Advance Version

COMPLIANCE COMMITTEE **CC/ERT/ARR/2014/21**
19 May 2014

Report of the individual review of the annual submission of Latvia submitted in 2013

Note by the secretariat

The report of the individual review of the annual submission of Latvia submitted in 2013 was published on 15 May 2014. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decisions 4/CMP.4 and 8/CMP.9), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2013/LVA, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

ADVANCE VERSION

United Nations FCCC/ARR/2013/LVA

Framework Convention on Climate Change

Distr.: General
15 May 2014

English only

Report of the individual review of the annual submission of Latvia 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.

Contents

I. Introduction and summary

1. This report covers the review of the 2013 annual submission of Latvia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 16 to 21 September 2013 in Riga, Latvia, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Katarina Mareckova (European Union (EU)); energy – Mr. Takeshi Enoki (Japan); industrial processes and solvent and other product use – Mr. Hongwei Yang (China); agriculture – Mr. Simon Wear (New Zealand); land use, land-use change and forestry (LULUCF) – Ms. Thelma Krug (Brazil); and waste – Mr. Davor Vesligaj (Croatia). Mr. Yang and Mr. Wear were the lead reviewers. The review was coordinated by Ms. Ruta Bubniene (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 Latvia, 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, unless otherwise specified.

3. In 2011, the main greenhouse gas (GHG) in Latvia was carbon dioxide (CO_2), accounting for 70.1 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (15.0 per cent) and methane (CH_4) (14.1 per cent). Hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) collectively accounted for 0.8 per cent of the overall GHG emissions in the country. Perfluorocarbons (PFCs) are reported as "NA" (not applicable), "NO" (not occurring).

4. The energy sector accounted for 68.1 per cent of total GHG emissions, followed by the agriculture sector (20.1 per cent), the industrial processes sector (6.3 per cent), the waste sector (5.2 per cent) and the solvent and other product use sector (0.4 per cent). Total GHG emissions amounted to 11,545.28 Gg CO_2 eq and decreased by 56.1 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; however, it recommends that Latvia include more explanatory information for some categories in the energy, agriculture and industrial processes sectors (see table 3 below).

5. 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, 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.

6. Additional background data on recalculations by Latvia 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.

[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.

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	19 041.87	19 041.87	9 036.44	6 992.61	8 175.66	7 433.66	8 529.00	8 088.05	–57.5
		CH_4	3 466.57	3 466.57	2 026.36	1 706.04	1 725.65	1 738.73	1 739.71	1 631.52	–52.9
		N_2O	3 804.00	3 804.00	1 535.40	1 399.83	1 646.26	1 680.37	1 742.91	1 730.28	–54.5
		HFCs	0.64	IE, NA, NE, NO	0.64	5.12	72.96	74.48	72.32	82.97	12 851.3
		PFCs	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
		SF_6	0.25	NA, NE, NO	0.25	1.28	10.08	13.53	13.13	12.45	4 858.3
KP-LULUCF	Article 3.3[b]	CO_2					156.39	45.54	22.21	19.98	
		CH_4					NO	NO	NO	NO	
		N_2O					15.01	15.33	15.49	15.55	
	Article 3.4[c]	CO_2	NA				–19 266.94	–17 954.63	–14 790.25	–15 163.36	NA
		CH_4	NA				28.00	34.11	40.31	9.46	NA
		N_2O	NA				145.78	146.21	146.86	302.51	NA

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, IE = included elsewhere, 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, NE = not estimated, 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. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. 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, cropland management, grazing land management and revegetation.

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	19 136.30	19 136.30	9 514.63	7 341.10	8 353.54	7 691.09	8 487.08	7 857.03	–58.9
	Industrial processes	599.76	598.87	160.21	179.40	371.84	339.63	605.33	727.69	21.3
	Solvent and other product use	50.70	50.70	41.49	44.81	43.62	26.55	45.25	41.31	–18.5
	Agriculture	5 931.27	5 931.27	2 307.62	1 956.33	2 224.03	2 255.96	2 326.80	2 320.62	–60.9
	Waste	595.30	595.30	575.14	583.24	637.58	627.56	632.60	598.63	0.6
	LULUCF	NA	–22 306.06	–21 618.46	–19 243.39	–19 660.60	–19 864.82	–16 410.78	–17 179.20	NA
	Total (with LULUCF)	**NA**	**4 006.39**	**–9 019.36**	**–9 138.51**	**–8 029.98**	**–8 924.04**	**–4 313.72**	**–5 633.92**	**NA**
	Total (without LULUCF)	**26 312.45**	**26 312.45**	**12 599.09**	**10 104.88**	**11 630.61**	**10 940.78**	**12 097.07**	**11 545.28**	**–56.1**
	Other[b]	NO	NO	NO	NO	NO	NO	NO	NO	NA
KP-LULUCF	Article 3.3[c] Afforestation and reforestation					–908.49	–1 007.09	–1 007.09	–1 007.12	
	Article 3.3[c] Deforestation					1 079.89	1 067.95	1 044.78	1 042.65	
	Total (3.3)					171.40	60.86	37.69	35.53	
	Article 3.4[d] Forest management					–19 093.16	–17 774.32	–14 603.09	–14 851.39	
	Article 3.4[d] Cropland management	NA				NA	NA	NA	NA	NA
	Article 3.4[d] Grazing land management	NA				NA	NA	NA	NA	NA
	Article 3.4[d] Revegetation	NA				NA	NA	NA	NA	NA
	Total (3.4)	**NA**				**–19 093.16**	**–17 774.32**	**–14 603.09**	**–14 851.39**	**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, 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. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. 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, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. 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. Latvia also submitted 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.

8. Latvia officially submitted revised emission estimates on 20 September 2013 in response to questions raised by the ERT during the review. The values used in this report are those submitted by Latvia on 20 September 2013 (see paras. 57 and 102 below).

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

2. Overall assessment of the inventory

10. Table 3 contains the ERT's overall assessment of the annual submission of Latvia. 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 SF_6 emissions from import in bulk and in products, CH_4 emissions from enteric fermentation (poultry), and CO_2, CH_4 and N_2O emissions from other (waste) for the period 1990–2002
Land use, land-use change and forestry[a]	Not complete	Mandatory: "NE" is reported for the carbon stock changes in living biomass for grassland remaining grassland
		Non-mandatory: "NE" is reported for the carbon stock changes in living biomass gains and dead organic matter for wetlands remaining wetlands, the carbon stock changes in living biomass for settlements remaining settlements, and CH_4 emissions from drainage of soils and wetlands (peatland) (see also paras. 73 and 82

		General findings and recommendations
		below)
KP-LULUCF	Not complete	
The ERT's findings on recalculations and time-series consistency in the 2013 annual submission	Generally consistent	The information provided in the NIR was not fully complete and transparent, but explanations were provided during the review. The ERT recommends that Latvia add this information to the NIR, including a note explaining the difficulty of data availability for the early years of the time series. Time-series consistency is a common challenge for several categories in the industrial processes and solvent and other product use sectors. Category-specific recommendations can be found in paragraphs 44, 48, 53, 56, 61 and 104 below.
The ERT's findings on verification and quality assurance/quality control procedures in the 2013 annual submission	Not sufficient	The QA/QC plan is elaborated, procedures are documented. However, the ERT identified a number of errors and inconsistencies in the CRF tables and the NIR. The ERT strongly recommends that Latvia improve the implementation of its QA/QC procedures and consider increasing the resources for this activity. Category-specific findings and recommendations can be found in paragraphs 23, 26, 30, 32, 47, 49, 50, 53, 69, 94 and 111 below
The ERT's findings on the transparency of the 2013 annual submission	Generally transparent	Transparency has improved since the last annual submission. However, the ERT noted that some category-specific information was not provided at a sufficient level of detail. Requested information was provided during the course of the review. The ERT recommends that the Party improve the transparency of its reporting, particularly in the energy, industrial processes, agriculture and LULUCF sectors (see paras. 34, 45, 52, 53, 65, 70, 76, 78, 85, 91, 101, 110 and 119 below)

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, 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, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control.

[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*).

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

Inventory planning

11. 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 Environmental Protection and Regional Development of the Republic of Latvia (MEPRD) Climate Policy and Technology Department is the designated single national entity with

overall responsibility for the compilation and reporting of the national GHG inventory. More detailed information on the responsibilities of individual institutions, that is, the collection of activity data (AD) and the calculation of emissions, is provided in the NIR. During the review, Latvia further clarified the institutional arrangements, particularly on data flow, the quality assurance/quality control (QA/QC) system and the archiving system. During the review, Latvia provided additional documents (e.g. Regulation No. 217, QA/QC user manual). The ERT recommends that Latvia include the information on the departments/divisions involved in the compilation and reporting of the national GHG inventory in the next annual submission.

12. The Latvian Environment, Geology and Meteorology Centre (LEGMC) is a governmental limited liability company and is responsible for collecting AD (AD are mainly collected from other institutions and LEGMC uses the data to calculate emissions) and for preparing the emission estimates for the energy, industrial processes, solvent and other product use and waste sectors. LEGMC also performs QC of relevant sectors and some cross-cutting activities such as key category analyses, uncertainty analyses and compilation of the NIR. The LULUCF sector is covered by the Latvian State Forest Research Institute, "Silava", in collaboration with the Ministry of Agriculture (MoA). The Institute of Physical Energetics (IPE) calculates the emissions for the transport sector in accordance with an agreement with MEPRD. The Latvia University of Agriculture in collaboration with MoA compiles the inventory for the agriculture sector. All these organizations are responsible for collecting relevant AD, selecting methods, preparing the emission estimates, implementing QC procedures and for the documentation and archiving of all materials.

13. During the in-country review, Latvia provided more detailed information on the national system for the preparation of the GHG inventory and provided additional documents to the ERT. The ERT commends the Party for the improvement of the legal and institutional arrangements in Latvia, enabled by Cabinet of Ministers Regulation No. 217, adopted on 27 March 2012. The regulation defines the responsibilities of individual institutions and sectoral experts. It also provides instructions on the implementation of QA/QC procedures, including a time schedule, tables for the documentation of corrective actions, archiving and formats for the documentation of corrective actions. The ERT acknowledges the ongoing and planned capacity-building projects which are intended to improve the quality of future annual submissions.

14. The process for official approval of the inventory is partly described in the NIR. During the review, Latvia provided additional information. The ERT recommends that Latvia provide more detailed information (e.g. department, function) in the NIR.

15. The main data supplier for the Latvian GHG inventory is the Central Statistical Bureau of Latvia (CSB). LULUCF relevant data is sourced from the national forest inventory (NFI) and is provided by Silava.

16. In response to questions raised by the ERT during the review, Latvia informed the ERT about its plan to shift the main responsibility for the compilation, and possibly also the management and planning, of the GHG inventory from MEPRD to LEGMC. The ERT encourages Latvia to precisely define the functionalities which will be transferred, to ensure the continuity of the functions of the national system despite this upcoming change and to thoroughly describe the changes in the NIR once they have been implemented.

17. The previous ERT noted many planned inventory improvements. The current ERT commends Latvia for implementing some of them and encourages the Party to continue improving the quality of the inventory.

Inventory preparation

18. Table 4 contains the ERT's assessment of Latvia'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 Latvia

		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)?	Yes	
Approach followed?	Tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has the Party 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	All KP-LULUCF activities (mandatory and elected) are key categories
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	The ERT acknowledges an improvement in the selection of methods. All but a few key categories are estimated using tier 2 and higher-tier methods (see paras. 45 and 56 below)
Are there any changes to the key category analysis in the latest submission?	No	Stationary combustion: other fuels – CO2, and other (LULUCF) – CO2, have been identified as key for the first time in the latest submission
Assessment of uncertainty analysis		

		General findings and recommendations
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	The ERT recommends that Latvia improve the transparency of the uncertainty analyses by providing additional information on the sources of uncertainty of individual AD and EFs; elaborate and document information on uncertainty ranges, particularly those based on expert judgement; explore the possibilities of replacing default uncertainty values by country-specific ones; prioritize documentation of uncertainty information and reduction of uncertainty of individual parameters before moving to a tier 2 method (particularly with regard to the LULUCF data) (see paras. 110 below); consider options to progressively reduce the uncertainties of the key categories.
Quantitative uncertainty (including LULUCF)	Level = 72.0% Trend = 253.0%	
Quantitative uncertainty (excluding LULUCF)	Level = 44.7% Trend = 31.7%	

Abbreviations: ERT = expert review team, 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.

19. The ERT noted high uncertainty for AD in some key categories (e.g. residential heating (other sectors) – liquid fuels (50.0 per cent); direct soil emissions (40.0 per cent); and manure management (40.0 per cent)); and emission factors (EFs) (e.g. forest land remaining forest land (70.0 per cent); managed waste disposal on land (52.0 per cent); and road transportation – diesel oil (30.0 per cent)). The ERT encourages Latvia to consider options to progressively reduce the uncertainty of these parameters.

