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REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY OF LATVIA SUBMITTED IN THE YEAR 2002[1]

(In-country review)

I. OVERVIEW

A. Introduction

1. The Conference of the Parties (COP), by its decisions 6/CP.5 and 34/CP.7, requested the secretariat to conduct individual reviews of greenhouse gas (GHG) inventories submitted by Parties included in Annex I to the Convention (Annex I Parties), according to the UNFCCC reporting guidelines for the technical review of GHG inventories from Annex I Parties, hereinafter referred to as the UNFCCC review guidelines.[2] The principal objectives[3] of the review of the GHG inventories are to ensure that the COP has adequate information on GHG inventories and GHG emission trends and to examine the information submitted by Annex I Parties in accordance with the UNFCCC reporting guidelines[4] for consistency with those guidelines.

2. Latvia volunteered for an individual in-country review of its 2002 inventory submission. The review took place from 23 to 27 September 2002 in Riga, Latvia. The in-country review was carried out by a team of nominated experts from the roster of experts and was coordinated by the secretariat. Experts participating in the review were: generalist – Ms. Kristina Saarinen (Finland), energy – Mr. Javier Hanna Figueroa (Bolivia), industrial processes – Ms. Karin Kindbom (Sweden), agriculture – Mr. Michael McGettigan (Ireland), land-use change and forestry (LUCF) – Mr. Jozef Mindas (Slovakia) and waste – Mr. Anand Bhide (India). Mr. Michael McGettigan and Mr. Anand Bhide were the lead reviewers of this review. The review was coordinated by Ms. Astrid Olsson and Ms. Sevdalina Todorova-Brankova (UNFCCC secretariat). Inventory experts from Estonia and Lithuania were invited to attend as observers during this in-country review of Latvia to gain insight into the review process. The observers were Mr. Jaan-Mati Punning and Mr. Jaanus Terasma from Estonia and Ms. Inga Konstantinaviciute and Mr. Egidijus Norvaisa from Lithuania.

3. At the beginning of the review, the host country officials and inventory experts provided a general overview of inventory preparation, including institutional arrangements. Thereafter, sectoral sessions on energy, industrial processes and LUCF were conducted in turn, followed by sessions on agriculture and

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[1] In the symbol for this document, 2002 refers to the year in which the inventory was submitted, and not to the year of publication. The number (2) indicates that this is an in-country review report.

[2] For the UNFCCC review guidelines and decision 6/CP.5 see document FCCC/CP/1999/7, pages 109–114 and pages 121–122, respectively.

[3] For the objectives of the review of GHG inventories see document FCCC/CP/1999/7, page 109, paragraph 2.

[4] The guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories (FCCC/CP/1999/7), are referred to in this report as the UNFCCC reporting guidelines.

waste taken in parallel. During these sessions, the Latvian experts responsible for the respective sectors clarified key issues related to inventory preparation and this was followed by a question and answer session.

4. In accordance with the UNFCCC review guidelines, a draft version of this report was communicated for comment to the Government of Latvia, which supported its publication without any further ammendments.

B. Inventory submission and other sources of information

1. National inventory report (NIR) and common reporting format (CRF)

5. Latvia's 2002 submission was received on 15 April 2002 in electronic format. It consisted of CRF files for 1999 and 2000 and a short NIR. The NIR included summary information on the methodologies and data used to compile the emissions inventories. Information on recalculations was also provided. The CRF files included completed CRF tables for the years 1999 and 2000 except tables 1.A(d) and 8(b) for 1999 and tables 5.B and 5.C for 2000.

2. Other sources of information

6. The expert review team (ERT) used the 2002 status report, parts I and II of the draft synthesis and assessment (S&A) report for 2002, together with the Party's responses to them, and the preliminary key source analysis[5] prepared by the UNFCCC secretariat. The status reports and the S&A reports for previous years and Latvia's Third National Communication were also provided for information purposes. Other reference material used during the review included the UNFCCC reporting and review guidelines and the draft review handbook, which provide additional guidance to ERTs conducting the review activities. Where needed, the ERT also used the 2000 and 2001 GHG inventory submissions of Latvia.

7. During the review the host country provided the ERT with additional information, including further detail on data and methods used in each source category, information related to recently recalculated data, and a full set of CRF tables for the recalculated years 1990, 1999 and 2000. This material is not part of the official inventory submission in April 2002 for which this review was conducted, but it was taken into account in this review and was helpful for assessing the status of the Latvian inventories and the improvements that are under way. The full list of materials used during the review is provided in annex I to this report.

C. Emission profile, trends and key sources

1. Emission profile

8. The 2002 submission shows an emission profile in Latvia that is typical of most Annex I Parties. The most important GHG is carbon dioxide (CO_2), contributing 63 per cent of total[6] emissions in 2000. Methane (CH_4) and nitrous oxide (N_2O) accounted for 23.4 and 13.6 per cent, respectively, of the total. Actual emissions of sulphur hexafluoride (SF_6) were partly estimated for 1999 and 2000 and actual and potential emissions of the halocarbons HFCs (hydrofluorocarbons) and PFCs (perfluorocarbons) have not yet been estimated. The energy sector accounted for 68.8 per cent of the total GHG emissions in 2000. Agriculture was the second largest source category, contributing 17.8 per cent of emissions, the waste sector accounted for 12.8 per cent, and the emissions from industrial processes accounted for just under 1 per cent of the total.

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[5] The preliminary key sources identified by the secretariat for Latvia are shown in table 3 of this report.

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

2. Emission trends

9. Tables 1 and 2 provide data on GHG emissions by gas and by sector for the years 1990 to 2000. The emission trends are dominated by very large reductions in the emissions of all gases in almost all sectors, reflecting the restructuring of Latvia's economy in this period. Total GHG emissions (without LUCF) decreased by approximately 65 per cent in 2000. The largest decrease occurred in CO_2, with a reduction of 70.9 per cent. The emissions of CH_4 and N_2O decreased by 38.3 and 56.7 per cent, respectively, from 1990 to 2000, due mainly to changes in agriculture, but a marginal increase is evident for these two gases since 1996.

10. The reduction in emissions from the energy sector was 70.2 per cent, reflecting the sector's overall dominance of CO_2 emissions. The reduction in agriculture, the second largest contributing source category, was 63.7 per cent. A similar reduction is also evident in the estimated CO_2 removals under LUCF. The decrease in the contribution from industrial processes, a minor source of emissions in Latvia, was 82 per cent. The waste sector, where CH_4 emissions increased by 185 per cent from 491 to 1,396 Gg, was the only source category to show an increase in emissions between 1990 and 2000. Most of the increase occurred between 1997 and 2000.

Table 1. GHG emissions by gas, 1990–2000
(Gg CO_2 equivalent)

GHGs	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Net CO_2 emissions/ removals	12,702	7,665	4,049	1,993	1,065	–338	–947	–1,890	–2,221	2,316	2,604
CO_2 emissions (without LUCF)	23,527	18,491	14,924	12,861	11,911	10,145	9,550	8,619	8,287	7,545	6,847
CH_4	4,115	4,017	3,333	2,387	2,086	2,128	1,997	2,180	2,622	2,596	2,537
N_2O	3,412	2,399	2,221	1,584	1,353	1,161	1,169	1,188	1,239	1,242	1,288
HFCs	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
PFCs	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
SF_6	NE	NE	NE	NE	NE	NE	NE	NE	NE	0	0
Total (with net CO_2 emissions/ removals)	20,229	14,082	9,603	5,963	4,504	2,951	2,219	1,478	1,640	6,154	6,429
Total (without CO_2 from LUCF)	31,054	24,908	20,478	16,831	15,350	13,435	12,715	11,986	12,149	11,384	10,672

NE = not estimated

Table 2. GHG emissions by sector, 1990–2000
(Gg CO_2 equivalent)

GHG SOURCE AND SINK CATEGORIES	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1. Energy	24,629	19,310	15,713	13,586	12,417	10,711	10,007	9,328	8,879	8,004	7,338
2. Industrial processes	563	584	286	89	154	127	185	154	236	161	101
3. Solvent and other product use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
4. Agriculture	5,335	4,418	3,871	2,534	2,139	1,934	1,848	1,804	1,794	1,708	1,746
5. LUCF	–10,789	–10,789	–10,838	–10,831	–10,809	–10,437	–10,450	–10,462	–10,462	–5,145	–4,156
6. Waste	491	558	571	586	603	616	628	655	1,193	1,423	1,396
7. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

NE = not estimated
NO = not occurring

3. Key sources

11. Latvia did not report a key source analysis as part of its 2002 submission. This review report therefore refers to the preliminary key source analysis performed by the secretariat, which identified 13 key source categories in Latvia in 2000, as listed in table 3. Five key sources related to CO_2 emissions in the energy sector, which accounted for 62.8 per cent of total emissions; further five key sources of CH_4 contributed 22.2 per cent of emissions; and three key sources of N_2O accounted for 10 per cent of the total.

Table 3. Key source categories in Latvia in 2000 (UNFCCC secretariat)[(a)]

Key source	Gas	Level assessment %	Cumulative total %
Stationary combustion – gas	CO_2	24.1	24.1
Mobile combustion – road vehicles	CO_2	17.1	41.2
Stationary combustion – oil	CO_2	14.4	55.6
Solid waste disposal sites	CH_4	11.6	67.2
Direct emissions from agricultural soils	N_2O	6.6	73.8
Enteric fermentation in domestic livestock	CH_4	5.4	79.2
Stationary combustion – coal	CO_2	5.3	84.5
Fugitive emissions: oil and gas operations	CH_4	3.2	87.7
Indirect emissions from agricultural soils	N_2O	2.0	89.7
Mobile combustion – railways	CO_2	1.9	91.6
Manure management	N_2O	1.4	93.0
Stationary combustion – biomass	CH_4	1.2	94.2
Waste-water handling	CH_4	0.9	95.1

[(a)] The UNFCCC secretariat has identified, for each Party, those source categories that 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 were also identified according to the tier 1 trend assessment for those Parties that provided a full CRF for the year 1990. The key sources presented in this report are based on the secretariat's preliminary key sources assessment. They might differ from key sources that may be identified by the Party itself.

