



**Report of the individual review of the annual submission of Latvia  
submitted in 2011**

**Note by the secretariat**

The report of the individual review of the annual submission of Latvia submitted in 2011 was published on 13 August 2012. 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 decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2011/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.





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Latvia submitted in 2011\***

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\* In the symbol for this document, 2011 refers to the year in which the inventory was submitted, and not to the year of publication.

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## I. Introduction and summary

### A. Overview

1. This report covers the centralized review of the 2011 annual submission of Latvia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 12 to 17 September 2011 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Anna Romanovskaya (Russian Federation) and Ms. Kristina Saarinen (Finland); energy – Mr. Steven Oliver (Australia) and Mr. Pedro Torres (Portugal); industrial processes – Ms. Lisa Hanle (United States of America) and Mr. Samir Tantawi (Egypt); agriculture – Mr. Sorin Deaconu (Romania) and Mr. Dionisio Rodríguez (Spain); land use, land-use change and forestry (LULUCF) – Mr. Xiaoquan Zhang (China) and Mr. Vladimir Korotkov (Russian Federation); and waste – Mr. Baek Wonseok (Republic of Korea). Ms. Romanovskaya and Mr. Zhang were the lead reviewers. The review was coordinated by Mr. Vitor Gois Ferreira (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of Latvia, which made no comment on it.

### B. Emission profiles and trends

3. In 2009, the main greenhouse gas (GHG) in Latvia was carbon dioxide (CO<sub>2</sub>), accounting for 65.0 per cent of total GHG emissions<sup>1</sup> expressed in CO<sub>2</sub> eq, followed by methane (CH<sub>4</sub>) (18.1 per cent) and nitrous oxide (N<sub>2</sub>O) (15.9 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 1.0 per cent of the overall GHG emissions in the country. The energy sector accounted for 67.0 per cent of total GHG emissions, followed by the agriculture sector (21.3 per cent), the waste sector (8.0 per cent), the industrial processes sector (3.4 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 10,735.47 Gg CO<sub>2</sub> eq and decreased by 59.7 per cent between the base year<sup>2</sup> and 2009. This emission trend is common among Parties with an economy in transition and reflects the economic downturn that has affected the country since 2008.

4. Tables 1 and 2 show GHG emissions from 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<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

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<sup>1</sup> In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

<sup>2</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions include emissions from Annex A sources only.

Table 1  
**Greenhouse gas emissions from Annex A sources and emissions/removals, by gas, from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, base year to 2009<sup>a</sup>**

	Greenhouse gas	Base year	Gg CO <sub>2</sub> eq							Change Base year–2009 (%)
			1990	1995	2000	2005	2007	2008	2009	
Annex A sources	CO <sub>2</sub>	19 057.77	19 057.77	9 037.16	7 004.65	7 778.41	8 623.63	8 187.55	6 979.49	–63.4
	CH <sub>4</sub>	3 759.91	3 759.91	2 143.75	1 913.38	1 989.19	1 930.87	1 970.15	1 943.60	–48.3
	N <sub>2</sub> O	3 803.69	3 803.69	1 535.29	1 405.72	1 622.28	1 686.56	1 672.20	1 704.20	–55.2
	HFCs	0.65	IE, NA, NE, NO	0.65	4.83	32.23	112.70	91.06	94.65	14 548.1
	PFCs	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
	SF <sub>6</sub>	0.25	NA, NE, NO	0.25	1.28	7.53	8.60	10.08	13.53	5 286.3
KP-LULUCF	Article 3.3 <sup>b</sup>	CO <sub>2</sub>						526.12	334.75	
		CH <sub>4</sub>						NO	NO	
		N <sub>2</sub> O						25.77	14.94	
	Article 3.4 <sup>c</sup>	CO <sub>2</sub>	NA					–23 772.60	–21 282.42	NA
		CH <sub>4</sub>	NA					28.00	34.11	NA
		N <sub>2</sub> O	NA					145.78	146.21	NA

*Abbreviations:* 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, IE = included elsewhere, NA = not applicable, NE = not estimated, NO = not occurring.

<sup>a</sup> “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

<sup>b</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

<sup>c</sup> Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 2

Greenhouse gas emissions by sector and activity, base year to 2009<sup>a</sup>

	Sector	Gg CO <sub>2</sub> eq								Change
		Base year <sup>a</sup>	1990	1995	2000	2005	2007	2008	2009	Base year–2009 (%)
Annex A	Energy	19 102.99	19 102.99	9 461.62	7 299.20	8 044.55	8 769.95	8 338.95	7 196.61	–62.3
	Industrial processes	599.77	598.87	160.22	179.11	290.05	417.62	389.94	359.79	–40.0
	Solvent and other product use	50.70	50.70	41.49	44.81	36.08	65.32	44.42	27.57	–45.6
	Agriculture	6 001.74	6 001.74	2 331.67	1 966.86	2 192.59	2 280.72	2 251.40	2 288.06	–61.9
	Waste	867.07	867.07	722.11	839.89	866.38	828.76	906.33	863.44	–0.4
	LULUCF	NA	–15 196.42	–16 249.90	–14 300.10	–17 140.52	–21 682.92	–22 743.40	–20 483.74	NA
	<b>Total (with LULUCF)</b>	<b>NA</b>	<b>11 424.95</b>	<b>–3 532.80</b>	<b>–3 970.24</b>	<b>–5 710.89</b>	<b>–9 320.55</b>	<b>–10 812.36</b>	<b>–9 748.27</b>	<b>NA</b>
	<b>Total (without LULUCF)</b>	<b>26 622.27</b>	<b>26 621.37</b>	<b>12 717.10</b>	<b>10 329.86</b>	<b>11 429.64</b>	<b>12 362.37</b>	<b>11 931.04</b>	<b>10 735.47</b>	<b>–59.7</b>
	Other <sup>b</sup>	NO	NO	NO	NO	NO	NO	NO	NO	NA
KP-LULUCF	Article 3.3 <sup>c</sup>	Afforestation and reforestation						–440.66	–506.22	
		Deforestation						992.56	855.91	
		<b>Total (3.3)</b>						<b>551.90</b>	<b>349.69</b>	
	Article 3.4 <sup>d</sup>	Forest management						–23 598.81	–21 102.11	
		Cropland management	NA					NA	NA	NA
		Grazing land management	NA					NA	NA	NA
		Revegetation	NA					NA	NA	NA
		<b>Total (3.4)</b>	<b>NA</b>					<b>–23 598.81</b>	<b>–21 102.11</b>	<b>NA</b>

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

<sup>a</sup> “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

<sup>b</sup> 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 the national totals.

<sup>c</sup> Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

<sup>d</sup> Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

5. Table 3 provides information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

Table 3  
Information to be included in the compilation and accounting database in t CO<sub>2</sub> eq

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment<sup>a</sup></i>	<i>Final<sup>b</sup></i>	<i>Accounting quantity<sup>c</sup></i>
<b>Commitment period reserve</b>	53 613 711	53 677 339		53 677 339	
<b>Annex A emissions for current inventory year</b>					
CO <sub>2</sub>	6 979 490			6 979 490	
CH <sub>4</sub>	1 943 601			1 943 601	
N <sub>2</sub> O	1 691 474	1 704 200		1 704 200	
HFCs	94 647			94 647	
PFCs	NA, NO			NA, NO	
SF <sub>6</sub>	13 529			13 529	
<b>Total Annex A sources</b>	<b>10 722 742</b>			<b>10 735 468</b>	
<b>Activities under Article 3, paragraph 3, for current inventory year</b>					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	-506 221			-506 221	
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NA, NO			NA, NO	
3.3 Deforestation for current year of commitment period as reported	855 908			855 908	
<b>Activities under Article 3, paragraph 4, for current inventory year<sup>d</sup></b>					
3.4 Forest management for current year of commitment period	-21 102 106			-21 102 106	
3.4 Cropland management for current year of commitment period					
3.4 Cropland management for base year					
3.4 Grazing land management for current year of commitment period					
3.4 Grazing land management for base year					
3.4 Revegetation for current year of commitment period					
3.4 Revegetation for base year					

*Abbreviations:* NA = not applicable, NO = not occurring.

<sup>a</sup> "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

<sup>b</sup> "Final" includes revised estimates, if any, and/or adjustments, if any.

<sup>c</sup> "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

<sup>d</sup> Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.



## II. Technical assessment of the annual submission

### A. Overview

#### 1. Annual submission and other sources of information

6. The 2011 annual inventory submission was submitted on 15 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1990–2009 and a national inventory report (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 under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Latvia officially submitted revised emission estimates on 25 October 2011 in response to the list of potential problems and further questions raised by the expert review team (ERT) in the course of the review, including information on KP-LULUCF activities and revised estimates of N<sub>2</sub>O emissions from agricultural soils. The values used in this report are those submitted by the Party on 25 October 2011.

8. Where necessary, the ERT also used previous years' submissions during the review. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.<sup>3</sup>

9. During the review, Latvia provided the ERT with additional information and documents which are not part of the annual submission but are in many cases referenced in the NIR. The full list of information and documents used during the review is provided in annex I to this report.

#### Completeness of inventory

10. The inventory is complete in terms of years and geographical coverage and covers all source and sink categories for which there are estimation methodologies available in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

11. Latvia has provided a complete set of CRF tables for the period 1990–2009 and a complete set of KP-LULUCF CRF tables for 2008 and 2009. The NIR follows the outline set out in 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).

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<sup>3</sup> The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), 6(c) and 6(k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

12. The ERT found that the emission estimates for some categories in the waste sector were not reported for the complete time series, such as: N<sub>2</sub>O and CH<sub>4</sub> emissions from the incineration of medical and hazardous waste prior to 1998 and waste composting prior to 2003. The ERT recommends that the Party provide the missing estimates in its next annual submission.

**2. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management**

Overview

13. The ERT concluded that the national system continues to perform its required functions.

14. The Party reported no changes to the national system since the previous annual submission, except for the change to the name of the Ministry of Environment, which became the Ministry of Environmental Protection and Regional Development (MEPRD) on 1 January 2011 (see para. 131 below).