Inventory management

20. Latvia 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 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. During the review, the ERT was provided with the requested additional archived material.

21. The archiving system is maintained by MEPRD. Access is password-protected. All information is also stored at LEGMC. The user manual for inventory experts was presented to the ERT during the review. The forestry research institute Silava stores forestry inventory data.

22. Some scientific papers and historical documents are stored as hard copies at individual institutions. All sectoral experts are obliged to archive all information used during the calculations as well. The ERT recommends that Latvia ensure that all AD and EFs or primary data used to derive the AD and EFs and stored at institutions other than MEPRD are thoroughly archived in a transparent way.

4. Follow-up to previous reviews

23. The ERT noted that Latvia has fully or partly implemented a number of recommendations made in the previous review report:

(a) Improved institutional and procedural arrangements by adopting Regulation No. 217 on 27 March 2012, which provides a framework for the planning, management and compilation of the national GHG inventory. Furthermore, Latvia has established a steering committee on GHG inventory preparation, which supports communication between different stakeholders and is setting up priorities for improvement;

(b) A significant improvement of the QA/QC system by the development of a QA/QC plan (section III in Regulation No. 217), including forms to document corrective actions taken. The document is drafted in Latvian; however, the ERT was also provided with a summary in English. Within LEGMC, an independent QA/QC manager was selected who is responsible for the coordination of QC and also for checking inventory calculations for selected sectors. The industrial processes and solvent and other product use sectors were reviewed by an independent reviewer in 2012. A review of the energy and agriculture sectors is planned for 2013;

(c) The primary data provider CSB is preparing for International Organization for Standardization accreditation and as part of this project an internal description and documentation of the processes needed for the collection and processing of AD used in the national GHG inventory has been developed;

(d) Information on the archiving system has been included in the NIR.

24. 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 below.

B. Energy

1. Sector overview

25. The energy sector is the main sector in the GHG inventory of Latvia. In 2011, emissions from the energy sector amounted to 7,857.03 Gg CO_2 eq, or 68.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 58.9 per cent. The key drivers for the fall in emissions are the political and economic circumstances in Latvia. Within the sector, 40.0 per cent of the emissions were from transport, followed by 26.5 per cent from energy industries, 20.7 per cent from other sectors and 11.5 per cent from manufacturing industries and construction. The remaining 1.2 per cent were from fugitive emissions from fuels (oil and natural gas).

26. The QC procedures were established in 2012 and are carried out in accordance with Regulation No. 217. In addition, Latvia performs category-specific QA/QC procedures

conducted at the data provider level. The ERT commends Latvia for the comprehensive procedures set in place for the energy sector. However, the ERT noted input errors in the CRF tables for the reference approach (see para. 30 below). It also observed that some EFs for peat for the years 2009 and 2010 in table 3.9 of the NIR were incorrect. In response to questions raised by the ERT during the review, the Party informed the ERT about a Norwegian project whereby Latvia plans to purchase an integrated database which automates emission calculations instead of relying on an Excel spreadsheet based database with links to databases that need to be changed manually. The expert will only need to fill in EFs (if these are changed) and some AD (which cannot be automated) and the emissions/removals will be calculated automatically. The ERT welcomes Latvia's plan to improve the inventory preparation process. However, the ERT recommends that the Party improve its QA/QC plan for the energy sector and the implementation of the plan.

27. For the uncertainty analysis, Latvia generally uses a 2.0 per cent uncertainty for AD provided by CSB. Latvia explained that the uncertainty figures are estimated according to the standards set out in a 2004 publication.[3] Higher uncertainty is given for AD not collected by CSB based on expert judgement, and the uncertainty figures for EFs are either taken from 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) or based on expert judgement. However, no references are provided for the values set by expert judgement in the NIR. The ERT recommends that Latvia provide references to the uncertainty figures in the next annual submission.

28. Chapter 10 of the NIR provides a list of recalculations and areas improved as a response to recommendations made in previous review reports. However, the list does not include all the issues regarding the energy sector. The ERT encourages the Party to organize and archive all the recommendations made in previous review reports and make an assessment of, and provide a status of implementation for, all recommendations as part of its inventory planning process.

2. Reference and sectoral approaches

29. 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 30–34 below.

Table 5
Review of reference and sectoral approaches

		Paragraph cross references
Difference between the reference approach and the sectoral approach	Energy consumption: –10.27 PJ, –8.99%	
	CO2 emissions: –768.36 Gg CO2 eq, –10.36%	31
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	30, 31

[3] Linden H and Papageorgiou H. 2004. *Standard Quality Indicators.*

		Paragraph cross references
Are differences with international statistics adequately explained?	No	33
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	34
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	35

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

30. The ERT noted some input errors in the CRF tables for the reference approach. For 2011, errors were observed for coal (imports), peat (production), gasoline (imports, exports and stock change) in table 1.A(b) which led to errors in table 1.A(c) comparing the reference approach and the sectoral approach. Similar errors were observed for most other years. In response to questions raised by the ERT during the review, the Party explained that the input errors were made while inputting data into the CRF Reporter. The ERT recommends that the Party improve its QA/QC plan to include a process to check the final output of the CRF tables, such as a third-party review of the tables generated by the CRF Reporter, to ensure that the Party's estimates are accurately reflected in the CRF tables.

31. During the review, Latvia provided the ERT with the correct figures for CRF tables 1.A(b) and 1.A(c) for the entire time series. The difference between the sectoral and the reference approach for CO_2 emissions for 2011 was approximately 9.7 per cent instead of the 10.36 per cent difference reported, with the sectoral approach being higher than the reference approach. From 1990 to 1998, the differences are within plus or minus 2.5 per cent, but the difference is much larger after 1999 (e.g. –16.7 per cent in 2010). Explanations are provided in the NIR and the CRF tables, for example, statistical difference, interproduct transfer, black market fuel consumption and distribution losses, but the ERT recommends that Latvia conduct an in-depth quantitative investigation to analyse the difference between the two approaches throughout the time series and report the correct values for the entire time series.

32. The ERT noted that Latvia used an oxidation factor of 0.995 for natural gas in the sectoral approach but used 1.00 in the reference approach table (CRF table 1.A(b)). In response to questions raised by the ERT during the review, Latvia informed the ERT that this was an error and the oxidation factor should be 0.995 for both approaches. The ERT recommends that Latvia correct the oxidation value in the reference approach tables.

33. Differences were observed between the CRF data and International Energy Agency (IEA) data. For example, the CRF data on bitumen imports and stock changes are systematically 7.0 per cent higher than the IEA data and, from 1997 onwards, the IEA data on gas and diesel imports are 7–31 per cent higher than in the CRF tables. In response to questions raised by the ERT during the review, the Party explained that some differences have resulted from the input errors identified above, but a detailed analysis between the CRF data and IEA data has not been conducted. The ERT recommends that Latvia use both the Eurostat data and the IEA data to conduct QC of the CRF tables to ensure consistency between data sets and provide a simple explanation of any differences.

International bunker fuels

34. The previous review report recommended that Latvia transparently describe the methodology used to split national and international (bunker) fuel consumption for navigation and aviation in the next annual submission. However, Latvia has not documented how fuel consumption data for navigation and aviation are split into national and international (bunker) fuel consumption. During the review, Latvia explained that the data collection for bunkers is based on Eurostat and IEA guidelines. Furthermore, Latvia explained that there are no cases where international marine or aviation transport departs from a port in Latvia and stops in a port in Latvia to drop off and pick up passengers or freight and then departs to a final destination in another country. Therefore, the implemented data collection of fuel consumption in international and national navigation/aviation fully ensures a correct allocation between national and international modes. Reiterating recommendations made in the previous review reports related to transparency, the ERT recommends that Latvia describe this situation in the next NIR.

Feedstocks and non-energy use of fuels

35. Bitumen, paraffin waxes, white spirit and lubricant have been reported as feedstocks and non-energy use of fuels. Latvia has reported a carbon fraction of 0.5 following the recommendation in the previous review report. However, Latvia has recently conducted studies to understand the amount of some lubricants that have been assumed to be combusted and oxidized in road transportation (see para. 37 below). However, in CRF table 1.A(d), 0.5 is reported as the fraction of carbon stored for lubricants. The ERT recommends that Latvia reflect the results of the study in CRF table 1.A(d), report the appropriate fraction of carbon stored in the CRF table and specify the amount of CO2 emissions and the allocated category name in the appropriate cells. The ERT encourages the Party to investigate the life cycle of bitumen, paraffin waxes, white spirit and report the fraction of carbon stored accordingly.

3. Key categories

Road transportation: liquid fuels – CO_2

36. In response to recommendations made in previous review reports, MEPRD commissioned a study on the fuel content of gasoline in 2011. In 2012, IPE carried out the study "CO_2 EF in the transport sector by fuel type, fuel combusted and research on combusted products" on the carbon content and hydrogen content in gasoline. Based on this research paper, IPE estimated the CO2 EF for gasoline (71.18 t/TJ) and has used this EF for the years 2009 to 2011. For 1990 to 2008, Latvia has used another country-specific EF (68.60 t/TJ). Latvia has assumed that since a new requirement for gasoline quality went into force in 2009, the new EF would be used for 2009 onwards. The ERT commends Latvia for carrying out this study and recommends that the Party reference the study in the NIR and compare the data used for gasoline for the entire time series to ensure that the methods of estimating the EFs are consistent.

37. Latvia has calculated CO_2 emissions from lubricant oil used in car engines in road transportation from the oil film developed on the inner cylinder walls. This oil film is burned along with the fuel. A calculation of lubricant oil consumption for engine operation has been performed using typical oil consumption factors for different vehicle types, fuel used and vehicle age (*EMEP/EEA Air Pollutant Emission Inventory Guidebook 2009* (updated 2012)). CO_2 emissions from lubricant oil burning for engine operation have been calculated based on this calculated lubricant oil consumption and using a default EF (*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter

referred to as the Revised 1996 IPCC Guidelines)). The ERT encourages the Party to investigate other uses of lubricants for energy purposes, such as two stroke engines.

Other sectors: biomass – CH_4

38. For biomass consumption in the residential sector, Latvia has used the default EFs from the Revised 1996 IPCC Guidelines for the entire time series (1.1 kg/TJ). In response to questions raised by the ERT during the review, Latvia explained that MEPRD commissioned a study in 2011 on CH_4 EFs for biomass combustion in the residential category. The ERT commends Latvia for this country-specific EF research and recommends that the Party analyse the results and, if applicable, use the country-specific EFs and reference the study in the NIR with a brief explanation.

4. Non-key categories

Civil aviation and navigation – CO_2, CH_4 and N_2O

39. The ERT noted that the trend of emissions from civil aviation and navigation fluctuates. In response to questions raised by the ERT during the review about the trend of emissions from civil aviation and navigation, Latvia explained some drivers for the fluctuations, such as weather conditions and the fact that international cargo turnover has a high correlation with the energy consumption in the navigation category. In addition, Latvia indicated that CSB has performed checks to confirm the fuel consumption for the years when the fluctuation is more than 20 per cent compared with the previous year and this has been conducted for these two categories. The ERT recommends that Latvia provide an explanation for the observed emission trends and summarize this QC procedure in the NIR.

Oil and natural gas: liquid and gaseous fuels – CO_2, CH_4 and N_2O

40. The ERT noted that Latvia reports fugitive emissions from oil as "NO". However, the ERT further notes that oil is being imported, transported and consumed within Latvia. In response to questions raised by the ERT during the review, Latvia explained that there are no fugitive emissions from any of the subcategories of the oil system, although oil is being imported, transported and consumed within Latvia. The ERT strongly recommends that Latvia review the oil system and provide sufficient documentation to verify that no fugitive emissions occur. If emissions are determined to occur, the ERT strongly recommends that Latvia report the emissions using at least default values.

41. The ERT noted the incorrect use of notation keys for natural gas distribution (1.B.2.b.iv), where CH_4 emissions are reported for 2011 (0.50 Gg CH_4) but "NO" is reported for CO_2 emissions, and for other leakage (1.B.2.b.v) (both industrial and residential), where CH_4 emissions are reported (1.18 Gg CH_4) but "NO" is reported for CO_2 emissions. The IPCC good practice guidance provides a default CO_2 EF for natural gas distribution, in addition to a CH_4 EF, so CO_2 emissions from natural gas distribution are required to be reported. A default CO_2 EF for other leakage is not provided in the Revised 1996 IPCC Guidelines or the IPCC good practice guidance. In response to questions raised by the ERT during the review, Latvia informed the ERT that all emissions from natural gas distribution and leakage will be recalculated by the natural gas company Latvijas Gāze (in particular transmission, distribution, gas storage and other leakage), according to the CH_4, CO_2 and non-methane volatile organic compound content in natural gas. This recalculation will occur because an official request has been sent from LEGMC and updated data will be available by the next annual submission. The ERT welcomes this development but strongly recommends that Latvia report CO_2 emissions from natural gas distribution in the annual submission and, if emissions are not reported, change the notation key from "NO" to "NE" (not estimated). In addition, the ERT recommends that the Party describe the methods and

data used in the NIR. The ERT encourages Latvia to report CO_2 emissions from other leakage.

