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Report of the individual review of the greenhouse gas inventory of Lithuania submitted in 2005[*]

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[*] 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

<u>Annex</u>

I. Executive summary

1.   This report covers the in-country review of the 2005 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. The review took place from 3 to 7 October 2005 in Vilnius, Lithuania, and was conducted by the following team of nominated experts from the roster of experts: Generalist – Mr. Tomoyuki Aizawa (Japan); Energy – Ms. Chia Ha (Canada); Industrial Processes – Mr. Newton Paciornik (Brazil); Agriculture – Mr. Damdin Dagvadorj (Mongolia); Land Use, Land-use Change and Forestry (LULUCF) – Ms. Tuija Lapveteläinen (Finland); Waste – Ms. Katerina Papagiannaki (Greece). Mr. Tomoyuki Aizawa and Mr. Newton Paciornik were the lead reviewers. The review was coordinated by Mr. Javier Hanna (UNFCCC secretariat).

2.   In accordance with the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention", a draft version of this report was communicated to the Government of Lithuania for comment prior to its publication

3.   In 2003, the most important GHG in Lithuania was carbon dioxide (CO_2), contributing 71.3 per cent to total[1] national GHG emissions, followed by methane (CH_4), 20.9 per cent, and nitrous oxide (N_2O), 7.6 per cent. Hydrofluorocarbons (HFCs), which are reported only as potential emissions, contributed 0.1 per cent of the overall GHG emissions in the country. Emissions of perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) have not been estimated. The Energy sector accounted for 69.9 per cent of total national GHG emissions, followed by Agriculture (12.3 per cent), Industrial Processes (9.3 per cent) and Waste (8.5 per cent).

4.   The inventory submitted in 2005 is broadly consistent with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). The transparency of the inventory is limited if only the information provided in the common reporting format (CRF) tables and the national inventory report (NIR) is considered, but the transparency of the inventory development process increased with the additional information supplied to the expert review team (ERT) during the in-country visit.

5.   The main recommendations from this review, to be implemented in Lithuania's next submission, are the following. Lithuania should: complete estimates for the whole time series; increase completeness by estimating missing sources where possible; and improve transparency by providing more information on methodologies, activity data (AD) and emission factors (EFs) in the NIR. More information on cross-cutting issues, such as institutional arrangements, quality assurance/quality control (QA/QC) procedures, the estimation of uncertainties and recalculations, could also usefully be brought into the NIR. The possibility of adopting a QA/QC plan should be considered bearing in mind Lithuania's national circumstances.

6.   The ERT noted that Lithuania has submitted the LULUCF reporting tables required by decision 13/CP.9.

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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.

Table 1. Greenhouse gas emissions by gas, 1990–2003[2]

GHG emissions	Gg CO$_2$ equivalent														Change 1990–2003 (%)
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
CO$_2$ (with LULUCF)	33 438								8 106			5 990	5 984	5 298	–84.2
CO$_2$ (without LULUCF)	38 920								15 663			13 326	12 704	12 287	–68.4
CH$_4$	7 938								3 732			3 172	3 557	3 600	–54.6
N$_2$O	4 077								2 424			3 844	3 292	1 314	–67.8
HFCs												14	34	22	
PFCs															
SF$_6$															
Total (with CO$_2$ from LULUCF)	45 452								14 261			13 020	12 868	10 234	–77.5
Total (without CO$_2$ from LULUCF)	50 934								21 819			20 356	19 588	17 223	–66.2

LULUCF = Land Use, Land-use Change and Forestry.

Table 2. Greenhouse gas emissions by sector, 1990–2003

Sectors	Gg CO$_2$ equivalent														Change 1990–2003 (%)
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Energy	37 669								14 885			12 626	11 650	12 037	–68.0
Industrial Processes	2 641								2 711			3 195	2 757	1 610	–39.0
Solvent and Other Product Use															
Agriculture	7 144								2 541			2 972	3 669	2 113	–70.4
LULUCF	–5 482								–7 558			1 177	1 210	–6 989	27.5
Waste	3 480								1 682			1 563	1 513	1 463	–57.9
Other															

LULUCF = Land Use, Land-use Change and Forestry.

II. Overview

A. Inventory submission and other sources of information

7.   Lithuania submitted an NIR on 27 May 2005. In its 2005 submission, Lithuania has submitted the CRF tables only for the year 2003. During the in-country visit the ERT was informed that the CRF tables for the years 1990, 1998, 2001 and 2002 included in the 2004 submission could be regarded as part of the 2005 submission, as these values have not been recalculated. There are, however, some inconsistencies between the amounts of GHGs reported for 2002 indicated in table 10 of the CRF submitted in 2005 and in table Summary 2 of the CRF submitted in 2004, even if no recalculations have been reported.

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[2] The information in tables 1 and 2 is taken from table 10 of the 2005 submission with the exception of the information for year 2003, which is taken from table Summary 2.

8.   During the in-country visit Lithuania provided the ERT with additional information sources. These documents are not part of the inventory submission. The full list of materials used during the review is provided in the annex to this report.

B. Key categories

9.   Lithuania has reported a key category tier 1 analysis, level assessment as part of its 2005 submission. The key category analyses performed by the Party and the secretariat[3] produced similar results. Both identified the same 14 key categories, but their order differs slightly because of simple mistakes in the Party's analysis. A trend key source analysis and key category analysis considering the LULUCF sector has not been conducted. Lithuania has not yet used the analysis to prioritize the development of its inventories. The ERT recommends Lithuania to archive the whole calculation processes and establish QC procedures in order to avoid simple mistakes.

C. Cross-cutting topics

1. Completeness

10.   The inventory provides estimates for the years 1990, 1998, 2001, 2002 and 2003 but the reporting for these years is not complete. Notation keys are used throughout the CRF, but the notation keys "not occurring" ("NO") and "not estimated" ("NE") have been used wrongly at points. Emissions from some sources that occur in Lithuania are still not estimated (e.g. CO_2 from Limestone and Dolomite Use, SF_6 from Electrical Equipment). The ERT recommends that the notation keys should be used consistently in all the CRF tables and that an effort should be made to estimate the GHG emissions from the sources that occur in Lithuania but are reported as "NE". The ERT also encourages Lithuania to estimate emissions and removals for all years from 1990 to the latest year and to provide CRF tables for all these years.

2. Transparency

11.   The NIR provides general background information for each sector in the Overview section, and this information was quite helpful to an understanding of the circumstances of GHGs emissions and removals in Lithuania. However, descriptions of the estimation methods are not clearly indicated in the NIR, and actual values of the EFs used are not provided, with the exception of the EF for CO_2 emissions from fuel combustion. Only general information on references of AD is indicated and no detail is provided. However, during the in-country visit the ERT was provided with many explanations on the estimation procedures and GHG emissions/removals trends, which could be used by the national experts for future improvement of the NIR. The inclusion of these explanations in future would also help to increase the transparency of the inventory. The ERT encourages Lithuania to provide such information in its NIR.

3. Recalculations and time-series consistency

12.   The CRF data submitted in 2004 have not been recalculated for any sector. The AD used for the estimation of CO_2 emissions from fuel combustion in 1990 and 2003 are inconsistent because of the use of different sets of data. In 2004, a new national energy balance for the years 1990–2003 was published. The ERT recommends Lithuania to provide estimates/recalculations of emissions for all years based on

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[3] 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. 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.

the use of a consistent data set for its next submission. The ERT also recommends Lithuania to provide estimates/recalculations for other sources and sinks in order to ensure time-series consistency and completeness.

