Framework Convention on
Climate Change

Report on the individual review of the annual submission of Estonia submitted in 2020*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases 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 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 review of the 2020 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 2 to 7 November 2020 remotely.

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* In the symbol for this document, 2020 refers to the year in which the inventory was submitted, not to the year of publication.

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Contents

Abbreviations and acronyms

AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
C	carbon
CER	certified emission reduction
CH_4	methane
CKD	cement kiln dust
CM	cropland management
CNG	compressed natural gas
Convention reporting adherence	adherence to the "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"
COPERT	software tool for calculating road transport emissions
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CP	commitment period
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
DOM	dead organic matter
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU	European Union
FAOSTAT	statistical database of the Food and Agriculture Organization of the United Nations
FM	forest management
FMRL	forest management reference level
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HFO	hydrofluoroolefin
HWP	harvested wood products
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, 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
NA	not applicable

NCV	net calorific value
NE	not estimated
NFI	national forest inventory
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SWDS	solid waste disposal site(s)
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"
UNFCCC review guidelines	"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"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*
Y_m	methane conversion rate
2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*

I. Introduction

1.   This report covers the review of the 2020 annual submission of Estonia, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (annex to decision 13/CP.20). The review took place from 2 to 7 November 2020 remotely[1] and was coordinated by Jongikhaya Witi, Tomoyuki Aizawa and Javier Figueroa Hanna (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Estonia.

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

Area of expertise	Name	Party
Generalist	Mikhail Gitarskiy	Russian Federation
Energy	Kendal Blanco-Salas	Costa Rica
	Audace Ndayizeye	Burundi
	Songli Zhu	China
IPPU	Roman Kazakov	Russian Federation
	Ils Moorkens	Belgium
Agriculture	Yu'e Li	China
	Batima Punsalmaa	Mongolia
	Juan José Rincón Cristóbal	Spain
LULUCF and KP-LULUCF	Erik Karltun	Sweden
	Timothy Paul Liersch	Australia
	Yusuf Serengil	Turkey
Waste	Maryna Bereznytska	Ukraine
	Violeta Hristova	Bulgaria
	Hiroyuki Ueda	Japan
Lead reviewers	Mikhail Gitarskiy	
	Songli Zhu	

2.   The basis of the findings in this report is the assessment by the ERT of the Party's 2020 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3.   The ERT has made recommendations that Estonia resolve identified findings, including issues [2] designated as problems. [3] Other findings, and, if applicable, the encouragements of the ERT to Estonia to resolve related issues, are also included.

4.   A draft version of this report was communicated to the Government of Estonia, which provided no comments.

5.   Annex I presents the annual GHG emissions of Estonia, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector, and

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[1] Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.

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

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

contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

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

II.   Summary and general assessment of the Party's 2020 annual submission

7.   Table 2 provides the assessment by the ERT of the Party's 2020 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.

Table 2
Summary of review results and general assessment of the 2020 annual submission of Estonia

Assessment			Issue/problem ID#(s) in table 3 or 5[a]
Dates of submission	Original submission: NIR, 13 April 2020; CRF tables (version 1), 13 April 2020; SEF tables (SEF-CP2-2019), 9 April 2020		
Review format	Centralized review conducted remotely		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	L.19
	(c) Development and selection of EFs?	Yes	L.18
	(d) Collection and selection of AD?	Yes	E.17, E.18, E.24, E.25, I.7, A.5, L.2, W.8, KL.4
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	Yes	E.12, E.19, E.23, A.11, L.15, KL.10
	(g) Reporting of uncertainties, including methodologies?	Yes	G.5, G.6, I.1, A.10
	(h) QA/QC?		QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)
	(i) Missing categories, or completeness?[b]	Yes	E.20, E.21, L.5, L.18, KL.7
	(j) 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?	Yes	
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 related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	

Assessment			Issue/problem ID#(s) in table 3 or 5[a]
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	No	
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No	
	Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the standard independent assessment report?	No	
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.4
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	Yes	KL.3, KL.5, KL.10
	(c) Reporting requirements of decision 6/CMP.9?	Yes	KL.7
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	Yes	KL.9
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Estonia does not have a previously applied adjustment
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 assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
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 any questions of implementation?	No	

[a] Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.
[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of recommendations included in the previous review report

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 16 January 2019,[4] and had not been resolved by the time of publication of the review report of the Party's 2020 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3
Status of implementation of recommendations included in the previous review report for Estonia

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
General			
G.1	Inventory management (G.6, 2018) Accuracy	Strengthen the communication between the GHG inventory team and the team in the Estonian Environment Agency with the aim of using all the information available on indirect GHG emissions in order to improve the accuracy of the GHG emissions inventory.	Resolved. Estonia described the cooperation between the GHG inventory team and the Estonian Environment Agency atmospheric pollutant inventory team in the NIR (chap. 1.2.1, pp.21–25). This cooperation involves annual meetings between the two teams and meetings of individual experts and aims to enhance the consistency of information and minimize differences in the estimations between the two inventories, including for indirect GHG emissions.
Energy			
E.1	International navigation – liquid fuels – CO_2, CH_4 and N_2O (E.20, 2018) Consistency	Revise fuel consumption estimates for international navigation and ensure its time-series consistency.	Not resolved. In its NIR (chap. 3.2.2, p.68), the Party reported recalculations due to corrections made by Statistics Estonia for 2017 only. For 2011–2012, Estonia continued to report in its NIR (chap. 3.2.2, p.67) that an AD-related methodology change by Statistics Estonia caused estimated fuel consumption to roughly double from 7,838 TJ for 2011 to 16,665 TJ for 2012.
			During the review, the Party stated that Statistics Estonia, which provides information for this category, has been notified of this issue and is looking into the matter with the intention of resolving the data consistency issue. The ERT considers that the issue has not been resolved because a sharp difference remains between the emission estimates reported for 2011–2012.
E.2	1.A Fuel combustion – sectoral approach – gaseous, liquid, solid and other fossil fuels, and biomass – CO_2, CH_4 and N_2O	Further improve QA/QC procedures during the preparation of the NIR and make efforts to avoid missing information and reporting incorrect figures, which hinders the review by the ERT of the reported information (annex 4 to the NIR did not contain information on whether information on gaseous fuels	Resolved. In the NIR (annex 4, p.144), the Party reported the energy data for all fuels using TJ as the unit. Estonia also reported the meaning of the asterisks used at the end of that annex (p.149). In addition, the same energy balance data are presented across the NIR (e.g. in annex 4 and in table 3.14, p.88) and the calorific values for gaseous fuels used are reported as NCVs in the NIR (chap. 3.2.4.2, table 3.9, p.83).

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[4] FCCC/ARR/2018/EST. The ERT notes that the report on the individual inventory review of Estonia's 2019 annual submission has not been published yet. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2018 annual submission.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(E.4, 2018) (E.8, 2016) (E.8, 2015) Transparency	was reported as NCV or gross calorific value and whether mass or volume units were used. In addition, annex 4 did not clarify the meaning of the asterisks used).	
E.3	1.A Fuel combustion – sectoral approach – other fossil fuels – CO_2, CH_4 and N_2O (E.6, 2018) (E.10, 2016) (E.9, 2015) Transparency	Report on the technologies used for waste incineration with energy recovery and on the waste types incinerated, the NCVs and AD.	Resolved. The Party reported information on waste types, NCVs, waste technologies and waste type incinerated in the NIR (p.84 and table 3.9). In addition, AD on waste by type incinerated were provided in the NIR (table 3.14). Waste types reported include municipal solid waste, waste oils, other fossil-based waste and plastics.
E.4	1.A Fuel combustion – sectoral approach – other fossil fuels – CO_2 (E.7, 2018) (E.11, 2016) (E.10, 2015) Transparency	Report which categories' non-biogenic waste is included under which fuel types in the reference approach in a more transparent manner.	Addressing. A list of non-biogenic waste types is included in the NIR (table 3.9, p.84). Estonia also provided a cross reference to the categories where the non-biogenic waste was included in the sectoral approach (waste oils are allocated to category 1.A.2.f and municipal solid waste to category 1.A.1.a).
			During the review, the Party clarified that there is only one waste incineration plant in Estonia, which reports its annual waste consumption and calorific value to the Estonian Environmental Board on an annual basis through an integrated environmental information system. These reports are used to quantify non-biogenic waste consumption under the reference approach. Estonia also clarified that, in the reference approach, non-biogenic waste is allocated under waste (non-biomass fraction) in CRF table 1.A(b). However, this information was not provided in NIR chapter 3.2.1, which is dedicated to the comparison of the sectoral and reference approaches.
E.5	1.A.1.a Public electricity and heat production – – solid fuels – CH_4 (E.21, 2018) Accuracy	Correct the 2016 CH_4 EF for solid fuels (of which the majority is oil shale) by using the correct plant-specific EF.	Resolved. The 2016 CH_4 EF for solid fuels was corrected in CRF table 1.A(a)s1 and the new value for the IEF for solid fuels (0.09 kg CH_4/TJ) is within the default range for 1990–2018 (0.03–0.18 kg CH_4/TJ). The corrected estimate (0.01 kt CH_4) is 99 per cent lower than the previous calculation (1.0 kt CH_4).
E.6	1.A.3.a Domestic aviation – liquid fuels – CO_2, CH_4 and N_2O (E.22, 2018) Consistency	Review the AD used to estimate emissions from domestic aviation and ensure that they are based on a consistent approach across the time series.	Resolved. In the 2019 NIR (table 3.33, p.112), Estonia provided recalculations for CO_2, CH_4 and N_2O emissions for all the years of the time series that reflect the revised consumption of aviation gasoline under domestic aviation (category 1.A.3.a). For 2016, the estimated emissions increased from 1.98 kt CO_2 eq as reported in the previous submission (2018) to 3.39 kt CO_2 eq, an emission increase of 140 per cent for category 1.A.3.a.
			During the review, the Party stated that the recalculation of emissions also considered the annual number of landings and take-offs and that this information is included in its 2020 NIR (chap. 3.2.5.2, pp.97–99). To ensure consistency, since 2019 Statistics Estonia has used fuel consumption data from Tallinn airport

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			for the time series 1992–2018, which are gathered by the Estonian Environment Agency; previously Statistics Estonia used its own information gathering methodology, which caused time-series inconsistencies.
E.7	1.A.3.b Road transportation – liquid fuels – CO_2, CH_4 and N_2O (E.15, 2018) (E.18, 2016) (E.17, 2015) Transparency	Explain 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).	Addressing. The Party reported in its NIR a reconciled set of data on the number of vehicles (table 3.25, p.104) and road traffic mileage (table 3.26, p.104) using the same vehicle categories as the COPERT model and ensuring consistency across the time series. However, the ERT considers that the issue has not yet been fully resolved because the NIR does not transparently explain how national data were reorganized to fit the COPERT model.
E.8	1.A.3.b Road transportation – LPG – CO_2, CH_4 and N_2O (E.23, 2018) Consistency	Correct the reporting of LPG consumption in road transport and ensure its consistency across the time series.	Resolved. In its NIR (chap. 3.2.5.2, p.104), Estonia stated that the reporting of LPG consumption under road transportation for the time series 1990–2018 had been corrected with the help of data collected by the Estonian Tax and Customs Board to reflect the actual consumption of LPG. Moreover, in the NIR (chap. 3.2.5.6, table 3.32, p.111), the Party reported emission recalculations (in terms of CO_2 eq) that reflect the changes in LPG consumption under road transport (category 1.A.3.b).
			During the review, the Party stated that NIR table 3.19 (p.96) reflects the updated LPG consumption. As the LPG consumption value was updated for the entire time series (1990–2018) using a reliable source of data (the Estonian Tax and Customs Board), the ERT considers that the possible underestimation of emissions for the previous submission has been corrected through the recalculation process and that emission estimates for 2018 are accurate and transparent.
E.9	1.A.3.b Road transportation – liquid fuels – CO_2 (E.24, 2018) Transparency	Carry out and report in the NIR a comparison between the fuel use estimated by the COPERT model (the bottom-up approach) and the actual fuel use reported by Statistics Estonia, along with a description as to why there are differences, if applicable.	Resolved. In its NIR (chap. 10.4.1, p.418), Estonia stated that the data for national fuel sales in the COPERT model were inserted by the Estonian Environmental Agency on the basis of information provided by Statistics Estonia and therefore there are no inconsistencies in the AD.
E.10	1.A.3.b Road transportation – biofuels – CO_2 (E.25, 2018) Transparency	Report in the NIR information on (1) the types of biofuel consumed, (2) whether they are 100 per cent biogenic in origin and (3) whether they are consumed as blends with conventional fossil fuels or as pure fuels.	Addressing. Regarding (1) the types of biofuel, the Party reported in its NIR (chap. 3.2.5.3, p.103) information provided by the Estonian Environment Agency about the fossil and biogenic origin of the biofuels. Regarding (2) the biogenic nature of the biofuels, Estonia confirmed during the review that information on the nature and type of bioethanol and biodiesel consumed is currently collected by the Estonian Environmental Board and stored in a database that is under development, which is why information on the biogenic nature of the biofuels was not reported in the NIR. Regarding (3) how biofuels are consumed, the NIR states that bioethanol is consumed only as a blend with petrol, while biodiesel is consumed both as a mix with diesel and in its pure form. However, the NIR did not include information on the amount of pure biodiesel consumed and biodiesel