Inventory planning

15. The NIR describes the national system for the preparation of the inventory. MEPRD has overall responsibility for the national inventory. The Latvian Environment, Geology and Meteorology Centre (LEGMC) is responsible for the quality assurance/quality control (QA/QC) activities; the coordination of the inventory together with MEPRD; and the planning, preparation, archiving and management of the inventory.

16. Other institutions participate in the preparation of the inventory and in the collection of activity data (AD), such as: the Central Statistics Bureau (CSB), which provides statistical data on the energy, industrial processes and agriculture sectors; the Latvian State Forestry Research Institute (LSFRI) Silava and the Ministry of Agriculture, which provide data on the LULUCF sector; the Institute of Physical Energetics, which provides data on the transport sector; and the company Latvijas Gāze, which provides data on natural gas emissions. Detailed information on the responsibilities of the institutions involved in the preparation of the inventory and on the sources of the AD used in the inventory is presented in tables 1.2 and 1.3 of the NIR.

Inventory preparation

*Key categories*

17. Latvia has reported a tier 2 key category analysis, both level and trend assessment, as part of its 2011 submission, but only for 2009. The key category analysis for the other years of the time series has been prepared using a tier 1 method. The key category analysis performed by the Party and that performed by the secretariat<sup>4</sup> produced broadly similar results, with some differences due to the different level of disaggregation used. The following categories have been identified as key categories in the 2011 submission, but were not identified as such in the previous annual submission: N<sub>2</sub>O emissions from the use of biomass in stationary combustion; CO<sub>2</sub> emissions from land converted to forest land;

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<sup>4</sup> The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

CO<sub>2</sub> emissions from land converted to cropland; and CO<sub>2</sub> emissions from settlements. The key category analysis was performed in accordance with the IPCC good practice guidance. Latvia has included the LULUCF sector in its key category analysis, in accordance with the IPCC good practice guidance for LULUCF.

18. A key category analysis for the KP-LULUCF activities was performed in accordance with the IPCC good practice guidance for LULUCF. The key categories identified are: CO<sub>2</sub> emissions from afforestation and reforestation (the associated LULUCF category is CO<sub>2</sub> emissions and removals from land converted to forest land); and CO<sub>2</sub> emissions from forest management (the associated LULUCF category is CO<sub>2</sub> emissions and removals from forest land remaining forest land).

19. The ERT welcomes the information provided in the NIR, which states that Latvia intends to perform a tier 2 analysis for all years of the time series in the next annual submission (table 10.3 of the NIR); and that the results of the key category analysis are, depending on the availability of resources, used to prioritize and prepare accurate estimates for the most significant categories. The ERT recommends that the Party include, in its next annual submission, details of how it uses the key category analysis to prioritize inventory improvements, in particular by specifying how it identifies the most significant key categories for which it prioritizes inventory improvements.

#### *Uncertainties*

20. In the NIR of the 2011 submission (chapter 1.7) Latvia stated that it had prepared a tier 2 uncertainty analysis in accordance with the IPCC good practice guidance. However, the ERT found, in chapter 10.4 of the NIR, that a tier 1 uncertainty analysis was carried out in the 2011 submission and that a tier 2 uncertainty analysis is scheduled to be carried out for the 2012 submission. The ERT encourages Latvia in its efforts to develop a tier 2 uncertainty analysis, but recommends that the Party improve its QC procedures for the next annual submission so that the transparency of the reporting is not impaired by inconsistent reporting in the NIR.

21. The tier 1 uncertainty analysis was performed for the level and for the trend, including the LULUCF sector, and is in accordance with the IPCC good practice guidance. Latvia used expert judgement to estimate the uncertainty values in cases where there was a lack of information (e.g. for some subcategories in the LULUCF sector).

22. The cumulative uncertainty of the total estimated GHG emissions excluding LULUCF is 48.1 per cent for 2009 and the trend uncertainty is 31.3 per cent for 2009, with the major contributions to the overall uncertainty coming from the energy sector (CO<sub>2</sub> emissions from the use of diesel oil in road transportation; gaseous fuels in the residential sector; and CH<sub>4</sub> emissions from the use of biomass in the residential sector), the agriculture sector (CH<sub>4</sub> emissions from enteric fermentation; direct and indirect N<sub>2</sub>O emissions from agricultural soils) and the waste sector (CH<sub>4</sub> emissions from managed waste disposal on land).

23. The ERT noted that the NIR does not specify how Latvia uses the results of the uncertainty analysis in the inventory preparation process. The ERT recommends that Latvia provide, in the NIR of its next annual submission, information on how it uses the uncertainty analysis in prioritizing future inventory improvements.

#### *Recalculations and time-series consistency*

24. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that the recalculations reported by the Party of the time series 1990–2008 have been undertaken to improve the consistency with the IPCC good practice guidance, to take into account the recommendations from the 2009 and 2010 review reports, and in order to rectify errors identified in the AD provided by CSB.

25. The major changes, and the magnitude of the impact, include: a decrease in estimated total GHG emissions for 1990 (by 1.0 per cent) and a decrease in estimated total GHG emissions for 2008 (by 0.2 per cent). The rationale for the recalculations is provided in the sectoral chapters of the NIR and summarized in CRF table 8(b). The ERT considers that the recalculations have improved the accuracy of the inventory.

#### *Verification and quality assurance/quality control approaches*

26. Latvia has provided information on its QA/QC activities in the NIR in accordance with the UNFCCC reporting guidelines. In addition, examples of checklists used for the agriculture and waste sectors are included in annex 6 to the NIR as evidence of the QA/QC activities carried out for the preparation of the 2011 inventory. The ERT commends Latvia for providing such transparent information on its QA/QC activities. However, the ERT noted that the QA/QC activities carried out by the Party do not identify all of the errors that occurred during the compilation of the inventory (e.g. the reporting of the tier level used for the key category analysis (see para. 17 above); and the CH<sub>4</sub> implied emission factor (IEF) used to estimate emissions from gaseous fuels used in road transportation (see para. 57 below)). Therefore, the ERT recommends that Latvia further improve its QA/QC procedures in order to avoid such errors in future annual submissions, including through the use of higher-tier QA/QC procedures. The ERT also recommends that Latvia report on the improvements in its QA/QC system in the next annual submission.

27. Latvia uses data from the European Union emissions trading scheme (EU ETS) to develop plant or country-specific emission factors (EFs) and to verify the emission estimates. Since the Party indicated that further research is required in order to use these data for some categories (e.g. regarding CRF table 1.A(d)), the ERT encourages Latvia to continue to extend the use of the EU ETS data in the inventory preparation process and verification procedures in its next annual submission.

#### *Transparency*

28. The ERT welcomes the fact that the inventory is generally transparent, in particular the description of the sectoral issues in the NIR. The ERT notes that Latvia has improved the transparency of the NIR since the previous annual submission and commends the Party for these improvements. In particular, the Party has improved the documentation for the industrial processes sector, which is highly comprehensive, and the methodological description for the agriculture sector has also been improved. However, the ERT found that there is room to improve the transparency of the reporting on the energy sector regarding the explanations of the trends. Other areas where Latvia could improve transparency are in the transport sector, regarding the split of domestic and bunker fuels; in the industrial processes sector, regarding the allocation of emissions per category; in the agriculture sector, regarding the use of notation keys; and in the LULUCF sector regarding the information on the expert judgement used as well as the inconsistencies identified between the reporting under the Convention (LULUCF sector) and the reporting under the Kyoto Protocol (KP-LULUCF activities).

#### Inventory management

29. Latvia has a centralized archiving system maintained by LEGMC, 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.

### 3. Follow-up to previous reviews

30. In the NIR (table 10.4 – response to the review of the 2010 inventory submission) Latvia provides clear information on how the recommendations from the previous review reports have been addressed. The ERT commends the Party for providing this table but notes that it does not address the KP-LULUCF activities. The ERT recommends that Latvia ensure the completeness of its reporting in its next annual submission by including information on the KP-LULUCF activities.

31. The ERT noted that Latvia has carried out most of the improvements recommended in previous review reports and, in particular, has developed a land-use change matrix. However, some recommendations have not yet been addressed by the Party, including: the assessment of the methane conversion factor (MCF) values for industrial wastewater, which Latvia is planning to develop in time for the 2012 submission; and the development of a country-specific N<sub>2</sub>O EF for emissions from cremation, for which a completion date has not yet been defined.

### 4. Areas for further improvement

#### Identified by the Party

32. The 2011 NIR (table 10.3) transparently identifies several areas for improvement, including a time schedule for the implementation of the remaining improvements. The ERT noted in the NIR that Latvia has undertaken improvements since the previous annual submission, in particular in the agriculture sector and for the KP-LULUCF activities. However, the ERT also noted that many of the improvements identified by Latvia in the NIR are still under development, and that for some improvements, work has not yet started. The ERT commends the Party for the action already taken but recommends that Latvia make efforts to fulfil its planned improvements on time and in accordance with its inventory improvement plan, and, in order to increase transparency, the ERT recommends that Latvia indicate in the NIR a time schedule for the implementation of the identified improvements in accordance with the limitations created by the availability of resources.

#### Identified by the expert review team

33. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 146 below.

34. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

## B. Energy

### 1. Sector overview

35. The energy sector is the main sector in the GHG inventory of Latvia. In 2009, emissions from the energy sector amounted to 7,196.61 Gg CO<sub>2</sub> eq, or 67.0 per cent of total GHG emissions. Since the base year, emissions have decreased by 62.3 per cent. The key drivers for the fall in emissions are the decreases in the following categories: other sectors (a decrease of 4,265.23 Gg CO<sub>2</sub> eq, or 73.7 per cent, since the base year); energy industries (a decrease of 4,403.15 Gg CO<sub>2</sub> eq, or 70.0 per cent, since the base year); and manufacturing industries and construction (a decrease of 2,853.39 Gg CO<sub>2</sub> eq, or 76.0 per cent, since the base year). Within the sector, 38.6 per cent of the emissions were from transport, followed by 26.2 per cent from energy industries, 21.2 per cent from other sectors and 12.5 per cent from manufacturing industries and construction. Fugitive emissions from fuels (oil and natural gas) accounted for 1.5 per cent and other (fuel combustion) accounted

for less than 0.1 per cent. Fugitive emissions from solid fuels are reported as not occurring (“NO”).

