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Report on the individual review of the annual submission of Estonia submitted in 2016*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas (GHG) inventory covering emissions and removals of GHG emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2016 annual submission of Estonia, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 19 to 24 September 2016 in Bonn, Germany.

* In the symbol for this document, 2016 refers to the year in which the inventory was submitted, not to the year of publication.

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Contents

I. Introduction[1]

1. This report covers the review of the 2016 annual submission of Estonia organized by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1, as revised by decision 4/CMP.11) (hereinafter referred to as the Article 8 review guidelines). As indicated in the Article 8 review guidelines, this review process also encompasses the review under the Convention, as described in the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" (hereinafter referred to as the UNFCCC review guidelines) and particularly part III, "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". The review took place from 19 to 24 September 2016 in Bonn, Germany, and was coordinated by Ms. Kyoko Miwa (UNFCCC secretariat). Table 1 provides information on the composition of the expert review team (ERT) that conducted the review of Estonia.

Table 1
Composition of the expert review team that conducted the review of Estonia

Area of expertise	*Name*	*Party*
Generalist	Mr. Mikhail Gitarskiy	Russian Federation
	Ms. Batima Punsalmaa	Mongolia
Energy	Mr. Christo Christov	Bulgaria
	Mr. Amit Garg	India
	Ms. Brooke Elizabeth Perkins	Australia
IPPU	Mr. Samir Tantawi	Egypt
	Mr. David Glen Thistlethwaite	United Kingdom of Great Britain and Northern Ireland
Agriculture	Ms. Oksana Butrym	Ukraine
	Ms. Hongmin Dong	China
	Mr. Fredrick Kossam	Malawi
LULUCF	Ms. Rehab Ahmed Hassan	Sudan
	Ms. Esther Mertens	Belgium
	Mr. Koki Okawa	Japan
	Mr. Lucio Santos	Colombia
Waste	Mr. Pavel Gavrilita	Republic of Moldova
	Mr. Hiroyuki Ueda	Japan

[1] At the time of publication of this report, Estonia had not yet submitted its instrument of ratification of the Doha Amendment, and the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

Area of expertise	*Name*	*Party*
Lead reviewers	Mr. Mikhail Gitarskiy	
	Ms. Batima Punsalmaa	

Abbreviations: IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry.

2. This report contains findings based on the assessment by the ERT of the 2016 annual submission against the Article 8 review guidelines. The ERT has made recommendations to resolve those findings related to issues,[2] including issues related to problems.[3] Other findings, and if applicable, the ERT's encouragements to resolve them, are also included.

3. A draft version of this report was communicated to the Government of Estonia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

4. Annex I shows annual greenhouse gas (GHG) emissions for Estonia, including totals excluding and including the land-use, land use change and forestry (LULUCF) sector, indirect CO_2 emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and, additional activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), if elected, by gas, sector and activity for Estonia.

5. Information to be included in the compilation and accounting database can be found in annex II.

6. The ERT notes that Estonia's 2015 annual submission was delayed, consistent with decision 6/CMP.9, paragraph 4. As a result, the review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission, in accordance with decision 10/CMP.11, paragraph 1. To the extent that identical information is presented in both annual submissions, the ERT has reviewed this information only once, and, as appropriate, has replicated the findings below in both the 2015 and the 2016 annual review reports.

II. Summary and general assessment of the 2016 annual submission

7. Table 2 provides the ERT assessment of the annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5 below.

[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.

[3] Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

Table 2
Summary of review results and general assessment of the inventory of Estonia

Assessment				*Issue or problem ID #(s) in tables 3 and/or 5*[a]
Dates of submission	Original submission: 15 April 2016 (NIR), 15 June 2016, version 2 (CRF tables), 15 April 2016 (SEF-CP1 tables-2015), 1 June 2016 (SEF-CP2 tables-2014, SEF-CP2 tables-2015)			
	Revised submission: 15 June 2016 (NIR)			
	The values from the latest submission are used in this report			
Review format	Centralized			
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:			
	1.	Identification of key categories	No	
	2.	Selection and use of methodologies and assumptions	Yes	E.7
	3.	Development and selection of emission factors	Yes	E.4, E.11, E.16, A.1, W.1
	4.	Collection and selection of activity data	Yes	E.3, E.9, I.10, A.3, A.4, L.3, W.6, W.7
	5.	Reporting of recalculations	No	
	6.	Reporting of a consistent time series	No	
	7.	Reporting of uncertainties, including methodologies	No	
	8.	QA/QC	QA/QC procedures were assessed in the context of the national system (see below)	
	9.	Missing categories/completeness[b]	Yes	A.4, W.9
	10.	Application of corrections to the inventory	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?		The Party did not report "NE" for any insignificant categories	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?		Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified in the following areas:			
	1.	National system:		
		(a) The overall organization of the national system, including the effectiveness and reliability of the	No	

Assessment			*Issue or problem ID #(s) in tables 3 and/or 5*[a]
	institutional, procedural and legal arrangements		
	(b) Performance of the national system functions	No	
	2. National registry:		
	(a) Overall functioning of the national registry	No	
	(b) Performance of the functions of the national registry and the technical standards for data exchange	No	
	3. ERUs, CERs, AAUs and RMUs and on information on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, taking into consideration any findings or recommendations contained in the SIAR	No	
	4. Matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, including any changes since the previous annual submission	No	
	5. LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol:		
	(a) Reporting in accordance with the requirements of decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.5, KL.8, KL.9
	(b) The Party has demonstrated methodological consistency between the reference level and reporting on forest management in accordance with decision 2/CMP.7, annex, paragraph 14	Yes	KL.6, KL.10
	(c) The Party has reported information in accordance with decision 6/CMP.9	No	
	(d) Country-specific information has been reported to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	Yes	KL.4, KL.5, KL.6
	(e) Other issues	Yes	KL.7, KL.11
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	No	
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the	Yes	

Assessment			*Issue or problem ID #(s) in tables 3 and/or 5*[a]
	UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?		
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Questions of implementation	Did the ERT list questions of implementation?	No	

Abbreviations: AAU = assigned amount unit, CER = certified emission reduction unit, CP1 = first commitment period of the Kyoto Protocol, CP2 = second commitment period of the Kyoto Protocol, CPR = commitment period reserve, CRF = common reporting format, ERT = expert review team, ERU = emission reduction unit, LULUCF = land use, land-use change and forestry, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control, RMU = removal unit, SEF = standard electronic format, SIAR = standard independent assessment report, UNFCCC Annex I inventory reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories", Wetlands Supplement = *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*.

[a] The ERT identified additional issues in the energy, industrial processes and other product use, agriculture, LULUCF and waste sectors and LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, that are not specifically listed in table 2 but are included in table 3 and/or table 5.

[b] Missing categories, for which methods are provided in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, may affect completeness and are listed in annex III to this document.

III. Status of implementation of issues and/or problems raised in the previous review report

8. Table 3 compiles all the recommendations made in the previous review report. Owing to the unique circumstances of the 2015 annual submission described in paragraph 6 above, the latest available review report was for the review of the 2014 annual submission, published on 10 April 2015. For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2016 annual submission and provided the rationale for its determination, taking into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of Estonia

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*[c]	*ERT assessment and rationale*
General			
G.1	National registry (89, 2014) Transparency	Verify the reference to the publicly available information provided in the NIR and present this information or provide claims of confidentiality	Resolved. Estonia references this publicly available information in section 12.4 of the NIR
G.2	National registry (96, 2014) Transparency	Provide in the NIR and present the referenced publicly available information in accordance with the requirements referred to in decision 13/CMP.1, annex, paragraphs 44–48, including any claims of confidentiality	Addressing. The ERT noted that the Kyoto Protocol web page on the website of the Ministry of the Environment of Estonia does not contain information that is fully

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*[c]	*ERT assessment and rationale*
			consistent with the information published on the European Union registry website (see also G.6 in table 5)
G.3	Article 3, paragraph 14 of the Kyoto Protocol (99, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Report any change(s) in the information provided under Article 3, paragraph 14, in accordance with decision 15/CMP.1, annex, chapter I.H, and/or further relevant decisions of the CMP	Resolved. Estonia has provided information in chapter 15 of the NIR on the changes in the information on the minimization of adverse impacts, in accordance with Article 3, paragraph 14
Energy			
E.1	1. General (energy sector) (23, 2014) Transparency*	Provide clear and comprehensive explanations in the next NIR, with additional information on the drivers behind the difference in the CO_2 emissions in the sectoral and reference approaches between two annual submissions (especially if a significant difference persists in future annual submissions)	Addressing. The Party has reported in the NIR that the difference was reduced, owing to the improvement in the calculation of the carbon EFs used for oil shale in the reference approach. Nevertheless, further improvement is needed to explain the reasons for the significant differences by fuel type (solid and liquid) and to explain the compensation of the positive and negative differences that result from the transfer of carbon and energy from solid to liquid fuels during the production of shale oil and by-products (see also E.7 and E.13 in table 5)
E.2	1. General (energy sector) (24, 2014) Comparability*	Improve the consistency between the data reported to IEA and the data gathered by Statistics Estonia	Addressing. The reasons for the differences between the data reported to IEA and the data from Statistics Estonia used for the GHG inventories are better explained in the NIR. Estonia indicated during the review that it is working on the unification of the reference approach and sectoral approach (see also E.7 in table 5)
E.3	1.A.1 Energy	Collect data (plant-specific parameters or direct	Addressing. Estonia explains

