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Report of the individual review of the greenhouse gas inventory of Estonia submitted in 2005*

* In the symbol for this document, 2005 refers to the year in which the inventory was submitted, and not to the year of publication.

CONTENTS

I. Executive summary

1. This report covers the in-country review of the 2005 greenhouse gas (GHG) inventory submission of Estonia, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8. The review took place from 3 to 7 October 2005 in Tallinn, Estonia, and was conducted by the following team of nominated experts from the roster of experts: Generalist – Mr. Michael McGettigan, Ireland; Energy – Mr Yannis Sarafidis, Greece; Industrial Processes – Mr. Justin Goodwin, United Kingdom; Agriculture – Ms. Hongmin Dong, China; Land Use, Land-use Change and Forestry (LULUCF) – Mr. Nagmeldin El Hassan, Sudan; Waste – Mr. Justin Goodwin, United Kingdom. Ms. Hongmin Dong and Mr. Yannis Sarafidis were the lead reviewers. The review was coordinated by Ms. Astrid Olsson and Mr. Harald Diaz-Bone (UNFCCC secretariat).

2. In accordance with the "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention", 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.

3. In 2003, the most important GHG in Estonia was carbon dioxide (CO_2), contributing 89.3 per cent to total[1] national GHG emissions expressed in CO_2 equivalent, followed by methane (CH_4), 9.2 per cent, and nitrous oxide (N_2O), 1.5 per cent. Emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) have not been estimated. The Energy sector accounted for 91.9 per cent of total GHG emissions, followed by Agriculture and Waste (3.4 per cent each) and Industrial Processes (1.3 per cent). Total GHG emissions amounted to 21,387 Gg CO_2 equivalent and decreased by 50.8 per cent from 1990 to 2003.

4. The estimates for 2003 indicate an increase of 9.7 per cent in emissions compared to 2002, following a period during which reported emissions had stabilized at approximately 45 per cent of the total in base year (1990). Emissions of CO_2, CH_4 and N_2O in 2003 were 49.9 per cent, 54.9 per cent and 69.4 per cent, respectively, lower than the corresponding emissions in 1990. Over the period 1990–2003, emissions from the Energy sector decreased by 49.4 per cent, emissions from the Industrial Processes and Waste sectors decreased by 55.0 per cent and 54.4 per cent, respectively, and reductions of 70.0 per cent occurred in emissions from the Agriculture sector. Reported net CO_2 removals in the Land-use Change and Forestry (LUCF) sector increased by 38.0 per cent between 1990 and 2003.

5. The Tallinn Pedagogical University produces the national GHG inventories under contract to the Ministry of Environment in Estonia. Virtually all activity data (AD) used in the inventory process are acquired from the Statistical Office of Estonia. Inventory capacity is severely limited as inventory experts are engaged only on a part-time basis and there is little direct involvement of other, external experts. The rigid contract approach to inventory compilation means that the inventory experts often work in an uncoordinated manner and there is an apparent lack of awareness of the objectives of the review process. This situation reflects inadequate administration of the overall reporting process by the Ministry and a lack of clearly defined roles and responsibilities for the various institutions and individuals involved.

[1] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding LULUCF, unless otherwise specified. Estonia has not provided the tables of the common reporting format for LULUCF as required by decision 13/CP.9 using the land use categories of the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-use Change and Forestry*. Instead it has used the common reporting format tables for Land-use Change and Forestry as contained in the common reporting format adopted by decision 18/CP.8, which are based on the categories of the Intergovernmental Panel on Climate Change *Revised 1996 Guidelines for National Greenhouse Gas Inventories*.

6. In its 2005 submission Estonia has submitted the common reporting format (CRF) tables for the year 2003 only. The 2003 CRF tables are accompanied by a national inventory report (NIR). However, Estonia submitted annual inventories in CRF files for the individual years 1999–2002 in its 2001–2004 submissions. The emission estimates for the years 1990–1998 were reported in summary format only in CRF table 10 of these submissions. The NIR was included only in the 2004 and 2005 submissions.

7. The inventories reported in the CRF data files indicate reasonably good source and gas coverage in Estonia. The Party has so far been unable to provide estimates of the emissions of fluorinated gases (F-gases). Other emission sources for which no estimates are provided include ammonia and nitric acid production, and N_2O emissions from human sewage. Notable inclusions in the 2005 NIR compared with the 2004 NIR are the 2003 national energy balance and the list of key categories.

8. The estimation of GHG emissions in Estonia is based almost entirely on Intergovernmental Panel on Climate Change (IPCC) tier 1 methods and default emission factors (EFs). However, country-specific data are applied in the case of oil shale combustion, which is Estonia's principal source of emissions, accounting for approximately two-thirds of the total in 2003.

9. The in-country review of Estonia's 2003 submission and supporting materials identified the need for improvements in relation to all aspects of 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 revised UNFCCC reporting guidelines). Transparency needs to be increased by providing more detailed information about AD and EFs in closer accordance with the specifications laid down in the UNFCCC reporting guidelines. Completeness can be readily improved by providing estimates for the sources mentioned in paragraph 7 above and by delivering CRF data files for all years. The expert review team (ERT) found it difficult to reconcile the energy data in the national energy balance for some sectors with the corresponding AD in the CRF. The reasons for the inter-annual variations in the emissions that have been reported for some sector/gas combinations and the apparent inconsistencies in trends for gases from the same sources are not explained. The Party is encouraged to provide more explanation of these issues in the NIR so that they can be fully resolved in later reviews.

10. Estonia has not complied with the requirements of decision 13/CP.9 to report 2003 emissions/removals estimates for LULUCF using the LULUCF tables, but instead has used the old LUCF reporting format in accordance with decision 3/CP.5, as for previous years. Some definitions governing land use and basic assumptions underlying CO_2 removals in the sectors Changes in Forest and Other Woody Biomass Stocks and Abandonment of Managed Lands, as well as the rate of biomass growth in forests, differ substantially from those given by the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), and explanations for the differences are not provided. Removals are estimated at a highly aggregated level and the same values of the basic input parameters (yield class, carbon content, wood density, biomass expansion factors) are applied for all forests in a particular year. Approximately half of the land area of Estonia is forest land, with wetlands and agriculture each accounting for 20 per cent of total area. The experts involved in deriving emissions/removals estimates for LULUCF need to become familiar 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) and with the requirements of decision 13/CP.9 so that they can better account for emissions and removals in these and other land-use categories by using the improved IPCC methods and background data. Estonia indicated that it will reassess the underlying parameters to estimate emissions from the LULUCF sector for future submissions.

Table 1. Greenhouse gas emissions by gas, 1990–2003

GHG emissions	Gg CO_2 equivalent														Change 1990–2003 (%)
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	
CO_2 (with LULUCF)	31 787	28 752	18 325	10 858	13 773	11 533	10 657	11 118	9 795	8 664	8 484	7 685	8 726	10 389	–67.3
CO_2 (without LULUCF)	38 107	35 915	26 142	20 553	21 378	19 315	20 264	20 225	18 318	16 771	16 849	17 103	17 290	19 106	– 49.9
CH_4	4 363	3 668	2 976	2 409	2 631	2 561	2 694	2 866	2 664	2 451	2 403	1 969	1 898	1 968	–54.9
N_2O	1 024	1 002	817	527	473	410	387	423	430	359	414	364	314	313	–69.4
HFCs	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
PFCs	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
SF_6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
Total (with CO_2 from LULUCF)	**37 174**	**33 422**	**22 118**	**13 794**	**16 877**	**14 505**	**13 738**	**14 407**	**12 889**	**11 473**	**11 301**	**10 018**	**10 938**	**12 670**	–65.9
Total (without CO_2 from LULUCF)	**43 494**	**40 585**	**29 934**	**23 490**	**24 482**	**22 287**	**23 345**	**23 514**	**21 412**	**19 580**	**19 666**	**19 436**	**19 502**	**21 387**	–50.8

LULUCF = Land Use, Land-use Change and Forestry.
NE = not estimated.

Table 2. Greenhouse gas emissions by sector, 1990–2003

Sectors	Gg CO_2 equivalent														Change 1990–2003 (%)
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	
Energy	38 829	36 606	26 735	20 958	21 874	19 891	20 948	20 873	18 717	17 155	17 308	17 590	17 734	19 645	–49.4
Industrial Processes	614	615	313	193	215	221	207	226	368	347	354	356	340	276	–55.0
Solvent and Other Product Use	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
Agriculture	2 440	2 328	2 050	1 480	1 358	1 117	909	921	911	775	808	769	702	732	–70.0
LULUCF	–6 317	–7 160	–7 814	–9 693	–7 603	–7 782	–9 607	–9 107	–8 522	–8 107	–8 365	–9 417	–8 564	–8 717	38.0
Waste	1 608	1 033	834	856	1 033	1 057	1 281	1 494	1 416	1 304	1 196	721	748	733	–54.4
Other															

LULUCF = Land Use, Land-use Change and Forestry.
NE = not estimated.

11. This review raised questions about the key assumptions made and other aspects of the methodological approach to estimating CH_4 emissions from solid waste disposal and waste-water handling. The emissions time series for solid waste disposal and waste-water handling appear not to be consistent with the changes actually taking place in waste management, and the suitability of some of the input parameters needs to be reassessed. The inventory agency is advised to reconsider its approach to these emission sources with a view to selecting AD and values of the input variables that are fully substantiated by the available national data. Estonia indicated that it will reassess the underlying parameters to estimate emissions from the Waste sector for future submissions.

