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Report of the individual review of the greenhouse gas inventory of Latvia submitted in 2006*

* In the symbol for this document, 2006 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Overview

A. Introduction

1. This report covers the in-country review of the 2006 greenhouse gas (GHG) inventory submission of Latvia, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8. The review took place from 21 to 26 May 2007 in Riga, Latvia, and was conducted by the following team of nominated experts from the roster of experts: generalist – Ms. Inga Konstantinaviciute (Lithuania); energy – Mr. Leif Hockstad (USA); industrial processes – Mr. Phillip Acquah (Ghana); agriculture – Ms. Hongmin Dong (China); land use, land-use change and forestry (LULUCF) – Mr. Harry Vreuls (Netherlands); waste – Mr. Sabin Guendehou (Benin). Mr. Leif Hockstad and Mr. Sabin Guendehou were the lead reviewers. The review was coordinated by Ms. Keryn Oude-Egberink (UNFCCC secretariat).

B. Inventory submission and other sources of information

2. In its 2006 submission, Latvia submitted a complete set of common reporting format (CRF) tables for the years 1990–2004 and a national inventory report (NIR). Latvia also submitted a revised GHG inventory on 18 September 2007 in response to questions raised by the expert review team (ERT) during the course of the in-country review. The submission of 18 September 2007 is used as the basis for this review.

3. Where necessary the ERT also used previous submissions, additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report.

C. Emission profiles and trends

4. In 2004, the most important GHG in Latvia was carbon dioxide (CO_2), which contributed 69.6 per cent of total[1] national GHG emissions expressed in CO_2 eq., followed by methane (CH_4), 16.9 per cent, and nitrous oxide (N_2O), 13.3 per cent. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together contributed 0.2 per cent of the overall GHG emissions in the country. The energy sector accounted for 72.6 per cent of the total national GHG emissions followed by agriculture, 17.3 per cent, industrial processes, 2.2 per cent, solvent and other product use, 0.5 per cent, and waste, 7.4 per cent. Emissions decreased in all sectors except the waste sector. The most significant reductions in emissions from 1990 to 2004 occurred in the energy sector and the agricultural sector – a 58.6 per cent reduction and a 68.8 per cent reduction, respectively. Total national GHG emissions amounted to 10,673.90 Gg CO_2 eq., a decrease of 58.8 per cent from 1990 (base year) to 2004. The significant decrease in Latvia's GHG emissions is mainly due to the process of transition to a market economy in Latvia after 1990.

5. Tables 1 and 2 show the GHG emissions by gas and by sector, respectively.

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

Table 1. Greenhouse gas emissions by gas, 1990–2004

GHG emissions (without LULUCF)	Gg CO_2 eq.								
	Base year Convention[a]	1990	1995	2000	2001	2002	2003	2004[a]	Change BY–2004 (%)
CO_2 (with LULUCF)	–2 068.12	–2 068.12	–8 873.67	–7 216.13	–6 798.87	–5 814.76	–6 180.45	–6 515.06	215.0
CO_2 (without LULUCF)	18 622.93	18 622.93	8 814.62	6 955.73	7 426.52	7 354.33	7 495.67	7 426.64	–60.1
CH_4	3 516.15	3 516.15	2 073.61	1 813.06	1 885.49	1 900.33	1 805.78	1 837.19	–47.7
N_2O	3 790.29	3 790.29	1 351.98	1 251.96	1 382.72	1 370.48	1 438.88	1 425.64	–62.4
HFCs	NA, NO	NA, NO	0.29	8.59	9.81	11.82	12.95	16.23	NA
PFCs	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA
SF_6	NA, NO	NA, NO	0.25	1.28	1.98	3.38	4.41	5.37	NA

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable; NO = Not occurring.

[a] Latvia submitted revised estimates in the course of the review on 18 September 2007 for all years of the time series. These estimates differ from Latvia's GHG inventory submitted in 2006.

Table 2. Greenhouse gas emissions by sector, 1990–2004

Sectors	Gg CO_2 eq.								
	Base year Convention[a]	1990	1995	2000	2001	2002	2003	2004[a]	Change BY–2004 (%)
Energy	18 708.68	18 708.68	9 239.53	7 285.88	7 775.30	7 696.44	7 794.84	7 753.68	–58.6
Industrial processes	545.51	545.51	166.95	186.70	203.84	221.06	231.89	232.09	–57.5
Solvent and other product use	55.70	55.70	46.17	49.01	55.16	53.41	54.07	55.32	–0.7
Agriculture	5 915.97	5 915.97	2 104.45	1 703.81	1 844.74	1 838.79	1 878.12	1 845.41	–68.8
LULUCF	–20 670.30	–20 670.30	–17 649.61	–14 109.84	–14 186.94	–13 126.44	–13 634.68	–13 904.53	–32.7
Waste	682.76	682.76	644.97	743.19	789.03	788.00	757.33	787.40	15.3
Other	NO	NO	NO	NO	NO	NO	NO	NO	NA
Total (with LULUCF)	**5 238.32**	**5 238.32**	**–5 447.54**	**–4 141.24**	**–3 518.87**	**–2 528.74**	**–2 918.43**	**–3 230.63**	**–161.7**
Total (without LULUCF)	**25 908.62**	**25 908.62**	**12 202.06**	**9 968.60**	**10 668.07**	**10 597.70**	**10 716.25**	**10 673.90**	**–58.8**

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable; NO = Not occurring.

[a] Latvia submitted revised estimates in the course of the review on 18 September 2007 for all years of the time series. These estimates differ from Latvia's GHG inventory submitted in 2006.

D. Key categories

6. Latvia has reported a tier 1 key category analysis, using both level and trend assessment, as part of its 2006 submission. Latvia has included the LULUCF sector in its key category analysis for the first time. A key category analysis was carried out for 1990 and 2004. The tier 1 key category analysis performed by Latvia and the secretariat[2] produced similar results, except that the secretariat identified N_2O from pasture, range and paddock manure (4.D.2) as key categories in its level and trend assessment and CH_4 from manure management (4.B) as a key category in its level assessment. The key categories identified by Latvia are more aggregated (e.g. Latvia has reported as a key category CO_2 removals from forest land, which includes forest land remaining forest land (5.A.1) and land converted to forest land (5.A.2)).

7. The ERT identified that Latvia has not used the results of the key category analysis to prioritize the development of its inventories and to identify the methodology to be applied to estimate key categories. The ERT recommends Latvia to continue to identify key categories including and excluding LULUCF, to improve the consistency of its reporting of key categories between the NIR and the CRF tables, and to use the results to prioritize the development of the inventory.

E. Main findings

8. In terms of completeness, consistency and comparability, the 2006 GHG inventory submitted by Latvia is broadly in conformity with the UNFCCC "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, Part I), the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). The NIR includes information on key categories, methods, data sources and emission factors (EFs).

9. The description of the institutional arrangements and procedures for the inventory preparation provided in the 2006 inventory submission is incomplete, including the roles, responsibilities and minimum capacities of the collaborating entities and their coordination with the designated single national entity, the Latvian Environment, Geology and Meteorology Agency (LEGMA). Additional information on the institutional arrangements and procedures, including the introduction of new regulations which will enter into force on 30 June 2008, was provided to the ERT during and after the in-country review. The new regulations will address the definition of the roles and responsibilities of the organizations involved in the preparation of the inventory. The ERT acknowledged that the activities to be implemented will improve the institutional and procedural arrangements needed to perform the functions of the national system.

10. A quality assurance/quality control (QA/QC) plan is not provided in Latvia's 2006 GHG inventory submission despite recommendations from the previous (2005) review. Latvia provided a schedule for the implementation of QA/QC procedures and reported that all issues regarding QA/QC activities will be elaborated in the new regulations that will enter into force on 30 June 2008. The ERT recommends that the QA/QC plan to be implemented with the new regulations should comply with the

[2] The secretariat identified, for each Party, those source categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for those Parties that provided a full set of CRF tables for 1990 (the base year). 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.

IPCC good practice guidance. The ERT also recommends Latvia to include documentation on verification procedures in its next inventory submission.

11. Latvia's inventory is generally accurate as defined by the UNFCCC reporting guidelines, Part I, and the IPCC good practice guidance. The accuracy of the inventory has improved compared with the previous (2005) submission, but could be improved further by preparing emission estimates for key categories using a higher-tier methodology in line with the recommendations of the IPCC good practice guidance. The ERT recommends Latvia to use higher-tier methods for all key categories. During the in-country review, the ERT identified a few categories where the activity data (AD), methods or EFs used are not in accordance with the IPCC good practice guidance (e.g. in the energy, industrial processes and agriculture sectors), which has resulted in inaccurate estimates, for example, overestimations in the base year and underestimations in 2004. The ERT recommends Latvia to use the revised AD, methods or EFs to report emissions for these categories in its next inventory submission. Further details are provided in the discussion on the individual sectors below.

