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UKRAINE

REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY SUBMITTED IN THE YEAR 2004[1]

I. OVERVIEW

A. Introduction

1. This report covers the centralized review of the 2004 greenhouse gas (GHG) inventory submission of Ukraine, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8 of the Conference of the Parties. The review took place from 18 to 22 October 2004 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalist – Mr. William Irving (United States) and Mr. Matthew Dudley (Australia), Energy – Mr. Pavel Fott (Czech Republic), Mr. Hongwei Yang (China), and Mr Takeshi Enoki (Japan), Industrial Processes – Mr. Jos Olivier (Netherlands) and Ms. Virginia Sena (Uruguay), Agriculture – Mr. Damdin Dagvadorj (Mongolia) and Ms. Anna Romanovskaya (Russian Federation), Land-use Change and Forestry (LUCF) – Mr. Rizaldi Boer (Indonesia) and Mr. Xiaoquan Zhang (China), Waste – Mr. Yunus Arikan (Turkey) and Ms. Elisabeth Scheele (United States). Mr. William Irving was the lead reviewer. Due to unforeseen events, Mr. Rizaldi Boer, who was invited as the second lead reviewer, was not able to attend the review in Bonn, but contributed from Indonesia. The review was coordinated by Ms. Astrid Olsson (UNFCCC secretariat).

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

B. Inventory submission and other sources of information

3. In its 2004 submission, Ukraine has submitted common reporting format (CRF) tables for the years 2001–2002 and a national inventory report (NIR). The NIR was submitted in Russian, which is one of the official languages of the UN, so that this is consistent with the UNFCCC reporting guidelines. Where needed, the expert review team (ERT) also used additional information provided during the review and other information. The full list of materials used during the review is provided in annex 1 to this report.

C. Emission profiles and trends

4. In the year 2002, the most important GHG in Ukraine was carbon dioxide (CO_2), contributing 58.5 per cent to total[2] national GHG emissions expressed in CO_2 equivalent, followed by methane (CH_4) – 38.3 per cent – and nitrous oxide (N_2O) – 3.2 per cent. Perfluorocarbons (PFCs) contributed

[1] In the symbol for this document, 2004 refers to the year in which the inventory was submitted, and not to the year of publication.
[2] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding LUCF, unless otherwise specified.

0.0003 per cent of the overall GHG emissions in the country. No estimates of emissions of hydrofluorocarbons (HFCs) or sulphur hexafluoride (SF_6) are provided.

5. The Energy sector accounted for 78.9 per cent of total national GHG emissions, followed by Industrial Processes (8.5 per cent), Agriculture (6.5 per cent) and (Waste 6.2 per cent). No emissions or removals are estimated for LUCF.

6. The trend from 2001 to 2002 is not directly comparable with the trend for the years 1990–98 reported as part of the First National Communication of Ukraine.

D. Key sources

7. Ukraine has reported a key source tier 1 analysis, both level and trend assessment, as part of its 2004 submission. Ukraine's and the secretariat's analyses[3] produced similar but not identical results. Ukraine identified 11 key source categories and the secretariat 13. The main reasons for the differences appear to be the different level of aggregation used and the inclusion by Ukraine of multiple gases as a global warming potential (GWP)-weighted total for some source categories. Ukraine uses a mix of summary level 2 and sectoral report levels of analysis (e.g., 2(I)). Its analysis is correct except for the lack of separation of gases, which should be addressed for next year's inventory.

8. Ukraine is using the key source analysis to prioritize the development of the inventory.

E. Main findings

9. The inventory submission includes the first NIR provided by Ukraine and provides a good basis for future development. The ERT noted that Ukraine has made considerable progress in improving its ability to meet the requirements of the UNFCCC reporting guidelines. This review report identifies areas in which the completeness, transparency and consistency of the inventory submission should be improved, notably through the provision of a complete time series, the inclusion of estimates for LUCF, and improved documentation of methodologies and data. The ERT also identified specific key source categories in which 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) recommends a higher-tier method than the one used by Ukraine (e.g., coal mining, solid waste disposal sites).

