**UNITED NATIONS**
**NATIONS UNIES**

**FRAMEWORK CONVENTION ON CLIMATE CHANGE - Secretariat**
**CONVENTION - CADRE SUR LES CHANGEMENTS CLIMATIQUES - Secrétariat**

FCCC/WEB/IRI(1)/2003/LVA 8 April 2004

# LATVIA

# REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY SUBMITTED IN THE YEAR 2003[1]

**(Desk review)**

## I. OVERVIEW

### A. Introduction

1. In accordance with decision 19/CP.8 of the Conference of the Parties, the United Nations Framework Convention on Climate Change (UNFCCC) secretariat coordinated a desk review of the 2003 greenhouse gas (GHG) inventory submission of Latvia. The review took place from 13 to 31 October 2003, and was conducted by the following team of nominated experts from the roster of experts: Generalist – Mr. Samir Amous (Tunisia) and Mr. Bernd Gugele (European Community); Energy – Mr. Lambert Schneider (Germany) and Mr. Francis Yamba (Zambia); Industrial Processes – Mr. Luis Conde Alvarez (Mexico) and Mr. Tinus Pulles (the Netherlands); Agriculture – Mr. Vitor Góis (Portugal) and Mr. Haruo Tsuruta (Japan); Land-use Change and Forestry (LUCF) – Mr. Mikhail Gytarsky (Russia) and Mr. Tomás Hernández-Tejeda (Mexico); Waste – Ms. Elizabeth Scheehle (United States) and Mr. Charles Jubb (Australia). Mr. Samir Amous and Mr. Mikhaill Gytarsky were the lead reviewers of this review. The review was coordinated by Ms. Sevdalina Todorova-Brankova (UNFCCC secretariat).

2. In accordance with the UNFCCC "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (hereafter referred to as the UNFCCC reporting guidelines), a draft version of this report was communicated to the Government of Latvia, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

3. The expert review team (ERT) commends Latvia for considerable progress in the improvement of its inventory submission in comparison with the inventories submitted in previous years, despite the fact that the limited human and financial resources, the restructuring and constrains of the statistical system and the difficulties in involvement of experienced experts from all relevant sectors still hinder the development of the annual GHG inventory of Latvia. The ERT further acknowledges the efforts undertaken by Latvia to improve quality of national reporting through the national inventory report (NIR) and common reporting format (CRF), the improved completeness, consistency and transparency of the reporting, as well as the strides to introduce the *Intergovernmental Panel on Climate Change (IPCC) Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) in the inventory preparation in the near future, although, as an economy in transition (EIT) Party, Latvia has two additional years to implement

[1] In the symbol for this document, 2003 refers to the year in which the inventory was submitted, and not to the year of publication. The number (1) indicates that this is a desk review report.

this guidance (FCCC/SBSTA/2000/5, paragraph 48 (c)). The ERT also acknowledges Party's supportive attitude to the review and its efficient cooperation with the review team.

## B. Inventory submission and other sources of information

4. In its 2003 submission, Latvia submitted a set of CRF tables for 1990–2001 and an NIR. Where needed the ERT also used previous years' submissions, additional information provided during the review and other information. The full list of materials used during the review is provided in annex 1 to this report.

## C. Emission profiles and trends

5. In the year 2001, the most important GHG in Latvia was carbon dioxide ($CO_2$), contributing 68.5 per cent to total[2] national GHG emissions (without LUCF) expressed in $CO_2$ equivalent, followed by methane ($CH_4$) – 22.2 per cent and nitrous oxide ($N_2O$) – 10.2 per cent. Perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs) have not been estimated; sulphur hexafluoride ($SF_6$) emissions contributed 0.0002 per cent of the overall GHG emissions in the country. It is worth noting that Latvia reports negative net $CO_2$ emissions, which means that $CO_2$ removals were larger than $CO_2$ emissions. The Energy sector accounted for 70.5 per cent of total national GHG emissions (excluding LUCF), followed by Agriculture – 14.3 per cent, Waste – 12.2 per cent and Industrial Processes – 2.2 per cent. Bearing in mind that a number of emission source categories in Industrial Processes, including those related to PFCs and HFCs, were not estimated ("NE"), this picture probably underestimates the contribution of the Industrial Processes sector to Latvia's total GHG emissions. In Latvia in 2001 total GHG emissions (without LUCF) amounted to 11,389.7 Gg $CO_2$ equivalent, and they decreased by 60.8 per cent from 1990 to 2001. The reductions in emissions have been substantial for all gases: $CO_2$ (–65.2 per cent), $CH_4$ (–32.6 per cent) and $N_2O$ (–60.5 per cent). The main reduction in emissions of $CO_2$ was in energy industries. The main reduction in $CH_4$ emissions was in enteric fermentation, and $N_2O$ emissions declined primarily from source category agricultural soils. The specific reasons for these sharp declines are partly documented in the NIR, but could be further elaborated; in general, the decline in economic activities affected most sectors. In the second half of the reported period, $CO_2$ emissions from transport and metal production increased.

## D. Key sources

6. Latvia has not carried out a key source analysis but states in the NIR that a key source analysis is part of its plans for future improvement of the inventory. The UNFCCC secretariat[3] carried out a key source analysis and identified 17 key sources; 15 based on the level assessment and 12 based on the trend assessment.