C. Industrial processes and solvent and other product use

1. Sector overview

42. In 2011, emissions from the industrial processes sector amounted to 727.69 Gg CO_2 eq, or 6.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 41.31 Gg CO_2 eq, or 0.4 per cent of total GHG emissions. Since 1990, emissions have increased by 21.3 per cent in the industrial processes sector, and decreased by 18.5 per cent in the solvent and other product use sector. The key drivers for the rise in emissions in the industrial processes sector are the increases in emissions from mineral products and consumption of halocarbons and SF_6. Within the industrial processes sector, 86.8 per cent of the emissions were from mineral products, followed by 13.1 per cent from consumption of halocarbons and SF_6. The remaining 0.1 per cent were from metal production.

43. Considering that two categories/subcategories contribute to 89.9 per cent of the industrial processes sector emissions in Latvia (in 2011, cement production accounted for 76.8 per cent and consumption of halocarbons and SF_6 accounted for 13.1 per cent of the industrial processes sector emissions), the ERT recommends that more priority be given to these two key categories with regard to further improvements and allocation of resources for the preparation of the GHG inventory.

44. Due to the national circumstances in Latvia, with the difficulty of data availability for the early years, time-series consistency is a common challenge for several categories of the industrial processes and solvent and other product use sectors; for example, tier 1/tier 3 methods have been applied to the periods 1990–2001/2002–2011, respectively, for solvent and other product use; and different data sets have been adopted for CO_2 emissions from cement production before/after the European Union Emissions Trading System (EU ETS) data became available in 2005. The ERT considers that this is not in accordance with section 7.3.2 of the IPCC good practice guidance and paragraphs 4 and 16 of 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). The ERT recommends that Latvia improve the time-series consistency of the industrial processes and solvent and other product use sectors by applying one of the techniques provided by the IPCC good practice guidance (e.g. overlap, surrogate, interpolation and extrapolation) to determine the missing values and document and demonstrate in the NIR that the time series is consistent, wherever such techniques are used.

2. Key categories

Cement production – CO_2

45. Latvia has reported in its NIR (pages 134–135) that the produced clinker is not weighed in the cement production plant but clinker production is estimated from the final cement type by multiplying it with the cement/clinker ratio according to the cement producer's GHG report. The ERT considered that this was not in accordance with section 3.1.1 of the IPCC good practice guidance because clinker production data must be collected in order to apply the tier 2 method. In response to a question raised by the ERT during the review regarding the possibility of obtaining clinker production data from the cement plant, Latvia explained that since 2008 LEGMC has actually used clinker production data from the plant.

46. According to the cement producer's GHG report provided by Latvia during the review, the ERT finds that the cement/clinker ratio is not used at all, rather, the cement plant uses a mass balance approach to obtain clinker production data in two steps: (1) calculate the used clinker data by subtracting all the additives from the produced cement; and (2) calculate the clinker production data by conducting a mass balance of clinker based on data for used clinker, clinker import/export and clinker stock change. The ERT concludes that obtaining clinker production data from the cement plant in this way is scientifically sound and should be regarded as plant-specific data, hence proving that a tier 2 approach has been fully applied. The ERT recommends that Latvia include this information in its NIR to improve transparency and avoid this point being raised repeatedly as an unresolved issue in the future and that Latvia further improve time-series consistency. The ERT further recommends that Latvia apply more rigorous QA/QC procedures for the data collected from the plant and update the uncertainty analysis accordingly.

Consumption of halocarbons and SF_6 – HFCs and SF_6

47. Latvia has reported that the emissions estimate for mobile air conditioning and fire extinguishers has been recalculated following the recommendations made in the previous review reports. Emissions have decreased by 16.2 per cent (13.98 Gg CO_2 eq) for 2010 from 86.30 Gg CO_2 eq reported in the previous annual submission to 72.32 Gg CO_2 eq reported in the 2013 annual submission. However, information on the assumption of the percentage of leakage at disposal from mobile air conditioning has not been fully updated accordingly in the NIR. For example, the information on page 182 (90.0 per cent leakage of HFC-134a from disposal of mobile air conditioning) is incorrect and inconsistent with the information on pages 190–191 and CRF table 2(II)F (100.0 per cent leakage of HFC-134a from disposal of mobile air conditioning). The ERT recommends that Latvia consistently update these descriptions in the NIR and further strengthen the implementation of QA/QC procedures to achieve more consistent reporting.

48. Latvia has reported potential emissions before 2004 as "NE". The ERT considers that this is not in accordance with the UNFCCC reporting guidelines, which require complete reporting covering the entire time series. In response to a question raised by the ERT during the review regarding the possibility of providing estimates of the potential emissions for the period 1990–2003, Latvia explained that, due to a lack of import/export data for the early years, it is still not feasible to estimate the potential emissions for the period 1995–2003. A project report entitled "SF_6, HFC and PFC emission inventory in Latvia 1995–2003" (a CORINAIR institutional strengthening project of inventories in Latvia) provided by Latvia during the review concluded that, due to a lack of AD, the potential emissions were evaluated in a descriptive manner as a backcast. The ERT encourages Latvia to make further efforts towards more complete reporting for the entire time series of this category.

3. Non-key categories

Other (mineral products) – CO_2, CH_4 and N_2O

49. Latvia has reported the aggregated total (for the period 1990–1992) and the disaggregated (for the period 1993–2011) CO_2 emissions from production of bricks for all five brick plants in the CRF tables under the category other (mineral products) and described its reporting in its NIR (pages 152–153). The notation key "IE" (included elsewhere) was used for the aggregated total CO_2 emissions from production of bricks for the period 1993–2011. In response to questions raised by the ERT during the review, the ERT was informed that these five brick plants were not all in production across all the years of the time series; for example, there were only three brick plants operating in 2011. The ERT recommends that Latvia report the aggregated brick production emissions in one line in the CRF table to avoid it being misunderstood as incomplete reporting for a single plant,

and meanwhile include plant-specific emission estimates in the NIR for the sake of transparency.

Solvent and other product use – CO_2 and N_2O

50. Latvia has reported N_2O emissions from fire extinguishers and aerosol cans as "NE" in CRF table 3. In response to a question raised by the ERT during the review, Latvia explained that there are no such activities in the country and confirmed that the use of the notation key "NE" in this case is incorrect, and "NO" should be applied instead. The ERT recommends that Latvia correct these notation keys and further strengthen the implementation of QA/QC procedures.

D. Agriculture

1. Sector overview

51. In 2011, emissions from the agriculture sector amounted to 2,320.62 Gg CO_2 eq, or 20.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 60.9 per cent. The key driver for the fall in emissions is the reduction in fertilizer application on agricultural soils followed closely by the reduction in the number of animals and thus emissions from enteric fermentation. Within the sector, 61.6 per cent of the emissions were from agricultural soils, followed by 29.0 per cent from enteric fermentation and 9.3 per cent from manure management.

52. The NIR lacks information on how the AD for the agriculture sector are sourced. In response to questions raised by the ERT during the review, Latvia provided information on the data sources. Data on livestock populations are sourced from CSB. Full censuses of farms are completed every 10 years, large surveys (of approximately 30,000 farms) are completed every three years, and for all other years there is an annual smaller survey (of approximately 5,000 farms). The last complete census was conducted in 2010 and the next large survey is due in 2016. The scope of the data covers agricultural production by smallholdings and households, and describes farm management practices such as animal waste management systems. Stocks as of 31 December are reported every year by the animal population statistics office. CSB surveys are supplemented with administrative data, for example from slaughterhouses and agriculture data centres, which provide data on carcass weights and milk quality data (milk fat and protein percentages). Latvia collects accurate data on fertilizer and fertilizer type by nitrogen (N) content to calculate the total elemental N applied to agricultural soils. The Food and Agriculture Organization of the United Nations (FAO) uses data on fertilizers provided by Latvia; however, FAO uses its own methodology to convert fertilizer into total elemental N and consequently the FAO data on N in fertilizer applied differ from the Latvian data. FAO also attributes livestock production to the year following the surveys or censuses. The ERT commends Latvia for the quality of the data sources and recommends that the Party provide more information in the agriculture section of the NIR, such as the sources of AD and the information provided to the ERT during the review. The ERT further recommends that Latvia continue to work with FAO to correct the FAO reporting of livestock and fertilizer data.

53. Transcription errors were found during the review week. Data on the distribution of animal waste management systems reported in table 6.16 of the NIR (distribution of different manure management systems for 2000) were incorrect and the values for dairy cattle did not add up to 100 per cent; however, the correct values had been reported in the CRF tables and used to calculate the emissions. Questions raised by the ERT during the review week revealed errors in the equations used to calculate the tier 2 CH_4 emissions from dairy and non-dairy cattle. The ERT replicated the tier 2 equations using data from Latvia and the assumptions reported in the NIR and determined that the estimates of gross

energy and volatile solids reported as additional information in CRF tables 4.A and 4.B(a) were not correct for dairy cattle for the years 1990 to 1999. The ERT recommends that Latvia strengthen the QA/QC processes for these categories.

54. The ERT identified room for further improvement of transparency, recommending that Latvia include the following in its NIR: references to documents that are the source of country-specific nitrogen excretion (Nex) rates for livestock; the value and justification for the choice of parameters for different data sources; the methane conversion factors (MCFs) for different animal waste management systems; and birth weight data. These were not provided in the NIR, making it difficult to check the tier 2 equations. In response to questions raised by the ERT during the review, Latvia explained that for animal digesters the MCF value of 0 per cent was selected from a range of values (0–100 per cent) presented by the IPCC good practice guidance. Latvia explained that this value was used because CH_4 from digesters was being recovered and used on farms as a fuel source, and is a mitigation technology in agriculture. Some recalculation explanations (e.g. atmospheric deposition on agricultural soils – N_2O) were not provided in either CRF table 8(b) or the category-specific recalculations text of the NIR. The ERT recommends that Latvia provide further information in the NIR and justifications for the parameter choices. In the case of anaerobic digesters, the ERT recommends that Latvia ensure that the CH_4 recovered for energy use is reported in the energy sector.

55. During the review, the ERT noted that Latvia has a long history of agricultural research and has used such research to inform the Nex rates for livestock. The ERT encourages Latvia to provide more information on the science programme being carried out as part of its planned inventory improvements and describe how the planned improvements and science research are prioritized to improve the accuracy of the inventory for the agriculture sector.

2. Key categories

Manure management – CH_4

56. During the review, the ERT noted that Latvia had recalculated CH_4 emissions from manure management in non-dairy cattle for the years 2000 to 2011 using a tier 2 method but had retained a tier 1 method with a default EF (4.0 kg CH_4/head/year) for the years 1990 to 1999 because annual data on the distribution of animal waste were not available for that period. Average values for the distribution of animal waste were, however, available for the period 1990–1999 and were used to calculate N_2O emissions from different animal waste management systems. Furthermore, during the review, errors in the NIR tables (e.g. table 6.16: distribution of different manure management systems for 2000) were found. Further analysis of the tier 2 method used to calculate CH_4 emissions from both dairy and non-dairy cattle determined that the MCF for pasture, range and paddock (reported under manure management) was not applied and therefore the emissions were being underestimated.

57. During the review week, Latvia submitted revised estimates of CH_4 emissions from manure management from both dairy and non-dairy cattle using a tier 2 method for the entire time series, correcting the calculation of CH_4 emissions from manure management and appropriately applying the MCF. Average data on the distribution of animal waste for the period 1990 to 1999 were used to calculate the tier 2 emissions for both dairy and non-dairy cattle. The revisions resulted in an increase in GHG emissions from agriculture of 0.2 per cent (5.1 Gg CO_2 eq) in 2011, and an increase in total national GHG emissions of 0.04 per cent. Emissions in 1990 decreased by 1.2 per cent (70.8 Gg CO_2 eq). The ERT agrees with these revisions and commends the Party for its effort to improve the accuracy and time-series consistency of its reporting. The ERT noted that Latvia stated that it had

plans to improve the data on animal waste management systems for the period 1990 to 1999. The ERT recommends that Latvia continue this effort and use the results to further improve the time-series consistency for all years for manure management CH_4 emissions for both dairy and non-dairy cattle for the period 1990 to 2011.

Manure management – N_2O and agricultural soils – N_2O

58. Latvia uses tier 1 Nex rates for swine (10 kg N/head/year) and sheep (13 kg N/head/year) that are lower than the default values in the Revised 1996 IPCC Guidelines and the IPCC good practice guidance of 20 kg N/head/year for swine and 16 kg N/head/year for sheep. The IPCC good practice guidance (section 4.4.1.3) provides the following guidance on determining and using country-specific annual average Nex rates: "Country-specific rates may either be taken directly from documents or reports such as from the agricultural industry and scientific literature, or derived from information on animal nitrogen intake and retention. In some situations, it may be appropriate to utilise excretion rates developed by other countries that have livestock with similar characteristics."