D. General assessment of the inventory

12. Because of Latvia's limited inventory capacity, the national inventory submitted by the Party does not conform with UNFCCC reporting guidelines in terms of transparency, consistency, comparability, completeness and accuracy. It has not yet been possible to prepare an NIR to provide sufficient information to support a complete understanding of the data provided in the CRF tables. Latvia has not yet begun to implement the IPCC good practice guidance, but the ERT recognizes that, under the special consideration given to Parties with economies in transition (EIT),[7] Latvia still has sufficient time to apply this guidance.

13. The approach used to estimate the GHG emissions relies heavily on IPCC tier 1 methods. Default emission factors have been used for virtually all source categories except CO_2 emissions from fuel combustion. Overall, this approach is broadly consistent with the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, hereinafter referred to as the IPCC Guidelines. However, there is

[7] According to the conclusions of Subsidiary Body for Scientific and Technological Advice (SBSTA) at its twelfth session, the IPCC good practice guidance should be applied by Annex I Parties as far as possible for inventories due in 2001 and 2002, and should be used for inventories due from 2003. Annex I Parties with economies in transition may phase in the IPCC good practice guidance two years later than other Annex I Parties.

incorrect allocation of sources according to the IPCC reporting format, some minor calculation errors and incomplete coverage of some source categories and gases. The NIR contains no information on uncertainties, quality assurance/quality control (QA/QC) activities or planned improvements. A more detailed assessment is provided in sections II–VII of this report.

1. Completeness

14. The Latvian inventory for 2000 includes emission estimates for the majority of source/gas combinations likely to be relevant in the country. There are data gaps, especially for some activities in the energy and industry sectors and for the years 1990–1995 in particular, mainly due to the reconstruction of the statistical system and the associated difficulties in obtaining consistent data for all years.

15. Fugitive emissions from oil and natural gas storage are not completely covered by the current inventory. Field burning of agricultural residues is not covered due to lack of activity data. Actual emissions of SF_6 are partly estimated. Actual emissions of HFCs and PFCs are not estimated. Emissions and removals by soils under LUCF are not fully covered by the inventory. Emissions from international bunker fuels are not reported separately, but are included within emissions from domestic fuel consumption and consequently increase the national total. It is likely that other emission sources also exist across the various sectors that are not covered in the current inventory.

2. Transparency

16. The NIR and the CRF tables are currently not sufficiently transparent. More detailed information is needed on how the data were produced and what basic information was used. Justifications for the methods chosen and the assumptions used need to be fully documented. Clear statements about data gaps and the reasons behind them would help the understanding of some areas not yet covered, and whether certain activities really exist. In general, there is quite good use of notation keys but some CRF tables (e.g. in the LUCF sector) are incomplete. The information sources used in the inventory need to be fully documented and the data and information in the CRF tables need to be adequately cross-referenced with the corresponding descriptions given in the NIR.

17. Confidentiality is mainly related to statistical data, which cannot be made available at a sufficiently disaggregated level due to the small number of enterprises concerned. This results in a lack of transparency in relation to reporting for Industrial Processes and Waste. Possibilities to obtain data for sources that are currently classified as confidential could be pursued further.

3. Recalculations and time-series consistency

18. In the 2002 submission Latvia provided recalculations for the year 1999 to account for the coverage of additional sources in LUCF. During this in-country review, Latvia provided the ERT with recalculations for the years 1990, 1999 and 2000, recently undertaken to take account of a number of important additional changes. These included improved statistical data for energy, the development of national emission factors for CO_2 and SO_2 for combustion sources, revised CH_4 and N_2O emission factors for gasoline engine cars, and new activity data for the industrial sector. The recalculations reflect a new methodology for estimating CO_2 uptake in forests and they address various issues related to the reporting of emissions from agriculture in the CRF tables identified in earlier S&A reports. The rationales for these recalculations were partly given in the documentation provided together with the recalculated inventories, and in the opinion of the ERT they seem to be justified.

19. The Latvian inventory is not consistent over the 1990–2000 time-series due to the changes in data and methods mentioned above. Furthermore, the ERT has identified a number of methodological problems associated with the recent recalculations and areas of non-conformity with the IPCC Guidelines. In the opinion of the ERT, further work is needed before the results of these recalculations can be formally

adopted by the Party. Consistency is also affected by the difficulties in obtaining consistent time-series activity data in certain sectors, particularly energy, for the years 1990–1994. Recalculations for these years will be made in the near future to improve time-series consistency.

4. Uncertainties

20. Latvia did not provide an uncertainty analysis in the 2002 submission. However, qualitative indicators relating to the emissions estimates for all source categories were given in CRF table 7.

5. Verification and QA/QC approaches

21. There is currently no QA/QC system in place for the Latvian inventory. However, certain QA/QC steps are being carried out by experts from the Latvian Environmental Agency (LEA), such as assessment of the magnitude of emissions in some source categories and comparison of data with those of previous years. The inventory is approved by the Ministry of the Environment and Regional Development before submission to the UNFCCC secretariat. The Central Statistical Bureau (CSB) also conducts normal statistical checks. The comparison of CO_2 emissions obtained from the reference approach with those obtained from the sectoral approach is the only element of verification so far employed for GHG inventories.

6. Institutional arrangements

22. During the in-country review, Latvia described the current institutional arrangements for preparation of the inventory. The LEA has overall responsibility for the national inventory, calculation of the emission estimates and maintaining the database. No other institutes are currently involved in the preparations of the inventory. At the LEA, the inventory is currently carried out on a project basis and no permanent inventory team is yet in place. Two experts are involved in the preparation of the annual greenhouse gas inventory and estimates of other emissions to air. Non-official working groups have from time to time been appointed to discuss the inventory work. When needed, the LEA experts may contact the national experts for advice on the suitability of IPCC methods and emission factors under national circumstances.

23. The Latvian national statistics are compiled and maintained by the CSB according to Eurostat and International Energy Agency (IEA) requirements. However, the national statistical law sets some constraints on the availability of fully disaggregated data as needed by the LEA for emission inventory purposes. Disaggregated production data may be obtained only if the number of units involved in a particular activity exceeds three. The Regional Environmental Boards' database includes some useful data for inventory purposes such as activity data (fuel and water use, production, fuel power, process and abatement technique) and information on emissions of indirect greenhouse gases. The data are collected from the annual emission reports of installations for compliance checking with national emission limit values. These data can, however, only be reviewed as regional totals (usually by city name). In the long term, it may be possible for the LEA to send requests directly to the enterprises for which sufficiently disaggregated data are not available, in order to obtain production data and other supplementary data needed in the inventory.

24. The LEA is to be commended for its achievements to date in the reporting of inventory data under the Convention, even though the available resources are very limited. The assignment of the overall responsibility for the national inventory to the LEA will be permanent from 2003. The ERT regards this assignment as a positive initial step that will help towards continuity of the inventory work and should ensure consistency of reporting to different international organizations. Contributing organizations appear willing to cooperate towards more efficient and timely data input to the inventory process and there is the potential to build up a functional national system using the LEA as the primary competent authority. This

requires some restructuring of current institutional arrangements and the promotion of more active collaboration between the LEA and other bodies.

7. Record keeping and archiving

25. Latvia does not yet have a centralized archiving system. The LEA is developing an archiving system for the current inventory. Documentation, including development of national methods and emission factors as well as assumptions made will be prepared and archived at the LEA.

8. Issues related to previous reviews

26. Major improvements have been carried out in response to issues highlighted in previous stages of the review process. The most important of these involved recalculating the energy sector emissions for the years 1990 to 1998 and checking the underlying energy statistics and the application of national emission factors for energy sector CO_2 and SO_2 emissions. This work also took account of improved activity data in the transport sector. Latvia has also carried out some estimation of SF_6 actual emissions for 1999 and 2000, and the emissions of NMVOC (non-methane volatile organic compounds) from road paving with asphalt were estimated according to a new method. In the LUCF sector, emissions from on-site burning of biomass were included and emissions from waste-water handling were estimated in the waste sector.

27. In response to the draft S&A report 2002, the calculations and the relevant CRF tables are being revised to resolve minor errors and issues of transparency and interpretation due to incorrect units of measurement for some activity data and the direct input of emission factors in the CRF. The recalculations and updated CRF tables made available to the ERT indicate that this work is already well advanced.

E. Areas for further improvement

1. Issues identified by the Party

28. The NIR does not identify particular areas for improvement. In its response to the draft S&A report 2002, Latvia indicates that it is working to improve its estimates of N_2O emissions for the agriculture sector. During the in-country review, Latvia informed the ERT that actual data will be obtained and used as far as possible in future submissions, and work will continue on the improvements in the statistical data for the years 1990–1996.

2. Issues identified by the ERT

29. Overall, the improvements in Latvia's submissions necessary to meet the needs of the Convention will require a more complete application of all aspects of the UNFCCC reporting guidelines. The Party needs to give particular attention to the NIR requirements. Many of the methodological issues that have been identified in this review may be quite readily resolved and it is possible to compile a consistent inventory time-series based on the current approach, even if there continues to be heavy dependence on default inputs in some sectors. The development of activity data and emission factors that reflect the dynamic situation for this Party undergoing transition to a market economy is the major task. Detailed documentation of the inventory process in these circumstances, according to the specifications laid down in the UNFCCC reporting guidelines, is vital for further assessment and review of the inventories.

30. General improvements clearly must also take account of the IPCC good practice guidance. Implementation of the IPCC good practice guidance is fundamental to progress envisaged in paragraph 29 in that it impacts upon many issues not yet given high priority by the Party under review. Accordingly, the following areas for improvement identified by the ERT, relating to cross-cutting issues in the Latvian

inventory, necessarily imply some application of the IPCC good practice guidance. However, the ERT recognizes that not all these improvements can be carried out in the short term.

