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Report of the individual review of the greenhouse gas inventory of Hungary submitted in 2005*

* In the symbol for this document, 2005 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Overview

A. Introduction

1. This report covers the centralized review of the 2005 greenhouse gas (GHG) inventory submission of Hungary, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8. The review took place from 10 to 15 October 2005 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalists – Mr. Riccardo de Lauretis (Italy) and Mr. Tinus Pulles (the Netherlands); Energy – Mr. Simon Eggleston (United Kingdom of Great Britain and Northern Ireland), Mr. Tomas Gustafsson (Sweden) and Mr. Francis Yamba (Zambia); Industrial Processes – Ms. Maria Jose Lopez (Belgium) and Ms. Virginia Sena (Uruguay); Agriculture – Mr. Jorge Alvarez (Peru) and Ms. Britta Hoem (Norway); Land Use, Land-use Change and Forestry (LULUCF) – Mr. Sandro Federici (European Community) and Walter Oyhantçabal (Uruguay); Waste – Mr. Faouzi Ahmed Senhaj (Morocco) and Mr. Jose Villarin (Philippines). Mr. Tinus Pulles and Mr. Jose Villarin were the lead reviewers. The review was coordinated by Mr. Harald Diaz-Bone and Mr. Javier Hanna (UNFCCC secretariat).

2. In accordance with the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Annex I Parties", (hereinafter referred to as UNFCCC review guidelines), a draft version of this report was communicated to the Government of Hungary, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

3. Comments indicating that the Party will consider the remarks made by the expert review team (ERT) in its future submissions are not specifically addressed in the final version of the report. In some comments, Hungary provides methodological support or explanations of issues, raised by the ERT in the draft version of this report. In such cases, the ERT leaves the relevant paragraphs unchanged since the ERT's recommendation to include such explanations in the national inventory report (NIR) is still valid. In some instances Hungary indeed announces to include such explanations in the next submissions.

B. Inventory submission and other categories of information

4. In its 2005 submission, Hungary submitted a complete set of common reporting format (CRF) tables for the years 1985–2003, a CRF set of tables averaging the values for 1985, 1986 and 1987 (the base year for Hungary is the averaged value for the three years 1985–1987) and a NIR. Hungary was one of the four Parties which tested the submission software tool CRF Reporter for the 2005 submission. The ERT acknowledged the effort made by Hungary to report its data using the new CRF reporting software. Descriptions of institutional arrangements, quality assurance/quality control (QA/QC) procedures, verification activities and uncertainties are also provided in the NIR. The full list of materials used during the review is provided in the annex to this report.

5. Hungary has not provided the CRF tables for LULUCF as required by decision 13/CP.9 using the land-use categories of the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). Instead it has used CRF table 5 for LULUCF as contained in the CRF Reporting Software for 1985–2002 and the base year, and the 2003 CRF table for Land-use Change and Forestry (LUCF) as contained in the CRF adopted by decision 18/CP.8, which is based on the categories of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines).

C. Emission profiles and trends

6. In 2003, the most important GHG in Hungary was carbon dioxide (CO_2), contributing 72.7 per cent to total[1] national GHG emissions expressed in CO_2 equivalent, followed by nitrous oxide (N_2O), 14.9 per cent, and methane (CH_4), 11.4 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together contributed 1.0 per cent of the total national GHG emissions. The Energy sector accounted for 76.0 per cent of total GHG emissions, followed by Agriculture (12.2 per cent), Industrial Processes 5.8 per cent and Waste (5.7 per cent). Total GHG emissions amounted to 83,219 Gg CO_2 equivalent and decreased by 31.9 per cent from base year (averaged value for the three years 1985–1987) to 2003. Emissions in Hungary show a rapid decrease in the early 1990s caused by the economic transition. Since the mid-1990s there is no apparent clear trend in emissions.

D. Key categories

7. Hungary has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2005 submission. The key category analyses performed by the Party and the secretariat[2] produced similar results.

E. Main findings

8. Most of the required inventory data and methodological information are provided in the CRFs and in the NIR, including methodologies where higher tiers have been implemented in the 2005 submission. The ERT recognizes that the quality of the NIR does not depend on the quality of the language used in that report; however, the ERT also believes that a language check could have made the NIR easier to understand, thus improving the transparency of the Party's submission. The ERT also noted several inconsistencies between the NIR and the CRF tables.

