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Report of the individual review of the annual submission of Lithuania submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2013 annual submission of Lithuania, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 23 to 28 September 2013 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Paul Filliger (Switzerland) and Mr. Tomas Gustafsson (Sweden); energy – Ms. Kristien Aernouts (Belgium), Mr. Alexey Cherednichenko (Kazakhstan), Mr. Christo Christov (Bulgaria) and Ms. Lea Kai (Lebanon); industrial processes and solvent and other product use – Mr. David Kuntze (Germany) and Mr. Jacek Skoskiewicz (Poland); agriculture – Mr. Daniel Bretscher (Switzerland), Mr. Nguyen Mong Cuong (Viet Nam) and Mr. Tom Wirth (United States of America); land use, land-use change and forestry (LULUCF) – Mr. Agustin Inthamoussu (Uruguay) and Ms. Sekai Ngarize (United Kingdom of Great Britain and Northern Ireland); and waste – Ms. Juliana Bempah (Ghana) and Ms. Kaatje Jespers (Belgium). Ms. Bempah and Mr. Gustafsson were the lead reviewers. The review was coordinated by Mr. Tomoyuki Aizawa (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Lithuania, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission after this review report has been published, unless otherwise specified.

3. In 2011, the main greenhouse gas (GHG) in Lithuania was carbon dioxide (CO_2), accounting for 64.6 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (20.2 per cent) and methane (CH_4) (14.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.1 per cent of the overall GHG emissions in the country. The energy sector accounted for 54.7 per cent of total GHG emissions, followed by the agriculture sector (23.0 per cent), the industrial processes sector (17.3 per cent), the waste sector (4.6 per cent), and the solvent and other product use sector (0.4 per cent). Total GHG emissions amounted to 21,614.23 Gg CO_2 eq and decreased by 55.7 per cent between the base year[2] and 2011. The expert review team (ERT) concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

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

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

5. Additional background data on recalculations by Lithuania in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year[a] to 2011

			Gg CO_2 eq							*Change (%)*
		Greenhouse gas	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A sources		CO_2	35 815.45	35 815.45	15 053.53	11 853.19	15 103.94	12 920.15	13 725.06	13 970.47	–61.0
		CH_4	5 749.67	5 749.67	3 621.23	3 158.03	3 324.99	3 226.32	3 177.09	3 045.57	–47.0
		N_2O	7 188.74	7 188.74	3 383.40	4 622.59	6 334.48	4 106.78	4 022.40	4 370.88	–39.2
		HFCs	2.76	NA, NO	2.76	13.66	152.81	167.27	190.20	219.19	7 850.4
		PFCs	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
		SF_6	0.05	NA, NO	0.05	0.33	3.21	2.77	5.85	8.12	16 881.9
KP-LULUCF	Article 3.3[b]	CO_2					–80.33	–99.18	–82.81	–109.63	
		CH_4					0.01	0.01	0.01	0.01	
		N_2O					0.001	0.002	0.001	0.002	
	Article 3.4[c]	CO_2	NA				–9 046.98	–11 666.63	–10 615.26	–10 873.90	NA
		CH_4	NA				0.37	1.05	0.06	0.97	NA
		N_2O	NA				23.08	23.25	23.12	23.37	NA

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2011

			Gg CO_2 eq							*Change (%)*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A		Energy	32 744.95	32 744.95	13 903.45	10 807.37	13 132.81	11 861.22	12 757.79	11 820.46	–63.9
		Industrial processes	4 399.60	4 396.79	2 111.51	3 019.01	5 525.37	2 367.35	2 230.00	3 737.55	–15.0
		Solvent and other product use	197.52	197.52	186.36	173.54	90.95	95.38	87.41	85.95	–56.5
		Agriculture	10 292.09	10 292.09	4 680.76	4 457.30	5 057.12	5 008.98	4 984.65	4 979.97	–51.6
		Waste	1 122.51	1 122.51	1 178.88	1 190.58	1 113.19	1 090.37	1 062.74	990.31	–11.8
		LULUCF	NA	–4 286.58	–3 375.69	–9 240.01	–8 435.51	–10 629.82	–10 397.49	–10 483.49	NA
		Total (with LULUCF)	**NA**	**44 470.10**	**18 685.27**	**10 407.79**	**16 483.93**	**9 793.47**	**10 725.11**	**11 130.74**	**NA**
		Total (without LULUCF)	**48 756.67**	**48 753.87**	**22 060.97**	**19 647.80**	**24 919.43**	**20 423.30**	**21 122.60**	**21 614.23**	**–55.7**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation					–89.32	–107.78	–109.11	–120.09	
		Deforestation					9.00	8.61	26.31	10.48	
		Total (3.3)					–80.32	–99.17	–82.80	–109.62	
	Article 3.4[d]	Forest management					–9 023.53	–11 642.34	–10 592.08	–10 849.56	
		Cropland management	NA				NA	NA	NA	NA	NA
		Grazing land management	NA				NA	NA	NA	NA	NA
		Revegetation	NA				NA	NA	NA	NA	NA
		Total (3.4)	**NA**				**–9 023.53**	**–11 642.34**	**–10 592.08**	**–10 849.56**	**NA**

Abbreviations: KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" for sources included in Annex A to the Kyoto Protocol refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2013 annual inventory submission was submitted on 15 April 2013; it contains a complete set of common reporting format (CRF) tables for the period 1990–2011 and an NIR. Lithuania also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Lithuania officially submitted revised emission estimates on 28 October 2013 in response to the list of potential problems and further questions raised by the ERT. The values used in this report are those submitted by Lithuania on 28 October 2013 (see paras. 39 and 41).

8. The full list of materials used during the review is provided in annex II to this report.

2. Overall assessment of the inventory

9. Table 3 contains the ERT's overall assessment of the annual submission of Lithuania. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

		General findings and recommendations
The expert review team's (ERT's) findings on completeness of the 2013 annual submission		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: "NE" is reported for: CO_2 from road paving with asphalt; CO_2 from chemical products, manufacture and processing; CH_4 and N_2O from glass production (see para. 36 below); N_2O from fire extinguishers and aerosols cans (see para. 46 below); CH_4 from agricultural soils; N_2O from industrial wastewater; N_2O from wastewater (domestic and commercial wastewater); potential HFC and SF_6 emissions (export in bulk, export in products and destroyed amounts)
Land use, land-use change[a] and forestry	Not complete	Mandatory: "NE" is reported for carbon stock changes: in living biomass and in soils for cropland converted to wetlands and grassland converted to wetlands; in living biomass for cropland and grassland converted to settlements

		General findings and recommendations
		Non-mandatory: "NE" is reported for carbon stock changes in dead organic matter for the following categories: cropland and grassland converted to wetlands; and cropland and grassland converted to settlements. "NE" is also reported for CH_4 and N_2O from drainage of soils and wetlands (flooded lands); CH_4 from drainage of soils and wetlands (peatland); and for CO_2, CH_4 and N_2O from biomass burning for wetlands (wildfires) and for settlements and other land
KP-LULUCF	Not complete	Changes in carbon stock for the pools above- and below-ground biomass are not reported under deforestation (see para. 84 below)
The ERT's findings on recalculations and time-series consistency in the 2013 annual submission	Generally consistent	See paragraphs 10 and 79 below
The ERT's findings on verification and quality assurance/quality control procedures in the 2013 annual submission	Sufficient	See paragraphs 11, 12, 17, 25, 33, 58, 71 and 80 below
The ERT's findings on the transparency of the 2013 annual submission	Generally sufficient	See paragraphs 10, 23, 39, 41, 42, 45, 47, 57, 60, 78 and 79 below

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NE = not estimated.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

10. The NIR (section 10) qualitatively describes all recalculations performed in the 2013 annual submission, several as a consequence of recommendations of the 2012 annual review report. The ERT commends Lithuania for including this information and considers that the recalculations have led to an improvement in the completeness, accuracy and transparency of the inventory. However, the NIR does not include justifications for all recalculations or descriptions of the implications of recalculations for emission levels or emission trends. The ERT recommends that Lithuania provide such information in the NIR in line with the outline provided in annex I to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines).

11. The NIR (section 1.6.3) describes that, under the coordination of the Lithuanian Environmental Protection Agency (EPA), a basic internal review is performed before the submission of the inventory, as part of its quality assurance (QA) procedures. The review involves different departments of the Ministry of Environment. The ERT notes that the results of the internal review are not presented in the NIR. In response to a question raised by the ERT during the review, Lithuania provided examples of findings from its internal review that led to changes in the inventory before its finalization (e.g. the use of revised

data on population from Statistics Lithuania for the waste sector calculations). The ERT recommends that Lithuania improve the transparency of its reporting on QA procedures by including the main results of its internal review in the NIR, both in terms of findings leading to recalculations in the current inventory and findings leading to future improvements.

