 emissions in 2008. For example, the EF for CH_4 emissions from solid fuel combusted in the residential sector is 96.5 kg CH_4/TJ in the 2006 IPCC Guidelines, whereas the default EF in the Revised 1996 IPCC Guidelines is 300 kg CH_4/TJ. During the review, Hungary submitted a revised NIR and CRF tables using the EFs provided in the Revised 1996 IPCC Guidelines. As a result, emissions of CH_4 from fuel combustion increased by 2.15 Gg CH_4 between the original and the revised 2010 submission. The ERT agrees with the revised estimates and recommends that Hungary apply these EFs in the next annual submission unless other justified EFs are available.

52. During the review, Hungary explained and justified the fact that the CH_4 and N_2O EFs from the 2006 IPCC Guidelines for road transportation for all fuels for all road vehicles with post-1996 emissions control technologies were, compared to the default EFs contained in the Revised 1996 IPCC Guidelines, more appropriate to Hungary's modern car fleet. The ERT agrees with the justification provided during the review and recommends that Hungary provide further justification for its use of the EFs from the 2006 IPCC Guidelines for road transportation in its next NIR.

53. The ERT noted that Hungary has postponed the planned peer review of the energy sector in order to give priority to the LULUCF sector for the 2010 submission. The ERT welcomes Hungary's plans to proceed with the peer review of the energy sector and encourages the Party to use the peer review to investigate any possible emission sources that have been omitted, further reconcile energy data reports, such as those of the International Energy Agency (IEA), and further understand the differences between energy emissions calculated using the sectoral and reference approaches.

2. Reference and sectoral approaches

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

54. In 2008, Hungary reported in its original submission a difference of 5.62 per cent in CO_2 emissions and a 3.48 per cent difference in energy consumption between the reference and the sectoral approach. The reference approach estimate for emissions from liquid and solid fuels was 10.63 and 5.68 per cent higher, respectively, than the emissions from these fuels estimated by the sectoral approach.

55. During the review, Hungary determined that 4,673 TJ of other liquid fuels (including white spirit and waxes) from oil refining, previously reported as losses, had been reported as emissions in the reference approach but were not combusted. Hungary allocated 2,754 TJ of other coal use (previously reported as losses) to coal oils and tars from coking coal and used the default EF for the fraction of carbon stored (75 per cent) from the Revised 1996 IPCC Guidelines, leading to an increase in CO_2 emissions of 63.83 Gg CO_2 from solid fuel combusted in the manufacturing industries and construction category. Emissions from the non-energy use of other oil products increased CO_2 emissions by 64.24 Gg CO_2 in the industrial processes category other (industrial processes). Emissions of CO_2 from oil flaring

[5] Tajthy, T., 1994: Calculation of emission of air pollution substances (In Hungarian: A légkört szennyezı anyagok kibocsátásának számítása), Technical University, Budapest.

at refineries were also increased by 24.96 Gg CO_2. In the submission of 8 November 2010, Hungary reported a difference of 1.61 per cent in CO_2 emissions between the reference and the sectoral approach for 2008. The ERT accepts the improvements made, which have resulted in a closer reconciliation of the sectoral and reference approaches. The ERT recommends that Hungary provide more detailed information on the new categories of emissions now accounted for in the sectoral approach and also provide further information on the non-energy use of fuels excluded from the reference approach in the next annual submission.

International bunker fuels

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

Feedstocks and non-energy use of fuels

57. Recalculations in the energy sector were performed in response to the recommendations from the 2009 review report. Hungary has removed liquid fuels used as feedstock from the entire time series for the category chemicals and has reallocated them to the industrial processes sector. The recalculation has resulted in a decrease in CO_2 emissions from the energy sector in 2007 of 999.83 Gg CO_2 (1.8 per cent). The ERT agrees with the recalculations and commends Hungary for making this improvement.

58. The ERT recommends that Hungary improve the transparency in the NIR by reporting how the fraction of carbon stored in the non-energy use of fuels and feedstock is estimated, and by providing some information on the end uses of fuels that are not included in the estimate of emissions using the sectoral approach.

3. Key categories

Stationary combustion: solid fuel – CO_2

59. For solid fuel combustion in electricity and heat production, the Party uses verified EU ETS EFs for lignite applied to national energy balances, but then reports AD from the EU ETS. The EU ETS data and national statistics data are closely reconciled; however, for some years, such as 2006, the EU ETS data are significantly lower than the AD from the national statistics. In 2006, the value from the EU ETS energy data for lignite combusted for power generation was 52.36 PJ, whereas the value from the national statistics data was 54.48 PJ. This results in a significantly higher CO_2 IEF for 2006. The ERT recommends that if Hungary continues to report AD from the EU ETS for solid fuel combusted in the energy sector, an explanation should be provided in the NIR as to how time-series consistency is maintained for the AD. The ERT also recommends that Hungary reconcile and explain the differences in AD between the two sources of AD.

60. Hungary reported a decrease in the CO_2 IEF for solid fuels in the iron and steel category between 2005 (106.00 t CO_2/TJ) and 2006 (98.58 t CO_2/TJ). Hungary explained that coke oven gas, which was reported under energy industries, was reallocated for the period 2006–2008 to iron and steel. Hungary informed the ERT that it intends to correct

this inconsistency for the years prior to 2006: most of the data is available but is missing for 1994. The ERT recommends that Hungary use the recalculation approaches suggested by the IPCC good practice guidance (e.g. interpolation) until more accurate data become available. The ERT recommends that Hungary make this correction to ensure time-series consistency and include sufficient documentation on the EFs, AD, methodologies and any assumptions used.

Coal mining and handling – CH_4

61. Since the base year (the average of the period 1985–1987) underground mining activity in Hungary has decreased. At present, the NIR reports that there is limited information upon which to disaggregate below-ground mining and above-ground mining of brown and black coal. Emissions from coal mining and handling have fallen from 43.95 Gg CH_4 (923.01 Gg CO_2 eq) in the base year to 1.00 Gg CH_4 (21.10 Gg CO_2 eq) in 2008. Hungary has stated that it intends to disaggregate AD and emissions from brown and black coal mining into above- and below-ground mining. There are no emissions associated with above-ground mining. The ERT recommends that Hungary disaggregate the data on coal mining and provide further information to explain the emission trends in this category. This will improve the transparency of emissions and reduce the uncertainty of emissions from this category.

4. Non-key categories

Stationary combustion: gaseous fuels – N_2O

62. The N_2O EFs for gaseous fuels in stationary combustion are from different data sources and do not appear to be fully consistent and comparable. For example, the country-specific natural gas N_2O EFs for power stations and direct heating stations are 3.00 kg/TJ and 5.00 kg/TJ, respectively (Tajthy, 1994), while the N_2O EF for petroleum refining is taken from the 2006 IPCC Guidelines and is 30 and 50 times lower (i.e. 0.10 kg/TJ) (Tajthy, 1994). During the review, Hungary could not demonstrate how the choice of CH_4 and N_2O EFs from sources other than the Revised 1996 IPCC Guidelines could be justified, nor could it explain how Hungary's national circumstances determine the choice of EFs. The ERT recommends that Hungary provide justification in the NIR to support its selection of N_2O EFs for stationary combustion from references other than the Revised 1996 IPCC Guidelines.

Civil aviation: liquid fuels – CO_2, CH_4 and N_2O

63. Previous review reports have noted that emissions and AD for civil aviation are only reported for the base year, 1999, 2000, 2001 and 2006. Hungary reported that, in recent years, aviation gasoline has not been separated from other gasoline due to a lack of information in the national statistics. Emissions from civil aviation are reported together with road transportation in the missing years. The ERT recommends that Hungary report both fuels separately and investigate, together with transport and civil aviation authorities, the possibility of constructing a time series of AD for civil aviation on the basis of landing and take-off activities.

5. Areas for further improvement

Identified by the Party

64. During the review, Hungary provided the ERT with the following list of specific planned improvements:

(a) The completion of a peer review of the energy sector;

(b) Continuing to improve data collection for the whole time series;

(c) The update of the country-specific and plant-specific EFs for CH_4 and N_2O;

(d) The implementation of the COPERT model for road transportation non-CO_2 emissions;

(e) The reallocation of sectoral natural gas consumption (currently, expert judgement is used before 1998 for some industrial sectors);

(f) The improvement of fugitive emissions from coal mining (separating AD for brown and black coal mining);

(g) The inclusion of CO_2 production for soft drink manufacture.