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*[c]	*ERT assessment and rationale*
	industries – solid fuels – CO_2 (28, 2014) (30, 2013) (31, 2012) Accuracy*	measurements) on the carbon content of the last fuel stream (semi-coke from gaseous heat carriers in gas generator technology and flue gases from solid heat carrier technology) and prepare a complete and accurate carbon balance, including a verification that no fugitive losses occur during the process that might not be captured by the current approach and ensuring that no emission estimates are missing	that companies that use the gaseous heat carrier process for shale oil production do not have data. The Party indicates that the gaseous heat carrier process is built so that there are no direct GHG emissions from the plants. The plant carbon balances were developed for the 2014 submission**.** Since the balances are considered confidential, the information was provided to the previous ERT during the review After the review week, the Party further explained that, in CRF table 1.A(b), a small amount of carbon contained in the ash in the solid heat carrier process (that is sent out to ash fields) and semi-coke of the gaseous heat carrier process under oil shale (solid fuel), which is stored, are excluded from the reference approach
E.4	1.A.1 Energy industries – solid fuels – CO_2 (30, 2014) Accuracy	Apply strict QC procedures to the EFs used from the EU ETS, ensuring the quality of the data, and provide sufficient information on these EFs in the NIR	Addressing. In the NIR Estonia reports that EFs from the EU ETS are compared with the EFs used for the GHG inventory; however, no results of QC, including the comparison of data, are reported
E.5	1.A.3.b Road transportation – liquid fuels – CO_2 (31, 2014) Transparency	Provide a table listing all EFs used to calculate the weighted average EF for Estonia, at least for the most recent reporting year and for all three fuels	Resolved. The NIR includes liquid fuel imports by country and kind of fuel (with gasoline in litres and diesel and LPG in kilograms), while the weighted EFs are reported in energy units (terajoules). However, the ERT noted that the net calorific value of the fuels is not reported (see also E.17 in table 5)
E.6	1.B.2 Oil and natural gas and other – oil	Change the notation key for the distribution of oil products, as this practice does occur in Estonia	Not resolved. CH_4 emissions are reported as “NO” (see also

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*[c]	*ERT assessment and rationale*
	fuels – CH_4 (34, 2014) (35, 2013) Transparency		E.21 in table 5)
IPPU			
I.1	2. General (IPPU) (43, 2014) Completeness*	Report all emissions of halocarbons and SF_6 in accordance with the UNFCCC Annex I inventory reporting guidelines	No longer relevant. The recommendation referred to the reporting of potential emissions of fluorinated gases, which are no longer required to be reported under the UNFCCC Annex I inventory reporting guidelines
I.2	2.A.1 Cement production – CO_2 (45, 2014) Accuracy	Review the uncertainty estimates and derive country-specific uncertainty parameters for this source category	Resolved. Estonia now applies country-specific uncertainty values for AD and EF, based on data provided by the cement plant operator (see I.4 in table 5)
Agriculture			
A.1	3.D Direct and indirect N_2O emissions from agricultural soils – N_2O (61, 2014) (53, 2013) Accuracy*	Revise the estimate of $Frac_R$ (the fraction of total above-ground biomass that is removed from the field as crop product) on the basis of national statistics and studies	Not resolved. Estonia explained during the review that it investigated this issue, following the recommendation made in the previous review report, and concluded that no such data have been historically or are presently being collected by any institution in Estonia dealing with agricultural statistics. Hence, it continued to use the default value of $Frac_{Remove} = 0$ and the Party does not have plans to further investigate this as it is not a key category or a priority. Noting that, under the 2006 IPCC Guidelines, the parameter is expressed by $Frac_{Remove(T)}$ = fraction of above-ground residues of crop, *T*, removed annually for purposes such as feed, bedding and construction, the ERT noted that cereal and maize production, as reported in the NIR, is increasing. In

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*[c]	*ERT assessment and rationale*
			the NIR, Estonia reports that the average yield of cereals was at a record level in 2014 at 17% higher than in 2013; the average yield of winter cereals increased by 45%; and the average yield of rye increased by 68% and the average yield of winter wheat increased by 40% in 2014 compared with 2013. This suggests that N_2O emissions from crop residues on agriculture soils may be increasing
LULUCF			
L.1	4.A.1 Forest land remaining forest land – CO_2 (68, 2014) Transparency	Include the information provided to the ERT during the review on the increased frequency of the sampling programme being undertaken in its NFI	Resolved. The description of the NFI has been updated in the NIR (p. 319)
L.2	4.A.2 Land converted to forest land – CO_2 (69, 2014) Accuracy*	Correct the calculation of removals from land converted to forest land and improve the QC activities	Resolved. The recalculation is provided in section 6.2.5 of the NIR. The Party improved its QC activities, as described in section 1.2.3 of the NIR
Waste			
W.1	5.A Solid waste disposal on land – CH_4 (73, 2014) Accuracy*	Make efforts to use national parameters (especially country-specific DOC and k values for municipal and industrial waste) instead of IPCC default values in order to improve the accuracy of the estimates	Not resolved. Country-specific DOC and k values have not been developed for this key category
W.2	5.A Solid waste disposal on land – CH_4 (75, 2014) Transparency	Enhance the QC activities to avoid inconsistencies between CRF table 6.A and the NIR regarding the annual amount of disposed waste in the future and provide accurate information on the AD used in the NIR	Resolved. The amount of disposed waste is consistent between the NIR and CRF tables
W.3	5.E Other (waste) – CH_4 and N_2O (76, 2014) Transparency	Include more details on the origin of the data for other waste and the related QA/QC activities	Resolved. The source of the AD is reported in the NIR
W.4	5.D Wastewater treatment and discharge – CH_4 (79, 2014)	Include information on the wastewater handling system in Estonia (the fraction of treated wastewater in anaerobic and aerobic conditions)	Resolved. The fraction of domestic wastewater treatment by type is included in the NIR

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*[c]	*ERT assessment and rationale*
	Transparency		
W.5	5.C.1 Waste incineration – CO_2 and N_2O (82, 2014) Completeness*	Carefully consider the availability of information regarding waste incineration for the years 2008 and 2011 and the use of the notation key "NO" in the context of the 2015 annual submission	Resolved. Emissions in 2008 and 2011 are reported
KP-LULUCF			
KL.1	General (KP-LULUCF)(Table 6, 2014) Transparency*	Provide the information submitted to the ERT on the size and geographical location of forest areas that have lost forest cover but which are not yet classified as deforested, taking into account future requirements provided in decision 6/CMP.9	Addressing. Estonia indicated during the review that it will include this information in the next submission
KL.2	General (KP-LULUCF) (Table 6, 2014) Transparency	Provide the information submitted to the ERT on Estonia's ability to identify areas of land and areas of land-use change, taking into account future requirements provided in decision 6/CMP.9	Addressing. Estonia indicated during the review that it will include information on cadastral and local authority records and the determination of the 1990 land-use baseline in the next submission
KL.3	Afforestation and reforestation – CO_2 (86, 2014) Transparency*	When revising the estimates of land-use change and the associated uncertainties, following the completion of the current NFI, demonstrate that the methods used are capable of detecting land-use change within acceptable confidence limits	Resolved. Information on the increased frequency of the NFI sampling programme is provided in the NIR (p. 319)

Abbreviations: AD = activity data, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, DOC = degradable organic carbon, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, $Frac_{Remove}$ = fraction of total above-ground crop biomass that is removed from the field as crop, GHG = greenhouse gas, IEA = International Energy Agency, IPCC = Intergovernmental Panel on Climate Change, IPPU = industrial processes and product use, k = methane generation rate constant, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LPG = liquefied petroleum gas, LULUCF = land use, land-use change and forestry, NFI = national forest inventory, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control, UNFCCC Annex I inventory reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories", 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories.*

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue was raised. Issues are further classified as defined in decision 13/CP.20, annex, paragraph 81. In the review of the supplementary information reported in accordance with Article 7, paragraph 1, of the Kyoto Protocol, the ERT has applied the classification in decision 22/CMP.1, annex, paragraph 69, in conjunction with decision 4/CMP.11.

[b] An asterisk is included next to each issue type for all issues that are also problems, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

[c] The review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission, and as such, the 2015 annual review report was not available at the time of this review. Therefore, the recommendations reflected in table 3 are from the 2014 annual review report. For the same reason, the year 2015 is excluded from the list of years in which the issue has been identified.

IV. Issues identified in three successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2016 annual submission of Estonia, and have not been addressed by the Party.

Table 4
Issues identified in three successive reviews and not addressed by Estonia

ID#[a]	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[b]
General		
	No such general issues were identified	
Energy		
E.6	Change the notation key for CH_4 emissions from the distribution of oil products in CRF table 1.B.2 (oil, natural gas and other emissions from energy production), as this practice does occur in Estonia	3 (2013–2015/2016)
IPPU		
	No such issues for the IPPU sector were identified	
Agriculture		
A.1*	In estimating direct N_2O emissions from agricultural soils, revise the estimate for $Frac_{Remove}$ on the basis of national statistics and studies	3 (2013–2015/2016)
LULUCF		
	No such issues for the LULUCF sector were identified	
Waste		
	No such issues for the waste sector were identified	
KP-LULUCF		
	No such issues for KP-LULUCF activities were identified	

Abbreviations: CRF = common reporting format, $Frac_{Remove}$ = fraction of total above-ground crop biomass that is removed from the field as crop, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry.

[a] An asterisk is included after any issue ID# where the underlying issue is related to accuracy or completeness of a key category, a missing category or a potential key category, as indicated in decision 13/CP.20, annex, paragraph 83.

[b] The review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission. As the reviews of the 2015 and 2016 annual submissions are not "successive" reviews, but are rather being held in conjunction, for the purpose of counting successive years in table 4, 2015/2016 is considered as one

year. The ERT noted that this table 4 is the same as that in the 2014 annual review report for Estonia, modified to reflect the combined 2015/2016 review.

V. Additional findings made during the 2016 technical review

10. Table 5 contains findings made by the ERT during the technical review of the 2016 annual submission of Estonia that are additional to those identified in table 3 above.

