COMPLIANCE COMMITTEE

CC/ERT/IRR/2007/15
15 November 2007

Report of the review of the initial report of Estonia

Note by the secretariat

The report of the review of the initial report of Estonia was published on 14 November 2007. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2), the report is considered received by the secretariat on the same date. This report, FCCC/IRR/2007/EST, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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Report of the review of the initial report of Estonia

According to decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Kyoto Protocol shall submit to the secretariat, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later, a report (the 'initial report') to facilitate the calculation of the Party's assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol, and to demonstrate its capacity to account for emissions and the assigned amount. This report reflects the results of the review of the initial report of Estonia conducted by an expert review team in accordance with Article 8 of the Kyoto Protocol.

CONTENTS

I. Introduction and summary

A. Introduction

1. This report covers the in-country review of the initial report of Estonia, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 4 to 10 June 2007 in Tallinn, Estonia, and was conducted by the following team of nominated experts from the roster of experts: generalist – Mr. Eilev Gjerald (Norway); energy – Mr. Javier Gonzalez Vidal (Spain); industrial processes – Ms. Natalya Parasyuk (Ukraine); agriculture – Mr. Erda Lin (China); land use, land-use change and forestry (LULUCF) – Mr. Aquiles Neuenschwander (Chile); waste – Ms. Kiyoko Miwa (Japan). Ms. Natalya Parasyuk and Mr. Aquiles Neuenschwander were the lead reviewers. In addition, the expert review team (ERT) reviewed the national system, the national registry, and the calculations of the Party's assigned amount and commitment period reserve (CPR), and took note of the LULUCF parameters. The review was coordinated by Mr. Harald Diaz-Bone (UNFCCC secretariat).

2. In accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1), a draft version of this report was communicated to the Government of Estonia, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Summary

1. Timeliness

3. Decision 13/CMP.1 requests each Party to submit the initial report prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later. Estonia submitted its initial report on 15 December 2006, which is in compliance with decision 13/CMP.1. On 26 April 2006, a complete time series (1990–2004) of the Estonian greenhouse gas (GHG) inventory was submitted in the common reporting format (CRF). On 31 January 2007, the CRF tables for the inventory years 1990 and 2004 were resubmitted. In its initial report Estonia refers to its 2006 GHG inventory submission of 31 January 2007. A national inventory report (NIR) was submitted on 11 April 2007. The initial report was resubmitted on 13 April 2007. The Party resubmitted its complete 2006 GHG inventory on 23 July 2007 and again on 25 September 2007, in response to questions raised by the ERT during the course of the in-country visit. The initial report, the national inventory report (NIR) and the revised common reporting format (CRF) tables included in this submission are considered in this review report.

2. Completeness

4. Table 1 below provides information on the mandatory elements that have been included in the initial report and reflects revised values for the assigned amount and the commitment period reserve provided by the Party resulting from the review process. These revised estimates are based on revisions concerning emissions of carbon dioxide (CO_2) from stationary combustion – solid fuels (see paragraph 42); CO_2, methane (CH_4) and nitrous oxide (N_2O) from transport (see paragraph 50); CH_4 from manure management (see paragraph 63); N_2O from agricultural soils (see paragraph 64); CH_4 from solid waste disposal on land (see paragraphs 80); and N_2O from wastewater handling (see paragraph 86). These revisions changed the estimate for total GHG emissions in the base year from 43,594.78 Gg CO_2 eq., as originally reported by the Party, to 42,622.31 Gg CO_2 eq. (see paragraphs 89–90).

Table 1. Summary of the reporting on mandatory elements in the initial report

Item	Provided	Value/year/comment
Complete GHG inventory from the base year 1990 to the most recent year available 2004	Yes	Base year: 1990
Base year for HFCs, PFCs and SF_6	Yes	1995
Agreement under Article 4	Yes/no	Not applicable
LULUCF parameters	Yes	Minimum tree crown cover: 30% Minimum land area: 0.5 ha Minimum tree height: 2 m
Election of and accounting period for Article 3, paragraphs 3 and 4, activities for the first commitment period	Yes	*No activities under Article 3.4 are elected.* Accounting period for Article 3 paragraph 3 activities: commitment period.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8	Yes	200,535,993 tonnes CO_2 eq.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8, revised estimate		196,062,637 tonnes CO_2 eq.
Calculation of the commitment period reserve	Yes	105,757,685 tonnes CO_2 eq.
Calculation of the commitment period reserve, revised estimate		107,253,951 tonnes CO_2 eq.
Description of national system in accordance with the guidelines for national systems under Article 5, paragraph 1	No	Estonia has provided a description of its national system in response to a request by the ERT during the review
Description of national registry in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for data exchange between registry systems adopted by the CMP	Yes	

5. The information in the initial report covers all the elements required by decision 13/CMP.1, section I of decision 15/CMP.1, and relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). The ERT noted that Estonia has not implemented a quality assessment (QA) plan, a complete uncertainty analysis or a signed agreement between the institutions involved in the inventory preparation, and that the archiving system is not located at a single location. The ERT recommended the Party to present an agreement signed by the institutions involved in the preparation of the inventory and to elaborate a description of the process for collecting data and estimating emissions.

3. Transparency

6. The initial report together with the NIR and the information given during the review period provides much of the information necessary to assess the inventory. However, more detailed information, particularly in the description of key categories, would help to improve the transparency of the NIR. The ERT recommended Estonia to improve the description of methodologies used, including a description of the quality assessment/quality control (QA/QC) plan, and to provide detailed explanations and analysis on the emission trends by sector and gas in its next NIR (see also paragraph 37).

4. Emission profile in the base year, trends and emission reduction target

7. In the base year (1990 for CO_2, CH_4, N_2O, and 1995 for hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6)), the most important GHG in Estonia was carbon dioxide (CO_2) contributing 88.4 per cent to total[1] national GHG emissions expressed in CO_2 eq., followed by CH_4, 7.3 per cent and N_2O, 4.3 per cent (see figure 1). HFCs, PFCs and SF_6 taken together

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

contributed less than 0.001 per cent of the overall GHG emissions in the base year. The energy sector accounted for 89.3 per cent of the total GHG emissions in the base year, followed by agriculture, 7.1 per cent, industrial processes, 2.2 per cent, and waste, 1.4 per cent (see figure 2). Total GHG emissions (excluding LULUCF) amounted to 42,622.3 Gg CO_2 eq. and decreased by 49.7 per cent from the base year to 2004. The trends of the different sectors and gases are reasonable and were explained during the in-country visit.