31. The ERT encourages the Party to:

(a) Develop institutional arrangements to make sufficient resources available for the inventory work (the LEA stated that one expert per sector is needed), to ensure continuity of the work and to provide sufficient support for development of national methods and emission factors at the collaborating national expert institutes;

(b) Complete the NIR in accordance with the UNFCCC reporting guidelines. The NIR should contain more precise descriptions of those methodologies that differ from the IPCC methodology and also provide explanations where data are not available or cannot be obtained from various sources. As the situation is rapidly changing in Latvia in almost all sectors, and economic growth is increasing, this should also be clearly reflected in the NIR, both generally and in the specific areas, to allow understanding of the trends;

(c) Compile time-series emission estimates for both actual and potential emissions of HFCs, PFCs and SF_6;

(d) Achieve greater completeness in respect of other source/gas combinations reported as not estimated (NE) and identify possible additional emission sources for all sectors;

(e) Investigate new data sources, such as industrial associations or through direct contact with large companies. Some companies, at least those having the Environmental Management and Audit System (EMAS) or ISO 14000 system, may publish environmental reports where data can be obtained;

(f) Carry out a key source analysis in order to prioritize major efforts in the inventory work;

(g) Establish QA/QC management and archiving systems and carry out a quantified uncertainty analysis;

(h) Continue work on recalculations after careful consideration of current methods and the findings of this review, and include the results in future submissions to the UNFCCC.

32. Recommended improvements relating to specific source categories are presented in the relevant sector sections of this report.

II. ENERGY

A. Introduction

33. In 1990, Latvia's total GHG emission from the energy sector were estimated at 24,629 Gg of CO_2 equivalent, representing 79.3 per cent of total GHG emissions in that year. The energy sector accounted for 70.3 per cent of Latvia's total GHG emissions in 1999 and for 68.8 per cent in 2000, and 97.9 and 98.5 per cent, respectively, of total CO_2 emissions with absolute emissions of 7,385 Gg and 6,746 Gg. This sector includes seven key source categories (table 3) with a combined contribution of 67.2 per cent of total emissions in 2000.

34. Total GHG emissions from energy use decreased by 67.5 per cent during the period 1990–1999, and by 70.2 per cent for 1990–2000. Emissions of CO_2 decreased by 67.8 and 70.6 per cent respectively, CH_4 by 61.5 and 63.1 per cent respectively, and N_2O by 68.1 and 69.8 per cent respectively. General steady reduction of the GHG emissions was driven mainly by the transition to a market economy in Latvia. Emissions of all GHG in all sectors show considerable annual fluctuations during this period, possibly

produced by some inaccuracies in the statistical data or the sudden changes in the availability of some fuels between years.

1. Completeness

35. The CRF included estimates for most gases and for most sources of emissions from the energy sector. There were some exceptions, including fugitive emissions of CH_4 and CO_2 associated with gas distribution, and CH_4 leakages at power stations and in the industrial, residential and commercial sectors. Table 9 of the CRFs indicates lack of data as a reason for not estimating emissions from these sources. The emissions estimates do include CH_4 fugitive emissions from the Inchukalns underground gas storage facility.

36. There were no estimates of emissions from international bunker fuels in the aviation and marine navigation categories because of lack of activity data, as explained in the NIR. It is not completely clear if military uses of fuels are included in the estimates and the NIR does not make any statements on this matter. However, during the review Latvian officials explained that the emissions from this source are included in the totals.

2. Transparency

37. The information presented in both the CRFs and the NIR is transparent, although there are a number of inconsistencies in the information provided in both (differences due to rounded figures, empty cells and manual processing of tables). Activity data were obtained mainly from national energy balances and from data provided by sectoral experts. The NIR makes no explicit statements on the integrity and quality control of the data and process of data collection, and does not sufficiently back up the data in the CRFs, especially considering data gaps due to changes in Latvian statistical systems.

38. Notation keys are used widely in the CRF tables. However, in some cells, notation keys were not used or notation keys were used that are not included in the guidelines (for example FE = fully estimated).

3. Methodologies, emission factors and activity data

39. In the estimates of emissions for the energy sector, the IPCC tier 1 methodologies have been widely used. Default emission factors have been used for all sectors and gases with a few exceptions.

40. The road transport sector uses a tier 2 method. Estimates are based on the allocation of fuels by vehicle type and their share of participation in the fleet, taken from 1994 data of the Ministry of Transport. Single IPCC recommended European emission factors for uncontrolled vehicles, according to vehicle category are used for both N_2O and CH_4 for the whole time series.

41. In the case of fugitive emissions from the natural gas storage facilities, emissions estimates provided by Latvia's Gas Company were used, as well as data on NMVOCs relating to gasoline distribution and consumption. Although there are no explanations on the methods used, the ERT was informed that these activity data have been obtained through reporting under environmental regulations.

42. During the review, Latvian officials presented a set of country-specific emission factors for CO_2 and SO_2, calculated on the basis of fuel specifications used in the country. The new emission factors have been used for recalculations undertaken since the 2002 submission.

43. Activity data were obtained mainly from national energy balances from CSB publications and the Latvian Development Agency. Information from the LEA and Ministry of Transport was also used, together with data provided by sectoral experts.

4. Recalculations and time-series consistency

44. Recalculations for the energy sector have not been reported in the 2002 submission. However, during the in-country review, specific information and recalculated data for the energy sector were provided for the years 1990, 1999 and 2000 covering all GHG. Recalculations resulted from newly available data (updated energy balances), country-specific CO_2 and SO_2 emission factors, updated data for the road transport sector (new yearly composition of the fleet based on vehicle type) and more accurate factors for natural gas transmission.

45. The recalculations resulted in marginal changes in emissions of CO_2 (0.6 per cent increase in 1990, decreases of 0.5 per cent in 1999 and 0.8 per cent in 2000) and decreased emissions of CH_4 (64.6 per cent in 1990, 26.1 per cent in 1999 and 38.9 per cent in 2000) and N_2O (43.8 per cent in 1990, 2.9 per cent in 1999 and 3.1 per cent in 2000).

B. Reference and sectoral approaches

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

46. Emissions of CO_2 from Latvia's energy sector were estimated using both the reference and the sectoral approaches. The results differed by 0.06 per cent in 1999 and by 0.48 per cent in 2000, and the corresponding energy consumption differed by 2.41 per cent and 0.92 per cent, respectively. Explanations for these small differences were provided in the documentation box of table 1.A(c) of the CRFs. Specific differences with the international data identified in the draft S&A report 2002 have been explained in Latvia's response.

47. In the reference approach estimates for the year 2000, double counting of lubricants has been noted. Lubricants are not produced in Latvia (only an upgrading process exists) but upgraded lubricants have been accounted for in the estimates. Also, it was noted that there was no inclusion of bitumen imports as activity data (which is subject to non-energy use), but bitumen carbon stored in bitumen is accounted for in the calculations. This discrepancy was removed in the revised version of the CRF submitted during the review.

2. International bunker fuels

48. The NIR reports that activity data were not available for the estimation of emissions resulting from international aviation and marine navigation. This could be due to a possible misunderstanding of the definition of bunker fuels given by the IPCC Guidelines for use in GHG inventories. The energy balances of Latvia, which apparently report total fuel consumption in these categories without distinction of domestic and international bunkers, are similar to those of many countries and the data need adjustment according to the IPCC definitions. The domestic consumption could be a minor part of the reported consumption of aviation fuels in the energy balances.

3. Feedstocks and non-energy use of fuels

49. In the 1999 CRF no estimates were reported for feedstock and non-energy use of fuels. No reasons were given for this in the NIR. However, in the 2000 CRF, a calculation of carbon stored in the bitumen was provided.

C. Key sources

1. Stationary combustion: gas, oil and coal – CO_2

50. Emissions of CO_2 from the stationary combustion of gas, oil and coal represented 43.8 per cent of total national emissions in 2000 (24.1 per cent, 14.4 per cent and 5.3 per cent, respectively for the three

fuel types). Emissions of CO_2 from these sources decreased by 72.7 per cent overall between 1990 and 2000, but fluctuated during the period.

51. The CRFs included estimates for all gases from all sectors of this key source category, using tier 1 methods and default emission factors. All sectors have disaggregated information by source categories. In estimating emissions from stationary combustion, emissions from mobile sources in the agriculture/forestry/fishing source categories were also included, which is not in line with the IPCC Guidelines.

52. For source category 1.A.1 Energy Industries (table 1.A(a)s1) the draft S&A report 2002 noted that only those emissions from public electricity and heat production were reported. In its response to the draft S&A report 2002, Latvia provided no explanation for this, but it is clear from the information provided during the in-country review that there are no other sources in this category. The ERT recommends the use of notation keys in such cases to facilitate the review process. In this source category, attention should be given to the misallocation of emissions from fuel use by autoproducers in source category 1.A.1(a) Public Electricity and Heat Production, which instead should be included under Manufacturing Industries and Construction (table 1.A(a)s2). For solid fuels, the high implied emission factor (IEF) for CO_2 was due to the inclusion in this category of peat and other fuels, which have relatively high CO_2 emission factors.

53. It is noted that all CO_2 emissions arising from the oxidation of coke in the course of iron and steel production were included in fuel combustion under 1.A.2 Manufacturing Industries and Construction (table 1.A(a)s2). Emissions from construction are not included in this source category, and instead are misallocated under 1.A.4 Other Sectors. The use of peat in industries could be the reason for sudden changes in the IEF for solid fuels during the 1990–2000 period (reductions or increases between years, especially concerning CH_4 and N_2O).

54. The draft S&A report 2002 noted that in table 1.A(a)s4 (Other Sectors), the value of the CO_2 IEF in 2000 for liquid fuels for category 1.A.4(b) Residential (62.44 kg/TJ) is the lowest among the reporting Parties. Latvia explained that the reason is that only LPG is reported under this category. In the Other Sectors the main issue is the incorrect allocation of emissions from construction sector in sub-category 1.A.4(a) Commercial/ Institutional instead of 1.A.2 Manufacturing Industries and Construction.

55. The main issue in source category 1.A.5 Other (table 1.A(a)s4) is the allocation of distribution losses here, using directly the data on losses from the energy balances. This means that actual losses were accounted wrongly as combustion of fuels (liquid, solid and gaseous). It should be very carefully assessed if the distribution losses of natural gas recorded in the energy balance could be taken as fugitive emissions. Emissions from the military use of fuels are not included in source category 1.A.5 Other.

