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Report on the technical review of the eighth national communication and the technical review of the fifth biennial report of Estonia

Parties included in Annex I to the Convention were requested by decision 6/CP.25 to submit their eighth national communication to the secretariat by no later than 31 December 2022. According to decision 15/CMP.1, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol are required to include in their national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. This report presents the results of the technical review of the eighth national communication and relevant supplementary information under the Kyoto Protocol of Estonia, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" and the "Guidelines for review under Article 8 of the Kyoto Protocol".

Developed country Parties were requested by decision 6/CP.25 to submit their fifth biennial report to the secretariat by no later than 31 December 2022. This report presents the results of the technical review of the fifth biennial report of Estonia, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention".

The review of these submissions took place in Bonn from 27 to 31 March 2023.

Contents

Abbreviations and acronyms

AEA	annual emission allocation
Annex II Party	Party included in Annex II to the Convention
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
CH_4	methane
CHP	combined heat and power
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CTF	common tabular format
EERC	Estonian Environmental Research Centre
ERT	expert review team
ESD	European Union effort-sharing decision
ESR	European Union effort-sharing regulation
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LEAP	Low Emissions Analysis Platform
LULUCF	land use, land-use change and forestry
N_2O	nitrous oxide
NA	not applicable
NC	national communication
NE	not estimated
NF_3	nitrogen trifluoride
NH_3	ammonia
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
NO_X	nitrogen oxides
PaMs	policies and measures
PFC	perfluorocarbon
reporting guidelines for supplementary information	“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol. Part II: Reporting of supplementary information under Article 7, paragraph 2”
SF_6	sulfur hexafluoride
SO_X	sulfur oxides
UNFCCC reporting guidelines on BRs	“UNFCCC biennial reporting guidelines for developed country Parties”
UNFCCC reporting guidelines on NCs	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications”

WAM	‘with additional measures’
WEM	‘with measures’
WMO	World Meteorological Organization
WOM	‘without measures’

I. Introduction and summary

A. Introduction

1. This is a report on the centralized technical review of the NC8 and BR5 of Estonia. The review was organized by the secretariat in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention", particularly "Part IV: UNFCCC guidelines for the technical review of biennial reports from Parties included in Annex I to the Convention" and "Part V: UNFCCC guidelines for the technical review of national communications from Parties included in Annex I to the Convention" (annex to decision 13/CP.20), and the "Guidelines for review under Article 8 of the Kyoto Protocol" (annex to decision 22/CMP.1 and annex I to decision 4/CMP.1).

2. In accordance with decision 13/CP.20, a draft version of this report was transmitted to the Government of Estonia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

3. The review was conducted together with the review of one other Party included in Annex I to the Convention from 27 to 31 March 2023 in Bonn by the following team of nominated experts from the UNFCCC roster of experts: Lukas Emele (EU), Jozsef Feiler (Hungary), Liviu Gheorghe (Romania), Admore Mureva (Zimbabwe), Sekai Ngarize (Zimbabwe), Spyridoula Ntemiri (Greece), Nasimjon Rajabov (Tajikistan) and Shanshan Yang (China). Liviu Gheorghe and Sekai Ngarize were the lead reviewers. The review was coordinated by Sevdalina Todorova, Anna Sikharulidze and Mirana Andriarisoa (secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the NC8 of Estonia in accordance with the UNFCCC reporting guidelines on NCs,[1] the reporting guidelines for supplementary information, in particular the supplementary information required under Article 7, paragraph 2, and on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol[2] and of the information reported in the BR5 of Estonia in accordance with the UNFCCC reporting guidelines on BRs.[3]

1. Timeliness

1. The NC8 was submitted on 29 December 2022, before the deadline of 31 December 2022 mandated by decision 6/CP.25. The NC8 was resubmitted on 3 February 2023 to correct errors in the submission detected by the Party. Unless otherwise specified, the information and values from the latest submission are used in this report.

2. The BR5 was submitted on 30 December 2022, before the deadline of 31 December 2022 mandated by decision 6/CP.25. The CTF tables were also submitted on 30 December 2022. The BR5 and the CTF tables were resubmitted on 3 February 2023 to correct errors in the submission detected by the Party. Estonia submitted a corrigendum on 30 March 2023 containing an omitted annex to the BR5. Unless otherwise specified, the information and values from the latest submission are used in this report.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

3. Issues and gaps identified by the ERT related to the information reported by Estonia in its NC8 are presented in tables 1–2. The information reported, including the supplementary information under the Kyoto Protocol, mostly adheres to the UNFCCC reporting guidelines on NCs.

[1] Decision 6/CP.25, annex.
[2] Decision 15/CMP.1, annex, and decision 3/CMP.11, annex III.
[3] Decision 2/CP.17, annex.

4. Estonia made improvements to the reporting in its NC8 compared with that in its NC7 by addressing recommendations from the previous review report. The ERT noted that the Party has improved the completeness of the information reported on projections and the total effects of PaMs by including projections of indirect GHG emissions, and the transparency of the information reported on projections and the total effects of PaMs by describing the methodology applied and activities considered for the projections of emissions from international bunkers.

Table 1
Assessment of completeness and transparency of mandatory information reported by Estonia in its eighth national communication

Section of NC	*Completeness*	*Transparency*	*Reference to description of recommendations*
Executive summary	Complete	Transparent	–
National circumstances relevant to GHG emissions and removals	Complete	Mostly transparent	Issue 1 in table I.1
GHG inventory	Complete	Mostly transparent	Issue 1 in table I.2
PaMs	Complete	Mostly transparent	Issues 4 and 8 in table I.3
Projections and the total effect of PaMs	Mostly complete	Mostly transparent	Issues 2, 4 and 10 in table I.4
Vulnerability assessment, climate change impacts and adaptation measures	Mostly complete	Transparent	Issue 1 in table I.5
Financial resources and transfer of technology[a]	NA	NA	NA
Research and systematic observation	Mostly complete	Transparent	Issue 1 in table I.6
Education, training and public awareness	Complete	Transparent	–

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in annex I. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

[a] Estonia is not an Annex II Party and is therefore not obliged to provide information on financial resources under Article 11 of the Kyoto Protocol, including on "new and additional" resources.

Table 2
Assessment of completeness and transparency of mandatory supplementary information under the Kyoto Protocol reported by Estonia in its eighth national communication

Supplementary information under the Kyoto Protocol	*Completeness*	*Transparency*	*Reference to description of finding(s)*
National system	Complete	Transparent	–
National registry	Complete	Transparent	–
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	–
PaMs in accordance with Article 2	Mostly complete	Mostly transparent	Issues 1–3 in table I.8
Domestic and regional programmes and/or arrangements and procedures	Mostly complete	Transparent	Issue 4 in table I.8
Information under Article 10[a]	NA	NA	NA
Financial resources[b]	NA	NA	NA
Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	–

Note: A list of findings pertaining to the completeness and transparency issues identified in this table is included in annex I. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

[a] The assessment refers to information provided by the Party on the provisions contained in Article 4, paras. 3, 5 and 7, of the Convention, as reported under Article 10 of the Kyoto Protocol, which is relevant to Annex II Parties only. An assessment of the information on the other provisions of Article 10 of the Kyoto Protocol is provided under the relevant substantive headings under the Convention, for example research and systematic observation.

[b] Estonia is not an Annex II Party and is therefore not obliged to provide information on financial resources under Article 11 of the Kyoto Protocol, including on "new and additional" resources.

5. Issues and gaps identified by the ERT related to the information reported by Estonia in its BR5 are presented in table 3. The information reported mostly adheres to the UNFCCC reporting guidelines on BRs. The ERT notes that issue 8 in table II.5 has been identified in three or more successive reviews.

6. Estonia made improvements to the reporting in its BR5 compared with that in its BR4 by addressing the recommendations and encouragements from the previous review report. The ERT noted that the Party has improved:

(a) The completeness of the information reported on its quantified economy-wide emission reduction target and related assumptions, conditions and methodologies by providing information in the CTF tables and the BR5 on the sectors and gases included in the target;

(b) The transparency of the information reported on progress in achievement of quantified economy-wide emission reduction targets and relevant information by ensuring the consistency of the information reported on projections in the CTF tables and the BR5;

(c) The transparency of the information reported on projections by using the latest year for which inventory data are available as a starting point for the projections under the WEM and WAM scenarios; by providing consistent information in the CTF tables and corresponding tables in the BR5; and by including additional diagrams, for example on projections for the different gases and for emissions from international transport, as well as projections of indirect GHG emissions;

(d) The transparency of the information reported on projections by providing information on the main differences in the assumptions and methods used and the results of the projections reported in the current and previous submissions.

Table 3
Summary of completeness and transparency of mandatory information reported by Estonia in its fifth biennial report

Section of BR	*Completeness*	*Transparency*	*Reference to description of finding(s)*
GHG emissions and removals	Complete	Mostly transparent	Issue 1 in table II.1
Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies	Complete	Mostly transparent	Issue 1 in table II.2
Progress in achievement of targets	Mostly complete	Partially transparent	Issues 1 and 3 in table II.3 Issue 1 in table II.4 Issues 2 and 8 in table II.5
Provision of support to developing country Parties[a]	NA	NA	NA

Note: A list of findings pertaining to the completeness and transparency issues identified in this table is included in annex II. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

[a] Estonia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paras. 3–5, of the Convention.