12. The ERT made it clear to Estonia that a full time series of emissions and supporting inventory data are vital for the review of annual inventories and for the assessment of changes since the base year (1990). Estonia is encouraged to use the key findings and recommendations of this in-country review to reassess the available inventory time series, especially the base year emissions, and to submit CRF data files for all years 1990–2003 as soon as possible, including the new reporting format for LULUCF. Moreover, in compiling robust estimates of emissions in the base year and developing a complete and consistent emissions time series, there is a particular need to take full account of the major changes that have occurred in the main drivers of emissions and their effect on the AD, EFs or other methodological parameters. In many cases, the values used for later years may not be appropriate for the base year, or for other years at the beginning of the time series.

II. Overview

A. Inventory submission and other sources of information

13. Estonia submitted an NIR on 15 April 2005.

14. In its 2005 submission, Estonia submitted a complete set of CRF tables for the year 2003.

15. During the in-country review the Party informed the ERT that CRF data files were available for all years, even though those for 1990–2002 were not part of the official 2005 submission to the UNFCCC secretariat. These CRFs were provided to the ERT together with further information, including a detailed national energy balance, copies of legislative instruments governing pollution control, survey data on the composition of municipal solid waste, and background reports on forest inventories requested during the review. This information is not referenced in the NIR and is not part of the official inventory submission for which this review was conducted. Nevertheless, it is useful for assessing certain aspects of the methods adopted in some sectors and it facilitates more complete analysis of the data presented in the CRFs. The full list of materials used during the review is provided in the annex to this report.

B. Key categories

16. Estonia has reported a tier 1 key category analysis using both level and trend assessment as part of its 2005 submission. The key category analyses performed by the Party and the secretariat[2] produced similar results. The secretariat did not perform a trend assessment, as CRF tables were not provided for 1990. The secretariat identified CH_4 from Fugitive Emissions for Coal Mining and Handling as a key category in the level assessment. This source category is not identified as a key category by Estonia,

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

apparently due to the effect of rounding on the individual key category contributions in the level assessment. The dominance of oil shale combustion as a source of greenhouse gases is well recognized in Estonia. Apart from a focus on acquiring reliable information for combustion sources which use this fuel in energy generation, there is no indication that Estonia has used the list of key categories in setting any priorities for the work to date on the GHG inventories.

17. In 2003 there were five key categories of CO_2 emissions, accounting for 87 per cent of total national emissions, and five key categories of CH_4, contributing a further 8 per cent of total national emissions. Stationary combustion of oil shale is by far the most important source of emissions in Estonia, accounting for two-thirds of total emissions in 2003.

C. Cross-cutting topics

1. Completeness

18. In its 2005 submission Estonia has submitted the CRF tables for the year 2003 only. The 2003 CRF tables are accompanied by an NIR. However, Estonia did submit annual inventories in CRF files for the individual years 1999–2002 in its 2001–2004 submissions. The emission estimates for the years 1990–1998 were reported in summary format only in CRF table 10 of these submissions. The NIR has been included only in the 2004 and 2005 submissions.

19. The inventory reported in the CRF tables for 2003 includes emission estimates for the majority of source/gas combinations likely to be relevant in the country. The principal data gaps identified by the ERT relate to emissions from ammonia and nitric acid production, actual and potential emissions of F-gases in the source category Consumption of Halocarbons and SF_6, N_2O from sewage disposal, and non-CO_2 gases in LUCF.

2. Transparency

20. The CRF tables have generally not been completed in sufficient detail and there is a lack of transparency because Estonia's use of the notation keys and documentation boxes is inadequate and inconsistent. The NIR provides a basic description of methods and data but lacks much of the detail it should contain according to the revised UNFCCC reporting guidelines. Transparency could be increased considerably by specifying the precise source of the EFs used and other information appropriately in the NIR, along with better descriptions of how methods and AD are used.

21. The ERT found it difficult to assess the quality of the emissions/removals estimates reported under LUCF, and encourages the Party to provide further information to justify the key assumptions made in this sector relating to land areas and biomass growth rate so that a more complete analysis can be performed for the relevant categories. The information sources used in the inventory need to be adequately documented and the data and emission estimates for individual source categories in the CRF tables need to be cross-referenced with the corresponding descriptions given in the NIR, using calculation sheets wherever practicable to facilitate an efficient review.

3. Recalculations and time-series consistency

22. No recalculations are reported in the 2005 submission, and the failure to take account of previous review findings by carrying out recalculations is a serious ongoing shortcoming in Estonia's current emissions time series. It is clearly difficult for the Party to include this element of inventory compilation in the annual reporting cycle but a systematic recalculation exercise is now a priority issue in order to achieve complete and consistent emissions inventories under the Convention. The Ministry of Environment must increase the resources being allocated to the work on GHG reporting so that the Party

can comply with the revised UNFCCC reporting guidelines. The recommendations of this report and earlier stages of the review process identify many areas where improvements can be made.

23. Particular attention must be given to revising the estimates for 1990 in order to prepare for a number of important forthcoming submissions. The IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) provides techniques for recalculations that could be applied by Estonia for revising the estimates for 1990 given the changes, indicated by Estonia, in national statistics since then. Emissions in the base year appear to be overestimated for some sources, and the ERT identified some additional sources for which the Party has not made any estimates which should be included in the base year and for other years.

4. Uncertainties

24. The calculation and documentation of complete tier 1 estimates of uncertainty in the NIR is another aspect of reporting that Estonia has so far failed to comply with. As oil shale combustion accounts for two-thirds of total national emissions, and the information relating to this fuel is apparently reliable, the overall uncertainty in Estonia's emissions would be quite low. The Party can readily quantify this uncertainty based on the methods given by the IPCC good practice guidance and is encouraged to do so in its future submissions.

5. Verification and quality assurance/quality control approaches

25. No formal quality assurance/quality control (QA/QC) procedures, as defined by the IPCC good practice guidance, are currently applied in the inventory process in Estonia for any sector. Informal control and review activities are in place which, however, are not documented in the NIR. Furthermore, the NIR does not mention plans for a formal national emissions inventory system that would incorporate a national QA/QC plan and verification processes. Verification is currently limited to comparing the estimates of CO_2 emissions obtained from the sectoral approach with those computed by the reference approach.

26. Many of the problems relating to inconsistencies in Estonia's inventory time series suggest that even the most basic quality checks are not carried out on a routine basis. This is a direct consequence of the system used to compile and document the annual inventories: the experts in Tallinn Pedagogical University work in an uncoordinated fashion and on a part-time basis to produce the inventories, using largely tier 1 methods and default EFs designed to simply fulfil contracts with the Ministry for individual years. There are no formal procedures in place for internal checking or for comparison with previous years. The annual inventories do not exhibit year-on-year development reflecting methodological improvements or other benefits that should accrue from the review process.

6. Institutional arrangements

27. During the in-country visit, the Party described the institutional arrangements for preparation of the inventory. The Institute of Ecology at Tallinn Pedagogical University has the role of inventory agency. It undertakes the work by way of a separate contract for each annual inventory negotiated with the Ministry of Environment. Up to six inventory experts are involved on a part-time basis, which usually equates to less than three person-months' work on the annual inventory. The statistical data inputs for all sectors are acquired from the Statistical Office of Estonia (SOE). The Ministry has overall control of and responsibility for reporting and archiving the national inventory, but is not directly involved in the calculation and preparation of emission estimates. Estonia indicated that the Information Centre in the Ministry of Environment could play a significant role in the inventory development process.

28. An inter-ministerial committee, which also includes representation from the SOE and other stakeholders, oversees the completion of the annual contracts for inventory preparation, but its role is

largely administrative, as no technical assessment or systematic checking of the completed inventory is carried out. The ERT was impressed by the comprehensive nature and timely publication of national statistics by the SOE. The established methods of data collection could become a key element of a formal national inventory system for the Party.

7. Record keeping and archiving

29. Estonia does not yet have a centralized archiving system for all materials and information related to its GHG inventories and no formal system is foreseen in the short term. The data used for the annual inventory compilation are stored mainly in electronic spreadsheet format and in hard copy at the Ministry. The ERT did not access these background files or any other inventory information kept electronically or as hard-copy archives.

8. Follow-up to previous reviews

30. The Party has not acted on previous recommendations that it should carry out and report recalculations in a consistent way that shows the effect across all years where revisions in a particular source category are justified. Other issues identified in earlier reviews, such as the provision of a complete set of CRF tables for the entire time series, have not yet been addressed.

D. Areas for further improvement

1. Identified by the Party

31. Specific areas for improvement are not being targeted in any systematic manner on a year-to-year basis. Clearly, the lack of resources for inventory purposes is the main problem, and substantially increased funding is needed to ensure that the inventory experts have full-time and long-term involvement in the annual cycle of inventory preparation and reporting. During the review Estonia also acknowledged the need to improve the quality of the data in the base-year inventory (1990). The ERT strongly encourages Estonia to make the necessary efforts to achieve the above objectives.