Identified by the expert review team

65. The ERT identified the following areas for improvement:

(a) The completion of the proposed peer review of the energy sector, paying special attention to: reconciling the difference between the sectoral and reference approaches, reconciling energy data between the IEA data and the CRF tables, confirming that there are no omitted emission sources, reporting some activities that are currently not reported separately (e.g. aviation gasoline) and improving time-series consistency;

(b) Reporting planned improvements to the energy sector with an indicative time frame;

(c) Demonstrating how the planned improvements prioritize recommendations from the review reports, regarding the uncertainty analysis and the key category analysis;

(d) The provision of clear documentation on the justification for the selection of EFs;

(e) The production of CO_2 for soda drink (or soft drink) manufacture was not seen as a priority by the ERT.

C. Industrial processes and solvent and other product use

1. Sector overview

66. In 2008, emissions from the industrial processes sector amounted to 4,812.20 Gg CO_2 eq, or 6.6 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 406.30 Gg CO_2 eq, or 0.6 per cent of total GHG emissions. Since the base year, 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, emissions have decreased by 55.4 per cent in the industrial processes sector, and increased by 42.8 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 (JI) project on N_2O abatement technology in nitric acid production). The key driver for the rise in emissions in the solvent and other product use sector was an increase in N_2O used as anaesthesia. Within the industrial processes sector, 47.2 per cent of the emissions were from mineral products, followed by 19.5 per cent from consumption of halocarbons and SF_6 and 19.1 per cent from other (industrial processes). Chemical industry accounted for 8.6 per cent and metal production for 5.6 per cent.

Completeness

67. The CRF tables include estimates of all categories of emissions from the industrial processes and solvent and other product use sectors, as recommended by the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Actual and potential HFC emissions from fire extinguisher production and use are reported as "NO". During the review, Hungary informed the ERT that fire extinguishers which are filled with HFCs are produced and used in Hungary. The Party also informed the ERT about its activities to obtain AD, which are currently not available because they are considered confidential by fire extinguisher producers. Further, Hungary informed the ERT that it is currently unable to allocate an appropriate part of the total imported/exported amount of HFCs to the subcategory fire extinguishers. The ERT recommends that Hungary use the notation key "IE" with relevant explanations in the next annual submission and continue its activities to obtain AD and other parameters in order to provide HFC emission estimates from fire extinguisher production and use.

68. As an improvement compared to the 2009 submission, CO_2 emissions from feedstock and potential emission estimates for HFCs from foam blowing and aerosols/metered dose inhalers are reported in the CRF tables and a methodological description is provided in the NIR.

Transparency

69. The information provided in the NIR on the industrial processes sector is generally transparent, with the exception of the category consumption of halocarbons and SF_6, where the methodologies used are often described in a basic way without sufficient detail. The ERT recommends that Hungary describe the methodologies used for the estimates in a more detailed way, including sources of AD and EFs and any relevant assumptions made, in the NIR of its next annual submission.

70. The ERT found that notation keys had not been used appropriately in some cases, including HFC emissions from fire extinguishers (as explained in para. 0 above), CO_2 emissions from soda ash production, CH_4 and N_2O emissions from glass production (reported as "IE" instead of not applicable ("NA")) and SF_6 emissions from disposal (reported as "NE" instead of "NO"). The ERT recommends that Hungary use the appropriate notation keys in its next annual submission.

Recalculations and time-series consistency

71. The time series of some AD, EFs and emission estimates (e.g. from cement and lime production) are not fully consistent because of changes in the analytical method used for the composition analysis of the raw material or the unavailability of some data sources in the in previous years. In the NIR and during the in-country review, Hungary provided sufficient explanation and documents which show its activities to improve time-series consistency. The ERT recommends that Hungary continue its activities to improve time-series consistency, for example by obtaining data about the comparison of the analytical method used for the composition analysis of CO_2 emission estimates from cement production.

72. The 2010 inventory submission shows significant improvements compared to the 2009 submission due to the recalculation of: CO_2 emissions from feedstock and non-energy use of fuels reported under other (industrial processes); CO_2 emissions from cement and ammonia production; and HFC emissions from refrigeration and air-conditioning equipment and aerosols/metered dose inhalers. Hungary explained that these recalculations were performed due to the availability of new AD. The overall impact of the recalculations was an increase in sectoral emission estimates by 20.9 per cent in 2007 and 0.6 per cent in

the base year, mainly due to the increase in CO_2 emissions from feedstock and non-energy use of fuels.

Uncertainties

73. The uncertainty analysis is performed in line with the IPCC good practice guidance using a tier 1 approach. However, for some non-key categories only qualitative rather than quantitative uncertainty estimates are provided, and for the category consumption of halocarbons and SF_6 only overall uncertainty values are provided. The ERT recommends that the Party provide quantitative uncertainty values for all categories.

Verification and quality assurance/quality control approaches

74. Tier 1 QC procedures have been implemented for all categories in the industrial processes sector and the solvent and other product use sector. During the in-country review, only one inconsistency was found, as explained in paragraph 0 below. This omission had no influence on the total emission estimates. As an improvement compared to the 2009 submission, Hungary provided a report on QA checks for the industrial processes sector. The report evaluates the entire process of preparing the inventory of GHG emissions from the industrial processes sector. The ERT welcomes Hungary's efforts in this regard and encourages the Party to provide more detailed descriptions of its QA/QC procedures in future annual submissions.

2. Key categories

Cement production – CO_2

75. CO_2 emissions from cement production are estimated based on plant-specific data from the EU ETS for the years 2005–2008. The plant-specific data are derived from a derivatographic analysis of CO_2 production from raw material and raw material consumption. This method corresponds to a tier 3 method from the 2006 IPCC Guidelines and is in line with the IPCC good practice guidance. For the years prior to 2005, raw material consumption is used as a basis for the CO_2 emissions calculation, but a different analytical method is used for the estimates of carbonate content. The use of different methods for the calculation of CO_2 emission estimates renders the time series inconsistent. The ERT reiterates the recommendation from the previous review report that Hungary examine whether time-series consistency can be further improved (e.g. by obtaining information about the methodological comparison or by using the IPCC good practice guidance, chapter 7) and report the results in its next annual submission.

Lime production – CO_2

76. Emissions from this category are estimated in accordance with the IPCC good practice guidance, and a tier 1 methodology and default EF are used. During the review, Hungary provided information showing that the AD were received directly from the operators or, for the early 1990s, from the national statistical office. In response to a question raised by the ERT, the Party explained that data from the EU ETS are also available and that these data are used for the verification of tier 1 emission estimates. Hungary also informed the ERT that the use of EU ETS data is planned for the future. The ERT recommends that Hungary provide a description of the time-series consistency and, if it finds that the time series is not consistent, examine whether the time-series consistency can be further improved by using the IPCC good practice guidance and report the results in the NIR of its next annual submission.

Ammonia production – CO_2

77. Hungary describes in the NIR that the methodology used to estimate CO_2 emissions from ammonia production is based on natural gas consumption, a method which was repeatedly recommended by previous review reports, and the AD used are based on information from both the ammonia-producing factory and national energy statistics. The ERT found that the CO_2 IEF (1.338 CO_2 t/tNH_3) is not in line with the above-mentioned methodological description. During the review, Hungary provided the ERT with information showing that one ammonia production plant uses hydrogen which comes from a chemical plant and the CO_2 emissions from hydrogen production are reported under chemicals in the energy sector. The ERT recommends that Hungary include this information in the NIR of its next annual submission.

Nitric acid production – N_2O

78. In Hungary, there is one nitric acid production plant, which had two production lines until 2007. The two production lines used different technologies to produce nitric acid. The EFs for nitric acid production are derived from measurement data for 2004 onwards from one of the production lines covering 80 per cent of the production. Hungary reported in the NIR that, on the basis of the measurements taken in 2004, the EF of the other production line was revised. The NIR also describes the revision of EFs in the subsequent years as a result of continued measurements. The ERT welcomes Hungary's efforts to ensure time-series consistency.