Table 5
Additional findings made during the 2016 technical review of the annual submission of Estonia

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
General			
G.4	Recalculations	Estonia submitted its original 2015 submission under the Convention on 2 November 2015. On 15 June 2016 Estonia resubmitted its 2016 submission, indicating that its official inventory submission of 2016 constitutes a submission under the Convention for the year 2016, a resubmission under the Convention for the year 2015 and a submission under the Kyoto Protocol for the years 2015 and 2016. The ERT noted that the 2016 submission contains only information on recalculations between the original 2015 submission and the 2016 submission, and that information on the full extent of recalculations between the 2014 submission and the final 2015 submission are not included. The ERT concludes that the reporting is not transparent but noted that this situation was related to the unique circumstances referred to in paragraph 6 above	Not an issue
G.5	Accuracy	Estonia chose to report indirect CO_2 emissions calculated from NMVOC emissions from solvent use and road paving with asphalt under the category other (2.D.3). However, in CRF table 6, indirect CO_2 emissions from the category other were reported as "IE", and the indirect CO_2 emissions were included in the CO_2 emissions that were reported in CRF table 2(I).A-Hs2. Consequently, in CRF summary table 2 and CRF table 10s, the same value was reported for the national total emissions (CO_2 equivalent (eq) emissions) and the total CO_2 eq emissions including indirect CO_2 emissions. (See also I.11 below.) The ERT also noted that the value for national total emissions without indirect CO_2 emissions was not reported in the NIR. Therefore, the ERT concluded that the reporting does not satisfy the reporting requirements of the UNFCCC Annex I inventory reporting guidelines, paragraph 29 The ERT recommends that Estonia report the actual volume of indirect CO_2 emissions, instead of reporting them as "IE" under the relevant sector in CRF table 6, in order to report national total emissions with and without indirect CO_2 emissions separately in the NIR and the CRF tables	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines*
G.6	Kyoto Protocol units	In response to a recommendation made in the previous review report, Estonia referenced the publicly available information, which is available on the Kyoto Protocol web page of the Ministry of the Environment of Estonia website,[c] in section 12.4 of the NIR. However, the standard independent assessment report (SIAR) identified the following as a problem that will need corrective action from the Party: the confidentiality of the information is not indicated on the Kyoto Protocol web page of the Ministry of the Environment of Estonia, despite the	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
		fact that the Party indicates the confidentiality of detailed information on transactions and holdings published on the website of the European Union registry for emissions trading.[d] During the review, in response to a question raised by the ERT, the Party indicated that it keeps publicly available information up to date, and it will make a note of the confidentiality of information published on its national website	
		The ERT recommends that Estonia improve the transparency of its reporting of Kyoto Protocol units by making the information on Kyoto Protocol units on its national website consistent with the information available in the European Union registry	
Energy			
E.7	Fuel combustion – reference approach – solid, liquid, other fuels – CO_2	The ERT noted that in CRF table 1.A(c), the reported differences in energy consumption between the sectoral approach and the reference approach are 67.72% for liquid fuels and 52.67% for other fossil fuels. The overall difference between the sectoral approach and the reference approach is –14.6%. (In all three cases, the estimates under the reference approach are smaller than those under the sectoral approach.)	Yes. Transparency*
		In response to a question raised by the ERT during the review, Estonia explained that Statistics Estonia compiles two sets of energy-related data every year: the national energy balance; and the joint questionnaire. The national energy balance is used for calculating the emissions for the sectoral approach, and the reference approach is calculated according to the second dataset (the joint questionnaire). Consequently, the differences between the reference approach and the sectoral approach arise from the different methodologies used in compiling the national energy balance and the joint questionnaire. Furthermore, Estonia is working to find possible courses of action to unify the reference approach with the sectoral approach. Noting the significant presence of shale oil in the energy balance of Estonia, the ERT considers that the main cause of the differences may originate from the transfer of carbon and energy from primary solid fuel (oil shale) to the secondary liquid fuel (shale oil) (as classified by the 2006 IPCC Guidelines) during the oil shale processing	
		The ERT recommends that Estonia further improve the explanation for the significant differences by fuel type (solid and liquid) by indicating the positive and negative differences that result from the transfer of carbon and energy from solid to liquid fuels during the production of shale oil and by-products	
E.8	1.A. Fuel combustion – sectoral approach	The ERT noted that units are not given for the national energy balance for the most recent inventory year reported in annex 4 to the NIR. There is also no explanation in the annex as to whether the calorific values of the gaseous fuels are reported as NCV or GCV or, if mass and	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a] and/or a problem[b]? If yes, classify by type
	– gas, liquid, solid, other fuels, biomass – CO_2, CH_4 and N_2O	volume units are used, what conditions of the gas are used (i.e. temperature 0, 18 or 20 °C). Furthermore, some of the energy carriers (coke, wood, light fuel oil and diesel, light fuel oil, shale oil gas, biogas, other biomass, municipal waste, other fuels, electricity) are marked with one or two asterisks, but no explanation as to what these asterisks mean is provided in the annex. During the review, Estonia clarified that all the data in the energy balance are presented in TJ and that all fuels are reported as NCV. The Party also provided the missing notes for the energy balance, which include: Coke*: Oil shale coke is exported as coke Wood*: Firewood, wood chips and waste Light fuel oil and diesel**: The imports of light fuel oil and diesel include marine bunkering Light fuel oil**: In the production of converted energy, light fuel oil is the light fraction of shale oil Shale oil gas**: Generator gas and coke oven gases Biogas**: In the years 1999–2010, biogas is included under other fuels Other biomass**: Straw, bone meal, organic waste from animals and black liquor Other fuels**: Until 2010, other fuels include shale oil gas, biogas and black liquor Electricity**: In the production of primary energy, electricity includes hydroelectric and wind energy The ERT recommends that Estonia further improve its QA/QC procedures during the preparation of the NIR and make efforts to avoid missing information and reporting incorrect figures (see also E.10, E.19 and E.20 below), which hinders the ERT's review of the reported information	
E.9	1.A. Fuel combustion – sectoral approach – liquid and solid fuels – CO_2, CH_4 and N_2O	Estonia explains, in annex 3 to the NIR, that two different technologies for shale oil production are used in Estonia: oil shale thermal processing with solid heat carrier technology; and oil shale thermal processing with gaseous heat carrier in gas generators technology. The ERT noted that in table A.3.1.2 ("Composition of semi-coke gas from the Narva Solid Heat Carrier") of annex 3, only 88.15% of the components of the gas are reported, and in table A.3.1.5 ("Composition of semi-coke gas from the Kiviõli Solid Heat Carrier processes"), only 94.90% of the gas are reported During the review, in response to questions raised by the ERT about the missing components,	Yes. Accuracy*

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		Estonia explained that the data for the composition of semi-coke gas are received directly from the shale oil production companies. For emission estimates for 2014 it was not possible for the companies to provide actual data for the components hydrogen sulphide, nitrogen (N_2), oxygen (O_2) and hydrogen (H_2) and so data from a previous year were used instead. Consequently, some totals stayed under 100%	
		The ERT considers the approach applied by the Party to obtain AD is not in line with good practice as described in chapter 2 (for data collection) and chapter 5 (for time-series consistency) of volume 1 of the 2006 IPCC Guidelines	
		The ERT recommends that Estonia obtain actual data for all components that are necessary for estimating emissions from shale oil production using solid heat carrier technology. In the case that data for some components are not available, the ERT considers that the appropriate method for time-series consistency is the extrapolation of available data	
E.10	1.A. Fuel combustion – sectoral approach – other fuels – CO_2, CH_4 and N_2O	The ERT noted that there is no description of the methodology used, AD and EFs for CH_4 and N_2O emissions from waste incineration with energy recovery in the energy chapter of the NIR, although the emissions are reported in CRF table 1.A(a) and (b)	Yes. Transparency*
		In response to a question raised by the ERT during the review, Estonia clarified that for waste incineration with energy recovery in 2014, the EF of CH_4 was 30 kg/TJ and the EF of N_2O was 4 kg/TJ in the heat and power production subcategory (1.A.1.a) of the energy industries category, and that 2 325 TJ of waste was used as fuel. In the non-metallic minerals subcategory (1.A.2.f) of the manufacturing industries category, a total of 2 089 TJ of waste (waste oils, plastics, municipal waste) was incinerated	
		The ERT recommends that Estonia report on the technologies used for waste incineration with energy recovery and on the waste types incinerated, the NCVs and AD	
E.11	1.A. Fuel combustion – sectoral approach – other fuels – CO_2	The ERT noted that, in table 3.8 (“Other fossil based solid waste”) in section 3.2.4 (“Energy industries and manufacturing industries and construction”) of the NIR, Estonia reports the following data for solid fuels - non-biogenic MSW: NCV, 19.0 and CEF, 21.8182 tC/TJ. However, the ERT noted that, in CRF table 1.A(b) for the reference approach, the CEF for waste (non-biomass fraction) is reported as 30.75, which is consistent with the IEF for CO_2 reported in CRF table 1.A(a).s4 (112 = 30.75 × 3.67)	Yes. Transparency
		In response to a question raised by the ERT during the review, Estonia clarified that for non-biogenic MSW the CEF value 30.75 is not correct. The Party indicated that the correct value for non-biogenic MSW in the non-metallic minerals subcategory (1.A.2.f) of the	