2. Mobile combustion: road vehicles – CO_2

56. Emissions of CO_2 from road transportation contributed 17 per cent of total national emissions in 2000. Emissions of CO_2 decreased by 64.7 per cent overall from 1990 to 2000, but fluctuated during the period.

57. The CRFs included estimates of all gases by fuel for this key source. The CRFs reported disaggregated activity data by fuels for this source category, as recommended in the IPCC Guidelines.

58. A tier 2 IPCC methodology has been used in this sector, using an allocation of fuel by vehicle type taken from 1994 data and using a single default emission factor (N_2O and CH_4) for the whole time series, assuming no emission controls for all vehicles. This assumption could introduce inaccuracies in the estimates, particularly for N_2O in recent years, due to evident changes in the composition of the fleet and inclusion of cars with new technologies that are known to increase N_2O emissions.

59. This fact is recognized by the Latvian experts who, during in-country review, presented a new yearly composition of the fleet based on vehicle type (up-dated data from the Ministry of Transport), which had been used for allocation of fuel consumption by vehicle type allowing recalculation of emissions from road transportation. Recalculations were based on updated CO_2 country-specific emission factors, but again used a single emission factor for CH_4 and N_2O for the entire time series. The ERT is of the view that this approach could not reflect accurately the likely increase in emissions of these gases in the last years of the available time series because the changes in the technologies and composition of the vehicle fleet, were not accounted for.

3. Fugitive emissions from oil and natural gas operations – CH_4

60. Fugitive emissions of CH_4 from oil and natural gas operations contributed 3.2 per cent to total national emissions in 2000. These emissions decreased by 70 per cent overall from 1990 to 2000, but fluctuated during the period.

61. The CRFs included tier 1 estimates only from the transmission of natural gas and leakages in the Inchukalns gas storage facilities. No emissions associated with crude oil operations are included and notation keys are missing in the relevant CRF tables. During the in-country review the Latvian representatives stated that such operations do not occur, which is the reason for no calculations of fugitive emissions from this subcategory.

62. The estimates relating to natural gas operations under 1.B.2(b) Natural Gas do not include fugitive emissions from gas distribution and leakages at power stations or in the industrial, residential and commercial sectors. The estimates of emissions from natural gas transmission could be revised on the basis of the data provided by Latvia's gas company accounting for the missing sources.

4. Mobile combustion: railways – CO_2

63. Emissions of CO_2 from railway transportation contributed 1.9 per cent of total national emissions in 2000. The CRFs included estimates of all gases by fuel for this key source, using a tier 1 methodology and default emission factor.

64. The CRFs reported disaggregated activity data by fuels, as recommended in the IPCC Guidelines. It was not possible to give a trend analysis for railway transport because the historical estimates for the entire transport sector were not disaggregated by mode of transport.

65. The review found no particular methodological problems associated with this key source. No notation keys are used to indicate the reason for missing emissions or activity data in table 1.A(a)s3 of the CRF.

5. Stationary combustion: biomass – CH_4

66. Emissions of CH_4 from the stationary combustion of biomass contributed 1.2 per cent to total national emissions in 2000. Most of the biomass consumption occurs in the residential sector.

67. The estimates have been made for CH_4 and N_2O using a tier 1 methodology and default emission factors for all sub-categories except 1.A.5 Other (not elsewhere specified).

68. The Party could give special attention to the use of biomass in category 1.A.4 Other Sectors, especially in relation to activity data and the applicability of the IPCC default emission factors for CH_4 for Latvia's circumstances.

D. Non-key sources

1. Energy industries: solid fuels – CH_4 and N_2O

69. The draft S&A report 2002 noted that the IEF for CH_4 in 2000 for solid fuels (24.77 kg/TJ) is the highest across the reporting Parties. The explanation given by the Party in the comments to the previous S&A reports is that peat has been included under solid fuels and IPCC default emission factors were used. Latvia could consider reassessing the applicability of IPCC default emission factors used for peat, especially those for CH_4 and N_2O.

2. Manufacturing industries and construction: solid fuels – N_2O

70. The draft S&A report 2002 noted that the IEF for N_2O in 2000 for solid fuels (0.24 kg/TJ) has decreased 69 per cent from the 1999 value. The Party has not provided an explanation for this decrease. The possible reason is the large reduction of peat use in this sector during 2000.

3. Other sectors: solid fuels – CH_4

71. The draft S&A report 2002 noted that the IEF for CH_4 in 1999 and 2000 for solid fuels (297.3 kg/TJ and 300.1 kg/TJ, respectively) is the highest across the reporting Parties. The Party explained this by the use of the IPCC default emission factors.

72. It was noted that the uses of peat (in commercial/institutional and residential sectors) and coal (in agriculture/forestry/fisheries), and of IPCC default emission factors are the reasons why CH_4 IEFs, for this category in Latvia are among the highest of all reporting Parties. It could be necessary to re-evaluate the suitability of the IPCC default emission factor for the particular national circumstances in Latvia.

4. Mobile combustion: road transportation – CH_4, N_2O

73. The draft S&A report 2002 noted that:

(a) The IEF for N_2O for gasoline combustion in 1999 and 2000 (1.63 and 1.58 kg/TJ, respectively) are very low compared with the average of all reporting Parties;

(b) The IEF for CH_4 emissions from gasoline combustion (26.40 kg/TJ in 1990 and 2000) in road transportation are the second highest across the reporting Parties;

(c) The IEF for CH_4 from diesel oil combustion in 1999 and 2000 (5.85 and 4.71 kg/TJ, respectively) for diesel oil is among the highest across the reporting Parties.

74. In the submission of 2002, the Party has revised the previous reported values. The assumption that cars in Latvia are mainly European models without emission controls may be the reason why these emission factors differ substantially from those of other Parties.

5. Civil aviation: liquid fuels – CO_2, CH_4, N_2O

75. The draft S&A report 2002 noted that activity data for domestic use of jet kerosene reported in the 2002 CRF are not available in the IEA data, whereas the IEA has a similar value reported for the international aviation. The Party has not given an explanation for this. A possible reason is the misunderstanding of related items of data in the energy balances of Latvia, and the fact that domestic aviation in Latvia could account for only a very minor part of fuel consumption for aviation.

E. Areas for further improvement

1. Issues identified by the Party

76. The Party recognizes the need to solve a variety of problems facing the elaboration of GHG emissions estimates for the energy sector, which remains the most important source of emission in the country. The NIR clearly enumerated many issues encountered by Latvia in compiling its inventory for this sector, including lack of human, technical and financial resources. In addition, major problems are still encountered in acquiring consistent energy statistics for all years, because of major changes in data collection methods and statistical systems.

2. Issues identified by the ERT

77. The ERT considers that almost all of the underlying inaccuracies, misallocations of emissions among source categories and possible mistakes in the energy sector could be solved by the Party with a reasonable amount of additional effort. The ERT recommends that the Party also undertakes the following improvements:

(a) Adopt a more rigorous application of the IPCC methodologies and the UNFCCC reporting requirements;

(b) Strengthen the institutional and human capacity of the GHG inventories team, with greater emphasis on proper collaboration between the various institutions and experts involved in this work, especially those that produce the energy-related data;

(c) Enhance the current system of data collection and quality control for energy statistics so that the primary inputs are more reliable and more compatible with the needs of the inventory;

(d) Use country-specific emission factor and methods as much as possible, or Baltic and/or Scandinavian values as appropriate, to more adequately represent national circumstances. The use of emission factor and methods developed for EIT Parties could also be useful;

(e) Give special attention to the key sources identified in the energy sector, given their large contribution to total emissions in Latvia;

(f) Investigate whether fugitive CO_2 emissions from peat mining need to be included in the inventory. Given that there are no IPCC methodologies for estimating these emissions, Latvia is encouraged to study the experience of other Parties in order to try to estimate the potential emissions occurring from this source.

III. INDUSTRIAL PROCESSES AND OTHER SOLVENT USE

A. Sector overview

78. According to the submission in April 2002, the Industrial Processes and the Solvent and Other Product Use sectors accounted for 1.47 per cent of the total CO_2 emissions in Latvia in 2000. The share of total CO_2 equivalent emissions from these sectors was 0.98 per cent, industrial processes accounting for 0.95 per cent and solvent use for 0.03 per cent. The latter contribution relates only to N_2O, as no conversion of NMVOC to CO_2 is included in the Latvian inventory. No key sources have been identified by the secretariat in these sectors. The CO_2 emissions from these two sectors decreased by 82 per cent from 1990 to 2000. The source category 2.A Mineral Products, which includes cement production, lime production and limestone and dolomite use and which are aggregated in the submission, accounts for all reported CO_2 emissions from Industrial Processes and Solvent and Other Product Use.

79. Industrial processes contributed 59 per cent of the NMVOC emissions, or 64 Gg of the reported total of 107.84 Gg NMVOC emissions in 2000 while solvent use accounted for 7.5 per cent of the total NMVOC emissions, or 8.1 Gg. Recalculations of NMVOC emissions, presented to the ERT at the review, were substantially lower. The major decrease occurred in the source category 2.A.6 Road Paving with Asphalt, due to changes in methodology and revision of the volatile fraction in bitumen.

1. Completeness

80. The CRF provides estimates for most gases and for most sources listed in the IPCC Guidelines but the actual and potential emissions of HFCs and PFCs are not included. During the review the Party informed the ERT that, according to new information, the sources cement production and glass production are known to be only partly covered. For category 2.B Chemical Industry, all emissions are reported as not occurring (NO) or not estimated (NE). For remaining sources reported as NO, it is unclear if they exist within the country or not as notation keys are not used in all tables, or are, in some cases, inconsistently used.

2. Transparency

81. The inventory is, with the exception of some sources, not transparent due to a large amount of confidential data. The Party has explained in the NIR and in its response to previous S&A reports that if there are fewer than three enterprises for a particular activity in the country, data cannot be provided due to confidentiality of the statistics. However, the ERT was permitted to study the confidential activity data during the in-country review, and was thereby able to confirm that the methods used comply with the IPCC Guidelines.