36. The Party has made recalculations for the energy sector between the 2010 and 2011 submissions following changes in AD and EFs. The impact of these recalculations on the energy sector is a decrease in emissions of 2.0 per cent for 2008. The main recalculations took place in the following categories:

(a) Energy industries: the CO<sub>2</sub> EF for natural gas was recalculated for the period 1990–2008 as a result of the availability of additional data on the characteristics of natural gas, such as density, obtained from a natural gas provider;

(b) Road transportation: CH<sub>4</sub> and N<sub>2</sub>O emissions decreased due to the use of a new version (v8.0) of the COPERT IV model, and emissions from the consumption of liquefied petroleum gas (LPG) in cars were recalculated for the period 1999–2008;

(c) Aviation: the consumption data for gasoline and jet fuel used in military aviation were recalculated by CSB for the years 2004, 2006 and 2007.

37. Latvia’s inventory for the energy sector is complete and has been prepared in accordance with the IPCC good practice guidance.

38. The inventory is generally transparent. Following a recommendation in the previous review report,<sup>5</sup> Latvia has made improvements to the transparency of its reporting by including in the NIR an explanation of the trends observed for civil aviation. The ERT commends Latvia for this effort and recommends that the Party also include in the NIR data on the number of landing and take-off (LTO) movements, the number of passengers transported or the amount of cargo carried, in order to check the validity of the fuel data trend. The ERT reiterates the recommendations made in the previous review report<sup>6</sup> that Latvia explain the trend in emissions observed for navigation and provide complementary information that could validate the explanations.

39. The ERT notes that Latvia extensively uses the documentation boxes of the CRF tables on the energy sector to include valuable information that helps to enhance the transparency of its reporting. For example, explanations of the emission trends and IEFs are provided at the individual category level within the documentation box of CRF table 1.A(a). However, the ERT also noted that not all of this information is included in the NIR, for example the discussion on the emission trends for fuel combustion in iron and steel. Therefore, the ERT recommends that Latvia ensure, in its next annual submission, that the explanations of the emission trends are also included in the sectoral chapters of the NIR.

40. As part of its QC plan, Latvia carries out a check on the fuel combustion data that detects changes in the values of the IEFs that are greater than 10 per cent (this check is performed at a subsectoral level by aggregated fuel type), and the Party has provided explanations for these changes in the NIR. Nevertheless, the ERT notes that the use of a threshold of 10 per cent may be too high for the transport sector, given the usual low temporal variability of refined liquid fuels in terms of their characteristics and EFs. Therefore, the ERT recommends that Latvia revise the thresholds used for individual fuel types in the transport sector and perform QC checks on the revised thresholds in the next annual submission. The ERT commends Latvia for this QC initiative that promotes accuracy but notes that some errors were detected for certain categories (e.g. the CO<sub>2</sub> EF for jet kerosene in civil aviation and the CH<sub>4</sub> EF for gasoline used in road transportation), which indicates that the QA/QC system can be further improved. Therefore, the ERT recommends that Latvia continue to improve its QC procedures so as to prevent these types of errors from occurring in its next annual submission, and report on the improvements made to its QC procedures for the energy sector in its next annual submission.

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<sup>5</sup> FCCC/ARR/2010/LVA, paragraph 47.

<sup>6</sup> FCCC/ARR/2010/LVA, paragraph 49.

41. The ERT recommends that Latvia pursue the planned inventory improvements described in the NIR, in particular: the research on country-specific CH<sub>4</sub> EFs for solid biomass combustion; the improvement of the country-specific CO<sub>2</sub> EFs for diesel and gasoline used in road transportation; and the separate reporting of auto-producer data in the NIR.

## 2. Reference and sectoral approaches

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

42. For 2009, the CO<sub>2</sub> emissions estimated according to the reference approach are 1.9 per cent lower than the CO<sub>2</sub> emissions estimated according to the sectoral approach. Explanations are provided in the documentation box of CRF table 1.A(c). The ERT commends Latvia for following the encouragement made in previous review reports and for including additional explanations for the fluctuations in the comparison of the reference approach with the sectoral approach.

43. The ERT noted the improvement made in the difference between the reference and sectoral approaches for 2009 compared to that of earlier years of the time series, for which the difference is generally greater than 2 per cent. The ERT recommends that Latvia discuss, in the NIR of its next annual submission, the reasons leading to this improvement.

44. The ERT noted that, for the purposes of performing the comparison between the reference and sectoral approaches, Latvia reallocated some products to standard CRF categories (e.g. white spirit, paraffin waxes and used oil were reallocated to “other oil”; and gasoline type jet fuel was reallocated to gasoline). As a result of these adjustments, the apparent consumption reported by Latvia corresponds closely to that reported by the International Energy Agency (IEA) (the difference is within 2 per cent for all years of the time series).

### *International bunker fuels*

45. The fuel consumption for international aviation and international marine bunkers, as reported in CRF table 1.C, corresponds closely to the IEA data.

46. As indicated in the previous review report,<sup>7</sup> Latvia calculates emissions from international bunker fuels based on statistics provided by CSB, but the split of fuel consumption in navigation between national and international fuel consumption is based on local expert judgement. During the previous review, the Party indicated that, in its 2011 submission, the fuel consumption would be split using a more precise method rather than by relying on local expert judgement only. However, the ERT could not find information in the 2011 submission to confirm that this improvement had been made. Therefore, the ERT reiterates the recommendation in the previous review report that Latvia transparently describe the methodology used to split national and international (bunker) fuel consumption for navigation in the NIR of its next annual submission.

### *Feedstocks and non-energy use of fuels*

47. Latvia reports in CRF table 1.A(d) four fuel types used for non-energy purposes: lubricants, bitumen, paraffin waxes and white spirit, and it is assumed that all carbon is stored in the products. Other feedstocks, such as coke, are not included in CRF table 1.A(d) since they ultimately result in emissions. The NIR provides explanations for the AD, methodologies and assumptions used. The ERT encourages the Party to include data on all feedstocks in CRF table 1.A(d) and to report on the emissions when these occur.

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<sup>7</sup> FCCC/ARR/2010/LVA, paragraph 38.

### 3. Key categories

#### Stationary combustion: all fuels – CO<sub>2</sub>

48. The ERT welcomed the work carried out by Latvia in implementing the recommendations made in previous review reports, in particular the updating of the CO<sub>2</sub> EF for natural gas using country-specific net calorific values (NCVs), carbon content and density data.

49. The ERT noted that the NCV values for coal have remained constant since 2003 at 26.22 TJ/Gg (the reference for this value is the Energobalance), despite the fact that domestic coal importers report the NCV data to CSB. Therefore, the ERT recommends that Latvia work with CSB to update the coal characteristics for more recent years of the time series and use the revised data to recalculate the emission estimates for its next annual submission.

50. The ERT also noted that the CO<sub>2</sub> emissions from the subcategory chemicals displayed high inter-annual variability (e.g. 1990/1991: –37.6 per cent, 1991/1992: –19.6 per cent, 1992/1993: 76.2 per cent, 1994/1995: 41.1 per cent, 1995/1996: –25.8 per cent, 1996/1997: –13.4 per cent, 1997/1998: –84.2 per cent, 1998/1999: –21.5 per cent, 1999/2000: –17.6 per cent, 2003/2004: –15.1 per cent and 2006/2007: –20.6 per cent. In response to the questions raised by the ERT during the review week, Latvia explained that these inter-annual fluctuations were caused by changes in the consumption of residual fuel oil (RFO), and that the time series for the RFO AD is provided in the NIR. However, the ERT recommends that Latvia improve the transparency of its reporting by explaining the drivers behind the AD trends within this subcategory in its next annual submission.

51. Also in response to a question by the ERT during the review week, Latvia explained that the increase in the value of the CO<sub>2</sub> IEF for liquid fuel use in the subcategory iron and steel for 2005 was caused by the significant amount of used oils consumed in this category during that year (used oils have a relatively high CO<sub>2</sub> EF). The ERT recommends that Latvia include explanations for the trends in the time series, such as the trend described above, in the NIR of its next annual submission.

#### Road transportation: liquid fuels – CO<sub>2</sub>

52. The ERT noted that, with regard to the trend of the CO<sub>2</sub> IEF for gasoline, the 2009 value (68.60 t CO<sub>2</sub>/TJ) is 1.7 per cent lower than the 1990 value (69.76 t CO<sub>2</sub>/TJ), and the majority of the reduction occurred in a single year, between 1998 and 1999 (a 1.4 per cent reduction). The 2009 CO<sub>2</sub> IEF value is also one of the lowest among reporting Parties (which range between 68.60 t CO<sub>2</sub>/TJ and 73.90 t CO<sub>2</sub>/TJ). In response to questions raised by the ERT during the review week, the Party explained that the reason for the trend in the CO<sub>2</sub> EF for gasoline was due to a change in the characteristics of the fuel used for road transportation. Latvia also informed the ERT that it used leaded gasoline up to 1998 and the share of leaded gasoline in the total amount of gasoline varies, thereby leading to fluctuations in the CO<sub>2</sub> EF during the period 1990–1998. In response to a request made by the ERT, Latvia provided additional information on: the calorific values used (44.00 GJ/t during the period 1990–2002 and 43.97 GJ/t during the period 2003–2010); the hydrogen/carbon ratio for leaded gasoline (2.56) and unleaded gasoline (2.31 for the period 1990–2002 and 2.30 for the period 2003–2010). However, Latvia could not provide the ERT with transparent information on the carbon content and CO<sub>2</sub> EFs used for the different kinds of gasoline. The ERT therefore considered that the issue had not been resolved by the end of the review week and demonstrated a potential underestimation of emissions.

53. In response to the list of potential problems and further questions raised by the ERT, Latvia provided the carbon content for gasoline (83.13 per cent), the NCV (43.96 MJ/kg) and the CO<sub>2</sub> EF for gasoline (68.60 t CO<sub>2</sub>/TJ), which are based on a study from 2004. The ERT concluded that the country-specific EF is in accordance with the IPCC good practice



guidance, but recommends that Latvia include, in the NIR of its next annual submission, additional documentation on the carbon content and energy content in order to support its choice of CO<sub>2</sub> EFs throughout the time series for gasoline used in road transportation. Latvia also informed the ERT that it is considering the possibility of investigating the characteristics of gasoline during 2011 and updating the inventory accordingly for the next annual submission.