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			consumed as part of a blend or on the composition of the blends, as this information is currently collected by the Estonian Environmental Board and stored in a database that is under development.
E.11	1.A.3.b.iv Motorcycles – gasoline – CO_2 (E.26, 2018) Transparency	Report in the NIR the differences between the number of motorcycles reported by the national registry and the number of motorcycles used for estimating emissions in the COPERT model, and explain the underlying reasons for the differences, when applicable.	Addressing. Estonia stated in the NIR (chap. 10.4.1, p.419) that the COPERT model has been using more precise data since 2019, as the number of demolished motorcycles is deducted from the totals. The Party further stated that the number of motorcycles reported in the NIR (table 3.25, p.104) is consistent with the number used in the COPERT model. However, the ERT considers that the issue has not yet been fully addressed because the NIR does not report the differences between the number of motorcycles reported by the national registry and the number of motorcycles used to estimate emissions in the COPERT model, or explain the reasons for the differences.
E.12	1.A.3.d Domestic navigation – liquid fuels – CO_2, CH_4 and N_2O (E.27, 2018) Consistency	Work with Statistics Estonia to review the domestic navigation fuel consumption data over the time series to ensure that a consistent methodology is used, and explain in the NIR the underlying reasons for significant inter-annual variations, if applicable.	Addressing. Liquid fuel consumption increased by 149.4 per cent between 2013 and 2014 (from 174.00 to 433.94 TJ) and by 51.0 per cent between 2015 and 2016 (from 543.00 to 820.00 TJ)), followed by a sharp decrease between 2016 and 2017 of 60.9 per cent (from 608.00 to 238.00 TJ). Estonia reported in its NIR (chap. 3.2.5.5, p.110) that CO_2, CH_4 and N_2O emissions for category 1.A.3.d increased between 2014 and 2016 owing to an increase in the number of passengers and declined between 2017 and 2018 because of an energy balance update by Statistics Estonia.
			During the review, the Party clarified that Statistics Estonia, which provides information for this category, has been notified of this issue. However, Estonia stated that, prior to the energy balance update, Statistics Estonia accounted for liquefied natural gas as a fuel under the domestic navigation category. However, since 2017 liquefied natural gas has been used only in international bunkering, not in domestic navigation. The Party also clarified that it is continuing to work with Statistics Estonia to check and correct the inconsistency in the reported domestic navigation diesel oil consumption for the entire time series.
E.13	1.A.3.d Domestic navigation – solid fuels – CO_2, CH_4 and N_2O (E.28. 2018) Transparency	Correct the NIR by deleting the text relating to coal consumption in chapter 3.2.5.5 as this fuel type is not consumed in domestic navigation.	Resolved. Estonia stated in the NIR (chap. 10.4.1, p.420) that the text relating to coal consumption in domestic navigation has been addressed since the 2019 submission: coal has never been used in domestic navigation for the whole time series.
E.14	1.A.4 Other sectors – liquid fuels – CO_2, CH_4 and N_2O (E.29, 2018) Transparency	Include in the NIR information on the data-collection process for estimating emissions for the categories commercial/institutional (1.A.4.a), residential (1.A.4.b) and agriculture/forestry/fishing (1.A.4.c), and review the AD for consistency.	Resolved. The Party reported in its NIR (chap. 3.2.6.2, p.116) information on the data-collection process for estimating emissions for the subcategories commercial/institutional (1.A.4.a), residential (1.A.4.b) and agriculture/forestry/fishing (1.A.4.c), and in the NIR (chap. 10.4.1, p.420) on how the AD were reviewed for consistency.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			During the review, the Party acknowledged that the data-collection method used for fuel consumption by small installations led to an inconsistency in the AD. A new consistency finding regarding this issue has been included in this report (see ID# E.25 in table 5).
E.15	1.B.2.a Oil – liquid fuels – CH_4 (E.18, 2018) (E.6, 2016) (E.6, 2015) (34, 2014) (35, 2013) Transparency	Change the notation key for the distribution of oil products, as this practice does occur in Estonia.	Resolved. Estonia used "NE" to report AD and CH_4 emissions for the distribution of oil products (category 1.B.2.a.5) in CRF table 1.B.2. The ERT noted that there are no default CH_4 EFs for category 1.B.2.a.5 in the 2006 IPCC Guidelines. Therefore, Estonia has used an appropriate notation key.
E.16	1.B.2.a Oil – CH_4 (E.19, 2018) (E.21, 2016) (E.20, 2015) Transparency	Fill in AD in the columns "unit" and "value" of the row "Distribution of oil products" in CRF table 1.B.2 instead of reporting these values as "NA", and change the notation keys in the other cells to "NA".	Addressing. The Party reported the unit "kt" under the column "unit" and "NE" under the column "value" for "distribution of oil products" but continued to report "NO" instead of "NA" in CRF table 1.B.2 for oil (category 1.B.2.a).
IPPU			
I.1	2.A.1 Cement production – CO_2 (I.8, 2018) Transparency	Provide in the NIR information on how the overall uncertainty for the clinker EF was calculated and how possible errors in the chemical analysis affect the final uncertainty value.	Addressing. The Party reported in its NIR (p.132) how the overall uncertainty for the clinker EF value was calculated. However, the impact of possible errors in the chemical analysis on the final uncertainty value was not explained in the NIR.
			During the review, the Party clarified that, to establish the emission uncertainty, the uncertainties of the EF and AD are combined by multiplication. The uncertainty of the EF is established by summing the uncertainty of the EFs for clinker and cement kiln dust, and the uncertainties of the EFs for both materials are caused by uncertainties (possible errors) in the chemical analysis of calcium oxide and magnesium oxide. The uncertainty of the AD relates to the uncertainty of weighing clinker and cement kiln dust and does not reflect the chemical analysis.
			The ERT considers that the recommendation has not been completely resolved because the Party did not include this information in its NIR and did not explain in its response to the ERT how possible errors in the chemical analysis affect the final uncertainty value.
I.2	2.A.1 Cement production – CO_2 (I.9, 2018) Transparency	Provide in the NIR information on the changes of the CKD correction factor, including regulations that could result in kiln dust control for the cement plant.	Resolved. The Party reported in its NIR (pp.131–132) that the CKD correction factor calculation is carried out by Estonia's only cement plant and that this procedure complies with the tier 2 method from the 2006 IPCC Guidelines (vol. 3, chap. 2). The Party stated that, according to information from this production plant, inter-annual changes in the CKD correction factor are mainly due to different quantities of CKD being generated during the process, in addition to the calcination rate of CKD, calcium oxide and the organic content of the clinker (limestone and shale (raw materials) may also contain a proportion of organic carbon) and ash content of the alternative fuels used in the kilns, which varied

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			slightly from year to year. The Party also stated in the NIR (chap. 4.2.1.2, p.132) that the cement plant follows national legislation (the Industrial Emissions Act of 2013) on best available technology and the European Commission's best available techniques reference document on integrated pollution prevention and control (European Commission, 2013) and continuously improves the dust control technology used in production. Both the Party and the ERT noted that the European Commission's best available techniques reference document and national legislation specify how much kiln dust should be recycled. The Party further stated in the NIR that the plant has optimized the clinker burning process in order to recycle maximum amounts of CKD.
I.3	2.A.4 Other process uses of carbonates – CO_2 (I.10, 2018) Accuracy	Review the EF for estimating CO_2 emissions from bricks and roof tiles and include a description of how the EF was calculated or, alternatively, use the default CO_2 EF from the 2006 IPCC Guidelines.	Resolved. Estonia did not change the EF for estimating CO_2 emissions from bricks and roof tiles and reported in the NIR (p.140) that CO_2 emissions were calculated using the tier 1 and 2 approaches from the 2006 IPCC Guidelines (vol. 3, chap. 2, p.2.34, equations 2.14–2.15) for small and large companies, respectively. The EFs were provided in the NIR (table 4.9). The Party also explained in the NIR (p.140) that the plant uses the same method to report its process emissions for the European Union Emissions Trading System.
			During the review, the Party explained that there is one major production plant in the country and its process emissions originate exclusively from limestone filler, and filler only represents a small proportion of total raw material, which is why the overall CO_2 EF ranges from 0.0004 to 0.029 t CO_2/t (NIR table 4.9), which is lower than the IPCC default range (0.37987–0.52917 t CO_2/t).
			The ERT considers that the recommendation has been resolved since the default EFs from the 2006 IPCC Guidelines (vol. 3, chap. 2, p.2.7) were correctly reported in the NIR, along with information on how the emissions for this category were calculated (p.140). The ERT considers that there is no underestimation of emissions.
I.4	2.B.1 Ammonia production – CO_2 (I.11, 2018) Transparency	Provide in the NIR clear and transparent information on the ceased production of ammonia on the basis of the official statement from the ammonia production plant.	Resolved. The Party included in the NIR (p.146) an official statement from the ammonia production plant according to which ammonia production in Estonia ceased in 2014 and has not resumed since. This is due to the fact that ammonia production has become unprofitable owing to low global market prices for ammonia.
I.5	2.F.1 Refrigeration and air conditioning – HFCs (I.12, 2018) Transparency	Provide information on the EU restrictions and discontinued use of R-134a as a foam-blowing agent and in other applications in a more transparent manner by providing references to the relevant EU decisions.	Resolved. The Party reported in its NIR (p.196) information on the restrictions on the use of R-134a, which is a blend of HFC-143a and HFC-125, referring to the previous EU regulation on certain fluorinated GHGs (regulation 842/2006), which covers the sale of HFCs in one-component foams. This regulation caused the two Estonian producers of one-component foams to stop marketing one-component foams with R-134a in the country in 2008, with its use mainly replaced with hydrocarbons, together with HFC-152a for some special applications. In addition, the Party stated in the NIR (p.196) that an Estonian

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			company manufactured one-component foam with R-134a as a propellant in 2010–2012, but all related products were exported to non-EU countries. Finally, the Party reported in the NIR (p.196) that since 2013 R-134a has not been used in the production of one-component foams in Estonia and that no corresponding emissions have occurred.
I.6	2.F.1 Refrigeration and air conditioning – PFCs, HFCs and SF$_6$ (I.13, 2018) Transparency	Provide further information to justify the use of German statistics on the share of new vehicles still charged with HFC-134a to estimate emissions from mobile air conditioning by including quantitative data showing the comparison between Estonian and German new vehicles in 2016.	Addressing. The Party stated in its NIR (p.179) that in accordance with the EU directive on emissions from air-conditioning systems in motor vehicles (directive 2006/40/EC), since 1 January 2017 the air-conditioning systems of new types of 'M$_1$' and 'N$_1$' category vehicles, as defined in Council directive 70/156/EEC, placed on the EU market shall be filled with a refrigerant that has a global warming potential of 150 or less (HFC-134a does not comply with this requirement). The most common refrigerant meeting this criterion is HFO-1234yf.
			During the review, the Party clarified that for 2006 onward (i.e. for reported years) it has used country-specific data on the share of vehicles charged with HFC-134a for new makes and models of cars in addition to incomplete data on HFO-1234yf use for mobile air conditioning in passenger cars in 2014 for the validation of German data (HFO-1234yf is proposed as an alternative for HFC-134a and has a lower global warming potential). Estonia indicated that it found information on the share of vehicles charged with HFC-134a to be consistent for new makes and models of Estonian and German cars, which all used HFC-134a for mobile air conditioning until 2014. However, significant differences were identified in the share of HFC-134a used in 2016 (e.g. for 2016 the Estonian HFC-134a share of 54 per cent of cars was used instead of the share of 43.7 per cent in Germany). Detailed German data on new cars using HFC-134a (charged amounts and share of use) could not be shared with the Estonian inventory compiler for 2016 and subsequent years for confidentiality reasons. The Party also indicated that collecting country-specific data for 2016–2017 from Estonia's car sellers enabled it to use more accurate data compared with using German data without validation. This also enabled the Party to avoid errors at the end of the time series regarding the share of cars with HFC-134a, which could have been purchased according to article 27 of the EU directive establishing a framework for the approval of motor vehicles (directive 2007/46/EC), which stipulates that, for a limited period of time only, EU member States may register and permit the sale or entry into service of vehicles conforming to a type of vehicle whose European Community type approval is no longer valid.
			The ERT considers that this recommendation has not yet been addressed since the Party did not include in the NIR the explanations related to this issue provided during the review.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
I.7	2.F.1 Refrigeration and air conditioning – HFCs (I.7, 2018) (I.10, 2016) (I.9, 2015) Accuracy	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.	Addressing. The Party reported in the NIR (p.409) that it is addressing the recommendation, and reiterated that the overhauled reporting system or database for commercial and industrial refrigeration AD on use and consumption of HFCs in the country is expected to be in place by the 2022 annual submission at the earliest, and most probably later, as the project scope is sizeable and involves a multistep process.
			During the review, the Party confirmed the information above and stated that the reporting system or database should be fully developed by 2021.
			The ERT concluded that per capita emissions in Estonia were not significantly lower than those of neighbouring countries with similar climatic, economic and urban planning conditions and any possible underestimation would be below the threshold for application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions for this subcategory. The ERT considers that the project should be completed soon enough to enable it to be included in the reporting in the annual submission for the final year of the second commitment period of the Kyoto Protocol.