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		manufacturing industries and construction category (1.A.2) is 21.8182 (a plant-specific value) After the review week, the Party confirmed that the CO_2 emissions had been estimated correctly. The Party further clarified that the CEF of waste in public electricity and heat production (1.A.1.a) under the category of energy industry is 30.75 and that this figure has been used in the emissions estimates with the sectoral approach. The same CEF value is also reported for the "non-biomass fraction of waste" in CRF table 1.A(b) for the reference approach, because the waste combusted under the category of 1.A.1.a is reported as waste (non-biomass fraction) in the reference approach. While the waste combusted under the non-metallic minerals subcategory (1.A.2.f) (CEF = 21.8182) is reported as "other fossil fuels" in the reference approach along with other waste, such as plastics (CEF = 20.4545) and waste oils (CEF = 20.1818) The ERT recommends that Estonia, in its next submission, report which categories' non-biogenic waste are included under which fuel types in the reference approach in a more transparent manner	
E.12	1.A. Fuel combustion – sectoral approach – other fuels – all gases	The ERT noted that Estonia reported, in table 3.8 of its NIR (p. 81), CEFs and NCVs of "gas gasoline" and "sod peat", both of which are not specified in the CRF tables and the 2006 IPCC Guidelines. The ERT also notes that there is no explanation what fuels are included under the "Other fuels" in table 3.13 on the NIR (p. 85). Consumption of other fuels is reported since 2013 under the subcategory energy industries and since 2000 under the category manufacturing industries and construction During the review, the Party clarified that gas gasoline is a by-product fuel of shale oil production and that sod peat is a processed form of peat that is compressed into small (40–70 mm) pieces. Other fuels include municipal waste, plastics and waste oils. The consumption of other fuels appears in 2013 under energy industries because in 2013 a waste incineration plant was opened in Estonia. Similarly, in 2000, the combustion of various wastes commenced in Estonia in a cement production plant The ERT recommends that Estonia, in its next NIR, provide descriptions of these fuels and report the reasons for the late appearance of the emissions from those fuels	Yes. Transparency*
E.13	1.A.1 Energy industries – solid fuels – CO_2	In response to a recommendation made in the previous review report, Estonia provided a reference that justifies the reasoning that no fugitive losses occur during the process for shale oil production that might not be captured by the current approach. In CRF table 1.A(b), a small amount of carbon is excluded from the reference approach (see also E.3 in table 3). The ERT noted that Estonia developed the required plant carbon balances for the 2014 submission	Yes. Transparency

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		and provided them to the ERT during the 2014 review because they were considered confidential	
		The ERT recommends that Estonia, in addition to the recommendations made in the previous review reports, prepare a summary with a complete and accurate carbon balance for the totals of oil shale processing and use of products to share with the ERT in a timely manner upon request, in order to avoid the confidentiality problem of quoting carbon balances of individual plants in the NIR	
E.14	1.A.1 Energy industries – solid fuels – CO_2	The ERT noted that Estonia's CO_2 IEF for solid fuel in 2014 (73.57 t/TJ) is the lowest among the reporting Parties (whose corresponding IEFs range from 73.57.6 to 169.21 t/TJ). In fact, since 1993 Estonia's CO_2 IEF for solid fuel (93.23 t/TJ in 1990 and 71.47 t/TJ in 2012) has been the lowest among the reporting Parties. The Party explained that the category 1.A.1, energy industries, includes both fuel combustion for electricity and heat production and combustion for oil shale production, which emits only a small amount of CO_2 compared with the amount of oil shale used in the process	Yes. Transparency
		The ERT recommends that Estonia, in its next NIR, include reasons for the low CO_2 IEF of energy industries	
E.15	1.A.1.a Public electricity and heat production – solid fuels – CO_2	The ERT noted that the NIR does not report where and how oil shale gas (a generator gas), a by-product of oil shale thermal processing in vertical reactors that is combusted in boilers, is cleaned – whether at the shale oil production plant or at the boilers (by flue gas desulphurization). The NIR also does not indicate where the CO_2 emissions from desulphurization are reported for 2012 (they are reported under neither the energy nor the IPPU sector). During the review, the Party explained that the gas is not cleaned before being sent to the boilers for combustion. The cleaning of boiler flue gases takes place at the boilers; they are desulphurized with calcium oxide (quicklime) as the active agent. This process does not emit CO_2 or other GHGs	Not an issue
		The ERT encourages Estonia to report, in its next NIR, both in the energy and in the IPPU sector, the reasons for the absence of CO_2 emissions from desulphurization	
E.16	1.A.1.a Public electricity and heat production – solid fuels – CO_2	The ERT noted that the CEF for oil shale combustion under the category energy industries depends on the combustion technology (pulverized combustion or circulated fluidized bed combustion). For the entire time series (1990–2014), Estonia uses country-specific CEFs, 27.85 t C/TJ for older pulverized combustion and 26.94 t C/TJ for circulated fluidized bed combustion boilers (NIR, p. 78), from annex 2 to the regulation "Calculation of the amount of CO_2 discharged into the atmosphere", issued in 2004 by the Ministry of the Environment. The	Yes. Consistency*

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		NIR states (p. 89) that these CEFs differ from the plant-specific EFs determined in the verified annual CO_2 emission reports under the EU ETS During the review, the Party informed the ERT that Estonia is planning to revise the 2004 regulation on the basis of EU ETS data. The Party considers that the best data from the base year to the introduction of the EU ETS in 2005 are those determined by the 2004 regulation, as ETS data are not available for the 1990–2004 period. The ERT notes that the country-specific EFs used by the Party are lower than the plant-specific EFs that were determined in the verified annual CO_2 emission reports under the EU ETS The ERT recommends that Estonia accelerate the revision of the 2004 regulation on CO_2 EFs for oil shale combustion and recalculate the emissions from oil shale combustion in the facilities where, and for the period when, the relevant technologies were used, and for the power plants where there have been no changes in combustion technology, apply the most appropriate plant-specific EFs depending on the technologies used in the time series in order to recalculate emission estimates for the entire time series and report how emissions were recalculated	
E.17	1.A.3.b Road transportation – liquid fuels – CO_2	In response to a recommendation made in the previous review report, Estonia provided a table listing all the EFs used to calculate the weighted average EF for Estonia, for all years and for all three fuels (see also E.5 in table 3); however, the ERT noted that the NCV of the fuels is not reported in the NIR or in CRF table 1.A(a). In response to a question raised by the ERT during the review, the Party provided the NCVs of diesel (42.3 GJ/kg), LPG (45.5 GJ/kg) and gasoline (33.0 GJ/litre) The ERT recommends that Estonia, in its next NIR, report the information of the NCV of the fuels as it provided to the ERT during the review	Yes. Transparency
E.18	1.A.3.b Road transportation – liquid fuels – CO_2, CH_4 and N_2O	Estonia estimates CO_2, CH_4 and N_2O emissions from road transportation using a tier 2 method provided in the 2006 IPCC Guidelines. The ERT noted that the number of vehicles in Estonia is based on data from Statistics Estonia and is reported in table 3.26 of the NIR, with the divisions: passenger cars; buses; lorries and special vehicles; motorcycles and mopeds; and trailers. The annual road traffic mileage is reported in table 3.27 of the NIR under different divisions: cars; vans; lorries; buses; and motorcycles and mopeds In response to a question raised by the ERT during the review, the Party explained that for COPERT modelling, which was used for the CH_4 and N_2O emission estimates from road transportation, the vehicles are divided into the following groups: passenger cars; light commercial vehicles; heavy duty trucks; buses; and mopeds and motorcycles. Each group is	Yes. Transparency*

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		further divided into subgroups according to engine technology (fuel used, vehicle mass, etc.). For COPERT modelling, the number and mileage of vehicles is acquired from the Estonian Road Administration	
		The ERT recommends that Estonia improve the transparency of reporting by explaining how data from different sources (Statistics Estonia and the Estonian Road Administration) are rearranged in a way that ensures consistency across the three data sets (number of vehicles, annual road traffic mileage, and the division used in the COPERT model)	
E.19	1.A.3.d Domestic navigation – liquid fuels – CO_2	The ERT noted that CO_2 emissions from domestic navigation reported for the time series in table 3.20 of the NIR are not consistent with the emissions and explanation in section 3.2.5.5 (on domestic navigation) of the NIR or with the emissions reported in the CRF tables. In response to a question raised by the ERT during the review, the Party explained that an error had occurred in the filling in of table 3.20	Not an issue
		The ERT recommends that Estonia correct table 3.20 data	
E.20	1.A.4.a Commercial/ institutional – gas, liquid, solid, biomass – CO_2, CH_4 and N_2O	The ERT noted that the explanation of the GHG emission trend for the commercial/institutional sector in the NIR is contradictory in that it says the "rapid decrease in emissions in 2006 was caused by structural changes of used fuels – use of wood fuels decreased about 72% when at the same time the use of gaseous fuels increased by 12% compared to 2006" (p. 112). The ERT noted that the reported fuel consumption change (wood fuels decrease and gaseous fuels increase) should result in a significant increase (not a decrease, as reported in the NIR) in CO_2 emissions in 2006	Yes. Transparency*
		In response to a question raised by the ERT during the review, the Party clarified that the fuel-use change was not reported correctly. In addition to the reported change in wood and gas consumption, the use of light fuel oil dropped by 77% and the use of coal dropped by 90% compared with 2005 consumption levels, which resulted in the reported rapid decrease in emissions	
		The ERT recommends that Estonia explain the GHG emission trend and AD in the commercial/institutional sector in a correct and non-contradictory manner	
E.21	1.B.2.a Oil – CH_4	Previous review reports have made recommendations that Estonia report CH_4 emissions for distribution of oil products as "NA", as this practice does occur in the Party (see also E.6 in table 3 and table 4); however, the ERT noted that the Party still reports "NO" in CRF table 1.B.2	Yes. Transparency
		Noting the recommendations made in the previous review reports, the ERT further	