#### Oil and natural gas: natural gas – CH<sub>4</sub>

54. The ERT noted the recommendation made in previous review reports in relation to the description of the methodology used to estimate CH<sub>4</sub> fugitive emissions from natural gas. Latvia informed the ERT during the review week that MEPRD obtained updated information from the sole gas supplier in the country in early 2011 and that it intends to include this information in the NIR. The ERT reiterates the recommendation made in the previous review report<sup>8</sup> that Latvia document the methodology used to estimate the reported CH<sub>4</sub> emissions in the NIR of its next annual submission, in order to improve transparency and demonstrate the consistency of the methodology with the IPCC good practice guidance.

### **4. Non-key categories**

#### Civil aviation: liquid fuels – CO<sub>2</sub>

55. The CO<sub>2</sub> IEF value for jet kerosene for 2009 (81.08 t/TJ) is 11.4 per cent higher than the IPCC default value (72.80 t/TJ). During the review, Latvia informed the ERT that the reason for this high EF was the misuse of a representative aircraft to derive the LTO EFs and informed the ERT that the problem will be corrected in its next annual submission. The ERT recommends that Latvia correct this error in its next annual submission and report on the changes made in the NIR. The ERT further recommends that Latvia improve its QC procedures for this category in order to identify and correct these types of mistakes prior to the finalization of the annual submission.

56. In addition, the ERT recommends that Latvia improve transparency by including in the NIR further information on the AD and assumptions used in the calculation of the emissions, namely the correspondence list between the aircraft and representative aircraft and complementary data on LTOs, and information on the average LTO EFs.

#### Road transportation: gaseous fuels – CH<sub>4</sub>

57. The ERT found that the inter-annual change in the CH<sub>4</sub> IEF for gaseous fuels between 2008 (50.00 kg CH<sub>4</sub>/TJ) and 2009 (0.50 kg CH<sub>4</sub>/TJ) is unexpectedly high. Latvia informed the ERT during the review week that this was a mistake and that it will be corrected in the next annual submission. The ERT recommends that Latvia correct this error in the next annual submission and report on the changes made in the NIR. The ERT also recommends that Latvia improve its QC procedures for this category in order to identify and correct these types of mistakes prior to the finalization of the annual submission.

## **C. Industrial processes and solvent and other product use**

### **1. Sector overview**

58. In 2009, emissions from the industrial processes sector amounted to 359.79 Gg CO<sub>2</sub> eq, or 3.4 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 27.57 Gg CO<sub>2</sub> eq, or 0.3 per cent of total GHG emissions. Since the base year, emissions have decreased by 40.0 per cent in the industrial processes

<sup>8</sup> FCCC/ARR/2010/LVA, paragraph 46.

sector, and decreased by 45.6 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are the global economic crises, including the crisis associated with the transition to a market economy in the early 1990s which was mostly reflected in the decrease in emissions from mineral products, which have decreased by 343.98 Gg CO<sub>2</sub> eq, or 58.7 per cent, since the base year. In Latvia, emissions from cement production have largely reflected the strength of the economy. Although, after 1994, emissions from the industrial processes sector generally increased, driven by an increase in emissions from cement production due to the demand from the building and construction industry, total GHG emissions from the industrial processes sector decreased again after 2008 as a consequence of the recent global economic downturn. The decrease in emissions was partly offset by the increase in emissions from consumption of halocarbons and SF<sub>6</sub>, which increased by 107.28 Gg CO<sub>2</sub> eq from 1995 to 2009. Likewise, the trend in emissions from the solvent and other product use sector reflected the changes in the strength of the economy. Within the industrial processes sector, 67.3 per cent of the emissions were from mineral products, followed by 30.1 per cent from consumption of halocarbons and SF<sub>6</sub> and 2.7 per cent from metal production. Emissions from the chemical industry and production of halocarbons and SF<sub>6</sub> were reported as “NO”.

59. Latvia has made recalculations for the industrial processes sector between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD and EFs, and in order to rectify identified errors. The impact of these recalculations on the industrial processes sector is an increase in emissions of 13.4 per cent for 2008. The main recalculations took place in the following categories:

(a) The largest recalculation in the industrial processes sector was performed for the category CO<sub>2</sub> emissions from asphalt roofing and road paving. In the previous annual submission, Latvia estimated the emissions using AD for bitumen only, but the 2011 submission also includes bitumen mixtures;

(b) The second most significant change was the recalculation of emissions from consumption of halocarbons and SF<sub>6</sub>. Emissions for this category increased by 9.3 per cent between the 2010 and 2011 submissions. In accordance with the information included in the CRF tables, these changes resulted primarily from updated AD from the national statistics, but no updated information has been provided by the Party in the NIR: the discussion on recalculations in the 2011 NIR still reflects the recalculations made in the 2010 submission instead of the 2011 submission. The ERT recommends that Latvia ensure that it verifies that the information on the recalculations is updated in the NIR for the next annual submission;

(c) Recalculations were also made for emissions from mineral products, including: cement production, as a result of the updating of the calcium oxide (CaO) content of clinker; and lime production, as a result of the revision of limestone and dolomite use and in order to reflect missing AD for the period 1990–2005.

60. The Party has also made recalculations for the solvent and other product use sector between the 2010 and 2011 submissions following changes in AD. The impact of these recalculations on the solvent and other product use sector is a decrease in emissions of 18.3 per cent for 2008. The main recalculation took place in the category other, where Latvia moved to a higher-tier method by calculating the emissions based on data reported directly to the Chemical Substances Register. This enabled Latvia to update not only the AD but also the content of non-methane volatile organic compounds of the substances consumed.

61. The ERT observes that the information in the NIR is generally well documented and transparent. The ERT encourages Latvia to maintain this level of transparency in future annual submissions.

62. The ERT noted that Latvia has continued to improve the GHG inventory for the industrial processes and the solvent and other product use sectors, and has made significant

efforts to implement the recommendations made in previous review reports. In particular, the Party has improved time-series consistency (e.g. updating the emissions from lime production and the CaO content of clinker) and accuracy. However, the ERT recommends that Latvia continue its efforts, as the Party uses different methods for different years of the time series for some categories. The Party provided explanations for the use of the different methods (e.g. in brick production, the different methods reflect the difficulties in obtaining data for the early 1990s, due to the economic and political situation, followed by the increase in data availability from the EU ETS for the most recent years of the time series). Latvia informed the ERT during the review week that it intends to further consider the issue of time-series consistency in future legislation regarding the implementation of the EU ETS, in particular legislation requiring that facilities use one estimation method throughout the entire time series unless the facility receives permission from the competent authority to change the method. The ERT welcomes these efforts, but notes that the availability of EU ETS data for the most recent years of the time series is common to other European Parties, and the fact that data are collected from industrial plants is not a reason for the inventory to be inconsistent. Therefore, the ERT recommends that Latvia, for its next annual submission, consider the arrangements within its national system so that the procedures for the collection of data from industrial operators or for the compilation of data for the GHG inventory result in a consistent time series in accordance with the IPCC good practice guidance.

63. The ERT welcomes Latvia's planned improvement to conduct tier 2 QA/QC procedures for the category cement production, but reiterates the encouragements in previous review reports Latvia implement tier 2 QA/QC procedures for all key categories in its next annual submission. Where feasible, the ERT encourages the Party to conduct additional QA/QC activities on non-key categories where questions have been raised regarding time-series consistency (e.g. brick production (see para. 62 above)). In response to questions raised by the ERT during the review, Latvia informed the ERT that it is considering whether to involve international experts from neighbouring countries to conduct QA procedures for the industrial processes sector. The ERT welcomes these efforts and encourages Latvia to implement such external reviews and report on the results in the next annual submission.

## 2. Key categories

### Cement production – CO<sub>2</sub>

64. The Party explains in the NIR that, during 2009, the wet kiln production process that was in operation at Latvia's single cement plant was closed and a new plant began operation using a dry kiln production process. This change led to some variation in the emissions over the time series; for example, because of the closure of the wet kiln production process line, the cement kiln dust (CKD) was not recycled at the plant, but rather landfilled, leading to an increase in emissions. The ERT welcomes this additional information on emissions from CKD provided in the NIR, in line with the recommendations made in the previous review report.

65. The ERT recommends that, using the opportunity provided by the introduction of the new production process, Latvia consider using a tier 2 approach for this key category by weighing the clinker directly as opposed to estimating clinker production based on the clinker fraction of cement. The ERT considers that weighing the clinker, along with Latvia's current practice of using measurement data on the CaO content of the clinker, would improve the accuracy of the estimates for this key category. The ERT also welcomes the Party's intention to carry out tier 2 QA/QC procedures for this category.

Consumption of halocarbons and SF<sub>6</sub> – HFCs

66. The ERT concluded that the inventory is complete in terms of actual emission estimates, although an apparent inconsistency in the time series was detected by the ERT during the review: the NIR states that only eight companies reported data for the year 2007, while in the 2010 submission the NIR stated that over 530 companies reported data. In response to questions raised by the ERT, Latvia informed the ERT that the emission estimates for the years prior to the entry into force of EC regulation no. 842/2006 of the European Parliament and of the Council on certain fluorinated greenhouse gases are probably incomplete. The ERT recommends that Latvia complete the time series for the period 1990–2006, in order to ensure time-series consistency in accordance with the IPCC good practice guidance. As an example, the ERT recommends that Latvia investigate whether additional AD could be gathered for this category either from country statistics, by considering alternative domestic or international data sources, or by interpolating data using indicator drivers.

67. The ERT noted that the estimates of potential emissions are not complete, since data are not available at the national level to estimate potential emissions of SF<sub>6</sub>. The ERT encourages the Party to make efforts to complete its estimates of potential emissions of SF<sub>6</sub> in the next annual submission.