Figure 1. Shares of gases in total GHG emissions, 1990

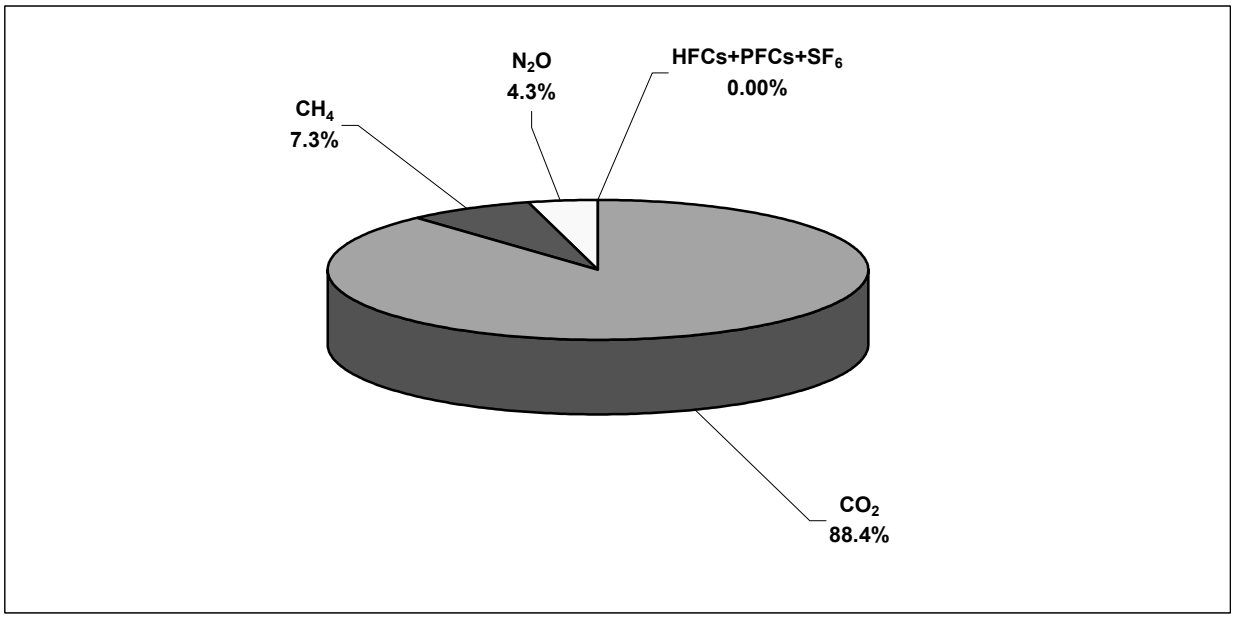
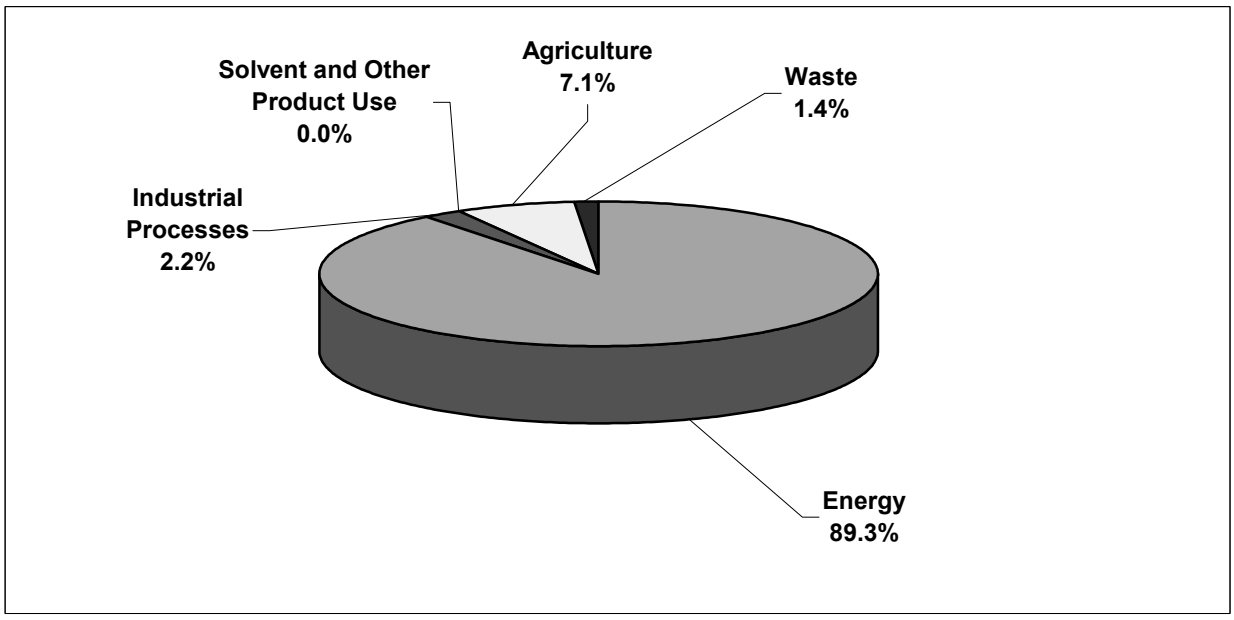


Figure 2. Shares of sectors in total GHG emissions, 1990



8. Tables 2 and 3 show the GHG emissions by gas and by sector, respectively.

9. Estonia's quantified emission limitation is 92 per cent as included in Annex B to the Kyoto Protocol.

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

GHG emissions (without LULUCF)	Gg CO_2 equivalent								Change
	Base year[a]	1990	1995	2000	2001	2002	2003	2004[a]	BY–2004 (%)
CO_2	37,677.86	37,677.86	19,456.06	16,464.87	17,061.78	16,732.83	18,681.86	18,792.51	–50.1
CH_4	3,124.54	3,124.54	2,139.98	2,021.90	1,825.16	1,714.49	1,762.79	1,890.78	–39.5
N_2O	1,819.52	1,819.52	877.05	721.39	697.14	647.56	743.10	755.01	–58.5
HFCs	0.13	0.00	0.13	4.19	4.89	5.68	6.59	7.21	5446.0
PFCs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA
SF_6	0.25	0.00	0.25	1.43	2.24	3.68	4.75	5.28	2012.0

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable.

[a] Estonia submitted revised estimates for the years 1990–2004 in the course of the initial review on 25 September 2007. These estimates differ from Estonia's GHG inventory submitted in 2006.

Table 3. Greenhouse gas emissions by sector, 1990–2004

Sectors	Gg CO_2 equivalent								Change
	Base year[a]	1990	1995	2000	2001	2002	2003	2004[a]	BY–2004 (%)
Energy	38,068.98	38,068.98	19,684.39	16,692.88	17,295.57	17,075.44	19,035.56	19,119.45	–49.8
Industrial processes	945.97	945.59	568.92	587.64	612.05	423.50	467.64	579.95	–38.7
Solvent and other product use	NA	NA	NA	NA	NA	NA	NA	NA	NA
Agriculture	3,031.30	3,031.30	1,465.71	1,136.24	1,133.10	1,058.86	1,174.76	1,192.05	–60.7
LULUCF	NA	–9,362.90	–9,214.08	–8,799.53	–8,431.72	–7,488.28	–7,734.40	–7,987.25	NA
Waste	576.07	576.07	754.44	797.02	550.49	546.44	521.12	559.35	–2.9
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	33,259.03	13,259.38	10,414.25	11,159.49	11,615.97	13,464.68	13,463.54	NA
Total (without LULUCF)	42,622.31	42,621.93	22,473.47	19,213.78	19,591.21	19,104.25	21,199.08	21,450.79	–49.7

Note: BY = Base year; LULUCF = Land use, land-use change and forestry; NA = Not applicable.

[a] Estonia submitted revised estimates for the years 1990–2004 in the course of the initial review on 25 September 2007. These estimates differ from Estonia's GHG inventory submitted in 2006.

II. Technical assessment of the elements reviewed

A. National system for the estimation of anthropogenic GHG emissions by sources and sinks

10. Estonia's national system is generally prepared in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). An improved description of the national system, more thorough than that presented in the initial report, was provided by the Party during the review. The ERT was informed by the Party that those elements of the national system which have not yet been implemented are planned to be implemented before next year's inventory submission. The elements that are in place are: a tier 1 QC plan; a tier 1 uncertainty analysis; identification of key categories; and procedures for recalculations to improve the inventory and for collecting data and developing estimates. The ERT recommends the Party to put in place the following elements and to report thereon in its next inventory submission: a signed agreement of institutional arrangements, a QA plan, and an archive at a single location, in order to be able to prepare GHG estimates in time and in accordance with the relevant UNFCCC and Intergovernmental Panel on Climate Change (IPCC) guidelines.

11. Table 4 shows which of the specific functions of the national system are included and described in the initial report.

Table 4. Summary of reporting on the specific functions of the national system

Reporting element	Provided	Comments
Inventory planning		
Designated single national entity*	Yes	See section II.A.1
Defined/allocated specific responsibilities for inventory development process*	Yes	See section II.A.1
Established process for approving the inventory*	Yes	See section II.A.1
Quality assurance/quality control plan*	Yes	See section II.A.2
Ways to improve inventory quality	Yes	See section II.B.3
Inventory preparation		
Key category analysis*	Yes	See section II.B.1
Estimates prepared in line with IPCC guidelines and IPCC good practice guidance*	Yes	See section II.B.2
Sufficient activity data and emission factors collected to support methodology*	Yes	See section II.B
Quantitative uncertainty analysis*	Yes	See section II.B.2
Recalculations*	Yes	See section II.B.2
General QC (tier 1) procedures implemented*	Yes	See section II.A.2
Source/sink category-specific QC (tier 2) procedures implemented	No	See section II.A.2
Basic review by experts not involved in inventory	No	See section II.A.2
Extensive review for key categories	No	See section II.A.2
Periodic internal review of inventory preparation	No	See section II.A.2
Inventory management		
Archive inventory information*	Yes	See section II.A.3
Archive at single location	No	See section II.A.3
Provide ERT with access to archived information*	Yes	See section II.A.3
Respond to requests for clarifying inventory information during review process*	Yes	See section II.A.1

* Mandatory elements of the national system.

