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LITHUANIA

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 Lithuania, 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 11 to 15 October 2004 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalists – Ms. Riitta Pipatti (Finland) and Mr. Pavel Shermanau (Belarus), Energy – Ms. Branca Americano (Brazil), Mr. Mamadou Diarra (Niger) and Mr. Dario Gomez (Argentina), Industrial Processes – Mr. Menouer Boughedaoui (Algeria) and Mr. Alexander Nakhutin (Russian Federation), Agriculture – Mr. Viktor Novikov (Tajikistan) and Mr. Haruo Tsuruta (Japan), Land-use Change and Forestry (LUCF) – Mr. Nagmeldin Goubti Elhassan (Sudan) and Mr. Risto Sievänen (Finland), Waste – Ms. Tatiana Tugui (Republic of Moldova) and Mr. Gao Qingxian (China). Mr. Dario Gomez and Ms. Riitta Pipatti were the lead reviewers. 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 Lithuania for comment prior to its publication.

B. Inventory submission and other sources of information

3. In its 2004 submission, Lithuania has submitted common reporting format (CRF) tables for the years 1990, 1998, 2001 and 2002, and a national inventory report (NIR). This is the first time Lithuania has used the CRF tables in its reporting and provided an NIR. The expert review team (ERT) welcomed the submission of the CRF tables and the NIR as a major improvement compared to the Party's previous reporting.

4. The previous reporting consisted of incomplete estimates of national GHG emissions and removals, and was not used in the review. The full list of materials used during the review is provided in annex 1 to this report.

C. Emission profiles and trends

5. In the year 2002, the most important GHG in Lithuania was carbon dioxide (CO_2), contributing 68.7 per cent to total[2] national GHG emissions expressed in CO_2 equivalent, followed by methane (CH_4)

[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.

– 20.7 per cent – and nitrous oxide (N_2O) – 10.4 per cent. Hydrofluorocarbons (HFCs) contributed 0.2 per cent of the overall GHG emissions in the country, but only estimates of potential emissions have been provided and not all possible sources are included. Emissions of perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6) have not been estimated or are reported as "not occurring" ("NO") for some sources.

6. The Energy sector accounted for 67.1 per cent of total national GHG emissions in 2002, followed by Agriculture (12.6 per cent), Industrial Processes (11.5 per cent) and Waste (8.8 per cent). Emissions from the Solvent and Other Product Use sector are not estimated.

7. Total GHG emissions (excluding LUCF) amounted to 17,215 Gg CO_2 equivalent in 2002 and had decreased by approximately 66.2 per cent from 50,929 Gg CO_2 equivalent (excluding LUCF) in 1990. With the LUCF sector included, total national emissions in 2002 amounted to 10,494 Gg CO_2 equivalent (a decrease from 1990 of 76.9 per cent). Emissions have decreased greatly in all sectors (by 26–70 per cent), the most significant decreases being in the Energy and Agriculture sectors. It should be noted, however, that the quality of the statistical data for 1990 is poor, and the reduction in emissions may be overestimated.

D. Key sources

8. Lithuania has reported a key source tier 1 analysis, by level assessment, as part of its 2004 submission. The key source analyses performed by the Party and the secretariat[3] produced similar results. Both identified 14 key sources; the secretariat's analysis included one source not identified by Lithuania (CO_2 from railways), and Lithuania identified one key source (CH_4 from manure management) that was not identified by the secretariat. The difference is probably due to a mistake by Lithuania in listing the key sources. A key source analysis based on trend assessment is not provided.

E. Main findings

9. Lithuania has made a major improvement in its inventory submission by using the CRF tables and providing an NIR for the first time. The CRF tables include many uses of the notation key "not estimated" ("NE")). Lithuania is encouraged to make its reporting more complete. The structure of the NIR is consistent with the UNFCCC reporting guidelines. The contents could be improved by including more thorough descriptions of the methodologies used, more detail, and the rationale for the choices of the country-specific emission factors (EFs) used for the Energy sector. The choices of activity data (AD) and EFs used in the other sectors prepared using the IPCC default methods should also be described in more detail in the NIR to increase the transparency of the inventory.