68. The ERT noted from the CRF tables that Latvia assumes zero emissions from disposal in several end-use applications of ozone-depleting substance substitutes (e.g. refrigeration equipment, fire extinguishers and aerosols), even though emissions from manufacturing and stocks are reported. Latvia explains in the NIR that the reason for using the notation key “NO” for disposal emissions is based on regulation no. 923 of the Cabinet of Ministers regarding the management of electrical and electronic equipment waste. During the review week, the ERT requested additional clarification from the Party since regulation no. 923 does not require the complete destruction or recycling of the substances upon disposal, but only minimum recycling or reduction levels by product type. Latvia clarified that the reason for using the notation key “NO” is ultimately based on the fact that all equipment is collected and exported to other countries for recycling or disposal and, therefore, no emissions occur in Latvia. The ERT agrees that this is consistent with the IPCC good practice guidance, but recommends that the Party update the information in the NIR to support the use of the notation key “NO” and to enhance the transparency of its reporting.

**3. Non-key categories**Lime production – CO<sub>2</sub>

69. The ERT welcomes the improvements made by Latvia to develop emission estimates for the full time series for lime production in the iron and steel industry, in line with the recommendations from the previous review report. Latvia was informed by the industrial plant in the country that data are only available from 1995 onwards; the Party assumes that the AD used for the emission estimates for 1995 are the same as those for the period 1990–1994. The ERT acknowledges that there may be a lack of data prior to 1995, but encourages Latvia to examine whether there are alternative methods for extrapolating the AD back to 1990. For example, the Party should consider whether the emission trends exhibited in iron and steel production are an appropriate driver for estimating lime produced in the iron and steel industry during that same period.

## D. Agriculture

### 1. Sector overview

70. In 2009, emissions from the agriculture sector amounted to 2,288.06 Gg CO<sub>2</sub> eq, or 21.3 per cent of total GHG emissions. Since the base year, emissions have decreased by 61.9 per cent. The key driver for the fall in emissions is the decrease in the dairy and non-dairy cattle, sheep and swine populations, and the decrease in the use of nitrogen (N) synthetic fertilizer on agricultural soils. As a result, emissions from enteric fermentation have decreased by 1,480.38 Gg CO<sub>2</sub> eq, or 68.9 per cent, since the base year; emissions from manure management have decreased by 588.91 Gg CO<sub>2</sub> eq, or 69.8 per cent, since the base year; and emissions from agricultural soils have decreased by 1,644.39 Gg CO<sub>2</sub> eq, or 54.6 per cent, since the base year. Within the sector, 59.7 per cent of the emissions were from agricultural soils, followed by 29.2 per cent from enteric fermentation. The remaining 11.1 per cent were from manure management. Emissions from rice cultivation and field burning of agricultural residues were reported as “NO”, while emissions from prescribed burning of savannas were reported as not applicable (“NA”).

71. The Party has made recalculations for the agriculture sector between the 2010 and 2011 submissions following changes in AD and EFs. The impact of these recalculations on the agriculture sector is an increase in emissions of 7.4 per cent for 2008. The main recalculations took place in the following categories:

- (a) Enteric fermentation;
- (b) Manure management;
- (c) Agricultural soils.

72. The inventory is complete with respect to the coverage of categories, gases and years, and is generally transparent. Uncertainties, recalculations, QA/QC procedures and planned improvements are sufficiently described in the NIR at category level, and the sources of the AD and EFs, the methodological issues and the AD and emission trends are clearly explained in the NIR. However, the ERT found some room for improvement with regard to transparency: in the NIR, the Party does not include information on time-series consistency within the subsectoral sections and presents a different list of key categories in tables 1.4 and 6.2 of the NIR. Other issues that require further improvement, which are linked to the uncertainty analysis and the completeness of the inventory, are discussed below (see paras. 74 and 75 below). The ERT recommends that the Party increase the transparency of its reporting in the next annual submission.

73. The ERT commends Latvia for implementing the recommendation from the previous review report<sup>9</sup> regarding the consistency of the data on organic soils between the agriculture and the LULUCF sectors.

74. The ERT noted that, for the categories manure management and agricultural soils, the uncertainty values for all parameters are not reported. In addition, for the category manure management, the data and information on the uncertainties are not reported separately for CH<sub>4</sub> and N<sub>2</sub>O emissions, and for agricultural soils, the information is not presented distinctly for every subcategory. In response to questions raised by the ERT during the review week, Latvia provided the ERT with additional data and information on the uncertainties. The ERT recommends that the Party incorporate these elements into its next annual submission, in order to increase the transparency of its reporting.

75. The Party did not provide sufficient information in the NIR on the reason why field burning of agricultural residues is reported as “NO”. In response to questions raised by the ERT during the review week, Latvia replied that legislative measures and agricultural

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<sup>9</sup> FCCC/ARR/2010/LVA, paragraph 66.

residue management practices prohibit field burning of agricultural residues. The ERT recommends that Latvia include these explanations in the NIR in its next annual submission.

76. The ERT commends Latvia for the improvement of its QA/QC and verification activities by involving third-party experts.

## 2. Key categories

### Enteric fermentation – CH<sub>4</sub>

77. Latvia uses both tier 1 and tier 2 methods from the IPCC good practice guidance to estimate emissions from this category: a tier 2 method with country-specific EFs is used to estimate emissions from dairy cattle and non-dairy cattle, while a tier 1 method with default EFs is used to estimate emissions from sheep, goats, horses and swine. The AD are provided by CSB. The ERT concludes that this procedure is in accordance with the IPCC good practice guidance.

### Manure management – CH<sub>4</sub> and N<sub>2</sub>O

78. Latvia uses both tier 1 and tier 2 methods from the IPCC good practice guidance to estimate CH<sub>4</sub> emissions: a tier 2 method with country-specific EFs is used to estimate emissions from dairy cattle, while a tier 1 method with default EFs is used to estimate emissions from non-dairy cattle, sheep, goats, horses, swine and poultry. In accordance with the IPCC good practice guidance, the ERT recommends that the Party develop tier 2 estimates with country-specific EFs for two animal types that are also significant: non-dairy cattle (accounting for 19.0 per cent of emissions from manure management) and swine (accounting for 33.4 per cent of emissions from manure management); the Party should use the information on gross energy intake that was used to derive the EF for enteric fermentation for non-dairy cattle when calculating the emissions. The ERT commends Latvia for the implementation of a tier 2 method to estimate emissions from dairy cattle, which were reported for the first time in the 2011 submission.

79. The method presented in the IPCC good practice guidance together with country-specific AD and EFs were used to estimate N<sub>2</sub>O emissions from livestock manure management. This approach is in line with the IPCC good practice guidance.

### Agricultural soils – N<sub>2</sub>O

80. Latvia uses tier 1 methods from the IPCC good practice guidance to estimate N<sub>2</sub>O emissions from agricultural soils. However, the ERT noted (on page 231 of the NIR) that, in order to calculate the amount of N from the application of animal manure to soils, Latvia uses an equation that is not in line with the IPCC good practice guidance (equation 2 in section 4.6 of the Revised 1996 IPCC Guidelines Workbook). In this respect, the amount of N applied to soils reported by Latvia for all years of the period 1990–2009 is lower in comparison with the values resulting from the use of equation 4.23 from the IPCC good practice guidance (which is a tier 1a approach). In response to the list of potential problems and further questions raised by the ERT during the review, the Party provided revised estimates in accordance with equation 4.23 from the IPCC good practice guidance. In accordance with this equation, the quantity of N added to soils increased from 13,974,072.88 to 16,063,885.92 kg N/year for 2009, and the emission estimates for the same year were revised from 0.27 to 0.32 Gg N<sub>2</sub>O (i.e. a 15.0 per cent increase). The ERT concluded that this potential problem was resolved by the Party during the review.

81. The ERT found differences in the data on the use of N synthetic fertilizers between the data published by the Food and Agriculture Organization of the United Nations (FAO) and the data reported in the GHG inventory for most years during the period 2002–2009, including 2008 (50,228 t/year in accordance with the FAO data and 47,500 t/year in

accordance with the inventory data) and 2009 (53,508 t/year in accordance with the FAO data and 51,400 t/year in accordance with the inventory data). The ERT also noted that the amounts reported by FAO were higher than those reported in the inventory, which indicates a potential underestimation of emissions. During the review week, the Party informed the ERT that the information is provided by CSB but that further time was needed to clarify how the FAO data are obtained and why the differences exist. Therefore, the ERT included this issue in its list of potential problems and further questions. Responding to the ERT after the six-week period following the issuance of the list of potential problems and further questions, Latvia informed the ERT that there are methodological discrepancies between the CSB data sources (used in the inventory) and the FAO data sources: FAO uses the calendar year, while CSB uses the harvest year. In addition, the Party informed the ERT that it has contacted FAO and was informed that this institution performed some recalculations on the original data and assumptions on the chemical composition of fertilizers. Latvia considers that the CSB data are more accurate since they are based on the original composition of fertilizer mixes. The ERT concludes that the explanations provided by Latvia clarified the issue during the review, but recommends that the Party provide information on this comparison in the NIR of its next annual submission.

82. The ERT noted that Latvia reports in the NIR (page 234) that crop tables involve data from farms with an agricultural area larger than 1 ha of agricultural areas. This threshold could mean that not all crop areas are included in the inventory and that the inventory is therefore not in accordance with the IPCC good practice guidance and that there is a potential underestimation of emissions. During the review week, the Party clarified to the ERT that the crop production data used to prepare the inventory also include crop production on agricultural land smaller than 1 ha. The ERT recommends that the Party clarify this issue in the NIR of its next annual submission.

83. Following a question raised by the ERT on how Latvia has addressed the recommendation made in the previous review report that the Party conduct research in order to produce high-quality national information on soil classification that conforms with international standards, the Party stated that it is still working on this issue and plans to produce national information on soil classification that conforms to international standards for the next annual submission. The ERT recommends that the Party continue its efforts to produce country-specific information and report on the advances made in its next annual submission.

84. During the review week, the ERT asked Latvia if sewage sludge is applied to agricultural soils and if there are country-specific data available to allow for the preparation of emission estimates in accordance with the IPCC good practice guidance. The Party responded that there is currently insufficient information on the use of sewage sludge applied to agricultural soils to allow for the calculation of emission estimates. The ERT recommends that Latvia develop national information on the use of sewage sludge applied to agricultural soils and prepare emission estimates in accordance with the IPCC good practice guidance in its next annual submission.