3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

12. The NIR and additional information provided by the Party during the review described the national system for the preparation of the inventory. The Ministry of Environment is the single national entity with overall responsibility for the national inventory and is in charge of the legal, institutional and procedural arrangements for the national inventory. Other agencies, organizations and consultants are also involved in the preparation of the inventory in accordance with specific legal arrangements, including:

(a) The EPA, which is responsible, by Order No. D1-1017 of the Minister of Environment, for implementing the quality assurance/quality control (QA/QC) procedures and for the coordination and compilation of the NIR;

(b) The permanent GHG inventory working group, established by Governmental Resolution No. 334 and by Order No. DI-538 of the Minister of Environment, which is responsible for the estimation of GHG emissions and removals, including the choice of methodological approaches, activity data (AD) and emission factors (EFs);

(c) The State Forestry Service, which is responsible, by Order No. D1-666 of the Minister of Environment, for the estimation of emissions and removals for forestry in the LULUCF sector and the compilation of information for the reporting of KP-LULUCF activities. In addition, an amendment of Governmental Resolution No. 334 on the establishment of a permanent GHG inventory working group designated the Lithuanian Research Centre for Agriculture and Forestry as the organization responsible for providing the estimates of GHG emissions and removals for non-forestry categories in the LULUCF sector;

(d) The National Climate Change Committee, which is responsible for approving the final draft annual submission as part of its role to advise on the implementation of the provisions of the Convention and coordinate compliance with the requirements of the Kyoto Protocol;

(e) External consultants, who can be contracted on an annual basis in areas where specific expertise is required or where the experience and knowledge of the permanent GHG inventory working group is not sufficient.

13. Resolution No. 388 determines the responsibilities of other ministries and their subordinated institutions, as well as other institutions and the state science research institutes, to collect, maintain and provide the data required for the compilation of the inventory.

Inventory preparation

14. Table 4 contains the ERT's assessment of Lithuania's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Lithuania

		General findings and recommendations
Key category analysis		
Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF)?	Tier 1 – Yes Tier 2 – No	See paragraph 16 below
Approach followed?	Both tier 1 and tier 2	For tier 2 see paragraph 16 below
Were additional key categories identified using a qualitative approach?	No	
Has Lithuania identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Are there any changes to the key category analysis in the latest submission?	Yes	See paragraphs 15 and 16 below
Assessment of uncertainty analysis		
Approach followed?	Tier 1	
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	See paragraph 68 below
Quantitative uncertainty (including LULUCF)	Level = 53.2% Trend = 9.9%	
Quantitative uncertainty (excluding LULUCF)	Level = 11.4% Trend = 2.4%	

Abbreviation: LULUCF = land use, land-use change and forestry.

15. Following the recommendations in the previous review report, in its 2013 annual submission, Lithuania made use of the uncertainty estimates and performed a tier 2 key category analysis in addition to the mandatory tier 1 analysis. Furthermore, the ERT noted that Lithuania followed the recommendations in the previous review report and included the sector solvent and other product use in its key category analysis, as well as used the key

category analysis when prioritizing the development and improvement of the inventory. The ERT commends Lithuania for these efforts.

16. In annex 1 to the NIR, Lithuania presented its tier 1 and tier 2 key category analyses. The ERT noted that the tier 2 analyses were not performed in line with 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). The ERT considers that the introduction of the tier 2 key category analysis has resulted in several new, but incorrect key categories in the Lithuanian inventory (e.g. N_2O from other sectors (fuel combustion)). In response to a question raised by the ERT during the review, Lithuania provided the underlying calculation sheets of its tier 2 key category analysis. The ERT concluded that Lithuania was not calculating the parameters "percentage contribution to level" and "cumulative total" correctly in its tier 2 analysis. In addition, Lithuania used a 95 per cent threshold for the tier 2 assessment instead of 90 per cent, without justifying this choice, which is not in line with the IPCC good practice guidance. The ERT therefore recommends that Lithuania perform the tier 2 key category analyses in line with IPCC good practice guidance.

Inventory management

17. The NIR reported that Lithuania has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The NIR further reported that archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The main archive is kept and managed by the EPA. In addition, sectoral experts have archives located in their own institutions, and the original National Forest Inventory (NFI) data is archived in the State Forest Service. During the review, the ERT was provided with the requested additional archived information.

4. Follow-up to previous reviews

18. In its 2013 annual submission, Lithuania has continued to make improvements on its inventory, in terms of transparency, completeness, consistency, comparability and accuracy. The Party has addressed most of the recommendations from the 2012 annual review report (e.g. see paras. 22, 31, 49, 65, 73, 74 and 76 below). The Party's improvements in its 2013 annual submission as a result of the recommendations in the previous review report are described in annex VIII to the NIR. The ERT commends Lithuania for its efforts to continue to improve its inventory and for transparently reporting the progress. However, there are still some recommendations from the previous review report not addressed regarding transparency in the energy and LULUCF sectors, accuracy in the LULUCF sector, and QA/QC procedures in the industrial processes sector, as follows:

(a) To include more information in the documentation box of CRF table 1.A(d) on the non-energy use of gaseous fuels (see para. 30 below);

(b) To obtain data or to estimate the emissions from the solvent and other product use sector (see para. 46 below);

(c) To provide more detailed information on the uncertainties of the AD and EFs used in the agriculture sector (see para. 50 below);

(d) To improve the completeness and transparency of reporting in the CRF tables in the agriculture sector by fully completing the tables and enhance the QC activities (see para. 50 below);

(e) To improve the transparency of the information on the country-specific nitrogen (N) excretion rate for cattle and swine by providing the source of these data (see para. 50 below);

(f) To continue to investigate the differences between the national data on synthetic fertilizer consumption provided by UAB Agrochema and the data provided by the International Fertilizer Industry Association (IFA) (see para. 50 below);

(g) To estimate the carbon gains and losses using the IPCC default method for forest land remaining forest land (see para. 69 below);

(h) To improve the reporting of emissions from biomass burning (see paras. 70 and 71 below).

5. Areas for further improvement identified by the expert review team

19. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 8.

B. Energy

1. Sector overview

20. The energy sector is the main sector in the GHG inventory of Lithuania. In 2011, emissions from the energy sector amounted to 11,820.46 CO_2 eq, or 54.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 63.9 per cent. The key driver for the fall in emissions is large changes in all sectors in the Lithuanian economy due to the collapse of the Soviet Union. However, since 1995, the economy has gradually recovered and in the period 2000–2007 the annual growth rate of gross domestic production (GDP) was, on average, 8.0 per cent; the global economic crisis in 2009 slowed down growth, but in 2010 and 2011 GDP began to rise again. Within the energy sector in 2011, 37.9 per cent of the emissions were from transport, followed by 37.6 per cent from energy industries, 12.2 per cent from other sectors and 9.9 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 2.3 per cent. The remaining 0.1 per cent were from other (military use – mobile).

21. Lithuania has made recalculations for the energy sector between the 2012 and 2013 annual submissions, based on updates to the energy balance, the use of country-specific EFs for CO_2 (values provided in the study "Determination of national GHG emission factors for the Lithuanian energy sector") and the change in default EFs for N_2O and CH_4 from those given in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) to those given in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) for the cases when no country-specific EFs were available. Also, emissions from road transportation have been recalculated for the whole time series using the COPERT IV model (version 10).

22. The ERT commends Lithuania for taking into account most of the recommendations from the previous review report in its 2013 annual submission, in particular:

(a) The inclusion of information and justification of the recalculations for the key categories;

(b) The use of default EFs from the Revised 1996 IPCC Guidelines instead of using EFs from the 2006 IPCC Guidelines without justification;

(c) The reporting of total imported natural gas in CRF table 1.A(b), without the exclusion of natural gas used for non-energy purposes;

(d) The investigation of the differences between international energy agency (IEA) data and the values reported in the CRF tables and the inclusion of explanations on the differences in the NIR;

(e) The inclusion of information on the assumptions and data sources used in emission calculations for civil aviation, aviation bunkers and road transportation, and of a more elaborated explanation of the trend of the implied emission factor (IEF) for gasoline in road transportation;

(f) The reporting of coke and coking coal consumption separately under stationary combustion, with specific EFs for each fuel.

23. Following a recommendation from the previous review report to include a description of the tier 2 QA/QC procedures carried out for the key categories, Lithuania included in the NIR (section 3.7) information on the comparison, for 2011, between verified CO_2 emissions from the GHG registry and the CRF tables. The overall difference for 2011 between the activities involved in the European Union Emissions Trading System (EU ETS) and the corresponding categories in the CRF tables showed a difference of 0.8 per cent. However, the ERT noted that for some categories (such as petroleum refining), the EU ETS CO_2 emissions are higher than those reported in CRF table 1.A(a). In response to a question raised by the ERT during the review, Lithuania indicated that in the CRF tables the allocation of emissions from combined heat and power (CHP) installations are mostly reported under the public electricity and heat production category, while emissions from these installations in the EU ETS are reported within the sector to which the installation belongs (petroleum refining, for the example provided). The ERT recommends that Lithuania include this explanation in the NIR.

24. The ERT noted that Lithuania reported in the NIR (section 3.2.6.6) that it foresees the need to further investigate the possibility of using data from the EU ETS for the category public electricity and heat production. The ERT encourages Lithuania to further analyse the data and possible use of EU ETS data or EFs where appropriate and document the result of the analysis.

25. The ERT noted that overall, the NIR has been improved and the ERT commends Lithuania for the effort that was made in the 2013 annual submission. However, the ERT noticed that there remain a few obvious textual mistakes in the NIR (e.g. in the text in table 3-70 (page 77) “jet kerosene” should be written instead of “residual fuel oil”; and in table 3-20 (page 99) “chemical industries” is written instead of “non-ferrous metals”). There is also an inconsistency between the data on liquefied petroleum gas in table 3-41 in the NIR and the dataset provided in table 8 of annex III to the NIR. In response to a question raised by the ERT during the review, Lithuania stated that it intends to correct this inconsistency. The ERT recommends that Lithuania correct the remaining errors and inconsistencies in the NIR.