2. Identified by the ERT

32. Further improvements in Estonia's submissions require the more complete application of most aspects of the revised UNFCCC reporting guidelines. The Party needs to pay particular attention to the NIR requirements set down in these guidelines. Many of the methodological issues identified in this review may be quite readily resolved but others will require in-depth analysis of some basic assumptions and approaches by national experts if the most appropriate methods and data are to be used. The ERT found it difficult to understand the inter-annual variations in the emissions that have been reported for some sector/gas combinations but recognizes the problems of obtaining reliable historical data for this Party, which is undergoing the transition to a market economy. In these circumstances, detailed documentation of the inventory process according to the specifications laid down in the revised UNFCCC reporting guidelines is vital for the further assessment and review of the inventories.

33. In the opinion of the ERT the following improvements on cross-cutting issues in the Estonian inventory are very important at the present time. In many cases achieving them will depend on much closer adherence to the IPCC good practice guidance, which is fundamental to producing inventories of high quality and adequate transparency. The ERT recognizes that not all these improvements can be carried out in the short term, and clear priorities must be established as a matter of urgency. The Party should:

(a) Allocate sufficient state funding and human resources to meet the overall needs of reporting under the Convention. The Ministry of Environment can justify an increase in its budgetary allocation for this purpose by promoting awareness of the importance

of reliable emissions data and complete reporting and by highlighting the importance of a national inventory system to implement the Kyoto Protocol. The permanent designation of an appropriate agency as the competent body for compiling and reporting annual inventories on a continuous basis, to replace the current system of separate annual contracts, would increase efficiency and improve the inventory reporting process;

(b) Develop institutional arrangements in line with the requirements for national inventory systems and initiate basic QA/QC procedures as part of such a system. Exploit the mandate of the SOE to enhance data collection related to those areas where data that are more specific to the emissions inventory process can be obtained;

(c) Encourage a more active role in inventory compilation for experts who can advise on methodologies and data use in all sectors, and expand the terms of reference of the inter-ministerial committee so that it can serve as a worthwhile internal review body for completed inventories;

(d) Include more detail in the NIR following the specifications given in the revised UNFCCC reporting guidelines. A considerable increase in transparency can be achieved simply by providing more of the basic AD and by describing how the national statistics are used. The rationale for choosing the various default EFs and other parameters that are used should also be made clear;

(e) Provide more explanation of emission trends in general in order to make it possible for reviewers to fully assess the changes that have taken place since 1990 and to understand the reasons for some large inter-annual variations across the time series, as well as apparent inconsistencies in the trends for gases from the same source;

(f) Consider seriously the recommendations in the sectoral sections of this report regarding the need for re-evaluation of certain aspects of the methodological approach for some important emission sources;

(g) Re-evaluate the entire emissions time series in the light of this review report and carry out a recalculation exercise to account for missing estimates, apparent overestimates and year-to-year inconsistencies, and improved methodological approaches, including the provisions of decision 13/CP.9 regarding LULUCF. This exercise should be planned with an initial focus on the base year and with a view to providing a complete and consistent set of inventories as soon as possible.

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

III. Energy

A. Sector overview

35. In 2003 the Energy sector accounted for 91.9 per cent of total national GHG emissions (without LULUCF). CO_2 represented 95.8 per cent of total emissions from the sector. Total GHG emissions from the sector decreased by 49.4 per cent from 1990 to 2003 due to Estonia's transition from a planned economy to a market economy. Emissions from Transport in 2003 accounted for 10.1 per cent of total emissions from the Energy sector, presenting a decrease of 20.2 per cent from 1990 to 2003. The share of Transport in total emissions from the Energy sector is rather low compared to that of other Parties included in Annex I to the Convention.

36. CO_2 emissions from Stationary Combustion and Mobile Combustion – Road Transportation as well as CH_4 emissions from Oil and Gas Handling and Coal Mining and handling were identified as key categories by the Party and the secretariat. Emissions from key categories accounted for 89.3 per cent of total national GHG emissions, 86.3 per cent of total national CO_2 emissions and 33.3 per cent of total national CH_4 emissions.

1. Completeness

37. The CRF includes estimates of all gases from the Energy sector, as well as emissions of indirect gases and sulphur dioxide (SO_2). Emissions are estimated and reported at an aggregate level (for Energy Industries, Manufacturing Industries and Construction) which is not consistent with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

38. Emissions from Energy Industries are reported under Electricity and Heat Generation. The notation keys are not used consistently as no notation keys are used in the relevant sectoral background data table, while emissions for Petroleum Refining and Other Energy Industries are reported as "not occurring" ("NO") in the sectoral report table for Energy. According to the national energy balance, which is attached as an annex to the NIR, petroleum refining does not occur in Estonia, while there are activities for fuel conversion (e.g. the manufacture of briquettes from peat). The ERT recommends the use of the notation key "NO" for Petroleum Refining (sub-source 1.A.1.b) and recommends Estonia to begin to disaggregate emissions from the Energy Industries on the basis of the available energy balance information. Estonia indicated that this disaggregation, for the whole time series, will be included in the 2007 inventory submission.

39. Emissions from Manufacturing Industries and Construction are reported under Other in that source category. The notation keys are not used consistently: they are not used in the relevant sectoral background data table, while emissions for the different industrial sectors are reported as "NO" in the sectoral report table for the Energy sector. The national energy balance, which is attached as an annex to the NIR, includes detailed information on the energy consumption of the different industrial sectors in Estonia. The ERT encourages Estonia to initiate the disaggregation of emissions from Manufacturing Industries and Construction on the basis of the available energy balance information. Until then the use of the notation key "included elsewhere" ("IE") seems more appropriate. Estonia indicated that emission estimates for 2004 will be disaggregated while the disaggregation of the whole time series will be included in the 2007 inventory submission.

40. There are several cases where the notation keys have not been used in the CRF tables as there are cells left blank or filled in with "0". The ERT recommends the proper use of the notation keys in the CRF tables. Estonia indicated that it will fill in all blank cells with notation keys in future submissions.

2. Transparency

41. The NIR includes a short description of the methodologies applied, the providers of the AD (mainly the SOE) and the EFs together with relevant parameters (e.g. the net calorific value (NCV) of fuels, and oxidation factors) used for estimating emissions from the Energy sector. Apart from the national energy balance (attached as an annex to the NIR) there is no information available regarding the AD used. The ERT recommends that Estonia include in its next submission more detailed AD (i.e. per source category and for the whole period) as this would increase the transparency of the inventory.

42. The tier 1 methodology described in the Revised 1996 IPCC Guidelines has been used to estimate emissions from the Energy sector. In most cases default EFs have been used. Country-specific EFs have been used to estimate emissions in the following cases: CO_2 emissions from the use of oil shale, CO_2 emissions from the use of shale oil, CH_4 emissions from the production (mining) of oil shale and shale oil, and nitrogen oxide (NO_X) and carbon monoxide (CO) emissions from the use of oil shale.

43. The characteristics of oil shale are presented in the NIR, and the calculation of the country-specific CO_2 EF (which is also included in the Revised 1996 IPCC Guidelines) is well discussed in the NIR. For the other country-specific EFs references are provided. The ERT recommends that Estonia include in its next submission a more detailed discussion of how those EFs are derived.

44. The inclusion of the national energy balance as an annex to the NIR has improved the transparency of Estonia's reporting compared to the 2004 submission. The energy balance is developed by the SOE on the basis of annual surveys and questionnaires. The energy balance format adopted by the SOE is different from the standard International Energy Agency (IEA)/EUROSTAT format as transport fuels (gasoline, diesel) are included in both the Transport and the Residential sector, while light fuel oil (used for heating purposes) and diesel (used in transport) are reported together. Total consumption of light fuel/diesel oil is allocated in the CRF under the different subcategories, but no background information is provided in the NIR. As a result the ERT could not follow the emissions calculations. The ERT was informed that the inventory team has access to detailed information on light fuel oil and diesel consumption on the basis of a special request to the SOE. The ERT recommends that Estonia include in its next submission a discussion on how the fuel categories of the national energy balance are transferred to the CRF tables.

3. Recalculations and time-series consistency

45. According to the NIR (section 2.1.1) recalculations have been carried out because gasoline and diesel used in the Residential sector have been reallocated to Road Transportation since 2001. However, there is no corresponding information on recalculations in CRF table 8 for the Energy sector. From the assessment of the CO_2 emissions trend (table 10 of the CRF), the ERT concluded that the above-mentioned change only applies since 2001 as the increase of emissions in the Transport sector is almost equal to the decrease of emissions in other source categories. The ERT recommends that Estonia recalculate emissions from those source categories, fill in the relevant tables of the CRF and include a detailed discussion on this issue in the NIR. Data availability problems can be handled by applying the methods described in the IPCC good practice guidance. Estonia indicated that recalculations for the period 1990–2000 will be performed and presented in the 2007 inventory submission.

46. The SOE, which is the body responsible for the development of the national energy balance, updates the energy balance annually with respect to the data of the previous year. However, on the basis of the additional information provided during the in-country review (a complete set of CRF tables for the period 1990–2002), it seems that emission estimates are not recalculated accordingly. The ERT recommends that Estonia check for any changes in the national energy balance data and recalculate emissions if necessary.

