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**Report of the individual review of the greenhouse gas inventories of Estonia  
submitted in 2007 and 2008\***

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\* In the symbol for this document, 2008 refers to the year in which the inventory was submitted, and not to the year of publication.

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## I. Overview

### A. Introduction

1. This report covers the centralized review of the 2007 and 2008 greenhouse gas (GHG) inventory submissions of Estonia, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. In accordance with the conclusions of the Subsidiary Body for Implementation at its twenty-seventh session,<sup>1</sup> the focus of the review is on the most recent (2008) submission. The review took place from 15 to 20 September 2008 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Justin Goodwin (UK), Mr. Jan Pretel (Czech Republic); energy – Mr. Javier González (Spain), Mr. Simon Wear (New Zealand), Mr. Scott McKibbin (Canada); industrial processes – Mr. Stanford Mwakasonda (South Africa), Mr. Eilev Gjerald (Norway); agriculture – Mr. Tom Wirth (United States of America), Mr. Jorge Alvarez (Peru); land use, land-use change and forestry (LULUCF) – Ms. Thelma Krug (Brazil), Mr. Chris Cameron (New Zealand); and waste – Mr. Mark Hunstone (Australia), Mr. Qingxian Gao (China). Mr. Goodwin (United Kingdom) and Mr. Mwakasonda (South Africa) were the lead reviewers. The review was coordinated by Ms. Astrid Olsson and Mr. Vitor Gois Ferreira (UNFCCC secretariat).
2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1), a draft version of this report was communicated to the Government of Estonia, which made no comment on it.

### B. Inventory submission and other sources of information

3. The 2008 inventory was submitted on 15 April 2008; it contains a complete set of common reporting format (CRF) tables for the period 1990–2006 and a national inventory report (NIR). This is in line with decision 15/CMP.1. The Party indicated that the 2008 submission is also its voluntary submission under the Kyoto Protocol.<sup>2</sup> The CRF tables were resubmitted on 15 May 2008. In its 2007 submission, Estonia included a complete set of CRF tables for the period 1990–2005 and an NIR. Where needed the expert review team (ERT) also used the 2006 submission, additional information provided during the review and other information. The full list of materials used during the review is provided in the annex to this report.

### C. Emission profiles and trends

4. In 2006 (as reported in the 2008 inventory submission), the main GHG in Estonia was carbon dioxide (CO<sub>2</sub>), accounting for 84.6 per cent of total GHG emissions<sup>3</sup> expressed in CO<sub>2</sub> equivalent (CO<sub>2</sub> eq); methane (CH<sub>4</sub>) accounted for 10.6 per cent, and nitrous oxide (N<sub>2</sub>O) for 4.4 per cent, of total GHG emissions. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) collectively accounted for 0.4 per cent of total GHG emissions; HFCs accounted for 0.4 per cent and SF<sub>6</sub> for 0.004 per cent, and PFCs were reported as not estimated (“NE”), not occurring (“NO”) or not applicable (“NA”). The energy sector accounted for 86.4 per cent of total GHG emissions, agriculture for 6.4 per cent, waste for 3.8 per cent and industrial processes for 3.5 per cent; activity data (AD), emissions and implied emission factors (IEFs) for the sector solvent and other product use were reported as “NA”. Total GHG emissions amounted to 18,876.18 Gg CO<sub>2</sub> eq and decreased by 54.6 per cent between the base

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<sup>1</sup> FCCC/SBI/2007/34, paragraph 104.

<sup>2</sup> Parties may start reporting information under Article 7, paragraph 1, of the Kyoto Protocol from the year following the submission of the initial report, on a voluntary basis (decision 15/CMP.1).

<sup>3</sup> In this report the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO<sub>2</sub> eq excluding LULUCF, unless otherwise specified.

year<sup>4</sup> and 2006. In 2005 (as reported in the 2007 inventory submission), total GHG emissions amounted to 20,939.04 Gg CO<sub>2</sub> eq. The shares of gases and sectors in 2006 (2008 annual inventory submission) were similar to those in 2005 (2007 inventory submission). Trends for different gases and sectors did not show any significant irregularities.

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

#### **D. Key categories**

6. Estonia has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2008 submission. The key category analyses performed by the Party and by the secretariat<sup>5</sup> produced similar results. Differences could be explained by the more detailed level of disaggregation used by the Party. The ERT reiterates the recommendation by the previous ERT that the Party carry out a tier 2 key category analysis as a basis for further improvement of the inventory. Estonia has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

7. In the 2007 submission the LULUCF sector was not included in Estonia's key category analysis and the level of disaggregation is different to that in the latest submission (2008). Inclusion of the LULUCF sector in the analysis in the 2008 submission created a new major key category, forest land remaining forest land. Other key categories do not show any important changes between the two submissions. Estonia is using the key category analysis as a driving factor for the preparation of the inventory, to prioritize future developments and improvements.

#### **E. Main findings**

8. 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), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. There is still some need to provide further information, for example, more precise descriptions of methodologies that differ from those provided/recommended by the IPCC, and underlying assumptions used for the uncertainty estimates. The structure of the NIR and the transparency of the methodology descriptions have been improved compared to previous submissions. However, the structure does not fully follow the recommended format (detailed explanations of emission trends and changes in trends in sectors, summary of recalculations, and background of uncertainty analysis are missing).

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<sup>4</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions do not include any possible emissions from deforestation; however, these are taken into account when the assigned amount is calculated.

<sup>5</sup> The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year. 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.

**Table 1. Greenhouse gas emissions by gas, 1990–2006**

Greenhouse gas emissions	Gg CO <sub>2</sub> eq								Change Base year–2006 (%)
	Base year <sup>a</sup>	1990	1995	2000	2003	2004	2005	2006	
CO <sub>2</sub>	36 358.28	36 358.28	17 749.10	15 278.71	16 938.96	17 103.37	15 971.84	15 971.84	–56.1
CH <sub>4</sub>	3 186.04	3 186.04	1 971.89	1 956.83	1 925.24	2 010.29	1 996.70	1 996.70	–37.3
N <sub>2</sub> O	2 048.25	2 048.25	1 081.28	1 004.84	814.32	910.95	831.66	831.66	–59.4
HFCs	0.13	0.00	0.13	4.19	6.59	7.21	75.18	75.18	57 730.2
PFCs	NA, NE, NO	NA, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA
SF <sub>6</sub>	0.25	0.00	0.25	1.43	4.75	5.28	0.80	0.80	219.8

*Abbreviations:* NA = not applicable; NE = not estimated; NO = not occurring.