12. Considerable improvements and revisions are still necessary in the LULUCF sector, such as the implementation of QA/QC procedures, the use of a higher-tier methodology for estimating the emissions from forestland, and including the LULUCF sector in the uncertainty analysis.

F. Cross-cutting topics

1. Completeness

13. The inventory is complete in terms of years and geographical coverage. Coverage of categories and gases is fairly complete. CRF tables are completely filled in (except table 9(b)), but some categories reported still use the notation key not estimated ("NE"), such as several LULUCF categories. Latvia states that these sources are mostly of very minor importance and that they are reported as "NE" due to a lack of methodology or AD. The ERT recommends Latvia to improve completeness of the national inventory by developing and implementing a plan for data collection, and by improving documentation of "NE" sources in its next inventory submission.

2. Transparency

14. The NIR includes information on key categories, methods, data sources and EFs. Transparency in the NIR and CRF tables has improved compared with the previous (2005) submission, including more information in the NIR regarding data such as the country-specific CO_2 EFs for stationary combustion in the energy sector. However, the latest information is not sufficient to assess the inventory in accordance with the UNFCCC reporting guidelines. More information is needed to achieve full transparency in the NIR, such as complete information on country-specific EFs, methodologies and assumptions, and on literature sources and references as well as improved documentation of expert judgments. On this basis, during the review the ERT recommended that Latvia, in its next submission, expand the discussion of methodologies in its NIR, make greater use of annexes in the NIR for documenting country-specific methods and EFs, and include additional country-specific information in the documentation boxes of the CRF tables. Latvia in providing comments on this report, advised that more detailed information on country-specific EFs and methodologies is included in the NIR of the 2008 inventory submission.

3. Recalculations and time series consistency

15. The ERT noted that recalculations have been reported by Latvia in all sectors for the time series 1990 to 2003, taking into account changes to methodologies, changes in EFs and updated AD. The major changes include: inclusion of estimates for the fluorinated gases (F-gases); the use of improved methodologies and AD applied for estimating sources of GHG emissions in the waste sector; reassessment of the area of histosols in agriculture; and the revision of AD on paint application under solvent and other product use. The changes resulting from the recalculations of the estimates of total

CO_2 eq. emissions (excluding LULUCF) are a 2.2 per cent increase in 1990 emissions and a 1.7 per cent increase in 2003 emissions for the 2006 submission when compared with the 2005 submission.

16. The rationale for these recalculations is provided in the NIR: generally, the availability of better AD led to the recalculations. The recalculations have resulted in improvements to Latvia's national inventory. During the review, in order to further improve transparency in the national inventory, the ERT recommended that Latvia should provide in its next submission an explanation of the recalculations in CRF table 8(b), which would improve consistency between the NIR and CRF tables, and more information on the impact of the recalculations on the key source categories, level as well as trend. Latvia in providing comments on this report, advised that an explanation of the recalculations is provided in the CRF table 8(b) of the 2008 inventory submission.

4. Uncertainties

17. In the 2006 submission, Latvia provided quantitative uncertainty estimates for the first time, based on IPCC good practice guidance tier 1 level and trend assessments. Uncertainty analysis has been carried out for all sectors except LULUCF. During the review, Latvia informed the ERT that it is planning to include the LULUCF sector in its next submission. The NIR states that uncertainty estimates are mainly based on expert judgment or default estimates from the IPCC good practice guidance, and that total inventory uncertainty is approximately 5 per cent. Latvia reports that the overall uncertainty for CO_2 is the lowest (4 per cent), whereas higher uncertainties are reported for CH_4 (16 per cent) and for N_2O (27 per cent). Latvia states that the CH_4 and N_2O uncertainties are higher because Latvia uses default EFs to calculate emissions from those gases.

18. Latvia reported separate uncertainty estimates for AD and EFs using the IPCC good practice guidance table 6.1. In general, for both AD and EFs, uncertainty values (2–5 per cent) have been assigned to the different source categories. The rationale provided by Latvia for the selection of such low uncertainty levels for the different sources is not very well explained, with the exception of the industrial processes sector. Expert judgments on uncertainties are not documented. The ERT recommends Latvia to include more information on the rationale for the selection of uncertainty levels in each sectoral chapter of the NIR in its next inventory submission.

5. Verification and quality assurance/quality control approaches

19. A QA/QC plan for Latvia's 2006 inventory submission is not included in the NIR. During the in-country review, Latvia explained that several checks are routinely carried out to eliminate potential basic errors. These include checks on: the correctness of emissions calculations; the correctness of EFs, units and conversion factors; the integrity of database files; and the consistency of data between source categories. These procedures are not well documented. QA by independent national experts has not yet been carried out.

20. During the in-country review, Latvia presented a QA/QC plan, which had been approved in April 2007 by the Director of LEGMA. The plan includes tier 1 QC procedures which will be implemented internally by LEGMA for future inventories, but the plan does not address QA procedures. Latvia explained during review that the Central Statistical Bureau (CSB) and the enterprises involved in the European Union Emissions Trading Scheme (EU ETS) have their own QC systems. In addition, following the in-country review, Latvia provided a schedule for the implementation of QA/QC procedures and reported that all issues regarding QA/QC activities will be elaborated in the new regulations which will enter into force on 30 June 2008.

21. The ERT recommends Latvia to implement and document in its next inventory submission a QA/QC plan in accordance with the IPCC good practice guidance, to improve QA by carrying out a domestic review of the inventory by independent experts and to include documentation on verification procedures.

6. Follow-up to previous reviews

22. Latvia has implemented some of the improvements suggested by previous reviews, in particular: the provision of additional information on AD, methodologies and EFs, and recalculations in the NIR; more complete reporting on F-gases; an evaluation of the area of cultivated histosols; and the estimation of quantitative uncertainties. However, further work is still needed to improve the transparency of the NIR, especially with respect to the description of country-specific methods, AD and EFs for some specific source categories, as is detailed in the sectoral sections below. Further work is also needed on the use of higher-tier methods to calculate emissions from key categories, as is detailed in the sectoral sections below, and implementation of a QA/QC plan and other areas presented in the relevant sectoral sections of this report.

G. Areas for further improvement

1. Identified by the Party

23. Latvia identified several areas for improvement in the NIR and provided further details during and following the in-country review; for example, Latvia noted the planned implementation of the new law, the Law on the Participation of the Republic of Latvia in the Flexible Mechanisms under the Kyoto Protocol and its regulations, which will provide the legal basis for requirements regarding the national system (including capacity); future implementation of the LEGMA QA/QC plan; further research on country-specific EFs; the development and improvement of the data links between the GHG inventory and the EU ETS; the use of officially available revised AD for the energy sector (for the period 1990–1994); and cooperation with appropriate experts in industrial companies and other institutions to develop national methods and EFs and to improve the uncertainty estimates for the agriculture and LULUCF sectors.

2. Identified by the ERT

24. The ERT identified the following cross-cutting issues for improvement. The Party should, in its next submission:

(a) Provide information in the inventory submission on the roles, responsibilities and coordination of all the collaborating entities involved in inventory preparation, including the establishment of formal agreements with data collection agencies to reflect the provisions of the new regulations (i.e which will address the institutional arrangements);

(b) Further develop, implement and document the QA/QC plan, including coordination with the external agencies and entities involved in the development of the inventory in its NIR, and develop and improve QA (e.g. by means of independent review) and verification procedures in its next inventory submission;

(c) Improve its documentation of country-specific methodologies, (e.g. for transportation categories), provide better documentation in the NIR of the AD values used in the calculations, make greater use of annexes to the NIR to document country-specific methods and EFs, and use the documentation boxes in the CRF tables;

(d) Improve the accuracy of its future inventory submissions by using higher-tier methods for estimating key categories in line with the recommendations of the IPCC good practice guidance;

(e) Improve completeness by addressing the calculation of categories that are currently reported as “NE”;

(f) Implement and document the new method of undertaking the National Forest Inventory (NFI), which is to be used for the LULUCF sector in the NIR, and use the method consistently throughout the time series for the identification of land areas, including land areas for Article 3, paragraphs 3 and 4, activities;

(g) Improve the uncertainty analysis and provide more details about the rationale for the selection of uncertainty levels, and document expert judgment used in the analysis.