47. The information given in the NIR does not allow for an assessment of emission trends in Estonia. The analysis of trends was, however, facilitated by the provision of additional information during the review (Ministry of Economic Affairs and Communication, Estonian Energy 2003; and Statistical Office of Estonia, Energy Balance 2003, 2004) according to which inter-annual variations of emissions are closely related to changes on energy consumption and production as a result of Estonia's transition from a planned economy to a market economy. The ERT recommends that additional information on energy production and consumption be included in Estonia's next NIR, following the provisions of decision 18/CP.8. The ERT welcomes the plan of Estonia to provide a more detailed NIR in its next submission.

4. Uncertainties

48. Uncertainty estimates for AD in the Energy sector have remained the same since the third national communication of Estonia November (2001). The uncertainty of AD, based on expert judgement, is ±10 per cent for energy consumption data and ±15 per cent for transport. During the in-

country review the ERT was informed that, thanks to improvements in institutional arrangements, the uncertainty for transport fuel consumption data could be lower. The ERT encourages Estonia to consider updating its uncertainty estimates for AD in the Energy sector.

49. Given the national circumstances, the ERT also encourages Estonia to consider an uncertainty analysis, especially for oil shale, which is the main fuel used. Estonia indicated that an uncertainty analysis for oil shale will be presented in the 2007 inventory submission.

B. Reference and sectoral approaches

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

50. Estonia has calculated CO_2 emissions from fuel combustion using the reference and the sectoral approaches. For the year 2003, there is a difference of –5.43 per cent in the CO_2 emission estimates between the two approaches. Explanations are not provided either in the documentation box of CRF table 1.A(c) or in the NIR. During the in-country review the ERT was informed about the different procedures followed for developing the production part (surveys) and the consumption part (questionnaires) of the national energy balance. However, the statistical differences reported in the energy balance (attached as an annex to the NIR) do not explain the differences between the two estimates. The ERT recommends that Estonia check this, especially for liquid fuels, where the greatest differences are observed, and provide all necessary explanations in its next submission.

2. International bunker fuels

51. The allocation of fuel consumption between domestic and international navigation is based on the data of the national energy balance. Estimates of emissions from international navigation are provided only for CO_2. The ERT was informed of plans to estimate CH_4 and N_2O emissions from international navigation for 2004 (2006 submission) and encourages Estonia to estimate CH_4 and N_2O emissions from international navigation since 1990 following the recommendations of the IPCC good practice guidance.

52. Estonia reports all aviation emissions as domestic although only a small part of the relevant fuel consumption is used for domestic aviation. Data on aviation fuel consumption are presented under the heading “aviation gasoline” in the national energy balance without any further details being given. The ERT recommends that Estonia look for additional information from the SOE (e.g. separate records for aviation gasoline and jet fuels, if available) or make an assumption based on expert judgement that would make it possible to allocate fuel consumption between domestic and international aviation for the period since 1990. Estonia indicated that in the 2006 submission aviation emissions will be allocated between domestic and international aviation.

3. Feedstocks and non-energy use of fuels

53. According to the NIR, non-energy use of fuels refers to the use of oil shale and natural gas. Natural gas is used for the production of fertilizers. This use of natural gas is not reported in any CRF table. Since the production of fertilizers is based on the production of ammonia from natural gas, the ERT recommends that Estonia estimate emissions from fertilizer production on the basis of the carbon content of the natural gas consumed and report them under Industrial Processes – Ammonia Production. Estonia indicated that this process is in progress and will be finalised in the 2007 inventory submission.

54. According to additional information provided to the ERT during the in-country review (Statistical Office of Estonia, Energy Balance 2003, 2004) small quantities of bitumen and lubricants are consumed in Estonia (32 kt and 5 kt, respectively). In order to improve the completeness of its reporting, the ERT recommends that Estonia include the non-energy use of bitumen and lubricants in its next submission, using the default values for carbon stored if country-specific values are not available.

4. Country-specific issues

55. Oil shale is the main domestic energy source of Estonia. The country's energy system relies heavily on oil shale production and consumption. The NIR includes a description of the characteristics of oil shale, the most important of which is the decomposition of the carbonates in the fuel. In normal firing conditions the CO_2 EF increases by up to 25 per cent because of the decomposition of the carbonates.

C. Key categories

1. Stationary Combustion: solid, liquid and gas – CO_2

56. CO_2 emissions from stationary combustion (solid, liquid, gaseous fuels) accounted for 78.0 per cent of total GHG emissions in Estonia in 2003 (without LULUCF). In 2003, CO_2 from solid fuels combustion (mainly oil shale) accounted for 66.5 per cent of total national emissions (without LULUCF) while CO_2 emissions from the combustion of liquid and gaseous fuels accounted for 4.5 per cent and 6.9 per cent of total national GHG emissions, respectively.

57. CO_2 emissions from Stationary Combustion are estimated on the basis of the tier 1 methodology described in the Revised 1996 IPCC Guidelines, using a country-specific EF for oil shale and default EFs for all other fuels, while the fuel consumption data and parameters are provided by the SOE. The aggregated reporting of emissions from Energy Industries and Manufacturing Industries and Construction is not in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance (see paragraphs 38 and 39 above).

2. Mobile Combustion – Road Vehicles: liquid – CO_2

58. CO_2 emissions from Road Transportation accounted for 8.3 per cent of total national GHG emissions in 2003 (without LULUCF). Emissions are estimated on the basis of the tier 1 methodology described in the Revised 1996 IPCC Guidelines, using default EFs, while fuel consumption data and parameters are provided by the SOE.

59. The increase of CO_2 emissions from Road Transportation in 2001 compared to 2000 (more than 100 per cent) is identified as an outlier and is attributed to a methodological change (the reallocation of transport fuels from the Residential sector to Road Transportation). Estonia indicated that recalculations for the period 1990 – 2000 will be performed and presented in the 2007 inventory submission.

3. Fugitive Emissions: Coal Mining and Handling – CH_4

60. CH_4 emissions from oil shale mining (both underground and surface) and handling accounted for 1.1 per cent of total national GHG emissions in 2003 (without LULUCF). Emissions are estimated on the basis of the IPCC tier 1 method using oil shale production data and country-specific EFs for mining and post-mining activities.

4. Fugitive Emissions: Oil and Gas Operations – CH_4

61. CH_4 emissions from Oil and Gas Operations accounted for 2.0 per cent of total national GHG emissions in 2003 (without LULUCF). Emissions are estimated on the basis of the IPCC tier 1 method using default EFs (for the region of the former USSR and Eastern European countries) and fuel production/consumption statistics. Since this is a key category the ERT encourages Estonia to consider the use of the methods described in the IPCC good practice guidance in the short term and the development of higher-tier methods in the longer term.

62. CH_4 emissions from gas production refer to the production of biogas from landfills. This is not in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance as biogas production is reported in the Waste sector. The ERT recommends that Estonia reconsider this and provide further explanations in its next submission. Estonia indicated that it will recalculate these emissions for the 2007 inventory submission.

D. Non-key categories

Mobile Combustion – Road vehicles: gasoline, diesel – N_2O

63. N_2O emissions from Road Transportation are estimated using the tier 1 methodology described in the Revised 1996 IPCC Guidelines. Given that the number of three-way catalysator cars is increasing, the application of this method cannot be considered appropriate. The ERT encourages Estonia to develop a plan for improving the methodology used for Road Transportation, following the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

E. Areas for further improvement

1. Identified by the Party

64. Estonia is planning to differentiate the CO_2 EF of oil shale in order to represent better the combustion conditions in fluidized bed combustion compared to pulverized combustion.

2. Identified by the ERT

65. The ERT encourages the Party, following this review report, to develop a long-term improvement plan with concrete intermediate targets which will be addressed to all the agencies involved.

IV. Industrial Processes and Solvent and Other Product Use

A. Sector overview

66. The only emissions Estonia reports for the Industrial Processes sector in 2003 are emissions of CO_2 from the cement and lime production processes. These emissions accounted for 1.3 per cent of total national GHG emissions (excluding LULUCF) in 2003 and are produced from a single cement plant and one single lime plant. Emissions from the sector have decreased by 55.0 per cent since 1990 as a result of declining production of cement and lime. Emissions fluctuate over the years, reflecting the ups and downs of production and maintenance in the plants in the country.

1. Completeness

67. The CRF includes estimates for the Mineral Industry only under the Industrial Processes sector. Estonia has indicated that ammonia production and nitric acid production do occur, and that there are relevant sources under Consumption of Halocarbons and SF_6. The ERT encourages Estonia to calculate emissions from these source categories and report them in its future submissions. Estonia does not use the notation keys consistently in the CRF tables and some cells are left blank. The NIR does not include enough information or description for the Industrial Processes sector or any information on the sources not included in the inventory submission. The ERT recommends that Estonia provide estimates of emissions and data for the sources listed above in the CRF with full documentation of these sources and the methodology used in the NIR. The ERT also encourages Estonia to review and correct its use of the notation keys. Estonia stated its intention to review and correct the use of notation keys as well as recalculate the whole time-series of emissions from the Industrial Processes sector for its 2007 submission.