9. Hungary does not have a QA/QC system in place. The ERT strongly suggests that Hungary develop a QA/QC system as required by the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance).

F. Cross-cutting topics

1. Completeness

10. Hungary has provided its GHG inventory data for the base year (the average of the three years 1985–1987) and the years 1985–2003, and included most of the tables required with data on all relevant gases and categories (except LULUCF); tables 7 and 8(b) have not been provided. The notation keys are used throughout the tables. Those categories that are reported as "not estimated" ("NE") or "included elsewhere" ("IE") are explained in CRF table 9. The CRF tables are generally complete, with a few exceptions described in the relevant sectoral chapters of the NIR.

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

[2] The secretariat identified, for each Party, those source 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 and Uncertainty Management in National Greenhouse Gas Inventories*. Key categories according to the tier 1 trend assessment were also identified for those Parties that provided a full set of CRF tables for the year 1990. 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.

11. The NIR and CRF tables for the LULUCF sector are not complete. In CRF table 5 Hungary reports only total emissions and removals for each gas and does not report background data following the requirements of decision 13/CP.9. Moreover, the methodologies reported in the NIR as being used for the estimation of the LUCF sector follow the Revised 1996 IPCC Guidelines instead of the IPCC good practice guidance for LULUCF.

2. Transparency

12. The ERT noted that the quality of the information reported in the CRF and the NIR has improved since the previous (2004) submission, but it needs further elaboration in order to eliminate inconsistencies between the CRF and the NIR. Moreover, the description of methodologies in the NIR should be improved by giving more detailed information. The emission factors (EFs) and trends in EFs used in several sectors should be clearly referenced or other information should be given to support the applicability of country-specific EFs.

3. Recalculations and time-series consistency

13. Hungary has provided recalculated estimates (tables 8(a)) for 1990 and 1998–2002. The rationale for these recalculations is provided in the NIR. The effect of the recalculations for the base year and for 2002 is an increase by 8.2 per cent and 3.4 per cent, respectively, in the estimates of CO_2 equivalent emissions. No information on the recalculations for the base year is provided in the CRF. The ERT recommends that Hungary compile the recalculation tables for the base year in its future submissions. The secretariat compared the summary emissions data contained in table 2 of the CRF as submitted in 2005 with the corresponding data submitted in 2004. This comparison shows that the estimates for CH_4 emissions from the Energy sector in 2002 are 0.11 per cent higher in the 2005 submission than in the 2004 submission, while the estimates of CO_2 emissions from the Industrial Processes sector in 2002 are 10.8 per cent higher. The ERT noted that these figures are different from those reported by Hungary in table 8(a). Hungary is encouraged to improve its QA/QC procedures to reduce the number of inconsistencies and errors in the CRF.

4. Uncertainties

14. Hungary has provided uncertainty estimates according to tier 1 of the IPCC good practice guidance for all sectors. The ERT noted that many inputs, both for EFs and for activity data (AD), are based on expert judgement only. According to the NIR, the estimates for CO_2 emissions show the lowest uncertainties, while the estimates for N_2O emissions from fuel combustion show the highest uncertainties. The estimated uncertainty for 2003 in total emissions is less than 10 per cent, while the uncertainties range between 2 and 4 per cent for CO_2 emissions estimates, between 15 and 25 per cent for CH_4, and between 80 and 90 per cent for N_2O. The ERT encourages Hungary to provide a more detailed description of the approaches taken and the underlying assumptions used for the uncertainty estimates in the NIR.

5. Verification and quality assurance/quality control approaches

15. The ERT noted that Hungary does not have a systematic and regular QA/QC system in place, although some verification and QC activities are carried out during the preparation of the inventory. The NIR specifies that AD are verified by their individual providers, but information on their reliability and on the quality management systems used by the providers is reported only for a few cases. The bottom–up approach in collecting basic data and information, especially in the Energy and Industrial Processes sectors, contributes to improve the quality of the inventory because it draws on the experience of the people involved in the process. The NIR does not include specific plans to implement QA/QC procedures according to the IPCC good practice guidance. The ERT encourages Hungary to develop a QA/QC plan.

6. Follow-up to previous reviews

16. Compared with the findings of the previous (2004) review, the ERT acknowledged that a complete CRF time series has been submitted using the CRF reporting software. Moreover the national energy balance for 2003 has been provided as part of the 2005 submission.