25. Recommended improvements relating to specific source/sink categories are detailed in the relevant sector sections of this report.

II. Energy

A. Sector overview

26. In 2004, emissions from the energy sector amounted to 7,753.68 Gg CO_2 eq., making the energy sector the largest source of GHG emissions in Latvia. The energy sector represented 72.6 per cent of total 2004 emissions (without LULUCF). The largest contribution to energy sector emissions in 2004 was emissions from transportation sources (36.7 per cent), which have grown substantially since 1990 (transportation represented 13.4 per cent of the energy sector total in 1990). In 2004, energy industries (1.A.1) were the second largest contributor in the energy sector (27.0 per cent), followed by other sectors (1.A.4) and the manufacturing and construction industries (1.A.2) (19.9 per cent and 14.7 per cent respectively). In 2004, fugitive emissions were of minor importance in Latvia (1.7 per cent).

27. The reporting of the energy sector in the NIR is mostly complete, consistent, and comparable. Transparency and accuracy remain the key areas on which to focus future efforts. Latvia has expanded its discussion of recalculations in the energy sector in response to previous reviews, and the ERT commends this improvement. With regard to transparency, the ERT recommends Latvia to improve its documentation of country-specific methodologies, specifically for transportation categories, and to provide better documentation in the NIR of the AD values used in the calculations (e.g., transportation). Additional QA/QC steps beyond those already detailed in Latvia's QA/QC plan may be necessary to ensure accurate reporting of this important sector of Latvia's national inventory. Further investigation is recommended to improve the uncertainty analysis in the energy sector.

28. Calculation and data-sharing agreements exist between LEGMA and external agencies and entities. For example, the CSB provides official fuel consumption data and the Road Traffic Safety Directorate (RTSD) provides AD for road transportation. The ERT recommends Latvia to put in place a sustainable system for the calculation of emissions from the energy sector in order to reinforce these arrangements, for example, by improving coordination on QA/QC activities with the CSB and formalizing arrangements for transferring AD on road transportation statistics from the RTSD as input to calculation models.

29. During the in-country review Latvia, in response to questions raised by the ERT, provided revised estimates for 1990–2004 for the energy sector, including energy industries (1.A.1) – all fuels – CO_2, CH_4, N_2O; manufacturing and construction industries (1.A.2) – all fuels – CO_2, CH_4, N_2O; other sectors (1.A.4) – CO_2, CH_4, N_2O; and road transportation (1.A.3.b) – gasoline – CO_2. The revisions were based on new EFs and revised AD.

B. Reference and sectoral approaches

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

30. Latvia has calculated CO_2 emissions from fuel combustion using the IPCC reference approach and the sectoral approach, and provided data in CRF table 1.A(c) for the entire time series. For the year 2004, there is a difference of –0.98 per cent in the CO_2 emission estimates and a difference of 5.07 per

cent in the fuel consumption estimates between the reference approach and the sectoral approach. Latvia noted in the CRF documentation boxes, and further explained during the in-country review, that the differences are due to statistical discrepancies between the CSB's energy balance and the available data for the inventory's sectoral approach. Latvia indicated during the in-country review that efforts are being made with the CSB to reduce these statistical differences. These differences resulted in an apparent overestimation in the sectoral approach to CO_2 emissions estimates for 2004 in the energy sector that was reported in the 2006 inventory submission. Differences with comparable international data were clarified during the in-country review. The ERT encourages Latvia to pursue this issue for its next inventory submission

2. International bunker fuels

31. Data on bunker fuels are based on surveys collected by the CSB for the energy balance. Latvia commissioned a study of domestic aviation detailing flight information broken down by the International Civil Aviation Organization (ICAO) into engine type and hours flown. For marine bunkers all fuels delivered to ports are considered to be for international bunker fuel use. To differentiate bunker fuel use from domestic fuel use, a study of domestic navigation was carried out on seasonal watercraft in Latvia. Both studies are only available in Latvian, making it difficult for the ERT to fully review them. It also remains unclear how the current use of the CSB survey of ports differentiates the potential uses for domestic navigation along the Daugava River from international bunker use. The ERT recommends that the results of the surveys be further explained and investigated by the CSB, in order to verify the assumption that all fuel deliveries to the ports are only for use as international bunker fuel. Latvia advised the ERT that this will be clarified in the 2008 inventory submission.

3. Feedstocks and non-energy use of fuels

32. Latvia reports the carbon (C) stored in bitumen and lubricants in CRF table 1.A(d). Details on the AD and storage factors are not provided in the NIR. No other feedstocks and possible non-energy uses of fuels are reported. The ERT recommends reporting the detail of the calculations for these non-energy uses of fuels more transparently in the NIR in Latvia's next submission.

C. Key categories

1. Stationary combustion – all fuels – CO_2

33. In the 2006 submission, Latvia calculates CO_2 emissions using country-specific EFs and AD from the CSB. During the in-country review and in response to the ERT's recommendations, Latvia provided revised GHG emission estimates for 1990−2004 for the categories energy industries (1.A.1); manufacturing and construction industries (1.A.2); and other sectors (1.A.4) to reflect new, more disaggregated CSB data (i.e. for 1990–1993), which conforms better to the IPCC good practice guidance and the UNFCCC reporting guidelines, Part I.

34. In response to previous reviews, Latvia includes a list of CO_2 EFs in the NIR (table 3.3.2). However, no substantive details are provided in the NIR on the derivation of the variables, except for a reference to the EF study. The country-specific CO_2 EFs for all fuels in the NIR table appear to have been applied across the entire time series.

35. During the in-country review, the ERT was provided with a study ("Metodiskie noradijumi CO_2 emisiju noteikšanai, izstradati, ieverojot" (2004)) that provides fuel types, C contents, calorific values and other relevant information. The report was funded by the Latvian Ministry of the Environment and was only available in Latvian.

36. The ERT recommends that, in order to facilitate future reviews, Latvia at least translate the relevant sections of this report on testing techniques for inclusion in the energy sector chapter or annex 2 of the NIR, as per the UNFCCC reporting guidelines. In addition, it was unclear to the ERT how the

application of these EFs across the entire time series affects the results for earlier years (the study was commissioned in 2004), so the ERT recommends Latvia to explain the issue of time-series consistency in the NIR in its next submission.

2. Road transportation: gasoline and diesel – CO_2

37. During the in-country review, the ERT compared fuel consumption data provided in the CRF tables with data available from the CSB energy balance for gasoline and diesel consumption under "Transport – Road". The ERT noted a number of inconsistencies between "Energy Balance 2004" (the CSB, Riga, 2005) and the AD for gasoline and diesel fuels reported in the CRF tables. In general, fuel consumption for the category road transportation (1.A.3b) reported in the CRF tables is lower than that reported in the CSB energy balances (especially diesel for 1990).

38. The ERT also noted that in the CRF tables for 2002 to 2004, gasoline consumption reported for road transportation (1.A.3b) is higher than the total gasoline consumption in the CSB energy balances, while the implied emission factor (IEF) in the CRF tables for gasoline declines between 2002 and 2004, indicating less CO_2 per unit of gasoline reported. After consultation with Latvia during the in-country review, the ERT determined that this inconsistency was due to a transcription error from the outputs of the COPERT III model to the CRF tables.

39. Given the inconsistencies in statistics and reported AD, the ERT recommended during the in-country review that Latvia address its procedures for the collection of fuel consumption data, including the transfer of data from the COPERT III model to the CRF tables. In response Latvia provided the ERT with revised CRF tables for the entire time series with corrected fuel consumption values. The ERT recommends Latvia to continue to implement the correct approach to reporting fuel consumption values in its next submission. The ERT further recommends Latvia to detail additional procedures for QA/QC measures for this category, beyond the currently planned QA/QC plan for the overall inventory.

40. In its 2006 submission, Latvia estimated CO_2 emissions from motor gasoline combustion in road transportation (1.A.3.b) using the COPERT III model, which uses EMEP/CORINAIR default EFs for European countries, not reported in the NIR. The country-specific CO_2 EF for motor gasoline reported in the NIR was only applied to the non-road combustion of gasoline. Using different EFs for the same fuel is not in line with the IPCC good practice guidance. The ERT recommended that Latvia apply a consistent EF in its calculations for all motor gasoline combustion or provide additional documentation as to why the EMEP/CORINAIR CO_2 EF is appropriate for gasoline for road transportation, while the country-specific CO_2 EF is only appropriate for off-road combustion. In response Latvia provided revised estimates of CO_2 emissions from road transportation (1.A.3.b) for 1990–2004 using the country-specific CO_2 EF for this category. The ERT recommends that Latvia continue to use the country-specific CO_2 EF for this category in its next submission.