4. Uncertainties

13.   Qualitative uncertainty assessment is provided in CRF table 7, but no quantitative uncertainty assessment is provided. The ERT recommends that a quantitative uncertainty analysis be conducted based on default category/gas uncertainties where uncertainties based on national circumstances cannot be estimated.

5. Verification and quality assurance/quality control approaches

14.   There is no clear indication of verification and QA/QC procedures in the NIR, and Lithuania recognizes that there are no procedures for QA by third-party and self-verification. During the in-country visit, the inventory team of the Ministry of Environment (MOE) and representatives of other governmental organizations provided a good deal of information to the ERT on this issue. The ERT noted that these human and material resources could be a part of future QA/QC procedures in the inventory preparation processes. The ERT recommends that Lithuania establish a formal QA/QC plan in line with the IPCC good practice guidance.

6. Institutional arrangements

15.   During the in-country visit, Lithuania explained the institutional arrangements for preparation of the inventory. The MOE has overall responsibility for the national inventory. The MOE inventory team assembles the inventory on the basis of published data and data provided by the Environmental Protection Agency (EPA), which is an agency under the MOE. The ERT noted that the institutional arrangements are still under consideration, as explained by the MOE. The ERT recommends the Party to establish institutional arrangements for the preparation of its GHG inventories.

7. Record keeping and archiving

16.   Lithuania does not yet have a centralized archiving system and procedures for record keeping. The ERT recommends the Party to establish record keeping and documentation of the calculation processes, as well as archiving in a systematic way.

8. Follow-up to previous reviews

17.   Improvements to the inventory as a whole resulting from recommendations of previous reviews have not been carried out.

D. Areas for further improvement

1. Identified by the Party

18.   The NIR identifies areas for improvement only in the Waste sector. In its response to the issues raised during the review, Lithuania presented a general list of improvements to be made for the next submission. It covers important issues such as institutional arrangements (including QA/QC procedures), the estimation of emissions for the whole time series, improving transparency, and the application of higher-tier methods for key categories.

2. Identified by the ERT

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

(a)   Improve the transparency of its reporting, providing more precise descriptions of the methodologies, AD and EFs used, especially for key categories;

(b)   Conduct tier 1 QC procedures and implement QA procedures;

(c)   Estimate missing sources/sinks and whole inventory years, providing recalculations where appropriate;

(d)   Apply higher-tier methodologies for key categories;

(e)   Formalize the institutional arrangements and put in place an inventory improvement plan;

(f)   Provide a quantitative uncertainty assessment.

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

III. Energy

A. Sector overview

21.   In 2003, GHG emissions from the Energy sector in Lithuania amounted to 12,036.80 Gg CO_2 equivalent or about 69.9 per cent of total national GHG emissions. Emissions from fuel combustion and fugitive sources amounted to 11,572.45 and 464.35 Gg CO_2 equivalent, respectively. Overall, GHG emissions from the sector have decreased by 68.0 per cent since 1990, and a 3.3 per cent increase in emissions is observed between 2002 and 2003. In 2003, Energy Industries contributed 31.41 per cent of the emissions from the Energy sector, followed by Transport with 21.04 per cent.

22.   The CORINAIR approach as identified in the CRF table has been used to estimate the 2003 combustion emissions along with the 2003 fuel consumption data from State Statistical Department of Lithuania (SSD) and country-specific EFs. GHG emissions information is reported and estimated for fuel combustion, fugitive emissions, international bunkers and the reference approach. The notation key "NO" has been used for 2003 to indicate that multilateral operations were not occurring, since they only started in 2004.

23.   The CRF tables have been used to report 2003 emission estimates for the Energy sector. Emissions are reported for CO_2, CH_4 and N_2O. CO_2 is by far the largest contributor to the total GHG emissions for the Energy sector, accounting for about 93.07 per cent (11,205.91 Gg). CH_4 contributed about 5.73 per cent (32.82 Gg) and N_2O 1.18 per cent (0.46 Gg) to total sectoral emissions. Lithuania also reports indirect GHG emissions for nitrogen oxide (NO_x), carbon monoxide (CO), non-methane volatile organic compounds (NMVOCs) and sulphur dioxide (SO_2) as part of its CRF for the Energy sector.

24.   The CRF tables include estimates for the year 2003 of all gases from most of the combustion sources for the Energy sector.

25.   Fugitive Emissions from Solid Fuels are not reported since there is no coal-mining industry in Lithuania.

1. Completeness

26.   To ensure time-series consistency and the completeness of the information reported, it is recommended that the Party's revised energy statistics for 1990–2003 be used to estimate fuel

combustion emissions. It is also recommended that the IPCC tier 2 methodology along with country-specific EFs be used in developing the revised emission estimates for the Energy sector.

27. CO_2, CH_4, N_2O and indirect GHG emissions are only reported in the CRF tables at the total category level for the Manufacturing Industries and Construction sources, and the notation key "NE" is used for each of the specific manufacturing subcategories, but no explanations are provided in CRF table 9. The ERT recommends Lithuania to develop and report disaggregated emissions and energy data using the detailed fuel consumption for each of the manufacturing subcategories as presented in the 1990–2003 national energy balance (provided during the in-country review by SSD), following the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the revised UNFCCC reporting guidelines). For all other sources as presented in the national energy balance, the emissions information should be reported and specified under category 1.A.2.f Other.

28.   Although transmission pipelines exist to transport natural gas from Russia to Lithuania and through Lithuania to neighbouring countries, combustion emissions from compressor stations used in transporting natural gas through high-pressure pipelines are reported as "NO" in category 1.A.3.e Other Transportation. The ERT recommends that Lithuania estimate the fuel combustion emissions associated with transmission pipelines and report them in category 1.A.3.e Other Transportation.

29.   Fugitive emissions from Oil - Exploration, Oil - Transport and Distribution of Oil Products are not reported in the CRF. Venting and flaring emissions from oil refining and from crude oil production are also not reported in the CRF tables. "NE" notations are reported due to lack of AD and institutional capacity to develop and report fugitive emissions from both the upstream and the downstream oil production industries, as the Lithuanian experts commented during the in-country review. The ERT encourages Lithuania's inventory team from the MOE to work with experts from the Lithuanian Energy Institute (LEI) to obtain detailed AD for the upstream oil industry (e.g. the number of wells, quantity and type of crude oil produced) to help in the development of emission estimates using the methodology and default EFs as outlined in the IPCC good practice guidance and/or the Revised 1996 IPCC Guidelines. The ERT also encourages the Party to develop a venting and flaring emissions model from crude oil refining and production. It may also be possible for both the MOE and the LEI to work jointly with technical experts from the refining industry to develop CO_2 and CH_4 emission estimates, since there is only one refinery in Lithuania.

30.   For the 1990 CRF tables, the emissions information reported is incomplete. Only aggregated totals for all combustion sources are reported in the CRF tables, excluding the Public Electricity and Heat Production and Residential subcategories, and only fugitive emissions from Natural Gas Distribution are reported. It is important to report emissions at the detailed subcategory level as listed in the CRF tables. Moreover, comparing the emissions and energy information in the 1990 CRF tables with the available energy data from SSD, it is apparent that some of the emission estimates have been either overestimated or underestimated due to the use of outdated AD (specially for Public Electricity and Heat Production - liquid fuels, Manufacturing Industries and Construction - gaseous fuels and Road Transportation). During the review, Lithuania provided revised estimates for the categories mentioned above, using the data of the revised national energy balance for 1990–2003. The ERT encourages Lithuania to estimate and report emissions for the Energy sector for the years 1990–2003 following the IPCC tier 2 approach in order to ensure that the information reported in the next CRF submission is complete and transparent as outlined in the revised UNFCCC reporting guidelines. Also, the ERT encourages Lithuania to recalculate and report the estimates for 1990–2003 based on the revised energy statistics in its next submission, to ensure that the emissions are not over- or underestimated.