G. Areas for further improvement

1. Identified by the Party

17. Hungary states in the NIR that it still has difficulty in converting the available statistics into a structure that fits the requirements of the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. In several sectors Hungary is planning improvements by upgrading to a higher-tier method (Manure Management), by developing country-specific EFs (CH_4 and NO_2 emissions from fuel combustion; Nitric Acid Production and Enteric Fermentation), or by obtaining better AD (4.5. Consumption of Halocarbons and SF_6).

2. Identified by the ERT

18. The ERT identifies the following cross-cutting issues for improvement. The ERT recommends strongly that Hungary:

(a) Develop a QA/QC plan according to the requirements of the IPCC good practice guidance;

(b) Improve its institutional arrangements of the national inventory system and strengthen its administrative capacity for the preparation of the national inventory;

(c) Separate the emissions caused by non-energy use of fuels from the Energy sector emissions and report them under Industrial Processes where this is possible (e.g., non-energy use in 2.C.1 Iron and Steel Production). The Party is also encouraged to make it clear in CRF table 1.A.(d) and the NIR exactly where energy use, or emissions, have been adjusted by these non-energy uses.

19. Recommended improvements relating to specific source/sink categories are presented in the relevant sector sections of this report.

II. Energy

A. Sector overview

20. In 2003, the Energy sector in Hungary accounted for 76.0 per cent of total national GHG emissions. Total sectoral emissions fell by 26.7 per cent between the base year and 2003 as result of decreasing emissions from stationary combustion. An increase in sectoral emissions by 4.8 per cent was experienced between 2002 and 2003. Emissions from Transport have been increasing steadily since the base year, with an overall increase of 27.5 per cent.

21. All the main IPCC source categories and gases are covered for the Energy sector. The level of disaggregation is according to the Revised 1996 IPCC Guidelines. The sectoral background tables are essentially complete for 2003.

22. The reporting of the Energy sector is generally transparent. The ERT noted that, while calculation methodologies are documented in the NIR, some important details such as clear references to EFs and methodologies applied are not presented for all source categories.

23. The ERT identified some differences between the CRF data and the energy statistics of the International Energy Agency (IEA), for example, imports and exports of gasoline are significantly higher according to the CRF. Hungary is encouraged to investigate the reasons for these differences and to provide an explanation in the next NIR.

24. The ERT detected a few inconsistencies in the use of the notation keys. The Party is encouraged to make an effort to be consistent in its use of the notation keys.

B. Reference and sectoral approaches

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

25. CO_2 emissions from fuel combustion have been calculated using the reference and the sectoral approaches. For the year 2003, there is a difference of 1.34 per cent in the CO_2 emissions estimates between the reference approach and sectoral approaches. However, CO_2 from liquid fuels shows a difference of 4.34 per cent as between the two approaches, while liquid fuels consumption differs by 8.46 per cent. The values for other gases are similar. The ERT recommends that the Party explain the differences in the liquid fuel data in the NIR. There is no documentation on the reference approach in the NIR. The Party is encouraged to provide this information and include references to the NIR in the CRF documentation box.

2. International bunker fuels

26. Emissions are reported for aviation bunkers. Hungary reports that there is no domestic commercial civil aviation in the country. Small amounts of aviation gasoline are reported as consumed for "general aviation". The ERT encourages Hungary to include in the NIR a more detailed description of the basis on which the total fuel use for aviation is estimated, and an explanation of how emissions from domestic aviation (currently reported as being included under Road Transportation) are estimated and how the associated fuel amount relates to that given for aviation bunkers.

27. The following inter-annual changes in CO_2 emissions from aviation bunkers have been identified as outliers: 1990–1991 (–20.9 per cent), 1993–1994 (+47.4 per cent) and 2000–2001 (–15.1 per cent). The ERT recommends that Hungary explain these changes in its future submissions.

3. Feedstocks and non-energy use of fuels

28. Feedstocks and non-energy use of fuels are estimated and reported. However, the Party has included estimates from non-energy use in fuel combustion. This is not in accordance with the Revised 1996 IPCC Guidelines and the ERT recommends that these fuels be allocated under either CRF 2 (Industrial Processes) if emissions are emitted, or CRF 1.A(d) (Feedstocks and Non-Energy Use) if emissions are stored in products.