82. During the review the ERT was informed that since Latvia's 2002 submission, efforts have been made by the Party to confirm whether the notation key NO is appropriate in all cases where it is used. A consistent use of the notation keys NO for sectors that do not exist in Latvia, and NE for sectors known to exist, but with no estimated data available, would increase the transparency of submissions. The transparency would also be greatly improved if more general explanations or descriptions of the industrial structure and existing sectors in Latvia were included in the NIR.

3. Methodologies, emission factors and activity data

83. The methodologies used are tier 1default methods in accordance with the IPCC Guidelines.

84. Emission factors are in most cases IPCC default emission factors. Exceptions are commented on in appropriate documentation boxes in the CRF tables.

85. Activity data are to a great extent confidential due to a small number of facilities within each sector. Plant-specific data have been obtained directly from large companies for a few sectors. Aggregated activity data from national statistics are available for the source categories 2.A.5 Asphalt Roofing and 2.A.6 Road Paving with Asphalt, and for paint production and import reported under the sector Solvent and Other Product Use.

4. Recalculations and time-series consistency

86. Only the trend of CO_2 emissions, dominated by emissions from cement production, has been submitted for the whole period 1990–2000. The trend reported in the April 2002 submission is variable; this was explained to depend on uncertainty in activity data and fluctuations in actual production. The recalculation of CO_2 for 1990, 1999 and 2000 did not alter the overall trend. Recalculation was justified by improved activity data.

B. Key sources

87. No key sources have been identified for the industrial processes sector, by either the Party or the secretariat.

C. Non-key sources

1. Cement production, lime production, limestone and dolomite use – CO_2

88. Activity data are reported as confidential and emissions are aggregated in the CRF. During the in-country review the activity data specific to each of the three source categories were made available to the ERT. These activity data are available for the complete time series. Default IPCC emission factors are used for each sector separately in the calculations. Recalculations, provided at the review, have been made for 1990, 1999 and 2000. The Party plans to conduct a general review of the complete emissions time series for these sources in the near future, with further recalculations as appropriate.

2. Asphalt roofing and road paving with asphalt – CO_2

89. In the draft S&A report 2002 it was noted that CO_2 emissions are reported as NO and activity data as confidential. The Party commented that this will be revised in future submissions. During the review the Party provided activity data and recalculated estimates of NMVOC emissions for 1990, 1999 and 2000. Recalculations were justified because methodologies in previous submissions had not been consistent. Recalculated estimates were substantially lower than those previously reported. The Party will be able to submit activity data in the future.

3. Chemical industry, including all sub-source categories – CO_2, CH_4, N_2O

90. Chemical industry was reported as NO. The Party commented in the draft S&A report 2002 that, according to newest available information, the notation key should be NE.

4. Iron and steel production – CO_2, CH_4, etc.

91. Emissions from coke are included in the energy sector and correctly indicated by the notation key IE under sub-category 2.C.1 Iron and Steel Production. Emissions of other gases (NO_x, CO, NMVOC, SO_2), reported under 2.C.1 are separately calculated from steel production activity data but reported as confidential. For rolling mills, default emission factors from the IPCC Guidelines were used. The Party is encouraged to further clarify what actual processes do occur in the iron and steel industry in Latvia, in order to establish the accuracy of the emission estimates.

5. Other production, pulp and paper – CO_2

92. In CRF table 2(I), no information was provided concerning the pulp and paper production. The Party clarified, with statistics and activity data provided during discussions, that the pulp and paper industry existed only until 1996. For the period 1997–2000 the notation key should be NO.

6. Aluminium production – PFCs

93. Emissions of PFCs from aluminium production are reported as NE, and other gases are reported as NO in table 2(I). In table 2(II).C,E the activity is reported as NO. During the review the ERT was informed that all notation keys referring to this source category should be NO.

7. Consumption of halocarbons and SF_6 – SF_6

94. The submission in 2002 was improved in that SF_6 was included for the first time. The potential emissions of SF_6 reported in table 2(II) should instead be reported as actual emissions because they refer to annual leakage of SF_6 from the equipment concerned. In table 2(I)s2, emissions of SF_6 were reported

as 0.02 Gg of substance, but in table 2(II)s2 they were reported as 0.02 Gg CO_2 equivalent. The correct value should be 0.02 Gg CO_2 equivalent, approximately 0.85 kg of SF_6, according to data provided during the review.

8. Consumption of halocarbons and SF_6 – actual and potential emissions of HFCs and PFCs

95. As has also been noted in the draft S&A report 2002, the notation keys NE and NO are not consistently used for HFCs and PFCs in table 2(II)s1 and 2(II)s2. In 2(II)s1 the consumption of all gases (actual emissions under F(a) Consumption of Halocarbons and SF_6) is reported as NE, but total actual emissions are inconsistently reported both as NO and as NE in 2(II)s2. Also in 2(II)s2, the imports of HFC-23, HFC-32, HFC-41, HFC-43-10mee, HFC-125, HFC-134, HFC-134a, HFC-152a, HFC-143 and HFC-143a are reported as NE, and the imports of other HFCs and all PFCs are reported as NO. If a substance is known not to be used in the country it should be reported as NO in all relevant tables referring to the particular substance, and as NE if it is used but no estimates have yet been made. The production and export of all gases are reported as NO. During the review it was explained that no production of these substances occurs in Latvia.

9. Paint application – NMVOC

96. Activity data are taken from national statistics and NMVOC emissions have been calculated using an emission factor of 0.5 t/t from Poland. The information reported in the CRF, including explanations in the documentation box, is transparent.

10. Use of N_2O for anaesthesia – N_2O

97. Emissions of N_2O from anaesthesia were reported for the first time in the 2002 submission. Activity data had been obtained from enterprises selling N_2O, and emissions were assumed to equal the amount of N_2O sold.

D. Areas for further improvement

1. Issues identified by the Party

98. During the review the Party informed the ERT that in the future it will try to obtain more information directly from industrial facilities in order to keep to a minimum the amount of information reported as confidential.

2. Issues identified by the ERT

99. The ERT encourages the Party to:

(a) Identify possible additional emission sources within the industrial processes sector. In view of the very large number of individual substances to be covered in this sector and the diverse range of sources involved, consistent use of notation keys, especially NE and NO, is needed to improve the transparency of the inventory for review purposes. All notation keys should be used strictly according to the definitions given in the UNFCCC reporting guidelines;

(b) Cooperate more closely with appropriate experts in industrial organizations and other bodies in the inventory process. Such experts could provide country-specific knowledge on industrial processes and contribute to the development of national methods and emission factors;

(c) Investigate possible sources of information concerning HFCs, PFCs and SF_6 in Latvia, so that estimates of potential and actual emissions of these substances can be submitted in the future.

IV. AGRICULTURE

A. Sector overview

100. Emissions from Agriculture in 2000 accounted for 16.5 per cent of total greenhouse gas emissions in Latvia. This contribution was largely due to CH_4 emissions in 4.A Enteric Fermentation (32 per cent) and N_2O emissions in 4.D Agricultural Soils (54 per cent). The single largest contributing source in Agriculture is the direct N_2O emissions from the cultivation of organic soils, which accounted for 18 per cent of emissions from the sector in 2000. The principal emission sources in Agriculture, and their relative contributions to the total, remained very similar during the period 1990 to 2000, even though total emissions from the sector decreased by approximately two-thirds in this period. According to the 2002 submission, the contribution of this sector to total emissions of CH_4 decreased from 56 per cent in 1990 to 26 per cent in 2000. This proportion remains among the highest for Annex I Parties with important agricultural sectors.

101. Notwithstanding the very large reduction in emissions from agriculture, the sector remains an important part of the Latvian inventory. The secretariat's preliminary key source analysis for 2000 identified four key sources in Agriculture in 2000 (table 3), three of which relate to N_2O. These key sources accounted for 86 per cent of emissions from the sector and for 15.3 per cent of total emissions in Latvia.

1. Completeness

102. The 2000 CRF contains estimates for all relevant gases in all agricultural sources listed in the IPCC Guidelines that may be expected to have emissions of greenhouse gases in Latvia. The CO_2 emissions from the liming of agricultural soils are allocated to LUCF, as permitted by these guidelines, and the notation key NE is used only for 4.F Field Burning of Agricultural Residues.

2. Methodologies, emission factors and activity data

103. There is total reliance on tier 1 methods and IPCC default emission factors (related to Eastern European conditions) in the agriculture sector. This methodological approach is in line with the IPCC Guidelines. Default values of the many other input parameters needed for the calculations are also used. However, in common with what is done in other sectors, it is clear that basic elements of the IPCC good practice guidance have not yet been taken into consideration in developing the emission estimates for agriculture. This means that there has been little overall assessment of the suitability of the various default values under Latvian circumstances and that the updated values of some important items provided in the IPCC good practice guidance are not taken into account. It also means that any relevant tier 2 methods are not considered for the four identified key sources.

104. Agricultural activity data are drawn from national statistical sources and publications. Information on livestock populations and fertilizer consumption is based on annual surveys conducted in November that cover a sample of up to 15,000 private farms, and monthly surveys of the larger state farms. Surveys are also carried out in June but their results are considered to be less representative of annual activity data as needed for the calculations. Averaging of statistical data over three years, as recommended by the IPCC Guidelines for the principal items of agricultural activity data, is not done. The ERT notes that the livestock characterization adopted by Latvia is used consistently across all source categories in the sector where the livestock populations are the primary basis for deriving the activity data needed for the calculations.

3. Transparency

105. The widespread use of default emission factors and other parameters, as well as the overall completeness of the various CRF tables, contribute to a substantial degree of transparency in the

emissions calculations for agriculture. In general, it is possible to reconstruct the inventory for the relevant source categories using the references to input data provided in the NIR and in the various CRF documentation boxes. However, the overwriting of cell formulae for implied emission factors (IEF) in some tables by the values actually used detracts from transparency to some extent. This problem was identified in the S&A reports and it is common to all CRF submissions received from Latvia up to 2002.