41. Latvia estimates CO_2 emissions from diesel combustion in road transportation using the COPERT III model. The composition of the vehicle fleet in Latvia was provided by the RTSD. An examination of the CRF tables for the entire time series and Latvia's energy balance showed that the 2006 inventory submission does not account for all the diesel fuel use by road transportation. The ERT recommends Latvia to carry out recalculations for the entire time series with regard to road transportation to integrate the new data on diesel vehicles supplied by the RTSD. Latvia informed the ERT that this was carried out for the 2007 inventory submission.

3. Stationary combustion: biomass – CH_4, N_2O

42. From 1990 to 2004, CH_4 emissions from biomass combustion (1.A) increased by 58.4 per cent and N_2O emissions from biomass combustion increased by 108.6 per cent. Latvia indicated in the 2006 submission that non-CO_2 emissions from stationary combustion of biomass were a key category in 2004, both by level and trend. Latvia currently uses IPCC default EFs for its calculations of this key category, which is not in line with the IPCC good practice guidance.

43. During the in-country review, the CSB acknowledged that better surveys of biomass and biofuel consumption are a priority. The ERT acknowledges this commitment to improve survey data collection, and also recommends Latvia to investigate appropriate country-specific EFs to improve its calculations of this key category in future submissions.

D. Non-key categories

1. Stationary combustion: other fuels – CO_2, CH_4, N_2O

44. In the 2006 submission, AD on "other fuels" is reported for 1993 to 2004 under 1.A.4 (NIR table 3.5.3), for 1999 to 2004 under 1.A.2 (NIR table 3.3.4) and for 2004 under 1.A.1 (NIR table 3.3.4). Details of what constitutes "other fuels" and EFs were not reported in the NIR, while GHG emissions not reported in the NIR, were included in the CRF tables of the GHG inventory submitted in 2006. It was unclear to the ERT how the GHG emissions were calculated. Presentations given by Latvia during the in-country review seemed to indicate to the ERT that the category "other fuels" includes GHG emissions from waste combustion with energy recovery (while emissions from general waste incineration, with no energy recovery, are reported separately in the waste sector). As no details on AD or EFs were presented in the NIR, the ERT recommends Latvia to clarify the inclusion of municipal solid waste combustion in future estimation of emissions from this category, and to provide transparency on such calculations in the NIR. Providing comments on this report, Latvia identified that AD on the combustion of other fuels (i.e. scrap tires used by cement kilns) has been collected and will be reported in the 2008 NIR.

2. Railways: liquid fuels – CO_2

45. The NIR for the 2006 submission states that an IPCC tier 1 method was used to calculate CO_2 emissions from railways. This includes using the IPCC default CO_2 EF for diesel, rather than the Latvian country-specific CO_2 EF for diesel provided in the NIR (table 3.3.2). The ERT recommends Latvia to use the country-specific CO_2 EFs for railway fuels in future submissions or explain why the IPCC default CO_2 EF for diesel is preferable to the Latvian country-specific CO_2 EF.

3. Oil and natural gas: – CO_2, CH_4

46. There are no refineries for crude oil in Latvia. However, in the 2006 submission the NIR noted that a crude oil pipeline crosses Latvia. The NIR reports that the company responsible for the pipeline has stated that no fugitive emissions occur from the pipeline. Emissions from oil transport (1.B.2.a.iii) were reported as not occurring ("NO") in the CRF tables. During the in-country review, Latvia further explained that crude oil has not been transported through the pipeline since 2004 and that there was a lack of consistent data for the amount of crude oil transported through the pipeline in previous years.

47. In Latvia the company handling natural gas, Latvijas Gaze, estimates fugitive emissions from its operations using its own country-specific methods and provides data to LEGMA. In the CRF tables of the 2006 submission, estimates of CH_4 emissions were provided but AD was reported as confidential ("C"). The ERT commends Latvia for its thoroughness in the calculation of CH_4 estimates for fugitive emissions from natural gas (1.B.2.b), and for the cooperation on data sharing between LEGMA and Latvijas Gaze.

III. Industrial processes and solvent and other product use

A. Sector overview

48. In 2004 emissions from industrial processes, and solvent and other product use contributed 232.09 Gg CO_2 eq. and 55.32 Gg CO_2 eq., respectively. Together this represented 2.7 per cent of the total national GHG emissions in 2004. The most significant subcategories in 2004 were cement production (2.A.1) – CO_2, which contributed 47.4 per cent of total sector emissions, and iron and steel production (2.C.1) – CO_2, which contributed 20.3 per cent of total sector emissions. Combined emissions from the industrial processes and solvent and other product use sector decreased from 601.20 Gg CO_2 eq. in 1990 to 287.41 CO_2 eq. in 2004, representing a 52.2 per cent reduction. The decline in emissions is mostly attributable to the transition of the Latvian economy, which occurred between 1990 and 1993.

49. The completeness of the reporting of emissions from the industrial processes and solvent and other product use sector has improved in the 2006 submission. Latvia estimates and reports potential and actual emissions from 1995 to 2004 under the category consumption of HFCs and SF_6 (2.F). In addition, Latvia also reported non-methane volatile organic compounds (NMVOCs) and indirect CO_2 emissions from solvent and other product use using EMEP/CORRINAIR methodologies, as well as NMVOC emissions from the food and drink industries (2.D.2).

50. Latvia has implemented revisions and recalculations of all sources using more accurate and transparent AD reported under the EU ETS. Latvia has also implemented a national project to quantify certain F-gases under national legislation and a Council Decision of the European Commission on F-gases.

51. In the 2006 inventory submission Latvia applies the IPCC tier 2 methodology and the EMEP/CORINAIR methodologies to several categories, but not to the key category cement production (2.A.1) where an approach equivalent to tier 1 is applied. In response to questions raised by the ERT during the in-country review, Latvia provided revised CO_2 estimates for the industrial processes sector for cement production (2.A.1). These revisions were based on plant-specific EFs and revised AD.

52. The ERT notes that Latvia predominantly uses EFs mandated under the EU ETS. The ERT notes that the participation of certain industries in the EU ETS programme has led to more accurate plant-specific AD for such plants. Latvia is encouraged to develop an improvement plan with regard to plant-specific EFs for the industrial processes and solvent and other product use sectors in accordance with the IPCC good practice guidance.

53. Latvia's participation in the regulated EU ETS has also improved the availability of more accurate plant-specific AD. Additional sources of information provided to the ERT during the review also demonstrate that the EU ETS programme has inherent comprehensive QA/QC procedures, which include external verification of AD at the plant level. The EU Council Decision, Latvian Cabinet Ministers' ordinance and Latvian accreditation laws ensure that uncertainty levels are well within +/–5 per cent. The ERT recommends Latvia to integrate elements of QA/QC from the EU ETS programme, such as the external verification of AD at the plant level and other QC procedures by certified auditors for estimating emissions from the industrial processes and solvent and other product use sectors.

54. The ERT notes that for 2000 to 2004 Latvia reported in the CRF tables AD and EFs as "C" for the categories lime production (2.A.2); limestone and dolomite use (2.A.3); soda ash use (2.C.4); other (2.A.7); and iron and steel production (2.C.1). However, EFs and category CO_2 emissions for the entire time series for a number of these categories are reported in the NIR, making this information non-confidential. The ERT recommends that Latvia should be consistent about confidentiality in its CRF tables and NIR in future submissions.

55. In order to improve transparency, the ERT recommends Latvia to describe in its next submission the non-energy related industrial processes associated with production activities, such as C burn-off in steel production, based on IPCC good practice guidance. This information would facilitate the identification of the sources of such emissions and the selection of appropriate methodological choices in accordance with the decision trees in the IPCC good practice guidance, particularly for the iron and steel category. In addition, Latvia should provide an explanation of recalculations by source categories in CRF table 8(b) in order to improve consistency between the NIR and the CRF.

B. Key categories

Cement production – CO_2

56. CO_2 emissions from cement production are a key category by level and trend assessment. The ERT notes that the information provided on this key category in the NIR, like all the other key categories in the sector, does not elaborate on the emission-producing process reactions based on national circumstances, or describe the methodological choices and assumptions made to produce the CO_2 emissions estimates. This is primarily because all data reported by the industries participating in the EU ETS have been classified as "C" since 1999. The ERT recommends Latvia to include a summary of the methodologies applied, based on the decision trees of the IPCC good practice guidance, to improve transparency and consistency with UNFCCC reporting guidelines.