F. Cross-cutting topics

Completeness

10. Ukraine provides inventory estimates for the years 2001–2002 for most sectors and source categories. Significant gaps include: the entire LUCF and Solvents and Other Product Use sectors; international bunker fuels; and fluorinated gases (F-gases) other than PFCs from aluminium production.

11. Ukraine's NIR includes information on emissions, some emission factors (EFs), activity data (AD) and identification of key sources. The ERT concluded that Ukraine should make it a high priority to provide a more detailed NIR that is consistent with the table of contents listed in the UNFCCC reporting guidelines.

12. Ukraine has submitted an almost complete set of CRF tables for 2001–2002 with sectoral and sectoral background data tables for the Energy, Industrial Processes, Agriculture and Waste sectors. The submission does not include CRF tables for LUCF and Solvent and Other Product Use or table 10 on trends.

[3] The secretariat had identified, for each individual Party, those source categories which are key sources in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance. Key sources according to the tier 1 trend assessment were also identified for those Parties providing a full CRF for the year 1990. Where the Party has performed a key source analysis, the key sources presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key source assessment conducted by the secretariat.

13. The ERT recommends that Ukraine make it a top priority to estimate a complete time series from 1990 to the most recent year, as this is the most important step in preparing a more complete inventory. It is recognized that preparing a complete time series from 1990 presents challenges for Ukraine in terms of time-series consistency and availability of data. The ERT encourages Ukraine to start with the 1990 base year and make use of the guidance in chapter 7 of the IPCC good practice guidance on recalculations and time-series consistency.

Transparency

14. The NIR is not sufficiently detailed to allow the ERT to assess the suitability of methods used and all the sources of data. Much of the activity data is referenced, however, as coming from one source: the State Committee on Statistics of Ukraine. This is particularly apparent in the Energy and Industrial Processes sectors. The ERT recommends that in the future Ukraine consider providing some of the activity data in the NIR, in addition to providing the external reference.

Recalculations and time-series consistency

15. As this is Ukraine's first inventory submission to include both an NIR and the CRF tables, no recalculations are identified. Table 8 (recalculations) has not been completed. Similarly, the NIR does not identify recalculations in the overview or the text descriptions of individual source categories.

16. Ukraine has used the same methodologies for 2001 and 2002. There are some minor inconsistencies between the years in the CRF tables.

Uncertainties

17. Ukraine does not report quantitative uncertainty estimates but has completed the qualitative assessment in CRF table 7. Table 7 indicates that all estimates are of "medium" quality. The ERT concluded that this assessment may not be correct in all cases because the accuracy of IPCC tier 1 methods and the default EFs for different source categories vary.

18. The ERT encourages Ukraine to make use of the default uncertainty estimates provided for individual source categories in the IPCC good practice guidance as a first step in completing a quantitative uncertainty analysis.

Verification and quality assurance/quality control approaches

19. There is no indication of any formal quality assurance/quality control (QA/QC) or verification activities other than the inclusion of the reference approach. The NIR and CRF data agree, however, indicating that Ukraine has implemented some informal QA/QC activities.

Follow-up to previous reviews

20. As this was the first review of Ukraine's inventory, there were no previous review findings. Ukraine did provide prompt and complete answers to questions raised by the ERT during the review.

G. Areas for further improvement

Identified by the Party

21. Ukraine identified some areas for improvement;

(a) Consideration of a higher-tier method for coal mining;

(b) Inclusion of LUCF estimates;

(c) Uncertainty analysis and QA/QC;

(d) Inclusion of estimates from solvents;

(e) Consideration of higher-tier methods for key sources.

Identified by the ERT

22. The ERT identifies the following near-term priority cross-cutting issues for improvement. The Party should:

(a) Develop a complete time series from 1990 to the most recent year, starting from the base year (1990);

(b) Provide a more complete and transparent NIR, particularly with respect to documentation of methods, AD and EFs, and adherence to the structure specified in the UNFCCC reporting guidelines;

(c) Develop a plan to implement higher-tier methods for key source categories over time where practical (e.g., coal mining, solid waste disposal sites etc.).

23. The ERT identifies the following medium-term cross-cutting issues for improvement. The Party should:

(a) Provide quantified uncertainty estimates using the tier 1 method in the IPCC good practice guidance;

(b) Create a formal QA/QC management system and a QA/QC plan.