4. Country-specific issues

29. While the implied emission factors (IEFs) are generally comparable with those used by other Parties, in several source categories the IEFs for CO_2 and N_2O exhibit unusually large inter-annual changes and fluctuations compared to those used by other Parties. For CO_2 these include: solid fuels use in Public Electricity and Heat Production for 1999–2003; use of gas and liquid fuels in 1.A.2.c Chemicals for 1990–2003; solid fuels use in 1.A.2a Iron and Steel for 1997–2001; and liquid fuels use in 1.A.4.b Residential for 1998–2003. For N_2O they include: use of gasoline and diesel in 1.A.3.b Road Transportation for 1990–2003; and use of all fuels in 1.A.4 Other Sectors for 1990–2003. The Party is encouraged to explain the reasons for these changes in its next NIR.

30. A discussion of the origin and derivation of the country-specific EFs should be included in the NIR to increase transparency. The ERT noted that, while the Party states that the international scientific literature has been used, no further information is given. To further improve the transparency of the inventory, the Party is encouraged to review the EFs and document them (providing the source of the data and details of any calculations performed) in its future NIRs. The Party is also encouraged to include a review of these EFs and a comparison of them with the IPCC default values as part of its future QA/QC procedures.

31. The ERT noted that, while the overall uncertainty for CO_2 is estimated by the Party to be 2–4 per cent, statistical differences in the energy balances show an overall difference of 5 per cent. The ERT recommends that Hungary provide some explanation of these differences.

C. Key categories

1. Energy Industry: Gas, Liquid – all gases

32. The NIR describes the use of propane-butane gas in the energy industry. However, it is not clear how propane-butane gas differs from liquefied petroleum gas (LPG), how these emissions are estimated or where they are allocated. The ERT recommends that the Party clarify this in its future submissions.

2. Manufacturing Industries and Construction: Gas, Liquid, Solid – CO_2

33. The trend in CO_2 emissions from this source category between 1990 and 2003 is unstable and needs some explanation. The Party makes reference to "production data in table2(I).A-Gs2 from 1990 to 2003". The ERT recommends that Hungary document the drivers for these fluctuations more clearly.

3. Other – Residential: Gas, Liquid, Solid – N_2O

34. The trend in N_2O emissions from the Residential category is unusual. The 2003 value is 40.9 per cent higher than the base year value. The following inter-annual changes have been identified as significant: 1991–1992 (–9.6 per cent), 1995–1996 (+8.9 per cent), 1997–1998 (–16.4 per cent), 2000–2001 (+9.4 per cent) and 2002–2003 (+18.5 per cent). The Party makes reference to the use of domestic LPG and other fuels. The ERT recommends that Hungary document clearly the drivers for these fluctuations. The Party is also encouraged to include more information regarding the fuel consumption for liquid fuels other than LPG in order to improve the transparency of the NIR.

4. Fugitive Emissions: Oil and Gas Operations – CH_4

35. The 2003 CH_4 IEF for Natural Gas – Transmission is 141.2 per cent higher than the base year value, and some years show significant inter-annual increases: 1991–1992 (+25.6 per cent), 1993–1994 (+11.3 per cent) and 1996–1997 (+12.2 per cent). Hungary responded during previous 2005 review stages that this is due to changes in the use of gas, whereas the emissions are calculated from pipeline length. The ERT recommends that Hungary report in the NIR AD for this source as pipeline length to increase transparency and comparability.

D. Non-key categories

1. Fugitive Emissions: Coal Mining and Handling – CH_4

36. The NIR states that the CH_4 EFs for solid fuels in coal mining and handling are based on country-specific measurement data from the "extinct Institute of Central Mining Development". The ERT recommends that the Party make clear references to underlying studies and to consider implementing QA/QC procedures for this source category.

2. Fugitive Emissions: Oil and Gas Operations – all gases

37. AD and CH_4 emissions from the Oil- Distribution of Oil Products, and AD and CH_4, CO_2 and N_2O emissions from Flaring of oil and natural gas, are reported as "NE". The ERT recommends the Party either to provide estimates or to show that the AD and emissions are negligible, if that is the case.