4. Recalculations and time-series consistency

106. The review team was informed that the same methods have been used for all years in the time series. Large year-to-year variations in the emissions of both CH_4 and N_2O, particularly during the early 1990s, are explained largely by the rapid decline in cattle populations as the number of large State farms decreased. The available emissions trend, which shows the rate of decrease to be highly variable up to 1995, probably also reflects the inability of statistical survey methods to fully capture the short-term changes that took place during that time.

107. Recalculations in respect of Agriculture carried out for the years 1990, 1995, 1999 and 2000 were elaborated and discussed during the review. These recalculations were not due to important revisions in methods, activity data or emission factors in any source category, except in the case of minor modifications to the allocation of animal wastes among the various waste management systems. Instead, they were carried out primarily to resolve the numerical problems arising from overwriting the formulae for IEFs in some tables and the use of certain items of activity data in units different to those specified in the CRF. Consequently, the impact of recalculations for the years concerned is a reduction in N_2O emissions of approximately 1 per cent, and CH_4 emissions remain unchanged.

B. Key sources

108. The four key source categories identified in this sector in 2000 are the direct and indirect emissions of N_2O under 4.D Agricultural Soils, of CH_4 in 4.A Enteric Fermentation and of N_2O in 4.B Manure Management. These key sources contributed 88 and 95 per cent, respectively, of the CH_4 and N_2O emissions in the sector, and they accounted for 15.3 per cent of total emissions in Latvia.

1. Enteric fermentation – CH_4

109. This source category accounted for 5.3 per cent of total emissions in 2000 and its contribution has been in the range 5–8 per cent over the period 1990–2000.

110. The IPCC tier 1 method and IPCC default emission factors are used for CH_4 emissions from enteric fermentation. A broad characterization of livestock populations is used to cover the relevant livestock categories in Latvia. These are dairy cattle, other cattle, sheep, goats, horses and swine. The IPCC default emission factors have been adopted without consideration of the underlying variables that influence CH_4 production by enteric fermentation and therefore no background data are provided to support the values used. In the case of other cattle, no information was provided in the CRF or NIR regarding age structure or range of animals covered by this group. However, the ERT was informed that this detail is available from the national statistics. The national statistics on populations compare reasonably well with the Food and Agriculture Organization of the United Nations (FAO) data with differences typically of the order of no more than 5 per cent. The national expert for agriculture expressed the view that the national data are much more reliable because FAO did not obtain the annual values for all years and FAO databases may include interpolations.

111. The review found no particular methodological problems with this key source. The application of the tier 1 method and the default emission factors reflecting conditions in Eastern Europe is complete and this approach provides an adequate assessment of the CH_4 emissions, given the circumstances of the

Party. There are only the minor reporting issues, highlighted in the draft S&A report 2002, associated with the overwriting of the formulae for the IEFs in the CRF by values actually used in the calculations.

2. Direct emissions from agricultural soils – N_2O

112. The direct emissions of N_2O from agricultural soils accounted for 6.6 per cent of total emissions in 2000. The trend in this contribution over the period 1990–2000 is not fully discernible without the corresponding CRF submissions for these years. The main component of these emissions is that arising from the cultivation of organic soils, which accounted for 45 per cent of direct emissions from soil in 2000.

113. The IPCC tier 1 method and IPCC default emission factors are used for estimating the direct emissions from agricultural soils. Table 4.D of the CRF indicates that all sources of nitrogen input to soils, included in the IPCC methods, are relevant in Latvia and they have all been accounted for in available estimates of emissions. The inventory experts make their estimates of N_2O emissions in simple spreadsheets designed to reflect the various calculation items as set out in the IPCC Workbook for Agriculture. These calculation sheets were inspected during the review. The Latvian system is an attempt to reproduce the capacity of the IPCC software module for Agriculture by considering the components of the calculations individually and aggregating the emissions as appropriate. This approach has the capacity to produce the desired result but it is prone to error if the linkages among the various nitrogen inputs that make up the activity data are not fully understood or accurately accounted for in the overall analysis. The review discovered that this is indeed the case in relation to the estimates of direct N_2O emissions.

114. The estimation of the total nitrogen excretion from livestock and the allocation of this amount among the various animal waste management systems in use in the country (reported in CRF table 4.B(b)) is one of the primary inputs for determining direct N_2O emissions. Latvia has done this on the basis of the same livestock populations that were used for CH_4 emissions under 4.A Enteric Fermentation, together with the excretion rate and the proportions of waste for each management system listed for Eastern Europe in the IPCC Guidelines. The outputs from this compilation, needed as activity data and reported in table 4.D, are not entirely in line with IPCC accounting of nitrogen inputs due to double counting in table 4.D of the nitrogen allocated to pasture range and paddock in table 4.B(b).

115. Revised CRF tables for 2000 made available during the review indicate changes in the matrix of animal waste nitrogen by waste management system (table 4.B(b)) and they address reporting issues relating to units of measurement and cell formula in the CRF. According to the Latvian agricultural experts, all animal wastes are either excreted at pasture or they are managed in anaerobic lagoons, liquid systems or solid storage. However, the revised table 4.B(b) does not account for all nitrogen excreted by animals in these systems, which results in errors in the revised estimates reported in table 4.D for both direct and indirect emissions. The inventory experts have been advised to re-evaluate this aspect of the inventory for agriculture.

116. The draft S&A report 2002 identified that the value of 0.2 for $Frac_{GRAZ}$, the fraction of animal waste nitrogen deposited during grazing, was the lowest of the reporting Parties in 2000. The revised allocation of animal wastes to the various management systems therefore seems justified and, when properly accounted for in table 4.B(b), is likely to increase this value substantially and bring it more into line with other Parties.

117. Direct soil emissions from the cultivation of organic soils are estimated on the basis that this activity occurs on 7 per cent of the arable land of Latvia. This proportion is fixed for all years in the time series and the default emission factor of 5 kg/ha given in the IPCC Guidelines is applied to calculate the emissions. The Party is advised that the default value for this activity given in the IPCC good practice guidance is 8 kg/ha. If this value were used, the direct emissions of N_2O would account for 10.6 per cent of the total for Latvia in 2000. The ERT is of the view that the area of contributing soils needs to be

established more robustly on an annual basis. In view of the major changes in agriculture, the value of 7 per cent arable land area may not be appropriate for the base year.

3. Indirect emissions from agricultural soils – N_2O

118. The secretariat's key source analysis (table 3) indicates that this key source accounted for 2 per cent of total emissions in 2000. Again, the estimates are based entirely on the IPCC default value of emission factors and other parameters necessary for the calculations. The Party makes estimates of NH_3 emissions for reporting to the Convention on Long Range Transboundary Air Pollution (CLRTAP) but no assessment is made in relation to how such estimates might influence the values of $Frac_{GASF}$ and $Frac_{GASM}$.

119. Many of the issues already described above under direct emissions also apply to this key source category because the amounts of applied nitrogen that become the activity data for estimating indirect emissions are calculated as part of the nitrogen accounting related to direct emissions.

4. Manure management – N_2O

120. This source category accounted for 1.4 per cent of total emissions in 2000. As default emission factors are again adopted, the emissions are entirely dependent on the allocation of excreted nitrogen among the various waste management systems. This allocation is being revised, leading to minor updates to the N_2O emissions.

C. Non-key sources

1. Manure management – CH_4

121. The emissions from manure management accounted for 12 per cent of CH_4 emissions from agriculture in 2000. These emissions emanate largely from the manures of cattle and swine. The Eastern Europe default emission factors under cool climatic conditions are the basis for the estimates and they are applied without any modification for Latvia. It is worth noting that the IPCC default values for cattle increase by a factor of three for temperate climatic conditions and that the higher values have been adopted by neighbouring Estonia. A review by the Party of its current choice of emission factors for CH_4 emissions from manure management therefore seems necessary.

D. Areas for further improvement

1. Issues identified by the Party

122. The Party recognizes the need to resolve the issues, relating to the full and proper accounting of nitrogen, that contribute to sources of minor error in the calculations with consequent implications for consistency and transparency. The revised CRF tables made available during this review show that the inventory experts have given high priority to this task.

2. Issues identified by the ERT

123. The ERT encourages the Party to consider the following points in planning further improvements in the quality of inventory submissions due from 2003:

(a) Take note of the most pertinent aspects of the IPCC good practice guidance (e.g. revised emission factor) so that the inventory is based on the most up-to-date background information;

(b) Investigate the feasibility of using the IPCC software to estimate emissions from agriculture as a way of overcoming the problems in accounting for nitrogen inputs. The ERT is of the

view that this approach could be readily adopted, as all inputs are already determined for use in the spreadsheet system currently used;

(c) Assess the rationale for adopting 7 per cent of arable land area as the basis for estimating emissions from the cultivation of histosols in all years. Clearly, there have been dramatic changes in the agriculture sector since 1990 and the suitability of this value in the base year may be questioned;

(d) As four key sources account for almost all emissions in agriculture, consideration should be given in the long-term to the use of tier 2 methods for the sources concerned, where available. The IPCC good practice guidance should be consulted to assess the data requirements for tier 2 methods;

(e) The level of nitrogen inputs to soils in Latvia may not justify the use of 0.3 as the value to be used for $Frac_{LEACH}$. The Party may have monitoring data on nitrates in rivers and groundwaters or other information that could be used to assess the suitability of this fraction;

(f) Latvia's NH_3 inventory could be used to assess whether the default values of $Frac_{GASF}$ and $Frac_{GASM}$ are appropriate to national circumstances;

(g) Farm surveys could be expanded to provide more complete and reliable information on the animal waste management systems in use throughout the country.

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

124. The LUCF category is a major sink of CO_2 in Latvia, with net CO_2 removals comparable in magnitude with emissions from the energy sector (energy CO_2 emissions of 6,746 Gg and LUCF removals of 4,243 Gg in 2000). Sub-category 5.A Changes in Forest and Other Woody Biomass Stocks accounts for all CO_2 removals and is regarded as the most important from the GHG inventory point of view. The area of contributing forest land currently represents 44.4 per cent of the whole territory of Latvia and this proportion is expected to increase to 50–55 per cent in the future. The wood export from these forests is an important part of the national economy.