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions do not include any possible emissions from deforestation; however, these are taken into account when the assigned amount is calculated.

**Table 2. Greenhouse gas emissions by sector, 1990–2006**

Sectors	Gg CO <sub>2</sub> eq								Change Base year–2006 (%)
	Base year <sup>a</sup>	1990	1995	2000	2003	2004	2005	2006	
Energy	36 742.15	36 742.15	17 971.78	15 502.78	17 289.02	17 428.60	16 310.97	16 310.97	–55.6
Industrial processes	945.97	945.59	568.92	587.64	467.64	579.95	655.61	655.61	–30.7
Solvent and other product use	NA	NA	NA	NA	NA	NA	NA	NA	NA
Agriculture	3 225.37	3 225.37	1 574.65	1 289.43	1 198.63	1 212.15	1 201.66	1 201.66	–62.7
LULUCF	NA	–5 373.45	–4 179.78	2 077.11	–1 683.20	–4 288.39	–3 471.41	–3 471.41	NA
Waste	679.47	679.47	687.28	866.15	734.57	816.40	707.95	707.95	4.2
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total (with LULUCF)</b>	NA	36 219.13	16 622.86	20 323.11	18 006.66	15 748.71	15 404.77	15 404.77	NA
<b>Total (without LULUCF)</b>	41 592.95	41 592.57	20 802.64	18 246.01	19 689.86	20 037.10	18 876.18	18 876.18	–54.6

*Abbreviations:* LULUCF = land use, land-use change and forestry; NA = not applicable.

<sup>a</sup> Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O, and 1995 for HFCs, PFCs and SF<sub>6</sub>. The base year emissions do not include any possible emissions from deforestation; however, these are taken into account when the assigned amount is calculated.

9. Further improvements are required in the NIR relating to detailed descriptions of methodologies, information on emission factors (EFs) used, and descriptions of individual categories (e.g. cement and ammonia production, forest land). The Party provided additional information on the quality assurance/quality control (QA/QC) plan during the review and other issues raised by the ERT. The ERT recommends that Estonia include this information in its next NIR to improve the overall transparency of the inventory. In the 2008 submission a quantitative uncertainty analysis was included in the NIR for the first time.

10. In response to questions raised during the review Estonia provided estimates of CH<sub>4</sub> and N<sub>2</sub>O emissions from field burning of agricultural residues. These new estimates increase the total GHG emissions by 3.76 Gg CO<sub>2</sub> eq for 2006 and by 6.59 Gg CO<sub>2</sub> eq for the base year. However, these emissions are not reflected in the national totals of this review report. The ERT commends Estonia for providing these emission estimates and recommends that the Party include them in its next annual submission.

## **F. Cross-cutting topics**

### **1. Completeness**

11. The inventory is complete in terms of years, sectors, gases and geographical coverage. Some of the categories, particularly in the industrial processes (consumption of halocarbons from fire extinguishers, solvents and other ozone depleting substance substitutes), agriculture (field burning of agricultural residues) and all LULUCF categories, except for forest land remaining forest land and direct N<sub>2</sub>O emissions from N fertilization, were reported as not estimated. The CRF tables are broadly complete, except for table 8(b). The ERT recommends that the Party provide estimates for these categories in its next inventory, in order to improve completeness.

### **2. Transparency**

12. The NIR, together with the information provided during the review, provides much of the information necessary to assess the inventory. This greatly improved the understanding of the major underlying assumptions and rationales behind the choices of data and methods and of other inventory parameters. However, inclusion of additional information in the next NIR (e.g. detailed descriptions of methodologies and specific EFs, background of the uncertainty analysis) will contribute to a higher level of transparency, which is especially important for key categories. The ERT recommends that the Party provide detailed explanations of emission trends and changes in trends in all sectors as well as technical references to country-specific EFs and activity data (AD). Further options identified by the ERT to enhance transparency are described in detail in the sector chapters below.

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

13. The ERT noted that main recalculations of the time series from base year to 2005 have been undertaken in the energy sector to take into account new AD in subcategories public electricity and heat production, petroleum refining, manufacture of solid fuels and other energy industries. Recalculations have also been made in the agriculture sector – for N<sub>2</sub>O emissions from synthetic fertilizers, animal manure applied to soils and atmospheric deposition of NO<sub>x</sub> and NH<sub>3</sub> – as a result of changes in AD; and several major recalculations have been made in the LULUCF sector taking into consideration new values of area and of biomass increment by tree species. Recalculations resulted in a real improvement of the inventory and in increasing the total GHG emissions and decreasing the emission/sink total. The ERT recommends that Estonia report the explanatory information on the recalculations not just in CRF table 8(b) but also in the special chapter of the NIR.

#### 4. Uncertainties

14. Estonia has provided an elaborated uncertainty analysis in an annex to its NIR, which includes uncertainties for each category and for the inventory as a whole, using the tier 1 method, following the requirements of the IPCC good practice guidance. The ERT encourages Estonia to use uncertainty analysis to prioritize its improvements to the inventory, in particular for the energy (energy industries, manufacturing industries and construction, and road transportation), agriculture and LULUCF sectors, where the uncertainties in the estimates are relatively high. The ERT encourages Estonia to provide a clear description of the national approach to the uncertainty analysis in the NIR. In the 2007 submission no uncertainty analysis was provided.

#### 5. Verification and quality assurance/quality control approaches

15. Estonia provided information on its QA/QC procedures in line with 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”, the Article 8 reporting guidelines (decision 15/CMP.1) and the IPCC good practice guidance. A comprehensive QA checklist for all sectors was provided in an annex to the NIR. During the review, Estonia responded to several additional questions, which helped the ERT to better understand the function of the national QA/QC plan for the 2006 inventory submission. The current version of the QA/QC plan still lacks some documentation on QC procedures for individual sectors as well as clear and detailed information on implemented QA/QC activities.