38. The ERT noted that while CH_4 emissions are reported, CO_2 emissions from natural gas processing (1.B.2.b.ii) are reported as "not occurring" ("NO"). However, natural gas produced from natural gas wells and oil wells can contain natural CO_2 that must be removed from the natural gas prior to distribution and use. The greater part of the CO_2 is separated from natural gas at gas processing plants and is generally vented to the atmosphere and result in fugitive emissions of CO_2 and N_2O as is mentioned in the Revised 1996 IPCC Guidelines. Default methods are provided in the IPCC good practice guidance and so the Party is encouraged to review the use of this notation key and collect relevant data.

III. Industrial Processes and Solvent and Other Product Use

A. Sector overview

39. In 2003, total emissions from the Industrial Processes sector amounted to 4,852 Gg CO_2 equivalent, or 5.8 per cent of total national GHG emissions. These emissions were 3.6 per cent higher than emissions in 2002, but 52.2 per cent lower than the base year emissions, mainly due to a decrease in emissions from the chemical industry. Emissions of HFCs and SF_6 have increased during the most recent years. Emissions of HFCs increased from 1.12 Gg CO_2 equivalent to 478.26 Gg CO_2 equivalent over the period 1994–2003, and SF_6 emissions increased from 67.95 Gg CO_2 equivalent to 161,92 Gg CO_2 equivalent over the same period. Emissions from the Solvent and Other Product Use sector amounted to 275 Gg CO_2 equivalent, or 0.3 per cent of total national GHG emissions in 2003.

40. Following the recommendations of the previous (2004) review report, Hungary has applied a tier 2 method to two key categories (Ammonia Production and Nitric Acid Production) and performed the corresponding recalculations for the whole time series.

41. The secretariat's key category analysis shows four key categories, which are the same key categories included in the Party's analysis provided in the NIR. Regarding completeness, some categories of emissions are not estimated for this sector due to lack of AD. These include: Soda Ash Use and Glass Production – CO_2; Foam Blowing and Fire Extinguishers – HFCs; and Electrical Equipment – SF_6 (actual emissions from disposal). The ERT encourages the Party to investigate the possibility of including emissions from these categories in its future submissions.

B. Key categories

1. Cement Production

42. Hungary has used a tier 2 approach, using plant-specific data of carbonate content in the raw mix kiln feed, or data on calcium oxide (CaO) content in clinker, depending on the data available. The ERT noted that these country-specific values are higher than the IPCC default values and encourages the Party to provide the necessary background data.

2. Ammonia Production

43. Hungary has used a tier 2 approach instead of a tier 1 approach as in previous submissions. The ERT welcomes the application of the tier 2 approach, based on natural gas consumption in each factory. However, the CO_2 IEFs (ranging between 1.97 and 2.48 t/t in the period 1990–2003) are higher than the IPCC default range of EF (1.5–1.6 t/t). The ERT recommends that the Party conduct verification

activities to ensure that the data obtained from the industries are appropriate. The ERT noted that many inter-annual changes in the CO_2 IEFs have been identified as outliers. It encourages the Party to describe clearly the evolution of the technology and operating conditions of the factories of this branch in order to clarify the differences identified between the CO_2 IEFs over the time series.

3. Nitric Acid Production

44. Hungary reports that one of the production facilities has been equipped with N_2O emissions measurement devices, but does not give any detail about the total number of factories in place, in how many of them measurements are made, and if they are representative of all the technologies used in the country. Also, it remained unclear to the ERT if these measurements are made for different technologies. Hungary reports in the NIR a weighted average EF, without further explanation as to how it is calculated. The ERT commends Hungary for using a tier 2 method, but recommends that the Party explain clearly the calculations and assumptions made to estimate emissions from all factories, as well as the data regarding the measurements made (number of factories, technology used in each factory, representativeness).

4. Consumption of Halocarbons and SF_6

45. Hungary reports HFC-134a emissions from Foam Blowing and Fire Extinguishers as "NE" for all years because of lack of AD. The ERT recommends that the Party obtain these AD in order to enhance the completeness of the inventory. On the other hand, the NIR states that the information required to estimate emissions of HFCs from the other categories was provided by manufacturers and sellers, but these data are not provided in the NIR. The ERT recommends that the Party provide further explanations regarding the calculations made and the information obtained from data providers (AD as well as data used to calculate EFs) to estimate the HFC emissions.

C. Non-key categories

Iron and Steel Production

46. The ERT noted that methods and data categories are explained in the NIR for the estimation of CO_2 emissions from steel production but not for the production of iron from iron ore. The ERT recommends that the Party provide information on the methods and data categories used to estimate emissions from iron production if it occurs or has occurred since 1990 in the country, in order to enhance the completeness and transparency of the inventory.