2. Transparency

68. The NIR does not provide the transparency that is necessary to enable the ERT to review the inventory. Only a very minimal description of the methodology used is provided for Cement Production and Lime Production, and this description is not consistent with the description provided by Estonia during the review. Estonia has not indicated whether cement or clinker production is used as AD in the CRF tables. Moreover, for a number of years the AD used for the cement and lime production estimates differ from the data on the national statistical web site. The ERT urges Estonia to provide full methodological descriptions for the methods used to estimate the emissions presented in the CRF, to identify data sources and assumptions made in its future NIRs, and to provide all the background data requested in the CRF background data tables. Neither the NIR nor the CRF provides any detailed description of the methods used, assumptions made or data sources for the two key categories Cement Production and Lime Production. The NIR provides only very basic generic explanations for the methods used to estimate CO_2 emissions from cement production and lime production, and these explanations do not include transparent documentation of the estimates provided for the base year or any other year to 2003. Only the CRF for 2003 is provided in the official submission. During the review Estonia provided the full set of CRF tables to the ERT, enabling only a simplistic assessment of the trends but not clarifying methods used, assumptions made or data sources. The ERT strongly encourages Estonia to comply with the revised UNFCCC reporting guidelines and report a full set of CRF files, from 1990 to the latest year, and to provide a full explanation of the methodology, assumptions and data sources used for the estimates for each year of the inventory. The ERT welcomes the plan of Estonia to provide a more detailed NIR in its next submission.

3. Recalculations and time-series consistency

69. No recalculations have been provided for the Mineral Industries subsector. Estimates of emissions from Cement Production are currently based on cement production but applying a clinker production EF. The implied emission factors (IEFs) for cement production in 2002 and 2003 appear to be inconsistent. The ERT recommends that Estonia recalculate the whole time series using clinker production data and country-specific EFs. There are time trends that are not transparent for the cement production and lime production estimates presented in CRF table 10. It is likely, judging from discussions during the review, that this change has been due to fluctuations in production from the cement and lime plants over the time series. The ERT encourages Estonia to provide a written explanation of the changes in emissions for the years 1990–2003 in its future NIRs and to provide a clear explanation of the recalculations in the NIR. Estonia acknowledged the need for the above-mentioned recalculations and indicated that they will be performed and presented in the 2007 inventory submission.

B. Key categories

1. Cement Production – CO_2

70. Emissions from Cement Production are presented in the CRF and a very brief description of the methodology is presented in the NIR. However, Estonia does not provide enough transparency on the methodology in the NIR. There is no indication in the CRF or the NIR as to whether AD are clinker production or cement production, and no documentation on the sources of information for the AD or EFs is provided in the NIR. During the review Estonia provided further information and indicated that the data used for the calculating emissions from Cement Production are cement production data provided annually by the cement industry. Estonia also indicated that specific data on the lime (CaO) content (63.5 per cent) of limestone, provided by the industry, have been included in the estimates to produce a country-specific EF for the estimation of CO_2 emissions on the basis of clinker production. This EF is currently applied to the figure for cement production of 506.3 kt for 2003 (presented in CRF table 2(I).A-Gs1). This is incorrect: it should be applied to the clinker production, as blending of the clinker to make

cement, or clinker imports and exports, will cause significant errors. Further examination of the official production statistics available from the SOE (<http://www.stat.ee>) shows that the clinker production statistics are significantly different for most years from those provided by the industry. The ERT recommends that Estonia review its CO_2 estimates for Cement Production (basing them on clinker production) and provide documentation for the methodology, assumptions and data sources in its future NIRs. The ERT also suggests that Estonia provide details of the QA/QC and the uncertainty of the data in its future NIRs.

71. Additional analysis of the AD provided in the CRFs for the years 1990–2002 shows differences between the CRF data and the national statistics for cement production from the SOE. For 1998–2002, the cement statistics reported in the CRF are significantly higher than those published by the SOE. The ERT recommends that Estonia check the AD and provide information on the source of AD and the reasons for the discrepancies in its future NIRs.

2. Lime Production – CO_2

72. Emissions of CO_2 from Lime Production are presented in the CRF for 2003 and a very brief description of the methodology is presented in the NIR. However, Estonia does not provide enough transparency on the methodology in the NIR or the CRF. There is no description of the source of lime production data in the NIR (a reference to national statistics was provided during the review). The ERT recommends that Estonia provide documentation for the methodology, assumptions and data sources in its future NIRs. Estonia stated that it will provide more information, as requested by the ERT in future submissions.

73. For 2002 an error was identified in the IEF for Lime Production. This error was corrected in the CRF tables supplied during the review. However, these corrected data were not provided for the official submission. The ERT recommends that Estonia review the methodology and EF used for 2002 and provide details of the recalculation in its future NIRs. Estonia indicated that it will review the methodology and the EF used for future submissions.

74. There is a small discrepancy between the default factor used by Estonia for estimating emissions from lime production and that published in the IPCC good practice guidance. Estonia uses a factor derived from the rounded equation of the molecular ratio of 44/56 when a ratio of 44.01/56.08 should be used. The ERT recommends that Estonia check its calculations and revise its estimates for all years for its future reporting.

75. There is a large drop in lime production between 2002 and 2003 that is not explained in the NIR. The ERT was informed during the review that lime production was stopped for refurbishment of a number of units at the single lime plant in Estonia. The ERT encourages Estonia to provide an explanation for the trends in emissions for lime production in the NIR, including explanations of changes that are due to AD fluctuations and changes in EFs. Estonia indicated that it will provide more explanations for the trends in future submissions.

76. The statistics used in the 1990–2002 CRF data provided to the ERT are inconsistent with the lime production data published by the SOE. There are major differences in the activity statistics as between the CRFs and the published national statistics for lime production for 1999, 2000 and 2002. The ERT recommends that Estonia review the AD used in the years 1990–2002, report updated (recalculated) estimates where necessary, and provide a clear explanation of the methodology, assumptions and data sources used for the full time series of estimates in its future NIRs. Estonia stated that it intends to check the AD and report updated estimates, where necessary, in future submissions.

C. Non-key categories

1. Consumption of Halocarbons and SF_6

77. Estonia has not estimated emissions from the consumption and use of halocarbons and SF_6. These emissions have been excluded from Estonia's estimates due to the lack of data (NIR page 6). Some HFC data are currently available on the SOE web site which are compiled by the ozone and climate unit at the Estonian Environmental Research Centre. Estonia has indicated its intention to estimate relevant emissions from the consumption and use of halocarbons and SF_6 in the 2007 inventory submission and provided an outline of ongoing work to collect the relevant data and estimate emissions. This work (although not directly focused on providing the data for the UNFCCC reporting requirements) will improve Estonia's understanding of emissions from the Consumption of Halocarbons and SF_6. The ERT recommends that Estonia ensure that this project can provide the detailed annual (importantly the base year) source- and gas-specific data required for reporting, as specified in the revised UNFCCC reporting guidelines and the CRF tables. Estonia should also work to obtain transparent and concise data and documentation on the uncertainties, methods, assumptions and data sources used to generate these data and report this work in its future NIRs. The ERT hopes that Estonia can show signs of progress with this component of the inventory for the 2006 submission and provide a complete estimate for these sources for the 2007 submission.

2. Production of Halocarbons and SF_6

78. Emissions of HFCs, PFCs and SF_6 are reported as "not estimated" ("NE") in table 2(I) and as "not occurring" ("NO") in table 2(II). Estonia has acknowledged that its use of the notation keys is inconsistent and clarified that emissions from the production of F-gases do not occur. The ERT recommends that Estonia review and correct the use of the notation keys in the CRF tables.

3. Ammonia Production – CO_2

79. Emissions from Ammonia Production are not reported in the 2005 submission. Estonia's national energy balance and annex 1 of the NIR provide natural gas feedstock data that could be used to calculate an emissions estimate. Estonia confirmed during the review that this was possible for ammonia (and eventually fertilizer) production and could be used to estimate emissions from Ammonia Production. Estonia and the ERT energy expert confirmed that this non-energy use of natural gas is currently excluded from the energy emissions estimates and therefore excluded from the estimate of total national GHG emissions. The ERT recommends that Estonia include estimates for the non-energy use of natural gas in its future submissions for all years from 1990 to the latest year, and calculate these using existing EFs for the carbon content of natural gas. The ERT also recommends that Estonia provide documentation of these estimates in its future NIRs.

4. Nitric Acid Production – N_2O

80. Emissions from Nitric Acid Production have not been reported in the 2005 submission, but UN statistics and industry experts in Estonia agree that nitric acid production does occur in Estonia. However, Estonia indicated in its response to the draft version of this report that domestic nitric acid production does not occur anymore. The ERT urges Estonia to resolve this issue, review its existing data on production and emissions, which are reported by the industry, and to include estimates for all relevant years in its future inventory submissions.

D. Areas for further improvement

1. Identified by the Party

81. Estonia has identified a project to calculate emissions from Consumption of Halocarbons and SF_6 for the GHG inventory.

2. Identified by the ERT

82. The ERT identified the following areas for future improvements. The Party should:

(a) Review the methodology and data sources, and improve the transparency of its NIR and CRF for the Mineral Products sector for all years 1990–2003;

(b) Include estimates and descriptions of methodologies, assumptions and data sources used for estimating emission sources in the Chemical Industry and Consumption of Halocarbons and SF_6;

(c) Improve the use of the notation keys in the CRF.