16. During the review Estonia informed the ERT that the QA/QC plan will be reviewed and analysed during the project “Improving the quality of Estonia’s national greenhouse gas inventory” prepared for 2009, and sufficiently clarified outstanding issues which were not well explained in submitted NIRs. The ERT recommends that Estonia document in the next NIR submission all relevant responsibilities of cooperating institutions and experts and their contribution to QA/QC plan.

#### 6. Follow-up to previous reviews

17. Estonia’s GHG inventory was reviewed in 2007 and since then it has improved. The Party has recalculated the complete time series for all sectors as recommended in the previous review. However, the ERT noted that Estonia has not followed up on some of the recommendations from previous ERTs such as moving to a tier 2 key category analysis, implementing tier 2 QC procedures and providing detailed explanations and analysis on the emission trends by sector and gas. Further recommendations are included in the sectoral chapters.

### **G. Areas for further improvement**

#### 1. Identified by the Party

18. The 2008 NIR identifies several areas for improvement. For example, Estonia indicated that it is working on:

- (a) Improving the development of the QA/QC system through the project “Improving the quality of Estonia’s national greenhouse gas inventory”;
- (b) Including country-specific EFs for fugitive CH<sub>4</sub> emissions from oil shale;
- (c) Investigating CH<sub>4</sub> and N<sub>2</sub>O emissions from animal manure, for which uncertainties are high;
- (d) Improving the waste classification following the waste groups indicated in the IPCC good practice guidance.

## 2. Identified by the expert review team

19. The ERT identifies the following cross-cutting issues for improvement:
- (a) Providing a more detailed description of the approaches and underlying assumptions used for the uncertainty estimates in the next annual submission;
  - (b) Providing more precise descriptions of methodologies that differ from those provided/recommended by the IPCC;
  - (c) Documenting the relevant responsibilities of cooperating institutions and experts and their contributions to QA/QC activities in the next NIR submission;
  - (d) Developing a national GHG inventory improvement plan which will address the issues identified in this report.
20. Recommended improvements relating to specific source/sink categories are presented in the relevant sector chapters of this report.

## II. Energy

### A. Sector overview

21. The energy sector is the main sector in the GHG inventory of Estonia. In 2006, emissions from the energy sector amounted to 16,310.97 Gg CO<sub>2</sub> eq, or 86.4 per cent of total GHG emissions. Emissions from the sector decreased by 55.6 per cent between 1990 and 2006. The key driver of the fall in emissions is the transition from a planned economy to a market economy (manufacturing industries and construction decreased by 69.3 per cent and other sectors decreased by 72.9 per cent between 1990 and 2006). The largest category is energy industries, which accounted for 74.3 per cent of the sectoral emissions; transport accounted for 14.9 per cent, manufacturing industries and construction for 3.3 per cent, oil and natural gas for 3.2 per cent, other sectors for 2.7 per cent, and solid fuels for 1.6 per cent.

22. The ERT recommends that Estonia provide in its next NIR a more detailed and transparent analysis of sectoral emission trends in order to provide a better understanding of the relevant fluctuations in the emissions of each category over the whole time series. The use of additional published reports and references relating to the different categories to support the explanations would be welcomed. The ERT encourages the Party to consider the use of facility-level data to improve the accuracy of the inventory or to verify estimates based on national statistics.

23. The coverage of categories and gases is almost complete for the inventory year 2006, although Estonia has not followed the recommendation of the previous ERT and has not reported emissions from military fuel use; they are reported as "NO" in the CRF, but according to the NIR they should be reported as "NE". The ERT reiterates the recommendation from the previous ERT that Estonia provide these estimates in the next annual submission. Otherwise the ERT encourages Estonia to correct the notation keys and to provide an explanation in future submissions.

24. In the 2007 submission there are several recalculations and improvements compared with the 2006 submission; for example, gasoline and diesel oil used by passenger cars, allocated to the residential sector in previous submissions, are now allocated to the transport sector.

25. Estonia has performed recalculations between the 2007 and 2008 submissions because of some minor changes in AD (energy balance) and of the development of different country-specific EFs for the two different types of oil shale gas produced and used in the country. As a result, the emissions estimate of the energy sector for 1990 decreased by 3.49 per cent.

## **B. Reference and sectoral approaches**

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

26. Emissions of CO<sub>2</sub> from total fuel combustion were calculated using the reference approach and the sectoral approach. For 2006, there is a difference of 4.31 per cent in the CO<sub>2</sub> emission estimates between the reference approach and the sectoral approach. The ERT recommends that Estonia investigate the reasons for this difference and provide explanations both in the CRF and in the NIR in its next annual submission.

27. Statistics Estonia collects energy data from surveys from all working units (this is a legal requirement of the Government), and elaborates an energy balance that feeds into the inventory as a major source of AD for the energy sector. However, systematic and significant differences between data available from the International Energy Agency (IEA) and the data reported in the CRF have been detected. Estonia stated that these differences are due to the quality of Estonian statistics and that it plans to carry out a special analysis in 2008 to clarify the reasons for the differences between national and international statistics. The ERT welcomes this initiative; it follows the recommendation of the previous ERT to study the data collection system and the procedures for reporting to different international organizations.

### **2. International bunker fuels**

28. The data for international bunkers are provided by Statistics Estonia. However, the methodology to allocate fuel consumption to international and domestic aviation and navigation is not transparently described. No recalculations for international bunkers have been carried out. Estonia stated that the next annual submission will contain additional information about the allocation between international and domestic aviation and maritime navigation. The ERT welcomes this initiative and reiterates the recommendation from the previous ERT that Estonia provide more information on the source of AD.

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

29. The reference approach does not take into account carbon stored as a result of the use of natural gas as feedstock; this should be subtracted from the overall carbon estimates in the energy sector, and related emissions should be accounted for in the industrial processes sector. The ERT reiterates the recommendation from the previous ERT that the Party recalculate the whole time series and assess the differences between the reference and sectoral approaches, taking into consideration that the later should be estimated based on final energy consumption.