57. The AD for cement production is reported as "C" in the CRF tables for 2000 to 2004. During the in-country review, the ERT noted that Latvia used IPCC good practice guidance tier 1 methodology for AD, based on plant-specific clinker fractions in various cement types, while the EFs are based on information provided by the EU ETS.

58. The ERT noted that the tier 1 methodology used by Latvia overestimated the cement kiln dust (CKD) factor in 1990, resulting in an overestimation of the CO_2 emission estimate for 1990, and that the later years (1994–2004) were underestimated. During the review, the ERT recommended that Latvia use the IPCC tier 2 method to develop plant-specific EFs for the cement production category. The ERT also recommended that Latvia calculate CO_2 emissions from cement production (2.A.1) for the entire time series based on AD from the EU ETS. Following the in-country review and in response to the ERT's recommendations, Latvia provided revised emission estimates of CO_2 emissions based on a CKD correction factor of 8 per cent. To ensure comparability, as required by the IPCC good practice guidance, and to reflect the national circumstances of Latvia, the ERT recommends that where the plant-specific exceeds 8 per cent Latvia use the maximum permissible IPCC good practice guidance limit for CKD (6 to 8 per cent).

C. Non-key categories

1. Limestone and dolomite use – CO_2

59. In the 2006 GHG inventory the notation key included elsewhere ("IE") is used for the category limestone and dolomite use (2.A.3). Latvia reports CO_2 emissions from limestone and dolomite use under the category other mineral products (2.A.7), which is not in line with the IPCC good practice guidance. Although the ERT acknowledges the improvements made by Latvia in response to the recommendations of the previous (2005) review, such as the disaggregation of limestone and dolomite use into the different mineral products (e.g. limestone, dolomite, potash, and fluorspar), the ERT reiterates the recommendation of the 2005 review that Latvia should report the aggregate of CO_2 emissions from all limestone and dolomite under limestone and dolomite use (2.A.3). It also recommends that Latvia recalculate the emissions from limestone and dolomite use (2.A.3) for the entire time series based on the available data from the EU ETS. Following the in-country review, Latvia advised that in the 2007 inventory submission, emissions from the use of limestone and dolomite or the

other subcategories in 2.A.7, for example glass and metal production, are appropriately reported under limestone and dolomite use (2.A.3).

2. Iron and steel production – CO_2

60. In the NIR Latvia identifies the production technology used for iron and steel production (2.C.1) as an open hearth furnace (OHF) type. During the in-country review, Latvia confirmed that the non-energy emissions from iron and steel production arise from the consumption of coke in OHFs, which are basically used for the reduction of the C content in crude steel. The ERT notes that the other non-energy process emissions from iron and steel production are reported as "NE" across the time series.

61. The ERT recommends Latvia to collect and use plant-specific data on the consumption of coke used in the reduction of the C content in crude iron and steel for the calculation of CO_2 emissions for the entire time series, in accordance with the IPCC good practice guidance, in its next submission. The ERT also recommends Latvia to recalculate the emissions from iron and steel production (2.C.1) for the entire time series based on the available AD from the EU ETS in its future submissions.

3. Consumption of halocarbons and SF_6 – HFCs, SF_6

62. Latvia reports actual emissions of HFCs and SF_6 for the years 1995–2004. Potential emissions from the consumption of HFCs were reported for 2004, which the ERT commends. The ERT recommends Latvia to report both actual and potential emissions for the time series 1990–2004 using available AD from the ozone depletion substance (ODS) substitution programme.

63. AD and the EFs were based on a country-specific study carried out in 2003. The study indicates that Latvia needs to build the capacity of the Latvia State Environmental Service. The ERT recommends that Latvia implement its improvement plan to build the capacity of the customs service and other identifiable institutions as well as the private sector to ensure appropriate reporting, reduce uncertainty and increase the coverage of the reporting of F-gases in Latvia.

IV. Agriculture

A. Sector overview

64. In 2004, the agriculture sector contributed 1,845.41 Gg CO_2 eq. or 17.3 per cent of Latvia's total GHG emissions. Agricultural soils contributed 56.5 per cent of the sector emissions, followed by enteric fermentation, which accounted for about 30.4 per cent of sectoral emissions. In the 2006 inventory submission, GHG emissions from agriculture decreased by 68.8 per cent from 1990 to 2004, mainly due to reductions in the number of livestock and in the use of nitrogenous fertilizers.

65. The NIR is complete for all gases and sources across the entire time series. Rice cultivation (4.C) and prescribed burning of savannas (4.E) are reported as "NO" in the CRF tables, and Latvia explained that these activities do not occur in the country. Emissions from field burning of agricultural residues (4.F) are reported as "NE" since they are negligible. The ERT recommends Latvia to maintain consistency in reporting across the CRF tables with respect to field burning of agricultural residues, and to ensure that the correct values and notation keys are used in the CRF tables in future submissions.

66. Latvia has carried out recalculations for N_2O emissions from manure management (4.B) and agricultural soils (4.D) for the years 1990–2003. N_2O emissions from manure management were recalculated to reflect results from new research on nitrogen (N) excretion per animal. N_2O emissions from agricultural soil were recalculated to reflect the change in N excretion rate (Nex) per animal, and a reassessment of the histosol area made in response to the recommendation of the previous (2005) review.

67. Latvia has improved the transparency and accuracy of its inventory by using the distribution of manure management across different animal types and animal waste management systems to determine country specific Nex values. During the in-country review, Latvia provided the ERT with additional material on its assumptions and the values of calculation parameters used to derive country-specific Nex values. The ERT recommends Latvia to further improve transparency in its next inventory submission by including this additional information on the derivation of these country-specific factors.

68. The ERT identified a lack of sector-specific QA/QC procedures in Latvia during the in-country review. The ERT recommends Latvia to conduct an expert peer review on the agriculture sector in line with the IPCC good practice guidance, and include impartial reviewers such as agriculture experts not currently involved in the inventory compilation (e.g. university professors) in its next submission.

69. In response to the questions raised by the ERT during the in-country review, Latvia provided revised estimates for the agriculture sector for N_2O emissions from manure management (4.B), and direct and indirect N_2O emissions from agricultural soils (4.D.1 and 4.D.3). The revised data were based on revisions to AD.

B. Key categories

1. Enteric fermentation – CH_4

70. Latvia used the tier 1 method with IPCC default EFs to calculate CH_4 emissions from this key category. The IPCC good practice guidance mandates the use of higher-tier methods for key categories. During the review, Latvia provided data on milk production, indicating that milk production per head of dairy cattle has continuously increased across the time series, which should result in changes to EFs. The ERT encourages Latvia to apply a higher-tier method for estimating CH_4 emissions from enteric fermentation from significant livestock species such as dairy cattle in future submissions.

2. Manure management – CH_4

71. CH_4 emissions from manure management were estimated based on the IPCC tier 1 methodology and IPCC default EF values for Eastern Europe in cool regions. This is not in line with the IPCC good practice guidance, since this is a key category. In addition, information on the annual average temperature was not provided in the NIR to support the use of the default EFs. The ERT recommends Latvia to include the average annual temperature in its next NIR to support the selection of IPCC default EF values.

72. In its NIR Latvia has allocated livestock according to animal waste management systems (AWMS), which is an important step towards the application of a tier 2 methodology. The ERT recommends Latvia to strengthen its efforts to apply a tier 2 methodology using such country-specific data in future submissions. If data are not available, the ERT recommends Latvia to explain how the IPCC default EFs correspond to national circumstances.

3. Manure management – N_2O

73. For the period 1990–2004, Latvia applied a constant country-specific Nex value for all animal types except swine. Different Nex values for swine were applied during the time series: 10 kg/head/year was applied for the years 1990–2003 and 7.3 kg/head/year was applied for 2004. No information was provided in the NIR to explain the change in the selection of Nex values. During the review, Latvia explained that the values reflect the results of different research and separate publications on Nexs for swine. However, no further explanation was given by Latvia for the use of different values for different years. With no additional explanation, such as feed change or other changes in animal husbandry, the ERT could not determine whether the lower value applied in 2004 is appropriate.

74. During the review Latvia provided revised N_2O estimates for manure management from swine based on a time-consistent Nex. The ERT recommend that Latvia in its future submissions continue to apply a time consistent Nex for the estimation of N_2O emissions from manure management for swine.

75. The ERT also encourages Latvia to continue its research on development of country-specific parameters, and exploring the application of tier 2 methodology in future submissions.