II. Technical review of the information reported in the eighth national communication and fifth biennial report

A. National circumstances relevant to greenhouse gas emissions and removals

1. Technical assessment of the reported information

7. The NC8 contains key data on legislation, population trends, geography and land use, climate and climate change, economic developments, energy, transport, the buildings sector, industry, trade, the services sector, agriculture, forestry, resource efficiency and wastewater.

8. GHG emissions per capita decreased considerably from 25.60 t CO_2 eq in 1990 to 8.69 t CO_2 eq in 2020 owing to major structural changes in the economy, improved energy efficiency and changes in the fuel mix combined with other GHG mitigation PaMs implemented across all sectors of the economy. Estonia's emissions are decoupled from economic growth, with GDP increasing between 1995 and 2020 and GHG emissions remaining at roughly 20,000 kt CO_2 eq/year over the same period; carbon intensity in 2020 was 77.9 per cent below the 1995 level. In 2020, GDP dropped by 2.9 per cent compared with the 2019 level owing to the coronavirus disease 2019 pandemic but remained at around half the level of the EU average. The economy grew by 8.3 per cent in 2021 with associated impacts on the level of GHG emissions.

9. Given the limited domestic market, the economy of Estonia is based largely on the export of products and services (accounting for 90 per cent of GDP). One third of this volume consists of the export of services (e.g. transport-related and tourism services), making Estonia's economy and GHG emission trends highly dependent on external factors.

10. The use of domestic oil shale, which is the main source of energy in Estonia, coupled with an increasing use of renewable fuels makes Estonia one of the EU countries that is least dependent on energy imports. Estonia ranks among the top EU member States in terms of primary energy production per capita and is a net energy exporter, which also has an impact on the GHG emission profile of the country. As of 2018, Estonia switched to an auction system in the electricity market, which provides support to producers that generate the cheapest renewable energy. As a result, the share of renewable energy has increased sharply in recent years, accounting for 30.1 per cent of final energy consumption (nearly doubling in the last five years) and 28.3 per cent of electricity production in 2020. In total, 67 per cent of the renewable sources used in electricity generation are from biomass, followed by wind energy (29 per cent) and waste fuel (5 per cent).

11. In the transport sector, the number of passengers travelling by train and the use of road transport have been growing (except when impacted by the pandemic), whereas a steady decline has been observed in the volume of freight transport owing to the reduced rail transit between Estonia and the Russian Federation since 2011. The industrial sector in Estonia comprised 14.7 per cent of the country's economy in 2020, which is close to the EU average. In 2020, 67 per cent of Estonia's production was exported, primarily to the Nordic countries within the EU internal market. The timber industry, which contributes significantly to Estonia's exports, has been increasing gradually and accounted for one fifth of the entire manufacturing industry production and 7.9 per cent of Estonian GDP in 2019.

12. The agriculture sector has been impacted by the structural changes in the economy and international markets since the 1990s (the area of agricultural land decreased from 1,458,400 ha in 1990 to 986,627 ha in 2021 and the number of farm animals decreased by 67.1 per cent over the same period). However, there has been a reversal in this trend over the past 15 years owing to EU support provided under the EU Common Agricultural Policy Implementation Act and subsidies paid to support the development of the agriculture and fishery sectors.

13. In 2020, approximately 51.3 per cent of the territory of Estonia consisted of forest land, with the surface area of forests amounting to 2,324,904 ha. However, owing to the high proportion of mature forest stands and the decreasing carbon sequestration capacity in

biomass, the biomass increment has been lower in the past 10 years (approximately 39 per cent of the forest stands are more than 60 years old). Estonia is among the most peatland-rich countries in the world, with approximately 20 per cent of its land area covered with peat soils. The majority of this peatland has been altered by drainage for use in agriculture, forestry and peat extraction. The age class structure of managed forests, use of peat soils and horticultural peat, and increased felling rates in the past few years have led to a decline in the LULUCF sector acting as a net sink.

14. The waste management improvements implemented under EU and national legislation (the Waste Act and Waste Management Plan 2014–2020) aimed at increasing recycling and reuse of municipal, construction and demolition waste have resulted in a decrease in GHG emissions in the waste sector of 21.5 per cent in 2020 compared with the 1990 level. In total, roughly 16.8 Mt waste was generated in 2020, including 0.5 Mt municipal waste, 53 per cent of which consisted of biodegradable waste. Waste from the oil shale industry accounted for more than 67 per cent of the total waste generated in 2020.

2. Assessment of adherence to the reporting guidelines

15. The ERT assessed the information reported in the NC8 of Estonia and identified issues relating to transparency, and thus adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table I.1.

B. Greenhouse gas inventory information[4]

1. Technical assessment of the reported information

16. Estonia reported information in its BR5 and NC8 on its historical GHG emissions and inventory arrangements. Total GHG emissions[5] excluding emissions and removals from LULUCF decreased by 71.2 per cent between 1990 and 2020 (from 40,175.17 kt CO_2 eq in 1990 to 11,555.81 kt CO_2 eq in 2020), whereas total GHG emissions including net emissions or removals from LULUCF decreased by 65.3 per cent over the same period.

17. Estonia's emission profile is dominated by emissions from the energy sector, which accounted for 81.9 per cent of Estonia's total GHG emissions in 2020. Agriculture was the second largest source and contributed 13.1 per cent of total GHG emissions in 2020, while emissions from the IPPU and waste sectors accounted for 2.6 and 2.5 per cent of total GHG emissions respectively. Total emissions from the energy sector decreased by 73.9 per cent between 1990 and 2020 owing mainly to factors such as structural changes following Estonia's transition from a planned economy to a market economy in the early 1990s, recent efforts to transition to renewable energy sources and a high EU ETS allowance price. After 2000, fluctuations in emissions are mainly due to economic trends, changes in the energy supply structure, electricity exports (produced from oil shale) and weather conditions. Other drivers that have influenced emission reduction trends in Estonia include the introduction of energy efficiency measures pursuant to the EU directive on energy efficiency, the increased share of renewable energy in the fuel mix and the increased proportion of new environmentally friendly technologies.

18. The total GHG emissions reported for the agriculture sector amounted to 1,508.38 kt CO_2 eq in 2020 compared with 2,628.34 kt CO_2 eq in 1990 (a 42.6 per cent decrease). The main driver for the decrease in emissions from the agriculture sector was the collapse of the former Soviet Union markets in the early 1990s, which left Estonia with a large excess supply of agricultural production. The transition from a planned economy to a market economy after 1991, the closure of clinker production plants and the decrease in F-gas emissions owing to the effect of restrictions implemented under the EU regulation on F-gases are among the factors impacting the reduction in emissions in the IPPU sector between 1990 and 2020 (by 69.3 per cent), while the changes in waste management practices, the reduced amount of

[4] GHG emission data in this section are based on Estonia's 2022 annual submission, version 4. All emission data in subsequent chapters are based on Estonia's BR5 CTF tables unless otherwise noted.

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

disposed waste and increased energy recovery were the main drivers influencing the downward emission trend in the waste sector over the same period (by 21.5 per cent).

19. A significant change compared with the NC7 and BR4 is the fact that the LULUCF sector has changed from being a net sink to a net source. Owing to the high proportion of mature and near-mature forest stands, the carbon sequestration capacity in biomass has decreased in the past 10 years. In 2020, net emissions from the LULUCF sector amounted to 1,297.27 kt CO_2 eq.

20. Table 4 illustrates the emission trends by sector and by gas for Estonia. The emissions reported in the 2022 annual submission are the same as those reported in CTF table 1.

Table 4
Greenhouse gas emissions by sector and by gas for Estonia for 1990–2020

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2019*	*2020*	*1990–2020*	*2019–2020*	*1990*	*2020*
Sector									
1. Energy	36 213.16	15 098.87	18 899.50	12 210.92	9 461.45	–73.9	–22.5	90.1	81.9
A1. Energy industries	28 288.34	11 727.31	15 038.58	8 203.31	5 847.70	–79.3	–28.7	70.4	50.6
A2. Manufacturing industries and construction	3 475.23	913.07	792.61	716.38	511.27	–85.3	–28.6	8.7	4.4
A3. Transport	2 481.91	1 684.86	2 288.39	2 401.82	2 232.54	–10.0	–7.0	6.2	19.3
A4. and A5. Other	1 903.52	738.47	749.82	868.45	851.23	–55.3	–2.0	4.7	7.4
B. Fugitive emissions from fuels	64.17	35.17	30.10	20.96	18.70	–70.9	–10.8	0.2	0.2
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NA	NA	NA	NA
2. IPPU	963.74	695.97	539.51	621.35	295.47	–69.3	–52.4	2.4	2.6
3. Agriculture	2 628.34	1 122.23	1 253.80	1 501.48	1 508.38	–42.6	0.5	6.5	13.1
4. LULUCF	–3 159.90	–4 204.98	–4 835.38	–334.56	1 297.27	–141.1	–487.7	NA	NA
5. Waste	369.93	562.45	488.00	302.38	290.51	–21.5	–3.9	0.9	2.5
6. Other[a]	NO	NO	NO	NO	NO	NA	NA	NA	NA
Gas[b]									
CO_2	36 922.21	15 500.38	19 002.52	12 380.19	9 343.01	–74.7	–24.5	91.9	80.9
CH_4	1 912.52	1 259.91	1 253.87	1 098.30	1 095.46	–42.7	–0.3	4.8	9.5
N_2O	1 340.45	637.47	746.47	928.46	929.68	–30.6	0.1	3.3	8.0
HFCs	NO	79.15	176.11	226.33	184.74	NA	–18.4	NA	1.6
PFCs	NO	NO	NO	NO	NO	NA	NA	NA	NA
SF_6	NO	2.61	1.83	2.84	2.92	NA	2.9	NA	0.0
NF_3	NO	NO	NO	NO	NO	NA	NA	NA	NA
Total GHG emissions excluding LULUCF	**40 175.17**	**17 479.52**	**21 180.81**	**14 636.12**	**11 555.81**	**–71.2**	**–21.0**	**100.0**	**100.0**
Total GHG emissions including LULUCF	**37 015.28**	**13 274.54**	**16 345.42**	**14 301.56**	**12 853.08**	**–65.3**	**–10.1**	**NA**	**NA**