## **C. Key categories**

### **1. Stationary combustion: gas, liquid, solid, biomass – CO<sub>2</sub>, CH<sub>4</sub>**

30. The trend in fuel consumption for manufacturing industries and construction fluctuates and all inter-annual changes, except 1990/1991 and 2003/2004, show large changes that range between –63.7 and 46.2 per cent. Estonia stated that the main reason is that Estonian industry is very small and every change has a big influence on the general trend. The ERT recommends that Estonia include an explanation on the trend in its next NIR.

31. The trend in fuel consumption in the category residential fluctuates considerably. Estonia stated that the big decrease in fuel consumption in this sector between 1991 and 1994 was caused by big changes in the economy after Estonia attained independence, and the changes in the prices of imported fuels. During the review Estonia explained the changes in the trend by some technological changes in the boiler houses and energy conservation measures in apartment buildings. The ERT recommends that Estonia provide this information in its next NIR. Also, an explanation of what kind of energy was used to reach a minimal level of thermal comfort in apartment building during the period 1991–1994 would be welcomed.

## 2. Railways: gas, liquid, solid – CO<sub>2</sub>

32. Fuel consumption in the railways sector fluctuates considerably over the whole time series. According to Estonia, the main activity for the Estonian railway transport system is transport of goods, where the volume depends of export/import possibilities and fluctuates across years. The ERT recommends that Estonia explain the variations over the time series and provide that information in its next NIR.

## 3. Other transportation: liquid – CO<sub>2</sub>

33. In the 2007 inventory submission GHG emissions from the use of diesel oil and gasoline in agriculture were allocated to the category agriculture/forestry/fisheries. In the 2008 submission those emissions have been reallocated into the category other transportation. The ERT recommends that Estonia estimate the fraction of those emissions that comes from transport and reallocate the rest back to agriculture/forestry/fisheries, which includes traction vehicles, pump fuel use, grain drying, horticultural greenhouses and other fuel use relating to agriculture.

### **D. Non-key categories**

#### Road transportation: liquid – N<sub>2</sub>O

34. As in previous submissions, a tier 1 approach has been applied to this non-key category. The ERT reiterates the previous ERT's finding regarding this category and notes that no qualitative analysis has been taken into account in the key category analysis, although N<sub>2</sub>O from road transportation could become a key category when higher tiers are used. Some of the information needed to develop a higher tier method (number and type of vehicles, mileage) is available. The ERT encourages the Party to apply higher tiers for modelling emissions from transport.

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

### **A. Sector overview**

35. In 2006, emissions from the industrial processes sector amounted to 655.61 Gg CO<sub>2</sub> eq, or 3.5 per cent of total GHG emissions. Emissions from the industrial processes sector decreased by 30.7 per cent from the base year to 2006. From 2005 to 2006 there was an increase in emissions mainly because emission estimates from consumption of halocarbons and SF<sub>6</sub> are more complete than in previous inventories. However, when the 2008 annual inventory was submitted the inventory for halocarbons and SF<sub>6</sub> was not finalized and it is expected that there will be further changes in the 2009 submission. The key driver of the fall in emissions was the transition from a planned economy to a market economy after 1991 when Estonia became independent. This led to a substantial decrease in industrial production, and to an overall decrease in emissions from industrial processes between 1991 and 1993. In 1994 the economy began to recover and production increased once again. Emissions from industrial processes fluctuated between 2001 and 2004 mainly because of fluctuations in the amounts of ammonia produced. The ERT recommends that Estonia provide more explanation of the variations in the trend for the industrial processes sector in general, and for the specific categories, in its next NIR.

36. Within the industrial processes sector, 67.9 per cent of GHG emissions were from mineral products and 20.6 per cent were from chemical industry. The remaining 11.6 per cent were from consumption of halocarbons and SF<sub>6</sub>.

37. To some extent Estonia has followed up on the recommendations from previous reviews to provide more transparent information to explain what methodologies, AD and EFs were used to estimate emissions from industrial processes. However, there is still room for improvement and the Party is encouraged to keep up its good work of improving the inventory. The ERT's general recommendation to Estonia to increase transparency for this sector is to elaborate the description of the methodologies used in

the calculations, also when data are collected from the European Union emissions trading scheme, and, when appropriate, to justify the assumptions used in the calculations.

38. The ERT recommends that Estonia follow the structure for sectoral chapters recommended in the UNFCCC reporting guidelines and have a separate chapter for each category – one for cement production, one for lime production, and so on.

39. Emissions from solvent and other product use are reported as not applicable, potential emissions of HFCs, PFCs and SF<sub>6</sub> are reported as “NE”, “NA” and “NO”, and emissions of CO<sub>2</sub> from production of urea are not included in the inventory. The ERT recommends that Estonia estimate these emissions.

40. Estonia will conduct a thorough study of the industrial processes sector to identify any categories that are missing from the inventory. Information from the study will be presented in future submissions.

41. The main difference between the 2007 and 2008 submissions is the inclusion of the results of an inventory of HFCs, PFCs and SF<sub>6</sub> in the 2008 submission (see para. 43 below).

## **B. Key categories**

### **1. Cement production – CO<sub>2</sub>**

42. Estonia uses the IPCC tier 2 methodology to calculate CO<sub>2</sub> emissions. The NIR explains that the EF used is plant-specific and varies slightly from year to year. The AD for clinker production used in the calculation are not collected from the plant for all years. The data for clinker production collected from the plant differ from data from Statistics Estonia as statistical data include only the amount of clinker sold. The ERT recommends that Estonia provide a more detailed description in the NIR of the origin of the EF and AD used in calculating CO<sub>2</sub> emissions in different years.