Agriculture

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
A.1	3. General (agriculture) – CH$_4$ (A1, 2018) (A.2, 2016) (A.2, 2015) Convention reporting adherence	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$_2$O emissions from manure management.	Resolved. The Party reported country-specific values for the uncertainties of AD for dairy cattle, non-dairy cattle, swine and sheep for CH$_4$ emissions from enteric fermentation and for CH$_4$ and N$_2$O emissions from manure management in its NIR (chaps. 5.2.5 and 5.3.5).
A.2	3.A Enteric fermentation – CH$_4$ (A.2, 2018) (A.3, 2016) (A.3, 2015) Accuracy	Obtain 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.	Resolved. The Party reported the procedure used for estimating 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 its NIR (p.217).
A.3	3.A Enteric fermentation – CH$_4$ (A.5, 2018) Transparency	Include information in the NIR explaining the correspondence between the Estonian animal classification presented in the NIR and the CRF reporting classification for cattle.	Resolved. The Party provided an explanation of the correspondence between the Estonian animal classification and the CRF reporting classification for cattle in its NIR (p.217), providing the subcategories of cattle included in each of the reporting categories (mature dairy cattle, other mature cattle and growing cattle).
A.4	3.A Enteric fermentation – CH$_4$ (A.6, 2018) Transparency	Correct the Y_m reporting for the entire time series, taking into account the annual contribution of each subcategory of growing cattle.	Resolved. The Party provided in its NIR (table 5.9, p.228) information on the correction of the Y_m for the growing cattle subcategory, which involved the use of a specific Y_m for calves aged 0–6 months and for those aged 6–12 months.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
A.5	3.B.4 Other livestock – CH_4 and N_2O (A.7, 2018) Comparability	Correct the allocation of poultry manure, taking into account the findings from the new study by the Estonian University of Life Sciences or, if the study does not provide the necessary information, changing the allocation from pasture/range/paddock to dry lot.	Addressing. The Party reported poultry manure as dry lot (on yards) in its NIR (table 5.24, p.244) and CRF table 3.B(a)s2; and used the dry lot EF from the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.40) for its estimations. In CRF table 3.B(b), dry lot poultry manure was reported under "Other" instead of under "Solid storage and dry lot".
			The ERT considers that the recommendation has not yet been fully addressed because the Party did not report N_2O emissions in CRF table 3.B(b) under "Solid storage and dry lot".
A.6	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.9, 2018) Transparency	Include in the NIR an explanation of the areas included and excluded for the estimations of the cultivation of organic soils, as well as the justification for the allocation of non-drained grassland in the LULUCF sector instead of in the agriculture sector.	Resolved. The Party reported both cropland and grassland areas of cultivated organic soils in CRF table 3.D. Emissions from drained grassland were included in the emission calculations for category 3.D.a.6 (cultivation of histosols). The NIR (p.270) includes an expert judgment supporting the exclusion of other natural grassland from the emission calculations on the basis that they are not cultivated.
A.7	3.F Field burning of agricultural residues – CH_4 and N_2O (A.10, 2018) Transparency	Include in the NIR a reference or the information in the new expert judgment on field burning of agricultural residues supporting the use of the notation key "NO" on the basis of the shortage of straw, the farm practices and the economic value for the husbandry sector.	Resolved. The Party referenced in its NIR (p.277) the new expert judgment from the Estonian Ministry of Rural Affairs supporting the Party's reporting of "NO" in CRF table 3.F. The ERT considers that the expert judgment provided supports the reporting of "NO".
A.8	3.G Liming – CO_2 (A.11, 2018) Consistency	Correct the reporting of CO_2 emissions from the application of lime fertilizers by using the new information available on liming provided by Statistics Estonia for the period 2005–2008.	Resolved. The Party included in its NIR (p.278) the information on liming provided by Statistics Estonia for 2005–2008 and reported the source of information for the EF applied for 1990–2004. The change in estimated emissions due to the recalculation ranges from –2.7 kt CO_2 for 2004 to –7.7 kt CO_2 for 2007.
A.9	3.H Urea application – CO_2 (A.12, 2018) Consistency	Ensure the time-series consistency of urea application by using any of the methods provided in the 2006 IPCC Guidelines (vol. 1, chap. 5).	Resolved. The Party reported in its NIR (p.281) an updated time series of urea application for 2010–2016 based on the application of the surrogate data method. Information for 1990–2009 was obtained from Nitrofert Ltd and Statistics Estonia. For 2010–2018, urea fertilizer marketing data provided by the Estonian Agricultural Board were used as the surrogate statistical parameter, using an average of the urea application for 2003–2009. The ERT considers that the Party applied the surrogate method in a manner that is consistent with the relevant guidance in the 2006 IPCC Guidelines (vol. 1, chap. 5).
LULUCF			
L.1	4. General (LULUCF) – CO_2 (L.2, 2018) Transparency	Correct the unit used to express the amount of carbon in tables 6.11, 6.18, 6.19, 6.31 and 6.41 of the NIR.	Resolved. The original recommendation refers to the units of EFs for various carbon pools. Owing to the table renumbering for the latest NIR, the relevant tables are now 6.10, 6.19, 6.20, 6.32 and 6.42. Each of these tables now correctly expresses EFs in terms of t C/ha rather than kt C/ha.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
L.2	4. General (LULUCF) – N_2O (L.3, 2018) Accuracy	Acquire the land-use change data for the period 1970–1990 and recalculate N_2O emissions for the entire reporting period.	Addressing. The NIR (p.404) identifies planned improvements, including Estonia's plan to acquire land-use change data for 1970–1990 for LULUCF.
			During the review, the ERT identified statements in the NIR regarding the pre-1990 history of cropland activity. Despite concerns regarding the consistency of these statements (see ID# L.17 in table 5), the ERT considers that this demonstrates that the Party has made progress in addressing this issue and should be capable of recalculating emissions for the next submission, but notes that it should describe its progress in addressing this recommendation in future NIRs to assist future ERTs.
L.3	4. General (LULUCF) – CH_4 (L.4, 2018) Comparability	Review the use of notation keys in CRF table 4, taking into account the definitions for notation keys given in paragraph 37 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party has, as per the original recommendation, made its use of the notation keys more consistent within the CRF tables. "NA" has been corrected to "NO" for consistency across land conversion categories. As the ERT concerns about the proper use of "NO" for biomass burning in line with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines are covered under ID# L.5 below, the ERT considers that this issue has been resolved.
L.4	4.A Forest land – CO_2 (L.5, 2018) Transparency	Provide in the NIR relevant data and evidence showing that CSCs in DOM are increasing constantly every year, such as references to scientific literature or the annual change in the stock of DOM in the country as determined by the NFI.	Addressing. The Party included a relevant citation in the NIR (p.301) to address this issue. Table 1.3.5 of the cited publication, *Yearbook Forest 2018*, shows the age-class distribution of forests in Estonia. Contrary to the description in the NIR, which indicates that Estonia has a significant number of old-age forests, *Yearbook Forest 2018* shows that over 90 per cent of forests in Estonia have a stand age of less than 100 years. The ERT considers that, on the basis of the information cited, the age-class distribution of Estonia's forests would be better described as dominated by medium-age forests, which would be consistent with the DOM accumulation rates shown in the Estonian inventory and supported by the cited literature.
			During the review, the Party confirmed that a state of equilibrium has not been reached in most of Estonia's forests, which is consistent with forests of these growth-dominated age classes. To fully address this recommendation, the ERT considers that the Party should update its description of Estonian forests to more transparently reflect the country's national circumstances, including by reporting the relevant data on the decadal age classes of Estonian forests.
L.5	4.B.1 Cropland remaining cropland – CO_2, CH_4 and N_2O (L.7, 2018) Completeness	Seek additional sources of information, such as agricultural statistics or criminal records about biomass burning in cropland, to verify the data on the areas and locations of the fires and confirm that no fires occur in cropland.	Addressing. The ERT did not find any information on the Party's progress in addressing this issue in the NIR. However, during the review, the Party explained that it has looked into the matter and found no available data sources that would provide sufficiently detailed information to enable it to either report biomass burning in cropland or confirm that no fires occur. Estonia plans to report these emissions as "NE" as a disproportionate amount of effort would be required to collect the AD and estimate the emissions, which would be insignificant in terms of the overall level of and trend in national emissions. In 1990–2018, emissions from forest wildfires peaked at 7 kt CO_2 eq in 2006, which constitutes less than

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			0.05 per cent of the national total GHG emissions (without LULUCF). GHG emissions from biomass burning in cropland would be very unlikely to exceed those emissions, as the biomass density of cropland is considerably lower than that of forest land.
			The ERT accepts this conclusion and anticipates that this recommendation will be resolved once the relevant notation keys reported have been updated to "NE" and an accompanying explanation has been added to the NIR.
L.6	4.B.1 Cropland remaining cropland – CO_2 (L.8, 2018) Transparency	Include in the NIR a reference or expert judgment supporting the assumptions on organic matter input levels in mineral soils in cropland.	Resolved. The NIR includes a reference to expert judgment by the Agricultural Research Centre of Estonia to support the assumptions on organic matter input levels in cropland mineral soils (p.313).
L.7	4.D.2 Land converted to wetlands – CO_2 (L.9, 2018) Transparency	Include in the NIR information supporting the use of the notation key "NA" for reporting CSCs in organic soil and litter from land-use changes to wetlands and peat extraction sites, including a reference to the BioSoil soil survey and information on the assumption that litter production is small and the litter layer is normally inseparable from the peat layer in bog forests.	Resolved. The NIR (pp.327–328) provides a justification for the Party's reporting of "NA", including a reference to the BioSoil survey and information on the assumption that the litter layer is normally inseparable from the peat layer.
L.8	4.E Settlements – CH_4 and N_2O (L.10, 2018) Completeness	Estimate GHG emissions from biomass burning in the settlements land category using equation 2.27 from the 2006 IPCC Guidelines or, alternatively, provide a justification for the exclusion of CH_4 and N_2O emissions from biomass burning in settlements in terms of the likely level of emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The NIR (p.342) provides information justifying the reporting of CH_4 and N_2O emissions from biomass burning in settlements as "NE" in terms of the likely level of emissions in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.
L.9	4.E.2 Land converted to settlements – CO_2 (L.11, 2018) Accuracy	Revise CSC factors for mineral soils and litter from land to settlements conversions by using the results of the national studies being developed and the scientific literature or, alternatively, use CSC factors from neighbouring countries provided that the similarities in the land-use change (climate, initial and final stocks, processes of change) between the selected values and Estonia's conditions are proven and are documented in the NIR.	Resolved. The ERT recognizes that Estonia provided comparisons with other EFs in the NIR (chap. 6.6.2), justifying the comparability of Estonian and Swedish national circumstances, and adjusted the EFs for forest land converted to settlements from –2.5 to –2.67 t C/ha to compensate for differences in Sweden's forests. The ERT considers that the differences in EFs between cropland converted to settlements and forest land converted to settlements are plausible owing to the recognized potential for well-cultivated cropland to have significantly higher levels of soil carbon, and so considers this recommendation to have been resolved (see ID# L.11 in table 5 for a related encouragement on QA).