Source: GHG emission data: Estonia's 2022 annual submission, version 4.
[a] Emissions and removals reported under the sector other (sector 6) are not included in total GHG emissions.
[b] Emissions by gas without LULUCF and including indirect CO_2 emissions. The Party did not report indirect CO_2 emissions separately in CTF table 6, but included them under the IPPU sector.

21. In brief, Estonia's national inventory arrangements were established in accordance with paragraph 143 of its Atmospheric Air Protection Act and articles 6 and 23 of the Statutes of the Ministry of the Environment. In 2018, the Ministry of the Environment appointed EERC as the institution with overall responsibility for maintaining the national system and coordinating the inventory preparation process. EERC is also responsible for carrying out final quality control and quality assurance and for submitting the final inventory to the European Commission and the UNFCCC on behalf of the Ministry of the Environment. The inventory continues to be jointly prepared by the Ministry of the Environment, EERC and

the Estonian Environment Agency. There have been changes in the source of funding for the GHG inventory preparation process since the BR4; since 2020, EERC is responsible for compiling the GHG inventory on the basis of the National Administrative Agreement with the Ministry of the Environment.

2. Assessment of adherence to the reporting guidelines

22. The ERT assessed the information reported in the NC8 and BR5 of Estonia and identified an issue relating to transparency, and thus adherence to the UNFCCC reporting guidelines on NCs and the UNFCCC reporting guidelines on BRs. The finding is described in tables I.2 and II.1.

3. National system for the estimation of anthropogenic emissions by sources and removals by sinks

(a) Technical assessment of the reported information

23. Estonia provided in the NC8 a description of how its national system for the estimation of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol is performing the general and specific functions defined in the annex to decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11. The description includes all the elements mandated by paragraph 30 of the annex to decision 15/CMP.1. The NC8 also contains a reference to the description of the national system provided in the NIR of the 2022 annual submission. The ERT took note of the review of the changes to the national system reflected in the report on the individual review of the 2022 annual submission of Estonia.

(b) Assessment of adherence to the reporting guidelines

24. The ERT assessed the information reported in the NC8 of Estonia and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

4. National registry

(a) Technical assessment of the reported information

25. In its NC8 Estonia provided information on how its national registry performs the functions in accordance with the annex to decision 13/CMP.1 in conjunction with decision 3/CMP.11 and the annex to decision 5/CMP.1 and complies with the requirements of the technical standards for data exchange between registry systems.

(b) Assessment of adherence to the reporting guidelines

26. The ERT assessed the information reported in the NC8 of Estonia and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

C. Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies

1. Technical assessment of the reported information

27. Estonia reported information on its economy-wide emission reduction target in its BR5. For Estonia the Convention entered into force on 25 October 1994. Under the Convention Estonia committed to contributing to the achievement of the joint EU economy-wide emission reduction target of 20 per cent below the 1990 level by 2020.

28. The target for the EU and its member States is formalized in the EU 2020 climate and energy package. The legislative package regulates emissions of CO_2, CH_4, N_2O, HFCs, PFCs

and SF_6 using GWP values from the AR4 to aggregate the GHG emissions of the EU until 2020. Emissions and removals from the LULUCF sector are not included in the quantified economy-wide emission reduction target under the Convention.

29. The EU-wide targets are primarily implemented through the EU ETS and ESD. The EU ETS covers mainly point emissions sources in the energy, industry and aviation sectors. From 2024 it will also cover emission sources from maritime transport. An EU-wide emission cap was put in place for 2013–2020 for the EU ETS with the goal of reducing emissions by 21 per cent below the 2005 level by 2020. For 2030, a reduction target of 62 per cent below the 2005 level has been set for emissions covered by the EU ETS. The ESD became operational in 2013 and covers sectors outside the EU ETS, including transport (excluding aviation and international maritime transport), residential and commercial buildings, agriculture, small industry and waste. The ESD is regulated through targets for each member State that add up to a reduction at the EU level of 10 per cent below the 2005 level by 2020. The ESR, the successor to the ESD, was adopted in 2018 and amended in 2023 with the target of reducing emissions covered under the ESR by 40 per cent below the 2005 level by 2030.

30. The EU generally allows its member States to use units from the Kyoto Protocol mechanisms for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. Operators and airline operators can use such units to fulfil their requirements under the EU ETS, and member States can use such units for their national ESD targets, within specific limitations.

31. The European Commission set out its vision for a climate-neutral EU in November 2018, and in December 2019 presented the European Green Deal as a road map with actions for making the EU economy sustainable. The European Council endorsed in December 2019 the objective of making the EU climate-neutral by 2050. As part of the European Green Deal, the 2050 climate-neutrality target was made binding in the first European Climate Law, adopted in 2021. It also increased the ambition of the 2030 emission reduction target to at least 55 per cent below the 1990 level. Member States will set out any increased ambition in the update of their national energy and climate plans. Estonia informed the ERT that the update of its National Energy and Climate Plan is ongoing in accordance with the EU regulation on the governance of the Energy Union and climate action.

32. Estonia has a national target of limiting its emission growth to 11 per cent above the 2005 level by 2020 for ESD sectors. This target has been translated into binding quantified AEAs for 2013–2020. Estonia's AEAs change following a linear path from 6,296.99 kt CO_2 eq in 2013 to 6,023.72 kt CO_2 eq in 2020.[6] Under the ESR, an EU-wide target was updated in 2023 to reducing emissions to 40 per cent below the 2005 level by 2030. Estonia had a national target of reducing emissions from covered sectors to 13 per cent below the 2005 level by 2030 and has a revised target to reduce emissions from covered sectors to 24 per cent below the 2005 level by 2030.

33. Estonia also committed to achieving a domestic target of a 25 per cent share of renewable energy in gross final energy consumption by 2020 under the EU renewable energy directive and an indicative target to decrease final energy consumption to 846 Mtoe/year and primary energy consumption to 1,128 Mtoe/year by 2020 under the EU energy efficiency directive. Estonia also reported on the longer-term EU targets of achieving a 32 per cent share of renewable energy in gross final energy consumption by 2030 and a 32.5 per cent energy efficiency target for 2030 under the EU renewable energy directive and the EU energy efficiency directive respectively, which include updated commitments at the national level. All reported international and domestic targets are in the process of being updated to include the goals of ensuring a low-carbon economy and achieving climate neutrality by 2050.

2. Assessment of adherence to the reporting guidelines

34. The ERT assessed the information reported in the BR5 of Estonia and identified an issue relating to transparency, and thus adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table II.2.

[6] According to the EU transaction log.

D. Information on policies and measures

1. Technical assessment of the reported information

35. Estonia provided in its NC8 and BR5 information on its PaMs[7] implemented, adopted and planned to fulfil its commitments under the Convention. The Party indicated in its NC8 that most of the PaMs reported in the NC7 have expired owing to their target date of 2020 and have been replaced with updated versions. Estonia explained that it is working to improve the tracking of the PaMs implementation cycle for use in future reporting.

36. Estonia reported on its policy context and legal and institutional arrangements in place for implementing its commitments and monitoring and evaluating the effectiveness of its PaMs. The Party also provided information on the current status of its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards its target. During the review, the Party highlighted the changes in these arrangements.

37. In 2021 the "MHR" methodological framework was established for estimating the ex ante and ex post mitigation impacts of PaMs to reduce GHG emissions. Estonia informed the ERT that the Ministry of the Environment and the State Shared Service Centre are currently working on establishing a system for using the MHR framework as the official guidelines when designing climate PaMs. It is expected that from 2024 onward PaMs will be designed in line with the MHR framework guidelines.

38. From 2023 onward all EU member States are mandated to report to the European Commission biannually on the status of implementation of their integrated national energy and climate plan by means of an integrated national energy and climate plan progress report. Estonia has established a core team with representatives of different ministries and other relevant institutions to gather all the information necessary for the progress report.