## E. Main findings

7. The ERT noted that Latvia has implemented some improvements recommended by the 2002 in-country review[4], such as the provision of CRF tables for the complete time series 1990–2001 and of more detailed information on the methodologies used in the NIR. However, the national inventory submitted is not yet in conformity with the UNFCCC reporting guidelines. The main remaining problems with regard to cross-cutting issues already mentioned in the 2002 in-country review report are: (a) the transparency and completeness of the NIR; (b) the absence of a key source analysis; (c) the uncertainty estimates; (d) quality assurance/quality control (QA/QC); and (e) the inadequate information provided on

[2] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of $CO_2$ equivalent excluding LUCF, unless otherwise specified.

[3] The secretariat had identified, for each individual Party, those source categories which are key sources in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance. Key sources according to the tier 1 trend assessment were also identified for those Parties providing a full CRF for the year 1990. Where the Party has performed a key source analysis, the key sources presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key source assessment conducted by the secretariat.

[4] See FCCC/WEB/IRI(2)/2002/LVA.

recalculations. However, it should be indicated that most of these recommendations are linked to the application of the IPCC good practice guidance, which is not yet compulsory for Latvia. For those recommendations which have been only partially implemented or not implemented at all, the ERT has included suggestions for improvement in paragraph 15 below.

8. The ERT also identified many cases of inconsistent data and time series, in particular in the Energy sector. These are mostly linked to activity data (AD) quality. Significant improvement could be made to the Latvian inventory through enhanced data collection, compilation and cross-checking.

## F. Cross-cutting topics

Completeness

9. Latvia has provided inventory data for the years 1990–2001 and included all the required tables, with the exception of table 8 (Recalculation), which was omitted due to the tight deadlines for submitting the inventories. Notation keys are used throughout the tables with a very few exceptions (table 1.A(b), table 10). Emission estimates for HFCs and PFCs are not provided, and $SF_6$ emissions are not fully covered. In CRF table 9 the Party refers to a number of source categories where emissions have not been estimated. The gaps include certain industrial sources, energy (multilateral operations and fugitive emissions from fuels), and field burning of agricultural residues. Emissions and removals from soils under the LUCF sector and emissions from agricultural soils, industrial waste water and waste incineration are not fully covered.

Transparency

10. The ERT recognizes that in terms of transparency Latvia has improved its NIR in the 2003 submission as compared to the 2002 submission. It includes information on methodologies used covering underlying assumptions, sources of data, emission factors (EFs) and further improvements needed. The 2003 NIR includes sections on uncertainties and QA/QC procedures, without expanding on these issues. However, the ERT encourages Latvia to further improve the transparency of its inventory, for instance, by clearly referencing the AD used (providing clear links from the text to the list of references) and by providing information on the reasons for and the effects of recalculations. The use of notation keys in table 1.A(b) would increase the transparency of the reference approach. According to the NIR, confidential data include: (a) AD for calculating fugitive $CH_4$ emissions from the gas sector, and (b) AD for cement and lime production for 1999–2001. The data cannot be made available because of the small number of enterprises involved. In addition, CRF table 9 indicates that emissions from military fuel use are confidential and included in category 1.A.4.a. Commercial/Institutional.

Recalculations and time-series consistency

11. Information on recalculations is not provided in the CRF (table 8), however comparison with data in 2002 submission reveals differences such as a decrease of total GHG emissions (without LUCF) by 6.4 per cent for 1990 and by 7.9 per cent for 2000. The NIR reports that recalculations have been made involving changes in methodology, EFs and AD. However, as the NIR does not describe these changes in detail, the ERT was not able to assess to what extent Latvia corrected the inconsistencies across years, tackled the methodological problems, and addressed the areas where the inventory does not conform with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines), as recommended in the previous review. [5]

Uncertainties

12. Latvia mentioned that it was not possible to implement uncertainty estimates in accordance with the IPCC good practice guidance because of lack of financial and human resources. Therefore no quantitative information on uncertainty estimates has been provided. Qualitative uncertainty estimates

[5] Refer to paragraph 19 of the 2002 in-country review, FCCC/WEB/IRI(2)/2002/LVA.

are provided in CRF table 7. Overall inventory quality has improved because a number of sources were estimated in 2003, which were not estimated the year before. In addition, according to CRF table 7, for some of the source categories already estimated in 2002 the uncertainties have been reduced. There is no clear link between the qualitative uncertainty estimates in table 7 and the prioritization of further improvements.

Verification and quality assurance/quality control approaches

13. Latvia has not implemented the QA/QC procedures in the IPCC good practice guidance because of lack of financial and human resources. While the need for quality improvements for various source categories is mentioned in the NIR, no concrete plans or deadlines for QA/QC procedures are provided. Despite the fact that the IPCC good practice guidance is not yet mandatory for the Party, Latvia is encouraged to start implementing QA/QC procedures according to the IPCC good practice guidance.

## G. Areas for further improvement

Identified by the Party

14. The NIR identifies several areas for improvement. Apart from sectoral improvements, the Party mentions the following: (a) the provision of an NIR according to the revised reporting guidelines; (b) provision of a key source analysis; (c) provision of uncertainty estimates; (d) implementation of QA/QC procedures; (e) improvements to institutional cooperation; and (f) application of the IPCC good practice guidance in order to improve applied methods and EFs. It is the ERT's view that the implementation of all these improvements, as identified by Latvia, would significantly improve the quality of the Latvian inventory in the future.