IV. Agriculture

A. Sector overview

47. In 2003, the Agriculture sector in Hungary accounted for 12.2 per cent of total national GHG emissions, reaching 10130.25 Gg CO_2 equivalent. Between the base year and 2003, emissions in the sector decreased by 49.4 per cent. In 2003, N_2O accounted for 78.7 per cent of the total sectoral emissions, and CH_4 for the remaining 21.3 per cent. In 2003, Agricultural Soils, Manure Management and Enteric Fermentation were the major source categories, contributing 66.5 per cent, 17.1 per cent and 16.3 per cent, respectively, to the total emissions of the sector.

48. Hungary has performed a tier 1 key category analysis and identified four key categories: Direct N_2O Emissions from Agricultural Soils, CH_4 emissions from Enteric Fermentation in Domestic Livestock, Indirect N_2O Emissions from Nitrogen Used in Agriculture, and N_2O emissions from Manure Management. This corresponds with the analysis made by the secretariat. The ERT acknowledges that Hungary has a good system for collecting information about animal populations and other AD, and

recommends that the Party use that system and start using higher-tier methodologies in its calculations, especially for the key categories identified.

B. Key categories

1. Enteric Fermentation

49. In calculating CH_4 emissions from Enteric Fermentation for non-dairy cattle, Hungary has used the IPCC default EF of 48 kg CH_4/head/year for all the years it reports, except for 1985, when 57.80 CH_4/head/year has been used, and for the base year, for which 51.05 CH_4/head/year has been used. The ERT recommends that the Party verify the use of different EFs for 1985 and the base year, which leads to an inconsistency in the time series, and to give an explanation of the use of different EFs in its next submission.

50. In the NIR the Party uses different terms for the same type of animals, for example, "dairy cattle" and "dairy cow". To make the reporting more consistent, the ERT recommends that the Party use in its next submission only the terms for different types of animal given in the Revised 1996 IPCC Guidelines.

2. Agricultural soils

51. The NIR states that, when calculating direct N_2O emissions from Animal Production and direct N_2O emissions from Agricultural Soils, default factors are used for the fractions $Frac_{GRAZ}$, $Frac_{NCRBF}$ and $Frac_{NCRO}$. However, this does not seem to be the case, since there are changes in these parameters across the time series. In response to previous 2005 review stages, Hungary informed the ERT that it plans to correct the reported $Frac_{GRAZ}$ value of 0.02 for 1990. The ERT noted that the same $Frac_{GRAZ}$ value was also reported for 1985–1987 and 2001. The ERT encourages the Party to verify these reported data and explain the changes in this parameter in its next NIR. The ERT also recommends that the Party verify the factors used for $Frac_{NCRBF}$ and $Frac_{NCRO}$ for the years 1988–1989 and 1991–2000.

52. The ERT was unable to review the values for $Frac_R$ as reported in table 4.D for the years 1988–1989 and 1991–2000 (0.55 kg nitrogen (N)/kg crop-N), which are higher than the IPCC default value (0.45 kg N/kg crop-N). The ERT encourages the Party to provide clear explanations of this parameter in its 2006 submission. In response to a previous 2005 review stage, Hungary informed the ERT that it has plans to recalculate the time series for $Frac_{BURN}$. The ERT was provided with the following new values for $Frac_{BURN}$: 0.11 (1985), 0.09 (1986), 0.07 (1987), 0.04 (1988), 0.02 (1989) and 0.00 (1990–2003). The ERT noted that no data are reported about the fractions in the additional information table of CRF table 4.D for the base year. The ERT encourages the Party to complete this table in its 2006 submission.

53. According to the NIR, the amount of animal manure applied to soils equals only 50 per cent of the manure produced in Hungary. The ERT noted that this assumption is not reflected in the calculations of direct N_2O emissions from manure applied to soils in table 4.D and table 4.B(b). The ERT recommends that the Party explain in the NIR where the part of the manure that is not applied to soils ends up.

54. The ERT noted that for $Frac_{GASM}$ the IPCC default value (0.2) is used for all years, whereas according to national studies referenced in the NIR, a value of 0.3 seems to be more appropriate. The ERT recommends that the Party verify the value for $Frac_{GASM}$ for its 2006 submission.