10. The time series of emissions and removals are incomplete (only the years 1990, 1998, 2001 and 2002 are provided), and Lithuania is encouraged to report the full time series in its future submissions. The information for the base year (1990) is more uncertain than that for the most recent years due to the poor quality or lack of statistical data for some categories for the early years of Lithuania's independence (1990, 1991, 1992). Completing and improving the consistency of the times series should be prioritized for the Party's next submission.

11. The NIR and CRF tables contain many inconsistencies, imprecise descriptions and mistakes. The estimates provided in the CRF tables for different years and in the summary trend tables for 2002 are sometimes different, for example, total emissions for the Energy sector in 2001 are given as 11,215.6 Gg CO_2 equivalent in table 10s5 in the CRF for 2002, and as 12,624.5 Gg CO_2 equivalent in the same table in

[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.

the CRF for 2001 (a difference of 12.5 per cent). Some CRF tables have been filled in incorrectly as implied emission factors (IEFs) have been given by the Party when these should be calculated by the CRF. The IEFs provided do not always match the results obtained by dividing the reported emissions by the reported AD.

12. Lithuania is only required to use 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) in estimating the emissions and removals from 2005. The estimates in the 2004 submission have largely been prepared using tier 1 methods (including for key sources). Country-specific EFs have been used only for fuel combustion in the Energy sector. Use of the IPCC good practice guidance to improve the methodologies for the key sources will increase the accuracy and quality of Lithuania's inventory in future.

13. Strengthening of the institutional arrangements and resources for the inventory preparation should be prioritized in the improvement of Lithuania's GHG inventory. The development and preparation of the inventory is currently the responsibility of a single person at the Air Protection Division at the Ministry of Environment. The ERT encourages Lithuania to engage more experts in the work.

F. Cross-cutting topics

Completeness

14. The inventory has been provided for the years 1990, 1998, 2001 and 2002 but the reporting for these years is not complete. Estimates have not been prepared and reported for all sources (e.g., estimates for lime use and application, poultry manure management, and managed solid waste disposal are missing). For some categories estimates are provided only for the years 2001 and 2002 (e.g., emissions from aviation for gasoline and kerosene). Lithuania gives lack of AD and EFs as the reasons for the incomplete reporting. The IPCC good practice guidance provides guidance on how to provide estimates when data are missing. The ERT encourages Lithuania to try to collect the missing AD or to use the IPCC good practice guidance to estimate the missing AD in its next submissions.

Transparency

15. The description of the methodologies used to derive the country-specific EFs used in the Energy sector is very general. Also, for some sources where IPCC tier 1 methodologies are used, the IEFs given suggest that the EFs or other parameters used in calculating emissions may be different from the average default values given in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines). The ERT encourages Lithuania to improve the descriptions by specifying the main assumptions and factors taken into account in determining country-specific EFs and information on how the IPCC methodologies have been applied, and to complement the information with references.

16. AD are derived mainly from the national statistics. Additional information on the coverage of and uncertainties in this information would increase the transparency of the reporting.

Recalculations and time-series consistency

17. Lithuania reports no recalculations in the CRF tables (the notation key "not applicable" ("NA") is used). Since the Party's previous reporting used a different reporting format, no meaningful comparisons between previously reported data and the data in the 2004 submission can be made.

18. Lithuania acknowledges the poor quality of the information for the base year. The ERT recommends that improvement of these data be given high priority in the next submission.

Uncertainties

19. Lithuania has provided qualitative uncertainty estimates (high, medium and low) in CRF table 7. The basis for the estimates is not given. In the NIR uncertainties are discussed under the sectoral chapters but the discussions are not linked to estimates in the CRF. Information on uncertainties is provided only for the year 2002 in the CRF. The NIR indicates that the uncertainties in the values for the year 1990 may be higher.

Verification and quality assurance/quality control approaches

20. Lithuania has not implemented a quality assurance/quality control (QA/QC system). The NIR does not provide any information on self-verification or review by a third party.