59. In response to questions raised by the ERT during the review, Latvia provided the ERT with a copy of Regulation No. 33[4] and a report by Witzke and Oenema (2007)[5] as documentation to support the use of country-specific Nex rates. Latvia explained that the Latvian regulations are based on research and were developed to support other environmental regulations on nitrates. The ERT strongly recommends that Latvia list the references to the papers used to justify the country-specific factors in the references, cite the reference in the relevant category discussion in the NIR, and provide an explanation regarding how the country-specific factors relate to Latvia's research and national circumstances.

Agricultural soils – N_2O

60. Latvia uses a default tier 1 methodology to estimate all related emissions from fertilizer use, including direct soil emissions, indirect emissions from leaching and indirect emissions from volatilization. During the review, the ERT learned that Latvia has national data on fertilizer containing N by type of fertilizer. The ERT recommends that Latvia consider developing a country-specific emission methodology for the different N-based fertilizers used, including parameters for leaching ($Frac_{LEACH}$) and volatilization of N in fertilizers ($Frac_{GASF}$) and direct emissions of N_2O where fertilizers containing N are applied.

61. Previous review reports have recommended that Latvia produce high-quality national information on soil classification that conforms with international standards. It was determined that land use has changed significantly since the 1980s and that the data applied by Latvia on the area of cultivated histosols were no longer considered accurate. In response to these recommendations made in the previous review report, Latvia has improved the estimation of N_2O emissions from cultivated histosols (organic soils). Latvia has used preliminary data for agricultural soils from the NFI, using 20.0 per cent of available sample plot data to revise the emissions from this category between 2000 and 2011. Latvia indicated its intention to further revise the emissions from this category when at least 50.0 per cent of the sample plots have been visited. The ERT commends Latvia for its efforts to improve the calculation of emissions from this category and encourages Latvia

[4] Cabinet of Ministers Regulation No. 33 of 11 January 2011, "Regulation on the protection of waters and soils against pollution caused by nitrates from agricultural sources".

[5] Witzke HP and Oenema O. 2007. "Integrated measures in agriculture to reduce ammonia emissions: assessment of most promising measures".

to report on progress to make improvements to this key category and to ensure time-series consistency for all years from 1990 to the most recent year when recalculations are made.

62. In 2011, Latvia reported that 21.8 per cent of dairy cattle manure and 49.2 per cent of non-dairy cattle excreta were deposited directly onto pasture, range and paddock. If these proportions are applied to the number of days in a year (365 days/year) then these figures imply that dairy cattle are on pasture for 80 days, and non-dairy cattle are on pasture for 180 days. Latvia's gross energy equation for cattle assumes that dairy cattle are on pasture for 145 days and non-dairy cattle are on pasture for 185 days; therefore, Latvia could be overestimating the gross energy requirements for cattle, and in turn overestimating CH_4 emissions from enteric fermentation, CH_4 and N_2O emissions from manure management and N_2O emissions from agricultural soils. Furthermore, data on livestock weight may be available from slaughterhouses to provide a better country-specific representation of live weights in the energy equations. The ERT recommends that Latvia consider reviewing the data on days in stalls and on pasture, and live weights for cattle to determine whether country-specific data may be available for all years, and, if so, recalculate the emissions for all years.

3. Non-key categories

Field burning of agricultural residues – N_2O

63. Data for crop production (tonnes), both N-fixing and non-N-fixing crops, are occurring but were reported in CRF table 4.F under crop production as "NO". The ERT noted that the CRF tables are the appropriate place in the annual submission to report all AD. The ERT recommends that Latvia complete CRF table 4.F with information on crop production, although no field burning of agricultural residues occurs, as these data are used to calculate N_2O emissions from agricultural soils from crop residues and N-fixing crops.

E. Land use, land-use change and forestry

1. Sector overview

64. In 2011, net GHG removals from the LULUCF sector amounted to –17,179.20 Gg CO_2 eq, including the carbon stocked in the harvested wood product pool. Since 1990, net GHG removals have decreased by 23.0 per cent (from –22,306.06 Gg CO_2 eq in the base year to –17,179.20 Gg CO_2 eq in 2011). The key drivers for this decrease are associated with an increased harvesting rate and an increased age of Latvian forests. Within the sector, forest land contributed as a carbon sink with –16,095.82 Gg CO_2 eq. Cropland, settlements, grassland and wetlands contributed with net emissions of 381.37 Gg CO_2 eq, 883.03 Gg CO_2 eq, 65.11 Gg CO_2 eq and 21.12 Gg CO_2 eq, respectively. No emissions or removals are reported for the category other land, since it is considered unmanaged. Latvia has reported removals from harvested wood products totalling –2,434.00 Gg CO_2 eq. In 2011, the total GHG emissions without LULUCF were reduced by 149.46 per cent with the inclusion of LULUCF (from 11,494.19 Gg CO_2 eq to –5,685.01 Gg CO_2 eq), showing the importance of this sector to Latvia's emission reductions.

65. In comparison with 2010, GHG net removals have increased by 4.7 per cent (from –16,410.78 Gg CO_2 eq to –17,179.20 Gg CO_2 eq) due to increased CO_2 removals in forest land remaining forest land (from –14,866.58 Gg CO_2 eq to –15,365.57 Gg CO_2 eq). GHG emissions from cropland decreased by 6.16 per cent (from 406.42 Gg CO_2 eq to 381.37 Gg CO_2 eq); GHG emissions from grassland and settlements increased by 1.0 per cent and 3.2 per cent, respectively (from 64.49 Gg CO_2 eq to 65.11 Gg CO_2 eq for grassland; and from 855.87 Gg CO_2 eq to 883.03 Gg CO_2 eq for settlements). The ERT finds that Latvia generally provides appropriate explanations for the trends in emissions. However, the ERT

recommends that the Party provide an explanation of the trend of CH_4 emissions from forest land (a 76.53 per cent decrease relative to 2010, from 40.31 Gg CO_2 eq to 9.46 Gg CO_2 eq).

66. The Party has made recalculations for the LULUCF sector between the 2012 and 2013 submissions (see table 9 below), mainly due to the inclusion of previously not estimated pools (dead organic matter for forest land); the inclusion of N_2O emissions from disturbance associated with land-use conversion to cropland; updated AD (mortality and harvesting rates and use of default data instead of preliminary country-specific data (e.g. average densities of wood for some tree species; use of a default biomass expansion factor and coefficients for the calculation of below-ground biomass from above-ground biomass 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) instead of a single average value)); a revised fraction of harvested wood residues burned; as well as the introduction of a new pool – harvested wood products. Most of these resulted from recommendations made in the previous review reports. The ERT welcomes these improvements.

67. The ERT concluded that the reporting of LULUCF is generally complete. The ERT noted a few cases of inconsistent treatment of notation keys applied to carbon pools for non-mandatory reporting categories (wetlands remaining wetlands and settlements remaining settlements). The ERT recommends that Latvia use consistent notation keys for all pools in these categories in the next annual submission. The ERT noted that Latvia reported the changes in carbon stocks in organic soils but used the notation key "NO" when reporting the changes in carbon stocks in mineral soils from grassland converted to forest land. Latvia clarified that the notation key "NO" was used to avoid the overestimation of removals. The ERT considers that these changes occur and therefore the notation key used is not appropriate. The ERT recommends that Latvia improve the accuracy of its reporting by either providing an estimate or by reporting this estimate as "NE".

68. Latvia has provided annual land-use change matrices for the period 1990–2011, using data from the NFI collected in the period 2004–2008; Landsat imagery for the years 1990, 2000 and 2005; and expert judgement. The land-use transitions for 2011 are provided only for forest land converted to other land-use categories (cropland and settlements) and have been based, for the years 2009, 2010 and 2011, on linear extrapolation of previous estimates. Latvia informed the ERT that the land-use change information will be updated with data from the second cycle of the NFI (2008–2013). The fact that land-use change matrices were provided only for the period from 1990 to 2011 implies that areas which have not been forest for at least the past 20 years are included under forest land remaining forest land, thus not consistent with the IPCC good practice guidance for LULUCF (refer to page 3.23). This assumes that the carbon stocks in the soil organic carbon pool are in a stable condition, leading to the non-estimation of changes in carbon stocks in the soil carbon pool from land converted to forest land. This can lead to the overestimation or underestimation of net emissions, depending on the land converted and previous management practices. The ERT recommends that Latvia provide an explanation for not considering land-use matrices for a longer period and the potential implications for the estimations for land converted to forest land.

69. The ERT has identified several inconsistencies between the areas presented in NIR table 7.4 and those in CRF tables 5.B (1,142.5 kha and 1,162.93 kha, respectively); 5.C (1,259.7 kha and 1,239.11 kha, respectively); and 5.E (254.1 kha and 254.65 kha, respectively) for 2011. In response to questions raised by the ERT during the review, Latvia explained that some mistakes were introduced into the CRF tables due to the transfer of areas from provisional (land converted to) to permanent (land remaining as) land-use categories, but that these inconsistencies had no effect on the net emission estimates. The

ERT also noted several inconsistencies in the total territorial area reported by Latvia, from 64,559 km^2 (page 26 of the NIR) to 64,569 km^2 (footnote 89) to 64,562.4 km^2 (KP-LULUCF table NIR-2). Inconsistencies were also identified in the previous review report and so the ERT reiterates the recommendation made in the previous review report that Latvia improve the consistency of the reporting between the CRF tables and the NIR.

70. Although the reporting for the LULUCF sector follows the annotated outline of the NIR, the language used for the reporting under the Convention and the reporting under the Kyoto Protocol is not consistent, making it difficult to follow (e.g. referring to deforestation instead of forest land converted to other land uses; or to afforestation/reforestation instead of land converted to forest land). The ERT recommends that the Party use language consistent with that contained in the IPCC good practice guidance for LULUCF (e.g. for the carbon pools and land-use categories) as well as provide separate information for lands remaining in the same land category, and lands converted to other land categories, to improve readability and enhance transparency.

2. Key categories

Forest land remaining forest land – CO_2

71. Latvia has reported the changes in carbon stocks in forest land remaining forest land for all pools using country-specific AD but mostly tier 1 EFs from the IPCC good practice guidance for LULUCF. For the changes in carbon stocks in litter and soil organic carbon (in naturally dry and wet mineral and organic soils), Latvia has applied the default method that assumes that the net carbon stock change equals zero. Estimates are provided for drained dry and wet mineral and organic soils. Previous review reports have recommended that the Party make efforts to generate country-specific data and higher-tier methods to be in alignment with good practice guidance for key categories. Latvia reported in the NIR and reaffirmed during the review that country-specific data will be applied in the next inventory submission, including growing stock, biomass expansion factors, root-to-shoot ratios, basic densities and mortality rate from the second round of measurements of the NFI, to be finalized in 2014. The ERT commends the Party for its efforts to produce national data and to report using higher-tier methods, and recommends that Latvia continue these efforts that will contribute to improving the accuracy of its future inventory.

72. Latvia has applied the default method to estimate the annual changes in carbon stocks in the living biomass pool, based on annual increases (gains) and decreases (losses) in carbon stocks due to biomass growth and loss, respectively. The ERT agrees with the choice of the method, since according to the IPCC good practice guidance for LULUCF, the alternative method (stock change method) will provide good results for relatively large increases or decreases of biomass, or where very accurate forest inventories are carried out. The ERT recommends that the Party evaluate the appropriateness of using the carbon stock change method after the second round of the NFI is completed and the forest properties are better known. The ERT also encourages the Party to apply both methods and assess whether there are significant differences in the estimates.

73. The ERT noted that the default method applied by the Party as mentioned in paragraph 72 above requires that losses of carbon stocks from living biomass be estimated for commercial fellings, fuelwood gathering and other losses, including those from disturbances. The ERT noted that Latvia provided estimates only for losses from commercial fellings, and strongly recommends that estimates for the other components be included and that the Party indicate in the NIR how these are considered. Additionally, the ERT recommends that Latvia provide information about the annual harvesting data and its relation to the annual volume increment of the forest total growing stock, and how salvage logged wood or wood affected by disturbances are treated and included in the inventory.

74. The ERT also noted that losses of biomass due to pest infestation (e.g. defoliation) need to be transparently reported and estimated in a way consistent with that used to estimate the biomass gains. For instance, the default biomass expansion factor used to expand the growing stock volume increment data to non-merchantable biomass components includes branches, foliage and non-commercial trees. Hence, losses of biomass from these components also need to be estimated. Finally, the ERT noted that carbon losses from decay due to natural mortality are included in the estimation of decreases in carbon stocks from annual commercial felling. The ERT considers that emissions from natural mortality should be included as part of the emissions from the dead wood pool and recommends that the Party separate these emissions from the estimates of changes in carbon stocks in living biomass.