39. In April 2017 the Parliament of Estonia adopted the General Principles of Climate Policy until 2050, a long-term low-carbon strategy, according to which the Government is to present a progress report to Parliament at least every four years on the preparation and implementation of cross-sectoral and sectoral strategies. In early 2022, the first such report for 2017–2021 was presented to Parliament. As a result, an amended version of the General Principles of Climate Policy until 2050 was adopted by Parliament on 8 February 2023, which included the target of achieving climate neutrality by 2050.

40. The Estonia 2035 development strategy, adopted by Parliament on 12 May 2021, stipulates that every minister shall provide annually to Parliament an overview of the activities in their field and plans for achieving the goals set out in the strategy, including the Minister of the Environment, who is responsible for Estonia's 2050 climate neutrality goal. This process gives members of Parliament the opportunity to obtain an annual overview of the main trends in all policy areas and take appropriate action to ensure reaching the goal of transitioning to climate-neutral energy production by 2035 while at the same time ensuring energy security by gradually reducing the share of oil shale energy (phasing out oil shale entirely by 2040) and developing and deploying new climate-neutral energy production and storage solutions. Guiding principles for transitioning to climate neutrality in all relevant sectors in Estonia are described in the General Principles of Climate Policy until 2050.

41. Other national strategy documents relevant to climate policy include the Agriculture and Fisheries Strategy 2030, Estonian Energy Development Plan until 2030, Estonian Forestry Development Plan until 2020 (extended until the new development programme is adopted), draft National Adaptation Plan 2030, Climate Change Adaption Development Plan until 2030, National Energy and Climate Plan until 2030 and its progress reports, and National Air Pollution Control Programme. The goals set out in these strategic documents and reports are guided by the national targets derived from the relevant EU targets.

[7] The UNFCCC reporting guidelines on BRs use the term "mitigation actions", whereas the UNFCCC reporting guidelines on NCs use the term "policies and measures". The terms are used interchangeably in this report to refer to the relevant information in either the NC or BR.

42. Estonia explained that there are currently no national rules for taking action against domestic non-compliance with national or EU emission reduction targets. However, rules on compliance with EU targets are established in EU legislation and Estonia, as an EU member State, follows these rules.

43. Estonia's assessment of the economic and social consequences of its response measures includes impact assessments carried out in the early stages of the policymaking process. Estonia did not report information on the identification of its own policies and practices that encourage activities that lead to greater levels of anthropogenic GHG emissions than would otherwise occur. During the review, the Party clarified that it had identified one measure under the WAM scenario related to the agriculture sector on the improvement of manure management that results in increased levels of GHG emissions from agriculture.

44. In its reporting on PaMs, Estonia provided the estimated emission reduction impacts for most of its PaMs in the energy, transport and IPPU sectors. The impacts were not estimated for PaMs in the LULUCF, waste and agriculture sectors and for some PaMs relating to energy consumption. The Party explained during the review that estimated impacts were not provided for some PaMs owing to the lack of quantifiable activity data or methods. Some of the PaMs reported are 'soft' measures, including activities such as trainings, advisory services, knowledge transfer and information activities, farm management services, studies and pilot projects, that are difficult to evaluate in terms of their contribution to GHG emission reductions or to quantify using the current projections compilation methodology.

45. The Party described its general methodology for estimating the impacts of its PaMs in the energy and transport sectors, which were estimated mainly by assessing fuel and/or energy savings using data from relevant studies, regulations in force and analyses conducted by a number of institutions. To estimate the impact of some PaMs in the LULUCF sector, Estonia is working towards the development of GHG reporting models integrated into a modern geoinformation system, which will allow the impact of specific PaMs to be assessed on a location-specific basis, thereby reducing the uncertainty of future assessments.

46. The key overarching related cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD. The package is supplemented by renewable energy and energy efficiency legislation and legislative proposals on the 2020 targets for CO_2 emissions from cars and vans, the carbon capture and storage directive, and the general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package. The 2021 European Climate Law, which forms part of the European Green Deal, made climate neutrality by 2050 legally binding and raised the EU-wide 2030 emission reduction target to at least 55 per cent compared with the 1990 level. In 2023, the European Parliament adopted a series of legislative proposals, collectively referred to as Fit for 55 intended to help achieve the new 2030 target. These new regulations strengthened both the ESR and EU ETS targets, extended the EU ETS to include maritime shipping in 2024 and established the Social Climate Fund to address equitability of mitigation impacts. The regulations also created the EU ETS 2 to cover at the point of distribution most fuel used in sectors not covered by the EU ETS, beginning in 2027.

47. The 2021–2030 EU-wide policies are operationalized through the national energy and climate plans of EU member States, which should set out national objectives for each of the five dimensions of the Energy Union, namely energy security; the internal energy market; energy efficiency; decarbonization; and research, innovation and competitiveness. The national energy and climate plans are periodically updated to reflect changes to EU policy, such as the implementation of the European Green Deal. During the review, Estonia explained that it is in the process of updating its National Energy and Climate Plan, as a number of domestic strategic documents have been adopted or revised over the past four years, including the Fit for 55 package of legislative proposals.

48. The National Energy and Climate Plan of Estonia from 2019 contains a total of 71 measures: 22 in the agriculture sector; 16 in the transport sector; 13 in the energy sector; 8 in the forestry sector; 6 relating to building stock; 4 in the waste management sector; 1 in the industry sector; and 1 cross-cutting measure. The main PaMs in the energy sector with the highest estimated mitigation impact are the development of additional heating and electrical

efficiency, reverse auctions for renewable energy and the development of wind parks. Other measures include the development of heating infrastructure and electricity grid development. In the transport sector, the main PaMs are on increasing the use of electric transport, increasing the energy and fuel efficiency of vehicles, the development of public transport and railway infrastructure, and the electrification of railways and ferries. With regard to the building stock, the reconstruction of public sector buildings, business and residential premises, and street lighting were the key PaMs reported by the Party, along with the implementation of minimum requirements for zero-energy buildings. In the agriculture sector, the promotion of organic farming, the improved use of fertilizer, the storage and increase of carbon stock in soils, and the improvement of animal welfare and feed quality were among the PaMs reported. Waste management measures are focused on the reduction of biodegradable waste, the reuse and reduction of waste materials, the reduction of landfilling and the reduction of environmentally hazardous waste.

49. Estonia introduced national-level policies to achieve its targets under the ESD and domestic emission reduction targets. The key policies reported include the street lighting reconstruction programme investments, the promotion of the use of electricity in passenger cars, the promotion of the use of biomethane in buses and the implementation of EU policies on F-gases. The mitigation effect of transport-related policies is the most significant. A key policy in the transport sector is the promotion of the use of biomethane in buses, with a cost efficiency in terms of CO_2 emission reductions of EUR 5.3/t. The ERT identified the promotion of the use of electricity in passenger cars as a mitigation action of particular interest because Estonia is at the forefront of efforts to promote e-mobility and is aiming to develop a system to support the expansion of the infrastructure needed for the switch to electric cars.

50. Estonia highlighted the domestic mitigation actions that are under development, such as those being revised to align with the more ambitious 2030 target of the EU to reduce domestic emissions by at least 55 per cent compared with the 1990 level, which will be included in the draft updated National Energy and Climate Plan to be published in 2023. The Party also provided information on measures under discussion but did not provide an assessment of their mitigation impact or include them in the projections under the WAM scenario.

51. Table 5 provides a summary of the reported information on the PaMs of Estonia.

Table 5
Summary of information on policies and measures reported by Estonia

Sector	*Key PaMs*	*Estimated mitigation impact in 2020 (kt CO_2 eq)*	*Estimated mitigation impact in 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	General Principles of Climate Policy until 2050	NA	NA
	Estonia 2035 development strategy	NA	NA
	Estonia 2035 action plan	NA	NA
Energy			
Energy supply and renewable energy	Investment support for wind parks	412.63	3 864.76
	Support for renewable and efficient CHP-based electricity production	769.16	471.57
	Increasing the share of solar energy in electricity generation	141.47	383.16
	Renewable energy support through underbidding auctions (technology-specific)	NE	383.15
Energy efficiency	Support for the reconstruction of apartment buildings	9.13	37.93
	Street lighting reconstruction programme investments	4.89	63.79
Transport	Increasing the share of biofuels in transport	112.62	NE
	Promotion of the use of electric passenger cars	4.33	74.31
	Promotion of the use of biomethane in buses	21.93	90.96

Sector	*Key PaMs*	*Estimated mitigation impact in 2020 (kt CO_2 eq)*	*Estimated mitigation impact in 2030 (kt CO_2 eq)*
	Development of railway infrastructure	NE	20.76
IPPU	Bans and duties implemented under the EU regulation on F-gases and the EU directive relating to emissions from air-conditioning systems in motor vehicles	NE	137.39
Agriculture	Support for soil and water protection	NE	NE
LULUCF	Prevention of bark beetle damage	NE	NE
	Investments to support forest adaptation to climate change	NE	NE
Waste	Enhancing the safe circular material use rate	NE	NE

Note: The estimated mitigation impacts are estimates of emissions of CO_2 eq avoided in a given year as a result of the implementation of mitigation actions. Estonia provided estimates of mitigation impact for 2020, 2030, 2040 and 2050, as reported in CTF table 3, the NC8 and the BR5.