79. Hungary also reported in the NIR that a new N_2O abatement technology had been installed and put into operation in 2007. At the same time, all other production lines were closed. During the review, Hungary provided additional documents, which described the measurement system and confirmed the reduction in N_2O emissions as a result of this JI project, and annual reports for the years 2008 and 2009. The ERT noted that this JI project led to a dramatic reduction (more than 99 per cent) in the N_2O EF for the year 2008 compared to the year 2007. The ERT recommends that Hungary provide this information in its next annual submission.

Iron and steel production – CO_2

80. The NIR provides information that all CO_2 emissions from coke use for pig iron production are reported under iron and steel in the energy sector and that for CO_2 emission estimates from steel production the IPCC good practice guidance methodology is used. During the review, Hungary confirmed this information. The ERT found that, in this case, CO_2 emissions from coke have potentially been double counted in Hungary's GHG inventory. The ERT recommends that Hungary investigate this issue and provide information on its investigation in the NIR of its next annual submission.

Consumption of halocarbons and SF_6 – HFCs and PFCs

81. The NIR includes information on the methodology, sources of AD and EFs used to estimate HFC and PFC emissions from the consumption of halocarbons and SF_6; however, the methodology and parameters used are not transparently described in the NIR. In response to a question raised by the ERT, Hungary clarified the principles on which the emissions are estimated. The ERT reiterates the recommendation made in the previous review report that Hungary improve the transparency of the NIR by explaining which IPCC tiers are used for the estimation of emissions and by reporting the relevant parameters used for each subcategory in the NIR of its next annual submission.

82. The ERT found that actual emissions from aerosols/metered dose inhalers are much higher than potential emissions for the period 2006–2008. Hungary provides the

explanation that both actual and potential emissions were recalculated resulting in a substantial increase in HFC emissions for the years 2006–2008 but only actual emissions were updated and reported in the CRF tables. The ERT recommends that Hungary update the potential emissions values in the CRF tables for the next annual submission.

3. Non-key categories

Consumption of halocarbons and SF_6 – SF_6

83. The ERT found that for some years (e.g. 1986, 1987, 1989, 2006 and 2007) actual emissions from electrical equipment are higher than potential emissions. Hungary explained that different AD are used for the emission estimates. To estimate potential SF_6 emissions, data from an import/export balance are used, and to estimate actual SF_6 emissions, data from the energy distribution company on SF_6 use for filling in new equipment or refilling old equipment are used. The ERT recommends that Hungary include the above-mentioned methodology and AD description in the NIR of its next annual submission. The ERT encourages Hungary to explore the differences in the two data sets and provide information on the results in its next annual submission.

4. Areas for further improvement

Identified by the Party

84. Hungary identified the following areas for improvement in the 2010 annual submission: the development and application of category-specific QA/QC and verification procedures for the new category other (industrial processes) and data refining of fluorinated gases (F-gases) consumption.

Identified by the expert review team

85. The ERT identified the following areas for improvement:

(a) The reiteration of the recommendation made in the previous review report that Hungary improve and provide information about time-series consistency (e.g. for cement, lime and glass production);

(b) The improvement of transparency by describing the methodologies used for the emission estimates in more detail, including AD, sources of AD and EFs, and any relevant assumptions made, in the NIR of its next annual submission;

(c) The review of the methodology used to estimate CO_2 emissions from steel production;

(d) The improvement of the use of notation keys.

D. Agriculture

1. Sector overview

86. In 2008, emissions from the agriculture sector amounted to 8,783.08 Gg CO_2 eq, or 12.0 per cent of total GHG emissions. Since the base year, emissions have decreased by 49.8 per cent. The key driver for the fall in emissions is a reduction in animal numbers and a decline in synthetic fertilizer use in the early 1990s. Within the sector, 59.1 per cent of the emissions were from agricultural soils, followed by 22.1 per cent from manure management, 18.6 per cent from enteric fermentation and 0.1 per cent from rice cultivation.

87. In the agriculture sector, all relevant IPCC categories are estimated. Emissions from prescribed burning of savannas and field burning of agricultural residues are reported as not occurring in Hungary. The use of notation keys is not always in line with the UNFCCC reporting guidelines. For the categories mentioned above, the notation key "NO" should be used in CRF table 4 and the sectoral background tables 4.E and 4.F instead of "NA" or "NA, NO".

88. The ERT commends Hungary for its efforts to further increase the accuracy of its estimates by developing country-specific EFs. The improved calculations resulted in a decrease of 6.0 per cent in GHG emissions in 2007 compared to the 2009 submission.

89. In response to the previous review, some improvements in the documentation of gross energy (GE) intake, the methane conversion rate (Y_m) and the allocation of waste to animal waste management systems have been made in the NIR. Additional information on the selection of parameters used for the calculation of direct N_2O emissions from agricultural soils has been added in the NIR, but there is still a lack of transparency. In the course of the review, Hungary provided additional information that made it possible for the ERT to assess the estimates. The ERT recommends that Hungary improve the transparency of the NIR by including this information in its next annual submission.

90. In 2010, Hungary prepared an internal QA report for the agriculture sector. The report includes information on the choice of input data and validation, and additional suggestions for further improvements are also described. The Party indicated that it plans to compile such a report every two to three years. The ERT welcomes Hungary's plans to periodically conduct sectoral peer reviews.

2. Key categories

Enteric fermentation – CH_4

91. The GE intake of dairy cattle (350.19 MJ/head/day) is the highest of all reporting Parties (180.02–339.10 MJ/head/day). The GE intake was calculated on the basis of data processed by the WinLp computer program on the nutrition of dairy cows. The program considers 69 fodders most commonly used in Hungarian dairy farms and calculates the nutritional requirements and the expected dry matter intake depending on parameters such as yearly body mass, milk yield, and other parameters characterizing Hungary's dairy cattle population. The difference compared to the 2009 calculation was explained by the use of a new conversion factor for the calculation of the GE intake from the net energy intake based on a Swiss study (Soliva, 2006).[6] Additionally, in the 2009 submission the WinLp computer program calculated a lower dry matter consumption, but, due to a lack of documentation, the reason for this could not be found. During the review, the Party indicated that it will re-check its GE consumption data. The ERT recommends that Hungary fully document its (re)calculations in the next NIR.

92. For dairy cattle, Hungary estimated an average body mass of 600 kg in 1985 and 650 kg from 2005 onwards. In response to questions raised by the ERT during the review, the Party explained that no extrapolation had been made, as the rate of growth in body mass is not constant, and Hungary's experts explained that the value of 650 kg is the best estimate for the years 2005–2008. The ERT recommends that Hungary provide supporting information for this value in the next NIR.

[6] Soliva, C.R. 2006: Dokumentation der Berechnungsgrundlage von Methan aus der Verdauung und dem Hofdünger landwirtschaftlicher Nutztiere. Im Auftrag des Bundesamtes für Umwelt, Bern. ETH Zürich, Institut für Nutztierwissenschaften. <http://www.environment-switzerland.ch/climatereporting/00545/01913/index.html?lang=en>.

93. Hungary calculated CH_4 emissions from non-dairy cattle on the basis of the weighted average body mass of cattle subcategories. The GE intake was estimated on the basis of regression equations used in the Hungarian Nutrition Codex. Following the IPCC good practice guidance, depending on the level of detail in the inventory, the calculations should be should be performed on a subcategory level. The ERT welcomes Hungary's plan to improve the methodology used by developing an enhanced livestock characterization for each subcategory, as suggested in the internal QA report.

Manure management – CH_4 and N_2O

94. Hungary has used a tier 2 methodology for all livestock categories (except rabbits). For dairy cattle and non-dairy cattle country-specific volatile solid (VS) excretion values have been derived; for the remaining livestock categories (except poultry and rabbits), IPCC default VS excretion values have been used. In the NIR, only limited information on the calculation of the VS excretion values is given. In response to questions raised by the ERT during the review, Hungary explained that the VS excretion of non-dairy cattle was calculated on the basis of the weighted average body mass of cattle subcategories (see para. 93 above) and indicated that it plans to calculate emissions on a subcategory level in the 2011 submission. The ERT welcomes this improvement and recommends that Hungary provide clearly structured documentation on the methods and parameters used for dairy cattle, non-dairy cattle and the remaining livestock categories.