75. Estimates of emissions from commercial felling are provided using the average harvesting rate reported by the State Forest Service (SFS). According to forest modelling data[6] the harvesting rate increased by 20.4 per cent between 2009 and 2010 and slightly decreased (by 0.8 per cent) from 2010 to 2011. Since 1990, the rate has increased by 193.2 per cent. The increased harvest rates are mainly associated with the age distribution of the Latvian forests. In response to questions raised by the ERT during the review, the ERT was informed that there are other data available on harvesting rates, not necessarily consistent with those of SFS, which is the official source. The ERT encourages the Party to assess these other sources of harvested timber and seek to understand the differences, if applicable. The ERT encourages the Party to report on any such QA efforts in its NIR.

76. Regarding the annual increases in carbon stocks due to biomass growth, these have been estimated using country-specific growing stock increment data from the NFI (which have been adjusted to reflect changes since 2008). Both the annual growing stock increment per hectare as well as the total growing stock increment are presented for five-year periods, the period between NFI cycles. For the period 2004–2008, the NFI data were used. Prior to this period, the growing stock increments and total growing stock were estimated with these data using backcasting techniques. Post-2008 estimates are projected based on NFI data. The NIR does not provide transparent information on how these estimates are produced. The ERT recommends that Latvia provide a more detailed description in the NIR of the estimates for the annual growing stock increments. As previously mentioned, default data for the basic density, biomass expansion factor and root-to-shoot ratio are used to provide the estimates of the annual changes in carbon stocks in living biomass. The ERT recommends that Latvia include in its annual submission the estimate of the average carbon stocks in living biomass in forest land remaining forest land, by type of forest and age, to increase the transparency of the reporting.

77. Considering the importance of the dead wood pool to the total carbon stock in Latvian forests (0.06 Mg C/ha and 3,347.16 kha of forest land in Latvia), the ERT recommends that Latvia provide clear information regarding how the mortality rates have been estimated, and how the age, species and other parameters have been taken into account. It also recommends that the Party provide information regarding how the carbon stock lost from thinning is incorporated into the estimation of the carbon stock changes in forest land.

78. The NIR does not include information on carbon stocks. In response to questions raised by the ERT during the review week about the carbon stocks, Latvia informed the ERT that the carbon stock in the Latvian forests is 825 t CO_2, distributed as follows: 321 t CO_2 in living biomass; 16 t CO_2 and 81 t CO_2 in the dead wood and litter pools,

[6] The "Forest data modelling tool" is a complex spreadsheet elaborated in accordance with the LVS ISO/IEC 26300:2009 standard. The model is still under development.

respectively; and 407 t CO_2 in organic soils. The ERT recommends that the Party report the carbon stock estimated for each of the carbon pools in its NIR, indicating how these values were estimated in order to improve transparency, taking into consideration any deviations observed from the default values in the IPCC good practice guidance for LULUCF.

79. The ERT noted that some default values used by Latvia do not correspond to the temperate climate zone but to the boreal climate zone (e.g. default biomass expansion factors for coniferous and deciduous species; biomass consumption values for fires). The ERT recommends that Latvia apply default values appropriate to the climate zone reported in the NIR.

Forest land remaining forest land – N_2O

80. Although not mandatory, Latvia has provided estimates for N_2O emissions from drainage of wet mineral (0.06 Gg N_2O) and organic forest soils (0.41 Gg N_2O) in forest land remaining forest land, in recognition of the large amount of forests with drained soils. Latvia has applied the methodology and default factors for nutrient-rich organic soils and mineral soils from the IPCC good practice guidance for LULUCF. These estimates are provided in CRF table 5(II). The ERT commends the Party for providing estimates for these non-mandatory subcategories, and encourages Latvia to develop country-specific EFs considering the relevance of the drainage of forest land soils activity in the country.

Land converted to forest land – CO_2

81. Latvia has not provided estimates of the areas of land converted to forest land for the years 2010 and 2011, except for the estimate of the area of grassland converted to forest land. It did provide the methodological approach for the estimates for the period 1990–2008, which were already reported in previous inventory reports. Latvia informed the ERT that no area estimates were provided for the last two years to avoid the overestimation of removals, since data from the NFI were not yet available. The ERT noted that, according to the IPCC good practice guidance for LULUCF (page 3.16), "even though national reporting of sources and sinks is required annually, it does not mean that national inventories have to be carried out annually for all pools, since data from national inventories done on 5 to 10 year cycles can be interpolated". The Party has indicated that information will be updated in 2014, when field measurements from at least 80 per cent of the permanent plots in the NFI will be available from the second round of measurements. The ERT recommends that the Party use all available data and information to provide estimates that are as accurate as possible.

Cropland remaining cropland – CO_2

82. Latvia has reported only changes in carbon stocks in organic soils. The Party has reported in the NIR that there is an increase in the growing stock volume of trees in cropland, but that the uncertainly is very high (60.0 per cent). Due to this high uncertainty, Latvia decided not to provide estimates for the changes in carbon stocks for the living biomass pool. It noted in the NIR and reaffirmed during the review in response to questions raised by the ERT that the data from the second cycle of the NFI will have considerably smaller uncertainty, thus producing more accurate estimates for the changes in the living biomass pool. The ERT recognizes the conservative approach adopted by the Party, but emphasizes the need to explore the available data and information to provide estimates that are as accurate as possible for all carbon pools and recommends that estimates be provided, even if a tier 1 approach is used as an interim measure. The ERT also notes that the notation key used in CRF table 5.B for the carbon stock changes in living biomass should be "NE" instead of "NO" and recommends that the Party use the notation key "NE" whenever an estimate is not provided.

83. Emissions from organic soils are reported following a tier 1 method with default EFs. The ERT noted that since this subcategory is a key category, higher-tier methods should be applied and it recommends that the Party implement higher-tier methods using country-specific data.

Agricultural lime application – CO_2

84. Aggregated CO_2 emissions from agricultural lime application are reported in CRF table 5(IV). The ERT noted that Latvia was not able to separate liming application for cropland from that for grassland and recommends that if no separate estimates can be provided, the emissions be reported under category 5.G, other (refer to footnote 4 in CRF table 5(IV)).

Land converted to cropland – CO_2

85. Latvia has applied the methodology based on annual rates of growth and loss to estimate the changes in carbon stocks in cropland biomass. No biomass growth has been reported after the conversion, to avoid the overestimation of removals. Losses are reported using data derived from the BioSoil Project[7] for the dead organic matter pool (average carbon stock is assumed to be equal to 20.9 t C ha^{-1} for litter, equal to 6.0 t C ha^{-1} for dead wood, and equal to 124 t C ha^{-1} for mineral and organic soils. The ERT noted that the average values reported for litter and dead wood are within the IPCC good practice guidance for LULUCF default values but recommends that the Party provide additional information about the methodology used to estimate these values, including for the soil organic carbon pool.

86. The ERT noted that the identification of organic soil areas in cropland and grassland is based on the assumption of an equal share of these soils in grassland and cropland, and that no change occurs over time. During the review, Latvia informed the ERT that the area reported under organic soils will be updated using data from the NFI. Estimates of emissions from these soils will use internationally verified EFs, thus improving the accuracy of the estimates of changes in these soils. The ERT commends Latvia for this improvement and recommends that the Party update the organic soil area in its next inventory submission.

Land converted to settlements – CO_2

87. Latvia has reported only forest land converted to settlements under this subcategory. However, it recognizes that other types of conversion may be possible, but indicated that there is no evidence in national statistics and thus it has reported all other conversions using the notation key "NO". Identification of other conversions is part of the improvements planned by the country. The ERT encourages the Party to improve its land-use change estimates to improve the accuracy of the reporting.

88. The ERT noted that Latvia has assumed a value for the carbon stock in the soil organic carbon pool (244 t C ha^{-1}) that differs considerably from the default values provided in the IPCC good practice guidance for LULUCF for the temperate climate zone. In response to a question raised by the ERT during the review, Latvia explained that the IPCC default values probably apply to mineral soils, whereas a large percentage of the soils in the country are organic. For conversion to settlements, Latvia used the carbon stock from a weighted average of carbon in mineral and organic soils in forest land. The ERT

[7] Bārdule et al. 2009 "Forest soil characteristic in Latvia according results of the demonstration project BioSoil (Latvijas meža augsņu īpašību raksturojums demontrācijas projekta BioSoil rezultātu skatījumā)".

considered the response satisfactory, but notes that the NIR does not identify the areas of organic soils as large. The ERT recommends that Latvia include the description of the rationale for using the value for the carbon stock in soil organic carbon in the next NIR.

89. Latvia has provided estimates for all pools (living biomass, dead organic matter and soil organic carbon). For the changes in carbon stocks in living biomass, the Party uses the tier 1 method that assumes that all carbon in living biomass before the conversion is lost in the year of conversion and that the carbon stocks following the conversion are zero. Latvia has provided estimates of the changes in carbon stocks in the dead organic matter and soil organic carbon pools, although the methodological approach in the IPCC good practice guidance for LULUCF considers only living biomass. Latvia has also assumed that all carbon in lands converted to settlements is lost after the 20-year period from the original carbon under the original vegetation. The ERT notes that this can lead to an overestimation of emissions and encourages the Party to explore further whether the zero carbon stock is in fact an adequate assumption.

3. Non-key categories

Grassland remaining grassland – CO_2

90. Latvia has reported the carbon stock changes for this subcategory only for organic soils, while reporting "NE" for the changes in carbon stocks in living biomass and "NO" for mineral soils. The ERT noted that the tier 1 approach for living biomass in the IPCC good practice guidance for LULUCF assumes no changes in carbon stocks in living biomass, and hence the ERT recommends that the Party use the notation key "NO" instead of "NE". Regarding the changes in carbon stocks in mineral soils, the IPCC good practice guidance for LULUCF provides a tier 1 method that does not assume zero change in carbon stocks, as assumed by the Party. Hence, the ERT recommends that instead of reporting "NO", Latvia provide estimates of the changes in carbon stocks in mineral soils, even if a tier 1 approach is used. Further, the ERT noted that grassland consists of areas with grasses and also of areas with trees and recommends that Latvia stratify the grassland by different types in its annual submission, to improve the accuracy of the reporting.

Other land – CO_2

91. Latvia stated in the NIR that under this category it allocates moorlands, dunes and recultivated lands, where land-use type cannot yet be determined. In response to questions raised by the ERT during the review, a clarification was provided regarding recultivated lands that the ERT understands to mean that changes in carbon stocks would occur, and hence would not be adequately represented in this land-use category. Latvia explained that recultivated areas are insignificant according to the NFI data, and represent recultivated landfills, former military infrastructure and other artificially created areas without vegetation and, in most cases, without soil layer. It further explained that some areas under other land may, in the future, transition to other land-use categories, but that these have not been identified. The ERT recommends that Latvia provide a much clearer explanation about the meaning of recultivated lands in the NIR, and use the data from the second NFI cycle to reallocate lands (e.g. grassland), as appropriate, even if considered insignificant.

F. Waste

1. Sector overview

92. In 2011, emissions from the waste sector amounted to 598.63 Gg CO_2 eq, or 5.2 per cent of total GHG emissions. Since 1990, emissions have increased by 0.6 per cent. The trend of emissions fluctuates over time and the key drivers for the rise and fall in emissions

are changes in gross domestic product (GDP) and population. Within the sector, 73.3 per cent of the emissions were from solid waste disposal on land, followed by 25.9 per cent from wastewater handling, 0.7 per cent from other (composting) and 0.1 per cent from waste incineration.

93. The waste incineration notation keys for 1990 to 1998 were changed from "NE" to "NO". The use of methods, EFs and AD is consistent across the time series except for cases when AD are not available (such as reporting "NE" for the non-mandatory category of waste composting for the period 1990–2002, or reporting "NO" for the period 1990–1998 for waste incineration). The ERT noted that one recommendation made in the previous review report has been implemented, specifically that related to documenting paramenters (such as chemical oxigen demand and MCF) and methods used for estimating emissions from industrial wastewater. The 2013 NIR provides links to a number of reference documents used in the emission estimation. However, some other recommendations in the previous review report that could improve the transparency of the inventory are still pending and are reiterated in the category-specific paragraphs below (see paras. 95 and 98 below).

94. Latvia has reported information on some category-specific tier 2 QC activities performed; however, this information is not sufficient to assess their impact on the correcteness and completeness of the AD and EFs. In response to questions raised by the ERT during the review, Latvia explained that some category-specific tier 2 QC activities are routine activities during the inventory preparation process and were actually performed but were not documented in the NIR. The ERT recommends that Latvia report the tier 2 QC activities performed in the NIR.

95. The information on the methods, EFs and AD used is presented in the NIR and in the CRF tables and is mostly transparent and complete. However, the ERT recommends that Latvia include in its NIR updated information on different waste streams according to the type of waste treatment, data on imports and exports of waste, and information on the amount of waste reported under other sectors, such as the energy or the agriculture sector, if such allocations occurred.