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
L.10	4.E.2 Land converted to settlements – CO_2 (L.12, 2018) Accuracy	Revise the CSC factors for organic soils used in forest land and cropland to settlements conversions.	Addressing. The NIR (table 6.32, p.334) contains revised CSC factors for organic soils that are higher than those in the previous submission and includes appropriate explanations for the choice of EFs. However, after the review, the ERT identified that CRF table 4.E contains the same EF of –1.62 t C/ha for mineral and organic soils in forest land converted to settlements.
			The ERT does not consider the issue to have been fully resolved because CRF table 4.E does not demonstrate full implementation of the revised CSC factors for organic soils in forest land converted to settlements.

Waste

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
W.1	5. General (waste) – CO_2, CH_4 and N_2O (W.2, 2018) (W.7, 2016) (W.7, 2015) Accuracy	Take measures with data providers to implement data reporting requirements and enhance 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.	Resolved. The NIR (p.357) contains an explanation of the QA/QC procedures applied by the Party with a view to ensuring that the AD used to estimate CO_2, CH_4 and N_2O emissions for the waste sector were complete. On the basis of the information provided by the Party, the ERT is of the view that all waste data were considered in the GHG emission calculations for all waste sector categories.
W.2	5.A Solid waste disposal on land – CH_4 (W.8, 2018) Transparency	Provide in the NIR information on how the data for the amounts of waste deposited on SWDS for the period 1950–1990 were estimated.	Resolved. The Party indicated in its NIR (p.357) that the data for the amounts of waste deposited in SWDS for 1950–1990 were estimated using extrapolation, with gross domestic product as a driver for industrial waste, and population and gross domestic product as drivers for municipal solid waste. The extrapolation methodology applied is in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 5).
W.3	5.A.1 Managed waste disposal sites – CH_4 (W.9, 2018) Transparency	Report in the NIR information on how time-series consistency of CH_4 recovery data is guaranteed and how the fraction of CH_4 in landfill gas is determined.	Resolved. The Party reported in its NIR (p.361) that control calculations were performed on data from Estonia's information system for ambient air pollution sources compared with data from an annual questionnaire on renewables and waste to validate the time-series consistency of CH_4 recovery data, and explained how the fraction of CH_4 in landfill gas was determined. The ERT agreed with the Party's approach to determining the fraction of CH_4 in landfill gas.
W.4	5.B.1 Composting – CH_4 and N_2O (W.10, 2018) Transparency	Provide in the NIR information about the assumptions used to determine quantities of waste composted for the period 1990–1994.	Resolved. The Party reported in its NIR (p.368) that the data for 1990–1994 were interpolated following expert judgment from the Tallinn University of Technology. On the basis of the information provided by the Party, the ERT is of the view that the interpolation methodology applied is in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 5).
W.5	5.B.2 Anaerobic digestion at biogas facilities – CH_4 and N_2O (W.5, 2018) (W.9, 2016) (W.9, 2015) Transparency	Estimate and report CH_4 and N_2O emissions from 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	Resolved. In CRF table 5.B the Party reported CH_4 and N_2O emissions from anaerobic digestion – sludge as "NE". An explanation of the Party's reporting of "NE" is presented in CRF table 5.B as well as in CRF table 9. The Party reported in its NIR (pp.367–368) that the CH_4 leakage calculations resulted in estimates of below 0.02 per cent of the national total GHG emissions for all years from 1994 onward, which is below 0.05 per cent of national total GHG emissions and does not exceed 500 kt CO_2 eq. Therefore, the Party reported CH_4 and N_2O emissions

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		the ERT to be able to assess whether the sum of all gases and categories considered insignificant remains below 0.1 per cent of the national total GHG emissions.	as "NE" in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.

KP-LULUCF

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
KL.1	General (KP-LULUCF) – CO_2 (KL.11, 2018) Transparency	Provide detailed information on the data sources and methodology the Party uses for detecting land use and land-use change for the period 1990–1999.	Resolved. The Party noted in the NIR (p.434) that additional information from older maps and aerial photography was used to determine land-category change before 31 December 1989. The NIR (pp.294 and 440) also indicates that the former land-use was registered where changes were understood to have occurred since the base point of 31 December 1989. The NIR (pp.440–442) contains examples of the aerial photography analysis used to identify land-use changes for 1990–1999 (see ID# L.14 in table 5).
KL.2	General (KP-LULUCF) – CO_2 (KL.4, 2018) (KL.5, 2016) (KL.5, 2015) Accuracy	Correct the estimation of background level for natural disturbances by accounting for emissions from salvage logging, and provide transparent information on how this exclusion was determined.	Resolved. The NIR (pp.454–455) has been updated to include descriptions demonstrating that salvage logging from wildfires was considered using information from the State Forest Management Centre, and the estimates of the background level and margin have been updated accordingly.
KL.3	General (KP-LULUCF) – CO_2 (KL.5, 2018) (KL.6, 2016) (KL.6, 2015) Consistency	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.	Addressing. In the NIR (p.411), Estonia indicated that it has taken note of the recommendation and plans to use a technical correction to exclude the effect of past disturbances in the FMRL. During the review, the Party confirmed this and noted that it will implement technical corrections at the end of the commitment period as it is not mandatory to make technical corrections annually.
KL.4	FM – CO_2 (KL.6, 2018) (KL.7, 2016) (KL.7, 2015) Completeness	Obtain necessary data and apply a tier 2 method for estimating CSCs under the litter pool.	Addressing. The NIR (p.411) notes that Estonia is working to obtain necessary data and apply a tier 2 method for estimating CSCs in the litter pool. This was confirmed by the Party during the review.
KL.5	FM – CO_2 (KL.8, 2018) (KL.10, 2016) (KL.10, 2015) Accuracy	Follow the recommendation made in document FCCC/TAR/2011/EST when making technical corrections during the second commitment period of the Kyoto Protocol (i.e. make a technical correction to the FMRL when agreement on HWP estimation has been reached because of the high inter-annual variability of the estimates for forest land in the 2011 GHG inventory, unless causes of such variability were detected and estimates consequently reassessed, and exclude CO_2 emissions from forest fires reported in CRF table 5(V)).	Addressing. The NIR (p.41) indicates that Estonia has taken note of the encouragement and will include the information in the NIR once the technical correction has been conducted. During the review, the Party confirmed this and noted that it will implement technical corrections at the end of the commitment period as it is not mandatory to make technical corrections annually.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
KL.6	HWP – CO_2 (KL.9, 2018) (KL.9, 2016) (KL.9, 2015) Transparency	Include more information on HWP, in particular an explanation of how Estonia adheres to the guidance provided by the Kyoto Protocol 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.	Resolved. The NIR (p.345) indicates that for reporting under the Convention HWP is treated in the same way as for reporting under the Kyoto Protocol following chapter 2.8 of the Kyoto Protocol Supplement, including for the exclusion of HWP in relation to SWDS, the application of the instantaneous oxidation method for deforestation-sourced timber, and the application of the production approach, which excludes imports. The ERT considers that this recommendation, insofar as it pertains to reporting under the Kyoto Protocol, has been fully addressed. The ERT notes a new issue pertaining to Convention reporting adherence on deforestation-sourced timber (see ID# L.19 in table 5).
KL.7	WDR – CH_4 and N_2O (KL.10, 2018) (KL.11, 2016) (KL.11, 2015) Completeness	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 (WDR) of the Kyoto Protocol Supplement and in the Wetlands Supplement.	Addressing. The Party reported CH_4 and N_2O emissions from drained organic soils in CRF table 4(KP-II)2 for FM. The ERT considered that estimates for AR and deforestation are also needed in order to fully address this recommendation, or alternatively an explanation as to why the AD cannot be disaggregated to enable the reporting of "IE". During the review, the Party indicated that estimates for AR will be included in the next submission, and that it is exploring the possibility of providing estimates for deforestation.

The ERT notes that the 2006 IPCC Guidelines do not contain emission estimation methods for rewetting of previously drained wetlands, and so the Party can only identify the prevalence of rewetting activities in the country and consider estimating the emissions using country-specific methods where they are potentially significant. The continued reporting of "NA" for rewetting is otherwise appropriate. |
| KL.8 | HWP – CO_2 (KL.12, 2018) Completeness | Estimate CO_2 emissions from HWP for 1990 and 1991 by collecting the AD to estimate the emissions or by using the splicing techniques given in the 2006 IPCC Guidelines. | Resolved. The NIR (p.346) shows estimated emissions from HWP for 1990–1991 and describes the methods used for extrapolating AD for those years. |

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

[b] The report on the review of the 2019 annual submission of Estonia was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2018 annual review report. For the same reason, 2019 and 2017 are excluded from the list of review years in which issues could have been identified.

IV. Issues and problems identified in three or more 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 and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2020 annual submission of Estonia, and had not been addressed by the Party at the time of publication of this review report.

Table 4
Issues and/or problems identified in three or more successive reviews and not addressed by Estonia

ID#	Previous recommendation for the issue	Number of successive reviews issue not addressed[a]
General	No issues identified.	
Energy		
E.4	Report which categories' non-biogenic waste is included under which fuel types in the reference approach in a more transparent manner.	3 (2015/2016–2020)
E.7	Explain 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).	3 (2015/2016–2020)
IPPU		
I.7	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.	3 (2015/2016–2020)
Agriculture	No issues identified.	
LULUCF	No issues identified.	
Waste	No issues identified.	
KP-LULUCF		
KL.3	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.	3 (2015/2016–2020)
KL.4	Obtain necessary data and apply a tier 2 method for estimating CSCs under the litter pool.	3 (2015/2016–2020)
KL.5	Follow the recommendation made in document FCCC/TAR/2011/EST when making technical corrections during the second commitment period of the Kyoto Protocol (i.e. make a technical correction to the FMRL when agreement on HWP estimation has been reached because of the high inter-annual variability of the estimates for forest land in the 2011 GHG inventory, unless causes of such variability were detected and estimates consequently reassessed, and exclude CO_2 emissions from forest fires reported in CRF table 5(V)).	3 (2015/2016–2020)

ID#	Previous recommendation for the issue	Number of successive reviews issue not addressed[a]
KL.7	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 (WDR) of the Kyoto Protocol Supplement and in the Wetlands Supplement.	3 (2015/2016–2020)

[a] The report on the review of the 2017 annual submission of Estonia has not yet been published. Therefore, 2017 was not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

V. Additional findings made during the individual review of the Party's 2020 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2020 annual submission of Estonia that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2020 annual submission of Estonia