52. Estonia provided a list of 103 PaMs in its NC8, BR5 and CTF table 3, which have a total quantified impact of 6,193 kt CO_2 eq (or 53 per cent of Estonia's GHG emissions in 2020). Of the listed PaMs, 21 have an annual emission reduction potential of between 10 and 100 kt CO_2 eq and 6 have an annual emission reduction potential greater than 100 kt CO_2 eq. The projected total impact of these measures is 5,508 kt CO_2 eq in 2030. With the exception of the measure on F-gases in the industrial sector, all the quantified measures are related to the promotion of renewable energy generation.

53. During the review, Estonia explained that it uses revenues from auctioning EU ETS allowances for climate policy purposes. Half of the auctioning revenues are earmarked for climate- and energy-related measures under the four-year State Budget Strategy. The list of associated measures and responsible institutions is included in appendix 5 to the State Budget Strategy. The Party has used revenues from the auctioning process to support measures such as the promotion of energy efficiency and renewable energy use in public buildings and sustainable transport. Estonia has also used the revenues to finance projects such as flood risk management plans, the development of the biomethane market and the implementation of adaptation measures.

54. The energy sector is the main source of GHG emissions in Estonia, with a share of 81.9 per cent of the country's total emissions in 2020, and the majority of mitigation measures are focused on this sector. Emissions from the energy sector decreased by 73.9 per cent between 1990 and 2020. Primary energy consumption was 54.8 TWh in 2019 and is projected to be less than 60 TWh in 2030. Final energy consumption was 32.88 TWh in 2019 and 34.05 TWh in 2020 and is projected to be between 32 and 33 TWh in 2030.

55. On the supply side, oil shale has historically accounted for up to 80 per cent of total electricity produced. Between 2017 and 2020, this decreased to 40.3 per cent, which can be attributed to the significant price increase in the EU ETS. According to the input collected from the energy industry for preparing projections, the industry plans to phase out oil shale pulverized combustion, build a more efficient oil shale combustion plant and phase out shale oil in solid heat carrier technology-based shale oil production plants, which will lead to a significant decrease in GHG emissions (particularly in 2040 and 2041) in the energy industries sector by up to 95.4 per cent by 2050 compared with the 2020 level. Estonia is implementing a project to address the related negative social and economic consequences of the decline and foreseen closure of the oil shale sector in the Ida-Virumaa region of the country. For the project, the Party uses resources from the EU Just Transition Fund to facilitate the transition to a climate-neutral economy in a way that guarantees the well-being of the local community while supporting entrepreneurs in identifying and implementing new business opportunities.

56. The changes in the energy mix are also linked to the increased share of renewables, from 26.5 per cent of primary energy production in 2017 to 42.2 per cent in 2020 following the increase in wood and waste use in CHP plants. The goals set in the Estonian Energy Development Plan until 2030 have been updated to include the target of a share of renewable

energy in total final energy consumption of above 55 per cent by 2035. The share of renewable energy in final consumption for heating and cooling is projected to increase from 58.8 per cent in 2020 to 63.0 per cent in 2030.

57. The capacity of hydropower plants for electricity generation was just 15 GWh in 2018 but doubled to 30 GWh by 2020. The capacity of solar power has also increased from 14.5 GWh in 2017 to 245.1 GWh in 2020. Nevertheless, the National Energy and Climate Plan has set a target of 400 GWh for solar energy by 2030. The electricity production of wind power plants has also increased from 636 GWh in 2018 to 760 GWh in 2020, with a target of 2,640 GWh by 2030, as set out in the National Energy and Climate Plan. Subsidies for wind electricity generation are granted through reverse auctions. Currently, there are only onshore wind parks in Estonia, although various plans are in place for the construction of offshore wind parks.

58. With respect to demand side management, one of Estonia's key goals is to increase energy efficiency. Obligations to improve energy efficiency are derived from EU strategies and legislation (under the overall EU indicative target to improve energy efficiency by 40 per cent by 2030 compared with the 1990 level). There are subsidies in place for renovating district heating systems and implementing light-emitting diode street lighting, and for enhancing the uptake of local heating systems in places where district heating is not available. Key measures aimed at reducing emissions from the residential and public sector are focused on energy conservation through the reconstruction of buildings. The Ministry of Economic Affairs and Communications is currently investigating possibilities for carbon-neutral heating and cooling system applications in Estonia.

59. The share of the transport sector within the energy sector was 23.6 per cent in 2020. Reducing GHG emissions from the transport sector is one of Estonia's main goals in meeting its targets under the ESR. Estonia is aiming to reduce GHG emissions from the transport sector to 1,700 kt CO_2 eq by 2035, as set out in the Estonia 2035 development strategy action plan. It should be noted that the share of public transport use is in decline despite efforts to make it more popular and the measures included in the Transport and Mobility Development Plan 2021–2035. The PaMs included in the NC8 and BR5 cover electrification of road and railway transport and use of biofuels.

60. The largest sources of industrial process emissions in Estonia in 2020 were ozone-depleting substance substitutes and mineral production (limestone and cement), which are covered by the EU ETS and regulated by the obligation for manufacturing industries to implement the best available technologies. The measure with the greatest effect on GHG emissions from industrial processes is the bans and duties implemented under the EU regulation on F-gases and the EU directive relating to emissions from air-conditioning systems in motor vehicles. The PaMs in the agriculture sector are consistent with the Estonian Rural Development Plan 2014–2020 and the EU Common Agricultural Policy Strategic Plan 2023–2027. The PaMs in the waste sector are part of the National Waste Plan 2022–2028, which encourages action to avoid waste generation and promotes the separate collection, reuse and recycling of waste.

61. The LULUCF sector is significant in Estonia, as forest land covers about 50 per cent of the country's territory and the associated industrial activities are significant. The LULUCF sector became a net emitter in 2020, whereas it previously acted as a carbon sink. Estonia faces the challenge of restoring the sink status of the LULUCF sector on the basis of the aims of the Fit for 55 package of legislative proposals and the EU LULUCF regulation. Estonia acknowledged during the review that the PaMs reported in the NC8 are insufficient to meet the targets set by 2030 and the LULUCF sector is projected to remain a source of GHG emissions. The Ministry of the Environment is currently analysing which additional measures are needed to reverse the current trends. Estonia is also working on developing methodologies to ensure high confidence in the data on the GHG impacts of PaMs in the sector.

2. Assessment of adherence to the reporting guidelines

62. The ERT assessed the information reported in the NC8 and BR5 of Estonia and identified issues relating to completeness and transparency, and thus adherence to the

UNFCCC reporting guidelines on NCs and the UNFCCC reporting guidelines on BRs. The findings are described in tables I.3 and II.3.

3. Domestic and regional programmes and legislative arrangements and procedures related to the Kyoto Protocol

(a) Technical assessment of the reported information

63. In its NC8 Estonia reported that the implementation of the Kyoto Protocol is underpinned by the policy documents anchored in or linked to EU policy and the EU 2020 climate and energy package and formulated in the National Energy and Climate Plan. The overall responsibility for climate change policymaking lies with the Ministry of the Environment, and a number of national institutions are involved in policy implementation. Estonia's institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards the economy-wide emission reduction target is overseen by Parliament. The Ministry of the Environment, Ministry of Rural Affairs, Ministry of Economic Affairs and Communications, Ministry of Finance, Ministry of the Interior and Ministry of Education and Research report to Parliament every four years on the implementation of national climate-related strategic documents in line with their sectoral responsibilities.

64. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, Estonia committed to contributing to the joint EU effort to reduce GHG emissions by 20 per cent below the base-year level (see paras. 27–31 above).

65. The Party informed the ERT that there are no domestic arrangements and enforcement procedures in place to meet its commitments under the Kyoto Protocol, including procedures for addressing non-compliance, besides the EU-wide arrangements and procedures.

66. Estonia did not report on the national legislative arrangements and administrative procedures in place that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources. Estonia explained during the review that the current system for the management of forests ensures biological diversity and productivity and promotes capability for regeneration without causing harm to other ecosystems. The Party further highlighted that the Forest Act provides the legal framework for managing Estonian forests to ensure the protection and sustainable management of forests as an ecosystem. The Forest Act encompasses reforestation measures aimed at the recovery of forest after logging or natural disasters and regulates the voluntary protection of key habitats through compensation (subsidies) for private forest owners.

(b) Assessment of adherence to the reporting guidelines

67. The ERT assessed the information reported in the NC8 of Estonia and identified issues relating to transparency, and thus adherence to the reporting guidelines for supplementary information. The findings are described in table I.8.

4. Policies and measures in accordance with Article 2 and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

(a) Technical assessment of the reported information

68. In the NC8 and during the review, Estonia reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties.

69. Further information on how Estonia strives to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties was reported in the 2022 annual GHG inventory submission. Estonia reported on the progressive reduction or phasing

out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all GHG-emitting sectors, taking into account the need for energy price reforms to reflect market prices and externalities. The Party reported information on what it prioritized in implementing its commitments under Article 3, paragraph 14, including several fiscal measures to support sustainable energy consumption and reduce GHG emissions.