1. Institutional, legal and procedural arrangements

12. During the in-country visit, host country officials explained the institutional arrangements, as part of the national system, for preparation of the inventory. In response to a request by the ERT, Estonia provided a textual description of the national system during the review. The Estonian Ministry of Environment (MoE) is the designated single national entity. The national inventory compiler is the Climate and Ozone Bureau at the Estonian Environment Information Centre (EEIC). The MoE coordinates work between the core institutions and is responsible for reporting and cross-cutting tasks and the national registry. The Department of Chemistry at Tallinn Technical University (TTU) has been responsible for preparing the emission estimates for the energy, industrial processes, agriculture, waste and LULUCF sectors. TTU collected point source data and relevant basic data and filled in data using the CRF reporter software. The estimates of fluorinated gases are prepared by the Estonian Environmental Research Centre (EERC). The institutional arrangements for preparing the GHG inventory for Estonia were established in autumn 2006 and the arrangement is described in the national system. The agreement between the MoE and TTU was signed on 19 October 2007 and will last for five years. An agreement with the EERC was signed on 28 May 2007. The Statistical Office of Estonia (SoE) is an important data source; however, it has remained unclear how the SoE is integrated in the institutional arrangements for the preparation of GHG emission inventories. The ERT encouraged the Party to include SoE more formally into the institutional arrangements.

13. No activities under Article 3.4 are elected. Activities under Article 3, paragraph 3, of the Kyoto Protocol will be accounted for the entire commitment period.

14. There is an established process for the official consideration and approval of the inventory, including recalculations, prior to its submission and for responding to any issues raised by the inventory review. The emission inventory is approved and submitted by the MoE, which also coordinates the overall inventory preparation. The Climate and Ozone Bureau of the EEIC as a part of the MoE is the national inventory compiler. The inventory is prepared by the TTU, EERC and the Climate and Ozone Bureau of EEIC.

15. The MoE is also responsible for the national coordination of official responses to external inventory reviews. During the in-country review, the MoE provided the ERT with responses from national experts to questions raised by the ERT.

2. Quality assurance/quality control

16. According to the textual description of the national system, Estonia has elaborated a QA/QC plan. However, the QA plan is not yet implemented. A tier 1 QC is performed for all sector categories. A Tier 2 QC is planned to be developed for the key categories. The ERT recommended the Party to include in its next NIR a list of the QC checks that are carried out by the ministry prior to submission.

17. The ERT noted that the Party has not conducted any QA of the inventory by staff not directly involved in the inventory compilation and therefore recommended the Party to assess the quality of its inventory before the next submission.

18. The ERT recommended Estonia to institutionalize system level checks, such as cross checking activity data (AD) available from different sources (SoE, the European Union (EU) emissions trading scheme (ETS), the EU Large Combustion Plant Directive, the EU IPPC Directive and the European Pollutant Emission Register), to minimize the risks of missing plants/data in future submissions. These QC checks could include having an independent sectoral expert review of AD to explain the reasons for large inter-annual variations for emissions from key sources (both level and trend basis). QA could be improved by including specific questions in the annual energy surveys of the industry in order to elicit additional information. The NIR states that the documentation on QC is under preparation.

3. Inventory management

19. Estonia currently has a decentralized archiving system[2] but is planning to have a centralized archiving system. The Climate and Ozone Bureau at the EEIC within the MoE is responsible for the archiving of the reports submitted to UNFCCC. At the time of the review, the archive did not include all GHG emission inventories submitted by the Party. Information on emission factors (EFs) and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory is archived by the individual inventory experts. This archive also includes internal documentation on QC procedures, documentation on annual key categories and key category identification. The ERT encouraged the Party to elaborate the archive at the EEIC and to include all inventory data from the inventory experts, in order to allow access to all inventory information at a single location.

B. Greenhouse gas inventory

20. In conjunction with its initial report, Estonia has submitted a complete set of CRF tables for the years 1990–2004 and an NIR in April 2007. The Party officially resubmitted its CRF tables for the years 1990–2004 on 4 September 2007, in response to questions raised by the ERT during the course of the in-country visit. Where needed, the ERT also referred to the 2005 and 2007 submissions.

21. During the review Estonia provided the ERT with additional information sources. These documents are not part of the initial report submission but are used by the ERT in the review. The full list of materials used during the review is provided in annex I to this report.

1. Key categories

22. Estonia has reported a tier 1 key category analysis, both level and trend assessment, as part of its initial report submission. Estonia has not included the LULUCF sector in its key category analysis. The description of methodology in the NIR is not specifically focused on the key categories. The ERT recommends the Party to improve the description of methodologies in the NIR and include more of the information given during the review in the NIR (see also paragraph 6).

23. The Party provided a tier 1 key category analysis without LULUCF for 1990 and 2004 in the 2006 submission. During the review Estonia provided an updated key category analysis for the years 1990 and 2005 which was developed in the context of the 2007 inventory submission. The latter analysis was used by the ERT in the review. The key category analysis performed by the Party and the secretariat produced similar results;[3] the Party's analysis is more detailed and also includes the following subcategories that are not included in the secretariat's analysis: fugitive emissions from solid fuels /coal mining – CH_4; ammonia production – CO_2; railways – CO_2; pasture, range and paddock manure – N_2O; lime production – CO_2; refrigeration and air conditioning equipment – HFCs; and electrical equipment – SF_6. The ERT noted that the Party does not use the key category analysis as a driving factor to prioritize the development in the inventory. The ERT recommends the Party to make one institution involved in the inventory responsible for the analysis of key categories. The ERT encourages the Party to carry out a tier II key category analysis as a basis for further improvement of the inventory.

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[2] The archive is available online at: <http://www.envir.ee/kliima/?lang=est&cpg=29&a=44>.

[3] The secretariat identified, for each Party, those source categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* for the base year or base year period as well as the latest inventory year. Key categories according to the tier 1 trend assessment were also identified. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

2. Cross-cutting topics

24. The inventory is generally in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). The ERT noted that the inventory for LULUCF is not in line with the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF), as very few CRF tables are filled in for this sector, and many time series were inconsistent. Some specific deviations from the Revised 1996 IPCC Guidelines and the IPCC good practice guidance are addressed in the sector sections of this report below.

25. The inventory has been compiled largely in accordance with Article 7, paragraph 1, of the Kyoto Protocol and decision 15/CMP.1.

Completeness

26. Estonia's inventory submission is generally complete and covers all years, sectors, sources, sinks and gases. However, the ERT noted that the following sub-categories were reported as not estimated: LULUCF (almost all sources); solvents and other product use; captured CO_2 from ammonia production; military fuel use and GHG emissions from international bunkers. CRF tables are broadly complete, except for the tables on LULUCF and tables 7 and 8b. The ERT recommends the Party to provide estimates for these categories in its next inventory, in order to improve completeness, and to submit all relevant CRF tables.

Transparency

27. The NIR together with the information given during the review period provides much of the information necessary to assess the inventory. However, additional information is still necessary to improve the transparency and it is especially important for the key categories. Improved transparency of the NIR will facilitate future reviews, particularly centralized reviews (see also paragraph 6). The ERT recommended the Party to provide detailed explanations on emission trends and changes in trends in all sectors, technical references to country-specific EFs and AD, particularly in the waste and agricultural sectors. Further options to enhance transparency identified by the ERT is described in detail in the sector sections below.

Consistency

28. The inventory is generally consistent. The ERT noted, however, that the CO_2 EF for oil shale is not consistent over time, as are estimates for LULUCF in general. Information on methods used as shown in summary table 3 of the CRF is inconsistent with the information on methods and EFs included in table 1.1 of the NIR. For example, the method for CO_2 from fuel combustion is indicated as country specific, tier 1 (CS, T1) in summary table 3, but as IPCC default, tier 1 (D, T1) in the NIR. Information on methods and EFs for most sectors disagree. The ERT noted that Estonia has submitted different versions of NIRs and CRF tables and recommended the Party to ensure consistency between the CRF tables and the NIR in its future submissions.

Comparability

29. The inventory is generally comparable with those of other Parties in its use of the IPCC methodologies and of the UNFCCC reporting formats. The main exception is for LULUCF where Estonia's inventory is incomplete, with only CRF tables 5(V) and table 5.A filled in. These issues are addressed in more detail in the sector sections of this report below.