4. Agricultural soils: direct soil emissions – N_2O

76. Latvia states in the NIR that the area of cultivated histosols has been reassessed based on information from the Ministry of Agriculture, the CSB, and foreign and Latvian publications. The area of cultivated histosols across the time series was reassessed and calculated by national experts as 7.0 per cent of the cultivated land area in Latvia. The ERT notes, however, that Latvia provides insufficient information in the NIR about the method used to arrive at this value. In response to the ERT recommendations from the in-country review, Latvia provided revised N_2O emission estimates for direct emissions from agricultural soils based on a single consistent reference for the area of cultivated histosols and Nex from animals (manure management).

77. The ERT recommends that in its next inventory submission Latvia continue to ensure consistency in the reporting of N_2O emission from this category, and document the assumptions, methods and parameters used to estimate the area of cultivated histosols. In addition, Latvia, in estimating direct N_2O emissions from this category, should continue to take into account any changes in the Nex of animals (manure management)

5. Agricultural soils: indirect emissions – N_2O

78. IPCC default value EFs were applied to estimate the indirect N_2O emissions from the use of N in agriculture. The ERT noted large interannual fluctuations in emission estimates, and Latvia explained that the emission profile for this category reflected interannual fluctuations in the AD, which are taken from national statistics. The ERT recommends Latvia to explain the trend in the AD in its next inventory submission. The ERT also recommends Latvia to take into account any changes in Nex from animals (manure management) in calculating indirect N_2O emissions from agricultural soils, as the lower Nex value applied in 2004 would appear to underestimate indirect N_2O emissions from agricultural soils.

79. During the review, Latvia provided revised N_2O estimates from indirect emissions from agricultural soils (4.D.3) based on a single consistent reference for the area of cultivated histosols and a time consistent Nex.

V. Land use, land-use change and forestry

A. Sector overview

80. The LULUCF sector was a net sink in Latvia over the period 1990–2004. Net CO_2 removals amounted to 20,691.05 Gg CO_2 eq. in 1990 and 13, 941.70 Gg CO_2 eq. in 2004. The ERT noted that net GHG emissions decreased by 32.7 per cent between 1990 and 2004, and recommends Latvia to provide an explanation for this decrease in its next submission. The main sink is the subcategory forest land (5.A) with net removals of 13,605.27 Gg CO_2 in 2004.

81. In its 2006 submission, Latvia for the first time provided the LULUCF reporting tables required by decision 13/CP.9. However, some categories, including land converted to cropland (5.B.2) and land converted to grassland (5.C.2), are reported as "NE". The ERT recommends Latvia to improve the completeness of the inventory by reporting on these land-use categories in its next inventory submission.

82. The methodology used to estimate the LULUCF categories is the IPCC tier 1 method. The ERT recommends Latvia to progress to a higher-tier method, in line with recommendations of the IPCC good practice guidance for key categories, in its next submission. In response to the ERT recommendations, Latvia informed the ERT that it will implement and document a higher-tier method in its 2008 inventory submission.

83. No description of category-specific QA/QC procedures are provided for the LULUCF sector in the NIR. These are required by the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). During the in-country review, Latvia provided the ERT with information on the comparison of reported land-use areas with other sources (e.g. *Statistical Yearbook of Latvia 2006*), which included data on the sown area of agricultural crops and land distribution by use. The NIR does not, however, contain a description or a reference to the data reported in the *Statistical Yearbook of Latvia*. The ERT noted that new regulations to be adopted by the Latvian Government will establish a legal basis for improved institutional arrangements, including QA/QC procedures, and will cover the LULUCF sector. The ERT recommends Latvia to improve the QA/QC procedures for the LULUCF sector (in coordination with QA/QC procedures for the others sectors) and to report on such developments in its next inventory submission.

84. The ERT identified that uncertainty estimates have not been provided for the LULUCF sector and recommends Latvia to include this sector in the uncertainty analysis in its next submission.

85. The recalculations reported by Latvia in the LULUCF sector are mainly due to the fact that the change in C stock from forest land remaining forest land has been calculated for the three pools (i.e. above-ground biomass, below-ground biomass and dead wood). The change in C stock from biomass in orchards, and CO_2 emissions from grass burning have been reported for the first time.

86. The NIR does not provide sufficient documentation on the representation of land areas in the 2006 submission. During the in-country review, the ERT identified that Latvia had used the IPCC approach 1 (i.e. basic land-use data presented in the IPCC good practice guidance for LULUCF) to represent land areas. Also during the in-country review, Latvia presented a new method for the NFI from the Latvian State Forestry Research Institute (Silava). The ERT recommends Latvia to provide in its next inventory submission more documentation on the identification of land areas and to develop a land-use change matrix using this new method. In response to the ERT's recommendations, Latvia advised the ERT that it will implement and document the new NFI method for its 2008 inventory submission.

B. Key categories

1. Forest land remaining forest land – CO_2

87. Latvia has applied the IPCC tier 1 method and default IPCC values to estimate CO_2 emissions from forest land remaining forest land (5.A.1). Higher-tier approaches should be used for key categories, in line with the recommendations of the IPCC good practice guidance. The ERT recommends Latvia to move to a higher-tier method in line with the recommendations of the IPCC good practice guidance in its next submission. During the in-country review, Latvia presented a new, country-specific method and the results of the NFI, based on 4 km grid plots, and the use of 5 metres as the minimum tree height for the forest definition (the former method uses 7 metres for the minimum forest tree height). In response, the ERT recommended Latvia to provide a detailed background document in English on the new method used by Silava for the NFI and the method used in 1990, and to present its plan for implementing this method.

88. Latvia provided further explanation and documentation of the NFI method and the approaches to be applied to identify land areas for the entire time series, which indicated Latvia's capacity to report on emissions and removals from the LULUCF sector. Latvia provided a description of the NFI method

(e.g. the establishment of permanent and temporary sample plots, measured every five years). Latvia also described how the determination of 1990 land-use categories will be organized, and the methods used to assess forest resources in the NFI's sample plots for the situation in 1990. The ERT recommends Latvia to use the country-specific parameters from the new method (the method used by the NFI) in its next submission. This new method should be applied consistently from 1990 throughout the time series to identify land areas and to develop the land-use change matrix.

89. The ERT found that the interannual variations in CO_2 emissions are not well described in the NIR. To increase the transparency of the inventory, the ERT recommends Latvia to provide information on major changes associated with the volume of timber harvesting (e.g. resulting from natural causes, such as storms, or from changes in policies or economic development).

90. In its 2006 GHG submission, Latvia reports on changes in C stocks in living biomass and dead organic matter. It reports that changes in C stocks in litter and soil organic matter are "NE" due to lack of data. The ERT recommends Latvia to collect data and estimate the changes in C stock in these two C pools in its next inventory submission.

91. Latvia reports for the first time, and in line with recommendations from the 2005 review, CO_2 emissions from slash burning in forests. The AD and EFs are based on national research.

92. The 2006 submission does not report on the estimation of CO_2 emissions from wildfires. However, a national study (Forest Fire Situation in Latvia, IFFN No. 24 April 2001, pp. 31–34) identifies that in 1990, on average over 500 ha of forest land was burned. The ERT recommends Latvia to estimate the emissions from wildfires in its future submissions. Following the in-country review, Latvia informed the ERT that estimation of emissions from wildfires will be addressed in the 2008 inventory submission.

93. In addition, Latvia reports in the CRF no emissions and/or removals from unmanaged forest land in the 2006 inventory submission, while in NIR table 7.3.3 the area of unmanaged forest land is presented. The ERT recommends Latvia to estimate CO_2 emissions and/or removals from unmanaged forest land in its future submissions.

2. Land converted to forest land – CO_2

94. For grassland converted to forest land (5.A.2.2), Latvia uses the IPCC tier 1 method together with the IPCC default parameters (e.g. basic wood density, biomass expansion factor, root-to-shoot ratio) to estimate the increase in C stock change in living biomass. Changes in C stock in dead organic matter and soils are reported as "NE". The ERT recommends Latvia to use country-specific parameters to estimate the change in C stock in living biomass and to report on the change in C stock in the soil organic matter pool (which could be a significant subcategory) in its next inventory submission. Latvia uses the notation key "IE" for CO_2 removals from cropland converted to forest land (5.A.2.1) without providing an explanation of where these estimates are included. The ERT recommends Latvia to explain the use of this notation key in the CRF tables and the NIR of its next inventory submission.