### **2. Consumption of halocarbons and SF<sub>6</sub>**

43. Estonia did not report a complete inventory of the fluorinated gases in the 2008 submission. Potential emissions are not reported for any year and actual emissions are reported for 1995–2006. The NIR stated that a new inventory for HFCs, PFCs and SF<sub>6</sub> was being conducted and during the review Estonia confirmed that this inventory was completed for the complete time series in mid-2008. The ERT recommends that Estonia include the new data and detailed information of the methodology, together with references to the EFs used in the inventory, in its 2009 submission.

## **C. Non-key categories**

### **1. Lime production – CO<sub>2</sub>**

44. The IPCC methodology and default EF for CO<sub>2</sub> from lime production have been used for calculating emissions from lime production. AD on lime production, used in the calculation, are obtained mainly from the industry and partly from Statistics Estonia. The NIR explained that the EF differs slightly from year to year, but in table 3.3 of the NIR the EF is exactly the same for all years. The ERT encourages Estonia to provide consistent information in the NIR and the CRF and to explain why the EF is exactly the same for all years even though it is based on plant-specific raw materials. The ERT also recommends that Estonia verify the AD used in the calculation, and document in the NIR the origin of the AD used in calculating CO<sub>2</sub> emissions in different years.

### **2. Ammonia production – CO<sub>2</sub>**

45. Estonia used data on the quantities of ammonia produced as input data for the calculation of CO<sub>2</sub> 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 to calculate the amount of natural gas used and the plant-specific carbon content of the natural gas (tier 1a). The ERT

reiterates the recommendation from the previous ERT that Estonia change the calculation methodology and use tier 1a.

46. Large quantities of CO<sub>2</sub> emitted from the production of ammonia that is used in the production of urea (carbamide), and minor quantities that are captured and exported, are subtracted from the gross amount of CO<sub>2</sub> emitted from ammonia production and are not reported in the Estonian inventory. According to the Revised 1996 IPCC Guidelines all CO<sub>2</sub> from production of ammonia should be included in the inventory, regardless of whether the CO<sub>2</sub> is used in urea production and temporarily stored in urea or is captured, as long as the capture and storage are not permanent. As indicated in the previous review report the Estonian approach leads to an underestimation of emissions. The ERT strongly recommends that Estonia include the total gross amount of CO<sub>2</sub> from production of ammonia in its inventory.

## IV. Agriculture

### A. Sector overview

47. In 2006, emissions from the agriculture sector in Estonia amounted to 1,205.42 Gg CO<sub>2</sub> eq, or 6.4 per cent of total GHG emissions. Emissions from the sector decreased by 62.7 per cent between 1990 and 2006. The main driver of the fall in emissions is the decrease in animal populations, and in the use of synthetic fertilizers.

48. Within the agriculture sector, as reported in the submission of 15 May, 53.9 per cent of the emissions (647.78 Gg CO<sub>2</sub> eq) were from agricultural soils, 36.2 per cent (434.54 Gg CO<sub>2</sub> eq) were from enteric fermentation, and 9.9 per cent (119.34 Gg CO<sub>2</sub> eq) were from manure management.

49. During the review, in response to questions raised by the ERT, Estonia provided emission estimates for field burning of agricultural residues. However, these emissions are not included in the national totals of this review report.

50. Recalculations are reported by the Party for all subcategories estimated by the Party, except for N-fixing crops and crop residues. These recalculations resulted in an increase of 6.4 per cent in emissions in the base year and a decrease of 0.6 per cent in emissions in 2005.

51. The sheep population reported in the CRF is 21 per cent smaller than that reported by the Food and Agriculture Organization of the United Nations (FAO). Estonia explained that the difference is due to differences in methodologies of data reporting. The ERT recommends that Estonia look into this matter and provide further information in its next NIR.

52. In its 2008 submission Estonia reported six swine subcategories and four non-dairy cattle subcategories in its animal classification. The ERT found that the distribution of the populations for these subcategories was inconsistent between the periods 1990–1998 and 1999–2006. The ERT recommends that the Party ensure time-series consistency of subcategory populations in its next annual submission.

53. Estonia has made improvements in its 2008 submission compared with its 2007 submission. The inventory is more complete, with the exception of emissions from field burning of agricultural residues, which were reported as “NE” (but as indicated in paragraphs 10 and 49 above, Estonia provided emission estimates for this category during the review). An uncertainty analysis was provided and more and better information relating to the AD was provided in this submission made by the Party relating to the data collection. Nevertheless the NIR is not completely transparent and some tables were inconsistent (cattle population for 2006 in table 4.4, figures 4.3, 4.5 and 4.6 and CRF table 4.A). Additionally, the reasons for the recalculations are not entirely clear. The ERT recommends that Estonia continue with the improvements in order to provide a transparent NIR in future submissions.

## B. Key categories

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

54. The Party uses a tier 2 method to estimate emissions from cattle and used, for first time, option B of the IPCC good practice guidance to report emissions. For all other livestock categories a tier 1 approach is used. The ERT welcomes the efforts made by the Party to improve the AD and derivation of country-specific factors, and encourages Estonia to continue with these improvements.

55. The ERT found some inconsistencies relating to animal populations reported in the NIR and in CRF table 4.A. The ERT recommends that Estonia report consistent animal population numbers in the NIR and CRF tables.

56. The ERT welcomes the correction made by the Party when applying the ratio of net energy available in a diet for growth and digestible energy consumed by dairy cattle (NE/DE) (tier 2 approach). Now the Party's estimate of the NE/DE ratio is correct.

57. In its 2007 submission Estonia used an EF of 1.9 kg CH<sub>4</sub> /head/year for emissions of fattening pigs with liveweight of 110 kg or more. In the 2008 submission the EF used was 1.5 kg CH<sub>4</sub> /head/year (default IPCC EF). In the NIR the Party did not explain the reasons for this change and no information about recalculations was provided. The ERT recommends that Estonia clarify this in its next annual submission.

### 2. Manure management – CH<sub>4</sub>

58. The Party stated that the recalculations in this category were made because there had been a change in the methodology of data collection by Statistics Estonia. However, the ERT found incompatibilities between animal statistics in the periods 1990–1998 and 1999–2006. Estonia should ensure time-series consistency and, in order to improve the transparency, should provide more information in the NIR about the new method used by Statistics Estonia and the differences between this and the method used in previous submissions.