V. Agriculture

A. Sector overview

83. In the year 2003, the Agriculture sector accounted for 732 Gg CO_2 equivalent or 3.4 per cent of total national GHG emissions in Estonia. Total emissions from the sector had decreased by 70.0 per cent, from 2,440 Gg, in 1990. Agriculture contributed 23.6 per cent of total CH_4 emissions and 85.7 per cent of total N_2O emissions in 2003. Enteric Fermentation, Manure Management and Agricultural Soils were the major source categories, contributing 54.4 per cent, 9.4 per cent and 35.2 per cent, respectively, to the total emissions of the sector (in CO_2 equivalent). Between 1990 and 2003, CH_4 emissions from Enteric Fermentation and Manure Management decreased by 62.9 and 84.1 per cent, respectively, because of a decrease in livestock population. N_2O emissions from Agricultural Soils and Manure Management declined by 72.9 per cent and 58.1 per cent, respectively, over the same period.

1. Completeness

84. The CRF includes estimates of all gases and sources of emissions from the Agriculture sector, as recommended by the Revised 1996 IPCC Guidelines. There is no rice production or savanna burning in Estonia, so the corresponding categories are reported as "NO". According to Estonia's introduction during the in-country review, field burning of agricultural residues does not occur in Estonia. However, GHG emissions from field burning are reported as "NE" in the CRF. The ERT recommends Estonia to check the use of the notation keys and to report emissions from Field Burning of Agricultural Residues as "NO". Estonia stated that it will use the notation key "NO" in future submissions.

2. Transparency

85. Estonia's NIR provides basic information such as the methodology and EFs used. This information was helpful for the review of the Estonian inventory. The ERT noted that transparency could be further improved by using the NIR to provide information on or explanations of the reasons for its choice of EFs and AD, as well as the underlying parameters. Western European default values of the EFs for Enteric Fermentation and Manure Management have been used. The NIR does not provide information to support this selection. However, Estonia provided enough information during the review to support the selection.

86. The information on AD of agricultural soils provided in the NIR is not sufficient to support the inventory estimations. The ERT recommends Estonia to improve its documentation of the AD for calculating emissions from nitrogen (N) input for manure applied to soil and grazing, as well as N-fixing crops, in the NIR.

3. Recalculations and time-series consistency

87. There are no recalculations in the Agriculture sector for the inventory under review. However, according to the recommendation of previous reviews, the default EFs for Western Europe were used in estimating CH_4 emission from Enteric Fermentation and Manure Management for 2003. Emission estimates for the years 1990–2002 were not recalculated. Changing the default values of EFs from Eastern European (cattle) and developing countries (sheep and goat) to the default values for Western Europe without recalculation may cause inconsistencies in the emission estimates over the time series. The figure for milk production per cow varies from 3,322 kg in 1992 to 5,176 kg in 2003 according to the data in the Agricultural Yearbook which Estonia provided during the in-country review. These values are higher than the reference values for developing countries and Eastern European countries in the Revised 1996 IPCC Guidelines. To improve the consistency of its reporting, the ERT recommends Estonia to check the EFs used for Manure Management and recalculate the emission estimates for the years before 2003 by using the appropriate EFs in its next submission.

B. Key categories

Enteric Fermentation – CH_4

88. CH_4 emissions from Enteric Fermentation have been estimated based on a tier 1 methodology and default EFs for Western Europe. According to the IPCC good practice guidance, if data are available or can be collected without excessive cost, the tier 2 method should be applied to significant sub-source categories (in this case Dairy and Non-dairy Cattle). The ERT encourages Estonia to use the higher-tier methodology when the data needed are available.

89. Default EFs for Western Europe countries have been selected according to the recommendation of the previous (2004) ERT. Previous ERTs used the annual milk production of dairy cattle to recommend whether the use of default EFs for developed countries is suitable. However, the NIR provides no information on milk yield and other related animal productivity to justify this choice. The reason for the choice of EFs should be indicated in the NIR. Estonia provided relevant information during the review to support the selection. To improve the transparency of its reporting, the ERT recommends that Estonia include information on milk production in the NIR for all years.

90. The NIR states that the number of livestock is provided by the SOE. The ERT noted that the SOE collects data on animal populations quarterly through the agricultural register. Animal population data at end of year are used as AD for estimating the emissions and are reported in the NIR and the CRF. The ERT encourages Estonia to consider the possibility and appropriateness of using average year data as its AD. According to the IPCC good practice guidance, the frequency of data collection, assumptions on AD development, and estimates of accuracy and precision should be documented.

91. The ERT also noted that Estonia has extensive data on animal production, including detailed animal population data for different ages, milk production per cow, and meat production for different animal species, which have not been considered in the development of the inventory. The ERT believes that these data could be of great help in future inventory development.

C. Non-key categories

1. Manure Management – CH_4

92. Estonia has applied the IPCC tier 1 method for all animal species.

93. The ERT identified inconsistencies in the EFs reported for dairy cattle, non-dairy cattle and swine between the CRF and the NIR: the NIR lists default EFs for cool climate regions of Western Europe

(with a typing error: "Eastern" instead of "Western" has been entered) but the CRF reports EFs for Eastern Europe.

94. Estonia reports a big decrease in CH_4 emissions from Manure Management between 1995 and 1996 (figure 4.2 in NIR and table 10 in the CRF). The NIR explains that this rapid decrease was partly caused by separating the number of goats from the number of sheep and using different EFs for goats and sheep. However, given the small percentage of emissions from sheep and goats in emissions from Manure Management, this separation is not sufficient to explain the change. The ERT encourages Estonia to look further into this decrease and to provide more information in its NIR.

95. During the review, Estonia unofficially provided CRF tables for the years 1990–2002. The ERT noted that the allocation to cool climate region and temperate climate region is not consistent over the time series. EFs for the temperate region of Eastern Europe were used to estimate CH_4 emissions for the years before 1995, and EFs for the cool region of Eastern Europe were used for the years 1996–2003. The ERT recommends that Estonia check the allocation to climate region and correct these errors in its next submission, if needed.

2. Manure Management – N_2O

96. The sum of N excretion of each animal waste management system (AWMS) reported in CRF table 4.B(b) does not match the N excretion calculated by multiplying animal populations with the N excretion rates indicated in the NIR. Estonia explained during the review that this inconsistency was the result of mistakes made during the conversion of data from the IPCC software to the CRF format. The ERT encourages Estonia to check these values and correct them in its next submission.

3. Agricultural Soils – N_2O

97. The tier 1a method with default EFs is used to estimate N_2O emissions from Agricultural Soils. This is in line with the decision tree of the IPCC good practice guidance, as Estonia does not have the relevant data needed to apply the tier 1b methodology.

98. Data sources on N input of fertilizer are not provided in the NIR. No data or data sources on disaggregated values for $Frac_{GRAZ}$ of different animal types are provided in the NIR. The ERT recommends that Estonia include these data in its next submission.

D. Areas for further improvement

1. Identified by the Party

99. Estonia has not provided information on any improvements identified or planned for the Agriculture sector.

2. Identified by the ERT

100. The ERT encourages Estonia to check the EFs used for livestock for Enteric Fermentation and Manure Management – that is, whether the values for Eastern or Western Europe should be used – in order to better reflect the process of transition in agricultural practices. The Party is also encouraged to resolve the inconsistencies between the NIR and the CRF, and to provide more information on methods and data in the NIR.

VI. Land Use, Land-use Change and Forestry

A. Sector overview

101. Estonia has not provided the LULUCF reporting tables as required by decision 13/CP.9. Instead it has used the LUCF reporting tables as contained in decision 18/CP.8. The ERT strongly encourages Estonia to report the LULUCF sector using the revised CRF tables. The remainder of this section is based on Estonia's reporting of the LUCF sector according to decision 18/CP.8.

102. Estonia's forest land covers about 51 per cent of the land territory. Net CO_2 removals from the LUCF sector in 2003 were 8,717 Gg according to the Party's submission; this amount offsets about 40.8 per cent of the net emissions from other sectors. CO_2 removals by LUCF in 2003 had increased by about 38.1 per cent compared to 1990. Estonia attributed this to the increase in forest area and growth rates.

103. The main features of the IPCC good practice guidance for LULUCF were discussed briefly with the Estonian expert. From this discussion and the review of the available data it is clear that there is already a good base for Estonia to start using the new guidance as required by decision 13/CP.9. There are extensive data on different land uses and type of forest in Estonia's Yearbook Forest and other sources.

1. Completeness

104. The CRF tables submitted by Estonia for the 2003 inventory include estimates of all categories except Forest and Grassland Conversion, which is considered insignificant and reported as "NO". However, the Party explained that at present there are no up-to-date data for land-use change available to make it possible to track whether such activities do occur in Estonia. Therefore no reporting was provided for non-CO_2 gases which are associated with this category.

2. Transparency

105. The NIR does not give sufficient description of the background data on the Forest sector, the national forest inventory system, or land-use changes, or on the methods, EFs and other parameters or the assumptions used. The ERT was not able to assess adequately the high growth rate value used to estimate removals in the Changes in Forest and Other Woody Biomass Stocks and Abandonment of Managed Lands categories, and was not able adequately to review the category CO_2 Emissions and Removals from Soil.