Identified by the ERT

15. The ERT supports the Party's analysis of the areas where development is needed and suggests that the key sources and uncertainty analyses should be used for prioritization of work to improve the inventory. Apart from the issues for further improvement identified by the Party, the ERT suggests the following cross-cutting areas for further work. Latvia is encouraged to: (a) provide CRF tables 8 (Recalculation) and document the reasons for recalculations; (b) improve the completeness of the inventory by estimating emissions for those source categories listed in table 9 that have not been estimated (including HFCs and PFCs); (c) investigate new data sources by contacting industrial associations or through direct contact with large companies; (d) further improve the transparency and completeness of the NIR by providing more detailed descriptions of the AD and methods used for the inventory calculations; (e) provide more detail on the responsibilities of the institutions involved in the compilation of the GHG inventory; (f) further enhance the institutional setting and make available sufficient resources for inventory preparation in order to ensure continuity of the work and to provide sufficient support for the development of national methods and EFs at the collaborating national expert institutes; and (g) provide in the NIR a section on responses to UNFCCC review findings.

16. As indicated in the NIR and in the response to the draft of this report, Latvia recognises the need for improvements in the areas listed in paragraphs 14 and 15. However, the implementation of the necessary improvements is much dependent on the human and financial capacity available at national level. Therefore, part of the improvements is included in the long-term plans of the Party for development of the annual GHG inventories.

17. Recommended improvements relating to specific source/sink categories are presented in the relevant sector-specific sections of this report.

# II. ENERGY

## A. Sector overview

18. In 2001, the Energy sector contributed 70.5 per cent of total GHG emissions (without LUCF) in Latvia. Fuel combustion is the main source of GHG emissions in the sector, accounting for 98 per cent, while fugitive emissions make a relatively small contribution (2 per cent). The largest sources of emissions are transport and energy industries (with 33 per cent each). In 2001, GHG emissions in the sector were 64 per cent below the 1990 level, which is a rather dramatic drop even for an economy in transition.

19. Latvia has recalculated emissions from fuel combustion for all gases and in all years from 1990 to 2001. In the Energy sector, the NIR provides rather limited information on the methodologies used and underlying assumptions. In addition, references are generally missing and, when provided, they are mostly unclear or incomplete. The ERT encourages Latvia to provide more explanation on methodology and assumptions used as well as submit a complete and clear reference list in the future inventory submissions. Latvia is also encouraged to include short summaries of the methodologies used and referenced within the NIR.

20. A major problem of the inventory in the Energy sector is the inconsistent allocation of fuels in the time series in most combustion sectors (1.A.2, 1.A.3 and 1.A.4). In several IPCC categories fuel consumption varies significantly between single years, which is rather unlikely to occur in reality. Thus, in 1.A.2 Fuel Manufacturing Industries and Construction, fuel consumption increased by 84 per cent from 1993 to 1994 and by 56 per cent from 1996 to 1997; in 1.A.3c Railways, the average consumption between 1994 and 1998 is about 3 per cent of the level for 1990–1993; in 1.A.3b Road Transportation it increases by 28 per cent from 1992 to 1993 and by 30 per cent from 2000 to 2001; in 1.A.3d Navigation the level of fuel consumption in 1993 is only 3 per cent of that of 1990; in 1.A.3a Civil Aviation it is about 40 per cent lower in 1999 than in 1998 and 2000; in 1.A.4b Residential sector it decreases by 32 per cent from 1998 to 1999 and increases by 47 per cent from 2000 to 2001; in 1.A.4a Commercial/Institutional sector between 1993 and 2001 it varies between approximately 7,000 and 15,000 TJ; and in 1.A.4c Agriculture/Forestry/Fisheries it increases by 111 per cent from 1993 to 1994. These inconsistencies may be due to the problems and data gaps in the national statistics, as described in the NIR. Latvia is aware of this problem and is planning further recalculations in the future. The ERT encourages Latvia to give priority to improving the generation of AD from energy statistics and to providing a thorough description of the way AD are generated in the NIR.

## B. Reference and sectoral approaches

Comparison of the reference approach with the sectoral approach

21. A comparison of the reference and the sectoral approaches has been conducted. The difference for the year 2001 amounts to –0.05 per cent for energy consumption and –1.89 per cent for $CO_2$ emissions. As already indicated in the 2002 review, Latvia reports the production of lubricants in the reference approach, whereas only the production of primary fuels should be included in the reference approach calculation. The amounts of carbon stored in the reference approach should not be reported directly in table 1.A.b but should only refer to the values calculated separately in table 1.A.d. Generally the information on feedstocks in table 1.A.d is not consistent with the values used in the reference approach (table 1.A.b). The use of diesel oil as an international bunker fuel is reported in the reference approach but not in table 1.C. The ERT recommends that these deficiencies be corrected.

Feedstocks and non-energy use of fuels

22. Latvia does not provide background information on the use of feedstocks in the NIR. In contrast to the information in the reference approach (table 1.Ab), where gas/diesel oil, liquefied petroleum gas (LPG), bitumen, lubricants and natural gas are reported to be used as feedstock or for non-energy purposes, in table 1.A.d only the use of bitumen as feedstock is reported, while other fuels are lacking.

Latvia is encouraged to provide in NIR and CRF consistent estimates of time series and transparent documentation for all relevant fuels.

International bunker fuels and comparison with international statistics

23. Latvia does not describe how national fuel consumption for aviation and navigation is separated from international bunkers. The AD, in particular in the case of jet kerosene, fluctuate considerably. Use of diesel oil for international navigation is reported as "not occurring" ("NO") in table 1.C. Meanwhile, large quantities of diesel oil for international marine consumption are reported in the reference approach (table 1.Ab) and to the International Energy Agency (IEA). The ERT encourages Latvia to check these inconsistencies and describe the method used to separate national from international AD in the NIR.

24. There are several significant differences between the data reported to IEA and the CRF tables. This refers in particular to international bunkers and the use of natural gas and solid fuels. Thus, the consumption of coke oven gas and crude oil is reported to IEA but is not provided in the CRF or the NIR.