59. Estonian experts started research to create an Estonian model of manure management systems, to be used for estimating emissions in future submissions. The research has already shown that there are no deep litter manure systems for cattle in Estonia. Therefore, the EF used to estimate emissions from manure management was changed from 0.005 kg N<sub>2</sub>O-N/kg N in the 2007 submission to 0.001 kg N<sub>2</sub>O-N/kg N, in the 2008 submission, to reflect the existing manure management system (open pits below animal confinements). The ERT encourages Estonia to continue with this research to obtain more country-specific information, and to report the results in its next annual submission.

### 3. Direct soil emissions – N<sub>2</sub>O

60. Estonia has, for the first time, included N<sub>2</sub>O emissions from cultivation of histosols and other direct emissions from sludge applied for all years, in its 2008 submission. The ERT welcomes this improvement in completeness of the inventory.

## C. Non-key categories

### Field burning of agricultural soils – CH<sub>4</sub>, N<sub>2</sub>O

61. CH<sub>4</sub> and N<sub>2</sub>O emissions were reported as not estimated, but AD are provided in CRF table 4.F. During the review the ERT recommended that Estonia estimate CH<sub>4</sub> and N<sub>2</sub>O emissions using a tier 1 methodology and default values provided in the Revised 1996 IPCC Guidelines. The Party accepted this recommendation and provided estimates of these emission for all years in the time series. These new estimates increase the emissions to 3.76 Gg CO<sub>2</sub> eq for 2006 and to 6.59 Gg CO<sub>2</sub> eq for the base year.

## V. Land use, land-use change and forestry

### A. Sector overview

62. In 2006, the LULUCF sector accounted for net removals of 3,471.41 Gg CO<sub>2</sub> eq. Net removals from the sector decreased by 35.4 per cent between 1990 and 2006. Estonia reported only on changes in carbon stock in living biomass and changes in soil organic carbon in the category forest land remaining forest land. The LULUCF sector does not perform consistently along the time-series from 1990–2006, fluctuating between being a sink and a source. From 2003 until 2006, the sector was a net sink, but in 2006 there was a decrease of 21.6 per cent in the net removals relative to 2005. A small decrease (0.5 per cent) in the forest area occurred between 2005 and 2006, according to Statistics Estonia. However, Estonia introduced other sources of data in the NIR which indicate an increase in the forest area in the same period (Eesti Metsad, 2006). In response to a question about the inconsistencies in the data presented in the NIR, Estonia informed the ERT that there is no well developed data set which could be used for the LULUCF GHG inventory in Estonia.

63. The annual loss of carbon stock includes losses from felling and from other losses. Estonia provides two different sources for area and volume felled – one from forest harvest documentation and the other from the national forest inventory (NFI) based on a statistical sampling method. In its inventory Estonia used the data from NFI, which provide a larger volume harvested than the other source. This is a conservative approach to the estimate of loss. There was an increase of 11 per cent in the area harvested, following a steady decrease since 2001. Estonia carried out recalculations for the emissions from changes in carbon stocks from felling, based on more accurate and transparent results.

64. The ERT noted with concern that Estonia reported only forest land remaining forest land in the LULUCF sector under the Convention. This could create major problems with reporting in 2010 of mandatory activities under Article 3, paragraph 3. During the review the ERT also raised a number of issues relating to whether the national system would be able to ensure that land areas subject to LULUCF activities under Article 3, paragraph 3, are identifiable. The ERT recommends that Estonia report a complete inventory for the LULUCF sector under the Convention, including well developed data sets to be used in the inventory, effectively address the issues relating to the national system being able to cover activities under Article 3, paragraph 3, and report thereon in its next annual submission.

### B. Key categories

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

65. Estonia applies the methods in the IPCC good practice guidance for LULUCF to estimate changes in carbon stock in forest land remaining forest land, based on annual increases and decreases in carbon stock due to biomass growth and loss, and applies the IPCC default values for root to shoot ratio and biomass expansion factors for the boreal climate zone. Basic wood densities are country-specific and are within the expected ranges. The average stock volume per unit of area for each type of forest considered is greater than the average growing stock volume in the IPCC good practice guidance for LULUCF (table 3A.1.4). In response to questions from the ERT, the Party clarified that the data reported were obtained from reports that provide input for the Estonian inventory. The ERT recommends that Estonia provide information on the methods used to estimate the stock volume and the increment per unit area in its next annual submission.

66. Estonia clarified during the review that it intends to use the same definition of forest for the purposes of reporting under the Convention and under the Kyoto Protocol. However, it is not clear how the “new” definition affects the data collected in the NFI, because it may include less land area as forest land due to the change in minimum tree height (1.3 m under the Estonian Forest Act and 2 m under the Estonian Kyoto Protocol definition). The ERT recommends that Estonia clarify, in the next annual submission, how it plans to correct for a possible overestimation in the present data collection procedure. In addition, it would be expected that the forest land in the FAO database would be smaller than that

under the Estonian Forest Act, because the FAO definition of forest includes only those trees that can reach a minimum height of 5 m, whereas the Estonian Forest Act and the Estonian definition for the Kyoto Protocol includes as forests trees with minimum height of 1.3 and 2 m, respectively. Additionally, the number for the Estonian forest stands in 2006 shown in table 5.70 of the NIR is a different to that provided in the FAO database and in the Estonian land use categories (NIR table 5.65). Estonia should clarify the differences in the distinct forest data sets included in its report, to facilitate future reviews.

67. The net emissions from forest land remaining forest land include removals due to increases in carbon stock in living biomass and emissions due to harvesting and from organic and mineral soils. Estonia does not clarify how other losses (in addition to biomass burning, such as windstorms and pest outbreaks) are assessed. The ERT suggests that Estonia clarify how it assesses other losses (windstorms and pest outbreaks) in the estimation of the annual decrease in carbon stocks due to biomass loss in forest land remaining forest land.