70. The NC8 includes information on activities of ICAO and IMO to limit emissions from aviation and marine bunker fuels. During the review, the Party clarified that it updated and submitted its State Action Plan to ICAO in September 2022, which includes measures to introduce sustainable aviation fuels. In 2022 the Maritime Economy White Paper 2022–2035 was adopted with the aim of moving the maritime transport sector towards climate neutrality and promoting the use of sustainable alternative fuels both in sea transport and inland shipping. The inclusion of international bunkers under the EU ETS is expected to create further impetus for measures in this area.

(b) Assessment of adherence to the reporting guidelines

71. The ERT assessed the information reported in the NC8 of Estonia and identified issues relating to transparency, and thus adherence to the reporting guidelines for supplementary information. The findings are described in table I.8.

E. Estimates of emission reductions and removals and the use of units from market-based mechanisms and land use, land-use change and forestry and progress in achieving the quantified economy-wide emission reduction target

1. Technical assessment of the reported information

72. Estonia reported in its BR5 that it does not intend to use units from market-based mechanisms under the Kyoto Protocol and other market-based mechanisms under the Convention to meet its commitment under the ESD. It reported in CTF tables 4 and 4(b) that it did not use any units from market-based mechanisms in 2019 or 2020. Given that the contribution of LULUCF activities is not included in the joint EU target under the Convention, reporting thereon is not applicable to Estonia. Table 6 illustrates Estonia's ESD emissions and use of units from market-based mechanisms for achieving its ESD target.

Table 6
Summary of information on emissions covered by the European Union effort-sharing decision annual emission allocation and use of units from market-based mechanisms by Estonia
(kt CO_2 eq)

Year	*ESD emissions*	*AEA*	*Use of units from market-based mechanisms*	*AEAs transferred to (–) or from (+) other Parties*	*Annual AEA surplus/deficit*	*Cumulative AEA surplus/deficit*
2013	5 752.96	6 296.99	NA	NA	544.03	544.03
2014	6 083.09	6 321.31	NA	NA	238.22	782.24
2015	6 144.41	6 345.64	NA	NA	201.23	983.47
2016	6 218.05	6 369.96	NA	NA	151.91	1 135.38
2017	6 205.02	5 928.97	NA	NA	–276.06	859.33
2018	6 121.70	5 960.55	NA	NA	–161.15	698.18
2019	6 208.76	5 992.14	NA	NA	–216.63	481.55
2020	5 934.83	6 023.72	NA	NA	88.89	570.44

Sources: Estonia's BR5, CTF table 4 and EU transaction log (AEAs).
Note: For a given year, a positive number (surplus) indicates that annual or cumulative ESD emissions were lower than the corresponding AEA or cumulative AEAs, while a negative number (deficit) indicates that annual or cumulative ESD emissions were higher than the corresponding AEA or cumulative AEAs.

2. Assessment of adherence to the reporting guidelines

73. The ERT assessed the information reported in the BR5 of Estonia and identified an issue relating to transparency, and thus adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table II.4.

3. Assessment of achievement of the quantified economy-wide emission reduction target

74. In assessing the Party's contribution towards achievement of the 2020 joint EU target on the basis of the information reported in its BR5, the ERT noted that, under the EU 2020 climate and energy package, Estonia committed to limiting its emission growth under the ESD to 11 per cent above the 2005 level by 2020 (see para. 32 above). This target has been translated into binding quantified AEAs for 2013–2020. In 2020 Estonia's ESD emissions were 1.5 per cent (88.89 kt CO_2 eq) below the AEA. Estonia has a cumulative surplus of 570.44 kt CO_2 eq with respect to its AEAs between 2013 and 2020.

75. The ERT noted that the Party reported that the total GHG emissions excluding LULUCF of the EU and including the use of units from market-based mechanisms do not exceed the emission level corresponding to the target in 2020, and thus that the EU has achieved its joint target. See the report on the review of BR5 of the EU for further details. Therefore, the ERT concluded that, on the basis of the information reported in the BR5, Estonia has met its 2020 commitment under the Convention through its contribution to achieving the joint EU target. The ERT noted that the Party's ESD emissions in 2020 do not exceed its AEA for 2020.

F. Projections

1. Projections overview, methodology and results

(a) Technical assessment of the reported information

76. Estonia reported in its BR5 and NC8 updated projections for 2021–2050 relative to actual inventory data for 2020 under the WEM scenario. The WEM scenario reported by Estonia includes PaMs implemented and adopted until 2020. In addition, it includes some PaMs from the EU Common Agricultural Policy Strategic Plan 2023–2027 that were planned when compiling the BR5 and NC8 and adopted in November 2022.

77. In addition to the WEM scenario, Estonia reported a WAM scenario. Estonia did not report a WOM scenario. The WAM scenario includes planned PaMs that are not included in the WEM scenario and are in line with the more ambitious targets and new measures proposed. The definitions indicate that the scenarios were mostly prepared in accordance with the UNFCCC reporting guidelines on BRs.

78. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions, and on a gas-by-gas basis for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case) as well as NF_3 for 2021–2050. The projections are also provided in an aggregated format for each sector and for a Party total using GWP values from the AR4. Estonia reported on factors and activities affecting emissions for each sector.

(b) Methodology, assumptions and changes since the previous submission

79. The methodology used for the preparation of the projections is different from that used for the preparation of the emission projections for the NC7. Estonia provided information on changes since the submission of its NC7 in the assumptions, methodologies, models and approaches used for the projection scenarios. In the NC7, Estonia reported projections until 2035, while in the NC8 the projections were reported until 2050. The changes in the models used mainly impact the energy and agriculture sectors. In the energy sector, an updated version of the Balmorel model was used, which combines a bottom-up modelling approach used in traditional technical modelling with a top-down economic analysis, projections and forecasts. In the transport sector, the LEAP modelling tool was replaced with the bottom-up Sibyl baseline model. In the agriculture sector, the Agriculture Projection Model was used

for the NC8, while in the NC7 emissions were calculated using a bottom-up approach based on the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Estonia provided a table showing a comparison of the changes in key input data (e.g. annual GDP growth rates, population and fuel prices) and total GHG emissions (including LULUCF) between the NC7 and NC8.

80. Although sophisticated sectoral models and approaches were used, Estonia does not currently consider the synergies across projected trends and does not apply model coupling. This implies, for example, that changes in the use of biomass in the energy sector do not affect the modelling of the LULUCF sector. In 2020, Estonia exported 66.1 per cent of generated electricity to neighbouring countries. In contrast, the projections for electricity generation calculated using the Balmorel model were compiled from an energy security perspective which excludes electricity exports.

81. To prepare its projections, Estonia relied on updated key underlying assumptions relating to population, energy prices, GDP as an economic development indicator, EU ETS carbon prices, energy supply and final energy consumption, indicators for the agriculture sector (e.g. livestock, fertilizer), waste amounts, land-use areas and wood felling volumes. The assumptions were updated on the basis of the most recent economic developments known at the time of the preparation of the projections and reported in tabular format in the NC8, BR5 and CTF table 5.

82. Estonia's population is projected to continue decreasing, but at a lower rate compared with the projections reported in the NC7, and is projected to be 3.8 per cent lower in 2050 than in 2020. GDP is projected to grow in all projected years, with the largest growth of 2.5 per cent in 2025 and a slowing down thereafter. The projected overall growth in GDP is slightly lower than the projections reported in the NC7. EU carbon prices have been revised significantly upwards (e.g. from EUR 36.5 in the NC7 and EUR 43.5 in the BR4 to EUR 120 EUR in the NC8 and BR5 for 2035). The Party provided an extensive list of the assumptions and indicators used at the sectoral and subsectoral level.

83. Estonia provided projections under the WEM and WAM scenarios for indirect emissions of NO_X, NMVOCs, SO_X, NH_3 and particulate matter 2.5 in the form of diagrams and textual descriptions. The largest changes are expected in emissions of NO_X and SO_X, while NH_3 emissions are projected to remain almost constant.

84. Sensitivity analyses were conducted for a number of important assumptions, such as population and GDP. Sensitivity analyses were performed for parts of the energy, industrial processes and waste sectors using higher GDP growth and lower population. The sensitivity analyses lead to higher projected GHG emissions in the energy and waste sectors and lower projected GHG emissions in the industrial processes sector.