2. Reference and sectoral approaches

26. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 27–30 below.

Table 5
Review of reference and sectoral approaches

		Paragraph cross-references
Difference between the reference approach and the sectoral approach in 2011	Energy consumption: –15.26 PJ, –8.97% CO_2 emissions: 140.03 Gg CO_2 eq, 1.25%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	Yes	
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	29, 30

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

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

27. The ERT noted that the difference between the reference approach and the sectoral approach for energy consumption is 8.97 per cent for 2011, while the difference in CO_2 emissions is 1.25 per cent. The ERT encourages Lithuania to analyse the difference and try to reduce the difference in the energy consumption.

International bunker fuels

28. No problems were identified.

Feedstocks and non-energy use of fuels

29. In the previous review report it was recommended that Lithuania cross-check the data reported as non-energy use in the energy sector and the data reported under the industrial processes sector. The ERT noted that, in annex VIII to the NIR, Lithuania stated that it has implemented this recommendation and has provided relevant information in the NIR. However, the ERT noted that the calculated CO_2 not emitted from the use of natural gas for non-energy purposes in CRF table 1.A(d) for 2011 differs from the CO_2 emissions from ammonia (NH_3) production reported in CRF table 2.B.1. In response to a question raised by the ERT during the review week, Lithuania stated that it had performed a cross-check between the natural gas data used in the industrial processes sector and the result of the check is reported in table 1.A(d). The small difference results from the use of different net calorific values for natural gas. In the industrial processes sector the specific net calorific value used is the average annual net calorific value of natural gas, which is calculated on the basis of reports from the natural gas supplier AB Lietuvos Dujos that measures the calorific value twice a month. In the energy sector, calculations are based on data provided by Lithuanian Statistics where fuel consumption is calculated in terms of

tonnes of oil equivalent and converted into terajoules (TJ) using the net calorific value (see table 3-12 in the NIR, page 85). The ERT recommends that Lithuania cross-check the data further and include information on these cross-checks in the appropriate section of the NIR.

30. In the previous review report it was recommended that Lithuania include in the documentation box of CRF table 1.A(d) more information on the non-energy use of gaseous fuels (and the allocation of possible related emissions). The ERT noted that Lithuania states in annex VIII to the NIR that it has included information on the non-energy use of gaseous fuels in the NIR. However, the ERT did not find this information sufficient (e.g. additional information on most of the fuels is reported as not applicable ("NA")) and therefore reiterates the recommendation from the previous review report that Lithuania include more information in the NIR and/or in CRF table 1.A(d), along with a documented cross-check between the energy sector and industrial processes sectors, where applicable.

3. Key categories

Stationary combustion: biomass – CH_4

31. In the previous review report it was recommended that Lithuania estimate CH_4 emissions from biomass combustion using a tier 2 approach (e.g. by using internationally referenced EFs or EFs from neighbouring countries appropriate to Lithuania's national circumstances), because this category is key. In annex IV to the NIR, Lithuania provided a summary of a study conducted in 2012 by the Lithuanian Energy Institute to determine national EFs. The study concluded that CH_4 measurements to determine appropriate EFs would be long lasting, and therefore the proposed EFs are mainly based on default IPCC values. The ERT encourages Lithuania to further investigate the possibility of using EFs from internationally referenced sources or EFs from neighbouring countries appropriate to Lithuania's national circumstances, especially for wood and wood waste.

4. Non-key categories

Other transportation: gaseous fuels – CO_2

32. The ERT noted that Lithuania reported an IEF for natural gas of 55.23 t CO_2/TJ in all categories, except for other transportation where an IEF of 56.90 t CO_2/TJ was reported. In response to a question raised by the ERT during the review, Lithuania agreed that there is no reason to use a different EF in this category, and that in its next annual submission the emissions will be revised using the country-specific EF of 55.23 t CO_2/TJ. The ERT recommends that Lithuania revise its estimates for this category for all years of the time series.

Oil and natural gas: gaseous fuels – CO_2 and CH_4

33. Lithuania reported in the NIR (table 4-73, page 168) that the reference for the EF for natural gas distribution and emissions is table 3-28 from the IPCC good practice guidance. The ERT noted that the reference to the IPCC good practice guidance should be table 2.16 and not table 3-28. The ERT also noted that in CRF table 1.B.2, for natural gas transmission, the description of the AD is indicated as "gas consumed", while the unit is said to be "1000 km". In response to a question raised by the ERT during the review, Lithuania stated that the description was a mistake and it should be "length of pipeline". The ERT recommends that Lithuania check and correct the references for the EFs that are used in the NIR and add or correct descriptions of the AD used in the CRF tables.

C. Industrial processes and solvent and other product use

1. Sector overview

34. In 2011, emissions from the industrial processes sector amounted to 3,737.55 Gg CO_2 eq, or 17.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 85.95 Gg CO_2 eq, or 0.4 per cent of total GHG emissions. Since the base year of the Kyoto Protocol, emissions have decreased by 15.0 per cent in the industrial processes sector, and decreased by 56.5 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the reduction of emissions from mineral products. In addition, there is an increase of emissions from chemical industry and consumption of fluorinated gases (F-gases). Within the industrial processes sector, 83.4 per cent of the emissions were from chemical industry, followed by 10.2 per cent from mineral products, 6.1 per cent from consumption of halocarbons and SF_6 and 0.2 per cent from other (industrial processes). The remaining 0.1 per cent were from metal production.

35. The ERT identified three issues of potential underestimation of emissions: disposal emissions from commercial and industrial refrigeration and disposal emissions from stationary air-conditioning systems (see paras. 39, 41 and 42 below).

36. Lithuania has used the notation key "NE" (not estimated) to report emissions for the entire time series for the following categories for which methodologies and/or EFs are not available in the IPCC good practice guidance or the Revised 1996 IPCC Guidelines: CO_2 emissions from road paving with asphalt; CH_4 and N_2O emissions from glass production; CO_2 emissions from chemical products, manufacture and processing; and N_2O emissions from other product use (except for the use of N_2O for anaesthesia, where emissions have been estimated). The ERT reiterates the encouragements from the previous review report and encourages Lithuania to explore the possibility of estimating these emissions.

2. Key categories

Ammonia production – CO_2

37. On p. 202 of the NIR, Lithuania reports that the total fuel consumption data is used as AD for NH_3 production. This problem was raised in the previous review report. The current ERT interprets this as an indication that Lithuania did not subtract the natural gas demand for the thermal process, which could lead to a possible overestimation of emissions. Moreover, the ERT noted that the CO_2 IEFs are in the range 2.02–2.68 t CO_2/t NH_3 (table 4-16). The values are higher than the IPCC default EF of 1.5 t CO_2/t NH_3 and no explanation of this high value is provided in the NIR. In response to a question raised by the ERT on this issue, Lithuania stated that it has used a country-specific CO_2 EF (55.23 t CO_2/TJ) for natural gas over the whole time series. Furthermore, Lithuania explained that the same EF is used for the calculations in the energy sector and that it will carry out an analysis of the potential overestimation and will provide a discussion on this subject in the NIR in the next annual submission. The ERT recommends that Lithuania provide in its NIR the results of discussions on the application of the EF that is also used in the energy sector calculations and also recommends that the Party compare the results with EU ETS data as a quality check, if possible, and report these results.

Nitric acid production – N_2O

38. In the NIR, the Party states "For the years 1990–2008, for which measurement data do not exist, Lithuania has identified which production units were in operation, and extrapolated the production per unit from production data for the period 2009–2011". The ERT concludes from this information that there is no documented amount of produced nitric acid for the years 1990–2008. In response to a question raised by the ERT on this

issue, Lithuania stated that documented amounts of the produced nitric acid are available for the whole reporting period (1990–2011). There are data on the level of production plant (1990–2008) and data on the level of production units (2009–2011). The ERT recommends that, as proposed to the ERT during the review, Lithuania check this unclear information and provide the relevant explanations and information in the NIR.

Consumption of halocarbons and SF_6 – HFCs

39. In its original submission of 15 April 2013, Lithuania reported emissions for the disposal of HFCs in commercial refrigeration as not occurring ("NO"). As the usage of this equipment started in 1995 and the lifetime according to the NIR of Lithuania (pp. 227–228) is between 10 and 15 years, disposal should have started in 2010. The ERT considered that this as a potential underestimation of emissions, and included this issue in the list of the potential problems and further questions raised by the ERT during the review. In response to the list of the potential problems and further questions raised by the ERT, Lithuania submitted revised estimates of HFC emissions from commercial refrigeration regarding disposal. Lithuania assumed 15 years as the lifetime for commercial refrigeration, based on expert judgement. This is within the range provided in the Revised 1996 IPCC Guidelines. Lithuania also assumed that the initial charge remaining in products is 90 per cent, which is in accordance with the Revised 1996 IPCC Guidelines. In addition, Lithuania assumed that the recovery amount is 90 per cent, based on expert judgement. This is at the high end of the suggested ranges of the best estimates in table 3.22 of the IPCC good practice guidance. The ERT concluded that the revised estimates submitted by Lithuania are in accordance with the IPCC good practice guidance and recommends that Lithuania provide this information and documentation in the NIR on the above-mentioned expert judgements in line with section 3.7.4.2 of the IPCC good practice guidance.

40. Lithuania reported the AD for the HFC emissions from transport refrigeration as "NE" in CRF table 2(II).F. Lithuania informed the ERT during the review that this was a reporting error. The ERT recommends that Lithuania report the AD in CRF table 2(II).F.