68. The mean volume of growing stock of forest stands in Estonian forest land is about 213 m<sup>3</sup>/ha, which seems in general agreement with the value reported by FAO (156 m<sup>3</sup>/ha) for above-ground volume only. The average annual net increment in volume is reported for different species but no explanation is given for how these values are achieved. The ERT recommends that Estonia include in its next NIR an explanation for all the values used to estimate the average annual increment in biomass.

69. The Party has performed recalculations for emissions from felling and removals from biomass, necessitated by updated data on harvesting and the use of biomass expansion factors instead of the annual biomass growth used in previous reports. The recalculations led to smaller net removals for each year of the entire time series from 1990 to 2006, but the year-to-year fluctuations are much larger in the recalculated time series. The ERT suggests that Estonia seek to identify more clearly the sources of such annual variation. This may become more transparent when Estonia presents a complete inventory, where changes in forest land may be linked to changes in other land-use categories.

70. Estonia has provided estimates of carbon emissions from organic soil for the first time in the 2008 NIR, using the default value in the upper range for the CO<sub>2</sub>-C EF for drained organic soils in the IPCC good practice guidance for LULUCF. However, the Party notes that the value used may be underestimating the true value, as seen in the literature and in information from other countries. The ERT encourages Estonia to strengthen its efforts to use a nationally defined value, to avoid underestimating or overestimating emissions from soil, consonant with good practice.

### **C. Non-key categories**

#### **Biomass burning – CH<sub>4</sub>, N<sub>2</sub>O**

71. Estonia applies equations from the IPCC good practice guidance for LULUCF to estimate non-CO<sub>2</sub> emissions from biomass burning and uses the IPCC tier 1 default values. The ERT recommends that the value used for the mass of fuel available for combustion be provided in the next annual submission.

## **VI. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**

72. Estonia has provided information on activities under Article 3, paragraph 3, of the Kyoto Protocol on a voluntary basis in an annex to the NIR. It did not report the Article 3, paragraphs 3 and 4, CRF tables. Estonia applies a tier 1 method from the IPCC good practice guidance for LULUCF to estimate changes in carbon stock in living biomass and soil organic matter. The ERT recommends that, in addition to the efforts being made by Estonia with respect to soil and litter pools, nationally developed estimates for growing stocks, biomass expansion factors, basic wood density, and root-to-shoot ratios should also be developed. This would facilitate the implementation of higher tier methods, in the case when Article 3, paragraph 3, activities are identified as a key category.

73. It is not clear from the NIR how present land-use categories such as bushes and grassland in table 5.66 of the NIR would be included as forests in the context of the Kyoto Protocol, because both sources of data in the table do not follow the Estonian definition of forest under the Kyoto Protocol.

74. Estonia stated that data on abandoned and deforested areas are not collected and reported by Statistics Estonia. The ERT encourages the Party to acquire reliable data on deforestation to allow it to be properly reported for the purposes of compliance with Kyoto Protocol requirements.

75. The Party stated in the NIR that abandoned agricultural land and grassland are considered to be directly the result of human-induced (anthropogenic) activities and thus fall into accounting under Article 3, paragraph 3. Estonia should clarify whether the abandoned agricultural land and grassland will be converted to forest land through planting, seeding and/or human-induced promotion of natural seed sources, in accordance with the definition of afforestation and reforestation in decision 16/CMP.1.

## **VII. Waste**

### **A. Sector overview**

76. In 2006, emissions from the waste sector were 707.95 Gg CO<sub>2</sub> eq, or 3.8 per cent of total GHG emissions, compared with 1.6 per cent in the base year. Emissions from the waste sector increased by 4.2 per cent from 1990 to 2006. The key driver of this rise in emissions is the increase in GHG emitted from waste composting in Estonia. In 2006 most of the emissions came from solid waste disposal on land, which accounted for 77.9 per cent of the total emissions from the sector; 16.8 per cent came from other, 9.4 per cent from wastewater handling, and 0.5 per cent from waste incineration.

77. The first order decay (FOD) approach for estimating emissions from solid waste disposal on land and waste incineration were applied, for the first time, in the 2008 submission. QA/QC procedures for the waste sector were implemented by an independent expert from Tallinn University of Technology. The ERT suggests that Estonia provide further descriptions of specific QA/QC and verification procedures in the waste sector in its next annual submission.

78. To improve the transparency of the NIR the ERT recommends that Estonia provide, in its next annual submission, more detailed descriptions on AD, IEFs and methodologies used; more information on methodologies, data sources and assumptions used to derive uncertainties; and further information on IEFs used in CRF table 6.C for CO<sub>2</sub> and N<sub>2</sub>O emissions.

79. Compared with the 2007 submission, the 2008 submission provides much more useful information, based on the previous recommendations from ERTs, and also provides recalculation results from the waste sector.

### **B. Key categories**

#### **1. Solid waste disposal on land – CH<sub>4</sub>**

80. The FOD approach (IPCC tier 2 method) was used, and Estonia has provided an analysis of country-specific degradable organic carbon (DOC) contents of different waste types in Estonia. AD on waste in Estonia are obtained from Estonia Environment Information Center (EEIC) from 1991 to 2006, and the base year data were interpolated based on the data of 1992–1998 taking into account Estonian gross domestic product and population. The ERT recommends that Estonia provide a clear description and further information about DOC values used in the calculations and whether the DOC values are country-specific values or based on the recognized international scientific literature.

81. Estonia carried out a CH<sub>4</sub> emission recalculation because of the use of the new FOD approach; this is in line with the IPCC methodology. The recalculation shows that after 2000, CH<sub>4</sub> emissions from solid waste disposal on land were much higher than those reported in the previous submission. The ERT

recommends that Estonia provide further information and analysis about the difference between the previous and current submissions in the NIR.

## 2. Other – CH<sub>4</sub> and N<sub>2</sub>O

82. The tier 1 approach from recognized international scientific literature was used to estimate emissions from biological treatment of solid waste with IPCC default EFs. AD on waste used in composting in Estonia from 1990 to 2006 are obtained from the EEIC. The amount of organic waste used in composting in Estonia increased after 2002, and the CH<sub>4</sub> and N<sub>2</sub>O emissions from biological treatment increase rapidly from 2002 to 2006. The ERT commends Estonia for including emissions from biological treatment in its inventory.