Accuracy

30. Estonia has conducted a tier 1 uncertainty analysis for the base year and 2004 that covers all sectors. This analysis was made available to the ERT during the review. The analysis was carried out for all individual source categories in the waste and agricultural sectors, whereas for energy, industrial processes and LULUCF sectors the analysis is less disaggregated. The analysis does not aggregate the level of uncertainty in the base year or the uncertainty in trend. The ERT was therefore unable to fully assess the level of accuracy of the estimates. The ERT took note of planned efforts to improve the uncertainty estimates for the 2008 submission and encourages the Party to carry out these plans.

Recalculations

31. The national system can ensure that recalculations of previously submitted estimates of GHG emissions by sources are prepared in accordance with the IPCC good practice guidance.

32. Estonia routinely evaluates whether recalculations of data are needed. The evaluation is performed closely in cooperation with the Estonian inventory team. Recalculations are made if there have been methodological changes influencing emissions in previous years or changes in data due to correction of errors or changes in preferred data sources. Inventory review reports from ERTs are used to identify the specific areas where the inventory needs further improvements.

33. The ERT noted that recalculations of the time series from the base year to 2003 had been undertaken in all sectors, taking into account the recommendations of previous reviews as well as new information and methods. The major changes for the year 1990 include increases in estimates for emissions from industrial processes (+54.1 per cent), agriculture (+28.0 per cent) and net removals from LULUCF (+48.2 per cent), and decreases in estimates for emissions from waste (–57.1 per cent). The total effect of these recalculations is a 0.9 per cent decrease in estimated total national emissions for 2003 and a 1.6 per cent increase for 1990. The rationale for these recalculations was provided during the review and in the NIR.

Uncertainties

34. Estonia has conducted its first uncertainty analysis, which was made available to the ERT during the review period (see paragraph 30). Estonia uses IPCC default uncertainties for waste, agriculture and LULUCF, and country-specific uncertainty values for energy and industrial processes. For energy, the uncertainty is estimated only for four fuels and not for each individual source category. The uncertainty is estimated for three process industries. The ERT was unable to assess the impact at this level of aggregation to the total uncertainty. The ERT encouraged the Party to elaborate the uncertainty analysis by using more country specific uncertainties values and more disaggregated source categories for energy and industrial processes, and to estimate the overall uncertainty in level and trend and include the information in its next NIR.

35. The uncertainty analysis for waste, LULUCF and agriculture was conducted by the sectoral experts at TTU and for energy and industrial processes by Metrosert Ltd, a private company that also compiled the final uncertainty document. The MoE has now contracted Metrosert Ltd for the development of future uncertainty analysis.

3. Areas for further improvement identified by the Party

36. Estonia has not described areas for improvement in either the NIR or the initial report.

4. Areas for further improvement identified by the ERT

37. The ERT identified the following cross-cutting issues for improvement:

(a) Provide more complete and transparent description of methodologies, including information on the collection of AD and the choice of method and EFs, and include in the NIR all the elements stipulated by the IPCC good practice guidance and the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), especially for country-specific methods;

(b) Provide complete CRF tables, by filling the reporting gaps, particularly in the LULUCF sector;

(c) Include a description of the QA/QC plan and information on the QA/QC measures implemented in all sectors in the NIR; the QA/QC plan should be improved and implemented in all sectors;

(d) Provide more disaggregated quantified uncertainty estimates and use more country-specific uncertainty values;

(e) Provide detailed explanations and analysis on the emission trends by sector and gas.

38. The ERT recommended the Party to implement the above mentioned cross-cutting issues for improvement in its next inventory submission. Recommendations for improvements relating to specific source categories are presented in the relevant sector sections of this report.

5. Energy

Sector overview

39. In 1990, the energy sector accounted for 89.3 per cent of Estonia's total GHG emissions (excluding LULUCF). Between 1990 and 2004, GHG emissions from the energy sector decreased by 49.8 per cent. CO_2 accounted for 96.5 per cent of sectoral emissions in 1990, with CH_4 and N_2O contributing 3.4 and 0.1 per cent, respectively. In 1990, the largest source was energy industries (70.7 per cent of sectoral emissions), followed by transport (6.9 per cent), energy use in other sectors (4.8 per cent), manufacturing industries and construction (4.1 per cent), and fugitive emissions from fuels (2.8 per cent). The ERT recommends that Estonia provide in its next NIR a more detailed and transparent analysis of sectoral emission trends.

40. The coverage of source categories and gases is almost complete for the base year emissions, although Estonia has not reported emissions from military fuel use. The ERT recommends that Estonia provide this estimate in its next submission.

41. Statistics of Estonia collects energy data from surveys from all working units, as a legal requirement by the Government, and elaborates an energy balance that feeds into the inventory as a major source of AD for the energy sector. Annual energy balances 1990–2004 developed by Statistics of Estonia are provided. Host-country officials informed the ERT that, for 1990, only an aggregated energy balance has been published. During the review, the ERT recommended the Party to confirm that the disaggregated energy balance for 1990 is an official energy balance of Estonia and to explain how it had been developed. Furthermore, it should be reported to the International Energy Agency (IEA). In response, Estonia provided an official letter from the SoE containing information about the methodology used to develop the 1990 energy balance. The ERT welcomes this information, and encourages Estonia to provide more detailed information in its next NIR.

42. The 2006 inventory submission of the CRF tables for 1990 and 2004 contained a number of estimates for GHG emissions from the energy sector (in sub-sectors 1.A.1, 1.A.2 and 1.A.3) that were identified by the Party as incorrect. Estonia corrected these mistakes in its 2007 submission. As a result

of this correction, total 1990 GHG emissions from the energy sector were estimated to be 581.41 Gg CO_2 eq. lower in the 2007 submission than in the 2006 submission. The ERT noted that the estimates in the 2006 submission overestimated the base year emissions by this value. During the in-country review, the ERT recommended the Party to revise the relevant estimates for the energy sector (in sub-sectors 1.A.1, 1.A.2 and 1.A.3) of the 2006 submission in order to correct the incorrect estimates. In response, Estonia provided revised estimates in September 2007. For the base year, these revisions reduced the estimate for total GHG emissions from the energy sector by 581.41 Gg CO_2 eq.

Reference and sectoral approaches

43. CO_2 emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 1990, CO_2 emission estimates calculated using the reference approach are 1.1 per cent lower than those calculated by the sectoral approach. Explanations for the difference between the two approaches are not provided in the documentation box of table 1.A(c) of the CRF or in the NIR.

44. The calculations of the reference approach do not take into account the carbon stored in non-energy use of fuels, which should be subtracted. The ERT recommends that the Party recalculate the whole time series and assess the differences with the sectoral approach.

45. The ERT noted that, for all inventory years, the apparent energy consumption reported to the UNFCCC for Estonia is larger by up to 15 per cent than that reported to the IEA; however, for the last four years the difference is only about 3 per cent. Data for Estonia are available to the IEA only from 1992 onwards.

46. Imports of other kerosene, reported in the CRF tables, are not reported to the IEA. Imports of gas/diesel oil are higher in the IEA dataset by comparable quantities. Bitumen and lubricants, reported to the IEA, are not reported in the CRF. The ERT recommends that the Party study the data collecting system for imports and the procedures for reporting data to different international organizations.

International bunker fuels

47. According to the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, GHG emissions from international bunkers should not be included in the national inventory. However, for the base year and other years with no data on the distribution between domestic and international activities in Estonia, emissions from international bunkers were reported as "not estimated" ("NE") or "not applicable ("NA"), and all fuel consumption has been allocated to domestic activities, resulting in a possible overestimation of the base year emissions from domestic navigation and aviation (see paragraphs 50 and 51). During the in-country review, the ERT recommended the Party to split domestic and international fuel use for aviation and marine activities, using justified criteria. In response, the MoE requested additional data on international aviation and navigation from the SoE and provided revised estimates for GHG emissions from bunkering for the whole time series in September 2007. The ERT welcomes this revision, and encourages Estonia to provide more detailed information regarding the new AD sources in its next NIR.

Country-specific issues

48. The production of oil shale (55 per cent of the total apparent energy consumption in 1990) is 5 to 7 per cent higher in the CRF tables than in IEA data, due to the use of a different net calorific value. The ERT recommended the Party to provide an explanation of this difference in its next NIR.