Country-specific issues

25. According to information in the NIR, there is a significant black market for fuels in Latvia. The emissions resulting from combustion of fuels from the black market are not considered in the inventory. The ERT recognizes the difficulties in accounting emissions from combustion of fuels from the black market and encourages Latvia to develop a method for estimating them in the future inventory submissions.

## C. Key sources

Stationary combustion: coal, oil, gas – $CO_2$

26. Latvia provides country-specific net calorific values (NCVs) and $CO_2$ EFs in the NIR. However, the references used and underlying assumptions are not provided in a transparent manner. According to the responses from Latvia received in the course of this desk review, calorific values for some fuels (such as oil products) are generated by expert judgement. However, it is good practice to collect calorific values of traded goods in common circulation from fuel suppliers and, if this is not possible, to use default values, rather than using expert judgement. The ERT recommends that the Party provide clear references and a description of how and from which sources the $CO_2$ EFs, NCVs and underlying oxidation factors are determined.

27. The $CO_2$ implied emission factor (IEF) for solid fuels in category 1.A.1 Energy Industries increases significantly from 1990 to 2001 (by 7.6 per cent). However, this increase is consistent with AD showing that in 1990 mainly coal was fired, while in 2001 peat is the dominating fuel.

Mobile combustion: road transportation, railways, navigation – $CO_2$

28. The $CO_2$ EFs for gasoline (68.6 t/TJ) and for lubricants (36.3 t/TJ) are significantly lower than the IPCC default values. The reasons for their use are not provided in the NIR. The ERT encourages Latvia to provide more explanation on the EFs used.

29. On page 23 of the NIR, Latvia provides AD information on the shares of different vehicle types. These data show inconsistencies in the time series. In particular there are abrupt changes from 1993 to 1994 (for gasoline the share of passenger cars increases from 65 per cent to 81 per cent, while the share of light-duty cars falls from 18 per cent to 3 per cent), which appear very unlikely to occur. This problem may be due to the use of different statistical sources for different inventory years. Several sources of information for the determination of AD are mentioned, but it is not explained how the different data sources fit together. The ERT encourages Latvia to reassess the generation of AD for road transportation, to provide clear references to statistical data, to explain the generation of AD in more detail in the NIR, and to provide AD information on the same level of aggregation as for EFs. Latvia

reported on its plan to calculate road transportation emissions using the COPERT model in the 2005 submission, which is expected to improve considerably the quality of the estimates for the source.

Stationary combustion: biomass – $CH_4$, $N_2O$

30. In Latvia, $CH_4$ and $N_2O$ emissions from stationary combustion of biomass are a key source. AD and emissions changed significantly from 1990 to 2001. Latvia is encouraged to apply a tier 2 method to estimate the emissions from this key source in accordance with the IPCC good practice guidance.

Fugitive emissions: oil and gas – $CH_4$

31. According to the NIR (page 15), emissions from oil and gas operations were calculated based on a country-specific method. However, this method is not explained in the NIR, nor are the AD and EFs provided. Fugitive emissions from natural gas transmission and distribution seem to be allocated to flaring instead of the respective categories (transmission and distribution). Because of data confidentiality, the respective AD are not reported. Total fugitive $CH_4$ emissions in 2001 (about 8 Gg) are considerably less than those calculated with the use of the IPCC default EFs for Eastern Europe (resulting in about 20–42 Gg). Furthermore, the figures for fugitive emissions from natural gas do not correspond well to the data on its consumption: the ratio between fugitive emissions and gas consumptions varies from 123 t/PJ to 309 t/PJ between 1990 and 2001. The units of the AD on the Inchukalns Gas Storage Facility are unclear. The ERT encourages Latvia to provide more explanation on the methods used for estimation of fugitive emissions, check the correctness of the estimates and allocate them appropriately to the respective source categories.

### D. Non-key sources

Stationary fuel combustion: coal, oil, gas – $CH_4$, $N_2O$

32. According to the page 13 of the NIR, Latvia used IPCC default EFs for estimating $CH_4$ and $N_2O$ emissions from stationary fuel combustion. However, some EFs on page 13 differ from the IPCC defaults. The ERT recommends the Party to check that the $CH_4$ and $N_2O$ EFs in 1.A.2 Manufacturing Industries and Construction and 1.A.4b Residential sector, and the $CH_4$ EF for coal in 1.A.4a Commercial/institutional sector are correct in the NIR and the CRF.

Mobile fuel combustion: diesel oil – $CH_4$, $N_2O$

33. The $CH_4$ and $N_2O$ IEFs for diesel oil in 1.A.3b Road Transportation show unusual changes. The values for 1991–1993 (9.82 kg $CH_4$/TJ and 3.02 kg $N_2O$/TJ, respectively) do not fit well with the values in 1990 and 1994 (about 5–6 kg $CH_4$/TJ and 3.2–3.4 kg $N_2O$/TJ, respectively). The ERT recommends that these inconsistencies be checked.

## III. INDUSTRIAL PROCESSES AND SOLVENT USE

### A. Sector overview

34. In the year 2001, total GHG emissions from the Industrial Processes sector amounted to 251.2 Gg $CO_2$ equivalent, and decreased by 64.8 per cent from the base year and by 19.8 per cent from 2000. The reduction comes mainly from mineral products, where there was a 77.9 per cent drop in emissions from the base year. The other source category reported is metal production, where there was a decrease in emissions of 13.2 per cent from 1990. The trends are explained in the NIR. Mainly $CO_2$ emissions are reported from the Industrial Processes sector. Consumption of $SF_6$ is reported since 1995.