96. Latvia has reported on planned improvements in the waste sector, particularly on estimating a country-specific degradable organic carbon (DOC) value in solid waste disposal on land and improving accuracy in calculating the emissions from wastewater handling, which is in line with recommendations made in the previous review report.

2. Key categories

Solid waste disposal on land – CH_4

97. Latvia used the IPCC good practice guidance first-order decay method with a combination of default and country-specific parameters for estimating the CH_4 emissions from solid waste disposal systems (SWDS). Historical data on volumes of municipal and industrial non-hazardous solid waste disposed and types of SWDS according to the IPCC classification (managed, unmanaged deep and unmanaged shallow) are estimated by a combination of a bottom-up approach and expert judgement for different time periods as follows: from 2002 to 2011, AD on waste amounts were collected directly from licensed waste management operators; in 1996, Latvia conducted research on the largest SWDS in the country, which provided information on amounts and types of waste disposed. Latvia used extrapolation for the period 1970–1995 and interpolation for the period 1997–2001, based on GDP per capita and population changes relative to a 1996 bechnmark value. The ERT agrees with the approaches used by Latvia to estimate emissions from solid waste disposal on land. However, the ERT notes significant inter-annual changes in waste

generation for the years 2008/2009 and 2010/2011 and encourages Latvia to undertake thourough QC to assess the drivers for these inter-annual changes.

98. To estimate the weight of municipal and non-hazardous solid waste disposed, Latvia used an average waste density of unsorted and uncompressed waste of 0.2 t/m^3. In response to questions raised by the ERT during the review, Latvia presented to the ERT the reference handbook from which this value was sourced. The ERT reiterates the recommendation made in the previous review report that Latvia provide information in the NIR about the sources of information for the methods used for estimating waste density, in order to improve transparency.

99. The DOC value is based on field research carried out in 2011 and is set as a constant value of 0.17 for the entire time series. Taking into account the increase in waste recovery and recycling, including composting, in the recent period, the DOC value could change over time. During the review, the ERT was informed that Latvia plans to establish annual research of waste composition in order to, inter alia, establish a country-specific DOC value which is line with the recommendations made in the previous review reports. The ERT encourages Latvia to progress the research to establish a country-specific DOC value, and report on any progress in the NIR.

Wastewater handling – CH_4

100. Latvia used the IPCC tier 2 method to estimate CH_4 emissions from industrial wastewater and sludge with a combination of IPCC default and country-specific parameters. AD on industrial production were taken from CSB. Conversion factors for the estimation of industrial wastewater quantities and chemical oxygen demand values for different types of wastewater were taken from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). The MCF values are country-specific. The ERT commends Latvia for providing a transparent description of the method used in the NIR.

101. For estimating CH_4 emissions from its domestic and commercial wastewater, Latvia has applied the "check method", which is not in accordance with the IPCC good practice guidance (as the "check method" may be used as a QC procedure for the reported emissions, but should not be the sole calculation method for a key category). The ERT concluded that available information on the AD, that is, the number of people served by a certain type of treatment, and country-specific parameters (degradable organic component (D_{dom}), MCF, rate of CH_4 recovery), which are provided in the NIR, are sufficient to allow the use of the IPCC tier 2 method. The ERT recommends that Latvia implement a tier 2 method for this category.

102. During the review, in response to questions raised by the ERT regarding the use of the most accurate available data, Latvia recalculated the CH_4 emissions from domestic and commercial wastewater and sludge using the IPCC tier 2 method, which resulted in an increase in CH_4 emissions in 1990 and 2011 by 61.0 and 94.0 per cent, respectively. The ERT recommends that Latvia continues to use the tier 2 method to estimate these emissions in future annual submissions.

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

103. Emissions from waste incineration with energy recovery were reported under the energy sector in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Emissions from the incineration of hospital waste and from cremation were reported in this category. The EFs used for the estimation of the indirect GHG emissions

are from the *EMEP/EEA Air Pollutant Emission Inventory Guidebook 2009*. In the previous annual submission, emissions were reported as "NE" until 1998; in the current annual submission, these emissions are reported as "NO", noting that AD for hazardous and hospital waste are available for the period 1999–2011. No substantiation for the activity not occuring in the country during this period is provided in the NIR. During the review, Latvia reiterated the statement made in the NIR that there is no convincing information available to confirm that waste incineration without energy recovery occurred in Latvia before 1999. The ERT reiterates the recommendation made in the previous review report that Latvia report on emissions from waste incineration for the full time series, for time-series consistency, accuracy and completeness.

Other (composting of waste) – CH_4 and N_2O

104. Emissions from composting activities were estimated for industrial and large waste treatment sites for the period 2003–2011. Household composting has not been included due to a lack of reliable AD. The ERT notes that emissions from waste composting are reported as "NE" prior to 2003 due to the unavailability of data for industrial waste composting and although the NIR acknowledges the use of composting in private households for many years, no data are available for this subcategory. The ERT reiterates the recommendation made in the previous review report that Latvia report on emissions from waste composting for the entire time series. For the time series reported, default EFs have been used from the 2006 IPCC Guidelines. The ERT also encourages Latvia to develop country-specific EFs for composting and to estimate the amounts of composted waste in households, since composting is set as one of the prioritized areas in waste treatment in Latvia.

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

105. Table 6 provides an overview of the information reported and parameters selected by Latvia 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 Latvia reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Sufficient	106, 115 –127
Identify any elected activities under Article 3, paragraph 4, of the Kyoto Protocol	Activity elected: forest management Years reported: 2008, 2009, 2010 and 2011	122–125
Identify the period of accounting	Commitment period	130

		Findings and recommendations
Assessment of Latvia's ability to identify areas of land and areas of land-use change	Sufficient	107

106. The ERT noted, however, that some supplementary information has not been adequately addressed or needed additional elaboration (e.g. subsection 11.3.1.3, "Information on whether or not indirect and natural GHG emissions and removals have been factored out", and subsection 11.3.1.7, "The year of the onset of an activity, if after 2008"); for others, additional explanation needs to be provided (e.g. subsection 11.3.1.2, "Justification when omitting any carbon pool or GHG emissions/removals from activities under Article 3.3 and elected activities under Article 3.4"). The ERT strongly recommends that Latvia report this supplementary information.

107. Latvia chose to report land areas subject to afforestation and reforestation, deforestation and forest management using reporting method 1 in the IPCC good practice guidance for LULUCF and defined the country boundaries as those within which the emissions and removals from the KP-LULUCF activities are reported. The geographical location of the areas that encompass the KP-LULUCF activities were identified using a time series of Landsat images from 1990, 1995 and 2000 in combination with the NFI data collected in the period 2004–2008. However, the areas afforested and reforested in 2010 and 2011 were not identified or estimated due to a lack of reliable data. Latvia expects to update the information on these lands in the next inventory submission, when data from the NFI for the period 2009–2014 will be almost completed. The ERT strongly recommends that Latvia use these updated data to provide more reliable estimates of the areas converted to forest land in the period 2008–2010.

108. The methodological approaches, AD and EFs used to estimate the GHG emissions and removals from the KP-LULUCF activities are consistent with those used to estimate the emissions and removals from LULUCF under the Convention. Hence, some of the issues raised by the ERT in this report for LULUCF also apply to the KP-LULUCF activities.

109. Latvia continued to use default EFs and methodologies in the 2013 annual submission to estimate GHG emissions and removals for all KP-LULUCF activities, although there were some improvements in the data used. The ERT strongly reiterates the recommendation made in the previous review reports that Latvia move to higher-tier methods and apply country-specific data.

110. The NIR includes uncertainty estimates for the reported carbon pools, EFs and AD, but the combined level of uncertainty continues not to be reported. No information has been provided on how the estimates are generated. Latvia did not implement the encouragement made in the previous review report to conduct a tier 2 uncertainty analysis. The ERT reiterates the encouragement and recommends that Latvia improve the transparency of its reporting on the uncertainty analysis.

111. The ERT noted some inconsistencies in the KP-LULUCF CRF tables; for example, in table NIR-1, Latvia reports "NO" for N_2O emissions from disturbance associated with land-use conversion to cropland for deforestation. However, these emissions are reported in table 5(KP-II)3 with values inconsistent with those reported in CRF table 5(III) for emissions from forest land converted to cropland under the Convention; similarly, carbon emissions from lime application are reported as "NO" in table NIR-1, but aggregated CO_2 emissions are reported in table 5(KP-II)4; and for the total area deforested, the values in

table 11.2 (36.38 kha) are not consistent with those provided in table NIR-2 (37.48 kha). In response to questions raised by the ERT during the review, Latvia explained that the CRF tables were updated after consultation with external consultants. These inconsistencies indicate that the QA/QC system in Latvia needs to be improved. The ERT reiterates the recommendation made in the previous review reports that Latvia improve the QA/QC procedures in order to enhance the consistency and transparency of its reporting.

112. Latvia has performed recalculations for the KP-LULUCF activities between the 2012 and 2013 submissions. The impact of the recalculations was an increase in CO_2 removals of 98.94 per cent for afforestation/reforestation (from 506.22 Gg CO_2 eq to –1,007.09 Gg CO_2 eq) and an increase in emissions of 5.93 per cent for deforestation (from 986.29 Gg CO_2 eq to 1,044.78 Gg CO_2 eq). These values are estimated using the figures in the information table "Accounting for activities under Articles 3.3 and 3.4 of the Kyoto Protocol" provided in the NIR. The ERT noted, however, that the value for deforestation provided in this table for 2010 (1,044.78 Gg CO_2 eq) is not consistent with the sum of the estimates provided in the KP-LULUCF CRF tables in the 2012 submission for 2010 for deforestation (table 5(KP-I)A2, equal to 597.40 Gg CO_2 eq, and table 5(KP-II)4 for carbon emissions from lime application, equal to 0.01 Gg CO_2 eq). If these KP-LULUCF CRF values are used to estimate the impact of the recalculations on the 2010 estimates for deforestation, the result would lead to a 57.18 per cent difference.

113. For forest management, the Party has reached the cap of net removals of 6,233.33 Gg CO_2 eq and there was no effect of recalculations in the accounting figure. The total impact on accounting (since 2008) was an increase in removals of 101.13 per cent for afforestation/reforestation (from 1,453.10 Gg CO_2 eq to 2,922.67 Gg CO_2 eq) and an increase in emissions of 1.67 per cent (from 3,192.62 Gg CO_2 eq to 3,246.04 Gg CO_2 eq). The reason for the increased removals from afforestation/reforestation is the inclusion for the first time of the dead wood and litter pools, with annual CO_2 removals of 0.15 t C $year^{-1}$ ha^{-1} and 0.47 t C $year^{-1}$ ha^{-1}, respectively. The explanation for the increased emissions from deforestation is related to the updated values for the EFs for mineral soils.

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

Afforestation and reforestation – CO_2

114. After the clarifying discussions with the national experts during the review, the ERT formed the view that the national system will be able to more accurately report activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in future annual submissions.

115. Latvia provided estimates for dead wood for land converted to forest land under the Convention using a tier 2 approach (data from the NFI), which had not been estimated in the 2012 inventory submission. However, it still uses a tier 1 (no change) method for litter and does not provide estimates for the carbon stock changes in mineral soils, indicating in the NIR that methodologies to estimate the carbon stock changes in naturally dry and drained mineral forest soils are under development. Considering that under the Kyoto Protocol net emissions from all pools need to be accounted for unless the Party provides transparent and verifiable information that the pool is not a net source, the ERT strongly recommends that the Party provide information to support the indication that a pool is not a net source in its next inventory submission if estimates are not generated.

116. The ERT noted that most afforestation and reforestation originates from natural succession. According to the IPCC good practice guidance for LULUCF (section 4.2.5.2), "it is good practice to provide documentation that all afforestation and reforestation activities included in the identified units of land are direct human-induced. Relevant documentation includes forest management records or other documentation that demonstrates that a decision had been taken to replant or to allow forest regeneration by

other means". The ERT strongly recommends that the Party provide the appropriate documentation to demonstrate that the natural succession was the result of a direct human-induced activity.

117. Latvia has reported the changes in carbon stocks in mineral soils as "NO". The ERT notes that tier 1 calculations are very uncertain and that according to the IPCC good practice guidance for LULUCF (page 3.63) "countries for which land conversion to forests is a key category should report at tier 2 or 3". The ERT therefore recommends that the Party either provide estimates for this pool using a higher-tier method or demonstrate that the pool is not a source.

Deforestation – CO_2

118. Latvia has reported GHG emission estimates for deforestation consistent with those provided for forest land converted to other land-use categories. However, Latvia still uses tier 1 EFs for biomass expansion factors, root-to-shoot ratios, densities and mortality rate. The ERT strongly recommends that Latvia use higher-tier methods to be in alignment with good practice for the key categories. The ERT noted that deforestation occurs only on land converted to cropland and settlements. It recommends that the Party provide evidence that deforestation does not result from conversion to other land uses.