95. The VS daily excretion value for poultry used in the Hungarian inventory (0.014 kg VS/day) differs from the IPCC default value (0.10 kg VS/day). No further documentation is provided to explain this value. Hungary addressed this issue in its internal QA report and suggested revising its estimates by using the IPCC default value or by deriving a country-specific value. The ERT welcomes these suggestions and recommends that Hungary provide transparent documentation on its recalculated estimates in its next annual submission.

96. CH_4 emissions from rabbits were calculated using the EF of the Italian inventory as a default value. The ERT recommends that Hungary provide further information on the applicability of the Italian EF for Hungary.

97. The share of liquid systems/swine reported in CRF table 4.B(a) includes "liquid systems", "pit storage < 1 month" and "pit storage > 1 month". For the methane conversion factor (MCF) a range of 0–39 per cent is given. The ERT encourages Hungary to report "pit storage < 1 month" and "pit storage > 1 month" separately under other animal waste management systems (AWMS). For the MCF, a weighted average value, rather than a range, should be reported. The ERT recommends that Hungary provide information on other AWMS in the documentation box in CRF table 4.B(a).

98. In accordance with the IPCC good practice guidance, a tier 1 method and country-specific nitrogen (N) excretion (Nex) values for dairy cattle, non-dairy cattle and swine were used. The ERT commends Hungary's efforts to improve the accuracy of the emission estimates by applying country-specific Nex rates for animals with a major share in emissions.

99. The calculations of Nex rates follow the approach of Koelsch and Shapiro (1997)[7] suggested in Febel and Gundel (2007)[8] as usable in Hungary. The values are in the range of other European countries. However, for swine, a low value is reported (8.13 kg Nex) which

[7] Koelsch, R. and C. Shapiro. 1997. Estimating manure nutrients from livestock and poultry. University of Nebraska Cooperative Extension. File G1334. September 1997.

[8] Fébel, H.Ms. – Gundel, J.: A takarmányozás és a környezetvédelem kapcsolata. [Connection between nutrition and environmental protection]. Állattenyésztés és Takarmányozás. 2007. 56:427-456.

was explained by the low average weight of swine. The ERT welcomes Hungary's plans to further improve the estimates of Nex rates.

100. The AWMS distribution was determined on the basis of the ratios provided in a study of Hungary's animal production (Raki, 2003)[9] and expert consultations (Meszaros, 2000).[10] The proportion of pasture/stall period was determined by expert judgement. All values are held constant from 1985–2008. The Hungarian experts explained that from 2007 onwards technological and environmental modernization took place in Hungary's animal production. The AWMS values will be revised in 2011 when new data from the General Agricultural Census 2010 become available. The ERT welcomes Hungary's plans to update this information.

Direct emissions from agricultural soils – N_2O

101. Hungary applies a tier 1b method to calculate direct N_2O emissions from agricultural soils in accordance with the IPCC good practice guidance.

102. In the CRF table 4.D, for the fraction of total above-ground biomass of N-fixing crop that is N ($Frac_{NCRBF}$), for the fraction of residue dry biomass that is N ($Frac_{NCRO}$) and for the fraction of total above-ground crop biomass that is removed from the field as crop product ($Frac_R$) a value of 0.0 with a reference to the NIR is reported. In the NIR, a range of values is given for all years. The ERT recommends that Hungary report the average values in CRF table 4.D and document in detail the parameters used for calculating the emissions from N-fixing crops and crop residues in the NIR.

103. As noted in the previous review report, additional information supporting the parameters used should be included in the NIR. During the review, Hungary provided a QA report for agriculture including additional information. The ERT recommends that Hungary include this information in its next annual submission.

104. No AD on synthetic fertilizer use are given in the NIR. The ERT recommends that Hungary provide a time series and a trend description in the NIR.

Indirect emissions from agricultural soils – N_2O

105. In the previous review report an inconsistency in the values of the fraction of N input to soils that is lost through leaching and run-off ($Frac_{LEACH}$) between the NIR and the CRF tables was noted. In the 2010 submission this inconsistency was corrected as recommended in the previous review report.

3. Non-key categories

Rice cultivation – CH_4

106. Rice cultivation is only of minor importance in Hungary. In response to the previous review report, Hungary included additional information on the methodological choice used to estimate CH_4 emissions from rice cultivation in the NIR. The ERT considers the use of the IPCC tier 1 methodology appropriate.

[9] Ráki, Z. (2003): Az állattartás épületkapacitása, kapacitáskihasználása és a nagyobb telepek műszaki állapota *[Building capacity, capacity utilization of animal management and the technical status of larger farms]*. Budapest. (unpublished, in Hungarian).

[10] Mészáros Gy., Ministry of Agriculture and Rural Development (2000): Expert judgement, verbal communication.

4. Areas for further improvement

Identified by the Party

107. As outlined in the NIR, a multistage, methodological development programme, jointly with the Research Institute for Animal Breeding and Nutrition, is in progress. Within this programme, further improvements in the calculation of GE intake and VS excretion values for cattle are planned. For the remaining animal categories, the applied IPCC default values will be continuously replaced by country-specific emission factors and parameters. As outlined in the NIR, Hungary plans to revise its AWMS distribution in 2011, taking into account the new results of the General Agricultural Census 2010. In its QA report, Hungary suggests developing country-specific emission factors and parameters for the residue to crop product ratio, dry matter fraction and N fraction of sunflower and rape seed. Improvements to the uncertainty analysis are also planned.

Identified by the expert review team

108. The ERT recommends that the Party provide additional information in the NIR on the assumptions and rationale for the choice of parameters in the development of country-specific EFs. Recalculations should also be described in detail on a subcategory level. In addition, the ERT encourages Hungary to formalize its QC activities for the external institutes and to complete its QC checks before the annual submission due date.

E. Land use, land-use change and forestry

1. Sector overview

109. In 2008, net removals from the LULUCF sector amounted to 3,628.65 Gg CO_2 eq. Since the base year, net removals have increased by 62.1 per cent. The key driver for the rise in removals, as explained in the NIR and by the Hungarian experts, is due to the increases in both the forest land area and its growing stock. However, due to a change in the AD used, the total land area under forest management (2,030.8 kha) is used in this submission, while in previous submissions only the stocked area (about 1,826 kha in the 2009 submission) was used. Hungary has also reported increases in the forest area which are attributed to the fact that the forest inventory each year identifies ("finds") additional forest areas due to unregistered afforestation and the natural expansion of forest, the reclassification of land (previously cropland, grassland, etc.) into forest land, and the continuous development of the forest inventory. In 2008, the area of "found" forests was about 4,798.1 ha. However, the large inter-annual fluctuations in the removals of Hungary, observed in a number of previous review reports, have not yet been fully explained or resolved. In response to the draft review report, Hungary explained that the Hungarian forest inventory system cannot capture all of the true variability; however, owing to the high frequency of its updating of the annual data, it can capture quite a high portion of this variability, which results in seemingly high, but not incorrect, variation in the reported carbon stock changes.

110. Within the LULUCF sector 4,145.39 Gg of removals were reported from forest land, 285.16 Gg of emissions from cropland, 215.01 Gg of emissions from grassland, 11.62 Gg of emissions from settlements and 51.14 Gg of removals from other land.

111. The LULUCF inventory of Hungary is not complete; many carbon pools that are required to be estimated have been reported as "NE", including:

(a) Dead organic matter and soil organic carbon in forest land remaining forest land and land converted to forest land;[11]

(b) Soil organic carbon in settlements converted to cropland;

(c) Soil organic carbon in settlements converted to grassland;

(d) Living biomass and soil organic carbon in other land converted to wetlands;

(e) Soil organic carbon in cropland converted to settlements;

(f) Living biomass and soil organic carbon in grassland, wetlands and other land converted to settlements;

(g) Living biomass and soil organic carbon in wetlands and settlements converted to other land.

112. Hungary indicated that data have not been collected systematically for the dead wood, litter or soil pools. The Party included the results of studies published in the Forest, Forest Focus and Life+ programmes of the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests), and in Somogyi and Zamolodchikov (2007)[12] and provided further references and also made reference to a presentation by Somogyi (2006)[13] to demonstrate that these pools are not a net source of emissions in 2008. Based on these studies, Hungary concluded that it could safely consider that these pools are not a net source of emissions. However, demonstrating that a pool is not a net source 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 mandatory categories, as well as all gases included in the IPCC good practice guidance for LULUCF and the full geographical coverage of the country.