41. Lithuania reports the disposal emissions of industrial refrigeration as "NO". As the usage of this equipment started in 1995 and, according the NIR of Lithuania (pp. 227–228), the lifetime is between 10 and 15 years, disposal should have started in 2010. The ERT considered that this as a potential underestimation, and included this issue in the list of the potential problems and further questions raised by the ERT during the review. In response to the list of the potential problems and further questions raised by the ERT, Lithuania submitted revised estimates of HFC emissions from industrial refrigeration regarding disposal. Lithuania has assumed 15 years as the lifetime for industrial refrigeration, based on expert judgement. This is within the range provided in the Revised 1996 IPCC Guidelines. Lithuania assumes the initial charge remaining in products is 90 per cent, which is in accordance with the Revised 1996 IPCC Guidelines. In addition, Lithuania has assumed that the recovery amount is 90 per cent, based on expert judgement. This is at the high end of the suggested ranges of the best estimates in table 3.22 of the IPCC good practice guidance. The ERT accepted the revised estimates submitted by Lithuania and recommends that Lithuania provide this information and documentation in the NIR on the above-mentioned expert judgements in line with section 3.7.4.2 of the IPCC good practice guidance.

42. Lithuania reports emissions from the disposal of HFCs in stationary air-conditioning equipment as "NE". The ERT considered this is a potential underestimation and included this issue in the list of the potential problems and further questions raised by the ERT during the review. In response to the list of the potential problems and further questions raised by the ERT, Lithuania submitted revised estimates of HFC emissions from stationary air-conditioning equipment regarding disposal and initial charging. Lithuania has assumed 15 years as the lifetime for stationary air-conditioning equipment, based on expert

judgement. This is within the range provided in the Revised 1996 IPCC Guidelines. Lithuania assumes the initial charge remaining in products is 90 per cent. This is in accordance with the Revised 1996 IPCC Guidelines. In addition, Lithuania has assumed that the recovery amount is 80 per cent, based on expert judgement. This is at the high end of the suggested ranges of the best estimates in table 3.22 of the IPCC good practice guidance. The ERT accepted the revised estimates and recommends that Lithuania provide this information and documentation in the NIR on the above-mentioned expert judgements in line with section 3.7.4.2 of the IPCC good practice guidance.

43. Lithuania reports HFC emissions from foam blowing in CRF table 2(II), but information on emissions, AD and IEFs for foam blowing is missing in CRF table 2(II).F. The ERT strongly recommends that Lithuania report the AD, IEFs and emissions for foam blowing in CRF table 2(II).F.

44. Lithuania reports SF_6 emissions from semiconductor manufacture, electrical equipment and other (non-specified) in CRF table 2(II). However, these emissions, AD and IEFs are not reported in CRF table 2(II).F. Lithuania informed the ERT that it will report these data in the next annual submission. The ERT strongly recommends that Lithuania report SF_6 emissions, IEFs and AD for semiconductor manufacture, electrical equipment and other (non-specified) in CRF table 2(II).F.

45. On p. 256 of the NIR (chapter 4.7.8), Lithuania states that "AB Litgrid provided exact data on annual operating losses meanwhile other companies pointed out that there have been no emissions from their equipment". In response to a question raised by the ERT during the review on what type of equipment without any leakage is used in Lithuania, the Party informed the ERT: "Operating losses from electric equipment are relevant exclusively to high voltage grid. High voltage is operated by a single company AB Litgrid. SF_6 containing units used in medium voltage grid are hermetic. Leak proof is guaranteed and serviced by the producer. At the end of the service period the units will be returned to the producer." The ERT recommends that Lithuania add this information in its NIR to improve transparency.

Solvent and other product use – N_2O

46. Lithuania has reported N_2O emissions from fire extinguishers, aerosol cans and other uses as "NE". In response to a question raised by the ERT during the review on this issue, Lithuania explained that it had tried to obtain data but without success. The ERT reiterates the encouragement of previous review reports that the Party make efforts to obtain data or estimate the emissions in order to improve the completeness of its emissions inventory.

3. Non-key categories

Soda ash use – CO_2

47. Statistics Lithuania stopped collecting statistical data on the consumption of soda ash in 2010. In response to a question raised by the ERT during the review, Lithuania informed the ERT that it plans to use new statistics on the balance of imports and exports. The ERT recommends that Lithuania document the new data sources in the NIR and make a comparison and analysis of any differences of emissions of the same years calculated with the old and the new AD and report on this analysis.

D. Agriculture

1. Sector overview

48. In 2011, emissions from the agriculture sector amounted to 4,979.97 Gg CO_2 eq, or 23.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 51.6 per cent. The key drivers for the fall in emissions are from reduced populations of cattle and subsequent reductions in CH_4 from enteric fermentation and manure management, along with associated emission reductions of direct, indirect and pasture range and paddock N_2O emissions from the reduced quantities of manure, in addition to reductions in direct N_2O emissions from reduced application of synthetic fertilizers. Within the sector, 61.1 per cent of the emissions were from agricultural soils, followed by 23.8 per cent from enteric fermentation and 15.1 per cent from manure management. Lithuania reported emissions from rice production, field burning of agricultural residues and prescribed burning of savannas as "NO".

49. The ERT commends the Party for implementing the following recommendations from the previous review report: 1) correcting the inconsistency between CRF tables 4.A and 4.B(a) regarding the animal mass reported for swine; 2) revising its reporting in CRF table 4.B(a) to report "NA" instead of "NE" for the average typical animal mass, the average daily excretion of volatile solids and the average CH_4 production potential for sheep, goats, horses and poultry, as these data are not used in the tier 1 method applied; 3) applying a tier 2 method to estimate CH_4 emissions from manure management for sheep; 4) improving its estimates of direct N_2O by applying tier 1b methods to account for emissions from crop residues and N-fixing crops, as well as accounting for emissions from sewage sludge; and 5) improving the transparency of the methods and estimates in the NIR when accounting for the quantity of manure deposited on pasture, range and paddock (PRP) by livestock.

50. The ERT reiterates the following recommendations from the previous review report, that the Party: 1)provide more detailed information on the uncertainties of the AD and EFs used in its uncertainty analyses; 2) improve the completeness and transparency of its reporting in the CRF tables by fully completing the tables and enhancing its QC activities; improve the transparency of the information on the country-specific N excretion rate for cattle and swine by providing the source of these data 4); continue to investigate the differences between the national data on synthetic fertilizer consumption provided by UAB Agrochema and the data provided by the International Fertilizer Industry Association (IFA).

2. Key categories

Enteric fermentation – CH_4

51. Lithuania uses a tier 2 method to estimate emissions from enteric fermentation of cattle, sheep and swine. Emissions from goats, horses, rabbits, nutria and other fur-bearing animals are estimated using a tier 1 approach.

52. Lithuania has reported on page 275 of its NIR that dairy cattle weights remain constant for the whole time period and are based on expert judgement. During the review, the ERT requested additional information on this issue. Lithuania responded that dairy cattle weights are not currently collected, but that there is a planned improvement to obtain more accurate data in the future. The ERT encourages Lithuania to implement this planned improvement and recommends that the Party collect this data in the future so that it can be used in improving the tier 2 enteric EFs for dairy cattle.

53. Populations of cattle and swine reported by Lithuania are significantly lower than those reported by the Food and Agriculture Organization of the United Nations (FAO)

(cattle is 7.2 per cent lower and swine is17.6 per cent lower). During the review, Lithuania explained that the differences in livestock populations between the FAO data and those reported in the Lithuania inventory are a result of differences in the way the basic data are applied to generate the annual estimates. The ERT recommends that Lithuania provide a transparent explanation in its NIR explaining why these differences occur so that future ERTs will be better able to evaluate the population numbers presented in the inventory and the differences from the FAO estimates.

54. In general, the tier 2 enteric emission estimates that Lithuania provides for the livestock categories of dairy, non-dairy, sheep and swine seem reasonable and consistent with those of other countries with similar management practices. However, the ERT noted that it is difficult to evaluate the estimates fully since many of the values used in generating the gross energy intake (GEI), using both the IPCC tier 2 approach (e.g. net energy (NE) values, and digestible energy expressed as a percentage of gross energy (DE)) and the country-specific feed accumulation approach (i.e. crude protein, crude fat, crude fibre and N-free extracts) are not included in the NIR. Lithuania provided these data during the review in response to a request from the ERT. The ERT recommends that Lithuania improve the transparency of its inventory by providing these data in future NIRs to assist reviewers in evaluating the emission estimates from livestock.

55. Lithuania produces a single tier 2 EF for all dairy livestock despite having two distinct types of management practices (i.e. 80 per cent high producing and 20 per cent low producing). The ERT believes that further subdividing the dairy cattle population by management practices, animal characteristics and other conditions could help Lithuania to improve its tier 2 EFs for dairy cattle. During the review, in response to a question raised by the ERT on whether the Party could subdivide the national herd into these two distinct management practice types, Lithuania indicated that while this could improve the estimates it does not have the necessary data to do so. The ERT encourages Lithuania to subdivide its dairy herd into high- and low-productivity subcategories and obtain the necessary AD in order to develop a tier 2 EF for the low-productivity subcategory of dairy cattle.