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		recommends that Estonia fill in AD in the columns "unit" and "value" of the row "Distribution of oil products", instead of reporting these values as "NA", and change the notation keys in the other cells to "NA"	
IPPU			
I.3	2. General (IPPU)	The ERT noted that the AD and IEF for the estimate of CO_2 emissions from category 2.D.3 (solvent use) are reported as "NE" in CRF table 2(I).A-Hs2 with the justification that "Activity data could not been totalised in kt, because NMVOCs from some activities are calculated: population*emission factor (NMVOC per person)". As there are CO_2 emissions reported under this category, the ERT notes that the use of the "NE" notation key is incorrect The ERT recommends that Estonia replace the "NE" notation key for the AD and IEF for category 2.D.3 (solvent use) and instead use NMVOC emissions for the AD as basic data for calculating indirect CO_2 emissions	Yes. Comparability*
I.4	2.A.1 Cement production – CO_2	The ERT noted that in the NIR (p. 134) the uncertainties of AD and EFs from cement production have been updated to use data from the cement kiln operator, which take into consideration clinker production and uncertainties regarding cement kiln dust. In response to a question raised by the ERT during the review, the Party confirmed that the revised values are consistent with the cement kiln operator's submission to the EU ETS, which has been verified by a third party in line with EU ETS reporting requirements The ERT commends the Party for this improvement to the uncertainty analysis for this key category	Not an issue
I.5	2.A.2 Lime production – CO_2	Estonia indicates in the NIR that CO_2 from lime production is estimated using a tier 2 method provided in the 2006 IPCC Guidelines. Also in the NIR, Estonia explains that it applied plant-specific EFs for two plants (one in operation since 1994 and one since before 1990) and the default EF (0.7665 t CO_2/t lime) for plants that closed before 1996. For a recently opened plant, the EF of 0.7857 t CO_2/t lime, taking into account the calcium and magnesium oxide contents of Estonian limestone, was applied because no plant-specific data are available yet. The ERT considers that using a higher-tier method for all operating plants would improve the accuracy of the submission In response to a question raised by the ERT during the review, Estonia explained that it is not currently possible to derive installation-specific EFs and uncertainty estimates for all plants. Specifically, there are two lime production plants that contribute significant emissions to the national total, one of which recently started production (in 2014). As current regulations in	Not an issue

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		Estonia do not require the development of plant-specific EFs and uncertainty analysis , the Party applies the default EF, which is regarded by the regulator as representative of lime production from Estonian limestone Noting that this is a key category, the ERT encourages Estonia to conduct research or consult with the operator of the new lime production plant and/or the regulator in order to develop plant-specific data. In the case that plant-specific data are not available, the ERT encourages the Party to seek further information to validate the use of the EF 0.7857 t CO_2/t lime for the new plant, referring to the calculations of emissions by lime type presented in equation 2.9 of the 2006 IPCC Guidelines (i.e. presenting production by lime type and the calcium oxide and magnesium oxide content, where appropriate), and to present the findings in the next NIR	
I.6	2.A.4 Other process uses of carbonates – CO_2	The AD for ceramic production reported in table 4.10 of the NIR (p. 144) include the production of bricks and tiles and lightweight gravel. The ERT noted that Estonia reported in the NIR (p. 145) that, since 2009, there has been no production of lightweight gravel, while table 4.10 indicates that the production of lightweight gravel has occurred throughout the period 1998–2014. The ERT also noted that in table 4.10, for the period 2010–2014, identical amounts of production are reported for ceramics, bricks and tiles and lightweight gravel, and that for the period 2003–2009, the amounts of ceramic production do not match the production data for bricks and tiles and lightweight gravel combined In response to a question raised by the ERT during the review, Estonia clarified that the production of lightweight gravel took place only in the years 1998–2009, and table 4.10 contains erroneous data on the production of lightweight gravel in the period 2010–2014. The ERT notes that the data in table 4.10 are consistent with data for ceramic production in CRF table 2(I).A-H The ERT recommends that Estonia improve the transparency of reporting by ensuring consistency of the information provided in the NIR and in the CRF table for this source category, correcting the data presented in table 4.10, and reporting the AD, EFs and emissions from bricks and tiles and lightweight gravel using the appropriate notation keys (i.e. “NO” for lightweight gravel production before 1998 and since 2010)	Yes. Transparency
I.7	2.A.4 Other process uses of carbonates – CO_2	Estonia reported in its NIR (p. 149) that limestone was used by one of the Estonian oil shale firing power plants for flue gas desulphurization in 2012 and 2013. In 2014, the plant discontinued the use of limestone for flue gas desulphurization because new combustion technology resulted in a sufficient decrease in SO_2 emissions. The ERT noted that Estonia has not reported detailed information to explain this technological change	Yes. Transparency

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		In response to a question raised by the ERT during the review, Estonia indicated that the information provided in the NIR about the replacement of the combustion technology at this particular plant was not correct, and that the main reason for discontinuing the use of limestone for flue gas desulphurization was that, since 2014, the plant uses only novel integrated desulfurization equipment, with calcium oxide as a sorbent	
		The ERT recommends that Estonia improve the transparency of the reported trend by including in the NIR the clarification provided to the ERT about replacement of the combustion technology	
I.8	2.B.1 Ammonia production – CO_2	Estonia reports CO_2 emissions from ammonia productions for the period 1990–2013. For 2014, "NO" is reported for ammonia production, as all ammonia production ceased in 2014 in Estonia for economic reasons	Yes. Transparency*
		Estonia uses a tier 3 method from the 2006 IPCC Guidelines for calculating CO_2 emissions from ammonia production, where derivation of emissions using plant-level ammonia production depends on an accurate estimation of the fuel equipment per unit of output (see the 2006 IPCC Guidelines, volume 3, chapter 3, p. 3.15). Estonia calculates the plant-level EF of ammonia production by dividing CO_2 emissions (without subtracting the recovered amount) by the amount of ammonia produced. This IEF, reported in the NIR, ranges from 1.243 to 1.446 t CO_2/t NH_3 produced across the time series. The IEFs presented in table 4.13 of the NIR are consistent with those presented in CRF table 2(I).A-H.s1(1.266–1.446 t CO_2/t NH_3). The ERT noted that in table 4.13, the production-based IEF is presented before the amount of CO_2 recovered is accounted for	
		In response to a request by the ERT for more detailed natural gas activity data, Estonia provided additional data on the natural gas used as feedstock in the ammonia production and the corresponding GHG emission estimates for 2012 and 2013. The ERT noted that Statistics Estonia collects data on natural gas consumption in millions of cubic metres (Mm^3) rounded to whole numbers and data are corrected retrospectively by the plant operator	
		Noting that this is a key category, the ERT recommends that Estonia improve the transparency of reporting by providing more detailed information, in its future NIRs, on the background data sources that inform estimates of natural gas used as fuel in ammonia plants, as well as on the process of cross-checking the data submitted to Statistics Estonia and the data reported as non-energy use in the energy balance, and by correcting the row label in table 4.13 in accordance with the estimation procedure	

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I.9	2.B.1 Ammonia production – CO_2	Estonia reported in its NIR (p. 153) that CO_2 emissions for 2008–2013 have been compared with EU ETS reports and that the differences in CO_2 emissions from the use of natural gas have been estimated to less than 0.5% in 2012 and 2013 The Party further explained in its NIR (p. 153) that plant data on the amount of natural gas used as feedstock were compared with data from Statistics Estonia on the aggregated amount of natural gas used as feedstock. The NIR stated that data from Statistics Estonia do not include plant-specific data in order to protect confidentiality In response to a request by the ERT to provide a quantitative comparison of natural gas as feedstock, Estonia provided natural gas activity data (in units of volume) to compare the natural gas used as a feedstock reported in the national GHG inventory against that reported within the operator submissions to the EU ETS, and explained that the differences evident in 2008 were owing to the operator retrospectively adding extra gas consumed for re-launching the plant Commending Estonia on the efforts made to transparently present the outcome of the QA/QC activities specific to this category, the ERT recommends that, in the statement in the QA/QC section of the NIR, Estonia include the outcome of the comparison between operator data on gas feedstock AD and the allocation of non-energy use of fuels in the energy balance from Statistics Estonia, as required by the UNFCCC Annex I inventory reporting guidelines (paragraph 41). Furthermore, the ERT encourages Estonia to continue to use this approach for this and other categories to further enhance the transparency of the submission	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.10	2.F.1 Refrigeration and air conditioning – HFCs	The ERT noted that, in the NIR (p. 181), for HFC emissions from industrial refrigeration equipment the uncertainty value of the approach followed is 30% (26% for the three AD (filled in new manufactured products; HFC stock in operating systems; and remained in products at decommissioning) and 15% for the EF), which is noted by the Party in section 4.1.5.3.3 of its NIR as high, as a result of uncertainties in the determination of total HFC stock In response to a question raised by the ERT during the review, Estonia explained that in 2013, the Party created a database that assists it in implementing the requirements for handling HFCs in stationary equipment that requires leak checking in accordance with European Union regulation 517/2014.[e] As at 2016, only a minority of such equipment had been entered in the database; the inventory compiler has to interview many service companies to request data, who themselves have many small companies to survey to obtain raw data. Estonia stated that it would review the uncertainty estimates applied in the model should more complete data	Yes. Accuracy*

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		become available in the future The ERT commends Estonia for its ongoing efforts to improve reporting and uncertainty analysis under this category, and encourages the Party to use the uncertainty analysis to help prioritize future improvement work to reduce uncertainty and improve accuracy Further, the ERT recommends that Estonia continue to seek to collect more complete, accurate AD and EF data in order to improve the database and improve the accuracy and completeness of the estimates, and to report on progress in its next submission	
I.11	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2	Estonia chose to report indirect CO_2 emissions calculated from NMVOC emissions from solvent use and road paving with asphalt under the category other (2.D.3). The ERT noted that in the NIR (p. 55) Estonia reported that in 2014, the IPPU sector contributed 3.4% of all GHG emissions in Estonia, totalling 706.68 Gg CO_2 eq with indirect CO_2 emissions (and 690.97 Gg CO_2 eq without indirect CO_2 emissions). The ERT also noted that in table 4.2 of the NIR (p. 128), indirect CO_2 emissions from solvent use and road paving with asphalt are reported for the whole time series. However, in CRF table 6, indirect CO_2 emissions from the category other were reported as "IE", and the emissions were included in CO_2 emissions. Consequently, in CRF summary table 2, the same value was reported for the national total emissions (CO_2 eq emissions) and the total CO_2 eq emissions including indirect CO_2 emissions As indicated in G.5 above, Estonia does not report the actual amount of national total emissions without indirect CO_2 emissions anywhere in the NIR nor in the CRF tables, because the reported values include indirect CO_2. Only the total IPPU emissions were reported, with and without indirect CO_2 emissions, which does not satisfy the reporting requirements of the UNFCCC Annex I inventory reporting guidelines (para. 29) See also G.5 above	Not an issue
I.12	2.F. Product uses as substitutes for ozone depleting substances – PFCs, HFCs, SF_6 and NF_3	The ERT noted that emissions of all relevant gases from the subcategories solvents (2.F.5) and other applications (2.F.6) under product uses as substitutes for ODS are reported as "NO" in the table under section A.5.1 for the assessment of completeness of annex 5 to the NIR. However, no explanation for those subcategories is provided in the NIR or the CRF tables The ERT recommends that Estonia provide an explanation for reporting "NO" for the subcategories solvents and other applications and use the notation keys in accordance with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines	Yes. Comparability