113. The number of carbon pools reported as "NE" in the Hungarian inventory is relatively large (see para. 111 above), without counting the pools in optional categories (e.g. wetlands remaining wetlands). The ERT recommends that Hungary make all possible efforts to improve the completeness of its LULUCF inventory by building on its recent work on land area representation, the best available national EFs and parameters and/or the IPCC default values to estimate all the mandatory categories that are currently reported as "NE".

114. Transparency is also an issue in the reporting of the LULULCF sector of Hungary. There are more than six carbon pools reported as "IE". The information provided in the NIR on the rationale for reporting these pools as "IE" is not complete for all pools or there is not sufficient or convincing information to show that they are included elsewhere in the inventory. These pools include living biomass, dead organic matter and soil from forest land and cropland converted to grassland, settlements, wetlands and other land. Most of these pools are included in the categories forest land remaining forest land, and cropland remaining cropland. Such reporting is not consistent with the IPCC good practice guidance for LULUCF and may lead to the inaccurate allocation of emissions/removals and the inappropriate application of methodologies. In response to questions raised by the ERT during the review, Hungary indicated that there are technical difficulties relating to the use of national data from the national forest inventory (total stock volume) and the national statistical office (aggregated data for perennial crops). The ERT recommends that Hungary

[11] In response to the draft review report, Hungary explained that it uses the tier 1 method from the IPCC good practice for LULUCF, which does not require the estimation of or reporting on deadwood or litter, and that, for forest soils, carbon stocks do not change with management.

[12] Somogyi, Z., Zamolodchikov, D. 2007: Forest Resources and their contribution to global carbon cycles.

[13] Available at <http://afoludata.jrc.it/events/kyoto_technical_workshop/presentations/Z_Somogyi.pdf>.

follow the IPCC good practice guidance for LULUCF and ensure that it applies the relevant methodologies contained therein to the relevant categories, and that the Party report removals/emissions under the corresponding land-use categories.

115. Another issue of transparency is related to the lack of complete documentation in the NIR. As an example, Hungary reported emission estimates from land converted to settlements in the CRF tables; however, no documentation has been provided in the NIR about the methods, AD and other parameters used to derive these estimates. The ERT strongly recommends that Hungary provide complete documentation in the NIR and ensure that it is consistent with the CRF tables.

116. Hungary performed recalculations of its emission/removal estimates for forest land, cropland, grassland and other land, and N_2O emissions from disturbance associated with land-use conversion to cropland. These recalculations were necessary because of the new work on consistent land representation and the new data for lands converted to forest land, based on official annual reports between 1989 and 2008 of the Forestry Directorate of the Central Agricultural Office. Biomass burning is included for the first time and new country-specific values for wood density have been used. As a result, the overall removals from the sector have decreased by 40 per cent on average – the major part of the decrease occurred in the forest land category (26.5 per cent). The ERT commends Hungary for its efforts to improve its national data and the recalculations reported in the NIR and the CRF tables.

117. In the 2010 submission, the uncertainty assessment and QA/QC are mainly qualitative and descriptive for the forest land category, and for cropland the IPCC tier 1 method has been used for the uncertainty assessment. However, Hungary informed the ERT about its recent work on uncertainty and QA/QC for the forest land category which will be reported in its next annual submission.

2. Key categories

Forest land remaining forest land – CO_2

118. The methodologies (tier 2), EFs and other parameters used to estimate CO_2 emissions/removals from forest land remaining forest land are country-specific or IPCC default values, and are consistent with the IPCC good practice guidance for LULUCF. Hungary used the carbon stock change methods of the IPCC good practice guidance, national AD for carbon stock, country-specific wood density parameters and the IPCC default values for root/shoot ratio. Biomass burning is reported based on new data developed through the European Forest Fire Information System (EFFIS).[14]

119. The issue of inter-annual changes in the removals of forest land remaining forest land has been repeatedly raised in previous review reports. The justification provided by Hungary during the review is based on the argument that this is due to the inherent nature of the forest growing stock in Hungary and the fact that there are always new forested land areas that are included in the stock volume and harvested land areas that are removed from the stock volume. The materials and presentations provided during the review show that there is a steady increase in the land areas and in the growing stock of forest land remaining forest land. The rate of the annual growth in both the land areas and the stock volume is not consistent with the fluctuations observed in the annual removals. The ERT does not find the justification provided sufficient to clarify the current inter-annual fluctuations in the removals. Since this issue has been raised in previous review reports, the ERT recommends that Hungary make efforts to obtain data and information that better clarify this situation and provide such materials and justifications in its next annual submission.

[14] Available at <http://effis.jrc.it> or <http://www.jrc.cec.eu.int/>.

120. Dead organic matter and soil organic carbon are reported in CRF table 5.A as "NE". In the NIR, Hungary states that these pools are assumed not to be a net source of emissions. The UNFCCC reporting guidelines require all sources and sinks as well as all gases included in the IPCC good practice guidance for LULUCF to be estimated. Since this is a key category, The ERT recommends that Hungary provide estimates for these carbon pools in its next annual submission.

Cropland remaining cropland – CO_2

121. The methodologies, default EFs and other parameters used to estimate CO_2 emissions from cropland remaining cropland are consistent with the IPCC good practice guidance for LULUCF. Hungary used the tier 1 gain and loss methodology, in particular equation 3.2.2 of the IPCC good practice guidance for LULUCF. AD are from the national statistical office.

122. The carbon stock change in living biomass in cropland converted to settlements and cropland converted to other land is included under this category. Hungary explained that this is because the data from the national statistical office is recorded in an aggregated form for perennials (e.g. vineyards and orchards). The methods of the IPCC good practice guidance for LULUCF for cropland converted to settlements and cropland converted to other land are different from the methods used to estimate emissions and removals from cropland remaining cropland because of the consideration of biomass before and after conversion.

123. The estimation and reporting of these carbon pools under cropland remaining cropland may lead to inaccurate estimates and an inappropriate allocation of emissions/ removals. The ERT recommends that Hungary use higher-tier methods for such a key category, as recommended by the IPCC good practice guidance for LULUCF, ensure that it applies relevant methods to each category and report emissions/removals in accordance with the IPCC good practice guidance for LULUCF.

3. Non-key categories

Land converted to forest land – CO_2

124. The methods used to estimate CO_2 emissions and removals from land converted to forest land are generally consistent with the IPCC good practice guidance for LULUCF. Emissions and removals in this category are estimated based on good quality data (for the period 1989–2008) from the national statistical office. Areas under this category are relatively small because Hungary does not follow the IPCC default time frame of 20 years for reporting/accounting land under a conversion state.

125. Hungary indicated that it has difficulties related to national statistics, since newly afforested lands are registered after inspection and automatically included in the forest land remaining forest land category. Therefore, it uses different time frames ranging from two to 14 years based on the species and other growth conditions of the forests. The IPCC good practice guidance for LULUCF defines the 20-year default time frame as a minimum time frame for soil carbon to reach stability; the time frame used by Hungary may not allow soils to reach stability after disturbance associated with a conversion.

126. Hungary has a national forest inventory based on subcompartments, in which the area and stock volume of each subcompartment is known and recorded. Based on these data, the ERT encourages Hungary to make efforts to estimate the land area and stock volume of land converted to forest land using the 20-year IPCC default time frame. The ERT therefore recommends that Hungary report lands under a conversion state (land converted to forest land) consistent with the IPCC good practice guidance for LULUCF. In

response to the draft review report, Hungary explained that it used this approach as it thought that it would provide the most accurate estimate owing to the fact that it uses the best data available. Hungary considers its approach to be correct, at least for biomass, from a theoretical point of view. In any case, Hungary has started to consider replacing its approach with the IPCC default approach.

Land converted to other land – CO_2

127. The inclusion of abandoned grassland and cropland set-aside into the category other land is not consistent with the IPCC good practice guidance for LULUCF definition for other land. As a result, the area of other land increased threefold between 1985 and 2008 (table 7.2 of the NIR) and will continue to increase when more areas of cropland and grassland set-aside or abandoned are classified in the same manner.