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
General			
G.2	Inventory planning	Estonia reported on the inventory planning, preparation and management processes in the NIR (chap. 1.2.2, pp.26–27), which cover April of the previous year to May of the submission year. These processes mainly deal with the compilation and approval of the national GHG inventory, the implementation of the QA/QC plan and the official submission of the inventory under the EU and UNFCCC processes. The ERT noted that the time frames reported in NIR table 1.1 do not include the GHG inventory preparation and, particularly, information on appropriately selecting methods and EFs, estimating GHG emissions and removals, implementing the uncertainty assessment and verifying the inventory data at the national level.	Not an issue
		During the review, Estonia clarified that the inventory preparation plan developed by the Estonian Environmental Research Centre includes an AD collection process and inventory calculations differentiated by time of AD availability. AD collection starts in April of the year preceding the inventory submission. The Party indicated that it intends to update the time frame for inventory development in the next NIR and describe the AD collection process more transparently in future annual submissions.	
		The ERT encourages Estonia to update the description of its inventory planning, preparation and management processes in its NIR and include a description of the time frames for appropriately selecting methods and EFs, estimating GHG emissions and removals, implementing the uncertainty assessment and verifying the inventory data.	
G.3	National system	Estonia reported in the NIR (p.460) that there have been no major changes in its national system. The ERT noted that this reporting is not in accordance with paragraph 21 of the annex to decision 15/CMP.1, which requires any changes in the national system to be reported. During the review, Estonia clarified that no changes have been made to the national system since the 2019 annual submission.	Yes. KP reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		The ERT recommends that the Party enhance the transparency of its reporting by including in its next NIR a clear statement on any changes made to the national system since the previous annual submission.	
G.4	Uncertainty analysis	Estonia reported on its quantitative uncertainty assessment in line with approach 1 from the 2006 IPCC Guidelines in the NIR (tables A.2.1–A.2.2, annex 2, pp.23–57). However, the Party did not provide information on the methods used and the underlying assumptions, or explain how the uncertainty estimates help to prioritize efforts to improve the accuracy of the national inventory in the future and to guide decisions on methodological choice. This is not in accordance with paragraph 42 of the UNFCCC Annex I inventory reporting guidelines, which states that the NIR should contain information on the uncertainties estimated, as well as methods used and underlying assumptions, for the purpose of helping to prioritize efforts to improve the accuracy of national inventories in the future and to guide decisions on methodological choice.	Yes. Convention reporting adherence
		During the review, the Party clarified that the estimated uncertainties help it to enhance its inventory methods, solve problems and identify necessary improvements. However, Estonia did not provide information on the methods used and underlying assumptions that help to prioritize efforts to improve the accuracy of the national inventory and to guide decisions on methodological choice.	
		The ERT recommends that Estonia report in its next NIR on methods and underlying assumptions used for the uncertainty assessment for the purpose of helping to prioritize efforts to improve the accuracy of the national inventory in the future and to guide decisions on methodological choice in accordance with paragraph 42 of the UNFCCC Annex I inventory reporting guidelines.	
G.5	Uncertainty analysis	Estonia reported on its quantitative uncertainty assessment including and excluding LULUCF for the latest inventory year and the trend between the base year and the latest inventory year in the NIR (tables A.2.1–A.2.2, annex 2, pp.23–57). However, the uncertainty assessment for the base year was not reported. The ERT noted that this is not in accordance with paragraph 15 of the UNFCCC Annex I inventory reporting guidelines.	Yes. Convention reporting adherence
		During the review, the Party clarified that it performed the uncertainty assessment for the entire time series including the base year and the latest inventory year, but did not report the estimates for the base year because of a lack of AD as the information available does not allow for the calculation of separate uncertainty values for different years.	
		The ERT recommends that Estonia perform the quantitative uncertainty assessment for the base year including and excluding LULUCF, following approach 1 from the 2006 IPCC Guidelines (vol. 1, chap. 3), and report the results in its NIR (e.g. using the structure provided in the 2006 IPCC Guidelines (vol. 1, table 3.3)).	
G.6	Uncertainty analysis	Estonia used approach 1 from the 2006 IPCC Guidelines to calculate the uncertainties of the estimates. During the review, Estonia indicated that it strives to continuously enhance the quality of its inventory as permitted by the available resources. The Party clarified that it does not plan to calculate uncertainties by undertaking an uncertainty analysis using approach 2 from the 2006 IPCC Guidelines in the near future.	Not an issue/problem
		The ERT encourages Estonia to assess uncertainties using approach 2 from the 2006 IPCC Guidelines (vol. 1, chap. 3) with the aim of progressing the general assessment of the inventory and enhancing the improvement plan.	
Energy			
E.17	1.A Fuel combustion – sectoral approach –	The Party reported total gas biomass consumption under fuel combustion (category 1.A) of 448.0 TJ for 2016 in CRF table 1.A(b) (300 TJ under category 1.A.1 energy industries and 148 TJ under category 1.A.2 manufacturing and	Yes. Accuracy

	biomass – CO_2, CH_4 and N_2O	construction). However, IEA reported an apparent consumption of gas biomass under category 1.A of 722.0 TJ for the same year (458 TJ under category 1.A.1 energy industries; 151 TJ under category 1.A.2 manufacturing and construction; 45 TJ under subcategory 1.A.4.a commercial/institutional; and 68 TJ for the combined subcategories 1.A.4.b and 1.A.4.c agriculture/fishing/residential), resulting in a total difference of 274.0 TJ between the two data sources.	
		During the review, the Party explained that, according to Statistics Estonia, 448.0 TJ is an outdated figure and 722.0 TJ is the correct value for gas biomass consumption for 2016. The ERT estimated the emissions using the correct biogas consumption for 2016 (722.0 TJ) under fuel consumption (category 1.A) by subcategory and noted a difference of 0.015 kt CO_2 eq (excluding biogenic CO_2) between the emission estimate for 2016 in the 2020 submission and the revised estimate (0.025 and 0.040 kt CO_2 eq, respectively, excluding biogenic CO_2). This difference is equivalent to 0.00008 per cent of the total national emissions for 2018 (19,974.14 kt CO_2 eq excluding LULUCF). Therefore, this finding for 2016 does not trigger an adjustment procedure in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11.	
		The ERT recommends that Estonia correct its CO_2, CH_4 and N_2O emission estimates using the corrected biogas consumption data for 2016 and report the corrected estimates in its NIR and CRF tables 1.A(a) and 1.A(b).	
E.18	1.A.2.d Pulp, paper and print – gaseous fuels – CO_2, CH_4 and N_2O	In CRF table 1.A(a)s2, under category 1.A.2.d (pulp, paper and print), fuel consumption for gaseous fuels increased from 216 to 739 TJ between 2017 and 2018, leading to a 226.05 per cent increase in GHG emissions. In the NIR (chap. 3.2.4.1, p.74), Estonia reported that this increase was due to changes in companies' reporting to Statistics Estonia. During the review, Estonia explained that the change relates to a company that until 2018 had reported natural gas consumption to Statistics Estonia under district heating, which was incorrect according to the 2006 IPCC Guidelines (vol. 1, chap. 8.5, p.8.9). In 2018, the company reported natural gas separately to Statistics Estonia. The Party acknowledged the consistency issue for previous years and stated that Statistics Estonia was not able to correct the time-series consistency issue in time for corresponding corrections to be made in the inventory for the 2020 submission.	Yes. Consistency
		The ERT recommends that Estonia correct the CO_2, CH_4 and N_2O emission estimates under category 1.A.2.d (pulp, paper and print) for 1990–2017 using the updated gaseous fuel consumption values reported by Statistics Estonia and report the corrected estimates in its NIR and CRF table 1.A(a)s2 and, to avoid double counting, correct the CO_2, CH_4 and N_2O emission estimates under category 1.A.1.a (public electricity and heat production) for 1990–2017 and report the corrected estimates in its NIR and CRF table 1.A(a)s1.	
E.19	1.A.3.b Road transportation – biomass – CO_2, CH_4 and N_2O	The Party reported liquid biomass consumption of 84.73 TJ for 2016 in CRF table 1.A(b). This liquid biomass relates to bioethanol consumed under category 1.A.3.b (road transportation) (NIR chap. 3.2.5.3, table 3.24, p.103). However, IEA reported the apparent consumption of liquid biomass as 191.80 TJ for 2016, resulting in a difference of 107.07 TJ between the two data sources.	Yes. Accuracy
		During the review, the Party explained that the information regarding the value for liquid biomass consumption used for estimating emissions (84.73 TJ) was received from the Estonian Tax and Customs Board, while the information from the IEA database was reported by Statistics Estonia. The Party informed the ERT that Statistics Estonia has been notified of this issue in the reporting and is investigating. The ERT estimated the emissions using 191.80 TJ as the possible correct value for 2016 liquid biomass consumption under category 1.A and noted that the difference between the estimate for 2016 in the 2020 submission and the ERT estimate for the same year (0.0215 and 0.0485 kt CO_2 eq,	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		respectively, excluding biogenic CO_2) amounts to 0.0270 kt CO_2 eq taking into account only CH_4 and N_2O emissions, which is equivalent to only 0.00014 per cent of the total national emissions for 2018 (19,974.14 kt CO_2 eq excluding LULUCF). Therefore, this finding for 2016 does not trigger an adjustment procedure in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11.	
		The ERT recommends that the Party select and use the correct value for liquid biomass consumption to estimate emissions for 2016 and explain in its NIR the reasons for selecting the AD used and, if necessary, correct the 2016 emission estimates and report the corrected estimates in its NIR and CRF tables.	
E.20	1.A.3.b Road transportation – biogas – CO_2, CH_4 and N_2O	Biogas consumption (54 TJ) was reported in the 2018 national energy balance under land transport (NIR annex 4, p.149) but was not reported in NIR table 3.20 (p.96) or NIR table 3.24 (p.103) under road transport (category 1.A.3.b) for the years in which the consumption occurred, and the corresponding emissions were not estimated.	Yes. Completeness
		During the review, the Party explained that biogas is consumed in Estonia under road transport by buses and passenger vehicles. Estonia provided unofficial revised estimates (0.08 kt CO_2 eq excluding biogenic CO_2) based on biogas consumption for category 1.A.3.b. The ERT noted that the estimates represent less than 0.0004 per cent of the national total emissions in 2018 (19,974.14 kt CO_2 eq excluding LULUCF). Therefore, this finding for 2018 does not trigger an adjustment procedure in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11.	
		The ERT recommends that Estonia estimate emissions from biogas consumption under road transport (category 1.A.3.b) for the years in which the consumption occurred and report the AD and estimates in its NIR and CRF table 1.A(a)s3.	
E.21	1.A.3.b Road transportation – gaseous fuels – CO_2, CH_4 and N_2O	Since 2012, Statistics Estonia has reported natural gas (CNG) consumption under land transport in the national energy balance. However, natural gas consumption was not reported under road transportation in the NIR (table 3.20, p.96) and the corresponding emissions were not estimated.	Yes. Completeness
		During the review, the Party acknowledged the error and stated that CNG consumption under road transportation (category 1.A.3.b) will be included in the 2021 submission. The ERT calculated the emissions on the basis of the CNG consumption reported in the national energy balance for 2018 (168 TJ) under road transportation, the country-specific carbon content (15.07 t C/TJ) reported by Estonia in its NIR (table 3.9, p.84) and the CH_4 and N_2O default EFs provided in the 2006 IPCC Guidelines (vol. 2, chap.3, p.3.16). Estonia agreed with the new estimates. The estimate of the ERT for 2018 (9.82 kt CO_2 eq) is equivalent to 0.0492 per cent of the national total emissions for 2018 (19,974.14 kt CO_2 eq excluding LULUCF), which is below the threshold for commencing an adjustment procedure in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11. The emission estimate calculated by the ERT for 2017 (12.74 kt CO_2 eq) using the CNG consumption value reported in the national energy balance for 2017 under road transportation (218 TJ) exceeds the significance threshold of 0.05 per cent (0.0638 per cent) of the national total emissions for the latest year of the time series (2018). However, as no recalculations were reported in the 2020 submission for this category for natural gas, this finding for 2017 does not trigger an adjustment procedure in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11.	
		The ERT recommends that Estonia estimate emissions from natural gas consumption under road transport (category 1.A.3.b) for the years in which the consumption occurred and report the AD and estimates in its NIR and CRF tables.	