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
Agriculture			
A.2	3. General (agriculture) – CH_4	The ERT noted that country-specific data for uncertainties in the livestock population were not used for the uncertainty analysis for CH_4 emissions from enteric fermentation or for CH_4 and N_2O emissions from manure management. Instead, Estonia obtained uncertainties of AD (livestock population) for a few countries from Rypdal and Winiwarter (2001)[f]: Austria (±10 %), Norway (±5–10%), the Netherlands (less than ±5%) and the United States of America (±2%). In the NIR, Estonia indicates that the experiences of Austria were used to calculate uncertainties in emissions from enteric fermentation of livestock. For EFs, the default uncertainty values from the 2006 IPCC Guidelines were used, mainly owing to the lack of an uncertainty analysis for each parameter Noting that CH_4 from enteric fermentation and manure management are key categories, and also noting that Estonia has detailed statistics on livestock, the ERT recommends that Estonia investigate the possibility of using country-specific values for the uncertainty analysis for CH_4 emissions from enteric fermentation and for CH_4 and N_2O emissions from manure management	Yes. Accuracy*
A.3	3.A Enteric fermentation – CH_4	In estimating its young cattle population for reporting on the CH_4 emissions, Estonia assumed that about 50% of the total population of calves (0–12 months old) are calves 0–6 months old for the entire time series. In response to a question raised by the ERT during the review, the Party explained that, as resources become available, it plans to improve the reporting of this subcategory The ERT recommends that Estonia improve the accuracy of its reporting by obtaining separate data on the calf population in terms of calves that are 0–6 months old and those that are 7–12 months old in order to apply EFs on milk and on forage, respectively	Yes. Accuracy*
A.4	3.H Urea application – CO_2	Estonia reported CO_2 emissions from urea application as "NO" for 2011, 2012 and 2014. Emission estimates were compiled on the basis of data from the only urea fertilizer producer in Estonia, and as there was no production of urea fertilizer by this plant in 2011, 2012 and 2014, no application of urea-based fertilizers for those years has been assumed. However, the ERT noted that according to statistics from the International Fertilizer Industry Association that are available in the internet, 7.5 kt urea was used in Estonia in 2014 The ERT recommends that the Party gather supplemental data on the sales and usage of urea in Estonia, and estimate CO_2 emissions, if appropriate	Yes. Completeness*

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
LULUCF			
L.3	4.D.1 Wetlands remaining wetlands – CO_2	The ERT noted that in CRF table 4.D, most wetlands are categorized as other wetlands remaining other wetlands. In the NIR, Estonia explains that wetlands are divided into unmanaged wetlands and areas of peatland extraction. Emissions from unmanaged wetlands, and from flooded land remaining flooded land, are reported as "NA" in CRF table 4.D. During the review, the Party clarified that other wetlands actually correspond to unmanaged wetlands, which were part of the wetlands remaining wetlands category in CRF table 5.D in previous submissions. The Party indicated its plans to exclude unmanaged wetlands from CRF table 4.D and to reflect them instead in CRF table 4.1 in future submissions The ERT recommends that Estonia implement this planned revision to exclude unmanaged wetlands from other wetlands reported in CRF table 4.D and instead to reflect them as unmanaged wetlands in the land matrix reported in CRF table 4.1	Yes. Comparability*
Waste			
W.6	5. General (waste)– CO_2, CH_4 and N_2O	The ERT noted that there is no description in the NIR on the waste management practices used in Estonia. During the review, Estonia provided information on these practices and explained that the amount of waste used for emissions estimation is derived from AD on the generated and imported MSW at the beginning of the year for each year of the whole time series. For the years between 2007 and 2014, the Party also provided data on the amount of waste at the end of the year The ERT recommends that Estonia ensure the transparency of its next GHG inventory submission by describing the waste management practices used in the country, as provided during the review week	Yes. Transparency*
W.7	5. General (waste)– CO_2, CH_4 and N_2O	The ERT noted that, in the information provided by Estonia on waste management practices and the AD as explained in W.6 above, the amount of waste at the end of one year does not correspond with the amount of waste at the beginning of the following year. During the review, the Party explained that there are several reasons for this inconsistency, such as incorrect units and data reported by the waste management companies and changes in their profiles. After the review week, the Party further explained that QA/QC procedures are in place, and workshops and consultations are also taking place to help companies to submit their annual waste data The ERT recommends that the Party improve the accuracy of its waste management AD by taking measures with data providers to implement data reporting requirements and by	Yes. Accuracy*

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
		enhancing QA/QC procedures in order to ensure that AD used for the estimation of emissions are the same for the end of one year and the beginning of the following year	
W.8	5.A Solid waste disposal on land – CH_4	Estonia reported in its NIR that the quantity of waste generated in the country in 2014 was about 22.1 million tonnes and that about 56% of the waste generated was produced by the oil shale industry, which is not taken into account in the estimation of GHG emissions from SWDS. The ERT noted that the remaining 44% of industrial waste does not match the reported amount (13 570 kt) in table 7.6 of the NIR. During the review, the Party explained that the waste generated by the oil shale industry should be corrected to 44%, not 56%, of the total waste generated in the country. Further, the Party explained that about a half of the waste from the oil shale industry (4 543 kt) was recycled, and the other half (5 266 kt) was landfilled. The Party also explained that the inert waste reported in NIR table 7.6 includes waste from the oil shale industry The ERT recommends that Estonia improve the transparency of its reporting by providing the explanation on the waste data and numerical data that correspond with each other	Yes. Transparency*
W.9	5.B.2 Anaerobic digestion at biogas facilities – CH_4 and N_2O	Estonia reported CH_4 and N_2O emissions from anaerobic digestion at biogas facilities as "IE" in CRF table 5.B. During the review, the Party explained that emissions from anaerobic digestion with energy recovery have been reported under the energy sector (1.A.1.a) and there is currently no anaerobic digestion taking place without energy recovery. However, the ERT noted that, according to the 2006 IPCC Guidelines, those CH_4 and N_2O emissions to be reported under the biological treatment of solid waste (5.B) are emissions from unintentional leakages at biogas facilities, not emissions from energy recovery. The ERT also noted that no description of the methodology, EF and AD for CH_4 and N_2O emissions from anaerobic digestion is provided in the NIR. If the Party has no information on the CH_4 and N_2O emissions from unintentional leakages, it is good practice for it to use a default value of 5% The ERT further noted that, during the review, Estonia estimated CH_4 emissions to be 0.05 kt (approximately 1.25 kt CO_2 eq) in 2014, for which the average CH_4 concentration of 60% and density of 0.717, and a net combustion value (18 TJ/Mm^3) from Statistics Estonia, were applied. The Party explained that the biogas generated from sewage sludge might include a very small fraction of other biogenic waste, which is currently impossible to subtract from sewage sludge biogas generation. Further, indicating paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, the Party stated that its preliminary calculation of anaerobic digestion with the confidential AD from the biogas facilities in 1990–2014 showed that the overall emissions level is insignificant The ERT recommends that Estonia estimate and report CH_4 and N_2O emissions from	Yes. Completeness*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a] and/or a problem[b]? If yes, classify by type
		anaerobic digestion at biogas facilities or, if these emissions are considered insignificant by the Party, report them as "NE" and provide a quantitative estimate of the likely level of the emissions in the NIR, in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, in order for the ERT to be able to assess whether the sum of all gases and categories considered insignificant remains below 0.1% of the national total GHG emissions	
W.10	5.D Wastewater treatment and discharge – N_2O	For estimating N_2O emissions from wastewater, Estonia adopted the IPCC default method (equation 6.8) in the 2006 IPCC Guidelines in conjunction with the IPCC default EF and other parameters. There are two options for default value selection for the parameter $F_{NON-CON}$ (factor for non-consumed protein added to the wastewater) in the 2006 IPCC Guidelines (section 6.3.1.3): for developed countries using garbage disposal, the default value is 1.4. The Party selected the higher value of 1.4 for its $F_{NON-CON}$ without explanation in the NIR	Yes. Transparency
		In response to a question raised by the ERT during the review, Estonia provided a summary of minutes from various meetings with wastewater experts from the Estonian Environmental Research Centre and local treatment plants, which explained that garbage disposal in sewers had been a popular practice in recent years in Estonia**,** but was not anymore, although the Party indicated that there is still a possibility that different types of waste are washed down the country's sewage systems	
		The ERT accepts the explanation provided and recommends that Estonia improve the transparency of reporting in its next NIR by including the information provided to the ERT during the review justifying the use of 1.4 for $F_{NON-CON}$	
W.11	5.D.1 Domestic wastewater – CH_4	Estonia reported the total CH_4 emissions from domestic wastewater handling as 1.99 kt in the NIR and 2.00 kt in the CRF tables. During the review, Estonia confirmed that the correct value is 2.00 kt	Yes. Transparency
		The ERT recommends that Estonia improve the transparency of its reporting by correcting the error in the NIR	
KP-LULUCF			
KL.4	General (KP-LULUCF) – CO_2	Chapter 11 of the NIR does not provide sufficient information on how the background level of natural disturbances has been estimated. The types of natural disturbance considered in the estimation of the background level are also not provided. The ERT considers the information provided does not meet the requirements of decision 2/CMP.7, annex, paragraph 33(a)	Yes. Transparency*
		In response to a question raised by the ERT during the review, the Party explained that	