128. The classification of land uses and the treatment of other land in this manner may lead to both methodological and reporting implications that are not consistent with the IPCC good practice guidance for LULUCF. Hungary estimated the areas of cropland set-aside and abandoned grassland based on the decrease in the total areas of grassland and cropland in the national statistics because the national statistics do not record lands that are abandoned or set-aside. However, instead of classifying the estimated areas into their relevant categories, Hungary included both areas in the other land category. The ERT recommends that Hungary follow the IPCC good practice guidance for LULUCF in classifying its national land use areas into their relevant IPCC categories.

4. Areas for further improvement

Identified by the Party

129. In the NIR and during the in-country review, Hungary identified the following plans for improving its LULUCF GHG inventory:

(a) Further verification of both the AD and the EFs applied still appears to be necessary. Also, a more complete description of the Hungarian forestry and forest inventory system, in order to improve the documentation provided, is planned for the reporting under the Kyoto Protocol;

(b) In 2008, a new method was designed and introduced into the National Forest Database to identify deforested areas. The operation of this data collection in the introductory year will be revised at a later date; however, the current submission is based on these data, and improvements in data quality will continue in future annual submissions;

(c) There are plans to collect data on litter and lying dead wood based on a systematic sampling grid of 4×4 km, used in the Forest, Forest Focus and Life+ programmes of ICP Forests. Over 1,000 plots will be surveyed in 2010;

(d) The reporting of uncertainty and QA/QC.

Identified by the expert review team

130. The ERT identified the following areas for improvement:

(a) Transparency: a number of carbon pools are reported as "IE" without clear explanations in the NIR or the CRF tables as to where they are included;

(b) Completeness: a number of pools are reported as "NE" without adequate documentation in the NIR;

(c) Consistency and comparability in the definition of land use, land-use classification, the reporting of carbon pools under the relevant land-use categories and the reporting of lands under a conversion state using the 20-year IPCC default time frame;

(d) The need to adequately address recommendations from previous review reports;

(e) The reporting of uncertainty and QA/QC.

F. Waste

1. Sector overview

131. In 2008, emissions from the waste sector amounted to 3,814.18 Gg CO_2 eq, or 5.2 per cent of total GHG emissions. Since the base year, emissions have increased by 28.3 per cent. The key driver for the rise in emissions is due to the fraction of municipal solid waste (MSW) disposed to solid waste disposal sites (SWDS) increasing from 0.59 to 0.79, and the waste generation rate increasing from 1.1 kg/capita/day to 1.2 kg/capita/day. Within the sector, 79.2 per cent of the emissions were from solid waste disposal on land, followed by 19.0 per cent from wastewater handling, and 1.7 per cent from waste incineration. Emissions from wastewater handling have shown a decreasing trend due to the growing number of dwellings connected to the public sewage network.

132. The CRF tables are complete; however, there is a lack of transparency in the NIR. The ERT recommends that Hungary provide an analysis of the key drivers for the increasing and decreasing emission trends of different subcategories in its next annual submission. Information on uncertainty and sector-specific QA/QC has been included in the NIR. The ERT recommends that Hungary continue its efforts to improve the sector-specific QA/QC procedures.

2. Key categories

Solid waste disposal on land – CH_4

133. CH_4 emissions from solid waste disposal on land amounted to 3,021.39 Gg CO_2 eq in 2008 based on the first order decay (FOD) method. Compared with the base year, CH_4 emissions have increased by 57.6 per cent. Within this category, Hungary reported CH_4 emissions from managed waste disposal sites while the notation key "NA" was used for unmanaged waste disposal sites. The ERT noted that in the NIR the MCF was reported as 1.0, which is a default value for managed solid waste disposal on land. Hungary reported the amount of MSW deposited at SWDS as 3,493.57 Gg and the fraction of MSW disposed to SWDS as 79 per cent for the year 2008. This means that 21 per cent of annual MSW is not treated at SWDS, leading to a possible underestimation of emissions. In CRF table 6.C, Hungary reported that 63.66 Gg of waste was treated by waste incineration. If all incinerated waste is MSW, there is still around 865.01 Gg of waste which does not seem to be accounted for. In response to questions raised by the ERT during the review on this possible omission of emissions from the waste sector, Hungary provided revised estimates for the waste category on 8 November 2010, including for solid waste disposal on land. Further, Hungary provided information on how the MSW was split into different waste streams. In the information provided by the Party it is clear that all MSW is accounted for in the inventory.

134. AD and EFs as well as relevant parameters used are included in the NIR, but the NIR is not fully transparent. The ERT reiterates the recommendation in 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 also recommends that

Hungary describe the methodology, the AD (the annual amount of MSW and the amount treated at SWDS) and the EFs (DOC, MCF and DOC_f, etc.) in its next annual submission. The ERT recommends that Hungary check the MCF for the years 1998, 1999 and 2000 (0.98, 0.98, and 0.96), which are different from the IPCC default value (1.0). If the values are correct, the ERT recommends that Hungary provide additional information on these values in the next NIR.

Wastewater handling – CH_4

135. CH_4 emissions from wastewater handling amounted to 526.63 Gg CO_2 eq using the EFs recommended by the 2006 IPCC Guidelines. Compared with the base year, CH_4 emissions from wastewater handling have decreased by 37.8 per cent, mainly due to the proportion of the population connected to public sewage systems and because secondary and tertiary treatment of wastewater has increased. Within this category, the total organic product from sludge of industrial, and domestic and commercial wastewater was reported as "NE" in CRF table 6.B, but the CH_4 emissions from sludge of industrial wastewater were reported as "IE". The ERT recommends that Hungary check the use of the notation keys, change them as appropriate and provide additional information about the category.

136. In order to improve transparency, the ERT recommends that Hungary provide more information and descriptions about the methodologies, AD, EFs and relevant parameters used, and that it focus in particular on the country-specific method and EFs.

137. Hungary reported that the data are checked by an independent institution, but that there is still a need for improvement. The ERT recommends that Hungary implement its QC procedures for wastewater handling.

3. Non-key categories

Wastewater handling – N_2O

138. N_2O emissions from human sewage were estimated using the IPCC default method, parameters and EF. Emissions from wastewater handling accounted for 99.0 per cent of total N_2O emissions from the waste sector. The notation key "NE" was used for N_2O emissions from sludge of industrial wastewater, but "NA" was reported for the IEF of N_2O from sludge of industrial wastewater. The ERT encourages Hungary to estimate N_2O emissions from industrial wastewater handling. If this is not possible, the ERT recommends that Hungary check the use of the notation keys and correct them, if necessary, in its next annual submission.

Waste incineration – CO_2, CH_4 and N_2O

139. For the first time, Hungary has reallocated its emissions from waste incineration for energy purposes to the energy sector. Emissions from all waste incineration reported in the waste sector for 2008 amount to 66.58 Gg CO_2 eq. To improve transparency, the ERT encourages Hungary to provide more information about the AD (MSW, industrial solid waste, hazardous waste, clinical waste and sewage sludge, etc.), the waste composition of the incinerated waste, and the EFs and relevant parameters used to estimate emissions from waste incineration in its next annual submission. The ERT reiterates a recommendation from the previous review report that Hungary enhance the transparency of reporting for the category by providing further details on the composition of incinerated waste.

4. Areas for further improvement

Identified by the Party

140. Following the recommendation in previous review reports, Hungary will seek to provide further justification of its assumption that illegally disposed waste does not lead to significant CH_4 emissions. Hungary expects more complete recovery data from SWDS in the future, and will explore ways of finding waste composition data that are representative for parts of the country other than Budapest.

141. According to a recently adopted legal instrument, Governmental Decree No. 220/2004 (21 July 2004) on the Protection of Surface Water Quality, wastewater handling operators are obliged to supply detailed data provided that the rate of emission exceeds 15 m^3/day or the wastewater contains hazardous substances. As a result, more detailed information is expected to become available in the future. The consistency of the time series has to be verified for commercial and domestic wastewater and, in the case of industrial wastewater, it has to be established.

Identified by the expert review team

142. The ERT recommends that Hungary check the consistency between the CRF tables and the NIR, and strengthen its QA/QC procedures in the waste 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

143. Hungary has elected forest management under Article 3, paragraph 4, of the Kyoto Protocol. It has chosen to account for all activities under Article 3, paragraph 3, of the Kyoto Protocol annually as well as for the elected forest management activity.

144. At the time of the in-country review, the NIR did not contain the supplementary information specified in paragraphs 6–9 of the annex to decision 15/CMP.1 for the documentation of KP-LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. In response to questions and issues raised by the ERT prior to the in-country review, Hungary responded that all answers would be provided "by the in-country review, and within six weeks after that".