(c) Results of projections

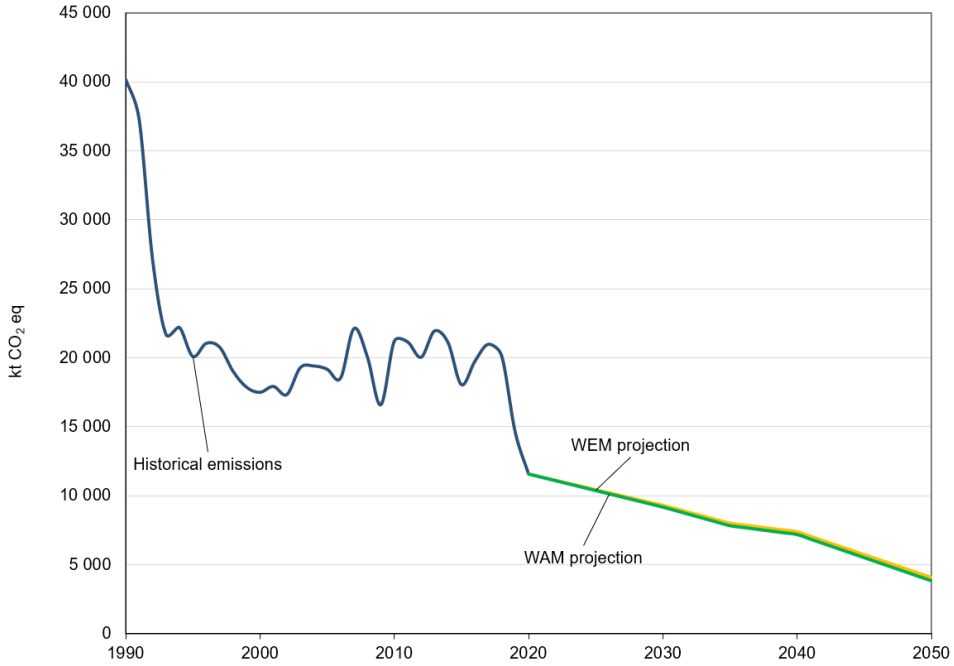
85. The projected emission levels under different scenarios and information on the quantified economy-wide emission reduction target are presented in table 7 and figure 1.

Table 7
Summary of greenhouse gas emission projections for Estonia

	GHG emissions (kt CO_2 eq/year)	*Change in relation to 1990 level (%)*	*Change in relation to 2020 level (%)*
Inventory data 1990	40 175.17	NA	NA
Inventory data 2020	11 555.81	–71.2	NA
WEM projections for 2030	9 299.05	–76.9	–19.5
WAM projections for 2030	9 177.46	–77.2	–20.6
WEM projections for 2035	8 003.27	–80.1	–30.7
WAM projections for 2035	7 833.08	–80.5	–32.2

Sources: Estonia's BR5 and BR5 CTF table 6.
Note: The projections are of GHG emissions excluding LULUCF and including indirect CO_2.

Figure 1
Greenhouse gas emission projections reported by Estonia

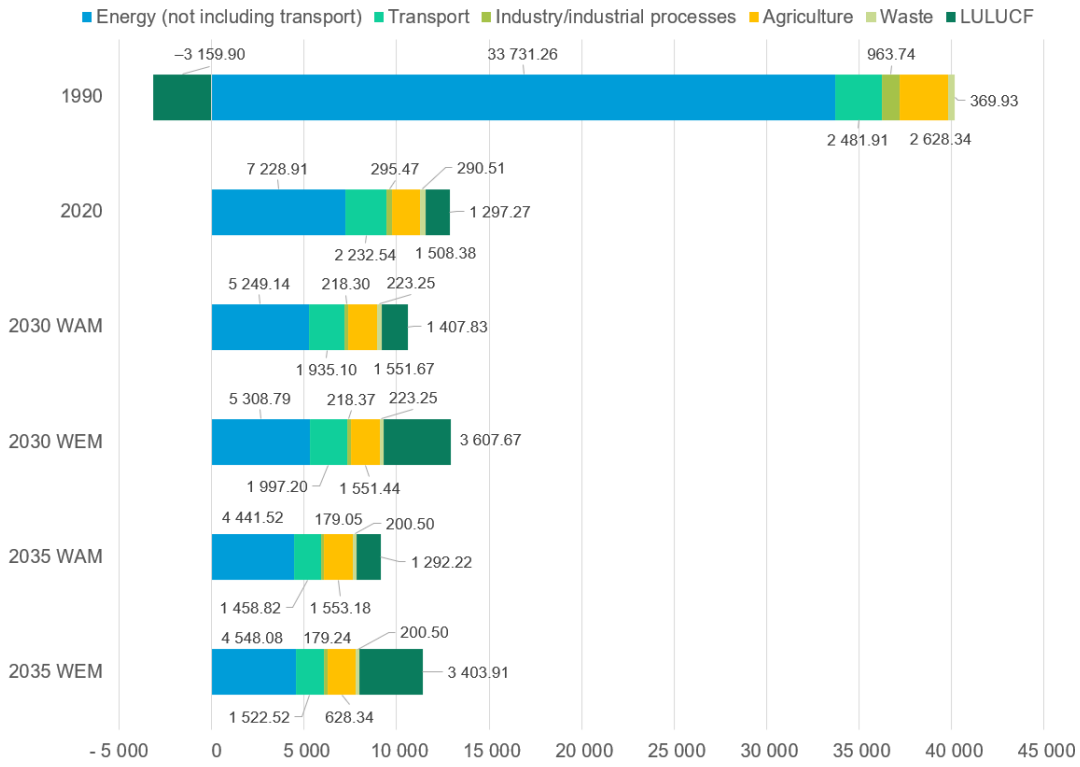


Sources: Estonia's BR5 and BR5 CTF tables 1 and 6 (total GHG emissions excluding LULUCF).

86. Estonia's total GHG emissions excluding LULUCF and including indirect CO_2 are projected under the WEM scenario to decrease by 76.9 and 80.1 per cent respectively below the 1990 level in 2030 and 2035. When including LULUCF (projected as a net source), total GHG emissions are projected under the WEM scenario to decrease by 65.1 and 69.2 per cent respectively below the 1990 level in 2030 and 2035. Under the WAM scenario, emissions including LULUCF in 2030 and 2035 are projected to be lower than those in 1990 by 71.4 and 87.7 per cent respectively. In 2050, total GHG emissions including LULUCF are projected to decrease by 81.4 per cent below the 1990 level under the WEM scenario and by 87.7 per cent under the WAM scenario.

87. Estonia presented the WEM and WAM scenarios by sector in tabular format for 2025, 2030, 2035, 2040 and 2050, as summarized in figure 2 and table 8. The corresponding diagrams in the NC8 cover each individual year from 1990 to 2050.

Figure 2
Greenhouse gas emission projections for Estonia presented by sector
(kt CO_2 eq)



Source: Estonia's BR5 CTF table 6.

Table 8
Summary of greenhouse gas emission projections for Estonia presented by sector

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
		2030		*2035*		*1990–2030*		*1990–2035*	
Sector	*1990*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
Energy (not including transport)	33 731.25	5 308.79	5 249.14	4 548.08	4 441.52	–84.3	–84.4	–86.5	–86.8
Transport	2 481.91	1 997.20	1 935.10	1 522.52	1 458.82	–19.5	–22.0	–38.7	–41.2
Industry/industrial processes	963.74	218.37	218.30	179.24	179.05	–77.3	–77.3	–81.4	–81.4
Agriculture	2 628.34	1 551.44	1 551.67	1 552.92	1 553.18	–41.0	–41.0	–40.9	–40.9
LULUCF	–3 159.90	3 607.67	1 407.83	3 403.91	1 292.22	–214.2	–144.6	–207.7	–140.9
Waste	369.93	223.25	223.25	200.5	200.5	–39.7	–39.7	–45.8	–45.8
Other	NO	NO	NO	NO	NO	NA	NA	NA	NA
Total GHG emissions excluding LULUCF	**40 175.17**	**9 299.05**	**9 177.46**	**8 003.27**	**7 833.08**	**–76.9**	**–77.2**	**–80.1**	**–80.5**

Source: Estonia's NC8 and BR5 table 5.2.

88. According to the projections reported for 2030 under the WEM scenario, the most significant absolute emission reductions are expected to occur in the energy sector, amounting to projected reductions of 84.3 per cent between 1990 and 2030. The pattern of projected emissions reported for 2035–2050 under the same scenario remains the same, with the most significant emission reductions projected in the energy sector. The most notable emission reduction is projected to occur between 2040 and 2041, when the plants converting oil shale to shale oil (which constitute the largest source of GHG emissions from energy

industries) are expected to be phased out. Decreasing levels of GHG emissions are projected in the transport, industrial processes and waste sectors, with emission reductions ranging from 19.5 per cent for transport to 77.3 per cent for industrial processes between 1990 and 2030. In contrast, the LULUCF sector was a sink in 1990 but has since become an emissions source and is projected to remain so, with a projected increase of 214.2 per cent between 1990 and 2030. Under the WEM scenario, the LULUCF sector is projected to become the largest source of GHG emissions in Estonia from 2040 onward. Emissions from the agriculture sector are projected to decline until 2025 under the WEM scenario, but an increase in emissions is projected thereafter, mainly caused by an increase in livestock and related emissions from manure management.

89. When additional PaMs are taken into consideration in the WAM scenario, emissions are projected to decrease further for most sectors. The largest difference is in the LULUCF sector, where projected emissions under the WAM scenario in 2030, 2035 and 2050 are significantly lower (e.g. by 69.6 per cent for 2030) than under the WEM scenario. The reduced emissions from the LULUCF sector can be attributed to lower felling volumes compared with those considered under the WEM scenario. This means that emissions from the LULUCF sector under the WAM scenario are only 144.6 per cent higher compared with the removals in the LULUCF sector in 1990. In contrast to the WEM scenario, the LULUCF sector is not projected to be the largest emissions source from 2040 onward under the WAM scenario. Under the WAM scenario, the energy and agriculture sectors are projected to be the largest emitters in 2050 with an almost equal share, as emissions in the energy sector are projected to decrease while at the same time emissions in the agriculture sector are projected to increase owing to a larger number of livestock (similar to the WEM scenario) and additional changes in manure management resulting in a decrease in NH_3 emissions but an increase in N_2O emissions.