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

II. ENERGY

A. Sector overview

25. In 2002 the Energy sector contributed 78.9 per cent of total national emissions. Fuel combustion accounted for 51.0 per cent of Ukraine's total GHG emissions and 86.7 per cent of its CO_2 emissions. Fugitive emissions play an important role in Ukraine due to its important coal-mining activities and the existence of a wide network of transit gas and oil pipelines. Fugitive emissions made up 27.9 per cent of total national emissions in 2002. The contributions of single subsectors are as follows: Energy Industries 21.6 per cent, Manufacturing Industries and Construction 14.9 per cent, Transport 2.7 per cent and Other Sectors 11.9 per cent of total national emissions. Comparing the 2004 submission with Ukraine's First National Communication, emissions from the sector decreased rapidly in comparison to 1990, yielding about half of the reference value given in the First National Communication. On the other hand, emissions from the two years reported (2001 and 2002) are nearly constant. Also, from the energy indicators published in the NIR (table 2-1) it appears that for the last few years' emissions from the Energy sector have been relatively stable.

26. All the IPCC sources are addressed for the Energy sector for both reported years and all GHGs are covered. The level of disaggregation is essentially in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines). Estimates of emissions of the precursor gases are reported in the CRF except for sulphur dioxide (SO_2). All the CRF tables, including the sectoral background tables, are provided, but in table 1.A(d) data on fraction of carbon stored are omitted. No comments are reported in the documentation boxes, and additional information is not provided in the relevant tables.

27. The reporting of the Energy sector is not sufficiently transparent. The calculation methodologies used are not satisfactorily documented in the NIR: mainly summary results are presented rather than explanations of methods used.

28. Ukraine has submitted CRF tables for 2001–2002 only, so no recalculation has been done. Nevertheless, fuel consumption in Energy Industries increased by 29.7 per cent between 2001 and 2002,

this being compensated by a corresponding decrease in Manufacturing Industries and in Other Sectors. Ukraine explained that these fairly significant variations were related to changes in the national statistics, resulting in different distributions between subsectors 1.A.1, 1.A.2 and 1.A.4. From this standpoint, therefore, the data for the two years reported are not fully consistent. The ERT encourages Ukraine to document these variations in national statistics in the NIR for the benefit of future review teams.

B. Reference and sectoral approaches

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

29. The differences between the sectoral approach and the reference approach presented in CRF table 1.A(c) are 1.8 per cent for 2002 and –0.05 per cent for 2001. However, the ERT identified a relatively high amount of carbon from fossil fuel combustion, resulting in CO_2 emissions which are covered under Industrial Processes, as discussed below. CO_2 emissions in 2002 amounted to 6,734 Gg in 2.B.1 Ammonia Production) and 21,573 Gg in 2.C.1 Iron and Steel Production. This carbon reported under Industrial Processes should be included in the reference approach but not accounted for under Fuel Combustion Activities in the sectoral approach. Ukraine is encouraged to address this issue in its forthcoming NIRs.

30. Total apparent consumption in the reference approach presented in CRF table 1.A(b) is about 10 per cent lower than the International Energy Agency (IEA) estimate for both reported years. The main differences observed were in gas and coal data. Ukraine is encouraged to analyse the reasons for this difference and harmonize its future reporting for IEA and UNFCCC.

International bunker fuels

31. Ukraine has reported all aviation emissions as domestic. The question arises whether or not the national statistics are able to distinguish between fuel (jet kerosene, aviation gasoline, gas/diesel oil, residual oil) sold to aircraft or ships that will be staying within or crossing the national border. The ERT encourages Ukraine to look into this issue further and to report bunkers in accordance with the IPCC good practice guidance.

Feedstocks and non-energy use of fuels

32. Ukraine reports in table 2(I).A-G consumption of 8,629 kt of coke, resulting in CO_2 emissions in subcategory 2.C.1 Iron and Steel Production. Similarly, as stated in the NIR, an amount of natural gas (120,633 TJ) is used for ammonium production. Some feedstocks (AD) are reported in the sectoral background data tables for fuel combustion activities even though they are not combusted, for example, in subcategory 1.A.2.c Chemicals. This method of reporting reduces the transparency of the inventory and comparability because it results in extremely low implied emission factors (IEFs). Ukraine is encouraged to identify the relevant parts of non-energy use of fuels (especially the amount of natural gas used for ammonia production) in its next submission and to report emissions from fuel combustion activities and feedstocks correctly.