3. Recalculations and time-series consistency

106. Estonia has not provided any recalculation or mapping back in its 2005 inventory.

4. Uncertainties

107. Very rough estimates, based mainly on expert judgement, of uncertainties are provided in the 2005 inventory submission, but the Party does not provide sufficient description to make it possible to assess the uncertainty levels.

B. Sink and source categories

1. Changes in Forest and Other Woody Biomass Stocks – CO_2

108. To estimate GHG fluxes in this category Estonia has used mainly IPCC methods and defaults without providing any description or the assumptions used to justify this in the NIR. AD have been collected from different national sources – from Statistical Office of Estonia, Yearbook Forest, and other publications, e.g. Karoles et al. (1994).

109. The annual growth rate value (5 t dm/ha/year) used in estimating removals from boreal forest is high compared to the value in table 5–2, page 5.20, of the Revised 1996 IPCC Guidelines. Previous review reports also found the growth rate value very high compared to those of other countries. The explanation provided by Estonia for this fast growth rate has not been sufficient and indicates some contradiction regarding the effect of the age classes on the growth rate of the forest stand. However, according to the Revised 1996 IPCC Guidelines, growth rates in boreal systems are more nearly linear over different age periods than growth rates in tropical systems. During the in-country review Estonia also explained that this value has been underestimated in the past and is now based on better inventory data. However, the ERT was not able to obtain sufficient information about the design of the Estonian forest inventory system. The ERT recommends that Estonia review and check this value, correct it if needed, and provide a full description of the methodology applied in the NIR of future submissions.

110. Estonia has detailed data on the areas of different forest types and species and many other inventory-related parameters in the national forest yearbook (e.g. Yearbook Forest 2004). However, Estonia continues to report GHG estimates from all forest types together on an aggregate level as boreal forest, and uses a single growth rate value to estimate removals from all of them. This aggregated reporting does not provide sufficient transparency and may lead to wrong estimates of GHG emissions. The ERT recommends that Estonia make more effort to use the data that are in fact available in order to provide more detailed, well-documented estimates in its future GHG inventories.

111. Estonia has used one single biomass expansion factor (BEF) value of 1.35 in calculating GHG emissions/removals from all forest types under the categories Changes in Forest and Other Woody Biomass Stocks and Abandonment of Managed Lands. BEF values normally vary depending on many local and site-specific factors, including climate, species, forest type and management system. Using one BEF value for all forest types may therefore lead to wrong estimates. The ERT recommends that Estonia use more relevant country-specific BEF values according to tree species or make use of the defaults provided in the IPCC good practice guidance for LULUCF in its future submissions.

112. There is a possible mistake in the way Estonia calculates its GHG estimates in this category. The calculation of CO_2 removals is based on the average value for conversion of volume data into dry biomass (tonnes) which has been derived from the two factors of the Revised 1996 IPCC Guidelines (0.65 for deciduous and 0.45 for conifers) multiplied by the average growth rate value (5.8 t dm/ha) for boreal forest (which is applied to all type of forest). This is multiplied by the total area, then by the same BEF value (35 per cent) and carbon fraction value (0.45), and finally converted to CO_2. When the ERT reproduced the estimates for deciduous and coniferous forests separately, it found an overestimation of 15 per cent in the estimates of removals in this category, caused by way the Party calculates the estimates. The ERT recommends that Estonia calculate GHG emissions/removals for the different forest types separately and at the end add up the resulting estimates for each source/sink category.

113. The ERT notes from tables 5.1 and 5.3 of the NIR that the AD actually used for the category Forest and Other Woody Biomass Stocks for 2003 are the area of managed forests in 1983, and that the difference between forest land in 2003 and forest land in 1983 is taken to be the area of abandoned land in 2003. The ERT suggests that there is a possibility of an error in this approach for AD which may be attributed to unclear definition of land uses, and recommends that Estonia consider reviewing its definitions for the different land uses so that the most appropriate land areas are used.

114. Traditional and other fuel wood use has not been estimated in the inventory. From the discussion during the in-country review it was agreed that there are some amounts of wood use that may not be recorded in the Yearbook Forest. These are mainly from small privately-owned forests. Emissions from these possible sources should be considered in Estonia's future inventories.

2. Forest and Grassland Conversion

115. Forest and Grassland Conversion are reported as "NO" in the CRF. However, in the discussion during the in-country review, the Estonian expert indicated that changes in land use have not been surveyed and data have not been updated recently. Currently most conversions have involved agricultural land because of the European Community agricultural policy. Estonia considers Forest and Grassland Conversion insignificant.

3. Abandonment of Managed Land

116. The difference between forest land in 2003 and forest land in 1983 is taken to be the area of abandoned land in 2003. The methodology and assumptions underlying this approach are not described in the NIR. The basis for table 5.3 provided in the NIR and the relationship between forest land and abandoned land is not clear. From the discussion during the in-country review it was clear that this is a problem of definition, as there is some doubt among the Estonian experts on what the current forest land area is. Moreover, according to one Estonian expert, some of the land specified as abandoned land could be managed land. The ERT considers that this is a problem of inconsistency in land representation and recommends that Estonia use national definitions for land uses in specifying land areas in its next inventory submissions.

117. The average annual growth rate value (5 t dm/ha/year) used is also high compared to the IPCC value for boreal forest. The explanations given are not sufficient. The use of such a national-level average (aggregate) value may lead to overestimations of the sinks because growth rates vary depending on many factors including climate, site, forest type, species and management. The ERT recommends that Estonia classify forest (e.g. by type, species etc.) and select more specific values that are appropriate for the different forest classes to derive its estimates of GHG fluxes.

4. CO_2 Emissions and Removal from Soil

118. No information is provided in the NIR on the methods and factors used to estimate CO_2 fluxes in this category. No assumptions or description of how the AD have been derived are provided. Estonia indicated during the review that this is one of the most difficult categories to estimate, since currently no system for monitoring soil carbon exists in Estonia and no assessment has taken place recently. It was not possible for the ERT to review this category adequately. The ERT recommends that Estonia make more effort to provide well-documented and transparent estimates for this category in its future submissions.

C. Areas for further improvement

1. Identified by the Party

119. Estonia expressed the intention to improve the quality of its GHG inventory in future. However, no specific plans for such improvement have been provided to the ERT.

2. Identified by the ERT

120. The ERT strongly encourages Estonia to report the LULUCF sector using the revised CRF tables in accordance with decision 13/CP.9.

121. The ERT recommends that Estonia use the IPCC good practice guidance for LULUCF in its next inventory submission.

122. The ERT recommends that Estonia calculate GHG emissions/removals, where detailed data are available, at a disaggregated level and then add up resulting GHG estimates per category at a final stage in order to avoid possible overestimation and/or double counting.

123. Growth rate data directly affect levels of GHG estimates, and the ERT therefore recommends that these factors be carefully identified and selected taking into consideration forest type, tree species and management practices. The national average growth rate factors that are currently used should be reviewed and corrected if necessary.

124. Land area is the most important item of AD for the GHG inventory calculations in the LULUCF sector. The ERT recommends that Estonia specify the national definitions for its different land uses and determine annual land areas for inventory purposes which are consistent with those definitions.

VII. Waste

A. Sector overview

125. The only emissions Estonia reports from the Waste sector in 2003 are emissions of CH_4 from Solid Waste Disposal and Waste-water Handling. Both were identified as key categories by the Party and the secretariat in 2003. The combined emissions from Solid Waste Disposal and Waste water Handling accounted for 3.4 per cent of total national emissions in 2003. Emissions from the Waste sector decreased by 54.4 per cent between 1990 and 2003.

1. Completeness

126. The CRF includes estimates of CH_4 emissions from the Waste sector. However, emissions of N_2O from Waste-water Handling and CH_4 from Sludge Handling have not been estimated. These exclusions are identified in the NIR. The NIR is not clear whether emissions have been estimated for sludge disposal to solid waste disposal sites (SWDS). The NIR does not include a complete description of the methodology applied or of the assumptions or data sources used for the estimates. The background data for both solid waste disposal and waste-water handling provided in the CRF are incomplete, and the notation keys are not fully used. Only the CRF for 2003 is provided in the official 2005 submission. The ERT encourages Estonia to provide complete estimates of emissions and all the required background data or use the notation keys in the CRFs for all the years 1990–2003 and to include in the NIR a complete and concise description of the methods, assumptions and data sources used for the emission estimates.

2. Transparency

127. There are inconsistencies between the CRF and the NIR for some of the parameters (e.g. the methane correction factor and fraction of degradable organic carbon (DOC) in municipal solid waste (MSW)). The NIR does not provide sufficient explanation of the methodology, data sources, emission trends and assumptions used for the Solid Waste Disposal or Waste-water Handling source categories. The ERT recommends that Estonia provide more transparency on the methods, assumptions and data sources used for estimating emissions for Solid Waste Disposal and Waste-water Handling and explain the emission trends between 1990 and 2003.