Follow-up to previous reviews

21. Previous review reports are not available for Lithuania as this is the first time the country has submitted an inventory using the CRF and provided an NIR.

G. Areas for further improvement

Identified by the Party

22. The NIR identifies some areas for improvement:

(a) Putting in place a QA/QC system;

(b) Improving the institutional arrangements;

(c) Improving and providing more complete coverage of the sectoral estimates.

Identified by the ERT

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

(a) Improve the consistency of the time series, with emphasis on the base year (1990) estimates;

(b) Provide complete times series for all sources and categories;

(c) Provide more detailed descriptions of the collection of AD, the EFs used and the application of methods;

(d) Improve the way the CRF tables are filled in, especially as regards consistency and the IEFs;

(e) Provide quantified uncertainty estimates;

(f) Establish a QA/QC management system including verification procedures.

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, energy-related GHG emissions amounted to 11,556 Gg CO_2 equivalent, or 67.1 per cent of total national GHG emissions (excluding LUCF). These emissions decreased by 69.3 per cent from 1990 to 2002 and by 8.5 per cent from 2001 to 2002.[4]

26. CO_2 emissions from the Energy sector decreased by 70.6 per cent between 1990 and 2002 and by 11.7 per cent in from 2001 to 2002. CH_4 emissions decreased by 0.4 per cent between 1990 and 2002; the change between 2001 and 2002 cannot be calculated because fugitive emissions for 2001 have not been reported. N_2O emissions decreased by 52.6 per cent between 1990 and 2002 and by 24.2 per cent between 2001 and 2002. Emissions of all other non-CO_2 gases decreased between 1990 and 2002 – nitrogen oxide (NO_x) emissions by 68.1 per cent, emissions of non-methane volatile organic compounds (NMVOCs) by 54.7 per cent, and emissions of carbon monoxide (CO) by 56.6 per cent. Between 2001 and 2002, NO_x emissions decreased by 9.4 per cent, CO emissions decreased by 1.9 per cent, and NMVOC emissions increased by 26.0 per cent. However, comparisons with the year (1990) should be interpreted carefully because of the large uncertainty in the AD for the base year.

27. For the Energy sector complete CRF tables have been submitted for the years 1990, 1998, 2001 and 2002, although the notation key "NE" is used quite extensively.

28. Lithuania reported that country-specific EFs have been used to obtain emission estimates from fuel combustion and default EFs to estimate fugitive emissions. Country-specific EFs were adopted from references for similar countries.

29. As estimates have been provided for only four years (1990, 1998, 2001 and 2002), it was not possible to conduct a real trend analysis for Lithuania. Nevertheless, comparing AD from 2001 and 2002, the ERT identified some large fluctuations. Consumption of gasoline in 1.A.3.2 Civil Aviation decreased by 97.7 per cent. Consumption of biomass and solid fuels in sector 1.A.2 Manufacturing Industries and Construction increased by 72.8 per cent and 397.6 per cent, respectively, while consumption of gaseous fuels fell by 55.0 per cent. Consumption of liquid and solid fuels in sector 1.A.1. Manufacture of Solid Fuels and Other Energy Industries decreased by 98.7 per cent and 77.6 per cent, respectively. The ERT encourages Lithuania to explain such large changes from one year to the next.

30. Five key sources were identified in the Energy Sector using the level assessment – four for CO_2 from fuel combustion and one for CH_4 from fugitive emissions.

B. Reference and sectoral approaches

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

31. For the year 2002, there is a difference of 8.0 per cent in the CO_2 emission estimates between the reference approach and the sectoral approach. No explanations are provided in the documentation box of CRF table 1.A(c). National experts indicate two possible reasons for the difference: that the sectoral approach does not take into account the amount of oil that goes to refinery; and that in the reference approach losses of natural gas are not estimated. However, the first is not correct, because energy consumption in refineries is taken into account in the sectoral approach, and the second is unlikely because the CO_2 losses mentioned are not that large.