		The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions for this category.	
E.22	1.A.3.b Road transportation – LPG – CO_2, CH_4 and N_2O	Estonia reported in its NIR (chap. 3.2.5.3, p.104) that emissions from LPG consumption in road transportation (category 1.A.3.b) were not estimated using the COPERT model, but were calculated separately using AD from national energy statistics. However, the NIR does not explain whether vehicles using LPG are extracted from the total number of vehicles under road transportation used as input to the COPERT model for estimating emissions from diesel and gasoline consumption, making it difficult for the ERT to assess whether this leads to an under- or overestimation of CO_2, CH_4 and N_2O emissions for this category.	Yes. Transparency
		During the review, the Party explained that vehicles that use LPG as fuel do not run exclusively on LPG; they usually have a biofuel system that uses gasoline or diesel as a second additional fuel. Estonia stated that, as the vehicles do not run purely on LPG, they are not accounted separately from the COPERT model inputs to ensure the accounting of the emissions from the second fuel. The ERT considers that the method used and the accounting of vehicles that use LPG in the COPERT model is correct.	
		The ERT recommends that Estonia explain in the NIR (chap. 3.2.5.3) that vehicles using LPG are not extracted from the total number of vehicles used in the COPERT model because diesel or gasoline is used as a second fuel.	
E.23	1.A.3.b.iv Motorcycles – gasoline – CO_2, CH_4 and N_2O	The NIR (table 3.25, p.104) indicates that there was a significant increase (60 per cent) in the number of motorcycles between 2012 and 2013 (14,000 compared with 23,000). During the review, Estonia clarified that this increase was due to the introduction of new legislation in Estonia in mid-2012 that made it compulsory to register mopeds. As mopeds are categorized under the 'L' vehicle class along with motorcycles, this caused the number of registered motorcycles to rise from 2013 onward. The Party acknowledged the consistency issue.	Yes. Consistency
		The ERT recommends that the Party work with the national vehicle registry to report the correct number of motorcycles reported for 1990–2012 by including mopeds under the motorcycles category (e.g. by using a data gap-filling technique in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 5, p.5.14)); and revise the estimated emissions under motorcycles (subcategory 1.A.3.b.iv) using the updated AD for 1990–2012, ensuring time-series consistency and documenting the estimates in the NIR.	
E.24	1.A.3.d Domestic navigation – diesel oil – CO_2, CH_4 and N_2O	In the NIR (table 3.20, p.96), the Party reported LPG consumption under domestic navigation (category 1.A.3.d) for 2017 and 2018 as 212 and 238 TJ, respectively, in accordance with the energy balance reported in NIR annex 4. These figures differ from the LPG consumption values reported for domestic navigation by IEA for 2017 and 2018 (279 and 274 TJ, respectively).	Yes. Accuracy
		During the review, the Party acknowledged the error and stated that Statistics Estonia has implemented the corrections to its energy consumption data for diesel oil consumption in domestic navigation for 2017 (277 TJ) and 2018 (272 TJ), which are similar to the values reported by IEA. The Party indicated that the corrected AD for diesel consumption for 2017–2018 from Statistics Estonia will be used for the next submission. The ERT calculated the emissions using the correct diesel consumption value for domestic navigation for 2018 (272 TJ) and the CO_2, CH_4 and N_2O EFs reported by Estonia in its NIR (table 3.31, p.111). There was a difference of 4.6 kt CO_2 eq between the emissions estimated for the 2020 submission (15.50 kt CO_2 eq) and the revised emission estimate calculated by the ERT and the Party (20.10 kt CO_2 eq), equivalent to 0.022 per cent of the national total emissions for 2018 (19,974.14 kt CO_2 eq excluding	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		LULUCF). Therefore, this finding for 2017–2018 does not trigger an adjustment procedure in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11.	
		The ERT recommends that Estonia correct the CO_2, CH_4 and N_2O emission estimates on the basis of the corrected diesel oil consumption data under domestic navigation for 2017–2018 and report the updated estimates in its NIR and CRF table 1.A(a)s3.	
E.25	1.A.4 Other sectors – liquid fuels – CO_2, CH_4 and N_2O	The Party reported in its NIR (chap. 3.2.6.2, pp.115–116) that liquid fuel consumption data for the subcategories commercial/institutional (1.A.4.a), residential (1.A.4.b) and agriculture/forestry/fishing (1.A.4.c) were collected by Statistics Estonia from energy and fuel producers and consumers using a survey sampling for energy consumers and a random selection procedure for smaller companies. The ERT considers that using this data-collection method may have led to inconsistencies for the category other sectors (1.A.4) as the survey process targets only a part of the small energy installations, which may lead to an underestimation or overestimation of the AD and emissions if only the smallest or largest fuel users are covered in each survey.	Yes. Accuracy
		During the review, the Party acknowledged that the data-collection method used by Statistics Estonia for small companies is likely to cause inconsistencies in the AD.	
		The ERT recommends that the Party work with Statistics Estonia to collect AD on total liquid fuel consumption for the subcategories commercial/institutional (1.A.4.a), residential (1.A.4.b) and agriculture/forestry/fishing (1.A.4.c), ensure the accuracy of the AD and recalculate emissions for all years (1990–2018).	
IPPU			
I.8	2.F.1 Refrigeration and air conditioning – HFC-143a	The Party reported several significant inter-annual changes in the AD (HFC-143a filled into new manufactured products) for industrial refrigeration, including for 2010–2011 (261.3 per cent increase) and 2015–2016 (172.0 per cent increase) in CRF table 2(II)B-Hs2.	Yes. Convention reporting adherence
		During the review, the Party clarified that there had been an error related to the interpretation of the data for 2016 and that the AD will be recalculated for the 2021 annual submission. The ERT checked the emission estimates for the category for the entire time series and concluded that the erroneously interpreted AD do not affect the consistency of the estimates.	
		The ERT recommends that the Party ensure that CRF table 2(II)B-Hs2 includes the correct AD for HFC-143a filled into new manufactured products for 2016 and include an explanation of significant inter-annual changes in AD in its next annual submission.	
I.9	2.F.1 Refrigeration and air conditioning – HFC-143a	The Party reported several significant inter-annual changes in the AD (HFC-143a remaining in products at decommissioning) for industrial refrigeration, including for 2014–2015 (13.9 per cent increase) and 2017–2018 (12.2 per cent decrease) in CRF table 2(II)B-Hs2.	Yes. Transparency
		During the review, the Party clarified that higher amounts of HFC-143a at decommissioning in 2015–2017 were caused by the decommissioning of all equipment in stock containing R-507, which is a blend of HFC-143a and HFC-125.	
		The ERT recommends that the Party clarify in the NIR the significant changes in the HFC-143a remaining in products at decommissioning for industrial refrigeration between 2015 and 2017.	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		Agriculture	
A.10	3.A.1 Cattle – CH_4	The Party reported in its NIR (p.235, table 5.15) that the uncertainty of the EFs for enteric fermentation is based on the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.33). Uncertainties were reported as 20 per cent for cattle and swine and 40 per cent for other animals. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.33), which state that the use of the tier 2 method should involve an uncertainty analysis reflecting the inventory compiler's situation, and, in the absence of this analysis, the uncertainty under the tier 2 method should be assumed to be similar to the uncertainty under the tier 1 method, and that the accuracy of EFs estimated using the tier 1 method is unlikely to exceed 30 per cent and the uncertainty may be up to 50 per cent. During the review, the Party acknowledged the issue.	Yes. Convention reporting adherence
		The ERT recommends that the Party use 40 per cent as the uncertainty of the EFs for enteric fermentation as an average of the uncertainties provided in the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.33).	
A.11	3.D.a.2.b Sewage sludge applied to soils – N_2O	In addition to providing information on AD and methodology in the NIR (p.262), the Party explained during the review that information on the amount of sewage sludge applied to soils was obtained through two sources: the Estonian Environment Information Centre for 1990–2003 and the national waste reporting system for 2004–2018. The amount of sewage sludge applied to soils varies significantly across the time series and the NIR (p.262) only explains the trend for the last two years of the time series. The trend in CO_2 emissions across the time series suggests that different values were provided in the two sources of information (see NIR figure 5.23).	Yes. Consistency
		During the review, Estonia did not provide further information on ensuring time-series consistency for sewage sludge applied to soils. The ERT considers that the Party did not ensure time-series consistency for this subcategory. Moreover, Estonia did not provide complete information to explain the large fluctuations in the data, but provided information for 2017 only.	
		The ERT recommends that the Party provide strong evidence that the information on the amount of sewage sludge applied to soils provided by the two sources and used for the estimates is consistent, or ensure time-series consistency by using any of the methods provided in the 2006 IPCC Guidelines (vol. 1, chap. 5). In addition, the ERT recommends that Estonia include information in the NIR explaining the fluctuations in the time series of sewage sludge applied to soils.	
A.12	3.G Liming – CO_2	The Party reported in its NIR (p.278) that the AD on areas of agricultural land on which lime was applied were obtained from the Estonian Ministry of Rural Affairs for 1990–2004 and from Statistics Estonia for 2005 onward. During the review, the Party clarified that data for 2004 were not obtained from the Estonian Ministry of Rural Affairs, but were interpolated from the data provided by the Ministry for 2003 and those provided by Statistics Estonia for 2005.	Yes. Transparency
		The ERT recommends that the Party clearly state in its next NIR the source of the liming application data used for 2004.	
		LULUCF	
L.11	4. General (LULUCF) – EFs	The Party frequently used Swedish EFs for LULUCF as a substitute where country-specific information is lacking and where their use was supported by local expert judgment confirming similarities between the national circumstances of Estonia and Sweden. The suitability of these EFs has been questioned by previous ERTs, and the Party has made	Not an issue/problem

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		sufficient improvements to the NIR to explain and justify the use of these EFs (see ID# L.9 in table 3). However, given the extent of the use of Swedish EFs, the ERT considers that the inventory would benefit from QA by Sweden on the choice of EFs. This would ensure that the EFs selected take into account Swedish knowledge on their limitations and suitability.	
		The ERT encourages the Party to engage with the Swedish inventory compilers or their experts to provide QA of the use of Swedish EFs.	
L.12	Land representation – areas	The Party indicated in the NIR (p.286) that the areas of unmanaged wetlands reported in NIR table 6.3 include the category land converted to unmanaged wetlands, which are considered managed wetlands in CRF table 4.1. However, as land cannot be simultaneously managed and unmanaged, this creates a consistency issue.	Yes. Convention reporting adherence
		During the review, the Party clarified that the 2016 ERT recommended that Estonia exclude unmanaged wetlands from other wetlands reported in CRF table 4.D and instead reflect them as unmanaged wetlands in the land matrix reported in CRF table 4.1 (FCCC/ARR/2016/EST, table 5, ID# L.3). The Party attempted to follow the recommendation, but CRF table 4.D includes land converted to unmanaged wetlands as emissions were reported for that subcategory. Therefore, the Party redefined these lands as managed wetlands in CRF table 4.1.	
		The ERT considers that the treatment in the CRF tables is correct but that the NIR contains confusing nomenclature, given that identifying these lands as "unmanaged" rather than "managed" wetlands in the NIR implies that the lands do not emit anthropogenic emissions. The ERT notes that the 2006 IPCC Guidelines (vol. 4, chap. 3.2) describe managed land as land where human interventions and practices have been applied to perform production, ecological or social functions, and that emissions and removals do not need to be reported for unmanaged land. During the review, the Party agreed that further clarification in the NIR would be useful.	
		Where emissions from land converted to "unmanaged wetlands" are reported in the NIR and where these areas are identified as "managed wetlands" in CRF tables 4.1 and 4.D, the ERT recommends that the Party does not use the term "unmanaged" to describe these lands in the NIR and that it provide more transparent descriptions in the NIR (chap. 6.1) to identify these lands as managed lands.	
L.13	Land representation – areas	CRF table 4.1 (land-transition matrix) contains the final areas of wetlands (managed) and other land, which are inconsistent with the initial areas of the same land types reported for 2006–2011. For example, for other land, the final area in 2009 was 37.71 kha, whereas the initial area in 2010 was 37.68 kha. This suggests that the area of wetlands (managed) converted to other land was not correctly accounted for in the calculation of wetlands remaining wetlands and other land remaining other land.	Yes. Convention reporting adherence
		During the review, the Party confirmed that there was an error in the land-transition matrix and there has been no conversion of wetlands to other land in Estonia. The Party indicated that this will be corrected in the next NIR. The ERT considers that this will also have implications for the reporting in CRF tables 4.D (wetlands remaining wetlands) and 4.F (wetlands converted to other land).	
		The ERT recommends that Estonia improve QC procedures and ensure that the final areas reported for each year under wetlands and other land are equal to the initial areas reported for the following year in CRF table 4.1, that CRF table 4.D reports the correct area of wetlands remaining wetlands, and that CRF table 4.F reports the area of wetlands converted to other land as "NO".	