125. The net CO_2 emissions/removals from LUCF showed a large decrease from those for the period 1990–1998 (during which they ranged from 10,484 to 10,826 Gg) to the values reported for 1999 and 2000 (5,229 Gg and 4,243 Gg, respectively). This large reduction in removals is due to the approximate doubling of wood harvest and consequent increases in the release of CO_2. In spite of the decrease in net removals during 1999 and 2000, the LUCF sector remains an important part of the Latvian GHG inventory.

1. Completeness

126. The 2000 CRF includes estimates of all relevant gases under LUCF but there is some lack of completeness on source coverage. No emission estimates are reported for category 5.C Abandonment of Managed Land, and the estimates for 5.B Forest and Grassland Conversion cover only non-CO_2 gases. The estimates for 5.D CO_2 Emissions and Removals from Soils are reported only for the cultivation of organic soils and for liming of agricultural soils. Detailed information about the LUCF activities are provided in the NIR.

2. Transparency

127. The submitted data for 2000 and associated information in the NIR are non-transparent and difficult to reconcile due to incorrect and incomplete reporting in the relevant CRF tables. The sectoral background data tables are largely incomplete and notation keys are not used. The LUCF sectoral report (table 5) has not been used as intended to take account of the background data in table 5.A. The CO_2 removals are reported for temperate forests in the removal column and the value of –4,338 Gg CO_2 is

entered as net annual removals. The gross emissions (harvest) as well as gross removals (biomass increment) from table 5.A should be entered separately in sectoral report table 5, and reporting data should be consistent between tables. The emissions of non-CO_2 gases from 5.B Forest and Grassland Conversion appear in the LUCF sectoral report (CRF table 5) but there are no corresponding emissions or activity data in sectoral background data table 5.B. Consequently, there are no IEFs for the activities concerned.

3. Methodologies, emission factors and activity data

128. The methodology follows the IPCC Guidelines, mostly on tier 1 level, and emission/removals calculations are appropriate for the LUCF sector.

129. In most cases the default emission factors for temperate forests have been used. In category 5.A, the country-specific data for biomass increment have been used.

130. All activity data in the LUCF sector are based on the national statistics. Statistical data for forestry and land use are maintained by the Ministry of Agriculture, State Forest Service, and State Land Service. Statistical surveys related to LUCF sector include: 1) Land use balance of the Republic of Latvia, 2) Timber felling in the final felling and intermediate cutting, 3) Forest utilization, 4) Forest fires, 5) Forest protection. These surveys are carried out on an annual basis. The statistical system in Latvia is in the process of being harmonized to the standard of European statistical systems (e.g. Eurostat). Activity data are appropriate and suitable for use with the IPCC methodology.

4. Recalculations and time-series consistency

131. In the 2002 submission, the estimate of CO_2 removals in category 5.A Changes in Forest and Other Woody Biomass Stocks was recalculated for 1999 resulting in small decrease (0.03 per cent) and negligible influence on the trends. These recalculations were discussed during the review. In addition, new recalculations for 1999 and 2000 based on a revised methodology by the Latvian forest experts were presented during the review and were discussed in detail. This methodology gave an entirely different result for CO_2 removals by forests (12,416 Gg for 2000 compared to 4,338 in the April 2002 submission). However, the new approach did not take wood harvesting into account and was clearly not in accordance with the IPCC Guidelines. This was pointed out by the ERT and improvements relating to this methodology and its future application in recalculations were therefore recommended.

B. Sink and source categories

1. Changes in forest and other woody biomass stocks – CO_2

132. Emissions and removals of CO_2 are reported for temperate evergreen and deciduous forests and for two additional categories specified as “clearing and rough afforestation” and “bushes”. The special classification takes account of the fact that young forest stands are outside official wood volume statistics. Reported average annual growth rates in 2000 ranged from 5.54 t dm/ha/yr (dm = dry matter) for deciduous forests to 5.70 t dm/ha/yr for coniferous forests. The growth rates were 0.95 t dm/ha/yr and 2.00 t dm/ha/yr for the special categories clearing and rough afforestation, and bushes, respectively.

133. The growth rates used for Latvian temperate forests are above the IPCC default values for the respective forest types. The main reason is the age class distribution of Latvian forests, because the most productive forests (trees with ages 50–80 years) make up most of Latvia’s forests now. The NIR explains that net removals in this category fluctuate as a consequence of changes in the amount of harvest. However, only 1999 and 2000 data were properly reported. The annual changes in woody biomass harvest during the period 1990–1998 do not fully correspond with the reported net removals data. In the 2000 submission, the data concerning non-forest tree biomass (parks, gardens) were reported, but it is not clear if these data are included in the data in the 2000 CRF tables 5 and 5.A or not. In the NIR, the

fuelwood consumption is mentioned, but in table 5.A traditional fuelwood consumed is not reported. The information in the CRF and the NIR should be made more consistent.

2. Forest and grassland conversion: CO_2 and non-CO_2 gases – CH_4, N_2O

134. Biomass burning is the only activity covered in the category 5.B Forest and Grassland Conversion. No CO_2 emissions are reported but estimates are given for CH_4, N_2O, NO_X and CO. It should be clarified if the processes of deforestation are important or not in Latvia.

135. Activity data and the calculations of emissions are correct and follow the IPCC Guidelines. The default emission factors have been used. Time series for CH_4 and N_2O are correctly calculated and consistent within the whole period 1990–2000. Highest values are reported for the years 1999 and 2000 and they are caused by the highest amounts of harvested residues in these years. Emissions of non-CO_2 gases are reported only in CRF table 5. These values should also be entered in sectoral background data table 5.B, together with the activity data (quantity of biomass burned on site). This category does not include the emissions from forest fires, which are an important issue for Latvian forestry. Because activity data (basic statistical information about forest fires) are available, it would be appropriate to account for forest fires in the calculations for future submissions.

3. Abandonment of managed lands – CO_2

136. No emissions are reported for this category. Carbon stock changes in biomass for afforestation activities are included in category 5.A. Changes in Forest and Other Woody Biomass Stocks. Soil carbon stock changes are not taken into account.

4. Emissions and removals from soil – CO_2

137. Two activities are covered in this category, namely the cultivation of organic soils and the liming of agricultural soils. Annual CO_2 emissions for the whole category fluctuated considerably within the range 84.5 Gg to 134 Gg over the period 1990–2000. The variations in emissions among the years are caused by changes in activity data (changes in areas of cultivated lands, changes in amounts of liming). The IEF for average annual rate of soil carbon uptake/removal is 1 Mg C/ha/yr (cultivation of organic soils) and corresponds with the IPCC default values. Emission calculations and reporting of the data are correct. The soil carbon changes in mineral soils due to large land-use changes in Latvia during previous decades, especially between agricultural and forest lands, should also be included in calculations in future.

C. Areas for further improvement

1. Issues identified by the Party

138. During the in-country review, more detailed information relating to the calculation of carbon stocks in biomass was provided by Latvian forestry experts. Also, information concerning the statistical surveys in forestry and land use in Latvia helped to explain the origin and use of the activity data.

139. The Party recognizes the need to improve various issues relating to better calculations in line with IPCC Guidelines and to achieve better reporting of sectoral data following the UNFCCC reporting guidelines. Discussions and recalculations made during the review showed that improvements in the inventory process for the LUCF sector will be possible in the near future. However, improvements in some areas are limited due to lack of the country-specific data (conversion/expansion factors) or lack of activity data (soil carbon stocks structured by soil types and by land use types).

2. Issues identified by the ERT

140. The reported results of inventory calculations, in general, are correct, but the transparency of reporting of the data should be improved for future submissions. The following points may be considered in efforts to bring about these improvements:

(a) Identified gaps in the Latvian inventory, such as missing estimates of carbon release by forest fires, can be eliminated without specific additional data requirements;

(b) Recalculations of the net/emission removals should take into account the annual data on harvesting. The new methodological approach presented by the Latvian forestry experts for category 5.A Changes in Forest and Other Woody Biomass Stocks should be harmonized and closely aligned with the basic principles (completeness) of the IPCC methodology in relation to carbon release calculations from harvested biomass. If this can be done in the near future, it would greatly improve the inventory results for this very important category;

(c) For improvements in some areas, especially in relation to soil carbon changes in mineral soils under source category 5.D, the long-term wider cooperation with experts from research, environmental and statistical institutions will be needed;

(d) Close cooperation and discussion with the LUCF experts from neighbouring countries is recommended.

VI. WASTE

A. Sector overview

141. Emissions from the waste sector accounted for 12.5 per cent of total emissions in 2000 compared with 1.6 per cent in 1990. The increased contribution to the total reflects the reported increase in emissions from waste, especially after 1997, while emissions from other sectors decreased. Emissions of CH_4, the major GHG from waste, nearly doubled from 1990 to 2000. The waste sector has two key sources: source category 6.A Solid Waste Disposal on Land and 6.B Waste-water Handling, which represented 11.6 and 0.9 per cent, respectively, of total emissions in 2000.

1. Completeness

142. All CRF tables specific to the waste sector are completed in the 2002 submission. Emissions of CH_4 are reported under 6.A Solid Waste Disposal on Land and emissions from combined industrial and municipal waste water, specified under 6.B.3 Other. Emissions of N_2O from human sewage are reported under 6.B.2 Domestic and Commercial Waste water. The emissions for all other specified activities in CRF table 6 are reported as NE. The notation IE (included elsewhere) would be more appropriate in the case of CH_4 emissions under 6.B.1 Industrial Waste water and 6.B.2 Domestic and Commercial Waste water. Trend table 10s2 does not contain emissions of CH_4 under 6.B Waste-water Handling for the years 1990–1998.

143. The contribution by sludge to GHG emissions from waste has not been estimated. The CRF tables submitted in April 2002 did not indicate the distribution of disposal sites into managed and unmanaged sites, but the revised tables made available during the review clearly indicate the proportions for managed and unmanaged sites. The two relevant source categories under Waste (6.A and 6.B) are not expected to result in emissions other than those reported, i.e. CH_4 and N_2O.