Key categories

Stationary combustion: solid fuels – CO_2

49. A 2004 regulation of the MoE defines the carbon EF for oil shale used in pulverized combustion technology to be 27.85 tC/TJ (previous value was 29.1 tC/TJ). The ERT noted that this new country-specific EF has been used for the inventory year 2004 but not for the inventory years 1990–2003. As the new EF is lower than the previous one, this time-series inconsistency results in an overestimation of the 1990–2003 emissions. Following the recommendations of the ERT, Estonia revised the GHG inventories for the whole time series with a new country-specific EF for oil shale pulverized combustion technology (CEF=27.85 tC/TJ) according to the latest 2004 regulation of the MoE. For the base year, this revision reduced the estimate for CO_2 emissions from stationary combustion by 2.0 per cent (from 37,496.8 to 36,732.2 Gg CO_2).

Civil aviation: liquid fuels – all gases

50. For the years with lack of data on the distribution between domestic and international aviation activities (i.e. 1990–1997), all fuel consumed by aviation had been allocated to domestic activities. The ERT noted that this approach made the time series inconsistent and resulted in an overestimation of the national emissions for the base year (see also paragraph 47). Following the recommendations of the ERT, the MoE requested additional data on international aviation from the SoE and revised the estimate for GHG emissions from this category for the whole time series (1990–2004). As result of these revisions, total GHG emissions from domestic aviation were reduced by 88.9 per cent in 1990 (from 111.0 to 12.3 Gg CO_2 eq.). The ERT welcomes the revised estimates and encourages Estonia to provide more detailed information regarding the new AD sources in its next NIR.

Navigation (domestic): liquid fuels – all gases

51. For the years 1990–1994, Estonia provided estimates of emissions from domestic navigation and reported emissions from international marine bunkers as not applicable (NA). During the review, host-country experts explained that data on international marine activities for the period 1990-1994 were not available in the energy balance of Estonia, which was the official source of activity data for the national inventory calculations. The ERT recommended the Party to follow the 1996 revised IPCC guidelines more closely and estimate emissions from international marine bunkers and include these estimates under memo items (see also paragraph 47). In response to this recommendations, the MoE requested additional data on international navigation from the SoE and revised the estimates of GHG emissions from international marine bunkers for the whole time series (1990–2004). Total GHG emissions from domestic navigation in 1990 remained unchanged. The ERT welcomes the revised estimates, and encourages Estonia to provide more detailed information regarding the new AD sources in its next NIR.

Fugitive emissions: coal mining and handling – CH_4

52. EFs applied by Estonia for CH_4 from surface and underground mining and handling are very low compared with the IPCC default values for coal. The Party explained that they *"do not deal with coal but oil shale. As oil shale is located very close to the surface of the earth, the major part of methane has already been emitted; upon emission calculation the recommendations of local mining specialists have been taken into account (methane emission factor 1.47 kg/t)"*. During the in-country review, the ERT recommended the Party to provide the technical report that supports the development of the country-specific EFs. Estonia responded that the EFs are obtained directly from the mining company AS Eesti-Põlevkivi (Estonian Oil Shale) and are calculated by the Institute of Ecology (Aunap, 1999).

Non-key categories

Road transportation: liquid fuels – N_2O

53. A tier 1 approach has been applied to this non-key category. The ERT noted that no qualitative analysis has been taken into account in the key category analysis, although N_2O from road transportation could become a key category when higher tiers are used. Some of the information needed to develop a higher tier method (car fleet, mileage) has already been made available by the SoE. The ERT encouraged the Party to apply higher tiers for modelling emissions from transport.

6. Industrial processes and solvent and other product use

Sector overview

54. In the base year, emissions from industrial processes in Estonia accounted for 2.2 per cent of total national emissions. The largest category in the sector was mineral products (66.4 per cent of emissions from the industrial processes sector) followed by the chemical industry (33.5 per cent). Emissions of fluorinated gases contributed 0.04 per cent of sectoral base year emissions. The CRF includes estimates of almost all gases and sources of emissions from industrial processes in Estonia, as recommended by the IPCC good practice guidance. However, some categories are not estimated, including iron and steel production, and solvent and other product use. Furthermore, actual emissions of HFCs, PFCs and SF_6 have not been estimated for the period 1990–1994, mainly because of lack of data. The ERT encourages Estonia to estimate these sources and include the estimates in its next submission.

Key categories

Cement production – CO_2

55. Estonia has used the IPCC good practice guidance tier 2 method for calculating emissions from this category by multiplying the amount of clinker produced by a country-specific EF. A constant CO_2 implied EF is used for the whole period 1990–2004. All relevant data are provided by the single cement plant in Estonia. However, statistical data on clinker production differ from plant to plant for the whole time series. The national experts explained during the in-country review that national statistics contain only data from clinker that has been sold. The ERT agrees with Estonia's approach of using plant-specific AD for clinker production. The ERT recommends the Party to verify and check the AD and provide an explanation for this inconsistency in its next NIR.

Lime production – CO_2

56. The IPCC methodology and default EFs for CO_2 from lime production have been used for calculating emissions from this category. New plant-specific AD was received during the preparation of the 2006 inventory; however, outdated statistical data was used for the emission calculations. This led to some inconsistencies between the AD in the NIR (plant-specific data) and that in the CRF table (statistical data) for lime production. The ERT recommends the Party to verify the AD, check it with the industry and the SoE and recalculate CO_2 emissions from lime production for the whole time series. The ERT also recommends that Estonia continue to work with the industry and use lime production data for calculating CO_2 emissions in this sector, and encourages Estonia to provide more transparent and clear explanations and a description of the methods and AD used in its next inventory submission.

Ammonia production – CO_2

57. The Party used data on the quantities of ammonia produced as the input data for the calculation of CO_2 emissions from ammonia production. The ERT noted that, according to the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, the most accurate method of estimation is based on the consumption of natural gas as ammonia feedstock. These approaches should in principle result in the

same estimates of emissions. However, the ERT's preliminary estimation of CO_2 emissions based on fuel consumed for ammonia production showed a slightly higher result. Moreover, CO_2 emissions from urea (carbamide) use were subtracted from the total emissions and not included in any corresponding categories. The ERT noted that this approach has led to an underestimation of the emissions. The ERT recommends the Party to estimate CO_2 emissions from ammonia production based on the fuel consumed. The fuel data could be obtained from the single producer in Estonia, as well as data on the carbon content factor and the carbon oxidization factor. In addition, emissions of CO_2 from urea use should be accounted for in the corresponding sectors.

Non-key categories

Fluorinated gases

58. For the base year, emissions of fluorinated gases were reported as "not occurring" ("NO") or "not applicable"("NA"). The ERT was informed that for the preparation of the 2006 inventory, precise data on the emission of PFCs, some HFCs and SF_6 was missing, due to lack of an adequate data collection system in Estonia. In order to improve the situation, the MoE recently contracted the EERC to fill in the gaps in the time series for fluorinated gases and set up a system for the provision, analysis and calculation of data in the future. The ERT welcomes the efforts made by Estonia to estimate emissions of fluorinated gases and encourages the Party to include the resulting estimates in its next submission.

7. Agriculture

Sector overview

59. In 1990, emissions from agriculture accounted for 7.1 per cent of total GHG emissions. Between 1990 and 2004, sectoral GHG emissions declined by 60.7 per cent due to decreases in livestock numbers, use of nitrogen fertilizer, and area of arable land. All relevant sources and gases are reported, except for burning of crop residues. The ERT noted that data quality was enhanced in recent inventory years due to improved data collection measures and better knowledge of the emission levels based on measurements. An uncertainty analysis was presented to the ERT during the review. The ERT encouraged the Party to include it in its next NIR.

60. Population numbers for livestock by sub-category and by county for 1990–2004 were not reported. The ERT recommends Estonia to provide detailed information on population numbers of livestock by sub-category and by county for the whole time series.

Key categories

Enteric fermentation – CH_4

61. Estonia used a tier 2 method, in line with the Revised 1996 IPCC Guidelines, and country-specific EFs to estimate CH_4 emissions from enteric fermentation of cattle and swine livestock. Tier 1 and IPCC default EFs were used for emissions of other livestock. The ERT noted that, in the 2007 NIR, for equations 4.7 and 4.9, data for DEji (Digestible energy expressed as a percentage of gross energy by category of cattle (j) and county (i)) are not reported. The ERT recommends Estonia to provide these data in its next NIR or CRF.