2. Transparency

31.   Detailed country-specific EFs (by fuel type, by type of gas and by source) for fuel combustion activities are reported in the NIR. The development of country-specific EFs is briefly discussed in the NIR and is based on literature reviews of Parties which use similar technologies, such as Denmark and Germany. The ERT recommends Lithuania to present in its next NIR a discussion of how the EFs were derived in order to increase the transparency of the information reported. It is good practice to archive and document all the information used in the development of the national inventory, such as the fuel combustion EFs study.

3. Recalculations and time-series consistency

32.   The only CRF table submitted is that for 2003, therefore no recalculations are provided. The ERT recommends Lithuania to recalculate and report its emission estimates based on the revised 1990–2003 national energy balance from SSD following the IPCC tier 2 approach for fuel combustion and fugitive sources and the IPCC good practice guidance recalculation approach. It is also recommended that Lithuania report a complete time-series estimate for international bunkers and biomass sources in its next submission.

4. Uncertainties

33.   Uncertainty estimates are not reported in the NIR for the Energy sector. The ERT recommends that an uncertainty study be conducted following the tier 1 uncertainty approach of the IPCC good practice guidance.

34.   Country-specific combustion EFs are reported in the NIR. It is also recommended that a study be conducted to determine the uncertainty associated with country-specific EFs by fuel type and the uncertainties for each fuel type as reported in Lithuania's national energy balance. The information resulting from the uncertainty studies on the AD and the country-specific EFs can then be used to develop GHG uncertainty estimates for the Energy sector.

5. Verification and quality assurance/quality control approaches

35.   The ERT was informed that, to ensure the quality of the national energy balance as compiled by SSD, the energy balance is reviewed by the LEI and other stakeholders. Since 2001, the national energy balance has followed the EUROSTAT approach. The ERT encourages Lithuania to develop a formal QA/QC plan for the review of the Energy sector emission estimates by relevant experts such as representatives from SSD, the LEI and the Transport Institute, experts in the oil and gas industry, and transportation experts. The Lithuanian inventory team could find guidance on the development of a QA/QC plan in the IPCC good practice guidance.

B. Reference and sectoral approaches

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

36.   There is a difference of 29.0 per cent in the figures for CO_2 emissions as between the reference and the sectoral approaches in the CRF for 2003. No explanations are provided in the documentation box of CRF table 1.A(c). The reason for the difference is that the carbon associated with the use of fossil fuel as feedstock and non-energy use is not included in the reference approach, although feedstock and non-energy use of fossil fuel information are reported in CRF table 1.A(d). Natural gas is also used as a feedstock for the production of ammonia. The ERT recommends Lithuania to report both the AD and the emissions associated with the non-energy use of fossil fuels (including the use of natural gas) in table 1.A(b) in order to ensure complete accounting of the carbon in the fuel stream and to facilitate the comparison of the reference and sectoral approaches.

37.   The ERT noticed large differences between the energy consumption values for liquid and solid fuels reported in the reference and the sectoral approaches. The ERT encourages Lithuania to review its national energy balance in order to ensure complete accounting of all fuels and minimize the differences between the reference and the sectoral approaches. The ERT would also encourage the Lithuanian inventory team to work together with relevant institutions (e.g. the SSD and the LEI) to verify that all the fuel consumed is accounted for and that the information is used consistently for the reporting to the International Energy Agency (IEA), EUROSTAT and the UNFCCC.

38.   The observed difference of 29.0 per cent in CO_2 emission may also be due to the use of weighted EFs in estimating sectoral emissions, resulting in an underestimation of GHG emissions. For the sectoral approach estimates, Lithuania is recommended to follow the IPCC tier 2 approach by directly applying each fuel-specific EF to the relevant fuel type. It is also recommended that a spreadsheet-based calculation file be developed. For example, MS Excel-based calculation files can be easily updated, corrected and reviewed on an annual basis rather than manually calculating weighted EFs and GHG emissions.

2. International bunker fuels

39.   GHG emissions from Aviation and Marine Bunkers are reported in the CRF. In 2003, GHG emissions from the Aviation Bunkers fuels amounted to 100.99 Gg CO_2 equivalent and emissions from Marine Bunkers to 355.68 Gg CO_2 equivalent. For aviation, jet fuel and kerosene jet-type fuel are classified as international bunker fuels, while all aviation gasoline is assumed to be for domestic consumption. To increase the transparency of the information reported, the ERT recommends Lithuania to provide an explanation in the CRF documentation box and the NIR as to the type of Aviation Bunkers fuels reported, and to explain that aviation gasoline is available for domestic consumption. For international marine bunkers, emissions are estimated based on SSD's classification of fuel oil and gas oil consumption under the Marine Bunkers category. It is also recommended that Lithuania provide a detailed discussion of the Marine Bunkers in the country in order to increase the transparency of the NIR.

3. Feedstock and non-energy use of fuels

40.   Information on the use of feedstock and non-energy use of fossil fuels is reported in table 1.A(d) of the CRF for 2003. However, emissions from feedstock and non-energy fossil fuel use are not included in the reference approach table of the CRF or in the Industrial Processes tables. The ERT recommends Lithuania to report emissions from the non-energy use of fossil fuel in the reference approach table and in the Industrial Processes sector under Other (2.G Others) in the CRF. It is also recommended, for completeness purposes, that CO_2 emissions from the non-energy use of paraffin and waxes be estimated following the Revised 1996 IPCC Guidelines and be reported in the CRF.

C. Key categories

1. Stationary combustion: gas, liquid and solid fuels – CO_2

41.   Based on the results of the IPCC good practice guidance methodology for key categories analysis, level assessment, as presented in annex 1 of the NIR for the 2003 data, emissions from stationary combustion of gaseous, liquid and solid fuels have been identified as key categories. The ERT encourages Lithuania to conduct a key category analysis at the subsector level to help identify areas for improvement and to enable a better understanding of the impact of each subcategory on the emission trends. The ERT also encourages Lithuania to apply the IPCC tier 2 approach in developing stationary emission estimates and in recalculating its emissions estimates for the period 1990–2003 based on the revised national energy statistics.

2. Mobile combustion: road vehicles – CO_2

42.   Lithuania has used the CORINAIR approach and country-specific EFs to estimate GHG emissions from Road Transportation activities. CO_2 emissions from Road Transportation amounted to 3,304.96 Gg CO_2 in 2003 and have been estimated based on the type of fuel consumed (i.e. gasoline, diesel oil and liquefied petroleum gas (LPG)). To better explain the trends in Road Transportation and identify specific sources that may have an impact on this category, it is recommended that the IPCC tier 2 approach be used to estimate emissions from this category because of the characteristics of the Lithuanian road vehicle fleets are changing (from heavy-duty vehicles, light-duty vehicles and passenger vehicles) and because of the change from traditional transport fuel to LPG.