C. Key sources

Stationary combustion: solid, liquid, gas – CO_2

33. Ukraine's GHG inventory is under development and the use of the tier 1 methodology and IPCC default factors for the Energy sector may therefore be necessary in the short term. Nevertheless, for the future, the ERT encourages Ukraine to develop representative country-specific EFs for the principal types of fuel used in Ukraine, subject to available resources.

34. The reporting of inventory results for fuel combustion activities (by the sectoral approach) is mostly in line with the IPCC methodology and the UNFCCC reporting guidelines. However, in some special cases (1.A.1.b, 1.A.1.c and 1.A.2.b, as stated in paragraph 32 above) fuels for non-energy use, forming products that contain stored carbon, are reported together with fuels which are actually

combusted. The ERT also recommends that Ukraine explore thoroughly all cases of extremely low IEFs that have been identified in previous 2004 review stages.

Fugitive emissions: solid, oil and gas – CH_4

35. In CRF summary table 3 Ukraine reports using the IPCC default EFs in all subsectors. However, for 1.B.1.a Underground Coal Mining the IEF reported (19.43 kg CH_4/t) is a little higher than the IPCC default EF interval. Ukraine informed the ERT that the value was obtained from the Ministry of Fuel and Energy and was based on domestic research. The ERT appreciates the use of country-specific or even seam-specific EFs and encourages Ukraine to document this activity transparently in its future NIRs. Ukraine is also encouraged to consider the availability of mine-specific methane emissions data for future inventories. The analogous case in source category 1.B.2.c (an unusually high value for natural gas production/processing) should be addressed in similar way.

D. Non-key sources

Stationary and mobile combustion: solid, liquid, gas – CH_4, N_2O

36. In CRF summary table 3 Ukraine reports using the IPCC default EFs for CO_2, CH_4 and N_2O. While for CO_2 there is no ambiguity as to how the set of IPCC default values are to be assigned, for CH_4 and N_2O there are more options for the Party to select suitable EFs for single relevant subsectors. For the sake of transparency, Ukraine is encouraged to provide explanations for its choice of EFs in its next NIR. The ERT recommends focusing on the following cases, which are generally important: N_2O from fluidized bed combustion, N_2O from road transportation (the IEF has been identified as a low outlier) and CH_4 from households (the residential subcategory).

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

37. In 2002, emissions from the Industrial Processes sector accounted for 8.5 per cent of total national CO_2 equivalent emissions, and CO_2 represented 91.3 per cent of emissions from the sector (mostly from iron and steel production). CH_4 and N_2O emissions accounted for 4.8 and 3.9 per cent of sectoral emissions, respectively. The production of coke is responsible for the greater part of the CH_4 emissions, while adipic acid production (71.1 per cent) and nitric acid production (28.9 per cent) are responsible for all N_2O emissions in the sector. Only by-product PFC emissions from aluminium production are reported, and their contribution to the total sectoral emissions is negligible. Neither actual nor potential emissions for production and consumption of F-gases are reported because no reliable data are available. Emissions from solvent and other product use are not estimated because of a lack of national statistics. The ERT notes that Ukraine is planning to investigate alternative data sources for this category.

38. From 2001 to 2002, total emissions from industrial processes (CO_2 equivalent) increased by 4.7 per cent, mainly because of an increase of 6.2 per cent in CO_2 emissions (due to larger emissions from iron and steel production and cement production), in spite of a decrease of 15.3 per cent in N_2O emissions and a decrease of 4.0 per cent in CH_4 emissions.

39. Ukraine identified two key source categories: CO_2 from iron and steel production and CO_2 from ammonia production. The secretariat identified the same key sources.

40. In the CRF tables, Ukraine frequently uses “0.00” or leaves cells blank instead of using the appropriate notation keys. It was difficult for the ERT to assess the completeness of the inventory for this sector since it is impossible to tell if emissions are not estimated or emission sources do not occur in the country. Indirect GHG emissions are not reported for the sector. The ERT recommends that Ukraine use the notation keys as appropriate and include the corresponding explanations in CRF table 9.