Manure management – CH_4 and N_2O

56. Lithuania uses a combination of tier 1 and tier 2 methods to estimate emissions from manure management, with higher-tier methods being applied to cattle, swine and sheep and lower-tier methods being applied to other livestock species. Recalculations were made due to an update on manure management system usage for cattle and swine, GEI data for cattle from 2008–2010 and a new method for calculating EFs for sheep. For CH_4, these recalculations caused relatively small changes in the total emissions during the early part of the time series, in the range of 0.5–4.0 per cent increases, while in the later part of the time series the recalculations caused increases in the range of 5–11 per cent. The recalculations for N_2O from manure management resulted in increased emissions for the early part of the time series and decreased emissions for the later part of the time series. Further elaboration on the reason for this change in the trend was requested by the ERT during the review. The reasons involved both changes to the N intake for dairy cattle and changes in the AD for animal waste management systems (AWMS). Both of these changes were a result of improved AD over the time series. The ERT commends Lithuania for implementing and applying the 2012 study of AWMS usage that resulted in these improvements.

57. The NIR (p. 290) states that the increase in the number of swine partially offsets the increased use of anaerobic digesters; however, table 6-10 shows that the swine population decreased across the time series. During the review, the ERT asked Lithuania to explain what is meant by the increasing swine population offsetting the use of anaerobic digesters. Lithuania responded that the increase in swine population only occurred in the period 2004–2006. The statement in the NIR that the increase in the number of swine partly

counterbalances the decrease in CH_4 emissions should be applied only for the period 2004–2006. Lithuania agrees that this sentence is misleading and confirmed that it will modify or delete the sentence to avoid any further confusion by readers of the NIR. The ERT recommends that Lithuania modify the sentence in its NIR.

58. For a number of years (i.e. 1991, 1995, 1997, 1999–2005, 2007 and 2009–2011), CRF table 4.B(a) has incorrect per cent values for the amount of manure allocated to the different AWMS. While the ERT confirmed that Lithuania used the correct per cent values in its calculations, the ERT strongly recommends that Lithuania improve its QC of the CRF tables to ensure the appropriate values are populated in the CRF tables.

59. The NIR (p. 296) states that all biogas from anaerobic digesters is collected and used as fuel. During the review, the ERT requested additional information about this statement. Lithuania replied that the data on produced and consumed biogas for the period 2004–2011 is provided by a single source (UAB "Saerimner"). The report the company provided to the regional environmental agency states that leakage to the atmosphere caused by the incomplete combustion of biogas is equal to 0 (zero); all gas produced is combusted in cogenerators. However, the ERT notes that these systems are not likely to be 100 per cent effective at capturing and combusting all the CH_4. The ERT strongly recommends that Lithuania provide a more transparent description of these systems in the NIR to help to confirm whether there is complete capture and combustion of all CH_4 emissions from these systems, or provide revised estimates in the next annual submission.

60. In table 6-38 of the NIR a methane conversion factor (MCF) value of zero is reported for anaerobic lagoons. The IPCC good practice guidance indicates that the value could range from 0–100 per cent. During the review, the ERT requested more information on this in order to confirm that this value of zero per cent is appropriate, or whether this value is used because the Party assumed that all the CH_4 from the lagoon is captured and combusted. In response to this question raised by the ERT during the review, Lithuania responded that it applies an MCF value of zero to anaerobic digesters even though these systems are generating large amounts of CH_4, but that all the CH_4 is apparently captured and combusted. The ERT considers that, it may be possible that these anaerobic lagoon systems do not emit any CH_4 to the atmosphere, and therefore the ERT strongly recommends that Lithuania apply the appropriate MCF to calculate the amount of CH_4 actually generated by these systems and then subtract for the amount of CH_4 that is captured and combusted. The ERT strongly recommends that Lithuania provide a more transparent description in the NIR and ensure that the methodology applied accounts for any CH_4 not captured by the systems (e.g. due to leakage, or potentially if the capture and combustion systems on these digesters become non-operable for some period of time), or provide revised estimates in the next annual submission.

Agricultural soils – N_2O

61. N_2O emissions from agricultural soils represents Lithuania's largest emission category from the agriculture sector, accounting for 61.1 per cent of total agricultural emissions in 2011. The largest contributor is direct soil emissions, followed by indirect emissions and PRP. Numerous improvements were made to these emission estimates including: updating synthetic fertilizer data; moving to a tier 1b method to account for N inputs from crop residues (both N-fixing and non-N-fixing crops) by using country-specific data rather than IPCC defaults; accounting for additional areas of drained organic soils; and accounting for N additions from sewage sludge. These recalculations resulted in significant increases across the time series, with increases in emissions ranging from 11.9 to 53.4 per cent compared with the 2012 submission. The ERT agrees with the new estimates and commends Lithuania for these significant improvements in the accuracy and transparency of the inventory.

62. Table 6-55 of the NIR provides the estimates for direct N_2O emissions from each N input. However, as this was the first time Lithuania estimated N_2O emissions from the application of sewage sludge to agricultural soils, the ERT noted that the Party failed to add an additional column to the table to present the sewage sludge emissions. Table 6-54 presents total direct N_2O emissions that include the contribution from sewage sludge as well as the CRF table 4.D and the CRF table 4. The ERT recommends that Lithuania make that correction.

63. In calculating the direct N_2O emissions from the application of sewage sludge, Lithuania applies the fraction of synthetic fertilizer N applied to soils that volatilizes as NH_3 and nitrogen oxides (NO_x) ($Frac_{GASF}$) value of 0.1 to account for the portion of N that volatilizes to the atmosphere. During the review, the ERT suggested that Lithuania use value of 0.2 for the fraction of livestock nitrogen excretion (Nex) that volatilizes as NH_3 and NO_x ($Frac_{GASM}$), because sewage sludge is similar to other organic N inputs, such as manure. Lithuania agreed with this approach and will apply it for the next annual submission. This will also make the method consistent with the calculation of indirect N_2O emissions where the $Frac_{GASM}$ value of 0.2 was applied to sewage sludge.

E. Land use, land-use change and forestry

1. Sector overview

64. In 2011, net removals from the LULUCF sector amounted to 10,483.49 Gg CO_2 eq. Since 1990, net removals have increased by 144.67 per cent. The key driver for the rise in removals is the increase in removals in the category forest land remaining forest land. Within the sector, net removals of 11,119.45 Gg CO_2 eq were from forest land, followed by net removals of 3,136.68 Gg CO_2 eq from grassland, while net emissions of 3,704.99 Gg CO_2 eq were from cropland and 67.65 Gg CO_2 eq from wetlands. Changes in carbon stock in settlements and other land were reported as "NO". CH_4 and N_2O emissions in settlements were reported as "NE", as were emissions/removals from other (harvest wood products).

65. Following recommendations in the previous review report, the Party improved the transparency of its reporting in regards to the land use representation, by including more information about the use and merger of different land-use studies that demonstrate how the Party has avoided double counting and omission of emissions and removals in the accounting of land areas. The ERT commends the Party for its efforts.

66. Between the 2012 and 2013 submissions the Party amended or adopted several legal acts in the country in order to establish cooperation among different institutions, providing data for GHG accounting in the LULUCF sector and to increase consistency, completeness and transparency of the methods and approaches used, as follows: the Government Resolution on forest land conversion to other land and compensation for converted forest land; the amendment of the Order of the Minister of Environment regarding the regulation on the sampling method used for the NFI; the Order of the Minister of Environment on harmonized principles for data collection and reporting on the LULUCF sector; the amendment of the Minister of Environment and Minister of Agriculture rules for afforestation of non-forest land; the Order of the Minister of Environment and Minister of Agriculture regarding the inventory and registration of natural afforestation of non-forest land; the amendment of the Government Resolution with regulation on State Forest Cadastre; and the Order of the Minister of Environment and Minister of Agriculture regarding harmonized methodologyies for GHG emissions and removals accounting under the LULUCF sector.

67. In the previous review report, Lithuania was recommended to report the areas converted to a different land use under the relevant land-use conversion category for 20

consecutive years before reporting them under the corresponding "land remaining" category. The Party followed this recommendation in the 2013 annual submission and the ERT commends the Party for this improvement. For example, land-use change from forest land to wetlands in 2009 resulted in emissions of 28.73 Gg C. That value is 1/20 of the total carbon stock change and the same value will be reported for the period 2009–2029 until it equals the carbon stock change. However, the ERT noticed that the emissions and removals in soil organic carbon were not reported using the same approach The ERT recommends that Lithuania report the soil organic carbon gains and losses following the 20 year transition period.

68. The Party has also improved its uncertainty assessment between the 2012 and 2013 submissions in response to recommendations in the previous review report. In the previous annual submission, Lithuania's analysis of the LULUCF sector was mostly based on expert judgement and using equations that were not fully consistent with those contained in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). In the 2013 annual submission, uncertainties were recalculated for several categories. For example, in forest land, uncertainty is mostly based on sampling methods with a national methodology for the overall uncertainty estimation. The Party also plans to further improve uncertainty assessment of emissions from cropland and grassland, as it is stated in the NIR. The ERT commends Lithuania for its efforts to improve the uncertainty assessment for the LULUCF sector, and recommends that Lithuania extend the improvements to all categories in its uncertainty analysis.

2. Key categories

Forest land remaining forest land – CO_2

69. In the previous review report, Lithuania was recommended to increase the transparency of its NIR by including the reporting of the carbon gains and losses using the IPCC default method. The ERT reiterates the recommendation from the previous review report that Lithuania estimate the carbon gains and losses using the IPCC default method.