145. During the in-country review, the Hungarian experts made four presentations to the ERT, covering most of the information and documentation required in the annex to decision 15/CMP.1. Hungary also informed the ERT that this supplementary information, including a revised version of the CRF table submitted to the UNFCCC secretariat on 25 May 2010, would be submitted after the in-country review within the time frames provided in the "Guidelines for review under Article 8 of the Kyoto Protocol".

146. The ERT discussed with LULUCF experts in Hungary the reporting requirements for KP-LULUCF, the issue of area identification and the ability of the Hungarian national system to perform this task to the satisfaction of KP-LULUCF reporting requirements, in particular the technical difficulties in the tracing and reporting of deforestation activities since 1990, and gave its observations on the information presented during the in-country review. From these discussions, the ERT found that Hungary's national system has the technical capacities to perform the required reporting tasks; however, the issue of the availability of financial resources was highlighted as the main reason that had caused the

delay in the submission of KP-LULUCF supplementary information. Hungary also informed the ERT that a new Governmental Decree (No. 345/2009) had entered into force at the end of 2009: this decree formalized the roles of the Forestry Directorate of the Central Agricultural Office and the Forest Research Institute in the preparation of the national inventory of Hungary in relation to the LULUCF sector and the supplementary reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

147. Hungary submitted a revised NIR and CRF tables including the KP-LULUCF supplementary information on 8 November 2010, as requested by the ERT, in line with the provisions set out in paragraphs 5–9 of the annex to decision 15/CMP.1. The revised submission contains the reporting of all activities under Article 3, paragraph 3, namely afforestation and reforestation, and deforestation and one activity, forest management, elected by Hungary under Article 3, paragraph 4, of the Kyoto Protocol. Hungary reported all pools; however, some pools were reported as "NE", and information was provided to demonstrate that these pools were not a net source of emissions in 2008 (based on the methodology included in the 2006 IPCC Guidelines and expert judgement). These pools include dead organic matter and soil in all afforestation, reforestation and forest management activities.

148. With regard to area identification, Hungary used reporting method 1 "broad area identification" and identified two main geographical locations – North Hungary and South Hungary – encompassing the area of all units of land under KP-LULUCF activities. The information provided clearly indicates the units of land under Article 3, paragraph 3, which would otherwise be included under the elected activities under Article 3, paragraph 4, of the Kyoto Protocol and how double counting has been avoided. The NIR does not include more detailed information (e.g. geo-reference data) on how these units of land can be located. The ERT encourages Hungary to make more efforts to provide detailed information in accordance with paragraph 6(b) of the annex to decision 15/CMP.1 so that KP-LULUCF land areas are clearly identifiable to the ERT in the next annual submission.

149. In 2008, Hungary's KP-LULUCF activities resulted in net removals of 2,784.02 Gg CO_2 eq from forest management and 1,125.09 Gg CO_2 eq from afforestation/reforestation, and emissions of 34.61 Gg CO_2 eq from deforestation.

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

Afforestation and reforestation – CO_2, CH_4 and N_2O

150. The supplementary information submitted by Hungary in response to the issues raised by the ERT provides a detailed description of how the inventory methodologies have been applied in the estimation of removals from afforestation/reforestation activities. The methods and parameters used are appropriate and Hungary has applied the stock change method of the IPCC good practice guidance for LULUCF and has used national AD and country-specific wood density parameters and default values for the root/shoot ratio to derive its estimates for the above- and below-ground biomass pools.

151. Hungary reported the soil, dead wood and litter pools as "NE" and provided transparent information, including some verifiable information, to demonstrate that these pools were not a net source of emissions in 2008. The justification provided includes information based on results of case studies (references provided by the Party), limited measurements, expert judgement and knowledge of a likely system response. The information provided also demonstrated that conservativeness was a key factor used by Hungary in the selection of parameters and assumptions in preparing this justification and in its KP-LULUCF inventory preparation.

152. The ERT commends Hungary for providing such transparent information and encourages the Party to improve the justifications for non-accounted pools in future submissions by including more information on, for example, whether dead wood and litter are used in any way or remain on the ground and also by adding more verifiable information.

Deforestation – CO_2, CH_4 and N_2O

153. The information provided by Hungary explains that the exact area and location of deforested areas is not available for all years since 1990. Hungary informed the ERT that two data sets have been used to estimate the area of deforestation. Although there is a paper-based record of certificates from the National Forestry Database, which includes permits issued for deforestation purposes, it is not certain whether it includes all the areas deforested since 1990 and for practical reasons it is difficult to retrieve all the deforestation information from these records. The official annual reports on deforestation, which are a more reliable data source describing the sum of the areas deforested, are available only for the years 2003–2008. Hungary also provided a description of the methodology used to estimate the area of deforestation based on these two data sets. The methodology shows that a sample-based study was conducted to compare the areas of deforestation in the paper-based record data set, which was found to be smaller by a factor of 1.18 compared to the reliable (surveyed) data of the official annual reports for the years 2003–2008. Therefore, this factor has been used to adapt the estimated deforestation areas between 1990–2008 from the paper-based records in each geographical location. The ERT encourages Hungary to undertake further work to retrieve all the necessary information required for developing more accurate estimates and accounting of deforestation under the Kyoto Protocol, including information on area, location and current land use.

154. Hungary applied the stock change method to estimate emissions from deforestation and assumed that the carbon stock in biomass and dead organic matter in the deforested area at the beginning of the inventory year (2008) is equal to zero regardless of the type of current land use and the time lapse since the deforestation occurred. For soils, carbon stock IPCC default values have been used to derive emission estimates. The resulting estimates may be conservative; however, the ERT encourages Hungary to undertake further efforts to identify current land use in the area deforested since 1990 and apply the relevant methodologies of the IPCC good practice guidance for LULUCF.

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

Forest management – CO_2, CH_4 and N_2O

155. In the NIR, the area of forest management is derived in a clear way, double counting is avoided and justification is provided as to why, for Kyoto Protocol reporting, Hungary has used the total area of stands (subcompartments), while for Convention reporting, Hungary has used the total area of forest land (including roads and other non-forested areas).

156. Forest management activity is the largest net sink in Hungary contributing 2,784.02 Gg CO_2 eq of removals in 2008. The methods and parameters used to estimate the removals from forest management activity are appropriate, Hungary has applied the stock change methods of the IPCC good practice guidance for LULUCF and has used national AD and country-specific wood density parameters and default values for the root/shoot ratio to derive its estimates for the above- and below-ground biomass pools.

157. Hungary has reported the soil, dead wood and litter pools as “NE” and has provided the required information to demonstrate that these pools were not a net source of emissions in 2008 (see para. 112 above).

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

158. 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 and recommendations included in the SIAR on the SEF tables and the SEF comparison report.[15] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

159. Information on the accounting of Kyoto 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. Information reported by the Party on records of any discrepancies was found to be consistent with information provided to the secretariat by the ITL.

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

160. 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. The ERT strongly recommends that Hungary report all mandatory information on the accounting quantities for KP-LULUCF in its next and future annual submissions.

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

[15] 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.

Table 4
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4

Activity	*Accounting quantity*	
	As reported	*Final*
Afforestation and reforestation	–1 184 210	–1 159 709
Deforestation	43 509	34 614
Forest management	–3 861 859	–2 784 023
Article 3.3 offset[a]	0	0
Forest management cap	–3 861 859	–2 784 023
Cropland management	0	0
Grazing land management	0	0
Revegetation	0	0

[a] 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 greenhouse gas (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.

162. Based on the information provided in table 4, Hungary shall issue 3,943,732 removal units in its national registry.

National registry

163. 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. However, the SIAR suggested some improvements to the publicly information available. Some of the information is only available in Hungarian and the SIAR suggested that it be translated into English. The ERT recommends that the Party address this issue and report the results in its next annual submission.