[4] Using the estimates in CRF summary 2 tables for the corresponding years.

International bunker fuels

32. Lithuania has assumed for the year 2002 that all jet kerosene goes for international flights and all jet gasoline goes for domestic flights, which is reasonable. This approach is reflected in CRF tables 1 and 1.A(a). However, in CRF table 1.C, for reporting the background data for international bunkers, these emissions are not reported correctly. Also, in table 1.A.(b) for the reference approach there is no information about international bunkers for the fuel jet kerosene. In the corresponding cell the notation key "NO" is used.

33. In CRF tables 1 and 1.C emissions from aviation gasoline are reported as international bunkers, which contradicts the explanation provided in the NIR. On the other hand they are not included as international bunkers in the reference approach, which is correct.

Feedstocks and non-energy use of fuels

34. Lithuania has provided information on feedstocks and non-energy use of fuels. Table 1.A(d) has been filled in but the data on estimated carbon stored in that table have not been transferred to table 1.A(b) of the reference approach, except for natural gas.

C. Key sources

Stationary combustion: gas, liquid and solid fuels – CO_2

35. Stationary combustion (CO_2) is a key source by level assessment for gas (25 per cent of total national emissions), liquid (14 per cent) and solid (3.4 per cent) fuels. Even though 80 per cent of the electricity produced in Lithuania comes from the Ignalina nuclear power plant, energy industries are responsible for 70 per cent of stationary CO_2 emissions.

36. The Manufacturing Industries and Construction category is responsible for 15 per cent of stationary CO_2 emissions. For this source category only aggregated AD and emissions are reported. The ERT encourages Lithuania to provide disaggregated emission estimates.

Road vehicles – CO_2

37. There are no AD for road transportation for the year 1990. Fuel consumption for total transport decreased by 38.8 per cent between 1990 and 2002, and corresponding CO_2 emissions decreased by 39.5 per cent. In 2002 gasoline consumption for total transport was 11.4 per cent lower than in 2001, and the 2002 value is 65.3 per cent lower than that for 1990. The NIR states that the number of personal cars more than doubled in the past decade. The change of the fleet profile, from old high-consumption vehicles to modern low-consumption cars, does not justify the decrease in consumption and emissions taking into account that only 4 per cent of the vehicles in the fleet were less than five years old in 2002. Responding to a question by the ERT, Lithuania related this discrepancy to the fact that the emissions have been estimated according to fuel consumption, not according to the number of vehicles. Fuel consumption is taken from the official Lithuanian statistics. The ERT encourages Lithuania to investigate further and clarify the trend in the emissions from this source.

Fugitive emissions: oil and gas operations

38. Fugitive emissions from venting and flaring have not been reported as AD are not available. The ERT encourages Lithuania to explore the possibilities of obtaining AD and reporting these emissions.

39. For the year 2002, the only fugitive emissions reported by Lithuania in category 1.B.2 correspond to CH_4 from oil transport (1.B.2.a) and CO_2 and CH_4 from distribution of natural gas (1.B.2.b). For 1990, 1998 and 2001, the emissions reported in category 1.B.2 are smaller. CH_4 emissions from oil transport, which are estimated for the years 1990, 2001 and 2002, show inconsistencies in both the AD and the EFs used. While the amount of oil loaded in tankers is not estimated for 1990, it amounted to 1519.14 PJ in

2001 and 124,000 Mg in 2002 (corresponding to 5.2 PJ if a default net calorific value of 42.08 TJ/kt is assumed for Lithuanian crude oil). The IEFs for CH_4 from oil transport are 0.13 kg/"unit" in 1990, 745 kg/PJ in 2001 (which corresponds to the EF suggested by the IPCC Guidelines), and 0.13 kg/Mg in 2002, which is not consistent with the previous value when the default net calorific value is considered. For natural gas distribution, associated CH_4 emissions are estimated for the years 1990 and 2002, while CO_2 emissions are estimated only for 2002. For this category, the AD for 1990 are more than twice those for 2002, while the CH_4 IEF for 1990 (134 kg/PJ) is much lower than that for 2002 (218 kg/PJ). The ERT encourages Lithuania to make efforts to improve the completeness of the time series in category 1.B.2, to check the consistency of the emission estimates, and to provide background information in a more transparent manner.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

40. In 2002, the Industrial Process sector emissions accounted for 11.5 per cent of total national GHG emissions (without LUCF) – a higher share than in the base year (1990, when it was 5.2 per cent).