3. Grassland – CO_2, CH4, N_2O

95. Latvia uses the IPCC tier 1 method for estimating emissions and removals from grasslands (5.C). Latvia reports the category grassland remaining grassland (5.C.1) as a net sink, which is the result of the increase in C stock change in living biomass. Changes in C stock in living biomass and in soils are reported because the greater part of the area of grassland in Latvia is abandoned managed land, which naturally becomes overgrown with trees and bushes.

96. The NIR does not contain documentation of the annual growth rate for CO_2 removals from abandoned managed land. The ERT recommends that more information on this category be provided in the NIR in Latvia's next inventory submission.

97. The ERT commends Latvia for reporting for the first time CO_2, CH_4, and N_2O emissions from burning of grassland. Latvia estimates this practice to have begun in 1993.

C. Non-key categories

Cropland – CO_2

98. A major time-series inconsistency was identified by the ERT for CO_2 emissions from 1994 to 1995 (from 212.65 to 23.18 Gg CO_2). Latvia explained during the in-country review that this change is caused by a change in the source of AD for cropland. The source of AD changed from the State Land Services (used for the years 1990–1994) to the CSB (used for the years 1995–2004). The ERT recommends Latvia to use the same data source and the same method to estimate the area of cropland for the entire time series in its next submission.

99. Following the in-country review, Latvia provided the ERT with revised estimates of N_2O emissions from agricultural soils by area sown based on CSB data. The ERT recommends that in its next submission Latvia ensure that the LULUCF information for cropland (5.B) is consistent with the data source used to estimate N_2O emissions from agricultural soils.

100. For lime use Latvia reports an average value for the period 1990–1995, and from 1996 onwards uses annual values (lime use statistics from the CSB). During the in-country review, Latvia explained that the average AD value for 1990–1995 represents the best estimation for this period. As the ERT acknowledges that no reliable annual data for this period could be estimated, it recommends Latvia to document the different assumptions and data used for the different time periods more transparently in the NIR in its next submission.

VI. Waste

A. Sector overview

101. In 2004, the waste sector in Latvia contributed 7.4 per cent of total national GHG emissions (excluding LULUCF). GHG emissions increased from 682.76 Gg CO_2 eq. in 1990 to 787.40 Gg CO_2 eq. in 2004 (an increase of 15.3 per cent). The major source of GHG emissions from the waste sector in Latvia for 2004 was CH_4 emissions from solid waste disposal on land (6.A). CH_4 emissions from this category contributed 66.7 per cent of total GHG emissions from the waste sector. The increase in emissions in the waste sector is mainly due to the increase in the amount of waste landfilled and the low rate of landfill gas recovery.

102. All the main IPCC categories and gases are covered. All the required CRF tables are provided for all years from 1990 to 2004.

103. Latvia has made considerable improvements in both methodology and data preparation since the previous (2005) submission. The methodologies applied to estimate emissions and to prepare the required data are transparently used. However, further methodological improvements are needed in order to comply with the IPCC good practice guidance requirements for the estimation of CH_4 emissions from wastewater handling (6.B). The ERT encourages Latvia to improve the transparency of its reporting by correctly allocating emissions between the waste and energy sectors when waste burned is associated with energy recovery. The ERT also recommends Latvia to improve the consistency between the CRF tables and the NIR with regard to the method used to estimate N_2O emissions from wastewater handling (6.B).

104. Recalculations have been reported for the full time series in the 2006 submission. These are due to methodological changes for all waste categories, and the preparation and collection of new AD, including changes in the allocation of the amount of waste between different types of landfills – managed, unmanaged and uncategorized. Information on the basis for the recalculations, and the effect

of those recalculations on the total emissions in the waste sector, was provided to the ERT during the in-country review. The ERT recommends Latvia to provide this information in its next NIR submission.

105. Latvia does not report category-specific QA/QC procedures, as recommended by the IPCC good practice guidance for the waste sector. During the in-country review, Latvia presented the QA/QC procedures which Latvia plans to implement. The ERT commends Latvia for taking such steps and recommends Latvia to commence the development of such QA/QC procedures in the preparation of future submissions.

106. Only limited information on uncertainties associated with the AD and EFs are provided in the NIR; for example, the NIR gives an uncertainty of 50.0 per cent for waste incineration EFs because "no correct information on C content in incinerated waste is known". During the in-country visit, Latvia informed the ERT that the uncertainties related to the EFs are default uncertainties provided by the IPCC good practice guidance. The ERT recommends Latvia to increase the transparency of its reporting in the waste sector by documenting in its next submission the methodology used to calculate the uncertainties associated with the AD and EFs. The ERT also encourages Latvia to provide the uncertainties related to the emissions estimates for waste using at least the IPCC tier 1 method in its next inventory submission.

B. Key categories

1. Managed waste disposal on land – CH_4

107. Following a recommendation of the previous (2005) review, and in line with the IPCC good practice guidance for the estimation of key categories, Latvia has moved from the mass balance approach (IPCC tier 1) to the first order decay (FOD) model (IPCC tier 2). The ERT commends Latvia for the consistent use of the method throughout the time series. The ERT concluded during the in-country review that the method was properly applied, even though some country-specific EFs are not available for the whole time series. The ERT recommends Latvia to continue applying the IPCC tier 2 method in its future submissions.

108. Latvia reports in its NIR current and historical data on waste deposited in landfills. To address the data gap on the amount of waste disposed to landfill from 1970 to 1989, Latvia used extrapolation based on population and gross domestic product (GDP). In the light of Latvia's national conditions and the availability of country-specific AD, the ERT accepts the extrapolation method used by the Party. Between 1990 and 2004, Latvia collected data from research and existing databases (e.g. LEGMA and the CSB). The ERT encourages the collection of more appropriate national AD from relevant sources.

109. Latvia used the IPCC default parameters (e.g. degradable organic C, decay rate constant, methane correction factor and oxidation factor) to calculate the distribution of waste to different types of landfill (between managed, unmanaged and uncategorized waste). Latvia explained during the in-country review that IPCC default parameters are used because national data are not available. The ERT encourages Latvia to develop country-specific EFs to be used in its future submissions.

2. Wastewater handling – CH_4

110. In its 2006 submission, Latvia used the "check method" provided in the IPCC good practice guidance to estimate CH_4 emissions from municipal wastewater treatment. The application of this tier 1 method is not in line with the IPCC good practice guidance for key categories. During the in-country review, the ERT discussed with Latvia the availability of country-specific AD and EFs and the possibility of using a more rigorous method (i.e., tier 2). Latvia identified that country-specific data were not available during the preparation of the 2006 inventory submission.

111. The ERT recommends that for future submissions Latvia use surveys and thoroughly documented expert judgment to collect country-specific data on the amount of wastewater treated in anaerobic conditions in the different existing systems (e.g. latrine, septic tank, lagoon), in order to be

able to move to a tier 2 methodology for estimating CH_4 emissions from wastewater handling (6.B.1). Latvia should also apply the appropriate parameters (e.g. methane conversion factor (MCF), methane producing capacity (Bo) and biochemical oxygen demand (BOD)) based on research. In addition, the ERT recommends that, in order to improve consistency, the method used to estimate emissions from industrial wastewater should be reported in the NIR and in the CRF tables in the next submission.

C. Non-key categories

1. Wastewater handling – N_2O

112. During the in-country review, the ERT noted from the CRF tables that N_2O emissions from wastewater handling (6.B) were calculated using the tier 1 IPCC method. Latvia explained during the in-country review that the only available value on protein consumption was used for the entire time series. To improve consistency and transparency, Latvia is encouraged to report on the use of the IPCC default methodology, and to report on the use of a single value on protein consumption in the NIR of its next submission. The ERT recommends Latvia to further investigate the availability of annual values for protein consumption from relevant sources (e.g. the Food and Agriculture Organization of the United Nations (FAO)) or to draw on documented judgement from national experts to derive annual protein consumption values for its next inventory submission.

2. Waste incineration – CO_2

113. Latvia uses the IPCC default method and IPCC default parameters (C content, fossil C content, combustion efficiency) provided in the IPCC good practice guidance to estimate CO_2 emissions from the incineration of hazardous and clinical waste for the years 1999 to 2004. Latvia explained that before 1999 incineration without energy recovery did not occur. The ERT recommends Latvia to increase transparency by explaining in its next inventory submission the rationale used for the allocation of emissions between the waste and energy sectors for the years 1999–2004

114. Latvia also reports non-CO_2 emissions from cremation using appropriate EFs from EMEP/CORINAIR. The ERT acknowledges Latvia's efforts to estimate non-CO_2 emissions from this category.