3. Railways: liquid fuels – CO_2

43.   In 2003, CO_2 emissions from railways amounted to 230.21 Gg. The ERT encourages Lithuania to conduct an uncertainty study on the CO_2 EF and on the AD (e.g. diesel fuel consumption).

4. Fugitive emissions: oil and natural gas – CH_4

44.   In 2003, fugitive emissions from oil and natural gas activities have been identified as a key category based on the level assessment. Currently, Lithuania is only reporting fugitive emissions from the subcategories Natural Gas – Distribution and from Oil Production and Refining/Storage. To ensure that the inventory is complete, the ERT recommends Lithuania to estimate fugitive emissions from natural gas transmission lines. Information on the quantity of losses from natural gas transmission and distribution is reported in the national energy balance and is only available from 2002 onwards. The inventory team should therefore develop a recalculation method (following the IPCC good practice guidance) to estimate transmission losses for 1990 to 2001. The ERT would also like to suggest to the inventory team that it should compare the fugitive losses as reported in the national energy balance with the estimated emissions using the length of the transmission pipeline and the IPCC default EF. It is also recommended that Lithuania estimate fugitive emissions from the Transport and Distribution of Oil Products from crude oil refining using the IPCC default EFs from the Revised 1996 IPCC Guidelines and the 2000 IPCC good practice guidance.

D. Non-key categories

1. Mobile combustion: road vehicles – CH_4 and N_2O

45.   The Road Transportation CH_4 implied emission factor (IEF) for motor gasoline reported by Lithuania in the CRF table for 2003 is 74.30 kg/TJ, which has been identified as the highest of all reporting Parties and is 3.7 times higher than the IPCC default EF (20 kg/TJ). Lithuania indicated that it will review the CH_4 IEF for motor gasoline. The ERT also encourages Lithuania to review its N_2O EFs for road transport as there has been a shift in emission control technologies for newer vehicle fleets which will result in an increase in N_2O emissions.

2. Fugitive emissions: oil and natural gas – CO_2

46.   In 2003 the notation key "NE" has been used for CO_2 emissions from oil and natural gas activities, including venting and flaring activities, due to lack of AD and EFs, as explained in the completeness table 9 of the CRF. To ensure that the inventory is complete, the ERT recommends that Lithuania estimate fugitive CO_2 emissions from all oil and natural gas activities following the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The ERT also encourages Lithuania to estimate CO_2 emissions from Venting and Flaring for the oil and gas industries.

E. Areas for further improvement

1. Identified by the Party

47.   No areas for further improvement are identified in the NIR. During the in-country visit the following sector-specific improvements for Stationary Combustion were identified by the Lithuanian inventory experts:

>   (a)   Report full time-series estimates for the Energy sector;
>
>   (b)   Provide recalculated emission estimates based on the revised national energy balance;
>
>   (c)   Use the latest available studies and research to revise the national EFs.

2. Identified by the ERT

48.   The following are the ERT's recommendations for improvements for the Energy sector for the Party's 2006 GHG inventory submission. The Party should:

>   (a)   Report complete time-series estimates and report recalculations for the Energy sector using the revised national energy balance for the years 1990–2003 and applying the IPCC tier 2 approach with country-specific EFs;
>
>   (b)   Report complete time-series subcategory estimates for the Manufacturing Industries and Construction category using the revised national energy balance from the SSD;
>
>   (c)   Report estimates of fugitive emissions from oil production, oil refining and natural gas transmission sources, including venting and flaring emissions from refineries;
>
>   (d)   Increase the transparency of the methodological descriptions and the information on the EFs provided in the NIR.

IV. Industrial Processes and Solvent and Other Product Use

A. Sector overview

49.   In 2003, emissions from the Industrial Processes sector amounted to 1,610.17 Gg CO_2 equivalent, representing 9.3 per cent of total national GHG emissions. Emissions from the sector had decreased by 41.6 per cent compared with 2002 and by 39.0 per cent compared with 1990. Emissions from Cement and Lime production contributed 24.1 per cent and emissions from the Chemical Industry contributed 74.5 per cent of the total emissions from the sector.

1. Completeness

50.   The CRF includes estimates for production of cement, lime, ammonia, nitric acid and methanol, and potential emissions from consumption of HFCs. Emissions from Metal Production and the Production of Halocarbons and SF_6 are reported as "NO", and the remaining categories are reported as "NE". CO_2 and N_2O emissions from the Solvent and Other Product Use sector are also not estimated. During the in-country review the ERT identified that for some categories the notation keys have been wrongly applied. The ERT recommends Lithuania to identify the categories not occurring in the country correctly in its next submission. The ERT encourages Lithuania to estimate the remaining categories for the sake of completeness of reporting. In particular, the occurrence of the following categories should be investigated: Limestone and Dolomite Use (other calcination uses), Glass Production, Other Chemical Production (petrochemicals – formaldehydes), SF_6 from Electrical Equipment, and Iron and Steel Production (pig iron).

51.   Lithuania includes in its report emissions of NO_x, carbon monoxide (CO) and SO_2 for the categories of Mineral Products and Chemical Production, and NMVOC emissions for the Solvent and Other Product Use sector and the Food and Drink category, taken from its annual report under the United Nations Economic Commission for Europe (UNECE) Long-Range Transboundary Air Pollution Convention (CLRTAP).

2. Transparency

52.   The transparency of the reporting should be improved by including in the NIR information about the characteristics of the AD used and the assumptions made in the choice of the EFs.

B. Key categories

1. Cement production – CO_2

53.   Lithuania has estimated CO_2 emissions from Cement Production using production of cement as AD (tier 1 methodology). As Cement Production is a key category, it is good practice to use clinker production as AD. As there is only one producer of cement in Lithuania, the Party is recommended to contact the producer for data. If data for clinker production are not available, information about average content of clinker in the different types of cement produced would make it possible to derive a country-specific EF.

54.   The EF default value of 0.4985 t CO_2/t cement from the Revised 1996 IPCC Guidelines has been used for the estimation. The IPCC good practice guidance states that this value is generally too high and suggests a clinker content of 95 per cent and not 98.3 per cent, as in the Revised 1996 IPCC Guidelines. That results in an EF of 0.4847 t CO_2/t cement. This value should be used if data for clinker production or information that enables the calculation of a country-specific EF cannot be obtained.

55.   The production of cement for 2003 is reported as 684 kt. The value published by the SSD is 596.86 kt. During the review, Lithuania clarified that the production data for the year 2003 were obtained from the company web site and not from the statistical publication (which was the source used in the previous (2004) submission), and later Lithuania was able to provide revised estimates for the base year using clinker production and country-specific calcium oxide (CaO) content obtained from the producer. The ERT encourages Lithuania to investigate the reason for the difference between the two sources, to update the whole time series consistently based on the updated information available and provide recalculated estimates for this category in its next submission.

2. Ammonia production – CO_2

56.   Lithuania estimates CO_2 emissions from Ammonia Production using the production of ammonia (NH_3) as AD. As Ammonia Production is a key category, the ERT recommends Lithuania to use the methodology based on natural gas input as it results in a more accurate estimate. During the in-country visit Lithuania informed the ERT that data for natural gas input could not be obtained for reasons of confidentiality. The ERT encourages Lithuania to proceed with its efforts to gain access to this information.

57.   Data for Ammonia Production were obtained from the SSD yearbook. However, the ERT identified that data in the statistical yearbook are provided in kg of nitrogen (N) units. As the default EF used refers to NH_3 production and not to N content, the AD should be converted. The emissions currently reported are therefore underestimated. The ERT also identified that the value for 2001 production included in the 2004 submission is higher than the value provided in the statistical yearbook.