41. Emissions from the sector have decreased greatly since 1990 when Lithuania gained independence from the Soviet Union. Lithuania is encouraged to explain why independence has affected some subcategories such as cement production but not others such as production of nitrogen (N) fertilizers.

42. For the following source categories the notation key "NE" is used: Limestone and Dolomite Use, Soda Ash Production and Use, Asphalt Roofing, Road Paving with Asphalt, Adipic Acid Production, Carbide Production, Metal Production, Other Production, and Consumption of Halocarbons and SF_6. CO_2 and N_2O emissions from Solvent and Other Product Use sources are not estimated. The ERT recommends Lithuania to try to estimate these emissions for the sake of the consistency and completeness of the time series.

B. Key sources

Cement production – CO_2

43. Cement production is identified as a key source by Lithuania (annex 1 of the NIR) and the secretariat, but is not reported as a key source in the NIR (chapter 4). Lithuania should correct this inconsistency in its next submission.

44. The CO_2 IEF is reported as 0.5 t/t for the years 1998, 2001 and 2002. For the year 1990 the value is 0.6 t/t. The ERT encourages Lithuania to explain the use of different EFs for different years.

Nitric acid production

45. The N_2O IEF is 0.0019 t/t in 1990, which is the lowest in the IPCC default value range and the lowest among reporting Parties, while for 1998, 2001 and 2002 it is 0.01 t/t, which is the highest of the IPCC default values and the highest among reporting Parties. This has resulted in an increase of 105.4 per cent in estimated emissions, although the production of nitric acid has decreased. The ERT recommends Lithuania to explain the choice of the EFs used.

Ammonia production

46. CO_2 emissions from ammonia production are reported for the years 1998, 2001 and 2002. The ERT recommends the Party to estimate CO_2 emissions for 1990 or to use the notation keys with an explanation.

C. Non-key sources

Consumption of halocarbons and SF_6

47. Only potential emissions of some of the HFCs are reported. Actual emissions are reported as "NE" in the CRF tables. The ERT encourages Lithuania to estimate the actual emissions and the potential/actual emission ratio but acknowledges the difficulties with obtaining AD.

IV. AGRICULTURE

A. Sector overview

48. In 2002, the Agriculture sector in Lithuania accounted for GHG emissions amounting to 2,170 Gg CO_2 equivalent, or 12.6 per cent of total national emissions (without LUCF). CH_4 emissions from enteric fermentation and manure management accounted for 39.3 per cent of total CH_4 emissions. N_2O emissions from the sector accounted for 43.1 per cent of total N_2O emissions, and included emissions from manure management and only the direct emissions from agricultural soils (although according to the NIR indirect N_2O emissions were also calculated).

49. Lithuania has reported these emissions for only four years, 1990, 1998, 2001 and 2002. Compared with emissions from the Agriculture sector in the base year (1990), emissions in the other three years decreased by between 58 per cent and 70 per cent, and in 2001 they were 17 per cent and 27 per cent higher than those in 1998 and 2002, respectively. Lithuania responded to a question raised during the review to the effect that the numbers of livestock and fertilizer use have varied during the period. The ERT recommends Lithuania to further explore and explain the reasons for the fluctuations.

50. No data are reported for N_2O emission from manure management in 1990 in the CRF. Lithuania is encouraged to provide data for this category for 1990.

51. Three key sources are identified in the level assessment by Lithuania and the secretariat – CH_4 from enteric fermentation, direct N_2O emission from agricultural soils, and N_2O from manure management. Lithuania also identified CH_4 emissions from manure management as a key source in table 6-2 and annex 1 to the NIR.