VII. Conclusions and recommendations

115. Latvia has submitted GHG data for the whole time series 1990–2004, and an NIR that is complete in terms of geographic coverage, years and sectors and fairly complete in terms of relevant gases and categories. Latvia's GHG inventory is in general accurate, as defined in the UNFCCC reporting guidelines.

116. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of the information presented in Latvia's 2006 inventory submission, including certain institutional and procedural arrangements for inventory planning, preparation and management. Most of the recommendations made by the ERT during the in-country review were implemented following the review process, including those relating to the improvement of institutional arrangements and where certain methods or EFs used by Latvia were not fully in accordance with the IPCC good practice guidance. However, there is room for improvement in the development of future inventory submissions. The ERT therefore identifies the following cross-cutting issues for improvement by Latvia:

(a) Following the adoption of the new regulation which will address institutional arrangements, Latvia is recommended to include in its next inventory submission information on the roles and responsibilities of the institutions involved in the preparation of the national inventory, in particular the RTSD and the Ministry of

Agriculture, including the designation of an institution responsible for the coordination of overall QA/QC and the QA/QC procedures for each institution;

(b) Further develop, implement and document in its next inventory submission a QA/QC plan in accordance with the IPCC good practice guidance and include documentation on verification procedures;

(c) Improve the completeness of its inventory by developing and implementing an improvement plan for data collection in order to address categories reported as "NE";

(d) Increase the transparency of its reporting in the national inventory submission through improved documentation of country-specific methodologies (e.g for transportation categories), EFs and assumptions, better use of the documentation boxes in the CRF tables and greater use of annexes to the NIR to document country-specific methods and EFs;

(e) Improve the accuracy of the inventory by using a higher-tier methodology for key categories in line with the IPCC good practice guidance (for categories where data are not currently available a plan should be developed to enable Latvia to move to higher-tier methodologies in the future);

(f) Improve the time-series consistency of AD, for example, by using a consistent data source and method to estimate the area of cropland for the estimation of emissions from LULUCF and agriculture;

(g) Improve the uncertainty analysis by providing more detail on the rationale for the selection of uncertainty levels, documenting expert judgment and including the LULUCF sector in the uncertainty analysis in its next inventory submission.

Annex

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

IPCC. Good practice guidance for land use, land-use change and forestry, 2003. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

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UNFCCC. 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/2004/8. Available at <http://unfccc.int/resource/docs/2004/sbsta/08.pdf>.

UNFCCC. 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>.

UNFCCC secretariat. Status report for Latvia. 2006. Available at <http://unfccc.int/resource/docs/2006/asr/lva.pdf >.

UNFCCC secretariat. Synthesis and assessment report on the greenhouse gas inventories submitted in 2006. FCCC/WEB/SAI/2006. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/sa_2006_part_i_final.pdf>.

UNFCCC secretariat. Latvia: Report of the individual review of the greenhouse gas inventory submitted in the year 2005. FCCC/WEB/ARR/2005/LVA. Available at <http://unfccc.int/resource/docs/2006/arr/lva.pdf >.

B. Additional information provided by the Party

General

Responses to questions during the review were received from Ms. Ingrīda Apene (Ministry of Environment), Ms. Agita Gancone (LEGMA), Ms. Helēna Rimša (LEGMA), Ms. Sabīne Krumholde (LEGMA), including additional material on the methodology and assumptions used.

Latvijas Republikas vides Ministrija. Response to the in-country review of Latvia's initial report under the Kyoto Protocol and the 2006 inventory submission – response on potential problems report; revisions of Latvia's 2006 inventory submission (CRF tables v2.1, 17 September 2007).

Energy

Central Statistical Bureau of Latvia. 2005. *Energy Balance in 2004: A Collection of Statistical Data*.

Central Statistical Bureau of Latvia. 2006. *Energy Balance in 2005: A Collection of Statistical Data*.

Detailed internal reports on 2004 fuel statistics, disaggregating details of CSB statistics.

EMEP/CORINAIR. 2002. *Emission Inventory Guidebook, Road Transport* (Activities 070100–070500), October.

Latvija Regisreto Transportlidzeklu Ar Pilnu Masu Virs 3,5 Tonnam Statistika, 2006. Gads, Celu Satiksmes Drosibas Direkcija [Road Traffic Safety Department].

Latvija Regisreto Transportlidzeklu Ar Pilnu Masu Lidz 3,5 Tonnam Statistika, 2006. Gads, Celu Satiksmes Drosibas Direkcija [Road Traffic Safety Department].

Metodiskie noradijumi CO_2 emisiju noteikšanai, izstradati, ieverojot ANO Visparejas konvencijas "Par klimata parmainam", Klimata parmainu starpvaldibu padomes (IPCC) rekomendacijas un Latvija pielietota kurinama fizikalas ipašibas. Riga, 2004 [CO_2 emission factor study].

Transportlidzeklu Statistikas Kopsavilkums Latvija, no. 1995. Lidz 2005. Gadam, 2006. Gads, Celu Satiksmes Drosibas Direkcija [Road Traffic Safety Department].

Response to questions during the review were received from Ms. Sabīne Krumholde (LEGMA) including additional material on the methodology and assumptions and models used for road transportation emission calculations (IPCC category 1.A.3).

Response to questions during the review were received from Ms. Helēna Rimša (LEGMA) including additional material on the methodology and activity data used for stationary combustion source emission calculations (IPCC categories 1.A.1, 1.A.2, 1.A.4).

Industrial processes and solvent and other product use

EMEP/CORINAIR Emission Inventory Guidebook, <http://reports.eea.eu.int/EMEPCORINAIR4/en/page019.html>.

European Environment Agency. 2004. *EMEP/CORINAIR Emission Inventory Guidebook 2004*, <http://reports.eea.eu.int/EMEPCORINAIR4/en/page002.html>.

Agriculture

Agri-chemical Research Center. *Yearbook 2002* (in Latvian).

Central Statistical Bureau of Latvia. *Agriculture of Latvia in 2005: Brief Collection of Statistical Data*.

Central Statistical Bureau of Latvia. 2006. *2006 Statistical Yearbook of Latvia* (in Latvian with English summary).

Data sheet on "Distribution of arable land and permanent crops by data sources".

Data sheet on "Milk production from 1990–2005".

Internal document "Sample description of agriculture survey 2005".

Internal document "Procedure of manure management calculation 2003".

Internal document "Manure standards INS9-5".

Internal document "Latvian manure standard 2006".

Internal document "Research regarding the Latvian project on 'Implementation of requirements of international convention on air pollution', 1. Nitrogen separation(Kg/head/year)".

Internal document on "Calculation on FCN and F BN" in Excel sheets.

Internal document on "Estimation from agriculture sector" in Excel sheets.

Latvia University of Agriculture. 1999. *Code of Good Agricultural Practice for Latvia*, published by Jelgavas tipografija Lt.

Oec.Ligita melece, "Working paper 2(16), 2006, Latvian State Institute of Agrarian Economics" (in Latvian).

LULUCF

Attachment to the email of 24 May 2007 from Ms. Ingrida Apene, "Highlights of Latvian Forest statistical inventory (National forest inventory)".

Central Statistical Bureau of Latvia. 2006. *Statistical Yearbook of Latvia 2006*

E-mail of 24 May 2007 from Ms, Ingrida Apene, Deputy Director Climate and Renewable Energy Department, Ministry of Environment, forwarding the answers of Ms. Lasma Abolina regarding Article 3, paragraphs 3 and 4, and the statistical inventory.

E-mail of 25 May 2007 from Ms. Lasma Abolina, Ministry of Agriculture, answering questions about the LULUCF sector.

Forest Fire Situation in Latvia, Arnis Gertners, Director, Forest Protection State Forest Service, in *IFFN* No. 24 (April 2001), pp. 31–34.

Koksnes izejvielu resursu un to izmantosana efektivitates novertejums. Latvijas Lauksaimniecibas universitate Meza fakultate, Leonards Lipins, 2004.

Ms. Ieva Līcīte, Forest Resources Department, Ministry of Agriculture, presentation of 22 May 2007 on "New approach of forest information-gathering in Latvia".

Waste

Agenda of the workshop on Inventories and Projections of GHG Emissions from Waste with the first order decay model under WG I and II of the EU Climate Change Committee, EEA, Copenhagen, 8–9 March 2006.

Pārskats par atkritumu izgāztuvēm Latvijā 2003 gadā.

Pārskats par atkritumu izgāztuvēm Latvijā 2004 gadā.

Pārskats par atkritumu izgāztuvēm Latvijā 2005 gadā.

Spreadsheets for the calculation of methane emissions from solid waste disposal sites using the first order decay model.

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