55. The 2004 review report recommended the Party to reconsider the suitability of using the IPCC default factor for $Frac_{LEACH}$ (0.3) for the years 1991–1999. The ERT noted that the use of synthetic fertilizer decreased by more than 50 per cent between the base year and 2003; however, $Frac_{LEACH}$ has not been changed. The ERT recommends that the Party verify the $Frac_{LEACH}$ value.

C. Non-key categories

Manure management – CH_4

56. Hungary has used both the West and the East European default EFs for CH_4 in the calculations for different livestock species, but the NIR does not provide information on the reasons for this approach. To improve transparency, the ERT recommends that the Party explain in its next NIR the criteria used for the choice of default EFs for the different livestock species.

V. Land Use, Land-use Change and Forestry

A. Sector overview

57. In 2003, the LULUCF sector in Hungary represented a net sink of 3,964.57 Gg CO_2, equivalent to 4.7 per cent of total national CO_2 emissions. Between 2002 and 2003, total net CO_2 removals increased by 67.6 per cent, mainly as a result of a reduction of the estimated emissions from soils in 2003. The ERT noted that this significant change is based on high variability in the estimates of CO_2 emissions from soils for previous inventory years (from 296 Gg CO_2 in 2001 to 2,580 Gg CO_2 in 2002, to 195 Gg CO_2 in 2003).

58. The ERT noted that Hungary has not provided the complete time-series of background data tables of the CRF for LULUCF as required by decision 13/CP.9. Only total aggregated net emissions are reported for every GHG for 1985–2002 and the base year in sectoral report table 5 for LULUCF as contained in the CRF reporting software. Due to the lack of the corresponding background information, the ERT was unable to review this sector. The ERT noted a lack of completeness and transparency in the whole report on LULUCF. The ERT requests Hungary to report a complete time series of CRF tables for LULUCF in its next submission.

59. The ERT identified further inventory problems affecting the overall transparency and completeness of the report:

(a) Even though country-specific data are used for the calculation of emissions and removals, these data are not presented in the NIR (see chapter 7.2.2.2 Methodological Issues). Relevant AD and factors such current annual growth (CAI) and biomass expansion factors (BEFs) are not presented. The ERT recommends that Hungary improve the completeness of its NIR substantially in its next submission;

(b) The time series of CO_2 emissions from soils presented in section 7.3, page 110, of the NIR shows high inter-annual variability, compared to the previous (2004) inventory (e.g., a very high value is reported for the year 2002), and many general uncertainties regarding AD are mentioned. Moreover, according to the 2004 NIR and the 2005 NIR, recalculations have been performed for this category for 1998, 1999, 2000 and 2001. In order to improve the accuracy, consistency and transparency of the inventory, the ERT recommends that the Party improve the quality of the data in this particular category;

(c) In the calculation of carbon stocks in aboveground biomass, air-dry wood density is employed instead of dry matter (which is also termed basic wood density). Noting that this has resulted in an overestimation of this carbon pool, the ERT recommends that Hungary use the appropriate wood basic density factors.

60. Table 7.2.1 of the NIR shows the results of a sensitivity analysis on net removals as estimated in CRF table 5.A. All input values, except the BEF, show a symmetric distribution. Considering that the

BEF is a constant, its behaviour in the sensitivity analysis should be similar to that of other factors analysed, resulting in a symmetric distribution.

61. The data reported for the years 1999, 2000 and 2001 in the table of section 7.3.2 (related to net emissions from soil) in the 2005 NIR are not the same as those reported in the same section in the 2004 NIR, but Hungary does not state that it has performed a recalculation. The ERT recommends that Hungary recalculate the estimates for these years in its next submission.

62. In cell C34 of table 8(a)s1 Hungary reports a wrong value (–2,359.1) for CO_2 net removals by the LUCF sector for the previous year (2002). The correct value should be –2,579.7 (i.e. the value reported in table 5 for 2002 in the Party's 2004 submission). The ERT recommends that Hungary correct the error in its next submission.

VI. Waste

A. Sector overview

63. In 2002, the Waste sector in Hungary accounted for 5.7 per cent of total national GHG emissions, with the category Solid Waste Disposal on Land contributing the largest portion (78.8 per cent). Compared to the base year, Waste emissions in 2003 had decreased by 12.1 per cent. Decreasing CH_4 emissions from waste-water handling (–32.1 per cent relative to the base year) account for most of this change.