52. The reporting of N_2O emissions from agricultural soils is incomplete because emission estimates for N-fixing crops, crop residues and indirect N_2O are not provided in table 4.D, even though the NIR suggests that these are included. Lithuania also states that "the IPCC Guidelines suggest to use a default mean EF of 0.0036 kg N-N_2O/kg N" for direct emissions from agricultural soils. This is not the same as the IPCC default EF for direct N_2O emissions. The ERT encourages Lithuania to provide estimates for indirect N_2O emissions from agricultural soils and to explain how it has derived the EF mentioned.

B. Key sources

Enteric fermentation – CH_4

53. Animal populations decreased drastically from 1990 to 2002. Lithuania is requested to describe the reasons for the decrease and any changes in data collection during the period, as well as whether the uncertainties in the AD are different between the years.

Manure management – N_2O

54. For animal wastes applied to soils in table 4.D, the AD are equal to the sum of total nitrogen excretion per animal waste management system except for pasture range and paddock. Nitrogen losses in the form of ammonia (NH_3) or nitric oxide (NO) during waste management have not been taken into account in estimating emissions from manure applied to agricultural soils, and the emissions may

therefore be overestimated. The ERT recommends Lithuania to check and correct the estimates in its next submission.

55. In CF table 4.B(b) for 2001, the EFs for solid storage and dry lot, and other are 0.013 kg N_2O-N/kg N and 0.003 kg N_2O-N/kg N, respectively. These EFs are very different from the IPCC default values (0.02 kg N_2O-N/kg N and 0.005 kg N_2O-N/kg N) which are used in the CRF for 2002. The ERT recommends Lithuania to check the values and explain any choices made, as well as the rationale for choosing them.

Agricultural soils – N_2O

56. The EF for animal wastes applied to soils is 0.007 kg N_2O-N/kg N in CRF table 4.D, which is much lower than the IPCC default value (0.0125 kg N_2O-N/kg N), but no explanation is given. The Party is requested to describe how this value is derived and to show that it is reasonable and reliable.

57. The additional information in CRF table 4.D is not provided, even though the data are needed to calculate emissions from soils. The Party is requested to provide the missing information.

58. In CRF table 4.D for 2001, the IEFs for synthetic fertilizers, animal wastes applied to soils and animal production are 0.008 kg N_2O-N/kg N, 0.006 kg N_2O-N/kg N, and 0.011 kg N_2O-N/kg N, respectively. These values are very different from the IPCC default values which are used in the NIR. The NIR states that the IPCC default values were used also for 2001. The Party is requested to explain this inconsistency.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

59. In 2002, the LUCF sector was a net sink in Lithuania, offsetting 6,721 Gg CO_2 or 39.0 per cent of total national emissions. Since 1990 (when it was 10.8 per cent) this share has increased strongly. In the past five years it has varied between 34.6 per cent and 39 per cent without a clear trend. Removals by the LUCF sector have increased from 5,482 Gg CO_2 in 1990 to levels of around 7,000 Gg CO_2 (7,558–6,721 Gg CO_2) during the five most recent years. During this five-year period, the forest area has expanded from 2.14 Mha to 2.18 Mha, thus giving rise to a potentially increasing sink. However, increasing commercial harvest and traditional fuelwood use (reported in table 5.A) have increased almost linearly, from 2,935 Gg CO_2 in 1990 to 5,775 Gg CO_2 in 2002, offsetting the increase in the growth rate.

60. The IPCC default methodology and national AD have been applied. The AD and parameters consist of statistical forestry data that are supported by expert judgement and analysis given by national forest experts from the State Forest Survey Service, the General Forest Enterprise of the Ministry of Environment. In general, the NIR does not provide sufficient explanations on the assumptions made or descriptions of the methodology used. As a consequence it is not always clear what assumptions and parameters/EFs have been used to derive the estimates. Further, the NIR states that the LUCF category makes a small contribution to the total GHG balance. In the light of the figures in the previous paragraph (about 39 per cent of total emissions) this statement seems questionable. The ERT recommends that Lithuania document the methodology in more detail, even if it is based on IPCC defaults, in its next submission to improve the transparency.