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
		emissions for natural disturbances are calculated using equation 2.14 of the 2006 IPCC Guidelines (volume 4, p. 2.18), and it provided the calculation sheet developed by the Joint Research Centre of the European Commission, which indicated that wildfires, insect attacks and disease infestations, extreme weather events and other disturbances (e.g. damage by game animals) are included in the background level, covering historical data for the period 2000–2012	
		The ERT recommends that Estonia include the information on how the background level was calculated and the types of natural disturbances considered as provided to the ERT during the review in future NIR submissions, in order to provide transparent information on the construction of the background level	
KL.5	General (KP-LULUCF) – CO_2	In accordance with decision 2/CMP.7, annex, paragraph 33, when considering natural disturbances, emissions from and associated with salvage logging must be accounted for, and must not be excluded from the emissions associated with natural disturbances during the commitment period. The ERT noted that the NIR and its reference materials do not transparently explain how historical emissions from natural disturbances exclude emissions from salvage logging, in accordance with good practice specified in the Kyoto Protocol Supplement (section 2.3.9.6). During the review, Estonia indicated that salvage logging is currently included in the background level, and that it intends to improve the accuracy and reliability of this background level	Yes. Accuracy*
		The ERT recommends that Estonia correct its estimation of background level for natural disturbances by accounting for emissions from salvage logging, and provide transparent information on how this exclusion was determined	
KL.6	General (KP-LULUCF) – CO_2	The ERT noted that the post-calibration procedure applied by Estonia automatically incorporates the average rate of past disturbances (for the period 2000–2008) into the projections used in constructing the FMRL. During the review, Estonia indicated that in the future it will include emissions from the background level of natural disturbances in the technical correction	Yes. Consistency*
		The ERT recommends that Estonia use a technical correction to exclude the effect of past disturbances in the FMRL in order to incorporate the background level of natural disturbances without double counting	
KL.7	Forest management– CO_2	The ERT noted that changes in carbon stock in litter are reported as “NE” owing to lack of data. For the activities of afforestation, reforestation and deforestation, the EF from Sweden (0.3 kt C/ha/year) is used for litter; however, for the activity of forest management, Estonia	Yes. Completeness*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a] and/or a problem[b]? If yes, classify by type
		explains that it chose a tier 1 method, assuming that carbon stocks are in equilibrium. In the NIR (section 10.4.2), Estonia describes an ongoing project about forest litter "Forest litter, research and modelling" that could help to make the estimation more complete and accurate Noting that decision 2/CMP.7, annex, paragraph 26, mandates that litter, as well as above- and below-ground biomass, dead wood and soil organic carbon, shall be accounted for unless the country chooses not to report changes in a pool that has been demonstrated not to be a source, and also noting that Estonia reports CO_2 emissions from forest management as a key category, the ERT recommends that the Party obtain necessary data and apply a tier 2 method for estimating carbon stock changes under the litter pool	
KL.8	Forest management– CO_2	The ERT noted large discrepancies between the emissions and removals from forest land remaining forest land under the LULUCF sector and those from forest management under Article 3, paragraph 4, of the Kyoto Protocol. In response to a question raised by the ERT during the review, Estonia explained that the emissions and removals reported for forest management activity under Article 3, paragraph 4, include the areas of forest that have been converted, not in a direct human-induced manner, and thus are not classified as afforestation and reforestation under Article 3, paragraph 3, as well as the effect of the HWP contribution, consistent with figure 2.7.1 of the Kyoto Protocol Supplement. The ERT considers that this creates a lack of transparency and comparability with other Parties The ERT recommends that Estonia add rows to CRF table 4(KP-I).A.1 and table 4(KP-I).B.1 to report subdivisions owing to HWP, grassland converted to forest land, and other land converted to forest land, or alternatively include a comparative table in the NIR, and provide an explanation to justify the inclusion of areas of forest conversion that are not direct human-induced in its estimates of emissions and removals from forest management	Yes. Transparency*
KL.9	Harvested wood products– CO_2	Reporting of methodologies and assumptions for HWP in chapter 11 of the NIR is limited and lacks transparency. For example, Estonia did not provide an explanation for how the requirements described in decision 2/CMP.8 are taken into account with a view to improving the transparency of reporting on HWP in the NIR. During the review, the Party explained that HWP emissions and removals for forest management under Article 3, paragraph 4, of the Kyoto Protocol are consistent with the total HWP removals reported in CRF table 4.G under the Convention, which excludes HWP from deforestation, in accordance with the Kyoto Protocol Supplement The ERT recommends that Estonia, in its next NIR, include more information on HWP, in particular an explanation of how it adheres to the guidance provided by the Kyoto Protocol	Yes. Transparency*

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
		Supplement and decision 2/CMP.8, such as the exclusion of imported HWP, the exclusion of deforestation, the inherent HWP and the relationship of the projection of HWP included in the FMRL with reporting under the Convention	
KL.10	Forest management – CO_2	In the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Estonia, Estonia indicates that it is working on the complete and official technical corrections to the FMRL, with the support of the Joint Research Centre of the European Commission. In the NIR, Estonia indicated that it chose not to make technical corrections for the above-mentioned report given that it is not mandatory to make technical corrections annually for the entire commitment period. The Party also indicated that a model recalibration was conducted, but a full rerun of the model would be carried out in the future, which will allow Estonia to implement complete and official technical corrections. The ERT noted that in the report of the technical assessment of the forest management reference level submission of Estonia submitted in 2011 (FCCC/TAR/2011/EST), a recommendation was made to Estonia to make a technical correction to the FMRL when agreement on HWP estimation had been reached, because of the high inter-annual variability of the estimates for forest land in the 2011 GHG inventory, which was the basis for the estimates in document FCCC/TAR/2011/EST, unless causes of such variability were detected and estimates consequently reassessed. The Party was also recommended to not include CO_2 emissions from forest fires reported in CRF table 5(V) in any recalculation of the FMRL based on the 2011 GHG inventory In response to the questions on these matters raised by the ERT during the review, Estonia explained that the emissions and removals of HWP are calculated in accordance with the Kyoto Protocol Supplement, taking into account inherent HWP emissions, HWP from deforestation and HWP for exports, and following the recommendations in document FCCC/TAR/2011/EST Estonia reported its FMRL in the report to facilitate the calculation of the assigned amount both using instantaneous oxidation for HWP (for which a value of –1.742 Mt CO_2 eq was reported) and by applying a first-order decay function for HWP (for which –2.741 Mt CO_2 eq was reported). In its annual submission, in CRF table 4(KP-I).B.1.1 and CRF table 'accounting', the Party reported the value as –2741.00 Mt CO_2 eq The ERT recommends that Estonia follow the recommendation made in document FCCC/TAR/2011/EST when making technical corrections during the second commitment period of the Kyoto Protocol	Yes. Accuracy*

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue[a] and/or a problem[b]? If yes, classify by type*
KL.11	CH_4 and N_2O emissions from drained and rewetted organic soils	In CRF table 4(KP-II).2, CH_4 and N_2O emissions from drained and rewetted organic soils are reported as "NA". In the NIR, Estonia explained that improvements are planned to better estimate non-CO_2 emissions from drainage of forest soils. During the review, Estonia indicated that it has AD for drained organic soils, but lacks the comparative data necessary to assess whether the tier 1 method will overestimate or underestimate the emissions Considering that Estonia reports afforestation and reforestation, deforestation and forest management as key categories, the ERT recommends that the Party report CH_4 and N_2O emissions from organic soils associated with drainage and rewetting under those activities, in accordance with the good practice guidance provided in section 2.12.4 (wetland drainage and rewetting) of the Kyoto Protocol Supplement and in the Wetlands Supplement	Yes. Completeness*

Abbreviations: AD = activity data, CEF = carbon emission factor, CO_2 eq = carbon dioxide equivalent, CRF = common reporting format, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, FMRL = forest management reference level, $F_{NON-CON}$ = factor for non-consumed protein added to the wastewater, GCV = gross calorific value, GHG = greenhouse gas, HWP = harvested wood products, IE = included elsewhere, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol Supplement = *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*, LPG = liquefied petroleum gas, LULUCF = land use, land-use change and forestry, MSW = municipal solid waste, NA = not applicable, NCV= net calorific value, NE = not estimated, NIR = national inventory report, NMVOC = non-methane volatile organic compounds, NO = not occurring, ODS = ozone-depleting substances, QA/QC = quality assurance/quality control, SWDS = solid waste disposal site, TJ = terajoules, UNFCCC Annex I inventory reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories", Wetlands Supplement = *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

[a] Recommendations are related to issues as defined in decision 13/CP.20, annex, paragraph 81, or problems as identified in decision 22/CMP.1, annex, paragraph 69, identified by the ERT during the review. Encouragements are made to the Party to address all findings not related to such issues.

[b] An asterisk is included next to each issue type that is also a problem, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

[c] <http://www.envir.ee/en/kyoto-protocol>.

[d] <https://ets-registry.webgate.ec.europa.eu/euregistry/EE/index.xhtml>.

[e] Available at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0517&from=EN>.

[f] Rypdal K and Winiwarter W. 2001. Uncertainties in greenhouses gas emission inventories – evaluation, comparability and implications. *Environmental Science and Policy*. 4: pp. 107–116.

VI. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

11. Estonia has elected commitment period accounting and therefore the issuance and cancellation of units for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are not applicable for the 2016 review.