41. To improve confidence in the inventory, the ERT recommends that Ukraine provide in the NIR more detailed information on the sources of the AD used, including specific references to documents that contain AD.

42. During the review Ukraine confirmed that AD for aluminium production are not confidential. The ERT recommends that Ukraine report the AD in its future submissions. The ERT also recommends that Ukraine report on SF_6 emissions from aluminium and magnesium foundries.

B. Key sources

Iron and steel production – CO_2

43. Ukraine estimates CO_2 emissions based on data on the consumption of reducing agent (coke), which is recommended in the IPCC Guidelines. The method used is the tier 1 approach, which does not take into account the carbon content in the ore, carbon storage in the remaining iron and steel, or the emissions from steel production in electric arc furnaces (EAFs). Since this is a key source, the ERT encourages Ukraine to consider a higher-tier approach.

44. Although coke is used in Ukraine as a reducing agent, a default EF given in the IPCC good practice guidance for coal (2.5 t/t) has been used which is lower than the one given for coke (3.1 t/t). The ERT recommends that Ukraine use the correct EF for its next submission and make the appropriate recalculations.

Ammonia production – CO_2

45. Ukraine uses a tier 1 approach to estimate CO_2 emissions on the basis of ammonia production AD and a default EF (1.5 t/t) presented in the IPCC Guidelines. Since this is a key source, the ERT recommends that Ukraine use a higher-tier approach to estimate the emissions, on the basis of the consumption of methane used to produce ammonia, as recommended in the IPCC good practice guidance. Ukraine states in the NIR that methane consumption for the production of ammonia is not available in the national statistics. However, the ERT encourages Ukraine to gather it directly from the ammonia producers.

C. Non-key sources

Nitric acid production – N_2O

46. For this source, Ukraine states in the NIR that an EF of 0.0022 t/t has been used, but in the CRF tables the IEF given is significantly lower (0.0003 t/t). The ERT recommends that Ukraine provide a justification for the EF used and, if abatement technology has been in place, to include all the relevant information in the NIR.

Aluminium production – CO_2 and PFCs

47. The default EF used to calculate CO_2 emissions is 1.5 t/t. Since the NIR states that the Horizontal Stud Soderberg anode is used, the higher default EF (1.8 t/t) recommended by the IPCC good practice guidance should be used. The EF Ukraine has used leads to underestimation of emissions, and the ERT recommends that Ukraine use the appropriate default emission factor.

48. On the basis of the aluminum production data and the tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6) emissions reported, the IEF is 0.0017 k/t for CF_4 and 0.00017 k/t for C_2F_6. These IEFs are significantly lower than the default values provided for the Horizontal Stud Soderberg technology and the emissions reported are therefore significantly lower than expected. The ERT recommends that Ukraine review the PFC emission values reported.

Cement production – CO_2

49. The IEF for this source (0.66 t/t) is the highest of reporting Parties and higher than the IPCC default (0.51 t/t). During the review Ukraine recognized that there was an error. The ERT recommends that Ukraine recalculate this estimate for its next submission.

Adipic acid production – N_2O

50. To estimate emissions Ukraine has used the IPCC default EF (300 kg/t), an N_2O destruction factor of 90 per cent, and a utilization factor of 80 per cent. To enhance transparency, the ERT recommends that Ukraine provide detailed information on the abatement technology and systems in place on a plant-by-plant basis.

Soda ash production – CO_2

51. CO_2 emissions from soda ash production are not estimated on the basis of Trona consumption. Instead, Ukraine uses the stoichiometric ratio between soda ash produced and CO_2 produced. The ERT recommends that Ukraine gather data on Trona consumption, or data on actual soda ash produced in Ukraine, to improve the accuracy of the emissions estimates.

Other (chemical industry) – CH_4

52. There is an error in the calculation of CH_4 emissions from the production of coke. The default EF should be 0.0005 tonne CH_4/ tonne coke produced, but the EF used by Ukraine is 0.005 t/t. The ERT recommends that Ukraine recalculate the emissions, using the correct EF, for its next submission.