58.   The ERT recommends Lithuania to correct the estimates and provide recalculations for the whole time series in its next submission.

3. Nitric acid production – N$_2$O

59.   Activity data (nitric acid production) are obtained from the SSD yearbook. However, the statistical yearbook provides data in kg of N units. A conversion factor should be applied to the data to obtain the production of nitric acid. The emissions currently reported are therefore underestimated. The production data for 2002 were updated in the statistical yearbook for 2003 and are much lower than the value provided in the previous (2004) submission. The data in the inventory should be updated accordingly.

60.   The EF used by Lithuania is within the default range provided in the IPCC good practice guidance. However, no documentation is provided for the choice of EF within this range.

61.   The ERT recommends Lithuania to provide recalculations of the estimates for the whole time series in its next submission.

C. Non-key categories

1. Lime production – CO$_2$

62.   The statistical yearbook provides data for two types of lime, but only one of them is included in the AD used by Lithuania in its report. Lithuania applies the default EF for quicklime. The ERT recommends that an investigation be conducted to include and identify the lime types and that the EF be corrected if appropriate.

63.   Production data for 2002 were updated in the statistical yearbook for 2003, and the value provided in the previous (2004) submission should therefore be updated and recalculations be provided in Lithuania's next submission.

2. Consumption of halocarbons and SF$_6$ – HFCs

64.   Only potential emissions of HFCs are estimated. The ERT encourages Lithuania to estimate the actual emissions of HFCs, as well as the actual emissions of SF$_6$. Lithuania only included the values for imports and exports of chemical products in bulk (tier 1a), although they are reported mistakenly in the line "in products" of the CRF. A recommended improvement is to include estimates for the gases contained in industrial products imported or exported. Calculations of quantities for each chemical product have been done based on import/export data for commercial products and the compositions of these commercial products. A mistake was identified in the calculations for HFC-134a, leading to an overestimation of the emissions of this gas.

D. Areas for further improvement

1. Identified by the Party

65.   Lithuania highlights in the NIR that many categories have not been estimated due to lack of data available from the national statistics, but recognizes that data could be obtained from the companies, offering possibilities for improvement.

2. Identified by the ERT

66.   The ERT encourages the Lithuanian inventory team to continue its efforts to increase the coverage of the inventory. Moreover, as many of the categories include very few industrial units (frequently only one), the ERT encourages Lithuania to collect AD and information for the development of a country-specific EF directly from the industrial companies.

67.   The ERT recommends Lithuania to prioritize the completion and updating of the time series for those categories that are already reported.

V. Agriculture

A. Sector overview

68.   In 2003, emissions from the Agriculture sector in Lithuania amounted to 2,113.10 Gg CO_2 equivalent, representing 12.3 per cent of total national GHG emissions. The emissions from the sector consist of CH_4 and N_2O. The Agriculture sector is the second-largest source of GHG emissions, emitting 40.2 per cent of all CH_4 and 50.8 per cent of all N_2O emissions. CH_4 emissions from the sector are from animal breeding (Enteric Fermentation and Manure Management). N_2O emissions from the sector include emissions from Manure Management and Direct Emissions from Agricultural Soils (Indirect Emissions from Agricultural Soils are not reported).

1. Completeness

69.   The Party has reported GHG emissions for only five years, the base year (1990), 1998, 2001, 2002 and 2003. Compared with the estimates of emissions from the Agriculture sector in 1990, emissions in 2003 decreased by 70.4 per cent. Lithuania informed the ERT during the in-country visit that livestock populations and fertilizer use had decreased significantly over that period because of economic recession in the country after independence. The ERT also observed some inconsistencies between the country AD on livestock population and the Food and Agricultural Organization of the United Nations (FAO) data. Lithuania explained that, unlike the FAO, its statistics used animal populations for the year as of 1 January. The ERT recommends Lithuania to further check the reasons for such differences between the GHG inventory and the FAO reports. The ERT encourages Lithuania to provide in its next NIR relevant explanations on the trends of GHG emissions.

70.   In 2003, the AD, IEFs and N_2O emissions for indirect emissions are reported in the CRF as "NE". The ERT encourages Lithuania to estimate the indirect N_2O emissions from Agricultural Soils in its next submission.

2. Transparency

71.   Estimation methods are not clearly described in the NIR. Actual values of the EFs used are not provided, and information on the references of AD is not given clearly. The ERT encourages Lithuania to provide appropriate information in the NIR in order to ensure transparency.

B. Key categories

1. Enteric fermentation – CH_4

72.   Because of a dramatic decrease of the animal populations between 1990 and 2003 there is a very large decrease of CH_4 emissions from Enteric Fermentation. During the in-country visit, Lithuania provided an explanation for the animal population decrease, which was related to economic conditions in the country since independence. The ERT observed inconsistencies in the data on animal populations reported in the CRF and the data in the FAO reports. Lithuania is encouraged to check the sources of the AD reported in the CRF, the NIR and the FAO reports and to remove the inconsistencies between the country data and the FAO data in its next NIR.

73.   In the CRF, average daily feed intake and CH_4 conversion parameters are reported as "NE". The ERT encourages the Party to report the average daily feed intake and CH_4 conversion parameters in its future submissions. Lithuania has used IPCC default EFs in estimating CH_4 from Enteric Fermentation. The ERT recommends Lithuania to consider using tier 2 methods for this key category.

2. Manure management – N$_2$O

74.   N$_2$O emissions from Manure Management in 2003 amounted to 0.70 Gg, which is 3.5 per cent higher than the value in 2002. The AD on Manure Management are not clearly described either in the CRF or in the NIR. The ERT encourages the Party to provide more information about the AD used in its next submission.

3. Direct N$_2$O emissions from agricultural soils

75.   The inter-annual changes in direct N$_2$O emissions from Agricultural Soils are very significant. The value in 2002 was 66.1 per cent lower than the 2001 value, while the 2003 value is 16.2 per cent lower than the 2002 value. N$_2$O emissions decreased by 88.8 per cent between 1990 and 2003. For 2003, no fractions used to estimate N$_2$O emissions have been reported. The ERT encourages Lithuania to clarify the data on fertilizer application to agricultural soils and revise the estimates for its next submission.

C. Non-key categories

Manure management – CH$_4$

76.   The ERT identified that CH$_4$ emissions from Manure Management are also a significant source of GHG emissions, accounting for 1.1 per cent of the national total. The inter-annual changes between 2001 and 2003 are not significant; however, CH$_4$ emissions from this category decreased by 61.0 per cent between 1990 and 2003.

D. Areas for further improvement

1. Identified by the Party

77.   No areas for improvement are identified by Lithuania in the NIR.

2. Identified by the ERT

78.   The following actions for further improvement of GHG inventories are recommended. The Party should:

(a)   Estimate country-specific EFs using reliable and documented data from domestic and sub-regional research sources. The ERT encourages the ongoing activities on estimating the country-specific EFs for enteric fermentation. They should continue in order to derive more accurate EFs;

(b)   Improve its documentation of the methodologies and assumptions used to estimate GHG emissions;

(c)   Include missing GHG emissions such as N$_2$O indirect emissions from Agricultural Soils and Field burning of Agricultural Residues, where possible;

(d)   Expand the scientific literature and farm surveys in order to obtain more complete and reliable information on animal waste management systems (AWMS);

(e)   Consider using tier 2 methods for key categories, but be aware that tier 2 methods usually require much more data;

(f)   Provide estimates for the whole time series.