83. In Estonia sludge from domestic and industrial wastewater treatment plants is used on agricultural land. The IPCC tier 1 approach was used and it is in line with the Revised 1996 IPCC Guidelines. The emissions from sludge applied on land are reported in the agriculture sector. The ERT recommends that the description in the NIR on these emissions be moved to the agricultural sector.

## C. Non-key categories

### Wastewater handling – CH<sub>4</sub>, N<sub>2</sub>O

84. In Estonia only aerobic wastewater treatment is employed. There is no wastewater treatment plant that uses the anaerobic method. So the CH<sub>4</sub> and N<sub>2</sub>O emissions in Estonia were reported as “NO” in the 2008 submission.

85. The default IPCC (the tier 1) method was used to estimate emissions from human sewage using the IPCC default emission factor (0.01 kg N<sub>2</sub>O-N/ kg N and 0.16 kg N/kg of protein). Estonia reported in the NIR that the annual per capita protein consumption was taken from the FAO statistical databases (101 g/person/day = 36.865 kg/person/yr) for 2004 to 2006; however, in CRF table 6.B the wrong figure (32.85 kg/person/year) was used from 1990 to 2006. The ERT recommends that Estonia correct this mistake in its next annual submission.

## VIII. Other issues

### 1. Changes to the national system

86. The Party has not reported any changes to its national system in the 2008 submission. In response to questions raised by the ERT during the review the Party confirmed that no changes to the national system have taken place. The ERT encourages Estonia to include details of changes, or statements to indicate no changes, in future submissions under the Kyoto Protocol.

### 2. Changes to the national registry

87. The Party has not reported any changes to its national registry in the 2008 submission. In response to questions raised by the ERT during the review the Party confirmed that no changes to the national registry have taken place. The ERT encourages Estonia to include details of changes, or statements to indicate no changes, in future submissions under the Kyoto Protocol.

### 3. Commitment period reserve

88. Estonia has not reported its commitment period reserve in the 2008 submission. In response to questions raised by the ERT during the review Estonia reported its commitment period reserve to be 94,380,896 t CO<sub>2</sub> eq, based on the total GHG emissions reported in its most recently reviewed inventory (18,876.18 Gg CO<sub>2</sub> eq). The ERT agrees with this figure. The ERT recommends that Estonia include information on its commitment period reserve in its next annual submission.

## IX. Conclusions and recommendations

89. Estonia has submitted a complete set of CRF tables for the years 1990–2006 and an NIR; these are generally complete in terms of geographical coverage, years and sectors, and fairly complete in terms of categories and gases. Some of the categories, particularly in the industrial processes (consumption of halocarbons from fire extinguishers, solvents and other ozone depleting substance substitutes), agriculture (field burning of agricultural residues) and all LULUCF categories, except for forest land remaining forest land and direct N<sub>2</sub>O emissions from N fertilization, were reported as not estimated. The ERT recommends that the Party provide estimates for these categories in its next annual submission, in order to improve completeness.

90. The Party's institutional arrangements are fully functional and designed to utilize the best expertise and resources available to develop the inventory. The ERT was impressed by the improvements made by Estonia in developing its inventory and national system. The ERT noted with appreciation that the Party reported its GHGs emission from biological treatment and included N<sub>2</sub>O emissions from cultivation of histosols and other direct emissions from sludge applied for all years, for the first time, in its 2008 submission.

91. The inventory is generally consistent with the UNFCCC reporting guidelines, the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. However, there are some areas for further improvement. These include the estimation of some missing categories (in industrial processes and LULUCF), increased transparency in the description of methods used (including the inclusion of descriptions provided during the review in future NIRs), improvements to the presentation structure in the NIR, and development of sector-specific QA/QC activities.

92. The ERT strongly recommends that Estonia ensure completeness, because some of the categories for industrial processes and LULUCF were not included in the 2006 NIR. The ERT welcomes the efforts made by the Party to use higher tier methodologies (e.g. use of tier 2 method to estimate emissions from cattle), AD and country-specific factors, and encourages the Party to continue with these improvements. The ERT welcomed Estonia's response to the review and the submission of revised estimates for CH<sub>4</sub> and N<sub>2</sub>O emissions from field burning using AD already included in CRF table 4.F.

93. The ERT further recommends that in its next annual submission Estonia:

- (a) Clarify how it plans to improve the current data collection procedures to avoid possible overestimation of emissions;
- (b) Clarify the differences in the distinct forest data sets included in its report, to facilitate future reviews
- (c) Follow up on recommendations in this review report and previous review reports that are still pending.

## X. Questions of implementation

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

Annex

**Documents and information used during the review**

**A. Reference documents**

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/english/>>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/SBSTA/2006/9. Available at <<http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>>.

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at <<http://unfccc.int/resource/docs/cop8/08.pdf>>.

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>>.

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Decision 15/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>>.

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for Estonia 2007. Available at <<http://unfccc.int/resource/docs/2007/asr/est.pdf>>.

Status report for Estonia 2008. Available at <<http://unfccc.int/resource/docs/2008/asr/est.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2007. Available at <<http://unfccc.int/resource/webdocs/sai/2007.pdf>>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2008. Available at <<http://unfccc.int/resource/webdocs/sai/2008.pdf>>.

FCCC/ARR/2006/EST. Report of the individual review of the greenhouse gas inventory of Estonia submitted in 2006. Available at <<http://unfccc.int/resource/docs/2007/arr/est.pdf>>.

FCCC/IRR/2007/EST. Report of the review of the Initial Report of Estonia. Available at: <<http://unfccc.int/resource/docs/2007/irr/est.pdf>>.

**B. Additional information provided by the Party**

Responses to questions during the review were received from Ms. Inga Kindsigo (Estonian Environment Information Centre), including additional material on the methodology and assumptions used. The following publication was also provided by the Party:

Eesti Metsad. 2006. *Estonian Forest 2006*. Tallinn: Metsakaitse Metsauenduskeskus. 2007. Available at <<http://www.metsad.ee/main.html>>.

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