IV. AGRICULTURE

A. Sector overview

53. In the year 2002, emissions from the Agriculture sector accounted for 6.5 per cent of total national GHG emissions. The largest contributing sources in the sector were CH_4 emissions from enteric fermentation and N_2O emissions from agricultural soils, which accounted for 44.9 and 30.1 per cent of CO_2 equivalent emissions from the sector, respectively, in 2002. The key source analysis conducted by Ukraine identified CH_4 emissions from enteric fermentation and N_2O emissions from agricultural soils as key sources in the sector, whereas the secretariat's more disaggregated analysis found CH_4 from enteric fermentation, direct N_2O emissions from agricultural soils and CH_4 emissions from manure management to be key sources. The ERT recommends that Ukraine use a more disaggregated level of sub-sources as proposed by table 7-1 of the IPCC good practice guidance, particularly for N_2O emissions from soils, because of the general correlation of estimation methods.

54. Ukraine reports GHG emissions from source categories 4.A Enteric Fermentation, 4.B Manure Management, 4.C Rice Cultivation, and 4.D.1 and 4.D.2 Direct N_2O Emissions in accordance with the IPCC Guidelines. However, N_2O emissions from manure management are reported only in the NIR and table 4s2 of the CRF, while in table 4.B(b) only population sizes are reported. Indirect N_2O emissions from soils are not estimated. The ERT recommends that Ukraine estimate indirect N_2O soil emissions using the default methodology of the IPCC Guidelines. In table 4.F Field Burning of Crop Residues only AD are reported, and GHG emissions are reported as "not occurring" ("NO"). No explanations are provided in the NIR. The population of swine reported in the 2004 NIR differs by 9 per cent from the data provided by the Food and Agriculture Organization of the United Nations (FAO). The ERT recommends that Ukraine provide a complete inventory, report all AD, explain the large discrepancies with the FAO data, and report the EFs, references and assumptions used in the inventory. Ukraine is also encouraged to check its use of the notation keys ("not estimated" ("NE"), "NO", "not applicable" ("NA")) and to fill in the additional information boxes in its future inventories.

B. Key sources

Enteric fermentation – CH_4

55. Ukraine has used the IPCC default EFs for developing countries and a tier 1 methodology for this key source. The ERT encourages Ukraine's intention to consider the possibility of using the tier 2 methodology for dairy and non-dairy cattle in its future submissions.

Agricultural soils – direct N_2O emissions

56. Direct N_2O emissions from agricultural soils amounted to 30.35 Gg in 2002 and were the second-largest key source in the country. Ukraine uses the default methodology and EFs for this source. N_2O emissions from cultivation of histosols are not estimated because of lack of AD. Because this source makes a significant contribution to the total national emissions the ERT suggests that Ukraine consider the possibility of developing country-specific EFs. Although the NIR reports that default nitrogen (N) excretion rates are used, the rates reported in NIR table 4-7 are lower by about 50 per cent than the default values for Eastern Europe. No explanations are provided. The documentation box of table 4.D is not filled in. The ERT recommends the Party to check the default N excretion rates used and to report all AD and EFs used in its next submission.

C. Non-key sources

Manure management – CH_4 and N_2O emissions

57. Ukraine has used the IPCC default EFs for developing countries using the tier 1 methodology in estimating CH_4 and N_2O emissions from manure management. The NIR reports the use of default data for the shares of different types of animal waste management system (AWMS) in the country; however, the data provided in table 4-8 are different from the default values for Eastern Europe, and the percentages of the different types of AWMS for most animal categories do not add up to 100. The ERT's default estimates based on animal populations showed that N_2O emissions from AWMS could be underestimated. Ukraine should clarify this problem in its next submission.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

58. No source and sink categories in the LUCF sector are reported. The ERT strongly recommends Ukraine to estimate emissions and removals in the LUCF sector in its next inventory.

VI. WASTE

A. Sector overview

59. In 2002, the main source of emissions in the Waste sector was CH_4 emissions from solid waste disposal sites (24,938 CO_2 equivalent), which constituted 83.8 per cent of total emissions of the sector and 13.5 per cent of total CH_4 emissions.