61. Both table 5 and the background tables have been filled in and the notation keys have been used. Non-CO_2 emissions have not been reported.

B. Sink and source categories

Changes in forest and other woody biomass stocks

62. It is not clear from the NIR what default factors of the IPCC methodology have been used for estimating removals in growth and emissions in harvests. Comparing the values given in the CRF with the information on increments and fellings given in the NIR, it seems that only biomass of stemwood has been considered. The ERT recommends that Lithuania report the methodology in a more transparent way. Lithuania is encouraged in its next submission to report total biomass that can be calculated using for example the expansion ratios given in annex 3A.1 Table 3A.10) to the IPCC good practice guidance for Land Use, Land-use Change and Forestry (LULUCF).

63. It is not clear how the amount of biomass in commercial harvests and in traditional fuelwood reported in CRF table 5.A has been estimated or how it relates to the volumes of fellings and total fuelwood given in the NIR (table 7-6). How the amount of biomass burned in forest fires (NIR table 7-6) has been calculated and under which CRF item it is included is not explained. The methodology should be explained in a more transparent way.

Forest and grassland conversion

64. This category has not been estimated ("NE" is reported) because, according to the NIR, the "source is not occurring". Even if forest area is increasing it may be the case, for example, that urban areas are expanding into forest areas and thus causing forest conversion. It is recommended that, to improve the transparency of the reporting, background information be given which shows that this category is negligible and, if it really does not occur, that the notation key "NO" be used.

Abandonment of managed lands

65. Only removals for temperate mixed broadleaf/coniferous forest have been estimated; other subcategories are reported as "NO".

66. The NIR states that the increase in forestland between 1978 and 2002 is assumed to be due to abandonment of land. Additional information has not been provided. The methods and EFs used are not specified in CRF table Summary 3 or in the NIR. The ERT encourages Lithuania to provide more detailed information in its next submission.

CO_2 emissions and removals from soil

67. Only CO_2 emissions from organic soils have been reported; all other subcategories have been reported as "NE".

68. For the subcategory Liming of Agricultural Soils, the NIR provides an explanation which is not clear – to the effect that this has not been calculated because liming is not applied in forest management. The ERT encourages Lithuania to complete the reporting of CO_2 emissions and removals from soils to cover all categories.

VI. WASTE

A. Sector overview

69. In 2002, emissions from the Waste sector contributed 8.8 per cent of total national GHG emissions (without LUCF) in 2002. This includes one of the highest shares of CH_4 emissions in total national emissions among reporting Parties. In the Solid Waste category only emissions from unmanaged waste disposal sites have been reported. All disposal sites that did not meet the European Union (EU) requirements until 2003 have been considered as unmanaged. Emissions of CH_4, the major GHG from

this sector, decreased by 56.5 per cent from 1990 to 2002 due to that fact that only 300 landfill sites were still in use in 2002, out of 800 which are registered in Lithuania.

70. The Waste sector has two key sources, CH_4 from solid waste disposal on land and CH_4 from waste-water handling, which contributed 6.3 per cent and 2.4 per cent, respectively, to total national emissions in 2002. Emissions from the incineration of municipal waste, hospital waste and "hazardous" waste have not been estimated (the notation key "NE" is used). Some types of waste (hospital, plastic, waste oil) in minor amounts are incinerated at industrial companies, but no official data are available in the Lithuanian *Statistical Yearbook*.

71. The CRF tables include estimates for most gases and sources of emissions from the Waste sector, excluding emissions from waste incineration. Lithuania has provided inventory data only for the years 1990, 1998, 2001 and 2002.

72. Lithuania uses the IPCC tier 1 methodologies to estimate emissions from the Waste sector. The references for the collection of AD and most parameters needed in calculating the estimates are not provided. The ERT encourages Lithuania to provide more detailed descriptions on the parameters used and references for its AD in the next submissions.