Manure management – CH_4

62. Estonia used a tier 2 method and country-specific EFs to estimate CH_4 emissions from manure management for cattle and swine. Tier 1 (IPCC 1996) and IPCC default EFs were used for emissions of other livestock. In the 2007 NIR, equation 4.15 and 4.16, the values for Bo_{ji} (maximum CH_4 producing capacity for manure produced, by category of cattle (j) and county (i)) and DE_{ji} (digestible energy in the

fodder, by category of cattle (j) and county (i)) are not reported. The ERT recommends Estonia to provide these data in its next NIR and CRF tables.

63. During the review, host-country experts informed the ERT about a mistake in the estimation of CH_4 emissions from manure management from cattle for the inventory years 1990–2002; the calculation was based on parameters for Western Europe. The ERT recommended the Party to correct this mistake. In response to this recommendation, Estonia provided revised estimates that were based on parameters for Eastern Europe in September 2007. For the base year, these revisions reduced the estimate for CH_4 emissions from cattle manure management by 40.5 per cent (from 132.78 to 78.96 Gg CO_2 eq.).

Agricultural soils – N_2O

64. Estonia used the tier 1 method and IPCC default EFs to estimate N_2O emissions from agricultural soils. The 2007 NIR provides a recalculated estimate for direct N_2O emissions from synthetic fertilizer nitrogen applied to soil. The calculation of this estimate in the 2006 submission was found to be incorrect; therefore the ERT recommended Estonia to provide full background information and to revise the estimate for N_2O emissions for the whole time series, including the base year. In response to this request, Estonia provided revised estimates for this category. For the base year, these revisions reduced the estimate for N_2O emissions from agricultural soils by 10.0 per cent (from 1.27 to 1.14 Gg CO_2 eq.).

8. Land use, land-use change and forestry

Sector overview

65. In 1990, the LULUCF sector was a net sink of 9,362.9 Gg CO_2 eq. or 22.0 per cent of total GHG emissions without LULUCF. During the period 1990–2004, this net sink decreased by 14.7 per cent. All removals were attributed to biomass growth in stocked forest lands, while emissions were derived from wood harvesting, fuelwood collection and wildfires.

66. In the 2006 inventory, only CRF tables 5, 5.A and 5(V) provide estimates of emissions and removals, while all other tables were filled with notation keys "NO" ("not occurring") and "NE" ("not estimated"). Host-country representatives informed the ERT that emissions and removals from cropland, grassland, wetlands, settlements, and other lands were not estimated because not all data requested in the IPCC good practice guidance for LULUCF for calculations at tier 1 was available.

67. The ERT noted that official data on land use and land-use change categories showed inconsistencies according to the data source, which are mainly the SoE, the National Forest Inventory and the Ministry of Agriculture. The ERT recommends the Party to develop institutional agreements between the Ministries of Agriculture and Environment in order to standardize the definitions and official data on the areas of land use and land-use change, and to develop a matrix of land-use change among the different land use categories, with the objective of preparing GHG inventories in line with the IPCC good practice guidance for LULUCF.

68. QA/QC procedures for LULUCF were not reported in the 2006 submission. Annex 2, table C, of the 2007 NIR reports on a QC procedure that was carried out for forest land remaining forest land and wildfires. No uncertainty assessment was reported in the 2007 NIR, however, during the review Estonia presented an initial uncertainty assessment on forest land remaining forest land and biomass burning from wildfires. No LULUCF key categories analysis was reported in the 2006 and April 2007 submissions. Estonia informed the ERT that QA/QC procedures, uncertainty assessment and key categories analysis will be considered for the LULUCF sector in future submissions.

Key categories

Forest land – CO_2

69. Forest land remaining forest land was identified as a key category by the secretariat's key category analysis. In 1990 removals from carbon stock changes in living biomass equalled 17 per cent of total GHG emissions without LULUCF.

70. In the inventory submission of April 2007, Estonia recalculated carbon stocks in forests by using new country-specific EFs (see NIR table 5.2_1). The ERT noted that the new wood density values for conifer species (0.44 tonnes of dry matter per cubic metre) are about 10 per cent higher than previous values and also higher than IPCC default values, except for pine (0.46 tonnes of d.m./m^3), and for broadleaf species, for which the new value (0.50 tonnes of d.m./m^3) is about 20 per cent higher than previous and IPCC default values. New biomass expansion factors (BEFs) include above and below ground living biomass, and, for broadleaf species, the present BEF (1.678) is 6.7 per cent above previously reported values. In the case of conifers, for spruce the present BEF (1.859) is 22.5 per cent above the previous value. The ERT recommended Estonia to compare the present wood density and BEFs with the IPCC default values and those reported by other Parties for boreal forests.

71. In order to assess carbon stock changes, all forest lands were assumed to be managed in Estonia. Only emissions and removals from above and below ground living biomass are estimated according to IPCC tier 1 level. The ERT reminded the Party that, according to decision 16/CMP.1, carbon stock changes in all forest carbon pools shall be accounted for, unless the Party can demonstrate that the pool is not a source.

Non-key categories

Biomass burning – CO_2, CH_4 and N_2O

72. In its 2006 submission, Estonia reported emissions of CO_2, CH_4 and N_2O only from wildfires, since controlled burning is not a practice in the country. Tier 1 from the IPCC good practice guidance for LULUCF was applied. The ERT appreciated the efforts made by Estonia in estimating emissions from wildfires to make the GHG inventory more complete.

9. Waste

Sector overview

73. In 1990, GHG emissions from the waste sector accounted for 1.4 per cent of the national total. Between 1990 and 2004, sectoral emissions decreased by 2.9 per cent. Estonia recalculated CH_4 emissions from solid waste disposal on land, CH_4 from industrial wastewater and domestic and commercial wastewater for the whole time series since 2005. CH_4 emissions from wastewater handling in 1990 and 2004 were further recalculated during 2006. In 2006, N_2O from human sewage was newly estimated and reported for all years under wastewater handling, which made the inventory more complete.

74. After the in-country visit, Estonia revised the estimates for CH_4 emissions from solid waste disposal on land, CH_4 emissions from sewage sludge under solid waste disposal on land and N_2O emissions from human sewage, taking recommendations of the ERT into consideration. As a result of these revisions, estimates for GHG emission from waste decreased by about 17 per cent (114.00 Gg CO_2 eq.) from the estimates before the review, and about 64 per cent (1,031.82 Gg CO_2 eq.) from the original estimates reported in the NIR.

75. CH_4 emissions from solid waste disposal contributed 70.6 per cent and CH_4 and N_2O emissions from wastewater handling contributed 22.4 and 7.0 per cent, respectively, to the estimated emissions of the waste sector in 1990.

76. During the period 1990–2004, CH_4 emissions from solid waste disposal on land increased by 27.9 per cent. Taking CH_4 recovered into account, gross emissions from this category increased by 36.5 per cent. CH_4 emissions from wastewater handling reduced by 96.4 per cent during the same period.

77. The secretariat's key category analysis identified CH_4 from solid waste disposal as key for both level and trend assessments for 1990. N_2O from human sewage under wastewater handling is identified as key by trend. Emissions from waste incineration are reported as "not estimated" ("NE") due to lack of activity data for incineration of biogenic waste.

78. With regard to uncertainties in the waste sector, Estonia recognized the potential uncertainties in the category of solid waste disposal due to lack of separated data between the large landfills and small dumpsites.

79. The ERT noted that the calculation procedures and their consistency over the entire time series were not transparent because the equations used for emission estimates for the entire time series were not shown in the calculation spreadsheets. It further noted that information regarding AD from expert judgement, communications between data compiler, experts and inventory compilers, is not well documented. The ERT encourages Estonia to elaborate its method of documenting and archiving its inventories.

Key categories

Solid waste disposal on land – CH_4

80. Estonia used the tier 1, mass-balance approach, to estimate CH_4 emissions from solid waste disposal, using country-specific AD for waste generation. Since this is a key category, Estonia recalculated CH_4 emissions using simple the first order decay (FOD) method as recommended by the ERT during the in-country review.