ID#	Finding classification	Description of the finding with recommendation or encouragement	*Is finding an issue/problem?[a]*
L.14	Land representation – areas	When considering issue ID# KL.1 in table 3 (KL.11, 2018), the ERT noted that, although the NIR includes an explanation of the Party's use of aerial photography to identify land use and land-use change in 1990–1999, it was not clear from NIR chapter 6.1 that this information can be found in NIR chapter 11.2.	Not an issue/problem
		The ERT encourages the Party to refer to the aerial photography analysis in NIR chapter 6.1.3 in addition to NIR chapter 11.2 with a view to ensuring that future ERTs are able to readily understand the methods used by Estonia.	
L.15	4.A Forest land – CO_2	Emissions from FM for 2013 were reported as –5,260 kt CO_2, compared with –3,415 kt CO_2 in the 2019 submission, a recalculation of –1,845 kt CO_2. In analysing the reasons for this recalculation, the ERT identified the same order of recalculation for the Convention reporting category forest land, where the trend in the emission time series has moved four years into the future compared with the reporting in the previous submission. For example, a peak in emissions in 2001 reported in the previous NIR is now identified as being in 2005.	Yes. Transparency
		During the review, the Party explained that differences following the recalculations to forest land emissions were mainly due to NFI developments and uncertainty from sampling. Estonia noted that the results of the latest NFI with increased sampling frequency, which took place in 2014–2018, were included in the 2020 submission, and that ongoing research from a remote sensing project is expected to improve the accuracy of emission estimates. These comments also appear in the NIR (p.308). In response to requests for further clarification, the Party explained that, although the NFI started in 1999, the first cycle ended in 2003, and that since the average growing stock of one year's stands is calculated on the basis of five-year data it is more correct to take 2003 as a base year and extrapolate from the growing stocks in previous years. The ERT is concerned that the explanation in the NIR regarding updates to the NFI series associated with new data collected in 2014–2018 is not sufficient to explain the recalculations to estimates for 1999–2013 given that, according to previous submissions, inter-annual changes in forest land emissions became more volatile from 1999 onward, reflecting the launch of the Estonian NFI programme in that year, while, according to the 2020 submission, these more volatile trends commenced in 2003 and follow the time series of trends reported in previous submissions with a four-year delay. The change in methodologies for historical time-series management is key to understanding these recalculations, but this is not explained in the NIR.	
		The ERT recommends that Estonia provide additional information in the NIR on how it carries out time-series management with NFI data to allocate AD to individual years with a view to ensuring that its estimates remain accurate and reliable as recalculations occur (see also ID# KL.10 below).	
L.16	4.B Cropland – areas	The NIR (p.309) describes the national circumstances of Estonian cropland and refers to arable land abandoned between 1991 and 2005. The ERT was confused by this description, thinking it might relate to cropland converted to grassland. However, during the review, the Party clarified that abandoned cropland is categorized as cropland remaining cropland as long as it retains arable land features. While this is an acceptable approach to land representation, the ERT considers that the NIR could be clearer on how Estonia categorizes abandoned arable land.	Not an issue/problem
		The ERT encourages the Party to explain in its NIR that abandoned cropland continues to be categorized as cropland and is not categorized as cropland converted to grassland.	
L.17	4.B Cropland – AD	The NIR contains contradictory statements regarding pre-1990 cropland activity in the country (see ID# L.2 in table 3). The NIR (p.309) states that cropland area increased until the 1990s in Estonia, but it (p.315) also notes that the management of agricultural land remained relatively stable during that period.	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	*Is finding an issue/problem?*[a]
		During the review, the Party clarified that the preliminary results of its efforts to collect pre-1990 land-use data point to a relatively small increase in arable land area in 1970–1990.	
		The ERT recommends that the Party ensure that historical pre-1990 cropland activity in Estonia is described consistently throughout the NIR.	
L.18	4.B.1 Cropland remaining cropland – CO_2	The NIR (p.310) states that CSCs in DOM in orchards on cropland are assumed to be at equilibrium in accordance with the tier 1 approach. However, this method does not consider DOM gained or lost during the establishment and removal of orchards, as is reported for living biomass, meaning that the reporting may be incomplete.	Yes. Completeness
		During the review, the Party confirmed that transitions to and from cropland are evaluated independently from increases or decreases to orchard area. In the view of the ERT, this implies that orchards are assumed to only exist on cropland remaining cropland for reporting and accounting purposes. The Party also confirmed that DOM losses are not considered owing to lack of country-specific data on DOM in orchards and that the 2006 IPCC Guidelines (vol. 4, chap. 5) do not provide default values for this pool, also noting that there is generally little deadwood in orchards as it is removed. The ERT considers that, if accompanied by an assessment showing that emissions from DOM would likely be less than 500 kt CO_2 or below 0.05 per cent of the national total emissions (excluding LULUCF), this explanation would be considered an appropriate justification for reporting "NE" in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines; however, the Party reported this carbon pool as "NO" in CRF table 4.B.	
		The ERT recommends that the Party either identify an EF and estimate CSCs from DOM resulting from changes in orchard area, or report "NE" in CRF table 4.B and justify its use on the basis of negligible emissions in the NIR and in CRF table 9.	
L.19	4.G HWP – CO_2	The Party reported in the NIR (p.345) that it calculated emissions from HWP using the methods for HWP reporting under the Kyoto Protocol using the Kyoto Protocol Supplement. The NIR notes that CO_2 emissions due to roundwood production on deforested land were estimated using the instantaneous oxidation method as per decision 2/CMP.7, annex, paragraph 31. However, this reporting is incorrect because reporting under the Convention does not contain a provision for treating wood products arising from different sources using different methodological tiers. According to the Kyoto Protocol Supplement (section 2.8), the methods available are similar to those specified under the production approach in the 2006 IPCC Guidelines (vol. 4, chap. 12, p.12.29) but decision 2/CMP.7 imposes a number of additional constraints and limits the extent of HWP that can be included in the Kyoto Protocol estimates and accounting. The Kyoto Protocol Supplement (figure 2.8.1) provides clear guidance on the circumstances that require Parties to use the tier 1 approach of instantaneous oxidation where the 2006 IPCC Guidelines (vol. 4, figure 12.1) would advise otherwise. Therefore, as some guidance from the Kyoto Protocol Supplement is inconsistent with the 2006 IPCC Guidelines owing to decision 2/CMP.7, the document should be used with caution for reporting under the Convention. This may be particularly relevant to Estonia, where significant changes to its national economy in the post-Soviet period may have resulted in a meaningful amount of timber sourced from areas of deforestation, and where the Party applies a tier 2 estimation methodology for HWP.	Yes. Accuracy
		During the review, the ERT asked the Party how the reporting of emissions from HWP under the Convention would differ if products harvested from cleared (deforested) land were accounted for using Estonia's tier 2 methods rather	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		than on the basis of instantaneous oxidation. The Party stated that it will consider the matter further and add corresponding information in the next submission.	
		The ERT recommends that the Party include in its tier 2 methods and reporting for HWP under the Convention the accumulation and decay of wood products in use arising from activities that would be defined as deforestation under the Kyoto Protocol.	
L.20	4.G HWP – CO_2	The NIR (p.346) identifies the use of a tier 3 approach under HWP for estimating semi-chemical wood pulp. However, the NIR did not specify how this tier 3 model differs from a tier 2 model, since the NIR seems to imply that the only difference in methodology applied was the use of a country-specific carbon conversion factor.	Yes. Transparency
		During the review, the Party clarified that semi-chemical wood pulp is a feedstock for paper manufacturing that is exported by Estonia and must be included under tier 3 to ensure completeness of accounting. The ERT agrees that semi-chemical wood pulp should be included in the NIR, but disagrees that the approach should be referred to as tier 3, which usually applies when country-specific models are used because the core methodology provided in the 2006 IPCC Guidelines (vol. 4, chap. 12.2.1) is not appropriate or adequate, with Parties required to provide a highly detailed description of the models, including verification information in line with the 2006 IPCC Guidelines. On the basis of the descriptions provided by Estonia, which include information on the use of methods from the Kyoto Protocol Supplement (chap. 2.8), the ERT considers that semi-chemical wood pulp may be suitably identified as a disaggregation of the paper and paperboard category, for which country-specific parameters are used as part of a tier 2 model.	
		The ERT recommends that the Party correct the reference to the tier used in the description of the methodology for estimating emissions from semi-chemical wood pulp.	
Waste			
W.6	5. General (waste) – CH_4	The Party reported in the NIR (table 1.3, p.44) CH_4 emissions from composting (category 5.B.1) twice as two separate key categories: biological treatment of waste and composting.	Yes. Transparency
		During the review, the Party clarified that in NIR table 1.3 the biological treatment of waste and composting are treated as the same category as composting (category 5.B.1) and that AD and emissions should be reported together.	
		The ERT recommends that the Party correct the information in the NIR and make sure that each category appears only once in the key category analysis.	
W.7	5. General (waste) – CO_2	The Party reported in the NIR (annex 5, p.159) CO_2 emissions as "NE" for aerobic managed waste disposal sites (subcategory 5.A.1.a), biogenic waste incineration (subcategory 5.C.1.1) and biogenic open burning of waste (subcategory 5.C.2.1). This does not correspond to the data presented in CRF tables 5.A and 5.C, where emissions for these subcategories were reported as "NA", "NO" and 0.906 kt CO_2, respectively.	Yes. Convention reporting adherence
		During the review, the Party explained that a technical error occurred in relation to its reporting of "NE", and stated that these issues will be resolved in the next submission.	
		The ERT recommends that the Party improve QC procedures and report consistent information in the NIR and the CRF tables.	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
W.8	5.D Wastewater treatment and discharge – N_2O	The Party reported in the NIR (p.390) that data on protein consumption (kg/person/year) were obtained from FAOSTAT. In CRF table 5.D the Party reported that protein consumption in 2018 was 37.92 kg/person/year. The protein consumption remained unchanged in 2013–2018. However, the data presented in CRF table 5.D are not consistent with the data from FAOSTAT, which are higher (e.g. 39.24 kg/person/year for 2018).	Yes. Accuracy
		During the review, the Party explained that, at the time of inventory compilation, the inventory team was not aware that the "new food balances" data set was available, and stated that the new data from the Food and Agriculture Organization of the United Nations will be included in the next submission. The ERT performed a preliminary estimate of N_2O emissions from domestic wastewater treatment and discharge using the protein consumption data obtained from FAOSTAT. The results indicated that estimated emissions for 2018 would increase by 1.14 kt CO_2 eq, or 0.006 per cent of the national total emissions (excluding LULUCF), which is below the threshold for application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11.	
		The ERT recommends that Estonia correct its protein consumption data (kg/person/year) on the basis of the new data from the Food and Agriculture Organization of the United Nations and revise its N_2O estimates for 2018 for its next submission.	
KP-LULUCF			
KL.9	FM – CO_2	In respect of the natural disturbances provision, the NIR must include information on how the Party avoids the expectation of net credits or net debits during the commitment period (decision 2/CMP.7, annex, para. 33). The ERT was unable to identify this information in the NIR. Furthermore, in the NIR (p.454) the series for estimating the background level shows an upward trend in emissions, which could indicate an expectation of net credits in the commitment period.	Yes. KP reporting adherence
		During the review, the Party noted that it will look into this matter and consider using 1990–2012 for estimating the background level and margin. The ERT welcomes this intention.	
		The ERT recommends that the Party ensure that its methodology relating to the natural disturbances provision avoids the expectation of net debits or net credits during the commitment period, and transparently describe in the NIR how this requirement is satisfied in accordance with decision 2/CMP.7, annex, paragraph 33.	
KL.10	FM – CO_2	Emissions from FM for 2013 were reported as –5,260 kt CO_2, compared with –3,415 kt CO_2 in the 2019 submission, a recalculation of –1,845 kt CO_2. In analysing the reasons for this recalculation, the ERT identified the same order of recalculation for the Convention reporting category forest land, where the trend in the emission time series has moved four years into the future compared with that reported in the previous submission. For example, a peak in emissions in 2001 reported in the previous NIR is now identified as being in 2005. The ERT recognizes that Estonia has elected to carry out commitment period accounting, but was nonetheless concerned that the 2013 estimate under the second commitment period may represent a potential underestimation of emissions (overestimation of sequestrations) by 1,845 kt CO_2.	Yes. Accuracy
		During the review, the Party explained that differences following the recalculations to forest land emissions were mainly due to NFI developments and uncertainty from sampling. Estonia noted that the results of the latest NFI with increased sampling frequency, which took place in 2014–2018, were included in the 2020 submission, and that ongoing research from a remote sensing project is expected to improve the accuracy of emission estimates. These	

ID#	Finding classification	Description of the finding with recommendation or encouragement	*Is finding an issue/problem?[a]*
		comments also appear in the NIR (p.308). In response to requests for further clarification, the Party explained that, although the NFI started in 1999, the first cycle ended in 2003, and that since the average growing stock of one year's stands is calculated on the basis of five-year data, it is more correct to take 2003 as a base year and extrapolate from the growing stocks in previous years. The ERT is concerned that the explanation in the NIR regarding updates to the NFI series associated with new data collected in 2014–2018 is not sufficient to explain the recalculations to estimates for 1999–2013 given that, according to previous submissions, inter-annual changes in forest land emissions became more volatile from 1999 onward, reflecting the launch of the Estonian NFI programme in that year, while, according to the 2020 submission, these more volatile trends in forest land emissions commenced in 2003 and follow the time series of trends reported in previous submissions with a four-year delay. The change in methodologies for historical time-series management is key to understanding these recalculations, but this is not explained in the NIR.	
		The ERT recommends that Estonia transparently explain the significant recalculations made for FM since the 2019 submission, including how updates to time-series management led to a revision that changed the 2013 estimate for FM sequestrations by over 50 per cent, and make a technical correction to the FMRL in accordance with the recalculations.	