## **E. Land use, land-use change and forestry**

### **1. Sector overview**

85. In 2009, net removals from the LULUCF sector amounted to 20,483.74 Gg CO<sub>2</sub> eq. Since the base year, net removals have increased by 34.8 per cent. The key driver for the rise in removals is the change in carbon stocks in living biomass in forest land remaining forest land, which have resulted in an increase in net removals by 4,641.83 Gg CO<sub>2</sub> eq, or 25.8 per cent, since 1990, mainly as a result of an active forest management policy. Also significant are the increases in net removals in land converted to forest land (506.85 Gg CO<sub>2</sub> eq since 1990), cropland remaining cropland (116.62 Gg CO<sub>2</sub> eq since 1990), and land converted to cropland (716.24 Gg CO<sub>2</sub> eq since 1990). Net emissions from land converted

to settlements have increased by 135.47 Gg CO<sub>2</sub> eq, or 52.5 per cent, since the base year. Within the sector, 20,870.92 Gg CO<sub>2</sub> eq of net removals were from forest land remaining forest land, followed by net removals of 506.22 Gg CO<sub>2</sub> eq from land converted to forest land. Land converted to settlements accounted for net emissions of 393.30 Gg CO<sub>2</sub> eq, cropland remaining cropland accounted for net emissions of 220.97 Gg CO<sub>2</sub> eq, and land converted to cropland accounted for net emissions of 189.7 Gg CO<sub>2</sub> eq. The remaining net emissions of 68.28 Gg CO<sub>2</sub> eq were from grassland remaining grassland, 19.80 Gg CO<sub>2</sub> eq of net emissions were from wetlands remaining wetlands, and 1.32 Gg CO<sub>2</sub> eq of net emissions were from land converted to wetlands.

86. The Party has made recalculations for the LULUCF sector between the 2010 and 2011 submissions following changes in AD and in order to rectify identified errors. The impact of these recalculations on the LULUCF sector was a decrease in removals of 21.24 per cent for 2008. The main recalculations took place in the following categories:

- (a) Forest land remaining forest land;
- (b) Land converted to forest land;
- (c) Land converted to cropland;
- (d) Land converted to settlements.

87. Latvia has provided annual land-use change matrices in the NIR for the period 1990–2009. These were derived based on the national forest inventory (NFI) for the years 2004–2008; satellite image series from 1990, 1995 and 2000; national statistics; and expert judgement. The area of organic soils in cropland and grassland has been updated since the previous annual submission using information from the inventory of historical data on farmland, which was implemented in 2009. The share of organic soils in cropland and grassland is assumed to be equal, and it is also assumed, based on expert judgement, that all land converted to forest land passes through the grassland category before becoming forest land. The ERT commends Latvia for these improvements in the inventory since the previous annual submission.

88. In spite of the recalculations performed, Latvia reported an improvement plan in the NIR which is especially focused on the update of the land use and land-use change matrices using data from the second NFI as well as the improvement of some parameters. The ERT commends the Party for the improvement plan and recommends that Latvia, for future annual submissions, conduct a quantitative assessment of the recalculations performed in accordance with the IPCC good practice guidance for LULUCF.

89. However, the ERT noted that most of the emissions by sources and removals by sinks were estimated using a tier 1 method and IPCC default parameters. In addition, the carbon stock changes in dead organic matter and mineral soils for land remaining forest land were not estimated. Therefore, the ERT recommends that Latvia make efforts to develop higher-tier methods and country-specific parameters for the estimation of emissions from the LULUCF sector and complete the inventory by providing estimates of the carbon stock changes for all mandatory carbon pools in its future annual submissions.

90. As mentioned in paragraph 87 above, some land-use change data and parameters were based on expert judgement. However, the ERT noted that no transparent information was provided in NIR on how the experts derived the data and parameters. Also, although the NIR includes estimates of the uncertainties for all reported categories, the level of the uncertainties is based on expert judgement and statistical errors in AD, but no information is provided in the NIR to explain how the experts derived the uncertainty values. In response to questions raised by the ERT during the review week, Latvia informed the ERT that the reporting of the methodology used for the estimation of GHG emissions and removals, including the uncertainty of the biomass expansion factors and other values used in the inventory, is under preparation. The ERT welcomes the planned improvement and recommends that Latvia improve the transparency of its reporting by providing detailed



explanations of the methodology used, in particular when expert judgement is used, in its next annual submission.

91. For all reported categories, Latvia uses category-specific QA/QC procedures as well as verification activities. However, the ERT still found some errors in the inventory (e.g. the different areas of cropland and grassland reported in NIR tables 7.1.2, 7.1.4, 7.1.5 and 11.1.1). Although these errors were clarified by Latvia in response to questions raised by the ERT during the review week, the ERT recommends that Latvia further improve the QA/QC procedures for the LULUCF sector in its next annual submission.

## 2. Key categories

### Forest land remaining forest land – CO<sub>2</sub>

92. In 2009, forest land remaining forest land, which constitutes more than 50 per cent of the total land area in Latvia, was a net sink of 21,051.24 Gg CO<sub>2</sub> eq, and showing an increase in net removals of 24.4 per cent since 1990. The driver for this increase is the steady increase in the annual increment of the growing stock of forests per ha (which increased by 52.0 per cent in 2009 compared to 1990), which was the result of forest management in the 1970s and 1980s as well as the significant increase in the area of fast-growing forest types and the fact that annual harvest levels were lower than the annual increments during the period 1990–2009.

93. The changes in carbon stocks in living biomass were estimated using country-specific AD together with the default method and parameters from the IPCC good practice guidance for LULUCF. Although Latvia uses data from the NFI to estimate the time-series increments of growing stock, the biomass expansion factors are the IPCC default values for broadleaf forest while the root/shoot ratio was selected from an IPCC default value for coniferous forest, according to expert judgement. The methodology used for the elaboration of biomass functions for the most common tree species is under development at LSFRI Silava. Latvia states in the NIR that as soon as country-specific biomass functions have been elaborated and verified, the values for these parameters will be revised. The ERT commends Latvia for its planned improvements and reiterates the recommendation in the previous review report<sup>10</sup> that Latvia develop country-specific parameters so that it can move to the use of IPCC tier 2 methods for the estimation of emissions and removals for this category. The ERT noted, based on the information provided by the Party, that the methodology used for the estimation and elaboration of the carbon stock changes in living biomass, mineral and organic forest soils and dead wood, which are under development, will be available only after 2012. The ERT recommends that the Party make efforts to obtain the results as soon as possible and report on the improvements made in the next annual submission.

94. Changes in the carbon stock in dead organic matter and mineral soils were reported as “NO” due to the lack of reliable information, but the ERT considers that the notation key used does not reflect the fact that the Party did not estimate the emissions. An IPCC tier 1 method and EF were used to estimate the carbon stock changes in drained organic forest soils. The ERT recommends that Latvia estimate and report the carbon stock changes for the missing pools in future annual submissions.

### Land converted to forest land – CO<sub>2</sub>

95. Latvia provided estimates of the net emissions and removals for the living biomass pool and for the conversion of grassland to forest land only (although this category includes areas converted from abandoned farmland). In 2009, net removals from this category amounted to 506.22 Gg CO<sub>2</sub>, and have increased from 0.62 Gg CO<sub>2</sub> in 1990. All other land-use categories converted to forest land were reported as “NO” based on expert judgement.

<sup>10</sup> FCCC/ARR/2010/LVA, paragraph 83.

In accordance with the NIR, the Party distinguishes forest land remaining forest land and land converted to forest land using a combination of information compiled by tracing back the age of dominant tree species at the permanent NFI plots. The ERT concludes that the methodology and assumptions used were transparently documented in the NIR.

#### Cropland remaining cropland – CO<sub>2</sub>

96. In 2009, cropland remaining cropland was a net source of 220.97 Gg CO<sub>2</sub>. Emissions from this category have decreased by 34.5 per cent since 1990, mainly due to a decrease in the area of cropland. Emissions from organic soils and agricultural lime application were estimated for this category using tier 1 methods and default EFs from the IPCC good practice guidance for LULUCF. In the NIR, Latvia presents information on living tree biomass, showing that this pool is not a net source, but there is a lack of data to enable the accurate estimation of net removals from this pool. Nevertheless, Latvia expects that the next NFI will provide sufficient information to report reliable data on the carbon stock changes in living tree biomass. In addition, Latvia states in the NIR that the area estimates for the entire time series will be revised when the new methodology, which combines information from the NFI and remote sensing data, is ready. The ERT welcomes the Party's efforts to improve the documentation on the AD, uncertainties and explanations of the planned improvements for this category. The ERT recommends that Latvia implement the described improvements and use a tier 2 method to estimate emissions from organic soils.

#### Land converted to cropland – CO<sub>2</sub>

97. Latvia reported the carbon stock changes for the dead organic matter and mineral soils pools for forest land converted to cropland, while the carbon stock changes in the living biomass and organic soils pools were reported under forest land remaining forest land and cropland remaining cropland. Latvia explains in the NIR that it is difficult to distinguish the loss of growing volume in this category from commercial harvesting stock, and no reliable information is available to separate organic soils under cropland remaining cropland from those under land converted to cropland. The ERT recommends that the Party make efforts to separate the estimates for these two categories in the next annual submission.

#### Land converted to settlements – CO<sub>2</sub>

98. Latvia provided estimates of the carbon stock change net emissions from the dead organic matter and soils pools for forest land converted to settlements. All other land-use categories converted to settlements were reported as "NO" based on expert judgement. In 2009, net emissions from this land-use category amounted to 393.30 Gg CO<sub>2</sub>, and have increased by 52.5 per cent since 1990. The carbon stock changes in living biomass for this category were reported under forest land remaining forest land, and the NIR explains that it is difficult to separate the loss of growing volume from commercial harvesting volume. The ERT recommends that the Party make efforts to separate the estimates for these two categories in the next annual submission.

### **3. Non-key categories**

#### Grassland remaining grassland – CO<sub>2</sub>

99. In 2009, grassland remaining grassland was a net source of 67.90 Gg CO<sub>2</sub>. The emissions result from organic soils and controlled burning on grassland. An IPCC tier 1 method and default EFs were used to prepare the estimates. The ERT recommends that Latvia estimate the carbon stock changes in living biomass and move to the use of a higher-tier method in line with the IPCC good practice guidance for LULUCF, in its next annual submission.