Calculation of the commitment period reserve

164. Hungary has reported its commitment period reserve in its 2010 annual submission. Due to a mistake the Party reported its commitment period reserve to be 365,693,265 t CO_2 eq and 368,365,605 t CO_2 eq in the NIR, based on the national emissions in its most recently reviewed inventory (73,138.65 Gg CO_2 eq). During the review, Hungary confirmed that the correct value is 365,693,265 t CO_2 eq. The ERT disagreed with this figure. After the in-country review, in response to questions raised by the ERT, Hungary revised the estimates in its most recently reviewed inventory (for the year 2008) to be 73,426.12 Gg CO_2 eq and reported its calculation of the commitment period reserve to be 367,130,614 t CO_2 eq. The ERT agrees with this figure.

3. Changes to the national system

165. Hungary provided information on the changes to its national system in its annual submission, the most important change being the entry into force of Governmental Decree No. 345/2009 on data provision relating to GHG emissions. During the review, Hungary described that, since the 2010 submission, the Ministry of Environment and Water has become the Ministry of Rural Development. The ERT concluded that, taking into account the confirmed changes to the national system, Hungary's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1. The ERT recommends that the Party, in its next annual submission, continue to report any change(s) to its national system in accordance with chapter I.F of the annex to decision 15/CMP.1.

4. Changes to the national registry

166. Hungary reported information on the changes to its national registry in its annual submission. The changes are in relation to the registry software and the availability of public information. During the review, Hungary explained to the ERT that within the next month, public information on the registry web page would also be available in English. The ERT concluded that, taking into account the confirmed changes to the national registry, 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 CMP. The ERT recommends that the Party continue to report in its next annual submission any change(s) to its national registry in accordance with chapter I.G of the annex to decision 15/CMP.1.

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

167. Hungary has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its 2010 annual submission. The Party submitted this information on 26 May 2010 and the ERT notes that the submission due date was 15 April 2010.

168. The reported information is considered complete. The reported information is, however, not sufficiently transparent in terms of how the Party's actions actually minimize the adverse impacts on developing countries. During the review, the Party provided the ERT with additional information partly clarifying these issues. Hungary has a Green Investment Scheme (GIS), including a climate-friendly home panel subprogramme and a climate-friendly home energy efficiency subprogramme. The subprogrammes are meant to support the refurbishment and construction of buildings, resulting in energy saving, energy efficiency and emission reductions. As the majority of the energy for heating residential buildings derives from Russian natural gas, it is not clear to the ERT how the GIS helps minimize adverse impacts on developing countries. The ERT recommends that Hungary improve the transparency of the information on the minimization of adverse impacts by providing examples of actions and activities supporting the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in which Hungary is engaged, and their effects on developing countries in its next annual submission.

169. In the 2010 submission, the Party explained that in February 2008 the Government of Hungary adopted a policy framework laid down in Hungary's National Climate Change Strategy (NCCS) for the period 2008–2025. The policy framework is based on extensive scientific research, a wide public consultation process and an impact assessment and

describes how climate policy is integrated into development policy and how emission mitigation projects, cooperation fostering technological transfer and enhanced funding options for climate change related projects will play an integral role in future development projects. Climate research will be integrated into other scientific studies and research activities and the business sphere will be involved in climate-friendly investments in developing countries.

III. Conclusions and recommendations

170. Hungary made its annual submission on 25 May 2010 for the CRF tables and on 26 May 2010 for the NIR. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: Kyoto Protocol units and 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). It does not contain all supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol). This is not in line with decisions 15/CMP.1 and 16/CMP.1. In its submission of 8 November 2010 Hungary provided this information.

171. The ERT concludes that the inventory submission of Hungary has generally 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 1985–2008 and an NIR; these are complete in terms of geographical coverage, years and sectors, and generally complete in terms of categories and gases. Some of the categories, particularly in the LULUCF sector (e.g. soil organic carbon in settlements converted to grassland), the energy sector (distribution of oil products), the industrial processes sector (electrical equipment) and the waste sector (wastewater handling), were reported as "NE" (for the last three categories there is either no methodology available in the Revised 1996 IPCC Guidelines and/or in the IPCC good practice guidance, or the incorrect notation key was used).

172. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has not been fully prepared and reported in accordance with decision 15/CMP.1. Hungary did not report information in the NIR on KP-LULUCF activities. The submission of 8 November 2010 was fully prepared and reported in accordance with decision 15/CMP.1.

173. The Party's inventory is generally in line with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the ERT concluded that Hungary could improve its annual submission by ensuring time-series consistency in all categories, clarifying the choice of methods used in the agriculture sector, providing justifications for the use of national references (EU ETS data, country-specific EFs, etc.), correcting the use of the notation keys, and providing further documentation on the large inter-annual changes in emissions/removals.

174. In its submission of 8 November 2010, Hungary provided all required information with regard to activities under Article 3, paragraph 3, of the Kyoto Protocol. This information in the NIR covers all the requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1. Overall, the ERT considers that the methodologies applied to these activities are in line with the IPCC good practice guidance for LULUCF.

175. 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.

176. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1; however, the ERT identified issues relating to the timeliness of reporting that will need to be addressed by Hungary.

177. 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.

178. Hungary has reported the information requested in 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 2010 annual submission. The information was provided on 26 May 2010. The reported information is considered complete; however, it is not sufficiently transparent in terms of how the Party's actions actually minimize the adverse impacts on developing countries.

179. In the course of the review, the ERT formulated a number of recommendations relating to timeliness of reporting, transparency, time-series consistency, uncertainty, QA/QC, KP-LULUCF and completeness of the information presented in Hungary's annual submission. The key recommendations are that Hungary:

(a) Review the elements of its national inventory system that would enable the timely submission of its inventory report, submit its next report by 15 April 2011 and ensure that all required elements are included in the annual submission;

(b) Improve the completeness of its inventory, especially the LULUCF sector, by estimating all the mandatory categories that are currently reported as "NE";

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

(d) Improve the transparency of the inventory by including more detailed information on all recalculations;

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

(f) Include explanations on the causes for differences in CO_2 emissions higher than 2 per cent between the reference and sectoral approaches in the energy sector;

(g) Improve time-series consistency by using consistent EFs for the whole time series, or providing more detailed explanations for the EFs used;

(h) Implement the key category analyses as part of its prioritization plans for future inventory improvements;

(i) Provide information on QA/QC procedures for all key categories;

(j) Remove the inconsistencies between the CRF tables and the NIR by improving the QC procedures in the final stages of the preparation of the NIR;

(k) Assess the use of notation keys following the UNFCCC reporting guidelines;

(l) Improve the transparency of the reporting on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol by providing more detailed information on the activities undertaken.

IV. Questions of implementation

180. 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>.

Status report for Hungary 2010. Available at <http://unfccc.int/resource/docs/2010/asr/hun.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2010. Available at <http://unfccc.int/resource/webdocs/sai/2010.pdf>.

FCCC/ARR/2009/HUN. Report of the individual review of the greenhouse gas inventory of Hungary submitted in 2009. Available at <http://unfccc.int/resource/docs/2010/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. Gabor Kis-Kovács, Ms. Klára Tarczay, Ms. Edit Nagy and Ms. Katalin Lovas (Hungarian Meteorological Service Greenhouse Gas Inventory Division), Mr. György Borka (Research Institute for Animal Breeding and Nutrition), Mr. Péter Kottek and Mr. Adrienn Horváth (Central Agricultural Office, Forestry Directorate), Mr. Zoltán Somogyi (Forest Research Institute), Mr. József Zsembeli (Karcag Research Institute of the University of Debrecen), Ms. Kinga Szabó (Department of Climate Policy), Ms. Katalin Kőbányai, Ms. Ildikó Babcsány and Mr. Ákos Dénes (National Inspectorate for Environment, Nature and Water), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by Hungary:

A Kormany 345/2009. *(XII.30.) Korm.rendelete az uveghazhatasu gazok kibocsatasaval kapcsolatos adatszolgaltatasrol* (Government decree on data provision relating to GHG emissions 345/2009). Hard copy.

Tajthy, T., 1994: Calculation of emission of air pollution substances (In Hungarian: A légkört szennyezı anyagok kibocsátásának számítása), Technical University, Budapest.

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gas
GE	gross energy
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
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
JI	joint implementation
kg	kilogram (1 kg = 1,000 grams)
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
LULUCF	land use, land-use change and forestry
m^3	cubic metre
MCF	methane conversion factor
MSW	municipal solid waste
NA	not applicable
NE	not estimated
NO	not occurring
Nex	nitrogen excretion
N_2O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SO_2	sulphur dioxide
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change
VS	volatile solids