64. The ERT noted that the inventory is not complete either in terms of source categories (notably in Waste-water Handling) or in terms of the time series (particularly for the base year and 1990). In addition to sludge-related and human sewage-related emissions, already mentioned in previous reviews, the ERT recommends that the Party estimate emissions from solid waste disposed in unmanaged sites.

65. According to the NIR, recalculations have been done for the base year, 1990, and the period 1991–1998. The ERT recommends that Hungary explain in detail and clearly the methods used and present a summary of these explanations in CRF table 8(b).

B. Key categories

Solid waste disposal on land

66. The ERT recommends that the Party use a tier 2 method to estimate emissions from this key category. A first-order decay (FOD) model can be applied using default values as recommended by the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

67. The ERT noted that the per capita waste generation rates reported vary from 1.2 to 2.0 kg/person/day over the inventory years. Hungary is encouraged to investigate the magnitude and trend of this value.

68. The ERT noted a lack of background information on the composition of solid waste in the NIR. The ERT recommends that the Party include this information in its future submissions.

69. As mentioned in previous reviews, emissions from unmanaged solid waste disposal sites should be estimated. Hungary is encouraged to use the IPCC default methane correction factor if country-specific values are not available.

C. Non-key categories

1. Waste-water handling

70. As stated in previous reviews, emissions from this category, particularly from sludge and human sewage, need to be estimated.

71. The ERT noted some inconsistencies between the data shown in the CRF tables and the NIR. For example, the NIR states that the degradable organic component value of 18,250 kg biochemical oxygen demand (BOD)/1,000 persons/yr was used from 1985 to 2001, and a new value of 15,200 has been used from 2002 onwards. However, the ERT noted that in CRF table 6.B the 2003 value equals 17,736 kg BOD/1,000 persons/yr.

72. Careful attention should be given to the estimation of emissions in the base year. For example, CH_4 emissions from Industrial and Domestic Waste water for 1990 and the base year are reported in the CRF, but there are no entries for the corresponding AD (e.g. Total Organic Product). The ERT recommends that the Party complete this information.

2. Waste incineration

73. For all inventory years prior to 2003, Hungary has used a default value for the fraction of non-biogenic waste incinerated (41.5 per cent). For 2003, this has been changed to a country-specific value (51.7 per cent). To ensure time-series consistency, country-specific data should be used for the entire time series. In the absence of country-specific data for other years, the ERT recommends that Hungary use the 2003 country-specific value for all inventory years.

74. The NIR states that incinerated industrial waste makes up approximately 40–50 per cent of incinerated municipal waste, and this fraction is presumably used for the entire time series. The ERT recommends that Hungary explain in the NIR whether this assumption stems from expert judgement or from empirical data, and, to improve the transparency of its reporting of this category, it is recommended that Hungary clarify whether industrial waste incineration is included in the emissions estimation.

75. The decreasing trend of incineration-related emissions in 2002 and 2003, from about 350 Gg CO_2 per year over the four years 1998–2001 to 192 Gg CO_2 in 2003, is explained in the NIR (page 123) as being due to the incineration plant operating at reduced capacity. For greater transparency and to ensure time-series consistency, the ERT recommends that Hungary explain the strong decrease between 1988–1989 (by 51Gg CO_2).

Annex

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

IPCC. Good practice guidance for land use, land-use change and forestry, 2003. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

IPCC/OECD/IEA. Revised 1996 IPCC Guidelines for national greenhouse gas inventories, volumes 1–3, 1997. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

UNFCCC. 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/2004/8. Available at <http://unfccc.int/resource/docs/2004/sbsta/08.pdf>.

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UNFCCC secretariat. Status report for Hungary. 2005. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/2005_status_report_hungary.pdf>.

UNFCCC secretariat. Synthesis and assessment report of the greenhouse gas inventories submitted in 2005. Part I: FCCC/WEB/SAI/2005. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/sa_2005_part_i_final.pdf>.

UNFCCC secretariat (2005). "Report of the individual review of the greenhouse gas inventory of Hungary submitted in the year 2004". FCCC/WEB/IRI/2004/HUN. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/2004_irr_centralized_review_hungary.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. László Gáspár (Ministry for the Environment and Water) including additional material on the methodology and assumptions used.

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