60. The key source analysis of Ukraine identified only methane from solid waste disposal on land, whereas the key source analysis of the secretariat also included methane from waste-water handling. The difference is mainly due to the fact that the calculations of Ukraine are based on percentage of total GHG emissions of the sector in total national GHG emissions, whereas the IPCC good practice guidance recommends that key source analysis shall be based on the contributions of emissions of different sources gas by gas.

B. Key sources

Solid waste disposal on land – CH_4

61. Ukraine states that 94 per cent of waste is disposed in landfills, but no background information on waste management practices is provided. During the review, Ukraine reported that 4.8 per cent of waste

was incinerated in 2001 and 2.25 per cent in 2002. The ERT recommends that Ukraine document the fraction of waste landfilled, recycled, incinerated and composted in its next CRF and NIR.

62. Ukraine has used a tier 1 methodology for estimating CH_4 emissions from landfill sites. The ERT recommends that Ukraine consider the use of higher-tier and/or country-specific EFs and parameters in its future submissions since this is a key source.

63. The ERT notes a transcription error in the CRF relating to the volume of solid waste disposed on land in 2001. According to Ukraine, the true value was used for the emission estimation.

64. The CH_4 IEF (0.10 t/t) was identified as among the highest of reporting Parties. Following Ukraine's response during the review, the ERT noted that the high IEF is due to the selection of higher default values for the methane correction factor (MCF) (1.0) and degradable organic carbon assimilated (DOC_f) (0.77) since the country is not a developed country and lignin is included.

65. The CRF includes data on the composition of only 66 per cent of the landfilled waste. The ERT recommends that Ukraine explore the possibility of including a waste composition analysis in its future submissions.

C. Non-key sources

Waste-water handling

66. Ukraine uses the "check method" with IPCC default values for estimating methane emissions from waste-water handling. The CF_4 IEF reported by Ukraine (0.48 kg/kg DC) was identified as the highest of reporting Parties. In order to provide more accurate estimates, the ERT encourages Ukraine to make use of the IPCC default method with appropriate EFs in its future submissions.

67. No CF_4 emissions are reported for sludge. The relevant CRF notation keys should be used (i.e., "NE", "NO", "NA", "included elsewhere" ("IE") or "confidential" ("C")) together with suitable documentation and explanation in the NIR.

68. For industrial waste water, Ukraine should use the IPCC good practice guidance methane-producing capacity (B_o) value of 0.6 instead of the IPCC Guidelines value of 0.25 since it is using biochemical oxygen demand (BOD) AD.

Waste incineration – CO_2

69. The ERT recommends that Ukraine report in the NIR the amount and composition of waste incinerated in the country. Ukraine should also include data on the breakdown between biogenic and non-biogenic components of municipal solid waste (MSW) and use this waste composition split to estimate CO_2 emissions.

70. Between 2001 and 2002, CO_2 emissions from waste incineration decreased sharply and the NIR noted that this is due to the closing of one of the three incineration plants.

71. The N_2O EF of 100 kg/Gg is not documented. During the review Ukraine provided additional information to show that that the average default EF for MSW was taken from the IPCC good practice guidance table 5.7. The ERT recommends that Ukraine provide further information on the choice of the EF from table 5.7 because several factors are shown for different types of incinerators and the value used by Ukraine appears to be outside the range by type.

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

2004 Inventory submissions of Ukraine. 2004 submissions including a set of CRF tables for 2001 and 2002 and an NIR.

UNFCCC secretariat. "2004 Status report for Ukraine" (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/ukr04.pdf>).

UNFCCC secretariat. "Synthesis and assessment report of the greenhouse gas inventories submitted in 2004. Part I": FCCC/WEB/SAI/2004 (available on the secretariat web site <http://unfccc.int/resource/webdocs/sai/2004.pdf>) and Part II – the section on Ukraine (unpublished).

UNFCCC secretariat. Review findings for Ukraine (unpublished).

Ukraine's comments on the draft "Synthesis and assessment report of the greenhouse gas inventories submitted in 2004" (unpublished).

UNFCCC secretariat. "Handbook for review of national GHG inventories". Draft 2004 (unpublished).

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B. Additional materials

Responses to questions during the review were received from Ms. Natalya Parasyuk, including additional material on the methodology and assumptions used.

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