3. Non-key categories

Biomass burning – CO_2, CH_4 and N_2O

70. Lithuania has reported, in CRF table 5(V), CO_2 emissions from wildfires in forest land remaining forest land and land converted to forest land. However, the ERT noted that because Lithuania uses the stock change method, CO_2 emissions due to wildfires are automatically accounted for when estimating the stock changes in forest land. The previous ERT recommended that Lithuania report the CO_2 emissions associated with wildfires as information only in its NIR and report the emissions as "IE" (included elsewhere) in CRF table 5(V) in the next annual submission. However, the ERT noted that Lithuania is still reporting CO_2 emissions due to wildfires in forest land remaining forest land and land converted to forest land in CRF table 5(V). The ERT reiterates the recommendation from the previous review report that Lithuania report these emissions using the notation key "IE".

71. The ERT noted that Lithuania has used incorrect default values for CH_4 and N_2O EFs for biomass consumption (derived from emission ratios of 0.012 and 0.007 for CH_4 and N_2O, respectively), instead of those reported in table 3.A.1.16 of the IPCC good practice guidance for LULUCF. The previous review report recommended that Lithuania use the correct CH_4 and N_2O EFs from table 3.A.1.16 of the IPCC good practice guidance for LULUCF and recalculate the corresponding emissions and removals for the entire time series. The previous review report also recommended that Lithuania use country-specific

data for the mass of available fuel, including dead wood and litter. The ERT noted that the Party stated in the 2013 NIR (annex VIII) that it has made changes in the calculations and corrected values in section 7.2.2.1 (forest land remaining forest land) and 7.2.2.2 (land converted to forest land) in response to these recommendations. However, the ERT noted that the Party has not applied the correct CH_4 and N_2O EFs from the IPCC good practice guidance for LULUCF and has not used country-specific data for the mass of available fuel in its 2013 submission. The ERT reiterates the recommendations from the previous review report that Lithuania improve its reporting on these issues by correcting the CH_4 and N_2O EFs.

F. Waste

1. Sector overview

72. In 2011, emissions from the waste sector amounted to 990.31 Gg CO_2 eq, or 4.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 11.8 per cent. The key drivers for the fall in emissions are the decrease in emissions from wastewater handling (since 1990) and the decrease in emissions from waste disposal sites (since 2003). Within the sector, 81.6 per cent of the emissions were from solid waste disposal on land, followed by 17.7 per cent from wastewater handling. The remaining 0.7 per cent were from waste incineration.

73. Following the recommendations of previous review reports, Lithuania improved the description of the general overview of the waste sector. For example, for the wastewater handling category Lithuania included the number of facilities per treatment method. The ERT commends Lithuania for its efforts to improve the transparency of its inventory. However, the ERT encourages Lithuania to include also a general description of the policies of the sector, as this can sometimes clarify the historical evolution of emissions and removals (e.g. a prohibition on disposal for certain waste types).

74. Following the recommendations from the previous review report, Lithuania has improved the description on the assumptions used to estimate the historical landfilled amounts. The ERT especially commends Lithuania for performing a sensitivity analysis on the assumptions for the annual growth of the amounts of landfilled waste. In addition, the ERT believes that the separate reporting on the landfill sites of sewage sludge improves the transparency of the inventory. The ERT noted the recalculations of the emissions from disposal of sewage sludge, based on the results of a new study on sewage sludge management, and is of the view that the recalculations have led to an improvement in the accuracy of the inventory.

75. The previous review report noted that there were 13 waste composting facilities in operation in Lithuania in 2010, but that the Party has not reported emissions from this activity. The ERT noted that there are still no emissions reported in this category in this annual submission. Neither the Revised 1996 IPCC Guidelines nor the IPCC good practice guidance provide a methodology to calculate emissions from waste composting sites. Lithuania noted in the 2013 NIR (p. 444) that some countries are providing emission estimates from composting based on country-specific methods. Such investigations, however, were not performed in Lithuania. The ERT reiterates the encouragement of the previous review report that Lithuania look for appropriate data and methodologies in order to estimate CH_4 and N_2O emissions for these waste composting sites.

2. Key categories

Solid waste disposal on land – CH_4

76. Following the recommendations from previous review reports (2011 and 2012) to estimate the historical waste composition for municipal solid waste (MSW), Lithuania included in the 2013 annual submission new waste composition data for MSW for the whole time series 1990–2011. Lithuania integrated a description of the methodology and the data in the NIR for 2013. The ERT commends Lithuania for this improvement and encourages Lithuania to integrate all forthcoming analyses of the composition of MSW in the years indicated in the NIR (p. 431) in order to maintain the transparency of its reporting in future annual submissions.

77. Lithuania used the first-order decay (FOD) method from the 2006 IPCC Guidelines to estimate CH_4 emissions from solid waste disposal on land. In response to a recommendation in the previous review report, Lithuania has included justifications in its 2013 annual submission (NIR p. 445) on the use of the FOD method from the 2006 IPCC Guidelines by pointing out several parameters that are outdated in the Revised 1996 IPCC Guidelines and IPCC good practice guidance, while the 2006 IPCC Guidelines provides parameters based on references from more recent research. Lithuania states that an important gain in the 2006 IPCC Guidelines is that default parameter values for the waste category sludge are provided. A significant part of the disposed waste in Lithuania consists of sewage sludge. The ERT considers that the use of the FOD method is in line with the IPCC good practice guidance. The ERT commends Lithuania for improving the transparency of its inventory.

78. Lithuania has described in the NIR the assumptions for the estimation of the historical quantities (1950–1989) of disposed waste. It was not clear to the ERT whether the assumptions described under the paragraph "historic waste disposal" (NIR p. 435) were provided for the total amount of landfilled waste: both MSW and industrial and commercial waste or only for the MSW. In response to a question raised by the ERT during the review, Lithuania confirmed that the assumptions are provided for the total amount of disposed waste. The ERT recommends that Lithuania improve the transparency of its reporting by including a sentence at the beginning of the paragraph on historical waste disposal explaining that the assumptions are applied to the total amount of disposed waste (including MSW and industrial and commercial waste).

3. Non-key categories

Wastewater handling – CH_4

79. In table 8-36 in the 2013 NIR (p. 458), the values on CH_4 recovery of sewage sludge have decreased compared with those in the previous submission (NIR 2012, table 8-20, p. 348), but the NIR does not mention this recalculation. In response to a question raised by the ERT during the review, Lithuania explained that data on CH_4 recovery from sewage sludge were modified due to revised statistics and conversion of volumes into mass units. The ERT recommends that Lithuania report in a more transparent way on this recalculation in the NIR. The ERT also recommends that Lithuania add the information on any recalculations under chapter 8.3.5 (p. 460) on category-specific recalculations, in order to improve the transparency of the inventory.

80. Lithuania has reported in the NIR (p. 456 paragraph 8.3.2 on wastewater discharge) that wastewater discharge in 1990 was estimated by linear extrapolation of data for 1991–1993. Lithuania states that applying an extrapolation of the trend is applicable because there was a very substantial decrease in water usage and water discharge after the restoration of national independence. However, the ERT noted that in the NIR (p. 456) it is stated that the

biochemical oxygen demand (BOD) discharge in 1990 was assumed to be the same as in 1991 and table 8-35 (NIR p. 457) shows that the value for BOD (reported in Gg) is the same for 1990 and 1991. The ERT considers that the underlying assumptions used for estimating values for wastewater discharge and BOD discharge for 1990 are not consistent. In response to a question raised by the ERT during the review, Lithuania explained that both assumptions were discussed during the inventory preparation. Finally, Lithuania decided that because the real worsening of economic conditions occurred only from 1992, the most reasonable assumption was that wastewater discharges in 1990 were approximately the same as in 1991. Lithuania expressed its intention to correct the description in the NIR regarding the extrapolation of wastewater discharge in 1990. The ERT recommends that Lithuania revise the information in the NIR.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

81. Table 6 provides an overview of the information reported and parameters selected by the Party under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6

Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

		Findings and recommendations
Has the Party reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Not sufficient	See paragraph 84
Identify any elected activities under Article 3, paragraph 4, of the Kyoto Protocol	Activities elected: forest management Years reported:1990, 2008, 2009, 2010 and 2011	
Identify the period of accounting	Commitment period accounting	
Assessment of the Party's ability to identify areas of land and areas of land-use change	Sufficient	

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

Afforestation and reforestation – CO_2

82. The ERT acknowledges the construction of the new yield curve for biomass stock changes in the 2013 annual submission, which was recommended in the previous review report. Moreover, the Party has also corrected the implementation of the stock change method, and this correction has resulted in a decrease of removals of 44.5 per cent between the 2012 and 2013 annual submissions. The ERT noted that in the 2013 annual submission the Party has also addressed the recommendation of the previous review report on

estimating the carbon stock changes in soils under this category. The ERT commends Lithuania for its efforts to improve the accuracy of its reporting.

83. The ERT noted that carbon stock change in dead wood is reported as "NO" with an explanation provided in the NIR (p. 502, chapter 11.3.1.1), which states that carbon stock changes in dead wood of afforested and reforested areas is assumed to be equal to zero, and therefore reported as "NO". The accumulation of dead wood was assumed to be marginal on afforested and reforested sites, during 1990–2011, and also the dead wood pool cannot decrease on those sites, because there is actually no dead wood there before the conversion. The dead wood starts to accumulate when natural mortality or thinnings occur (i.e. from 20 years). The ERT considers that Lithuania provided verifiable information demonstrating that dead wood of afforestation and reforestation is not a net source.