Wetlands remaining wetlands – CO<sub>2</sub>

100. Latvia reports the CO<sub>2</sub> emissions associated with industrial peat extraction in this category. IPCC default AD and EFs were used in the calculation of the emissions. The ERT encourages Latvia to implement its plan to use country-specific AD for industrial peat extraction and report the removals from living biomass as soon as NFI data for recent years are validated.

**F. Waste****1. Sector overview**

101. In 2009, emissions from the waste sector amounted to 863.44 Gg CO<sub>2</sub> eq, or 8.0 per cent of total GHG emissions. Since the base year, emissions have decreased by 0.4 per cent. The key driver for the fall in emissions is the decrease in emissions from wastewater handling, which have decreased by 203.84 Gg CO<sub>2</sub> eq, or 43.3 per cent, since the base year, while emissions from solid waste disposal on land have increased by 197.19 Gg CO<sub>2</sub> eq, or 49.8 per cent, since the base year. Within the sector, 68.7 per cent of the emissions were from solid waste disposal on land, followed by 30.9 per cent from wastewater handling and 0.3 per cent from other (waste composting). Waste incineration was responsible for less than 0.1 per cent of emissions from the waste sector.

102. The Party has made recalculations for the waste sector between the 2010 and 2011 submissions following updates in AD and changes in EFs. The impact of these recalculations on the waste sector is a decrease in emissions of 4.7 per cent for 2008. The main recalculations took place in the following categories:

- (a) Solid waste disposal on land;
- (b) Wastewater handling;
- (c) Waste incineration.

103. The inventory includes estimates for most gases and categories from the waste sector. However, the ERT notes that Latvia reports N<sub>2</sub>O emissions from biogenic waste incineration and CH<sub>4</sub> emissions from non-biogenic incineration as not estimated (“NE”). Therefore, the ERT encourages Latvia to improve the completeness of its inventory by reporting emissions from this category in the next annual submission.

104. The sector-specific QA/QC procedures are performed by the regional environmental board, but there is no information in the NIR on the sector-specific QC measures performed. The ERT reiterates the recommendations made in previous review reports that Latvia describe the sector-specific QC procedures in the NIR of its next annual submission and clarify which QC tier is used.

**2. Key categories**Solid waste disposal on land – CH<sub>4</sub>

105. Latvia uses the IPCC tier 2, or first-order decay (FOD), methodology to estimate CH<sub>4</sub> emissions from solid waste disposal on land, using country-specific AD and IPCC default values for the parameters. The ERT recommends that the Party conduct research in order to develop country-specific FOD parameters, instead of using IPCC defaults, so as to enhance the accuracy of this key category.

106. Latvia used the assumption that 50 per cent of solid waste disposal sites were managed and 50 per cent were uncategorized for the years 1980–1989. However, no justification for this assumption is provided in the NIR, and the ERT reiterates the

recommendation from the previous review report<sup>11</sup> that Latvia justify this assumption and further explain the expert elicitation methods used to arrive at this assumption, in its next annual submission.

107. The ERT noted that Latvia reports the amount of waste disposed in uncategorized landfill sites for the period 1970–1989, but does not provide transparent information on the emissions from the uncategorized landfill sites. The ERT recommends that Latvia provide information on how and where it estimates emissions from the uncategorized landfill sites in its next annual submission.

108. The ERT noted that Latvia used the waste density to calculate the amount of disposed waste in tonnes. During the review week, Latvia explained that the waste density value was changed from 0.3 t/m<sup>3</sup> to 0.2 t/m<sup>3</sup> according to recent research information. The ERT recommends that Latvia provide clear information in the NIR of its next annual submission on how the waste density values and their change were determined, in order to improve the transparency of the inventory.

#### Wastewater handling – CH<sub>4</sub>

109. Latvia estimates CH<sub>4</sub> emissions from the treatment of domestic, commercial and industrial wastewater. The ERT noted that, although the previous review report recommended the use of a higher-tier method to estimate emissions from wastewater handling since this is a key category, Latvia still uses the ‘check method’ from the IPCC good practice guidance. Therefore, the ERT reiterates the recommendation from the previous review report<sup>12</sup> that Latvia move to a higher-tier method to estimate emissions from this category in future annual submissions.

110. The method described by Latvia to estimate emissions from industrial wastewater does not refer to the MCF parameters and no information on the MCF values for industrial wastewater is provided in the NIR. The ERT reiterates the recommendation made in the previous review report<sup>13</sup> that Latvia include a discussion of the MCF values used for the estimation of emissions from industrial wastewater treatment in the NIR of its next annual submission.

111. In the previous review report, the ERT recommended that Latvia report emissions from the anaerobic treatment of sludge in the next annual submission. The ERT welcomes the efforts of Latvia to include emission estimates for this category and encourages the Party to improve the accuracy and transparency of the CH<sub>4</sub> emission estimates for this category.

### **3. Non-key categories**

#### Waste incineration – CO<sub>2</sub> and N<sub>2</sub>O

112. The ERT notes that emissions from the incineration of hazardous and clinical waste are not estimated prior to 1999. During the review week, Latvia explained to the ERT that the emissions from waste incineration are not estimated since information on incineration is not available prior to 1999. The ERT recommends that Latvia report emissions from waste incineration for the full time series in its next annual submission.

#### Other (waste) – CH<sub>4</sub> and N<sub>2</sub>O

113. The ERT notes that emissions from waste composting are not estimated prior to 2003. During the review, Latvia explained to the ERT that the emissions from industrial waste composting are not estimated because data are not available prior to 2003. The ERT

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<sup>11</sup> FCCC/ARR/2010/LVA, paragraph 97.

<sup>12</sup> FCCC/ARR/2010/LVA, paragraph 100.

<sup>13</sup> FCCC/ARR/2010/LVA, paragraph 104.

recommends that Latvia report emissions from waste composting for the entire time series in its next annual submission.

## **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

114. Under Article 3, paragraph 3, of the Kyoto Protocol, Latvia has reported emissions and removals from afforestation and reforestation, and deforestation, and under Article 3, paragraph 4, of the Kyoto Protocol, the Party has elected and reported emissions and removals from forest management for 2008 and 2009. Latvia has chosen to account for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol at the end of the commitment period.

115. The emissions and removals from all KP-LULUCF activities were estimated and reported in accordance with the IPCC good practice guidance for LULUCF and decisions 15/CMP.1 and 16/CMP.1, and in line with the requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1.

116. Latvia uses the IPCC reporting method 1 for land areas subject to afforestation and reforestation, deforestation and forest management. This approach is consistent with the approach used to estimate emissions for the LULUCF sector under the Convention. The geographical location of the boundaries of the areas that encompass all KP-LULUCF activities were identified through Landsat image series from 1990, 1995 and 2000 in combination with NFI data. The spatial assessment units cover the entire territory of Latvia.

117. The ERT found that the methodological approaches, AD and EFs used to estimate the emissions and removals from the KP-LULUCF activities are consistent with those used to estimate the emissions and removals from land use and land-use change reported under the Convention (LULUCF sector). Consequently, some of the issues raised in the discussion of the LULUCF sector of this report also apply to the KP-LULUCF activities.

118. In addition, the ERT noted that the methodology used for the estimation and elaboration of the carbon stock changes for all pools are under development and final recalculations will be available after the 2012 submission. The ERT commends the Party for its improvement plan but recommends that Latvia move to higher-tier methods and the use of country-specific parameters as soon as possible. The ERT also recommends that the Party report on the developments of the plan in the NIR of future annual submissions.

119. The NIR includes uncertainty estimates for the reported carbon pools, emissions and removals, and AD and EFs, but the combined level of uncertainty for the reported activities was not provided. The level of uncertainty is based on expert judgement and statistical errors in the AD, but no information is provided in the NIR on how the expert judgement was arrived at. The ERT recommends that Latvia conduct a tier 2 uncertainty analysis and improve the transparency of its reporting on the uncertainty analysis in its next annual submission.

120. The ERT found that the CO<sub>2</sub> emissions and removals in CRF table 5.A.1 for forest land remaining forest land are different from the emissions and removals reported in CRF table 5(KP-I)B.1 for forest management. The ERT also found some inconsistencies, or potential errors, in several CRF tables; for example, the areas of afforestation/reforestation and deforestation activities in CRF table NIR-2 are different from the areas reported in CRF tables 5(KP-I)A.1.1 and 5(KP-I)A.2. Also, the areas of afforestation/reforestation and deforestation land areas at the end of the current year (line 15) in CRF table NIR-2 for 2008 are different from those at the start of the current year (column J) in CRF table NIR-2 for

2009. The ERT recommends that Latvia improve the QA/QC procedures in its next annual submission in order to enhance the consistency and transparency of its reporting.

121. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD, and in order to correct identified errors. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows:

- (a) GHG emissions from deforestation activities decreased by 40.7 per cent;
- (b) GHG removals from forest management activities increased by 0.02 per cent.

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

122. Latvia used the same method and EFs as those applied under the Convention (LULUCF sector) for afforestation/reforestation (land converted to forest land), and deforestation (forest land converted to cropland and forest land converted to settlements), which is in line with the IPCC good practice guidance for LULUCF. The carbon stock changes for all carbon pools were estimated, except for litter and dead wood for afforestation and reforestation activities; the Party explained that this is due to a lack of data and in order to avoid the overestimation of removals. The carbon emissions from lime application on deforestation lands and N<sub>2</sub>O emissions from disturbance associated with deforestation to cropland were also reported.

#### *Deforestation – CO<sub>2</sub>*

123. The ERT found that Latvia did not provide sufficient information on how the loss of living biomass and CO<sub>2</sub> emissions from organic soils on deforestation lands were estimated given that it was difficult to separate them from forest land remaining forest land and cropland remaining cropland. In response to the questions raised by the ERT during the review week, the Party explained that the average harvesting stock was used to estimate the loss of living biomass on deforested lands. Also, it is assumed that the share of organic soils in cropland remaining cropland and land converted to cropland is the same (5.2 per cent), which was then used to estimate CO<sub>2</sub> emissions from organic soils on deforested lands. The ERT accepts the explanation provided by the Party and recommends that Latvia enhance the description of the methods used in the NIR of its next annual submission.