[a] Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments for the 2020 annual submission of Estonia.

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

12. Estonia elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF is not applicable to the 2020 review.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2020 annual submission.

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Estonia in its 2020 annual submission

1.   Tables I.1–I.4 provide an overview of the total GHG emissions and removals as submitted by Estonia.

Table I.1

Total greenhouse gas emissions for Estonia, base year[a]–2018

(kt CO_2 eq)

| | Total GHG emissions excluding indirect CO_2 emissions | | Total GHG emissions including indirect CO_2 emissions[b] | | Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c] | KP-LULUCF (Article 3.3 of the Kyoto Protocol)[d] | KP-LULUCF (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	38 682.52	40 308.84	NA	NA	NA		NA	
1990	38 650.99	40 277.31	NA	NA				
1995	18 294.27	20 109.10	NA	NA				
2000	14 041.71	17 246.55	NA	NA				
2010	17 279.56	21 019.06	NA	NA				
2011	16 967.22	21 058.29	NA	NA				
2012	16 330.69	19 966.95	NA	NA				
2013	18 640.57	21 848.04	NA	NA		150.04	NA	–4 940.16
2014	19 498.76	21 056.79	NA	NA		142.38	NA	–3 329.45
2015	15 893.72	18 109.74	NA	NA		159.88	NA	–3 959.62
2016	17 201.14	19 640.42	NA	NA		136.03	NA	–4 028.09
2017	19 088.86	20 923.49	NA	NA		110.70	NA	–3 469.20
2018	17 983.96	19 974.14	NA	NA		86.13	NA	–3 800.96

Note: Emissions and removals reported in the sector other (sector 6) are not included in the total GHG emissions.

[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, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

[b]   The Party did not report indirect CO_2 emissions in CRF table 6.

[c]   The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990 as contained in the report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of the Party.

[d]   Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

Table I.2

Greenhouse gas emissions by gas for Estonia, excluding land use, land-use change and forestry, 1990–2018

(kt CO_2 eq)

	$CO_2{}^a$	CH_4	N_2O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF_6	NF_3
1990	36 907.24	1 901.29	1 468.78	NO	NO	NO	NO	NO
1995	18 048.83	1 261.98	766.76	28.45	NO	NO	3.07	NO
2000	15 244.19	1 238.03	682.57	79.15	NO	NO	2.61	NO
2010	18 784.96	1 243.70	813.13	175.54	NO	NO	1.73	NO
2011	18 855.12	1 200.65	817.42	183.33	NO	NO	1.77	NO
2012	17 684.98	1 218.33	868.42	193.34	NO	NO	1.88	NO
2013	19 551.95	1 216.18	870.14	207.75	NO	NO	2.02	NO
2014	18 755.95	1 181.30	899.31	218.14	NO	NO	2.10	NO
2015	15 813.40	1 146.79	924.10	223.21	NO	NO	2.24	NO
2016	17 377.65	1 125.24	899.43	235.58	NO	NO	2.52	NO
2017	18 635.87	1 129.42	923.86	231.90	NO	NO	2.44	NO
2018	17 710.95	1 117.41	912.19	231.03	NO	NO	2.56	NO
Percentage change 1990–2018	**−52.0**	**−41.2**	**−37.9**	**NA**	**NA**	**NA**	**NA**	**NA**

Note: Emissions and removals reported in the sector other (sector 6) are not included in this table.
^{a} Estonia did not report indirect CO_2 emissions in CRF table 6.

Table I.3

Greenhouse gas emissions by sector for Estonia, 1990–2018

(kt CO_2 eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1990	36 237.60	963.29	2 706.50	−1 626.32	369.93	NO
1995	17 693.82	634.23	1 383.09	−1 814.83	397.97	NO
2000	14 848.09	694.88	1 141.12	−3 204.83	562.45	NO
2010	18 708.38	537.97	1 278.40	−3 739.50	494.31	NO
2011	18 646.21	661.67	1 293.84	−4 091.07	456.56	NO
2012	17 243.94	906.94	1 374.66	−3 636.26	441.41	NO
2013	19 035.50	998.12	1 406.71	−3 207.48	407.72	NO
2014	18 536.35	710.54	1 446.12	−1 558.03	363.80	NO
2015	15 791.75	515.07	1 446.24	−2 216.02	356.69	NO
2016	17 394.66	503.32	1 402.04	−2 439.28	340.40	NO

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
2017	18 512.80	638.79	1 443.21	−1 834.63	328.70	NO
2018	17 590.08	625.28	1 437.79	−1 990.18	320.99	NO
Percentage change 1990–2018	**−51.5**	**−35.1**	**−46.9**	**22.4**	**−13.2**	**NA**

Notes: (1) Estonia did not report emissions or removals in the sector other (sector 6); (2) Estonia did not report indirect CO_2 emissions in CRF table 6.

Table I.4

Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year[a]–2018, for Estonia
(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	Activities under Article 3.3 of the Kyoto Protocol		FM and elected activities under Article 3.4 of the Kyoto Protocol				
	Land-use change	AR	Deforestation	FM	CM	GM	RV	WDR
FMRL				−2 741.00				
Technical correction				NE				
Base year	NA				NA	NA	NA	NA
2013		−259.73	409.78	−4 940.16	NA	NA	NA	NA
2014		−239.69	382.07	−3 329.45	NA	NA	NA	NA
2015		−218.32	378.20	−3 959.62	NA	NA	NA	NA
2016		−238.25	374.28	−4 028.09	NA	NA	NA	NA
2017		−235.24	345.94	−3 469.20	NA	NA	NA	NA
2018		−208.61	294.74	−3 800.96	NA	NA	NA	NA
Percentage change base year–2018					**NA**	**NA**	**NA**	**NA**

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

[a] Estonia has not elected to report on any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol, and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column relates to 1990.

2.   Table I.5 provides an overview of key relevant data from Estonia's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Key relevant data for Estonia under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2020 annual submission

Parameter	Data values
Periodicity of accounting	(a) AR: commitment period accounting
	(b) Deforestation: commitment period accounting
	(c) FM: commitment period accounting
	(d) CM: not elected
	(e) GM: not elected
	(f) RV: not elected
	(g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	Yes, for FM
3.5% of total base-year GHG emissions, excluding LULUCF	1 399.884 kt CO_2 eq (11 199.075 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.6 include the information to be included in the compilation and accounting database for Estonia. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1
Information to be included in the compilation and accounting database for 2018, including on the commitment period reserve, for Estonia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
CPR	**45 951 279**	–	–	**45 951 279**
Annex A emissions				
CO_2	17 710 953	–	–	17 710 953
CH_4	1 117 409	–	–	1 117 409
N_2O	912 187	–	–	912 187
HFCs	231 030	–	–	231 030
PFCs	NO	–	–	NO
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 561	–	–	2 561
NF_3	NO	–	–	NO
Total Annex A sources	**19 974 140**	**–**	**–**	**19 974 140**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–208 615	–	–	–208 615
Deforestation	294 744	–	–	294 744
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 800 959	–	–	–3 800 959

Table II.2
Information to be included in the compilation and accounting database for 2017 for Estonia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	18 635 872	–	–	18 635 872
CH_4	1 129 417	–	–	1 129 417
N_2O	923 859	–	–	923 859
HFCs	231 901	–	–	231 901
PFCs	NO	–	–	NO
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 441	–	–	2 441
NF_3	NO	–	–	NO
Total Annex A sources	**20 923 490**	**–**	**–**	**20 923 490**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–235 243	–	–	–235 243
Deforestation	345 944	–	–	345 944
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 469 202	–	–	–3 469 202

Table II.3
Information to be included in the compilation and accounting database for 2016 for Estonia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	17 377 650	–	–	17 377 650
CH_4	1 125 235	–	–	1 125 235
N_2O	899 429	–	–	899 429
HFCs	235 584	–	–	235 584
PFCs	NO	–	–	NO
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 524	–	–	2 524
NF_3	NO	–	–	NO
Total Annex A sources	**19 640 422**	**–**	**–**	**19 640 422**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–238 248	–	–	–238 248
Deforestation	374 282	–	–	374 282
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–4 028 089	–	–	–4 028 089

Table II.4
Information to be included in the compilation and accounting database for 2015 for Estonia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	15 813 404	–	–	15 813 404
CH_4	1 146 791	–	–	1 146 791
N_2O	924 097	–	–	924 097
HFCs	223 207	–	–	223 207
PFCs	NO	–	–	NO
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 245	–	–	2 245
NF_3	NO	–	–	NO
Total Annex A sources	**18 109 744**	**–**	**–**	**18 109 744**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–218 322	–	–	–218 322
Deforestation	378 201	–	–	378 201
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 959 616			–3 959 616

Table II.5
Information to be included in the compilation and accounting database for 2014 for Estonia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	18 755 949	–	–	18 755 949
CH_4	1 181 298	–	–	1 181 298
N_2O	899 309	–	–	899 309
HFCs	218 139	–	–	218 139
PFCs	NO	–	–	NO
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 100	–	–	2 100

	Original submission	Revised submission	Adjustment	Final value
NF₃	NO	–	–	NO
Total Annex A sources	**21 056 795**	**–**	**–**	**21 056 795**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–239 689	–	–	–239 689
Deforestation	382 065	–	–	382 065
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 329 449	–	–	–3 329 449

Table II.6
Information to be included in the compilation and accounting database for 2013 for Estonia
(t CO_2 eq)

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	19 551 953	–	–	19 551 953
CH_4	1 216 180	–	–	1 216 180
N_2O	870 144	–	–	870 144
HFCs	207 750	–	–	207 750
PFCs	NO	–	–	NO
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	2 018	–	–	2 018
NF₃	NO	–	–	NO
Total Annex A sources	**21 848 045**	**–**	**–**	**21 848 045**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–259 732	–	–	–259 732
Deforestation	409 775	–	–	409 775
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–4 940 158	–	–	–4 940 158

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which estimation methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party's inventory are the following:

(a)   1.A.3.b Road transportation – biogas (CO_2, CH_4 and N_2O) (see ID# E.20 in table 5);

(b)   1.A.3.b Road transportation – CNG (CO_2, CH_4 and N_2O) (see ID# E.21 in table 5);

(c)   4.B.1 Cropland remaining cropland – biomass burning (CO_2, CH_4 and N_2O) (see ID# L.5 in table 3);

(d)   4.B.1 Cropland remaining cropland – orchards (CO_2) (see ID# L.18 in table 5);

(e)   WDR – organic soils (CH_4 and N_2O) (see ID# KL.7 in table 3).

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at https://www.ipcc.ch/publication/2013-revised-supplementary-methods-and-good-practice-guidance-arising-from-the-kyoto-protocol/.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2016 and 2018 annual submissions of Estonia, contained in documents FCCC/ARR/2013/EST, FCCC/ARR/2014/EST, FCCC/ARR/2016/EST and FCCC/ARR/2018/EST, respectively.

Other

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 https://unfccc.int/sites/default/files/resource/AGI%202020_final.pdf.

Annual status report for Estonia for 2020. Available at https://unfccc.int/sites/default/files/resource/asr2020_EST.pdf.

Report of the technical assessment of the forest management reference level submission of Estonia submitted in 2011. FCCC/TAR/2011/EST. Available at https://unfccc.int/sites/default/files/resource/docs/2011/tar/est01.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Hanna-Lii Kupri (Estonian Environmental Research Centre), including additional material on the methodology and assumptions used. The following references have been reproduced as received:

European Commission. 2013. *Best Available Techniques (BAT) Reference Document for the Production of Cement, Lime and Magnesium Oxide: Industrial Emissions Directive 2010/75/EU: (Integrated Pollution Prevention and Control)*. Seville: Publications Office of the European Union. Available at https://ec.europa.eu/jrc/en/publication/reference-reports/best-available-techniques-bat-reference-document-production-cement-lime-and-magnesium-oxide.

Estonian Environment Agency. 2019. *3. Fellings. Yearbook Forest 2018.* Tallinn: Estonian Environment Agency (in Estonian). Available at https://www.keskkonnaagentuur.ee/sites/default/files/03_raied_13.09_0.pdf.

Industrial Emissions Act of 2013. Available at https://www.riigiteataja.ee/en/eli/ee/510012019010/consolide/current.