73. Uncertainties have been evaluated as medium for the estimates of solid waste disposal sites and low for the estimates of waste-water treatment (CRF table 7). The NIR indicates that the current system of statistical data collection was established in 1991. The data from 1991 have been used for 1990. As Lithuania's gross national product (GNP) fell by 5 per cent between 1990 and 1991, using the same amount for 1990 leads to an underestimation of the GHG emissions for 1990.

B. Key sources

Solid waste disposal on land – CH_4

74. Most landfills (there are 300 in use) in Lithuania are considered to be unmanaged. Only the three landfills of the biggest cities comply with EU requirements and are considered as managed sites. According to the NIR, the CRF contains only emissions from the unmanaged waste disposal sites. However, when asked by the ERT during the review why emissions from managed landfills are not estimated, Lithuania responded that emissions from managed landfills are included in the estimate from unmanaged landfills. As the methane correction factor (MCF) for unmanaged landfills is lower than that for managed landfills, this may underestimate the emissions.

75. Lithuania has used the tier 1 method to estimate CH_4 emissions from solid waste disposal. Based on the significant changes in amounts of waste generated over the period 1990–2002, the ERT recommends further study of the possibility of using the tier 2 method to improve the accuracy of the reporting.

76. AD on waste in Lithuania are collected from the waste management utilities. Only a minority of landfills currently has scales for weighing the waste. Amounts of waste are estimated by visual assessment and calculated following a certain methodology.

77. The data on waste do not distinguish between waste flows to managed and unmanaged disposal sites. The Lithuanian NIR states that most of the waste is disposed at unmanaged landfills. The Party is planning to improve its statistics and to distinguish between waste flows to managed and unmanaged sites. Only part of the data in the additional information table in the CRF is provided and no well-documented references are given in the NIR. No information on the composition or characteristics of the waste is provided. The ERT recommends further studies to split the amounts of waste between managed and unmanaged solid waste disposal sites, and the reporting of emissions for managed and unmanaged sites separately.

78. The IPCC default EFs for estimating CH_4 emissions from solid waste disposal have been used (degradable organic carbon dissimilated (DOC_F) = 0.77, MCF = 0.6 for unmanaged sites). The 2002

value of the CH_4 IEF for solid waste disposal on land (0.05 t/t waste) is comparable to those of other reporting Parties.

Waste-water handling

79. CH_4 emissions from waste-water handling are also a key source and accounted for 2.4 per cent of total national emissions in 2002. The IPPC EF and tier 1 method have been used to estimate the emissions. No AD on the amount of sludge are available in the Lithuanian *Statistical Yearbook*.

80. N_2O emissions from human sewage have not been estimated. The ERT recommends Lithuania to use the IPPC good practice guidance to estimate N_2O emissions from human sewage based on AD on protein consumption/person/year (taken from the Food and Agriculture Organization of the United Nations).

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

2004 Inventory submission of Lithuania including a set of CRF tables for 1990, 1998, 2001 and 2002 and an NIR.

UNFCCC secretariat. "2004 Status report for Lithuania" (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/lit04.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 *Lithuania* (unpublished).

UNFCCC secretariat. Review findings for Lithuania (unpublished).

Lithuania'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).

UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", "Part II: UNFCCC reporting guidelines on national communications" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/1999/7(available on the secretariat web site <http://www.unfccc.int/resource/docs/cop5/07.pdf>).

UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC Reporting guidelines on annual inventories" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/2002/8 (available on the secretariat web site <http://unfccc.int/resource/docs/cop8/08.pdf>).

UNFCCC secretariat. Database search tool – *Locator* (unpublished).

IPCC. *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000* (available on the following web site: <http://www.ipcc-nggip.iges.or.jp/public/gp/english>).

IPCC/OECD/IEA. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, volumes 1–3, 1997* (available on the following web site: <http://www.ipcc-ggip.iges.or.jp/public/gl/invs1.htm>).

B. Additional materials

Responses to questions during the review were received from Ms Jolanta Kotvickaja (The Ministry of Environment of the Republic of Lithuania) including additional material on the methodology and assumptions used.

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