35. In the year 2001, total GHG emissions from solvent use amounted to 88.9 Gg $CO_2$ equivalent, and decreased by 15.9 per cent from the base year. The greater part of the emissions in this year (58.2 per cent) came from $CO_2$ emissions produced by paint application, followed by domestic solvent use (14.9 per cent).

36. Because of lack of information, emissions for many sources have not been estimated. Since 1999, national legislation has placed restrictions on the provision of information. This raises the problem of confidentiality in the sector. AD and emissions reported under Industrial Processes and Solvent Use show a high degree of variability, but the underlying reasons for this are not clarified. Although comparison of the emissions in the current submission and the previous submission shows that there have been major recalculations in the sector (e.g., a 210.5 per cent decrease for 2000), the recalculations are not reported in the CRF (table 8). The ERT concludes that the transparency issue identified earlier for the Latvian inventory for the Industrial Processes sector has not yet been resolved.

### B. Key sources

Cement production – $CO_2$

37. Cement production in Latvia is a key source. Since AD are confidential, the quality of the reported emissions data cannot be checked.

Iron and steel production – $CO_2$

38. Under iron and steel production, the EF (3.1 t $CO_2$/t reducing agent) for coke was multiplied by 3.67 (this last factor is used to convert the difference between carbon content of ore and carbon content of metal, which is not reported by Latvia), resulting in high emissions. The ERT recommends the use of the EF 3.1 t $CO_2$/t reducing agent, which was agreed by Latvia.

### C. Non-key sources

Other production – non-methane volatile organic compounds

39. Emissions of non-methane volatile organic compounds (NMVOC) from food and drink are reported, but AD are reported as "NE".

Consumption of halocarbons and $SF_6$

40. Emissions of F-gases are reported either as "NO", which is explained in the NIR, or as "NE". In the NIR Latvia indicates that the emissions of these gases are due entirely to leakages from domestic refrigerators. Apparently Latvia assumes that no such refrigerators were taken out of use in the reporting year, so actual emissions are estimated to be small. Latvia expects higher emissions from these sources in the future. The ERT therefore encourages Latvia to look more closely at these sources. A similar recommendation should be made for $SF_6$ emitted from electrical equipment.

Solvents and other product use – $CO_2$, $N_2O$, NMVOC

41. Emissions from solvents are small in Latvia. $CO_2$, $N_2O$ and NMVOC emissions are reported, following simple estimation methods, which are explained in the NIR and are considered acceptable.

## IV. AGRICULTURE

### A. Sector overview

42. In the year 2001, the Agriculture sector emitted 1,631.7 Gg of GHG emissions expressed as $CO_2$ equivalent and accounted for 14 per cent of Latvia's overall emissions (without LUCF). Total emission trends showed a continual decrease from the base year of 1990 to 1999 – by 71 per cent – as a result of a reduction in agricultural activity, and a gradual increase from 1999 to 2001 – by 12 per cent. Emissions from the following sources have been calculated: $CH_4$ emissions from 4.A Enteric Fermentation; direct and indirect $N_2O$ emissions from 4.D Agricultural Soils; and $N_2O$ and $CH_4$ emissions from 4.B Manure Management. A tier 1 method was used for the calculation of emissions from these sources. The NIR refers to planned research which will address the lack of AD, necessary information on livestock characterization, and country-specific EFs.

43. Latvia does not include emissions estimates of $N_2O$ and $CH_4$ from field burning of residues. However, in the NIR and in its responses to the ERT Latvia stated that these emissions could occur. The ERT encourages Latvia to report on emissions from 4.F Field Burning of Agricultural Residues in its next submission.

44. Although the transparency of the NIR has increased compared to the previous submissions, there is still a room for improvement in this area. In response to questions from the ERT, Latvia sent two documents with detailed information on nitrogen (N) from animal waste management systems (AWMS) and organic soils (see annex 1). The ERT encourages Latvia to include the information from these documents in its next submission in order to provide a clear explanation of the country-specific method of data collection for livestock populations, N excretion, and AWMS. In addition, Latvia should continue research, improve the transparency of the methodology, and further reduce the gaps in the documentation.

45. According to the additional information provided during this review, country-specific data for N excretion from domestic livestock were derived on the basis of long-term research. However, according to the NIR, the IPCC default values for all animal categories were used. The country-specific N excretion rates for dairy and non-dairy cattle are almost the same as the IPCC defaults, but for other animals they show considerable differences. The ERT encourages Latvia to provide more clarification to explain for what animal categories country-specific N excretion rates have been used, what their values for specific categories are, and how they have been derived.

46. According to the additional information provided to the ERT, the allocation of animal waste to different AWMS was estimated by analysing very limited data for 1990 and 2001, and by interpolating these two-year data for the period 1991–2000. As a result, the total $N_2O$ emissions from six different AWMS and from all animals for 2000 changed from 0.49 Gg $N_2O$ in the 2002 submission to 0.40 Gg $N_2O$ in the 2003 submission. Latvia has also reassessed its livestock population for 1990–2001, and a considerable decrease in population was found for dairy and non-dairy cattle, swine and poultry from 1990 to 1993 connected with the liquidation of the collective farms and state farms, as was already reflected in Latvia's 2002 submission. For the sake of transparency, the ERT recommends Latvia to document these considerable decreases.