B. Key categories

1. Solid Waste Disposal on Land – CH_4

128. Solid Waste Disposal on Land was identified as a key category by both the secretariat and Estonia. The methodology currently used by Estonia is consistent with the IPCC tier 1 methodology. According to the IPCC good practice guidance, key categories should be estimated using tier 2 first-order

decay (FOD) calculations. However, there are a number of current issues with the implementation of Estonia's tier 1 methodology that should be resolved before Estonia can be encouraged to move to a tier 2 methodology. These issues are outlined below. They include the appropriate application of the methodology for the years 1990–2000 to account for waste disposed in small or unmanaged sites or tips. Due to Estonia's current resource circumstances and the difficulties it faces in using the current tier 1 methodology, the ERT recommends that Estonia concentrate on compiling a complete and consistent tier 1 estimate for all the years 1990–2003. In future, when its inventory compilation capacity is expanded, Estonia should consider estimating emissions using a tier 2 methodology. Estonia indicated that it will recalculate the emission estimates if the needed data are made available by the Ministry of Environment.

129. Estonia provides in the NIR a discussion of the number of SWDS between 1990 and 2003. The NIR discussion suggests that there were at least 300 sites in operation up to 1999/2000, serving a population of about 1.4 million inhabitants. Waste disposal after 1999 was then consolidated into a small number of large managed sites. The very large number of sites in operation between 1990 and 1999 suggests that the vast majority of sites were typically very small and unmanaged shallow landfills and likely to be insignificant in terms of methane generation. The total amount of solid waste disposed on land is therefore not appropriate as the basis for estimating emissions for this source category for the years 1990–1999. Estonia was unable to provide details of the quantity of waste disposed in managed/large deep landfill SWDS in the years 1990–1999. The ERT urges Estonia to recalculate the historic emissions for methane from SWDS taking account of only the quantities of waste disposed in managed or large deep SWDS, as only this waste will generate methane emissions.

130. No AD for solid waste disposal are provided in Estonia's 2005 submission (CRF table 6.A). Estimates of "generation of mixed municipal waste" are provided in table 6.3 of the NIR. However, these data are not consistent with the value reported on page 38 of the NIR for 2003 (of 360.18 Gg) used for estimating methane emissions for solid waste disposal in 2003. In addition, the ERT was not able to generate the value for waste disposed of in SWDS (360.18 Gg) from the national statistics available from the SOE. The ERT urges Estonia to include details of annual MSW disposed at the SWDS (in Gg/yr) for all years in CRF table 6.A, to explain how these data have been generated from the national statistics, and to reference the source material in its future NIRs.

131. As indicated in previous reviews, the trend of CH_4 emissions for the category Solid Waste Disposal on Land fluctuates, with significant inter-annual changes. Estonia was not able during the in-country review to provide an explanation for these historical changes in emissions. The ERT did, however, establish from the data in the NIR (table 6.3) that the trend between 1991 and 2000 was a result of changes in the AD, and that a consistent methodology has been applied. The trend between 2000 and 2001 was influenced significantly by the introduction of the revised IPCC good practice guidance factor for degradable organic carbon degraded (DOC_f) of 0.6 instead of the Revised 1996 IPCC Guidelines factor of 0.77. This factor (0.6) should have been applied to earlier years (1990–2000) and recalculations done. The largest fluctuation (between 1990 and 1991) remains unexplained as there were no AD available to the ERT. The ERT recommends that Estonia review the emission estimates for Solid Waste Disposal on Land and ensure that consistent factors are applied to the full time series (1990–2003). The ERT also urges Estonia to provide descriptions of the methods, assumptions and data sources used for the estimates, as well as a description of the emission trends.

132. There are inconsistencies between the value reported for the methane correction factor in the CRF and in the NIR. The NIR quotes a factor of 1 while a factor of 0.8 is listed in CRF table 6.A. If the CH_4 emissions are recalculated using the methane correction factor of 1 and the value of MSW given on page 38 of the NIR, the result is the figure reported for 2003. Therefore the CRF value for the methane correction factor (0.8) is inconsistent with the emissions value as calculated. The ERT recommends that

Estonia review the approach used to estimate emissions for the Solid Waste Disposal on Land sector and to use the most appropriate factors available.

133. The ERT questioned the source of the information used for the DOC percentage in the estimates for Solid Waste Disposal on Land. Estonia clarified the source of the data as the default for Russia presented in table 6–1 of the Revised 1996 IPCC Guidelines. Estonia also provided additional data from studies on waste composition for the Tallinn area. A sample set of these data was reviewed by the ERT. The DOC percentage values varied between 13 per cent and 17 per cent. Therefore the default value chosen is reasonable. The ERT urges Estonia to use country-specific data for estimating the DOC percentage where these data are available. Where country-specific data are available but are not considered appropriate then a discussion on this should be included in the NIR. The ERT urges Estonia to provide details of the source of parameters used in its estimates in its future NIR and CRF reports.

134. In the CRF a value of 1 is given for the fraction of DOC in MSW but a value of 0.17 (the default value for Russia) is provided in the NIR and was confirmed by Estonia during the review. The ERT encourages Estonia to ensure that the CRF and NIR are consistent and that the NIR contains a description of the data source and the reasons for choosing the Russian factor.

135. No information is provided on the calculation of methane recovered. The ERT recommends that Estonia provide in the NIR an explanation of the methodology used for estimating methane recovered, if this occurs.

2. Waste-water Handling – CH_4

136. Estonia indicates in its NIR (page 39 and 40) that most waste-water treatment is aerobic treatment. This implies that methane is not generated from the bulk of the domestic and industrial waste-water treatment. However, Estonia estimates emissions on the basis of the total quantity of domestic and industrial waste water. Estonia agreed to report back to the ERT on the quantities of waste water treated aerobically and aerobically. The ERT recommends that Estonia review the status of waste-water treatment plants over the period 1990–2003 to determine the proportion of waste water treated anaerobically. The methodology used for calculating methane emissions should be applied to this anaerobic fraction only, as methane is not generated from aerobic waste-water treatment.

137. The description in the NIR of the methodology used for estimating emissions from Waste-water Handling for the Industrial sector is not transparent. Reference is made to table 6–6 of the Revised 1996 IPCC Guidelines but no explanation is provided of the chemical oxygen demand (COD) values chosen. There are also significant fluctuations in the time series of total organic waste provided in the 2003 (and earlier CRF submissions) which are not in line with the variations in waste-water output (also provided in the CRF). This indicates that there is a variation in other variables used for the calculation which are not provided in the CRF or the NIR. The ERT encourages Estonia to provide a fully transparent calculation for industrial waste-water methane emissions by providing all the required data in CRF table 6.B and documenting the methods, assumptions and data sources used in the NIR.

138. The value of waste-water output reported for pulp and paper and organic chemicals in Estonia's 2005 submission is the same as that reported for its 2004 submission. Estonia agreed to correct this error and remove the value for organic chemical waste water, which was inserted in error.

139. No estimates are provided for Sewage Sludge Handling and Disposal, and it is not clear whether emissions from sewage sludge disposal are included in the estimates for Solid Waste Disposal on Land. Estonia states in the NIR that sewage sludge handling is excluded. Although the quantity of sludge generated in 2003 is presented in the NIR, along with an associated discussion of means of disposal, and Estonia indicated that sludge is included in the quantities landfilled in SWDS, it is not clear how this information is incorporated in the inventory estimates for Waste-water Handling or Solid Waste

Disposal. The ERT encourages Estonia to include estimates of emissions from sewage sludge handling and to incorporate these into its reporting of GHG emissions, together with associated documentation on methodology, assumptions and data sources used. The ERT also encourages Estonia to check, and estimate if necessary, whether emissions from the quantity of sludge that is disposed to landfill are included under the Solid Waste Disposal estimates reported in the CRF.

C. Non-key categories

1. Human Sewage emissions – N_2O

140. Emissions are reported as "NE" in sectoral table 6. In table 6.B, the AD, the IEF and emissions for N_2O from Human Sewage are not reported and notation keys are not used. It is considered likely that N_2O emissions from Human Sewage do occur, and they can be calculated from the population of Estonia and default EFs. The ERT recommends that Estonia estimate and report emissions of N_2O from Human Sewage in the CRF and include a description of the methodology and data sources used in its future NIRs.

2. Waste Incineration – CO_2, CH_4 and N_2O

141. AD, IEFs and emissions are not reported for waste incineration and the notation keys are not used. In the past Estonia has stated in response to questions that there is no waste incineration, and this was confirmed during the review. However, Estonia should use the appropriate notation keys in the CRF.

D. Areas for further improvement

1. Identified by the Party

142. Estonia has not identified any specific areas for future improvements regarding the Waste sector.

2. Identified by the ERT

143. The ERT identified the following areas for future improvements. The Party should:

(a) Review the methodology and AD used and improve the transparency of the NIR and CRF for Solid Waste Disposal on Land for all years 1990–2003. In the opinion of the ERT the CH_4 emissions reported from Solid Waste Disposal are likely to be overestimated for the early years of the time series, including the base year, and need to be revised to reflect changes in management practice;

(b) Review the methodology used for Waste-water Handling and its application to the quantity of anaerobically treated waste water, and provide transparent documentation in the NIR to support the value of the AD selected;

(c) Improve the use of the notation keys in the CRF.

Annex

Documents and information used during the review

A. Reference documents

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

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B. Additional information provided by the Party

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Statistical Office of Estonia, *Agricultural Yearbook, 2004*.

Statistical Office of Estonia, *Energy Balance 2003*, 2004.

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