VII. Questions of implementation

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

Annex I

Overview of greenhouse gas emissions and removals for Estonia for submission year 2016 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

1. Tables 6–9 provide an overview of total greenhouse gas emissions and removals for Estonia, as submitted by the Party.

Table 6
Total greenhouse gas emissions for Estonia, base year[a]–2014[b]
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[c]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[d]*	*KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[e]*	*KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV WDR*	*FM*
FMRL								–2 741.00
Base year	31 870.48	39 996.70	31 870.48	39 996.70	NA		NA	
1990	31 838.95	39 965.17	31 838.95	39 965.17				
1995	10 299.30	19 934.79	10 299.30	19 934.79				
2000	18 017.28	17 061.85	18 017.28	17 061.85				
2010	14 572.28	19 911.68	14 572.28	19 911.68				
2011	17 141.12	20 485.04	17 141.12	20 485.04				
2012	17 506.56	19 423.33	17 506.56	19 423.33				
2013	21 028.49	21 676.71	21 028.49	21 676.71		116.12	NA	–1 688.84
2014	20 482.46	21 059.24	20 482.46	21 059.24		82.49	NA	–1 247.01

Abbreviations: CM = cropland management, FM = forest management, FMRL = forest management reference level, GHG = greenhouse gas, GM = grazing land management, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, RV = revegetation, WDR = wetland drainage and rewetting.

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs SF_6 and NF_3. Estonia has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.

[c] The Party has reported indirect CO_2 emissions in common reporting format table 6.

[d] The value reported in this column refers to 1990.

[e] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

Table 7

Greenhouse gas emissions by gas for Estonia, excluding land use, land-use change and forestry, 1990–2014[a]

(kt CO_2 eq)

	CO_2[b]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	36 666.03	1 912.19	1 386.95	NO	NO	NO	NO	NO
1995	17 953.74	1 246.81	702.71	28.45	NO	NO	3.07	NO
2000	15 141.39	1 237.39	601.32	79.15	NO	NO	2.61	NO
2010	17 833.78	1 182.87	717.87	175.43	NO	NO	1.73	NO
2011	18 449.93	1 134.03	716.30	183.00	NO	NO	1.77	NO
2012	17 304.64	1 143.21	780.57	193.03	NO	NO	1.88	NO
2013	19 566.37	1 132.69	769.16	206.46	NO	NO	2.03	NO
2014	18 918.72	1 102.37	819.53	216.52	NO	NO	2.10	NO
Per cent change 1990–2014	**–48.4**	**–42.4**	**–40.9**	**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: NA = not applicable, NO = not occurring.

[a] Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

[b] CO_2 emissions include indirect CO_2 emissions reported in common reporting format table 6.

Table 8
Greenhouse gas emissions by sector for Estonia, 1990–2014[a, b]
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	35 950.56	961.64	2 682.87	–8 126.21	370.09	NO
1995	17 599.32	634.87	1 302.60	–9 635.49	398.01	NO
2000	14 743.64	697.41	1 057.25	955.42	563.55	NO
2010	17 746.17	537.47	1 165.05	–5 339.40	462.99	NO
2011	18 233.03	660.14	1 166.30	–3 343.91	425.56	NO
2012	16 857.08	904.87	1 254.32	–1 916.76	407.06	NO
2013	19 049.11	995.22	1 262.93	–648.22	369.44	NO
2014	18 697.85	706.68	1 317.93	–576.78	336.78	NO
Per cent change 1990–2014	**–48.0**	**–26.5**	**–50.9**	**–92.9**	**–9.0**	**NA**

Abbreviations: IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

[a] Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

[b] Emissions include indirect CO_2 emissions. Indirect CO_2 emissions are reported as "IE" (included elsewhere) in common reporting format table 6.

Table 9

Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year[a, b]–2014, for Estonia

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[c]	*Article 3.3 of the Kyoto Protocol*		*Forest management and elected Article 3.4 activities of the Kyoto Protocol*				
	Land-use change	*Afforestation and reforestation*	*Deforestation*	*Forest management*	*Cropland management*	*Grazing land management*	*Revegetation*	*Wetland drainage and rewetting*
FMRL				–2 741.00				
Technical correction				NE				
Base year	NA				NA	NA	NA	NA
2013		–175.33	291.44	–1 688.84	NA	NA	NA	NA
2014		–208.43	290.92	–1 247.01	NA	NA	NA	NA
Per cent change Base year–2014					**NA**	**NA**	**NA**	**NA**

Abbreviations: FMRL = forest management reference level, NA = not applicable, NE = not estimated.

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs SF_6 and NF_3. Estonia has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Values in this table include emissions on lands subject to natural disturbances, if applicable.

[c] The value reported in this column refers to 1990.

2. Table 10 provides an overview of relevant key data for Estonia's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10
Key relevant data for Estonia under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Key parameters	*Values*
Periodicity of accounting	(a) Afforestation/reforestation: commitment period accounting (b) Deforestation: commitment period accounting (c) Forest management: commitment period accounting (d) Cropland management: not elected (e) Grazing land management: not elected (f) Revegetation: not elected (g) Wetland drainage and rewetting: not elected
Election of activities under Article 3, paragraph 4	None
Election of application of provisions for natural disturbances	Yes, for forest management
3.5% of total base year GHG emissions, excluding LULUCF, and including indirect CO_2 emissions	11 199.075 kt CO_2 eq for the duration of the commitment period
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. Afforestation and reforestation in 2014	NA
2. Deforestation in 2014	NA
3. Forest management in 2014	NA
4. Cropland management in 2014	NA
5. Grazing land management in 2014	NA
6. Revegetation in 2014	NA
7. Wetland drainage and rewetting in 2014	NA

Abbreviations: AAU = assigned amount unit, CER = certified emission reduction unit, ERU = emission reduction unit, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, RMU = removal unit.

Annex II

Information to be included in the compilation and accounting database

Tables 11 and 12 include the information to be included in the compilation and accounting database for Estonia. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable), as well as the final data to be included in the compilation and accounting database.

Table 11
Information to be included in the compilation and accounting database for 2014, including the commitment period reserve, for Estonia
(t CO_2 eq)

	Original submission	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	45 951 278.4			45 951 279
Annex A emissions for 2014				
CO_2 [c]	18 918 715			18 918 715
CH_4	1 102 373			1 102 373
N_2O	819 529			819 529
HFCs	216 522			216 522
PFCs	NO			NO
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	2 100			2 100
NF_3	NO			NO
Total Annex A sources	**21 059 240**			**21 059 240**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 Afforestation and reforestation	–208 429			–208 429
3.3 Deforestation	290 920			290 920
Forest management and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 Forest management for 2014	–1 247 012			–1 247 012

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] CO_2 emissions include indirect CO_2 emissions. Indirect CO_2 emissions are reported as "IE" (included elsewhere) in common reporting format table 6.

Table 12
Information to be included in the compilation and accounting database for 2013, for Estonia
(t CO_2 eq)

	Original submission	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2013				
CO_2 [c]	19 566 368			19 566 368
CH_4	1 132 690			1 132 690
N_2O	769 163			769 163
HFCs	206 458			206 458
PFCs	NO			NO
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	2 027			2 027
NF_3	NO			NO
Total Annex A sources	**21 676 706**			**21 676 706**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 Afforestation and reforestation	−175 327			−175 327
3.3 Deforestation	291 442			291 442
Forest management and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 Forest management for 2013	−1 688 844			−1 688 844

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] CO_2 emissions include indirect CO_2 emissions. Indirect CO_2 emissions are reported as "IE" (included elsewhere) in common reporting format table 6.

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which methods are included in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* were reported as "NE" (not estimated) or for which the expert review team otherwise determined that there may be an issue with the completeness of reporting in the Party's inventory are the following:

(a) National total emissions without indirect CO_2 emissions (see G.5);

(b) CO_2 emissions from urea application (see A.4);

(c) CH_4 and N_2O emissions from anaerobic digestion at biogas facilities (see W.9);

(d) CO_2 emissions from litter under forest management (see KL.7);

(e) CH_4 and N_2O emissions from drained and rewetted organic soils (see KL.11).

Annex IV

Documents and information used during the review

A. Reference documents

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at <http://unfccc.int/resource/webdocs/agi/2015.pdf>.

Annual status report for Estonia for 2016. Available at <http://unfccc.int/resource/docs/2016/asr/est.pdf>.

FCCC/ARR/2014/EST. Report on the individual review of the annual submission of Estonia submitted in 2014. Available at <http://unfccc.int/resource/docs/2015/arr/EST.pdf>.

FCCC/ARR/2013/EST. Report of the individual review of the annual submission of Estonia submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/EST.pdf>.

FCCC/ARR/2012/EST. Report on the individual review of the annual submission of Estonia submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/EST.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

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

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories". Annex to decision 24/CP.19. Available at <http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf#page=4>.

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

"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention". Annex to decision 13/CP.20. Available at <http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf#page=6>.

"Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, part I: implications related to accounting and reporting and other related issues". Decision 3/CMP.11. Available at <http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=5>.

"Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, part II: implications related to review

and adjustments and other related issues". Decision 4/CMP.11. Available at <http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=30>.

Intergovernmental Panel on Climate Change. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories.* Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Available at <http://www.ipcc-nggip.iges.or.jp/public/kpsg>.

Intergovernmental Panel on Climate Change. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. Available at <http://www.ipcc-nggip.iges.or.jp/public/wetlands/index.html>.

Standard independent assessment report, part 1, for Estonia for 2016. Available at <http://unfccc.int/files/kyoto_mechanisms/application/pdf/siar_2016_est_1_2.pdf>.

Standard independent assessment report, part 2, for Estonia for 2016. Available at <http://unfccc.int/files/kyoto_mechanisms/application/pdf/siar_2016_est_2_2.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Türkson and Ms. Kaar (Ministry of the Environment, Estonia), including additional material on the methodology and assumptions used.

Annex V

Acronyms and abbreviations

CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
ERT	expert review team
FM	forest management
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
Mm^3	million cubic metres
Mt	million tonnes
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
QA/QC	quality assurance/quality control
SEF	standard electronic format
SIAR	standard independent assessment report
UNFCCC	United Nations Framework Convention on Climate Change