VI. Land Use, Land-use Change and Forestry

A. Sector overview

79.   In 2003 the LULUCF sector in Lithuania's inventory represented a net sink of 6,989.43 Gg CO_2. According to the 2005 inventory submission, the Forest Land Remaining Forest Land category in 2003 contributed as a sink with 7,150.00 Gg CO_2, while emissions from organic cropland and grassland contributed as sources, with 151.95 Gg CO_2 and 8.62 Gg CO_2, respectively. The net sink from the LULUCF sector represented 40.6 per cent of national total emissions (17,223.31 Gg CO_2 equivalent). In 1990, as reported in the 2004 submission, the Land-use Change and Forestry (LUCF) sector was a net sink of 5,482.36 Gg CO_2; thus the net sink increased by 27.5 per cent between 1990 and 2003.

80.   In the 2005 submission only the year 2003 is reported using the LULUCF reporting tables required by decision 13/CP.9. The LUCF tables were provided in the 2004 submission for the years 1990, 1998, 2001 and 2002.

81.   Lithuania has not classified its total land area according to the six land-use categories (Forest Land, Cropland, Grassland, Wetlands, Settlements, and Other Land) according to the *IPCC Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). A national definition is provided only for the Forest Land category. Since the estimates of most of the emissions and removals in the LULUCF sector are based on the six land-use categories, the ERT strongly recommends that Lithuania provide area data and national definitions for all the six land-use categories given in the IPCC good practice guidance for LULUCF and follow the guidance given in its chapter 2. This will help to avoid possible double counting and/or omissions.

1. Completeness

82.   As a whole, the reporting of the LULUCF sector is not complete. Several missing emission sources were identified during the in-country visit, such as peat production areas, agricultural liming and forest fires. The ERT recommends Lithuania to include the missing source categories to its next submission.

83.   It seems that only a small part (*c*. 1.5 per cent) of the managed agricultural land is included in the inventory reporting, since the total area of agricultural land in the country is nearly 3.5 million ha according to the NIR (the Agriculture chapter). The ERT urges the Party to examine carefully the whole area of managed agricultural land (cropland, managed grassland), including soil characteristics (e.g. soil type) and management regime (e.g. tillage intensity), and revise the estimates for cropland and grassland soils. Given that agricultural land accounts for over 53.5 per cent of the land area in Lithuania, these emissions/removals may even have substantial impacts on the carbon (C) balance of the whole LULUCF sector.

2. Transparency

84.   The LULUCF reporting tables required by decision 13/CP.9 are provided only for the year 2003, but the corresponding chapter 7 in the NIR follows the LUCF categorization. No mapping back between the LULUCF and the LUCF categorization is provided in the NIR. The ERT strongly recommends Lithuania to update its NIR according to the new LULUCF categorization for its next inventory submission. There is a serious lack of consistency between the CRF tables and the NIR of the 2005 submission.

85.   In general there is a serious lack of transparency in the descriptions in the NIR of the methods, EFs, other parameters and AD used in the calculations. It is recommended that all the factors (national

and IPCC defaults), methods and AD used in the calculations be described transparently and in detail in the NIR of Lithuania's next inventory submission.

3. Recalculations and time-series consistency

86.   No recalculations have been done in the LULUCF sector, as this is the first time the sector has been reported. As Lithuania has only submitted information for the year 2003, the ERT recommends it to include in its next submission the whole time-series estimates at least for the source and sink categories that are already provided.

4. Uncertainties

87.   No uncertainty or key category analyses have been conducted for the LULUCF sector. The ERT recommends Lithuania to conduct and report these analyses in its next submission with the help of the recommendations of chapter 5 of the IPCC good practice guidance for LULUCF.

5. Verification and quality assurance/quality control approaches

88.   No QA/QC or verification procedures have been conducted in the LULUCF sector. Sector-specific guidance for this is provided in chapter 5 of the IPCC good practice guidance for LULUCF. It is good practice to prepare tables about the available land-use data with complete territorial coverage (similar to table 2.3.1 in the IPCC good practice guidance for LULUCF) as part of the QA/QC procedures in the LULUCF sector.

B. Sink and source categories

1. Forest land – CO_2

89.   Lithuania reports as forest land an area of 1,967,741 ha at the end of 2003. The area of forest land increased from 1,797,000 ha in 1990 (a 9.5 per cent increase). The land area is taken from the Lithuanian *Statistical Yearbook of Forestry*. According to the definition given in the 2005 NIR, forest land area includes swamps, sands and land appropriate for afforestation. When Lithuania divides its land area into the six land-use categories according to the IPCC good practice guidance for LULUCF, the current definition of forest land should also be revised to ensure, for example, that there will not be double-counting.

90.   In the Forest Land category (CRF table 5.A), Lithuania reports C stock changes in biomass under Forest Land Remaining Forest Land (5.A.1), but the description of calculations given in the NIR is not sufficiently clear to demonstrate how the estimates provided in CRF table 5.A (Carbon Stock Changes in Biomass) have been calculated. It is not clear how the national annual increment figures (m^3/ha) given in NIR table 7–5 have been converted to the average annual biomass increment per hectare (3.3 dm/ha for coniferous and 3.4 dm/ha for deciduous) provided in the NIR. It seems that no biomass expansion factors have been used. During the in-country visit the Party clarified that national factors were used for wood densities (D) taken from the *Lithuanian Forest Manual*. The ERT recommends Lithuania to revise the estimates in table 5.A (Changes in Living Biomass) following the methodology provided in the IPCC good practice guidance for LULUCF (chapter 3.2.1.1). The same factors for wood density should be applied when calculating C stock increase due to forest increment and C stock decrease due to fellings. According to the Party, in the current submission IPCC default factors were used for calculating the C stock decrease in living biomass (fellings). Carbon stock decrease in biomass has been calculated by using data on total timber removals from the State Forest Survey Service. It seems that fuelwood gathering and other losses have not been included in the calculations.

2. Cropland and grassland – CO_2

91.   According to the NIR, the Party reports soil emissions from organic croplands and grassland, but in CRF tables 5.B and 5.C these emissions are accidentally misplaced (they are entered under Changes in Living Biomass). In the current reporting, agricultural soils are reported as organic soil, but during the review the Lithuanian experts were not convinced whether the reported area was actually organic soil (it may also be mineral soil). According to the NIR there is approximately 3.5 million ha of agricultural land in Lithuania, but only 41,442.3 ha of it are reported as cropland and 9,406.2 ha as being grassland. That is less than 1.5 per cent of the total area of agricultural land (3,483,700 ha according to the Land Fund of the Republic of Lithuania). During the in-country review it became evident that data on shares of organic and mineral soils and different soil types have not been used in the inventory calculations. The ERT encourages Lithuania to collect all the necessary national data available on areas of cropland and managed grassland, including data about soil type, soil characteristics and management regime (e.g. tillage intensity), and then revise the estimates of emissions from all agricultural soils. Different calculation methods are provided in the IPCC good practice guidance for LULUCF for mineral and organic soils, and the calculation of the C balance of mineral soil depends directly on, for example, the soil type and management intensity. Guidance for the tier 1 method can be found in the IPCC good practice guidance for LULUCF (chapters 3.3 (cropland) and 3.4 (grassland)). It is very important to include all the managed agricultural land in the calculations.