47. According to additional information provided to the ERT, Latvia has re-evaluated the area of histosols on the basis of data of the Agrochemical Research Centre. The new data show that the histosols cultivated every year (according to the IPCC good practice guidance) were 1.5 per cent of total arable land instead of the 7 per cent reported in the previous submission (2002). Latvia has recalculated the $N_2O$ emissions from histosols for 1990–2000. As a result, for 2000, the figures for $N_2O$ emissions from histosols decreased from 1.02 to 0.35 Gg, whereas the figures for overall direct $N_2O$ emissions from agricultural soils decreased from 2.24 to 1.33 Gg.

48. As a result of all recalculations, the figures for total $N_2O$ emissions from Agriculture for the base year 1990 have changed from 9.67 to 8.74 Gg, and for 2000 from 3.56 to 2.75 Gg. $CH_4$ emissions from enteric fermentation and manure management show no change for all the years (1990–2000) since the same values for livestock population and EFs were used for both the 2002 and the 2003 submissions.

## B. Key sources

Enteric fermentation – $CH_4$

49. Latvia uses AD from its *Statistical Yearbook* as an official data source. Comparison of the livestock numbers in the NIR with the figures in the Food and Agriculture Organization of the United Nations (FAO) database for 2001 shows differences in population sizes for swine of about 9 per cent and less for cattle and sheep. Latvia clarified that the population reported in the *Statistical Yearbook* refers to the end of the reported year and that the inventory team will check the discrepancy with the Ministry of Agriculture.

Manure management – $N_2O$

50. Regarding the allocation of animal wastes to manure systems in Latvia, the ERT noted that N excretion classified to "Other" is about 28 per cent of the total N according to CRF table 4.B(b), which is higher than that for the other Parties. The ERT encourages Latvia to classify the quantity of manure considered under "Other" to specific AWMS and provide more explanation on this issue in its NIR.

Direct and indirect emissions from agricultural soils – $N_2O$

51. For 2001, the value for synthetic fertilizer use reported in the NIR (31,600,000 kgN/yr) is lower than that provided in the FAO database (36,845,000 kg N/yr). In its comments on draft review report, Latvia indicated that they used national statistical data. The ERT encourages Latvia to undertake efforts to provide for consistent reporting on synthetic fertilizer use between national and international databases.

52. The sum of N from all AWMS in table 4.B(b) excluding pasture range and paddock does not match the reported value of N input from manure applied to soil (table 4.D) corrected by $Frac_{GRAZ}$, $Frac_{GASM}$ and $Frac_{FUEL}$. The $Frac_{GRAZ}$ value is not consistent with the N values reported in table 4.B(b) (the $Frac_{GRAZ}$ value of 0.282 in table 4.D is not equal to the value of 0.251 obtained by dividing N excretion in pasture range and paddock by total N excretion). The ERT encourages Latvia to check the calculations and correct the presentation of data in the CRF.

53. The ERT noted that the values of $Frac_{BURN}$, $Frac_{GRAZ}$ and $Frac_R$ in CRF table 4.D are not correct. The correct values are 0.1, 0.251 and 0.45, respectively. In response to the ERT's questions, Latvia agreed and provided the reason for incorrect input. However, the default value of $Frac_{BURN}$ is 0.1 kg N/kg crop-N, whereas the Party's response to the questions of the ERT indicated 0.9 kg N/kg crop-N.

54. According to the additional information provided to the ERT, 1,844.8 kha of arable land, 28.8 kha of perennial plantings, 611.3 kha of meadows and pastures and 516.9 kha of unused land are histosols. However, under cultivation of histosols Latvia is covering arable land only. The ERT encourages Latvia to verify which of the other areas mentioned fall under the definition for organic soils cultivated annually, and to add them to the AD in its next submission, if relevant.

### C. Non-key sources

Manure management – $CH_4$

55. To permit a better understanding of the $CH_4$ and $N_2O$ emissions estimates from manure management, the ERT encourages Latvia to provide more information on the allocation of the AWMS in the NIR and the CRF, for possible use of the tier 2 method in the future.

## V. LAND-USE CHANGE AND FORESTRY

### A. Sector overview

56. In the year 2001, the LUCF sector was a net sink of 80.3 per cent of Latvia's total GHG emissions. Since 1990, overall removals have decreased by 51.6 per cent. According to the NIR, the decrease is attributed to intensive harvesting. In response to the previous review, Latvia reports on $CO_2$ and non-$CO_2$ emissions and removals for all years and categories. However, emission trends as well as source and sink categories in the CRF are only partially covered. The removals from regrowth of coniferous and broadleaf forests on abandoned managed lands and emissions from cultivated mineral soils and pastures/forests on organic soils in tables 5.C and 5.D are not estimated because of lack of data. Notation keys are used consistently within the sector.

57. Latvia has used the IPCC default methodology and country-specific growth rates for calculating $CO_2$ and non-$CO_2$ emissions and removals in the LUCF sector. The Party noted the difficulties it faces in

gathering the AD needed for estimating the emissions and removals from the sector. A considerable part of the AD and growth rates is based on assumptions and expert judgement. Latvia is encouraged to provide justification of assumptions and judgements made and to undertake verification and uncertainty assessment of the estimates derived.

58. Following the recommendations of the previous review, Latvia has recalculated emissions and removals from the LUCF sector from 1990 to 2000 and included annual data on harvesting in the estimates. According to the analysis of the UNFCCC secretariat, the recalculated values over the 1990–2000 period differ from the estimates previously submitted: the differences range from –95.1 to +12.5 per cent. The reasons for the recalculations are explained in the NIR and in the Party's responses to the ERT's questions, but no quantitative information was provided. Latvia is encouraged to provide more quantitative information about the recalculations in the NIR and the CRF.