119. Latvia explained in the NIR that some areas that meet the definition of forest continue to be reported as non-forested land (e.g. parks and yards, which are allocated under settlements; or areas that have the (biological) potential to reach the forest thresholds but will not, due to management decisions, which are normally reported as grassland). The ERT recommends that the Party provide additional information in the NIR justifying the reasons why these lands are not categorized as forests, to improve the transparency of the reporting.

120. Latvia has reported the deforestation estimates for 2010 and 2011 from extrapolation (linear regression model) using data from 1990 to 2009. The ERT noted that data from 2010 could also be used. In response to a question raised by the ERT during the review regarding the use of the continuous NFI measurement data, Latvia stated that the NFI methodology is based on the assumption that only full sets of five-yearly data are used. The data collection for the NFI concentrates on permanent sample plots located in one region, and within five years covering the entire country. Hence, using annual results from the NFI may result in significant changes in land-use and growing stock changes, depending on the sites visited and the regional differences. However, the Party explained that a different approach would be implemented for the third cycle. The ERT found the explanation adequate and commends Latvia for the planned changes to be introduced for the next NFI cycle.

121. Latvia explained in the NIR that the losses of carbon stock in living biomass for deforestation are estimated using the average harvesting losses according to the annual figures of commercial felling reported by SFS. The ERT noted that these losses need to be estimated so as to represent the average commercial felling values in the deforested areas only, and that these should represent the species composition, age and specific regional differences. The ERT recommends that the Party seek to provide specific harvesting losses for the areas deforested, which can be estimated as an average of the losses taking into account the location of the deforested lands to capture regional differences. The average losses from these can then be used as an estimate for the average harvesting losses.

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

Forest management – CO_2

122. Latvia has reported "NO" for the changes in carbon stocks in litter, assuming a tier 1 methodology. The ERT reiterates the recommendation made in the previous review report and strongly recommends that the Party either estimate the changes in carbon stocks for this pool applying a tier 2 or 3 method or demonstrate that this pool is not a source (e.g. by demonstrating that the country does not experience significant changes in forest types, disturbances or management regimes).

123. Latvia has used a tier 1 methodology to estimate the carbon stock changes in mineral soils, and therefore reports "NO" (no changes). The ERT recommends that the Party provide evidence that this pool is not a source (e.g. no changes such as intensification of forest management activities or changes in harvesting practices; or in the frequency of disturbances such as pest and disease outbreaks, flooding and/or fires).

124. The ERT noted that the default method applied by the Party requires that losses include those due to commercial fellings, from fuelwood gathering and from other losses, including those from disturbances (see para. 73 above).

125. In response to a question raised by the ERT during the review regarding the management of afforested lands, Latvia indicated that no harvesting takes place on afforested lands but if "harvesting took place on afforested area it would also be reported in national statistics and included under forest management related carbon stock changes". The ERT noted, however, that these losses should be reported under afforestation/reforestation and not under forest management. During the review, Latvia explained that this is one of the points for improvement of the GHG inventory and that harvesting of afforested/reforested lands will be estimated on the basis of NFI data and reported under afforestation/reforestation. The ERT commends the Party for the planned and necessary improvement and recommends that this issue be transparently reported in the NIR.

Biomass burning – CO_2, CH_4 and N_2O

126. Latvia reported in the NIR that "all fires taking place in forests are reported under the category forest land remaining forest land". In this case, no separate emissions from biomass burning for afforestation/reforestation and forest management are reported. In response to a question raised by the ERT during the review, Latvia explained that no forest fires were found in previously identified afforested/reforested lands during the second round of the NFI, thus explaining the use of the notation key "NO" in table 5(KP-II)5.

127. The ERT noted that the tier 1 methodology in the IPCC good practice guidance for LULUCF (equation 3.2.20) to estimate non-CO_2 gases from biomass burning was not properly applied. The value in table 3.A.1.13 already tabulates the product of the biomass density on the land before combustion and the combustion efficiency, so no different values need to be provided for these variables. The ERT recommends that the Party correct this in its next inventory submission, assuming that it applies the same methodology.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

128. Latvia 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.[8] 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 (see paras. 133 and 134 below).

129. 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

130. Latvia has reported its commitment period reserve in its 2013 annual submission. Latvia reported its commitment period reserve to be 57,470,925 t CO_2 eq based on the national emissions in its most recently reviewed inventory (11,494.185 Gg CO_2 eq). The ERT notes that, based on the submission of revised emission estimates by Latvia during the course of the review of the 2013 annual submission, the commitment period reserve for Latvia changed, and the new commitment period reserve is reported as 57,726,425 t CO_2 eq. The ERT agrees with this figure.

3. Changes to the national system

131. Latvia reported that there is a change in its national system since the previous annual submission. The Party described the change, specifically the establishment of the steering committee on GHG inventory preparation (Ordinance No. 94, 28.72013), in its NIR (chapter 13, page 348). 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.

4. Changes to the national registry

132. Latvia 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 (see pages 350–352 of the NIR). CSEUR is a consolidated platform, which implements the national registries in a consolidated manner and was developed together with the new EU registry.

133. The ERT noted that there were recommendations in the SIAR that had not been addressed related to CSEUR, in particular recommendations related to the public availability of information on the website, the reporting of a description of the changes in database structure and the reporting of test results. During the review, Latvia provided further information on the changes to the national registry, including on the public availability of information on the website, the reporting of a description of the changes in database structure and the reporting of test results.

[8] 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.

134. The ERT concluded that, taking into account the confirmed changes in the national registry, including the additional information provided to the ERT during the review, Latvia'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. With respect to the provision of information related to database structure specifically, the ERT encourages the Party to provide additional information in the NIR. The ERT recommends that Latvia include all other additional information in response to the SIAR findings in its NIR in accordance with decision 15/CMP.1, annex, chapter I.G.

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

135. Latvia reported that there are no 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 (NIR, chapter 15, page 325). The ERT acknowledges that by including this information in the NIR the recommendation from the previous review report has been implemented.

136. During the review, Latvia presented information on activities considered for the minimization of adverse impacts. Most of the activities are harmonized with EU legislation. As a member State of the EU, Latvia designs and implements most of its policies in the framework of EU directives, regulations, decisions and recommendations, including those on the liberalization of electricity (and natural gas) markets, on addressing market imperfections, and on supporting EU attempts to minimize potential adverse impacts of biomass use to promote second-generation biomass technologies.

III. Conclusions and recommendations

A. Conclusions

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

Table 7
Expert review team's conclusions on the 2013 annual submission of Latvia

		Paragraph cross references
The ERT concludes that the inventory submission of Latvia is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011)		
Annex A sources[a]	Complete	10
LULUCF[a]	Not complete	67, 82
KP-LULUCF	Not complete	106–107
The ERT concludes that the inventory submission of Latvia has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	10
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with	Yes	128–135

		Paragraph cross references
decision 15/CMP.1		
Latvia'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	48, 109
Latvia has reported information on Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Yes	105
Latvia 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	128, 129
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	131
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	128
Did Latvia 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	135

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, 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, 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

138. The ERT identified the issues for improvement listed in table 8 below. 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	National inventory system Inventory planning	Provide more specific information in the NIR on the institutional structure, responsibilities and functions of the institutions involved in the preparation of the inventory	11–14
		Elaborate the information on the formal	

Sector	*Category*	*Recommendation*	*Paragraph cross references*
		approval of annual submissions	
	QA/QC	Improve the implementation of QC procedures to avoid errors in reporting and inconsistencies between the NIR and the CRF tables	69
		Ensure appropriate QC and archiving of all supplementary information used for the LULUCF and agriculture sectors, including at Silava and MoA	12
		Introduce additional steps into QC before final submission, particularly for the energy, industrial processes and LULUCF sectors	13
		Ensure sufficient resources for implementation of the QA/QC plan	13
	Transparency	Further improve transparency regarding the explanation of emission trends and recalculations for individual sectors	4
		Enhance the information in the NIR on the methods and EFs as recommended by sectoral experts	70, 111
		Provide complete information in CRF table 8(b) on the reasons for non-reporting and check whether the notation keys are used properly	53
	Consistency	Further improve the consistency of information between the NIR and the CRF tables	47, 53, 69, 111
	Uncertainty	Improve the transparency of the uncertainty analyses by providing additional information on the sources of uncertainty of individual AD and EFs	Table 4
		Elaborate and document information on uncertainty ranges, particularly those based on expert judgement	Table 4
		Explore the possibilities of replacing default uncertainty values by country-specific ones; prioritize documentation of uncertainty information and reduction of uncertainty of individual parameters before moving to a tier 2 method (particularly with regard to the LULUCF data)	Table 4
		Consider options to progressively reduce the uncertainties of the key categories	Table 4
	Time series	Progressively improve the consistency of trends in individual categories	31

Sector	*Category*	*Recommendation*	*Paragraph cross references*
Energy	Sector overview	Improve the QA/QC plan and implementation of the plan	26
		Improve transparency (e.g. the split between domestic and international aviation and navigation, and natural gas fugitive emissions) for sections that deal with methods, AD, EFs and assumptions	34
		Provide reference(s) to the uncertainty figures where expert judgement is used	27
		Organize and archive all recommendations made by previous review teams and make an assessment of the recommendations as part of the inventory planning process	28
	Comparison of the reference approach with the sectoral approach and international statistics	Improve the QA/QC plan to include a process to check the final output of the CRF tables, including the data for the reference approach	30
		Conduct an in-depth quantitative investigation to analyse the difference between the sectoral and reference approaches throughout the time series and report the correct values for the entire time series	31
		Correct the oxidation factor for natural gas in the reference approach	32
		Use Eurostat and IEA data to conduct QC of the CRF tables, ensure consistency between the different data sets and provide a simple explanation of the differences	33
	International bunker fuels	Explain in the NIR the basis of allocating fuel between international and domestic navigation and aviation	34
	Feedstocks and non-energy use of fuels	Report the appropriate fraction of carbon stored in lubricants in the CRF table and specify the amount of CO_2 emissions and the allocated category name in the appropriate cells	34
	Road transportation: liquid fuels – CO_2	Assess the two studies used for the assessment of emissions from gasoline to ensure that the methods of estimating the EFs are consistent	36
	Other sectors: biomass – CH_4	Analyse the results of a national study into residential biomass CH_4 emissions and, if applicable, use the country-specific EFs and include a brief explanation of the study with the appropriate reference	38
	Oil and natural gas: liquid and	Examine oil flow activity, report the AD and	40

Sector	*Category*	*Recommendation*	*Paragraph cross references*
	gaseous fuels – CO_2, CH_4 and N_2O	verify that there are no fugitive emissions from this activity in Latvia	
	Oil and natural gas: liquid and gaseous fuels – CO_2, CH_4 and N_2O	Correct the notation keys and describe the methods and data used	41
	Civil aviation and navigation – CO_2, CH_4 and N_2O	Summarize the QC procedure in the NIR	39
Industrial processes and solvent and other product use	Sector overview	Give priority to the two key categories with regard to further improvements and allocation of resources for the preparation of the GHG inventory for the industrial processes and solvent and other product use sectors	43
	Cement production – CO_2	Update the information on the mass balance approach used to estimate clinker production and apply a more rigorous QA/QC procedure for the data collecting process of the plant and update the uncertainty analysis accordingly	45
	Consumption of halocarbons and SF_6 – HFCs and SF_6	Update the descriptions in the NIR following recalculations and further strengthen the implementation of QA/QC procedures to achieve more consistent reporting for the next annual submission	47
	Other (mineral products) – CO_2, CH_4 and N_2O	Report aggregated brick production emissions in one line in the CRF table and include plant-specific estimates in the NIR for transparency	49
	Solvent and other product use – CO_2 and N_2O	Correct the notation keys and improve the implementation of QA/QC procedures	50
Agriculture	Sector overview	Provide more information in the NIR, such as the sources of AD and the information that was provided to the ERT during the review and continue to work with FAO to correct the FAO reporting of livestock and fertilizer data	52
		Provide further information in the NIR and justifications for parameter choices	53
	Manure management – CH_4	Develop data on waste management practices for 1990 to 1999 and further improve the time-series consistency for all years for manure management CH_4 emissions for both dairy and non-dairy cattle for 1990 to 2011	56
	Manure management – N_2O and agricultural soils – N_2O	List the references to the papers used to justify the country-specific factors (e.g. nitrogen excretion rates) in the references and cite the reference in the appropriate section of the NIR, and provide an explanation regarding how the country-specific factors relate to the research and national circumstances	58