92.   Lithuania has not reported emissions from agricultural liming. Guidance for that is given in chapter 3.3 of the IPCC good practice guidance for LULUCF. The Agriculture chapter of the NIR states that there is over 1 million ha of acid agricultural land that must be permanently limed. The ERT recommends the Party to include these emissions in its next inventory submission.

C. Areas for further improvement

1. Identified by the Party

93.   No areas for improvement are identified in the NIR. During the in-country review the Party understood the importance of updating the NIR to correspond to the LULUCF categorization. The Party also understood that the transparency of the description of the methodologies, AD and factors used in calculations needs to be substantially improved in its next NIR.

2. Identified by the ERT

94.   Since most of the calculations in the LULUCF sector are based on area AD, the ERT strongly recommends Lithuania to collect all the available area data on different land uses in the country, including the necessary soil type and management data, and reclassify them according to the IPCC good practice guidance for LULUCF (chapter 2) for the inventory calculations. The entire land area of the country should be completely covered in LULUCF sector reporting, for example, all the land area should be presented in one or another category of the six land-use categories given in the IPCC good practice guidance for LULUCF. Even if emissions and removals have to be reported only from the managed lands, the terrestrial area information about the whole land area, including unmanaged lands, should be reported. National data about land use are available, for example, from the Land Fund of the Republic of Lithuania.

95.   The ERT recommends Lithuania to revise the estimates reported in Forest Land category 5.A (Changes in Living Biomass) so as to follow the general methodology provided in chapter 3.2.1.1 of the IPCC good practice guidance for LULUCF. National factors can be used, but they have to be reported transparently in the NIR.

96.   The ERT strongly recommends Lithuania to revise its emission estimates from cropland and managed grassland by using the total area of cultivated cropland and managed grassland in the country and the methodologies provided in the IPCC good practice guidance for LULUCF.

97.   The ERT also encourages Lithuania to improve the completeness of the LULUCF sector inventory by adding the following emission sources to the inventory submission, given that the in-country review identified that the AD needed at least for tier 1 calculations are available in the country:

   (a) CO_2 emissions from agricultural liming (to be reported in CRF table 5(IV)). A methodology is provided in chapter 3.3.1.2 of the IPCC good practice guidance for LULUCF (equation 3.3.6);

   (b)   Emissions from peat production areas (to be reported in CRF table 5.D Wetlands). A methodology is provided in chapter 3.5.2.1 of the IPCC good practice guidance for LULUCF (equations 3.5.5, table 3.5.2);

   (c)   Emissions from forest fires (to be reported in CRF table 5(V)). A methodology for CO_2 emissions is provided in chapter 3.2.11 and for non-CO_2 emissions in chapter 3.2.1.4 of the IPCC good practice guidance for LULUCF;

   (d) CO_2 emissions from drained forest soils. A methodology is provided in chapter 3.2.1.3 of the IPCC good practice guidance for LULUCF.

VII. Waste

A. Sector overview

98.   In 2003, emissions from the Waste sector represented 8.5 per cent of total national GHG emissions. In 1990 the contribution of the sector was 6.8 per cent. Emissions from the Waste sector had decreased in 2003 by 57.9 per cent compared to 1990, mostly because of the decrease of waste disposed to landfill.

99.   The Waste sector has two key source categories, CH_4 emissions from Solid Waste Disposal on Land and CH_4 emissions from Wastewater Handling, which contributed 5.8 per cent and 2.7 per cent, respectively, to total national emissions in 2003. CH_4 emissions from Solid Waste Disposal on Land contributed 97.8 per cent and 67.8 per cent of emissions from the sector in 1990 and 2003, respectively. This decreasing share is due to a significant increase of emissions from waste-water handling from 1990 to 2003 (505.7 per cent) and a parallel decrease of emissions from solid waste disposal on land from 1990 to 2003 (70.8 per cent). However, Lithuania was not able to support the reliability of these emissions trends, mainly because of the large uncertainty of the AD used and inconsistencies in the time series related to parameters and EFs used. Lithuania is recommended to thoroughly check the AD used and to develop a more consistent time series of emissions estimates.

1. Completeness

100.   The CRF includes estimates of most gases and sources of emissions from the Waste sector, as recommended by the Revised 1996 IPCC Guidelines. CH_4 emissions from sludge generated from domestic and industrial waste-water treatment are not estimated; nor are GHG emissions from waste incineration. AD for these missing sources are available, however, and Lithuania intends to provide emissions estimates in its next submission. N_2O from human sewage has also not been estimated. National estimates of protein consumption may be available from the Public Health Centre of Lithuania. As an alternative, the ERT recommends the use of data from the FAO database, according to the IPCC good practice guidance.

101.   Methodologies, assumptions and background data are not properly referenced in the NIR. Lithuania is recommended to provide more information and precise references in the Waste sector chapter, as well as to identify the major problems and suggest possible future actions to deal with them.

2. Transparency

102.   During the review it became clear that all the background data used for the calculation of emissions from the Waste sector derive from the databases of the EPA. No calculation files or documentation for the emissions estimates in electronic format existed in the MOE. The calculations were prepared manually in a way that is very difficult to review. The ERT replicated the calculations for CH_4 emissions from Solid Waste Disposal on Land, and this resulted in different estimates. Lithuania is recommended to make the necessary corrections and provide the recalculations in its next submission. The CH_4 emissions are underestimated in the 2005 submission by 0.7 per cent for the year 2003 due to mistakes in the calculations, and in the 2004 submission they were underestimated by 0.7 per cent for the years 2000 and 2001, and by 4.5 per cent for 1998, while for 1990 the emissions were correctly calculated. Lithuania is strongly recommended to create the appropriate files of calculations and to archive the references and background information used in order to improve the transparency of the inventory and to avoid mistakes and gaps that cannot be checked.

3. Uncertainties

103.   Only qualitative estimates of uncertainty have been reported in the relevant CRF table. Uncertainties have been evaluated as medium for the estimates of emissions from Solid Waste Disposal on Land and low for the estimates of emissions from Wastewater Handling. The reliability of the AD and EFs used for the estimations was assessed during the review and estimated by the ERT to be low. Lithuania is recommended also to prepare quantitative estimates of uncertainty according to the IPCC good practice guidance, in order to prioritize the necessary actions towards reducing the greatest uncertainties in the parameters.

4. Verification and quality assurance/quality control approaches

104.   No verification and QA/QC procedures have been implemented. The ERT recommends the Lithuanian experts to exploit fully the data and information available in the EPA and other relevant sources and to insist on examining the quality and accuracy of the data. Furthermore, Lithuania is encouraged to prepare a formal QA/QC plan in order to facilitate and improve the transparency of their work.

B. Key categories

1. Solid waste disposal on land – CH_4

105.   The default methodology and all default factors included in the Revised 1996 IPCC Guidelines have been applied for the estimations. According to the IPCC good practice guidance, the tier 2 methodology should be applied for estimating emissions from Solid Waste Disposal on Land, as it is a key category. Lithuania is strongly recommended to investigate whether the data required to use the first order decay (FOD) methodology are available.