Deforestation – CO_2

84. The ERT noted that the Party has made recalculations for the land-use category deforestation, presented in CRF table 5(KP-I)A.2, between the 2012 and 2013 annual submissions. In the previous annual submissions (2011 and 2012), the Party reported carbon stock changes in above-ground and below-ground biomass with values. The ERT noted that in the 2013 annual submission the Party reported these pools as "IE", stating that these emissions/removals are included under forest management. The ERT also noted that net emissions and removals from forest land converted to other land-use categories are reported in the CRF tables under the Convention as "NO" because the country is applying a carbon stock change method. However, the ERT notes that all carbon stock changes and GHG emissions from land deforested on and after 1 January 1990 must be reported under deforestation in CRF table 5(KP-I)A.2. The ERT strongly recommends that Lithuania report carbon stock changes in above-ground biomass and below-ground biomass.

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

Forest management (biomass burning) – CO_2, CH_4 and N_2O

85. As identified in the LULUCF sector (see para. 70), to estimate emissions from biomass burning, Lithuania uses a default value for biomass consumption (19.8 t/ha) from table 3.A.1.13 of the IPCC good practice guidance for LULUCF, which represents the product of available fuel and combustion efficiency (values B and C, respectively, of equation 3.2.20 of the IPCC good practice guidance for LULUCF). The ERT notes that the Party uses incorrect CH_4 and N_2O EFs, instead of those reported in table 3.A.1.16 of the IPCC good practice guidance for LULUCF (see para. 71). The Party has reported, in CRF table 5(KP-II)5, CO_2 emissions associated with wildfires in forest land. However, the ERT notes that, as Lithuania uses the carbon stock change method, the CO_2 emissions from biomass burning should be reported as "IE" in CRF table 5(KP-II)5. The ERT recommends that the Party use the correct CH_4 and N_2O EFs from table 3.A.1.16 of the IPCC good practice guidance for LULUCF and report the CO_2 emissions in CRF table 5(KP-II)5 as "IE". The ERT also recommends that Lithuania use country-specific data on the mass of available fuel, including dead wood and litter.

86. The ERT notes that the Party is still using a default value for biomass consumption from table 3.A.1.13 of the IPCC good practice guidance for LULUCF, but Lithuania has stated (in chapter 7.2.7 in NIR 2013) that it is planning to revise the methodology used for the estimation of country-specific mass values of available fuel for wildfires, including dead wood and litter. In response to a question raised by the ERT during the review, the Party explained that: the Directorate General of State Forests (DGSF) under the Ministry of Environment has modified its previous form for fire site assessment and included table 7 which will help to estimate burned forest biomass; more detail information will be provided,

specifically, the explicit certified forms by the fire site assessing officer and data presented to State Forest Service; in 2014 DGSF will start to distribute and use this form for the estimation of country-specific values of available fuel for wildfires, including deadwood and litter, and present these data to State Forest Service.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

87. Lithuania has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[3] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

88. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Calculation of the commitment period reserve

89. Lithuania has reported its commitment period reserve in its 2013 annual submission. Lithuania reported its commitment period reserve to be 108,058,476 t CO_2 eq based on the national emissions in its most recently reviewed inventory (21,611.70 Gg CO_2 eq). The ERT notes that, based on the submission of revised emissions estimates by Lithuania during the course of the review of the 2013 annual submission, the commitment period reserve for Lithuania changed, and the new commitment period reserve is reported as 108,071,164 t CO_2 eq based on the national emissions in its most recently reviewed inventory (21,614.23 Gg CO_2 eq). The ERT agrees with this figure.

3. Changes to the national system

90. Lithuania reported that there are changes in its national system since the previous annual submission. The Party described that, by the decision of Kyoto Protocol Compliance Committee of 24 October 2012, Lithuania became eligible to participate in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol. In addition, Lithuania has implemented an action plan to improve the identification of land areas in order to strengthen the reporting under Article 3, paragraph 3, of the Kyoto Protocol. The changes are described in its NIR. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

[3] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

4. Changes to the national registry

91. Lithuania reported that there are changes in its national registry since the previous annual submission. The Party described the changes, specifically due to the centralization of the EU ETS operations into a single European Union registry operated by the European Commission called the Consolidated System of European Union Registries (CSEUR), in its NIR. The ERT concluded that, taking into account the confirmed changes in the national registry, Lithuania's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

92. Lithuania reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The Party described in its NIR that in 2012 it adopted a strategy (Strategy for National Climate Change Management Policy by 2050) to assist developing countries by the year 2020, and that it is planning to increase its bilateral project assistance through Official Development Assistance (ODA) and its Climate Change Special Programme fund. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

93. In its 2013 NIR, Lithuania described that during 2012 it continued to contribute to the financing under the Fast Start Financing and the Energy Sector Management Assistance Programme (ESMAP). However, the ERT noted that the NIR does not include information on what type of projects the funds were used for. During the review, the Party provided the ERT with information on the types of project, beneficiary area, implementation period and a short description of the impacts and results. The ERT recommends that Lithuania include this information.

III. Conclusions and recommendations

A. Conclusions

94. Table 7 summarizes the ERT's conclusions on the 2013 annual submission of Party, in accordance with the Article 8 review guidelines.

Table 7

Expert review team's conclusions on the 2013 annual submission of Lithuania

		Paragraph cross-references
The ERT concludes that the inventory submission of Lithuania is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011)		
Annex A sources[a]	Complete	
LULUCF[a]	Not Complete	Table 3

		Paragraph cross-references
KP-LULUCF	Not Complete	
The ERT concludes that the inventory submission of Lithuania has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	Table 4
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	No	Table 6
The Party's inventory is in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*	Generally yes	See paragraph 17 (key category analysis)
Lithuania has reported information on Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Yes	See paragraph 84, and table 3
Lithuania has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	See paragraph 90
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	See paragraph 91
Did Lithuania provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

B. Recommendations

95. The ERT identified the issues for improvement listed in table 8. All recommendations are for the next annual submission, unless otherwise specified.

Table 8
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph cross-references*
Cross-cutting		Provide information on justifications for all recalculations or descriptions of the implications of recalculations for emission levels or emission trends in the NIR	10
		Improve the transparency of its reporting on QA procedures by including the main results of its internal review in the NIR, both in terms of findings leading to recalculations in the current inventory and findings leading to future improvements	11
		Perform the tier 2 key category analyses in line with IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*	16
Energy	Sector overview	Include an explanation on differences between CRF tables and EU ETS in the NIR	23
		Correct the remaining errors and inconsistencies, which were pointed out during this review, in the NIR	25
	Feedstocks and non-energy use of fuels	Cross-check the data on feedstocks and non-energy use of fuels further and include information on these cross-checks in the appropriate section of the NIR	29
		Include more information in the NIR and/or in CRF table 1.A(d), along with a documented cross-check between the energy sector and industrial processes sectors	30
	Other transportation: gaseous fuels – CO_2	Revise the estimates for this category for all years of the time series	32
	Oil and natural gas: gaseous fuels – CO_2 and CH_4	Check and correct the references for the EFs that are used in the NIR and add or correct descriptions of the AD used in the CRF tables	33
Industrial processes and solvent and other product use	Ammonia production – CO_2	Provide in the NIR the results of discussions on the application of the EF that is also used in the energy sector calculations	37
		Compare the results with EU ETS data as a quality check if possible and report these results	37
	Nitric acid production – N_2O	Check the unclear information identified during this review and provide the relevant explanations and information in the NIR	38
	Consumption of halocarbons and SF_6 – HFCs	Provide information on the disposal of HFCs in commercial refrigeration and documentation in the NIR regarding the expert judgements for these emissions	39
		Report the AD for HFC emissions from transport refrigeration in CRF table 2(II).F	40

Sector	*Category*	*Recommendation*	*Paragraph cross-references*
		Provide information on the disposal of HFCs of industrial refrigeration and documentation in the NIR regarding the expert judgements for these emissions	41
		Provide information on the disposal of HFCs in stationary air-conditioning equipment and documentation in the NIR regarding the expert judgements for these emissions	42
		Report the AD, IEFs and HFC emissions for foam blowing in CRF table 2(II).F	43
		Report SF_6 emissions, IEFs and AD for semiconductor manufacture, electrical equipment and other (non-specified) in CRF table 2(II).F	44
		Add the information regarding equipment used by AB Litgrid in its NIR to improve transparency	45
	Soda ash use – CO_2	Document the new data sources in the NIR and make a comparison and analysis of any differences of emissions of the same years calculated with the old and the new AD and report on this analysis	47
Agriculture	Sector overview	Provide more detailed information on the uncertainties of the AD and EFs used in the uncertainty analyses	50
		Improve the completeness and transparency of its reporting in the CRF tables by fully completing the tables and enhancing QC activities	50
		Improve the transparency of the information on the country-specific nitrogen excretion rate for cattle and swine by providing the source of these data	50
		Continue to investigate the differences between the national data on synthetic fertilizer consumption provided by UAB Agrochema and the data provided by the International Fertilizer Industry Association (IFA)	50
		Collect dairy cattle weights in the future so that it can be used in improving the tier 2 enteric EFs for dairy cattle	52
	Enteric fermentation – CH_4	Provide a transparent explanation in the NIR explaining why the differences between the FAO data and those reported in the Lithuania inventory occur	53
		Improve the transparency of the inventory by providing the data used in generating the gross energy intake in future NIRs	54
	Manure management – CH_4 and N_2O	Modify the sentence on increasing swine population offsetting the use of anaerobic digesters in its NIR	57
		Improve QC of the CRF tables to ensure the appropriate values are populated in the CRF tables	58