81. Estonia gathered recent data on waste management from a few landfill sites in the capital area and extrapolated these data to the whole time series, including for the period between 1990 and 1992. The ERT noted that the application of recent data on waste management from the urban municipal landfill sites to the whole population of Estonia and throughout the entire time series might result in an overestimation of degradable organic materials in the municipal solid waste (MSW) in earlier periods. In its revision of emissions from this category using the FOD method, Estonia considered the urban population only (instead of the total national population) with revised degradable organic carbon (DOC) values to take a more accurate amount of DOC in the landfill sites into account. As result of this revision, the estimate for base year CH_4 emissions from the MSW, excluding sewage sludge from industrial and domestic and commercial wastewater handling, was reduced by 52.0 per cent (from 515.79 Gg CO_2 eq. to 247.50 Gg CO_2 eq.). The ERT welcomed this improved accuracy of the emission estimates from this category.

82. In CRF table 6.B for 1990, sludge is reported as "included elsewhere" ("IE"). In the 2005 NIR, and also during the country visit, it was explained that the total amount of sludge was assumed to be brought to landfills. However, in the course of recalculation, Estonia noted that CH_4 emissions from sewage sludge brought to landfills were not included in its original estimates. Estonia added CH_4 emissions from sewage sludge in landfills using the tier 1 mass-balance method because it was difficult to estimate reasonable historical data on sewage sludge generation using the FOD. IPCC default parameters and DOC values from the inventory of Finland were used in this estimation.

83. The ERT noted that, although it improved completeness in this sector, the use of a mass-balance approach that adds emissions from sewage sludge brought to landfills is not recommended, because CH_4 emissions from landfill sites is a key category, and emissions from other DOC in the landfill sites are estimated using the FOD method. Noting the difficulties of estimating historical data on sewage sludge under the national circumstances of Estonia, the ERT recommends the Party to further elaborate historical AD and the DOC values of its sludge (from industrial wastewater and domestic and commercial wastewater) brought to landfills, and to use these parameters for the estimation of CH_4 emissions from landfill sites, based on the FOD method, in future submissions.

84. The ERT also recommends Estonia to improve transparency of the NIR and reconsider the presentation of data and methods used, for example by using fractions for all waste types in the landfill sites, including inert material such as plastics, with the sum of these fractions adding up to 100 per cent of the amount of waste produced in Estonia.

85. Estonia does not estimate CH_4 emissions from industrial waste under solid waste disposal. During the review, host-country experts informed the ERT about plans for collecting the relevant data and to provide an estimate in its next inventory. The ERT welcomed these plans and recommended Estonia to estimate emissions from industrial waste for completeness reasons.

Wastewater handling: human sewage – N_2O

86. Estonia estimated N_2O emissions from human sewage using per capita protein supply as input parameter. The ERT recommended the Party to use per capita protein consumption instead. In its response, Estonia revised the estimate for N_2O emissions from human sewage with data on per capita protein consumption from the Food and Agriculture Organization of the United Nations (FAO) database, in accordance with the recommendation by the ERT. For the base year, these revisions reduced the estimate for N_2O emissions from human sewage by 10.9 per cent (from 45.14 to 40.21 Gg CO_2 eq.).

Non-key categories

Wastewater handling – CH_4

87. The overall trend in emissions from both industrial wastewater and domestic and commercial wastewater fluctuates. CH_4 emissions from industrial wastewater decreased by 80.4 per cent between 1992 and 1993, and CH_4 of domestic and commercial wastewater decreased by 72.1 per cent between 1993 and 1994. Estonia explained these decreases in emissions resulted from a change in the wastewater treatment method. During the review, the ERT requested Estonia to provide more background information including the capacity of treatment facilities.

C. Calculation of the assigned amount

88. The assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1.

89. Estonia's base year is 1990 and the Party has chosen 1995 as its base year for HFCs, PFCs and SF_6. Estonia's quantified emission limitation is 92 per cent as included in Annex B to the Kyoto Protocol. Based on Estonia's original estimate of base year emissions (43,594.78 Gg CO_2 eq.) and its Kyoto Protocol target (92 per cent), the Party calculated its assigned amount to be 200,535,993 tonnes CO_2 eq.

90. In response to inventory issues identified during the review, Estonia submitted revised estimates of its base year inventory, which resulted in a recalculation of the assigned amount. Based on the revised estimates for Estonia's base year emissions – 42,622.3 Gg CO_2 eq. – the Party calculates its assigned amount to be 196,062,637 tonnes CO_2 eq. The ERT agrees with this figure.

D. Calculation of the commitment period reserve

91. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1.

92. Based on the original estimate for its total GHG emissions in the most recent inventory year (2004), 21,151.54 Gg CO_2 eq., Estonia calculated its commitment period reserve to be 105,757,685 tonnes CO_2 eq.

93. In response to inventory issues identified during the review, the Party submitted revised estimates of its 2004 inventory, which resulted in a recalculation of the commitment period reserve. Based on the revised estimates, the Party calculates its commitment period reserve to be 107,253,951 tonnes CO_2 eq. The ERT agrees with this figure.

E. National registry

94. Estonia has provided all the information on the national registry system required by the reporting guidelines under Article 7, paragraphs 1 and 2, of the Kyoto Protocol (decision 15/CMP.1). The information provided is broadly transparent and in accordance with the requirements of the UNFCCC reporting guidelines. However, the ERT noted that some of the information is not clearly indicated in the initial report, for example, conformity with the United Nations data exchange standards, procedures to minimize discrepancies, and disaster management. The ERT recommends that Estonia provide more detailed information in its next inventory report under the Kyoto Protocol.

95. Table 5 summarizes the information on the mandatory reporting elements on the national registry system, as stipulated by decision 15/CMP.1, which describes how the national system performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1.

96. During the initial review, the ERT was provided with additional and updated information on the national registry of Estonia, which is administered by EEIC Climate and Ozone Bureau. To fulfil its obligations, Estonia contracted a private Finnish company, Innofactor Ltd, in November 2006 to set up, host and maintain the national registry. Estonia uses the registry software GRETA (Greenhouse Gas Registries for Emissions Trading Arrangements) developed by the Department for Environment, Food and Rural Affairs of the United Kingdom; however, a migration towards CR v1.1 (an open-source product for EU member States) was under consideration in late 2007.

97. During the review visit to Tallinn, the ERT was not able to visit the data centre in Espoo, Finland, at which servers hosting the national registry are located.

98. Host country representatives informed the ERT that connectivity and interoperability tests with the international transaction log (ITL) were expected to be completed by 15 October 2007. The initialization process was completed by 29 October 2007 and the registry is ready for full operation with the ITL. The ERT understands that the delay was due to late delivery of documentation from the ITL operator, and was not related to the state of readiness of the national registry of Estonia. Information on the national registry will become publicly available at <http://khgregister.envir.ee>.

Table 5. Summary of information on the national registry system

Reporting element	Provided/ referenced	Comments
Registry administrator		
Name and contact information	Yes	
Cooperation with other Parties in a consolidated system		
Names of other Parties with which Estonia cooperates	Yes	During the review, the Party clarified that no such cooperation exists.
Database structure and capacity of the national registry		
Description of the database structure	Yes	
Description of the capacity of the national registry	Yes	
Conformity with data exchange standards (DES)		
Description of how the national registry conforms to the technical DES between registry systems	Yes	Covered in the independent assessment report (IAR)[a]
Procedures for minimizing and handling of discrepancies		
Description of the procedures employed in the national registry to minimize discrepancies in the transaction of Kyoto Protocol units	Yes	
Description of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction	Yes	
Prevention of unauthorized manipulations and operator error		
An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error	Yes	
An overview of how these measures are kept up to date	Yes	
User interface of the national registry		
A list of the information publicly accessible by means of the user interface to the national registry	Yes	
The Internet address of the interface to Estonia's national registry	Yes	
Integrity of data storage and recovery		
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	Yes	
Test results		
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	Yes	

[a] Pursuant to decision 16/CP.10, the administrator of the international transaction log (ITL), once registry systems become operational, is requested to facilitate an interactive exercise, including with experts from Parties to the Kyoto Protocol not included in Annex I to the Convention, demonstrating the functioning of the ITL with other registry systems. The results of this exercise will be included in an independent assessment report (IAR). They will also be included in the annual report to the CMP.