124. The ERT noted that GHG emissions from deforestation for 2008, according to the 2011 submission, are over 40.7 per cent lower than those reported in the 2010 resubmission, although the deforestation area is the same. The ERT also found that the values of the EFs used for dead wood, litter and mineral soils in the 2011 submission are much lower than those reported in the 2010 resubmission, without any explanation in the NIR. The ERT recommends that Latvia provide transparent clarification of the recalculations in the NIR of its next annual submission, in order to improve the transparency of its reporting.

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

#### *Forest management – CO<sub>2</sub> and N<sub>2</sub>O*

125. Latvia used the same method and parameters as those applied under the Convention for forest land remaining forest land (forest management activity), which is in line with the IPCC good practice guidance for LULUCF. The Party reported the carbon stock changes in living biomass, the emissions from organic forest soils, the N<sub>2</sub>O emissions from forest soil drainage and the GHG emissions from biomass burning on forest management lands. The ERT reiterates the recommendations made above for forest land remaining forest land (see paras. 93 and 94 above), which also apply to forest management.

## 2. Information on Kyoto Protocol units

### Standard electronic format and reports from the national registry

126. 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 SIAR on the SEF tables and the SEF comparison report.<sup>14</sup> The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the findings and recommendations contained in the SIAR.

127. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, 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 set out in paragraph 88(a-j) of the annex to decision 22/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.

### National registry

128. The ERT took note of the SIAR and its findings that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its findings that the national registry continues, in general, 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 decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

129. However, the ERT noted from the SIAR and its findings that the national registry has not fulfilled the requirements regarding the public availability of information in accordance with section I.I.E of the annex to decision 13/CMP.1. The ERT reiterates the recommendation in the SIAR that Latvia provide a different weblink or modify the software to make the information referred to in the annex to decision 13/CMP.1, paragraph 45, publicly available.

### Calculation of the commitment period reserve

130. Latvia has reported its commitment period reserve in its 2011 submission (53,613,711 Gg CO<sub>2</sub> eq). The ERT disagrees with this figure. In response to the list of potential problems and further questions raised by the ERT, Latvia reported its commitment period reserve to be 53,677,339 Gg CO<sub>2</sub> eq based on the national emissions in its most recently reviewed inventory (10,735.47 Gg CO<sub>2</sub> eq). The ERT agrees with this figure.

## 3. Changes to the national system

131. Latvia provided information on the changes to its national system since the previous annual submission: starting from 1 January 2011 the name of the Ministry of Environment was changed to the Ministry of Environmental Protection and Regional Development. 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.

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<sup>14</sup> The SEF comparison report is prepared by the ITL administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

#### **4. Changes to the national registry**

132. Latvia provided information on the changes to its national registry since the previous annual submission. However, Latvia reported that there have been no significant technical, functional or documentary changes in its national registry since the previous annual submission, apart from the update of the contact details of the registry administrators. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

133. Latvia did not provide information on the 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. However, the ERT noted that the text in the NIR is unchanged from the previous annual submission. The ERT recommends that the Party, in its next annual submission, report any change(s) in its information provided under Article 3, paragraph 14, in accordance with chapter I.H of the annex to decision 15/CMP.1.

134. The reported information is generally transparent and complete and includes information on policy elements for the mitigation of climate change in order to fulfil its commitments under Article 3, paragraph 1, of the Kyoto Protocol. However, it is not clear from the information provided in chapter 15 of the NIR how Latvia, in implementing its commitments under Article 3, paragraph 14, of the Kyoto Protocol, prioritizes the actions listed in paragraph 24 of the annex to decision 15/CMP.1. The ERT encourages Latvia to enhance the completeness of its reporting by expanding the information provided in the NIR with a description of how the actions are prioritized.

### **III. Conclusions and recommendations**

135. Latvia made its annual submission on 15 April 2011. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

136. The ERT concludes that the inventory submission of Latvia has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2009 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as complete in terms of categories and gases.

137. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1.

138. The Party's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT notes that Latvia has made significant improvements to the methods used and has provided recalculations for the full time series since the previous annual submission.

139. The Party has made recalculations for the inventory between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD and EFs, and in order to rectify identified errors. The impact of these recalculations on the



national totals is a decrease in emissions excluding LULUCF of 0.19 per cent for 2008. The main recalculations took place in the following sectors/categories:

- (a) Energy industries;
- (b) Manufacturing industries and construction;
- (c) Other sectors;
- (d) Mineral products;
- (e) Agricultural soils.

140. Latvia has reported emissions and removals from activities under Article 3, paragraph 3, and emissions and removals from forest management activity under Article 3, paragraph 4, for 2008 and 2009. The estimates are consistent with the IPCC good practice guidance for LULUCF and decision 16/CMP.1, and complete information has been provided with respect to the requirements outlined in paragraphs 5–9 of the annex to decision 15/CMP.1. The methods, AD, EFs and spatial approach used to report the KP-LULUCF activities are consistent with the reporting for the LULUCF sector. The ERT commends Latvia for the efforts made to improve the methodological level and develop country-specific parameters.

141. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to the 2010 annual review report, following changes in AD and in order to rectify identified errors. The main recalculations for 2008 are as follows:

- (a) GHG emissions from deforestation activity decreased by 40.74 per cent;
- (b) GHG removals from forest management activity increased by 0.02 per cent.

142. Latvia has reported information on its accounting of Kyoto Protocol units in accordance with chapter I.E of the annex to decision 15/CMP.1, and has used the required reporting format tables as required by decision 14/CMP.1.

143. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

144. 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.

145. Latvia has reported information under chapter I.H of the annex to decision 15/CMP.1, “Minimization of adverse impacts in accordance with Article 3, paragraph 14” as part of its 2011 annual submission. The information was provided on 15 April 2011. The reported information is generally complete and transparent.

146. The ERT identifies the following cross-cutting issues for improvement:

- (a) Continuing efforts to move to the use of higher-tier methods and country-specific data for the estimation of emissions and removals from the key categories;
- (b) Improving the way in which the QC procedures are implemented in order to reduce the occurrence of errors and inconsistent reporting between the CRF tables and the NIR (see paras. 20, 26, 59(b), 63, 91, 104 and 120 above), and reporting on any improvements made;
- (c) Providing detailed information in the NIR on how the key category analysis and the uncertainty analysis are used to prioritize inventory improvements (see paras. 19 and 23 above);

(d) Making efforts to implement planned inventory improvements in a timely manner (see para. 32 above);

(e) Enhancing the transparency of the reporting, in particular the explanations of the trends and some assumptions (see paras. 28, 39, 46, 49, 53, 68, 72, 74, 81, 82, 90, 106–108, 110, 123 and 124 above);

(f) Reporting any change(s) in its information provided under Article 3, paragraph 14, in accordance with chapter I.H of the annex to decision 15/CMP.1.

147. In the course of the review, the ERT formulated a number of recommendations relating to the information presented in Latvia's annual submission. The key recommendations are that Latvia:

(a) Provide further explanations on the emission trend for navigation (see para. 38 above) and the split between national and international navigation (see para. 46 above);

(b) Revise the thresholds (10 per cent) used for the QC procedures in the energy sector, and make the thresholds specific to each category (see para. 40 above);

(c) Update the characteristics of fuels, such as gasoline and coal, using more recent information and provide transparent information in the NIR on the underlying data and assumptions used (see paras. 49 and 53 above);

(d) Include in the NIR further information on the AD and assumptions used in the calculation of emissions from civil aviation, namely the correspondence between aircraft and representative aircraft and complementary data on LTOs and the LTO EF;

(e) Improve the consistency of the time series in the industrial processes sector where different methodologies or AD are used for different time periods (see paras. 62, 66 and 69 above);

(f) Improve the accuracy of the emission estimates for cement production by moving to a tier 2 method;

(g) Improve the explanations in the NIR as to why emissions from field burning of agricultural residues are reported as "NO";

(h) Develop tier 2 estimates with country-specific EFs for non-dairy cattle and swine;

(i) Continue its efforts to implement the improvement plan for the LULUCF sector, and conduct a quantitative assessment of the recalculations made;

(j) Develop higher-tier methods and country-specific parameters for the LULUCF sector and the KP-LULUCF activities, and complete the inventory by providing estimates of the carbon stock changes for all mandatory carbon pools (see paras. 89, 93, 94, 96, 97, 99, 100 and 118 above);

(k) Develop country-specific FOD parameters for the category waste disposal on land and move to a higher-tier method for the estimation of emissions from wastewater handling in the waste sector.

#### **IV. Questions of implementation**

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

## Annex I

### 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 2011. Available at <<http://unfccc.int/resource/docs/2011/asr/lva.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <<http://unfccc.int/resource/webdocs/sai/2011.pdf>>.

FCCC/ARR/2010/LVA. Report of the individual review of the annual submission of Latvia submitted in 2010. Available at <<http://unfccc.int/resource/docs/2011/arr/lva.pdf>>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <[http://unfccc.int/kyoto\\_protocol/registry\\_systems/independent\\_assessment\\_reports/items/4061.php](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 (Latvian Environment, Geology and Meteorology Centre), including additional material on the methodologies and assumptions used.

## Annex II

### Acronyms and abbreviations

AD	activity data
CaO	calcium oxide
CH <sub>4</sub>	methane
CKD	cement kiln dust
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU ETS	European Union emissions trading scheme
FAO	Food and Agriculture Organization of the United Nations
FOD	first-order decay
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs and SF <sub>6</sub> without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10 <sup>9</sup> joule)
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kg	kilogram (1 kg = 1,000 grams)
LTO	landing and take-off
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MJ	megajoule (1 MJ = 10 <sup>6</sup> joule)
N	nitrogen
NA	not applicable
NCV	net calorific value
NE	not estimated
N <sub>2</sub> O	nitrous oxide
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
RFO	residual fuel oil
SEF	standard electronic format
SF <sub>6</sub>	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10 <sup>12</sup> joule)
UNFCCC	United Nations Framework Convention on Climate Change