Sector	*Category*	*Recommendation*	*Paragraph cross-references*
		Provide a more transparent description of the cogenerator systems in the NIR to help to confirm whether there is complete capture and combustion of all CH_4 emissions from these systems, or provide revised estimates in the next annual submission	59
		Apply the appropriate methane conversion factor (MCF) to calculate the amount of CH_4 actually generated by these systems and then subtract for the amount of CH_4 that is captured and combusted	60
		Provide a more transparent description in the NIR and ensure that the methodology applied accounts for any CH_4 not captured by the systems or provide revised estimates in the next annual submission	60
	Agricultural soils – N_2O	Make the correction by adding a column to the table to present the sewage sludge emissions	62
LULUCF	Sector overview	Report the soil organic carbon gains and losses following the 20 year transition period	67
		Extend the improvements to all categories in its uncertainty analysis	68
	Forest land remaining forest land – CO_2	Estimate the carbon gains and losses using the IPCC default method	69
	Biomass burning – CO_2, CH_4 and N_2O	Report these emissions from biomass burning using the notation key "IE"	70
		Improve its reporting by correcting the CH_4 and N_2O EFs	71
Waste	Solid waste disposal on land – CH_4	Improve the transparency of the reporting by including a sentence at the beginning of the paragraph on historical waste disposal explaining that the assumptions are applied to the total amount of disposed waste	78
	Wastewater handling – CH_4	Report in a more transparent way on this recalculation in the NIR	79
		Add the information on any recalculations under the chapter 8.3.5 (p. 460) on category-specific recalculations, in order to improve the transparency of the inventory	79
		Revise the information on assumption for biochemical oxygen demand (BOD) in the NIR	80
KP-LULUCF	Deforestation	Report carbon stock changes in above-ground biomass and below-ground biomass in order to fulfil the requirement stated in paragraph 6(e) of annex to the decision 15/CMP.1	84
	Forest management (Biomass burning) – CO_2, CH_4 and N_2O	Use the correct CH_4 and N_2O EFs from table 3.A.1.16 of the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* and report the CO_2 emissions in CRF table 5(KP-II)5 as "IE"	85

Sector	*Category*	*Recommendation*	*Paragraph cross-references*
		Use country-specific data on the mass of available fuel, including dead wood and litter	85
Article 3, paragraph 14		Include information on what type of projects the funds were used for	93

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, EU ETS = European Union Emissions Trading System, IE = included elsewhere, IEF = implied emissions factor, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, QA/QC = quality assurance/quality control.

IV. Questions of implementation

96. No questions of implementation were identified by the ERT during the review.

Annex I

Background data on recalculations and information to be included in the compilation and accounting database

Table 9
Recalculations in the 2013 annual submission for the base year and the most recent year

	1990	*2010*	*1990*	*2010*	
Greenhouse gas source and sink categories	*Value of recalculation (Gg CO_2 eq)*		*Per cent change*		*Reason for the recalculation*
1. Energy	–958.67	–95.75	–2.8	–0.7	
A. Fuel combustion (sectoral approach)	–958.59	–95.11	–2.9	–0.8	
1. Energy industries	–442.93	–127.13	–3.2	–2.3	
2. Manufacturing industries and construction	–229.03	0.11	–3.8	0.0	
3. Transport	–106.41	–1.39	–1.4	0.0	
4. Other sectors	–180.22	33.31	–3.1	2.3	
5. Other		–0.02		–0.1	
B. Fugitive emissions from fuels	–0.08	–0.64	–0.1	–0.2	
1. Solid fuels					
2. Oil and natural gas	–0.08	–0.64	–0.1	–0.2	
2. Industrial processes	101.14	–19.17	2.4	–0.9	
A. Mineral products	0.17	0.80	0.0	0.2	
B. Chemical industry	100.97	–35.03	4.8	–2.0	
C. Metal production					
D. Other production					
E. Production of halocarbons and SF_6					
F. Consumption of halocarbons and SF_6		15.07		8.2	
G. Other					
3. Solvent and other product use	–0.09	–5.21	0.0	–5.6	
4. Agriculture	–279.62	–180.25	–2.6	–3.5	
A. Enteric fermentation	–12.34	5.62	–0.4	0.5	
B. Manure management	11.21	40.54	0.6	5.4	
C. Rice cultivation					
D. Agricultural soils	–278.49	–226.42	–5.2	–7.0	
E. Prescribed burning of savannas					
F. Field burning of agricultural residues					
G. Other					
5. Land use, land-use change and forestry	2 005.03	1 317.08	–31.9	–11.2	
A. Forest land	–611.87	1 449.11	8.5	–11.8	
B. Cropland	5 424.95	3 699.81	1 527.9	–13 092.4	

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
C. Grassland	–2 823.86	–3 844.12	–606.4	–714.9	
D. Wetlands	15.81	12.28	21.7	21.7	
E. Settlements					
F. Other land					
G. Other					
6. Waste	–43.19	–98.51	–3.7	–8.5	
A. Solid waste disposal on land	–42.80	–70.51	–4.7	–7.4	
B. Wastewater handling	–0.74	–28.00	–0.3	–13.7	
C. Waste incineration	0.35	0.00	8.4	0.0	
D. Other					
7. Other					
Total CO_2 equivalent without LULUCF	–1 180.43	–400.91	–2.4	–1.9	
Total CO_2 equivalent with LULUCF	824.60	916.17	1.9	9.3	

Abbreviation: LULUCF = land use, land-use change and forestry.

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2011, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	108 058 476	108 071 164		108 071 164
Annex A emissions for 2011				
CO_2	13 970 466			13 970 466
CH_4	3 045 574			3 045 574
N_2O	4 370 884			4 370 884
HFCs	216 653	219 191		219 191
PFCs	NA, NO			NA, NO
SF_6	8 117			8 117
Total Annex A sources	**21 611 695**	**21 614 233**		**21 614 233**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–120 095			–120 095
3.3 Afforestation and reforestation on harvested land for 2011	NA, NO			NA, NO
3.3 Deforestation for 2011	10 479			10 479
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011	–10 849 555			–10 849 555
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2010, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	13 725 057			13 725 057
CH_4	3 177 091			3 177 091
N_2O	4 022 399			4 022 399
HFCs	190 184	192 198		192 198
PFCs	NA, NO			NA, NO
SF_6	5 853			5 853
Total Annex A sources	**21 120 584**	**21 122 598**		**21 122 598**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–109 107			–109 107
3.3 Afforestation and reforestation on harvested land for 2010	NA, NO			NA, NO
3.3 Deforestation for 2010	26 310			26 310
Activities under Article 3, paragraph 4, for 2010[c]				
3.4 Forest management for 2010	–10 592 084			–10 592 084
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	12 920 151			12 920 151
CH_4	3 226 320			3 226 320
N_2O	4 106 783			4 106 783
HFCs	167 079	167 272		167 272
PFCs	NA, NO			NA, NO
SF_6	2 768			2 768
Total Annex A sources	**20 423 103**	**20 423 296**		**20 423 296**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–107 779			–107 779
3.3 Afforestation and reforestation on harvested land for 2009	NA, NO			NA, NO
3.3 Deforestation for 2009	8 609			8 609
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009	–11 642 336			–11 642 336
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	15 103 941			15 103 941
CH_4	3 324 988			3 324 988
N_2O	6 334 483			6 334 483
HFCs	152 641	152 810		152 810
PFCs	NA, NO			NA, NO
SF_6	3 212			3 212
Total Annex A sources	**24 919 265**	**24 919 434**		**24 919 434**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–89 319			–89 319
3.3 Afforestation and reforestation on harvested land for 2008	NA, NO			NA, NO
3.3 Deforestation for 2008	8 996			8 996
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008	–9 023 528			–9 023 528
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation in the base year				

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NA = not applicable, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Lithuania 2013. Available at <http://unfccc.int/resource/docs/2013/asr/ltu.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2013. Available at <http://unfccc.int/resource/webdocs/sai/2013.pdf>.

FCCC/ARR/2012/LTU. Report of the individual review of the annual submission of Lithuania submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/ltu.pdf>.

Standard independent assessment report, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Jolanta Merkelienė (Ministry of Environment), including additional material on the methodologies and assumptions used.

Annex III

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
BOD	biochemical oxygen demand
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DE	digestible energy expressed as a percentage of gross energy
DGSF	Directorate General of State Forests
EF	emission factor
EPA	Lithuanian Environmental Protection Agency
ERT	expert review team
ESMAP	Energy Sector Management Assistance Programme
EU	European Union
EU ETS	European Union Emissions Trading System
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
FOD	first-order decay
$Frac_{GASF}$	fraction of synthetic fertilizer N applied to soils that volatilizes as NH_3 and NO_x
$Frac_{GASM}$	fraction of livestock N excreted that volatilizes as NH_3 and NO_x
GDP	gross domestic product
GEI	gross energy intake
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IFA	International Fertilizer Industry Association
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NH_3	ammonia
NFI	National Forest Inventory
NIR	national inventory report
NO	not occurring
NO_X	nitrogen oxides
ODA	Official Development Assistance

PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
PRP	pasture range and paddock
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change