99. The ERT was also informed about the procedures and security measures in place to minimize discrepancies, terminate transactions and correct problems, and minimize operator error. These procedures and security measures include the use of a secure sockets layer (SSL) digital certificate that provides authentication and encryption power for secure online transactions, strict confidentiality agreements with the registry administrators, well-defined business rules to ensure a common and tested way of maintaining the registry, and application manuals and support documentation. The ERT acknowledged the security measures that were implemented for the national registry of Estonia under EU ETS. The ERT noted that Estonia has allocated sufficient resources to the development, operation and maintenance of the national registry under the Kyoto Protocol.

100. The ERT took note of the results of the technical assessment of the national registry, including the results of standardized testing, as reported in the independent assessment report (IAR) that was forwarded to the ERT by the administrator of the international transaction log, pursuant to decision 16/CP.10 on 13 November 2007.

101. The ERT reiterated the main findings of this report, including that the registry has fulfilled all of its obligations regarding conformity with the DES. These obligations include having adequate transaction procedures; adequate security measures to prevent and resolve unauthorized manipulations; and adequate measures for data storage and registry recovery.

102. Based on the results of the technical assessment, as reported in the IAR, the ERT concluded that Estonia's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding operational performance or public availability of information prior to the operational phase.

F. Land use, land-use change and forestry parameters and election of activities

103. Table 6 shows Estonia's choice of parameters for forest definition as well as elections for Article 3, paragraphs 3 and 4, activities in accordance with decision 16/CMP.1.

104. The ERT noted that the parameters chosen for the definition of forest contained in table 6 are within the agreed values in decision 16/CMP.1. and in line with the official definition of forest contained in the Estonian Forest Act, which is an area of 0.5 hectares or more, covered with trees higher than 1.3 metres, and with a canopy closure of at least 30 per cent. The ERT also noted that this definition differs from Estonia's definition of forest under the Global Forest Resources Assessment (FRA) of FAO, which defines forest as land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 per cent, or trees able to reach this thresholds in situ.

Table 6. Selection of LULUCF parameters

Parameters for forest definition		
Minimum tree cover	30%	
Minimum land area	0.5 ha	
Minimum tree height	2 m	
Elections for Article 3, paragraphs 3 and 4, activities		
Article 3, paragraph 3 activities	**Election**	**Accounting period**
Afforestation and reforestation	Mandatory	Commitment period
Deforestation	Mandatory	Commitment period
Article 3, paragraph 4 activities		
Forest land management	Not elected	Not applicable
Cropland management	Not elected	Not applicable
Grazing land management	Not elected	Not applicable
Revegetation	Not elected	Not applicable

105. In accordance with decision 16/CMP.1, the Party explained that Estonia's definitions of forest under the FAO and under the Kyoto Protocol differ in their parameters, as the first definition follows the FAO terms and definitions for the national reporting tables for FRA 2005, whereas the second definition follows the Estonian Forest Act and was adapted in order to meet the criteria for minimum tree height as stipulated by decision 16/CMP.1.

III. Conclusions and recommendations

A. Conclusions

106. The expert review team concluded that the information provided by Estonia in the initial report and during the review process is complete and in accordance with the relevant provisions of the annex to decision 13/CMP.1, relevant elements of section I of the annex to decision 15/CMP.1, and other relevant decisions of the CMP; that the assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1, and is consistent with the revised inventory estimates as submitted and reviewed; that the calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1, and is consistent with the revised inventory estimates as submitted and reviewed; and that the LULUCF definitions are within the agreed range.

107. Estonia's national system for the estimation of greenhouse gas emissions has not been fully implemented. Overall, the system includes most elements of a national system. However, the arrangements of the national system were formalized only during the review process, and resources for the coordination and compilation of the inventory need to be enhanced. At present, the institutional arrangements are not based on a signed agreement. Also, a QA plan needs to be developed and implemented.

108. Estonia's greenhouse gas inventory is largely complete, except for the LULUCF sector, and has been compiled in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. It has a data collection system, building mainly on national statistics, and plant-specific data for the energy and industrial processes sectors. Country-specific AD and EFs are used for the most important key categories. In spite of this, the 2006 submission included a number of deficiencies, many of which were corrected in the resubmission of the 2006 GHG inventory in September 2007. Most significantly, the descriptions in the NIR need to be made more transparent and the data gaps in the CRF tables, in particular in the LULUCF sector, need to be filled in future submissions.

109. Based on Estonia's base year emissions (42,622.31 Gg CO_2 eq., including the revised estimates provided in the energy, agriculture and waste sectors) and its Kyoto Protocol target (92 per cent) the Party calculates its assigned amount to be 196,062,637 tonnes CO_2 eq. Estonia calculates its commitment period reserve to be 107,253,951 tonnes CO_2 eq. The ERT agrees with these figures.

110. Estonia's choice of the parameters to define forest (minimum tree cover: 30 per cent; minimum land area: 0.5 hectares; minimum tree height: 2 metres) is in accordance with decision 16/CMP.1. Estonia has elected not to account for any activities under Article 3, paragraph 4, of the Kyoto Protocol. It has elected commitment period accounting for the activities under Article 3, paragraph 3, of the Kyoto Protocol.

111. Based on the results of the in-country review visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that Estonia's national registry is fully compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1.

B. Recommendations

112. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of information presented in the initial report. Recommendations were also made relating to the choice of methods, AD and EFs in the GHG inventory. Many of the recommendations were implemented during the review process, for example, all identified potential

problems that could have led to an overestimation of the base year emissions were resolved. The remaining key recommendations[4] are that Estonia:

(a) Improve the NIR's description of methodologies and include all the elements stipulated by the IPCC good practice guidance and the UNFCCC reporting guidelines, especially for country-specific methods;

(b) Include a description of the QA/QC plan and information on the QA/QC measures implemented in all sectors in the NIR, and a list of the QC checks that are carried out by the ministry prior to submission;

(c) Provide detailed explanations and analysis on the emission trends by sector and by gas in its next NIR;

(d) Put in place the following elements of its national system: a signed agreement on institutional arrangements, a QA plan, and an archive at a single location;

(e) Complete the relevant parts of the CRF tables for all years with emission estimates, in particular for LULUCF (almost all sources), solvents and other product use, captured CO_2 from ammonia production, and military fuel use; and provide information in all background data tables in the CRF in its next inventory submission.

113. Future reviews should focus on whether:

(a) The structure of the NIR and the transparency of the methodology description have been improved; this issue has been raised in several previous reviews;

(b) The QA plan has been developed, and how it is implemented, especially at the sectoral level;

(c) Emission estimates have been provided for all years in the CRF tables, in particular in the LULUCF sector.

C. Questions of implementation

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

[4] For a complete list of recommendations, the relevant sector sections of this report should be consulted.

Annex I

Documents and information used during the review

A. Reference documents

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

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UNFCCC secretariat. Estonia: Independent assessment report of the national registry of Estonia. Reg_IAR_EE_2007_1. Will be available at <http://www.unfccc.int>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Karin Radiko (MoE), Ms. Eve Tamme (EEIC), Ms. Inge Roos (TTU) and Ms. Olga Gavrilova (TTU), including additional material on the methodology and assumptions used.

Aunap, A. Environmental Impact of Oil Shale Mining and Handling in North-East Estonia. Publications of the Tallinn Pedagogical University, Tallinn, 1999 (in Estonian).

The Estonian Ministry of Environment . Method for determining the amount of carbon dioxide discharged into the atmosphere. Regulation of the Minister of Environment, State Gazette No. 94, 16.07.2004 (in Estonian).

Office for Official Publications of the European Communities. Municipal waste management in Accession Countries. Luxembourg, 2002.

Turnpenny, J. R. et al. Integrated models of livestock systems for climate change studies. 2. Intensive systems. In: Global Change Biology (2001).

Annex II

Acronyms and abbreviations

AD	activity data
BEF	biomass expansion factor
CH_4	methane
CMP	Conference of the Parties serving as the Meeting of the Parties
CO_2	carbon dioxide
CO_2 eq.	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
DES	data exchange standards
DOC	degradable organic carbon
EEIC	Estonian Environment Information Centre
EERC	Estonian Environmental Research Centre
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
FAO	Food and Agriculture Organization of the United Nations
FOD	first order decay
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1 thousand grams)
LULUCF	land use, land-use change and forestry
m^3	cubic metre
MSW	municipal solid waste
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SF_6	sulphur hexafluoride
SoE	Statistical Office of Estonia
TJ	terajoule (1 TJ = 10^{12} joule)TTU
UNFCCC	United Nations Framework Convention on Climate Change

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