## B. Sink and source categories

Changes in forest and other woody biomass stocks – $CO_2$

59. In the year 2001, this category constituted a net sink for 91 per cent of the total GHG emissions of Latvia. According to the NIR and the CRF, net removals have decreased by 47.4 per cent since 1990 as a result of substantially increased harvesting (by 179 per cent) and only minor growth in removals (by less than 3 per cent) due to a steady enlargement of forest and biomass stocks. The removals seem to be overestimated as a result of the use of similar value of biomass expansion factor (1.62) both for evergreen and deciduous temperate forests and high annual growth rates for non-forest trees (800,000 $m^3$/yr for lone trees and trees in gardens and parks and 500,000 $m^3$/yr for trees on other wooded lands except for forests). The revision of the biomass expansion factor and the growth rates for non-forest trees was identified as a priority in the previous review report, and Latvia is encouraged to reconsider these parameters in line with on-going work on the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (LULUCF), and include an appropriate explanation of them in its next submissions. Since 2005, the Parties will use the IPCC LULUCF Good Practice Guidance which will help them with new more comprehensive methodologies in the sector.

Forest and grassland conversion – $CO_2$ and non-$CO_2$

60. Under this category Latvia reports on $CO_2$ and non-$CO_2$ emissions from burning of harvesting residues (slash). In 2001, emissions from this category were 10.2 per cent of total national GHG emissions and 67.9 per cent higher than in 1990. According to the NIR, between 50 and 70 per cent of slash is assumed to be burned. About 30 per cent of this amount is reported elsewhere because it is used for energy. The remaining slash is left to decay. However, in so far as the default IPCC method and a similar biomass expansion factor are used by Latvia for calculations under categories 5.A and 5.B, $CO_2$ emissions from on-site burning should not be reported here because they are included in category 5.A. In line with the previous review, the ERT recommends that Latvia harmonize its calculation procedures with the IPCC methodology in order to avoid double counting of carbon (C) released from biomass harvesting.

Abandonment of managed lands – $CO_2$

61. In the year 2001, removals on abandoned lands represented a sink of 0.3 per cent of national emissions. The NIR and the CRF report a decrease in the area of abandoned land in 1997 but do not provide information on possible emissions from it. For more balanced reporting on the LUCF sector, Latvia is encouraged to provide information on possible emissions resulting from the reduction in areas of lands abandoned in 1997.

Emissions and removals from soil – $CO_2$

62. Latvia reports on $CO_2$ emissions from organic soils and liming, being less than 1 per cent of national emissions in 2001. Since 1990, the emissions dropped by 32.1 per cent as a result of a decrease

in the areas of cultivated soils and in lime use. As with the recommendations of the previous review, the ERT encourages Latvia to obtain the AD and report on emissions and removals from mineral soils and from pastures and forests on organic soils within the country.

## VI. WASTE

### A. Sector overview

63. Emissions from the Waste sector contributed 12.2 per cent of total emissions (excluding LUCF) in the year 2001 compared with 3.2 per cent in 1990. Emissions increased by 47.2 per cent from 1990 to 2001, and by 56.4 per cent from 2000 to 2001. Emissions of $CH_4$, the main GHG in this sector, increased by 50.1 per cent from 1990 to 2001 and by 59.6 per cent from 2000 to 2001. These major changes are attributable to a substantial change in $CH_4$ emissions from solid waste disposal on land. The need to consider carefully whether these changes are reasonable was noted in the draft of the review report and further information was provided by the Party. The Party's response is discussed below. These emissions and $CH_4$ from waste-water handling are identified as key sources in the secretariat's key source analysis.

64. The Party's inventory is complete with the minor exceptions of $CH_4$ and $N_2O$ from waste incineration. Reporting is not fully transparent as not all the relevant cells include data or a notation key and no information is included in the additional information table. Although it is apparent that there have been significant recalculations since the previous submission,[6] these are not reported or explained in the CRF, nor are they explained adequately in the NIR. The ERT recommends that the recalculation tables in the CRF be completed and more detailed explanation of recalculations be included in future NIRs so as to enable a proper assessment of the methodological changes and the reliability of the trend in emissions. A detailed accounting of the division of solid waste disposal on land between managed and unmanaged sites is provided in the 2003 submission, and emissions for domestic and commercial waste water, and industrial waste water, are reported separately. Overall the inventory is substantially improved with respect to previous submissions.

### B. Key sources

Solid waste disposal on land – $CH_4$

65. The Party uses the IPCC tier 1 default method to estimate emissions. $CH_4$ recovery is not reported or noted. $CH_4$ emissions from solid waste disposal on land increased by 109.5 per cent from 1990 to 2001, with a sharp increase (77.5 per cent) occurring from 2000 to 2001. This substantial growth has driven the growth in the emissions for the Waste sector. In the response to the previous stage of the review activities and to questions raised during this review, the Party advised the ERT that the statistical data source was changed between 2000 and 2001, making more reliable and complete data available. It is unclear whether the new data have been applied consistently over the entire time series. More detailed clarification of the approach to recalculations is required. According to the data in the NIR, managed waste disposal increased from 365.9 Gg in 2000 to 652.5 Gg in 2001. Total municipal solid waste (MSW) generated in 2001 is not shown, although it is for previous years. It is not clear whether all MSW generated is now assumed to be disposed at solid waste disposal sites (SWDS), or whether the increase of 78.3 per cent in the quantity of waste disposed at these sites is an error.