2. Transparency

144. The CRF tables read in conjunction with the Party's NIR provide a reasonable level of transparency. Methodologies used for estimating emissions from this sector are indicated as tier 1 methodologies (summary table 3s2). The non-standard notation key FE used in CRF table 7s3 probably represents "full estimate". Only the standard notation keys given in the IPCC Guidelines should be used in this table.

145. Although the tables are quite comprehensive, the sources of activity data and also basic information used are not clearly identified. A justification for the method used, along with information about the assumptions made, is desirable. In the recalculations made available during the review, additional information regarding solid waste quantities disposed of at managed and unmanaged landfills, including deep and shallow sites, was submitted. However, the details of the waste composition were not provided. The recalculations indicate the revised waste generation rate to be marginally more than that assumed earlier for 1990 but it is substantially lower than the value assumed to apply for all subsequent years in the April 2002 submission. However, the basis for this change and the source of the supporting data have not been given. Similarly, the individual quantities of domestic and industrial waste water have not been specified. The Party plans further work on its recalculations and will provide detailed information to assist in reconstruction of the inventory during future reviews.

3. Methodologies, emission factors and activity data

146. CRF summary table 3s2 shows the methodologies as the tier 1 default methodologies. Considering the non-availability of some of the data from primary sources, default values of many parameters required for the calculations are also used. This methodological approach is in line with the IPCC Guidelines.

147. The selection of emission factors was not correctly made by the Party in deriving the emissions estimates submitted in April 2002. Discussions with the ERT helped the inventory experts to recognize the need to revise the CH_4 emissions estimates. The Party will continue to improve the estimate of CH_4 emissions from the disposal of solid waste on land and from wastewater handling for future submissions.

148. The basis of the activity data for solid waste disposal is described in the NIR. The data on solid waste quantities are obtained by multiplying volumetric data by assumed density values. However, the ERT is of the opinion that it is desirable to use data obtained by actually weighing the solid waste quantities disposed at the land disposal sites. The Party indicated that sludge is not included in the total quantity of waste disposed at the landfill sites, as advised by their experts. However, as the IPCC good practice guidance clearly states that sludge be included for estimating CH_4 emissions, the ERT recommends that the Party include the sludge quantities in the estimates of solid waste used to calculate CH_4 emissions.

149. The rate of solid waste generation is known to increase every year at different rates in different countries. The fraction disposed of at managed sites increases every year with resultant reduction in the waste disposed of at unmanaged sites. Such a trend is not noticed in the revised tables, probably due to the secondary source of data and the method of computation used.

150. The activity data values used to calculate CH_4 from waste water (combined for industrial and municipal waste waters) are not specified or explained in the NIR. The data source is given as the Annual State Statistical Report 2-Water. The ERT pointed out the need to account for the quantities of municipal and industrial waste water separately, as the emission factors for these individual waste waters differ substantially.

4. Recalculations and time-series consistency

151. The approximate doubling of CH_4 emissions from solid waste disposal from 1997 to 1998 (table 10s2) reflects a major inconsistency in the underlying input data. For the years 1990 to 1997, country-specific MCF (methane correction factor) values of 0.6 and 0.16 were used for managed and unmanaged sites, respectively. The IPCC default MCF values of 1 and 0.6 for managed and unmanaged sites, respectively, were used for 1998, 1999 and 2000. The recalculations for this source category for the full time series made available during the review address this inconsistency and take account of changes in other input parameters to improve the CH_4 estimates. The Party provided recalculated values in CRF tables 6, 6.A and 6.B for the years 1990, 1995 and 2000. The recalculated data in table 6 for 2000 are now more rationally presented. The distribution of the quantities of solid waste disposed of at managed and unmanaged sites, covering both shallow and deep landfills, was provided. The revised values of waste generation rate were much lower (except in the year 1990), resulting in substantial reduction in CH_4 emissions from the disposal of solid waste on land.

152. The revised estimates for 6.A Solid Waste Disposal on Land revealed that, after registering a continuous increase during the period 1990–1999, CH_4 emissions were marginally lower in the year 2000 due to a slight decrease in contributing population. However, it is observed that for any given year, the revised values were lower than those reported in April 2002. The revised estimates therefore indicate that the corrected total CH_4 emissions from solid waste disposal on land were only 29.60 Gg as compared to 58.58 Gg reported in the original tables submitted in April 2002.

153. The activity data in table 6.B regarding waste water are based on protein consumption values provided by the Latvian Food Centre. The Party was advised to revise the estimates made earlier for the past years so as to ensure time-series consistency.

B. Key sources

1. Solid waste disposal on land – CH_4

154. The activity data were based on ad hoc conversion of volume to weights based on assumed density values, resulting in overestimates of solid waste quantities. Although the Party claimed that it used values of DOC (degradable organic carbon) from the IPCC Guidelines they were slightly different. During recalculations, a value of 0.61 kg/capita/day was used for the waste generation rate over the full time series. It is possible that this rate may be increasing and it is felt that this should be investigated by the Party.

2. Waste-water handling – CH_4

155. The quantities of domestic and industrial waste water were combined and default values for COD (chemical oxygen demand) and BOD (biochemical oxygen demand) for maximum CH_4 production capacity were arithmetically added. This is not the correct approach to quantifying the emissions concerned and, based on the discussions, the Party undertook to adopt methods that are in accordance with the IPCC Guidelines.

156. The Party was advised to use appropriate values of CH_4 conversion factors, available in the IPCC good practice guidance, consistently for all years.

157. The CRF states that waste water data are obtained from the CSB. No further details are given. The ERT stressed the need to substantiate the reported values with details of the sources so as to enable reconstruction of the inventory in the future.

C. Non-key sources

1. N_2O from human sewage

158. An apparent error in the calculation for N_2O from human sewage was pointed out during the review and corrected by the Party.

D. Areas for further improvement

1. Issues identified by the Party

159. The Latvian inventory experts are aware of the need to obtain more exhaustive and reliable activity data and have already initiated action on this, as was evident from the recalculated tables made available to the ERT.

2. Issues identified by the ERT

160. The main issues in this sector concern the activity data needed for the key source categories 6.A Solid Waste Disposal and 6.B Waste-water Handling:

(a) The ERT pointed out the need to obtain the primary waste data directly from the source instead of obtaining the information from the CSB, as is the present practice. The primary data on solid waste quantities should preferably be obtained by direct weighing of the solid waste (including any sludge) received at the land disposal sites. In the future it may be possible to accommodate such data collection systems through improved waste management practice and associated legislation;

(b) The ERT recommends that the data on quantities of waste water be obtained directly from municipal and industrial sources. The data should also include the necessary information for those industrial sectors that have fewer than three individual enterprises in the country, and are hence presently classified as confidential. Future improvements in institutional arrangements could help the LEA to obtain these data directly.

Annex 1

MATERIALS USED DURING THE REVIEW

A. Support materials on the CD-ROM and the UNFCCC web site for the review

2000, 2001 and 2002 *Inventory submissions of Latvia* including CRF and NI [unpublished].
UNFCCC secretariat. *2000 Status reports for Latvia* [available *at* http://unfccc.int/program/mis/ghg/statrep00/lat00.pdf*]*.
UNFCCC secretariat. *2001 Status report for Latvia* [available at http://unfccc.int/program/mis/ghg/statrep01/lva01.pdf*]*.
UNFCCC secretariat. *2002 Status report for Latvia* [available at http://unfccc.int/program/mis/ghg/statrep02/lva02.pdf].
UNFCCC secretariat*. Synthesis and assessment report of the greenhouse gas inventories submitted in 2000*,. FCCC/WEB/SAI/2000 [available at http://unfccc.int/program/mis/ghg/sai2000.pdf].
UNFCCC secretariat. *Synthesis and assessment report of the greenhouse gas inventories submitted in 2001*, FCCC/WEB/SAI/2001 [available at http://unfccc.int/program/mis/ghg/sai2001.pdf].
UNFCCC secretariat. *Draft synthesis and assessment report of the greenhouse gas inventories submitted in 2002* (Part I and Part II – the section on Latvia) [unpublished].
Latvia's comments to the "Draft synthesis and assessment report of the greenhouse gas inventories submitted in 2002" [unpublished].
UNFCCC secretariat. *Key source analysis on the Latvian inventory for the year 2000* [unpublished].
UNFCCC secretariat. *Handbook for review of national GHG inventories*. Draft 2002 [unpublished].
UNFCCC secretariat. *UNFCCC guidelines on reporting and review*. FCCC/CP/1999/7 [available at: http://www.unfccc.int/resource/docs/cop5/07.pdf].
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 inventory, volumes 1–3*, 1997 [available at: http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm].

B. Additional materials provided by the Party

Ministry of Environmental Protection and Regional Development of Latvia. Latvian Environment Agency (2002) *Environmental Indicators in Latvia 2002*.
Ministry of Environmental Protection and Regional Development of Latvia, *How to mitigate climate change. Part II. Policies and measures for reduction of greenhouse gas emissions in Latvia. Industry, agriculture and waste management*, (2000) summary of the final report of the study.
Latvian Regional Environmental Authorities Questionnaires UPDK 0632018 and UPDK 0632016 (water use, waste waters, air emissions, boilers, fuels).
The Latvian Environmental Agency (LEA, former title Latvian Environment Data Centre), website at URL: http://www.vdc.lv/eng/.
The LEA supplementary database. CD-Rom including data sets for the calculations.
Latvian Environmental Agency and Ministry of Environment and Regional Development. *In-country review of greenhouse gas inventories of Latvia, 23–27 September 2002*. Folder prepared for the in-country review including additional sectoral information and recalculations for the years 1990, 1999 and 2000.

The Ministry of Environmental Protection and Regional Development of the Republic of Latvia, website at URL: http://www.varam.gov.lv/Esakums.htm.
Statistical Central Bureau CSB, website at: http://www.csb.lv/avidees.cbm.
Statistical Central Bureau CSB. *Latvian energy balances 1990, 1999 and 2000*, [unpublished].
Statistical yearbook of Latvia. *Agricultural farms in Latvia.* [unpublished].
Statistical yearbook of Latvia. *Environmental protection indicators in Latvia.* [unpublished].

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