106.   Emissions from managed landfills are included in the estimates for unmanaged landfills. The reason for this was the difficulty of separating data on waste disposed to managed and unmanaged landfills. For the years 1998 and 2001–2003, all sites were considered uncategorized, according to the classification of the Revised 1996 IPCC Guidelines. During the review, the ERT was informed that the three major disposal sites of the country, which are considered as managed, serve almost half of the population of the country. Lithuania is encouraged to use relevant information, ratios for per capita

generation of waste and recycling data to estimate the quantities of waste landfilled in managed sites. The current characterization of the managed sites as uncategorized may cause underestimation of emissions, as a lower value for the methane correction factor is used. As far as the base year (1990) is concerned, the ERT was informed that an methane correction factor which corresponds to managed solid waste disposal sites (SWDS) was used (default value 1.0) for calculating CH_4 emissions from all the waste disposed on land. However, this contradicts Lithuania's information to the effect that all sites were considered unmanaged. As this may lead to overestimation of the emissions in the base year, Lithuania is recommended to use the appropriate methane correction factors according to the type of site. During the review, the Party provided revised estimates of the emissions for the base year, using a lower methane correction factor (0.6, for uncategorized sites). The ERT recommends to include recalculations for this source using the revised data in Lithuania's next submission.

107. Emissions from SWDS decreased by 70.8 per cent between 1990 and 2003. The most important reason for this is that the amount of waste disposed on land was reduced by 49.5 per cent. The ERT was informed during the review that measurements of waste disposed in the early 1990s have a large uncertainty and that quantities of waste finally landfilled are probably overestimated for 1990. The statistical system has improved since then, and a new database for the input of waste landfilled, in line with the European Union (EU) directives for waste statistics, has existed in the EPA since 2001. Lithuania is recommended to check the reliability of the data, especially for 1990. It would be very helpful if Lithuania uses suitable drivers for its estimates of amounts of waste disposed on land in 1990, such as per capita generation and disposal. These could also usefully be compared to other Parties' data.

108. The fraction of degradable organic carbon (DOC) (0.18) included in landfilled waste for 1990 is not justified or referenced by the Lithuanian experts. For 2003 a default value representing the case of Russia (0.17) has been selected from the Revised 1996 IPCC Guidelines. During the review, however, Lithuania provided revised estimates for the emissions of the base year using a country-specific fraction of DOC (0.17). The calculation was based on country-specific data on the composition of waste and biodegradable waste disposed and on the default fractions for DOC included in each type of waste, according to the IPCC good practice guidance. The ERT recommends that the Party include this revised country-specific information in the NIR and use it in estimating recalculated emissions from this source for its next submission. The Party is also encouraged to estimate the composition of waste landfilled for the entire time series, in order to calculate representative fractions of DOC for each year.

109. The CRF tables have not always been consistently used. More specifically, the formulae of the IEF have been overwritten, the fraction of DOC has been reported instead of DOC degraded, and the quantity of waste landfilled has been included in the additional information box instead of the fraction of waste landfilled. Lithuania is recommended to be more precise and careful in the filling in of the CRF tables as they are the main source of numerical data and specific methodological information.

110. A National Strategic Waste Management Plan was adopted in 2002, within the framework of which all unmanaged disposal sites will be eliminated and 10 regional landfills which cover the entire country and meet EU environmental standards will be operating by 2009. The ERT was informed that improvements have already been achieved in the separation of waste at source and the recycling of biodegradable waste. Data from these actions may be very helpful in the compilation of Lithuania's future inventory submissions.

2. Waste-water handling – CH_4

111. The default methodology included in the Revised 1996 IPCC Guidelines has been applied, using default EFs and country-specific AD for total organic waste, as the degradable organic component (DC) in waste water. According to the IPCC good practice guidance, a more analytical methodology should be applied for estimating emissions from Waste-water Handling, as it is a key source. Lithuania is

recommended to obtain information for the characterization of waste-water flows and treatment systems, and to use the updated default value for maximum methane producing capacity (B_o) (0.6 kg CH_4/ kg biochemical oxygen demand (BOD)) for domestic waste water, according to the IPCC good practice guidance. The two subcategories of this source are of roughly the same significance. Domestic and Commercial Waste-water Handling accounted for 42.3 per cent of total emissions from the sector in 2003 and 35.1 per cent in 1990. Emissions increased for both domestic and industrial waste-water handling between 1990 and 2003 (by 628.5 per cent and 439.2 per cent, respectively).

112.   The ERT was informed during the review that there are currently 967 domestic waste-water handling installations in Lithuania, of which two operate methane recovery plants. Data for BOD are provided directly to the EPA from these installations. As far as industrial waste water is concerned, the EPA also obtains data on chemical oxygen demand (COD) from the industrial companies by means of questionnaires.

113.   The per capita concentration of BOD in domestic waste water which results from the AD reported by Lithuania for 2003 (0.03 kg BOD/cap/day) is 40.0 per cent lower than the default estimate recommended by the Revised 1996 IPCC Guidelines (0.05 kg BOD/cap/day), while in 1990 the same parameter is 90.0 per cent lower (0.004 kg BOD/cap/day). Additionally, the fluctuation of total BOD across the inventory years should be re-examined and may be recalculated (there are 842 per cent and 565 per cent increases in 2001 and 2003, respectively, compared to 1990). Lithuania was not able to provide the ERT with clear information about the fraction of population connected to the handling systems reporting to the EPA. However, data related to the waste-water treatment systems may be available in international databases such as EUROSTAT. Lithuania is encouraged to check the reliability and the coverage of its national AD and to report them in a more transparent way in its next NIR.

114.   The IEF of 0.25 kg CH_4/kg DC is the same as the B_o for both domestic and industrial waste-waters because the weighted average of methane conversion factors was not considered during the calculation of the EFs. Lithuania is recommended to obtain information on the fraction of DC that ultimately degrades anaerobically during the different types of waste-water treatment in order to be consistent with the IPCC good practice guidance and produce more accurate emissions estimates.

C. Areas for further improvement

1. Identified by the Party

115.   The revision of the AD and EFs used for the emissions estimates is one of Lithuania's major priorities. Concerning the AD for Solid Waste Disposal on Land, Lithuania informed the ERT that it will attempt to separate them between managed and unmanaged disposal sites. The ERT commends this effort.

116.   Data on methane recovery from the waste-water treatment facilities will be collected in order to subtract it from the total emissions from domestic waste-water handling.

117. N_2O emissions from Human Sewage and GHG emissions from Waste Incineration will be estimated and included in Lithuania's next submission.

118.   Lithuania is considering the possibility of applying higher-tier methodologies for the key categories. The ERT encourages this effort.

2. Identified by the ERT

119.   During the review, a variety of background information and studies was made available to the ERT, related to the rates of waste produced and landfilled, to waste composition data and to surveys conducted at the major disposal sites. Lithuania is strongly recommended to exploit this valuable

material and elaborate the data provided in order to complete the time series of estimates and to improve the quality and accuracy of its emission estimates.

120.   A more thorough look over the practices recommended by the IPCC good practice guidance would be particularly helpful for the improvement of the inventory.

Annex

Documents and information used during the review

A. Reference documents

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B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Vytautas Krusinskas (Ministry of Environment), Mr. Romualdas Brazauskas (Ministry of Environment), Ms. Danguole Bernotiene (Ministry of Environment), Ms. Jolanta Kotvickaja (Ministry of Environment), Mr. Arvydas Andreikenas (State Statistical Department of Lithuania), Ms. Dalia Streimikiene (Lithuanian Energy Institute), Ms. Vida Auguliene (Lithuanian Hydrometeorological Service), and Mr. Romas Lenkaitis (Center for Environmental Policy), including additional material on the methodology and assumptions used.

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