Sector	*Category*	*Recommendation*	*Paragraph cross references*
	Agricultural soils – N_2O	Develop a country-specific emission methodology for the different nitrogen-based fertilizers	60
	Enteric fermentation – CH_4, manure management – CH_4 and N_2O and agricultural soils – N_2O	Consider reviewing the data on days cattle are in stalls and on pasture, and live weights for cattle to determine whether country-specific data for the tier 2 model may be available for all years, and if so recalculate the emissions for all years of the time series	62
	Agricultural soils – N_2O	Correct the notation keys for crop production in CRF table 4.F	63
LULUCF	Sector overview	Continue work to improve the reporting, particularly for those categories where the notation key "NO" is used, such as in the estimation of changes in carbon stocks in mineral soils for grassland converted to forest land	67
		Provide an explanation for not considering land-use change matrices for a longer period and the potential implications for the estimation of land converted to forest land	68
		Improve the consistency of reporting between the NIR and the CRF tables	69
		Apply only language consistent with that in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*	70
	Forest land remaining forest land – CO_2	Provide the land-use change matrices since 1970 to ensure that areas allocated to forest land remaining forest land include only those that have been forests for at least 20 years	71
		Evaluate the appropriateness of using the carbon stock change method after the second round of the NFI is completed and the forest properties are better known	72
		Estimate emissions from other components of natural disturbances (only commercial at present); provide information on annual harvesting data, volumes and increments; and separate emissions from natural mortality from the estimates of changes in carbon stocks in living biomass	73
		Provide information in the NIR regarding how the carbon stock lost from thinning is incorporated into the estimation of carbon stock changes in forest land	76
		Estimate the average carbon stocks in living biomass in this category, by type of forest and	76

Sector	*Category*	*Recommendation*	*Paragraph cross references*
		age	
		Report estimates of the carbon pools for each pool in this category, and explain how the estimates were derived	78
		Apply default values appropriate to the climate zone reported in the NIR	79
	Cropland remaining cropland – CO_2	Provide estimates for the changes in carbon stocks for the living biomass pool, and use the notation key "NE" when not estimated	82
		Implement higher-tier methods using country-specific data for organic soils	83
		If no separate estimates for liming application on grassland and cropland can be provided, report emissions under category 5.G, other (refer to footnote 4 in CRF table 5(IV))	84
	Land converted to cropland – CO_2	Provide additional information about the methodology used to estimate the biomass change values, including for the soil organic carbon pool	85
		Update the information on the area under organic soils	86
	Grassland remaining grassland – CO_2	Stratify grassland by different type and provide estimates of the changes in carbon stocks in mineral soils, even if a tier 1 approach is used, and correct the notation key "NO" in CRF table 5.C	90
	Other land – CO_2	Provide an explanation of recultivated lands in the next inventory submission, and use the data from the second NFI cycle to reallocate lands (e.g. grassland)	91
Waste	Sector overview: QA/QC	Report the tier 2 QC activities	94
		Include data on imports and exports of waste and include information on the amount of waste reported under other sectors	95
	Solid waste disposal on land – CH_4	Provide information in the NIR about the sources of information for the methods used for estimating waste density for transparency	98
	Wastewater handling – CH_4	Implement a tier 2 method for this category	100
		Provide an explanation of the recalculation	102
	Waste incineration – CO_2, CH_4 and N_2O	Report the emissions from waste incineration for the full time series in the next annual submission	103
	Other (composting of waste) –	Report on emissions for the entire time series	104

Sector	*Category*	*Recommendation*	*Paragraph cross references*
	CH_4 and N_2O		
KP-LULUCF	Sector overview	Report additional supplementary information	106
		Provide reliable estimates of the areas converted to forest land in the period 2008–2010	107
		Move to higher-tier methods for all KP-LULUCF activities and apply country-specific data	109
		Improve the transparency of the reporting on the uncertainty analysis	110
		Improve the QA/QC procedures	111
	Afforestation and reforestation – CO_2	Provide more accurate estimates of all areas converted to forest land	114
		Provide information to support the indication that a pool is not a net source if estimates are not reported	115
		Provide the appropriate documentation to demonstrate that the natural succession was the result of a direct human-induced activity	116
		Provide estimates for the pool (changes in carbon stocks in mineral soils) using a higher-tier method or demonstrate that the pool is not a source	117
	Deforestation – CO_2	Provide evidence that deforestation does not result from conversion of land to any land use other than cropland and settlements	118
		Provide additional information in the NIR to justify the reasons why some lands are not categorized as forests	119
		Seek to provide specific harvesting losses for the areas deforested, which can be estimated as an average of the losses taking into account the location of the deforested lands to capture regional differences	121
	Forest management – CO_2	Either estimate the changes in carbon stocks for the litter pool applying a tier 2 or tier 3 method or demonstrate that this pool is not a source	122
		Provide evidence that the changes in carbon stocks for the mineral soil pool have not resulted in the pool becoming a net source	123
		Include emissions from natural mortality as part of the emissions from the dead wood pool and separate these emissions from the	124

Sector	*Category*	*Recommendation*	*Paragraph cross references*
		estimates of the changes in carbon stocks in living biomass	
		Although harvesting does not occur on afforested lands, harvesting losses should be reported under afforestation and reforestation and not under forest management if harvesting were to occur and this should be transparently reported	125
	Biomass burning – CO_2, CH_4 and N_2O	Correct the estimate of non-CO_2 gases from biomass burning if the Party applies the same methodology	127
National system		Thoroughly document planned changes in institutional arrangements	11
National registry		Address the findings from the 2013 SIAR and report on these	37–40

Abbreviations: AD = activity data, CRF common reporting format, EF = emission factor, ERT = expert review team, FAO = Food and Agriculture Organization of the United Nations, IEA = International Energy Agency, IPCC = Intergovernmental Panel on Climate Change, 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, MoA = Ministry of Agriculture, NE = not estimated, NFI = national forest inventory, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

IV. Questions of implementation

139. 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

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
1. Energy	–15.89	46.87	–0.1	0.6	Change in AD, EFs and methods
A. Fuel combustion (sectoral approach)	–15.89	46.87	–0.1	0.6	
1. Energy industries	–0.92	0.13	–0.0	0.0	
2. Manufacturing industries and construction	–18.34	6.00	–0.5	0.6	
3. Transport	3.37	37.57	0.1	1.2	
4. Other sectors		–3.49		–0.2	
5. Other					
B. Fugitive emissions from fuels					
1. Solid fuels					
2. Oil and natural gas					
2. Industrial processes		–14.55		–2.3	Change in AD
A. Mineral products		–1.44		–0.3	
B. Chemical industry					
C. Metal production					
D. Other production					
E. Production of halocarbons and SF_6					
F. Consumption of halocarbons and SF_6					
G. Other					
3. Solvent and other product use		3.30		7.9	Change in AD
4. Agriculture	–70.75	–2.77	–1.2	–0.1	Change in AD and methods
A. Enteric fermentation					
B. Manure management	–70.75	–2.12	–8.4	–0.9	
C. Rice cultivation					
D. Agricultural soils		–0.65		–0.0	
E. Prescribed burning of savannas					
F. Field burning of agricultural residues					
G. Other					
5. Land use, land-use change and forestry	–6 294.66	736.09	39.3	4.3	Change in AD and methods
A. Forest land	–6 144.13	2 277.45	36.7	12.7	

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
B. Cropland	–20.09	–66.91	–3.2	–14.1	
C. Grassland					
D. Wetlands					
E. Settlements	42.55	682.55	68.6	393.8	
F. Other land					
G. Other					
6. Waste	–205.63	–33.48	–25.7	–5.0	Change in AD and methods
A. Solid waste disposal on land					
B. Wastewater handling	–205.63	–33.48	–43.7	–14.7	
C. Waste incineration					
D. Other					
7. Other					
Total CO_2 equivalent without LULUCF	–292.27	0.63	–1.10	–0.01	
Total CO_2 equivalent with LULUCF	–6 586.93	735.46	–62.18	–14.57	

Abbreviations: AD = activity data, EF = emission factor, 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	57 470 925	57 726 425		57 726 425
Annex A emissions for 2011				
CO_2	8 088 049			8 088 049
CH_4	1 580 424	1 631 523		1 631 523
N_2O	1 730 284			1 730 284
HFCs	82 973			82 973
PFCs	NA, NO			
SF_6	12 454			12 454
Total Annex A sources	**11 494.19**	**11 545.28**		**11 545.28**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–1 007 123			–1 007 123
3.3 Afforestation and reforestation on harvested land for 2011	NA, NO			NA, NO
3.3 Deforestation for 2011	1 042 649			1 042 649
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011	–14 851 387			–14 851 387
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

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	8 529 995			8 529 995
CH_4	1 677 188	1 739 711		1 739 711
N_2O	1 742 915			1 742 915
HFCs	72 315			72 315
PFCs	NA, NO	NA, NO		NA, NO
SF_6	13 129			13 129
Total Annex A sources	**12 034 542**	**12 097 065**		**12 097 065**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–1 007 088			–1 007 088
3.3 Afforestation and reforestation on harvested land for 2010	NA, NO			NA, NO
3.3 Deforestation for 2010	1 044 781			1 044 781
Activities under Article 3, paragraph 4, for 2010[c]				
3.4 Forest management for 2010	–14 603 086			–14 603 086
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	7 433 661			7 433 661
CH_4	1 680 148	1 738 734		1 738 734
N_2O	1 680 372			1 680 372
HFCs	74 485			74 485
PFCs	NA, NO			NA, NO
SF_6	13 529			13 529
Total Annex A sources	**10 882 195**	**10 940 780**		**10 940 780**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–1 007 088			–1 007 088
3.3 Afforestation and reforestation on harvested land for 2009	NA, NO			NA, NO
3.3 Deforestation for 2009	1 067 949			1 067 949
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009	–17 774 316			–17 774 316
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	8 175 664			8 175 664
CH_4	1 657 580	1 725 654		1 725 654
N_2O	1 646 260			1 646 260
HFCs	72 960			72 960
PFCs	NA, NO			NA, NO
SF_6	10 076			10 076
Total Annex A sources	**11 562 539**	**11 630 614**		**11 630 614**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–908 492			–908 492
3.3 Afforestation and reforestation on harvested land for 2008	NA, NO			NA, NO
3.3 Deforestation for 2008	1 079 890			1 079 890
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008	–19 093 159			–19 093.159
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 Latvia 2013. Available at <http://unfccc.int/resource/docs/2013/asr/lva.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/LVA. Report of the individual review of the annual submission of Latvia submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/lva.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. Agita Gancone, (Ministry of Environmental Protection and Regional Development of the Republic of Latvia), including additional material on the methodology methodologies and assumptions used. The following documents[1] were also provided by Latvia:

Bārdule et al., "Forest soil characteristic in Latvia according results of the demonstration project BioSoil (Latvijas meža augsņu īpašību raksturojums demontrācijas projekta BioSoil rezultātu skatījumā)."

Broceni Cement Plant. 2012. Report of greenhouse gas emissions. Broceni

Central Statistical Bureau of Latvia, (2013) Agriculture in Latvia Collections of Statistical Data Riga

Cabinet *Regulation No.217* regarding the National Inventory System of Greenhouse Gas Emission Units, adopted 27 March 2012.

Cabinet *Regulation No. 33* "Regulation on the protection of waters and soils against pollution caused by nitrates from agricultural sources" January 11, 2011.

Internal guidance i.e. Manual for inventory experts developed by inventory coordinator . "*Instrukcija informācijas apmaiņai SEG inventarizācijas sagatavošanai, datu apkopošanai CRF Reporter programmatūrā, Kvalitātes kontroles procedūru ievērošanai, nacionālā SEG inventarizācijas ziņojuma (NIZ) sagatavošanai un noformēšanai".*

Inventory improvement plan: *Īstermiņa (2013. gada) un ilgtermiņa nepieciešamie uzlabojumi Latvijas SEG inventarizācijai ANO Vispārējās konvencijas par klimata pārmaiņām un Kioto protokola ietvaros*

The Regional Environmental Center for Central and Eastern Europe Parstavnieciba Latvija. 2004. *SF_6, HFC un PFC Emisiju Inventarizacija Latvija 1995-2003 (SF_6, HFC and PFC Emission Inventory in Latvia 1995-2003).* Riga.

Summary information on upcoming capacity building project*: Development of National System for Greenhouse Gas Inventory and Reporting on Policies, Measures and Projections.*

Witzke & O. Oenema (2007) Integrated measures in agriculture to reduce ammonia emissions- Assessment of most promising measures.

[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
C	carbon
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
CSEUR	Consolidated System of European Union Registries
CRF	common reporting format
D_{dom}	degradable organic component
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
FAO	Food and Agriculture Organization of the United Nations
$Frac_{GASF}$	volatilization of N in fertilizers
$Frac_{LEACH}$	parameters for leaching
GDP	Gross domestic product
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
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
kha	kilohectares
km^2	kilometre square
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
m^3	cubic metre
MCF	methane conversion factor
Mg	megagram (1 Mg = 1 tonne)
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
Nex	nitrogen excretion
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride

SIAR	standard independent assessment report
SWDS	solid waste disposal system
t	tonne
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change