66. No information is provided in the additional information table, although relevant methodology parameters used in the calculations are included in the NIR. The value for $DOC_F$ is shown as 0.77. This

[6] The 2002 submission reported emissions of 490.97 Gg $CO_2$ equivalent for the Waste sector for 1990 compared with 941.16 Gg $CO_2$ equivalent in the 2003 submission (a 91.7 per cent increase) and 1,396.08Gg $CO_2$ equivalent for 2000 compared with 885.69 Gg $CO_2$ equivalent in the 2003 submission (a 56.9 per cent decrease). The reasons appear to be (a) the change in statistical data source for solid waste; (b) the disaggregation of emissions from domestic and commercial waste water, and industrial waste water; and (c) the inclusion in the trend tables of emissions due to waste-water handling for the years 1990–1998, which were omitted by the 2002 submission.

value is appropriate if lignin C is excluded. Where lignin C is included a value of 0.5 to 0.6 is recommended in the IPCC good practice guidance. In the response to the draft review report, the Party indicated that a value within the range recommended in the IPCC good practice guidance, where lignin C is included, would be implemented.

67. Latvia is encouraged to review the substantial change in MSW disposed of to SWDS, in order to ascertain whether there is an error arising from the change in data source. If the quantity of MSW for 2001 is correct, it is suggested that the data for earlier years be reconsidered to determine whether these emissions should be recalculated. In a response to the draft of this report, Latvia has undertaken reassessment of the emission trend. Explanation of the outcome of the assessment in the Party's next submission would assist future reviews of the Party's inventory.

Waste-water handling – $CH_4$

68. The methodology used by the Party is the "check method" provided for in the IPCC good practice guidance (page 5.16) as a quick method to check national estimates, and is not the accepted IPCC default method. The method is noted by the Party as a default tier 2 method. The ERT recommends that the Party consider implementing the IPCC default method rather than the check method. Recalculations will be required for all years from 1990. The Party responded during this review that the check method was used because of lack of data; however, the IPCC default method is not data-intensive.

69. $CH_4$ emissions from waste-water handling declined by 41.9 per cent from 1990 to 2001, and increased by 1.8 per cent from 2000 to 2001. During the period, emissions fell by 33.4 per cent between 1992 and 1993. In response to questions from the ERT, the Party stated that the decline in industrial production and in population explains this drop in emissions as indicated in the NIR (page 6 and 27).

70. Emissions from industrial waste water are reported separately from domestic and commercial waste water, which was not done in Latvia's previous submissions. During the review and in response to the draft of this report Latvia explained that the estimates are made under a local project and indicated that they are based on IPCC methodology. They also provided a brief explanation of the method used. The ERT recommends that Latvia provide a more detailed explanation in its future submissions.

### C. Non-key sources

Waste incineration – $CO_2$, $CH_4$ and $N_2O$

71. The NIR states that data are not available prior to 1999 and $CO_2$ emissions are therefore not reported for 1990–1998. In its response to the draft review report, Latvia clarified that until 1995, there was no waste incineration in the country and indicated that proper notation keys will be used in future submissions. The ERT encourages Latvia to provide more explanation on waste incineration in the NIR and estimate emissions from this source for the period from 1995, with these estimates reported in future submissions.

72. $CH_4$ and $N_2O$ are reported as "NO" and "NE", respectively, as noted in the previous stages of the review activities. The Party stated that there are no EFs for $CH_4$ emissions from waste incineration. With regard to $N_2O$, the NIR observes that lack of information makes it impossible to calculate emissions. During this review, the Party advised the ERT that there is a lack of information on technologies. The ERT considers that the Party should keep both issues under review to determine whether there are likely to be any emissions of significance in the future.

## ANNEX 1: MATERIALS USED DURING THE REVIEW

### A. Support materials used during the review

2002 and 2003 Inventory submissions of Latvia. 2003 submissions including CRF for years 1990–2001 and an NIR.

UNFCCC secretariat (2003). "Report of the individual review of the greenhouse gas inventory of Latvia submitted in the year 2002 (in-country review)." FCCC/WEB/IRI(2)/2002/LVA (available at http://unfccc.int/program/mis/ghg/countrep/latincountrep.pdf).

UNFCCC secretariat. "2003 Status report for Latvia" (available at http://unfccc.int/program/mis/ghg/statrep03/lat03.pdf).

UNFCCC secretariat. "Synthesis and assessment report of the greenhouse gas inventories submitted in 2003. Part I." FCCC/WEB/SAI/2003 (available at http://unfccc.int/program/mis/ghg/s_a2003.html); and Part II – the section on Latvia (unpublished).

Latvia's comments on the "Draft synthesis and assessment report of the greenhouse gas inventories submitted in 2003" (unpublished).

UNFCCC secretariat. Review findings for Latvia (unpublished).

UNFCCC secretariat. "Handbook for review of national GHG inventories." Draft 2003 (unpublished).

UNFCCC secretariat. "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/CP/1999/7 (available at http://www.unfccc.int/resource/docs/cop5/07.pdf).

UNFCCC secretariat. "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. Database search tool – *Locator* (unpublished).

IPCC. *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories 2000* (available at http://www.ipcc-nggip.iges.or.jp/public/gp/gpgaum.htm).

IPCC/OECD/IEA. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, volumes 1–3, 1997* (available at http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm).

### B. Additional materials

Responses to questions during the review were received from Ms. Agita Gancone and Ms. Kristina Zommere (Latvian Environment Agency), including additional material on the methodology and assumptions used. In particular, the following papers were received:

- Research regarding Latvian project "Implementation of requirements of international convention on air pollution": this may have been drafted by the inventory team in response to questions raised by the ERT.

- Evaluation of the quantity of organic soils (histosols) in Latvia: Report prepared by the Deputy Director of the Agrochemical Research Centre for Scientific Work, Dr. Agr. R. Timbare.

- - - - -