90. Estonia presented the WEM and WAM scenarios by gas for 2030 and 2035, as summarized in table 9.

Table 9
Summary of greenhouse gas emission projections for Estonia presented by gas

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
		2030		*2035*		*1990–2030*		*1990–2035*	
Gas	*1990*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
CO_2[a]	36 922.21	7 135.02	7 020.99	5 890.49	5 736.54	–80.7	–81.0	–84.0	–84.5
CH_4	1 912.52	1 130.02	1 125.70	1 125.64	1 115.42	–40.9	–41.1	–41.1	–41.7
N_2O	1 340.45	914.27	911.03	906.29	900.26	–31.8	–32.0	–32.4	–32.8
HFCs	NO	115.40	115.40	76.15	76.15	NA	NA	NA	NA
PFCs	NO	NO	NO	NO	NO	NA	NA	NA	NA
SF_6	NO	4.21	4.21	4.56	4.56	NA	NA	NA	NA
NF_3	NO	NO	NO	NO	NO	NA	NA	NA	NA
Total GHG emissions without LULUCF	**40 175.17**	**9 299.05**	**9 177.46**	**8 003.27**	**7 833.08**	**–76.9**	**–77.2**	**–80.1**	**–80.5**

Source: Estonia's NC8 and BR5 table 5.2. The totals are not the sum of the values above.
[a] Estonia included indirect CO_2 emissions in its projections.

91. For the projections, the European Commission provided harmonized values for population, GDP, fuel import prices and EU ETS carbon prices; however, Estonia used more recent data for the projections of GDP growth (provided by the Ministry of Finance in September 2022) and population (provided by Statistics Estonia in February 2022).

(d) Assessment of adherence to the reporting guidelines

92. The ERT assessed the information reported in the NC8 and BR5 of Estonia and identified issues relating to completeness and transparency, and thus adherence to the

UNFCCC reporting guidelines on NCs and the UNFCCC reporting guidelines on BRs. The findings are described in tables I.4 and II.5.

2. Assessment of the total effect of policies and measures

(a) Technical assessment of the reported information

93. In its NC8 Estonia presented information on the estimated and expected total effect of implemented and adopted PaMs. However, for some PaMs, inconsistent information was provided on whether they were included in the WEM or WAM scenario only. Information was not presented in terms of GHG emissions avoided or sequestered, by gas (on a CO_2 eq basis) for the WEM scenario. The expected total effect of implemented and adopted PaMs was calculated using a bottom-up approach by aggregating the individual effects of implemented and adopted PaMs where a quantification was possible.

94. In its NC8 Estonia also presented the estimated total effect of planned PaMs under the WAM scenario, calculated using two approaches. Estonia calculated the total effect on the basis of a summation of additional PaMs included in the WAM scenario (using the same methodology as for the WEM scenario) and presented the results in terms of GHG emissions avoided or sequestered for 2020, 2030, 2040 and 2050. As a complementary method, Estonia calculated the total effect of the additional PaMs as the difference between the WEM and WAM scenarios and presented the results in terms of GHG emissions avoided by gas (but not on a CO_2 eq basis) for 2020, 2025, 2030, 2035, 2040 and 2050.

95. Estonia reported that the total estimated effect of its implemented and adopted PaMs is 6,409.94 kt CO_2 eq in 2030 but did not provide information at the sectoral level. According to the information reported in its NC8, PaMs planned in the transport sector will deliver the largest emission reductions by 2030, while PaMs planned in the energy sector will deliver the largest reductions by 2035 and are projected to be within the scope of Estonia's emission reduction target. The WEM and WAM scenarios differ for the LULUCF sector owing to the alternative felling rate used in the WAM scenario. Table 10 provides an overview of the total effect of PaMs as reported by Estonia.

Table 10
Projected effects of Estonia's planned, implemented and adopted policies and measures in 2030 and 2035
(kt CO_2 eq)

	2030		*2035*	
Sector	*Effect of implemented and adopted measures*	*Effect of planned measures*	*Effect of implemented and adopted measures*	*Effect of planned measures*
Energy (without transport)	NE	–59.65	NE	–106.56
Transport	NE	–62.10	NE	–63.70
Industry/industrial processes	NE	–0.07	NE	–0.19
Agriculture	NE	0.23	NE	0.26
Land-use change and forestry	NE	–2 199.84	NE	–2 111.69
Waste management	NE	NO	NE	NO
Total excluding LULUCF	**NE**	**–121.59**	**NE**	**–170.19**

Source: Estonia's NC8 table 5.2.
Note: The total effect of planned PaMs is defined as the difference between the WEM and the WAM scenarios.

(b) Assessment of adherence to the reporting guidelines

96. The ERT assessed the information reported in the NC8 of Estonia and identified issues relating to completeness and transparency, and thus adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table I.4.

3. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

(a) Technical assessment of the reported information

97. In the NC8 Estonia provided information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. The ERT noted that Estonia does not plan to use market-based mechanisms to meet its Kyoto Protocol target.

(b) Assessment of adherence to the reporting guidelines

98. The ERT assessed the information reported in the NC8 of Estonia and recognized that the reporting is complete and transparent, and thus adheres to the reporting guidelines for supplementary information. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

G. Provision of financial, technological and capacity-building support to developing country Parties

99. Estonia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3–5, of the Convention. However, Estonia provided information in its NC8 and BR5 on its provision of support to developing country Parties. The ERT commends Estonia for reporting this information and suggests that it continue to do so in future NCs.

100. The Party aims to support climate change mitigation and adaptation in developing countries by supporting the development of renewable energy sources, and energy and resource efficiency projects in the transport and industry sectors, as well as by strengthening administrative capacity regarding climate action or by supporting climate change adaptation solutions. In 2019 the Ministry of the Environment adopted a regulation on the terms and conditions and procedure for providing support for achieving climate policy goals in developing countries aimed at supporting cooperation in developing countries and stipulating rules for international climate cooperation, with support provided both through international cooperation and through open project calls. Through the open project calls, support is provided for mitigation- and adaptation-oriented projects while taking into account the needs of the target country. Estonia is seeking to mobilize private finance through the annual open project calls, as applicants are required to contribute at least 10 per cent of the total eligible costs of the project.

101. In 2019–2020, Estonia channelled EUR 2 million from the revenues of the auctioning of EU ETS allowances for financing international climate cooperation. The total climate-specific financial contributions provided by Estonia through multilateral, bilateral, regional and other channels amounted to EUR 531,763.03 and EUR 607,957.72 in 2019 and 2020 respectively. Most of the support was channelled through official development assistance in accordance with the methodology of the Development Assistance Committee of the Organisation for Economic Co-operation and Development. During this period, Estonia supported climate activities in Algeria, Bangladesh, Burkina Faso, Costa Rica, Georgia, Grenada, Kenya, Myanmar, South Africa and Uzbekistan. At the United Nations Climate Change Conference in Glasgow, Estonia announced a voluntary contribution of EUR 1 million to the Least Developed Countries Fund (operated by the Global Environment Facility).

H. Vulnerability assessment, climate change impacts and adaptation measures

1. Technical assessment of the reported information

102. In its NC8 Estonia provided information on the expected impacts of climate change in the country, the adaptation policies covering regional, sectoral and cross-sectoral

vulnerabilities and considerations and some action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. The Party provided a description of climate change vulnerability and impacts on its eight priority areas, namely health and rescue capability, land use and planning, natural environment, bioeconomy, economy, society awareness and cooperation, infrastructure and buildings, and energy and security of supply. The NC8 states that the average annual temperature has increased slightly faster in Estonia compared with the worldwide average since the mid-twentieth century. The major impacts of climate change on Estonia reported in the NC8 are similar to those reported in the NC7 and include the spread of vector-borne diseases, rising sea level and land degradation.

103. Estonia highlighted the adaptation response actions taken and planned at different levels of government. Some of the adaptation strategies reported in the NC8 include developing monitoring and support systems and drawing up action plans to increase the efficiency of the management of health risks, increasing rescue capability and increasing awareness of the effects of floods, similar to the information reported in the NC7. In its NC8, Estonia included information on the eradication of invasive species as a new adaptation strategy. In 2020 the Minister of the Environment approved the National Action Plan on Invasive Alien Species 2020–2025 and in 2021 a monitoring plan for alien species was prepared. Since the NC7, several studies that include modelling and forecasting of climate change impacts and climate risk insurance have been conducted to improve adaptation to climate change.

104. Impetus has been given to addressing adaptation matters with the adoption of the updated Climate Change Adaptation Development Plan 2030, which will form part of the new Environmental Development Plan until 2030. A report on the implementation of the Climate Change Adaptation Development Plan for 2017–2020 was presented to the Government in 2022 and provided an overview of the achievement of the goals set out in the Development Plan and its effectiveness, as reported in the NC7, particularly the achievements related to the availability of climate data, improvements in environmental and weather monitoring systems and improved capacity for the implementation of adaptation measures. Since the NC7, the Party has finalized the Climate Change Adaptation Development Plan 2030 and the related action plan for 2021–2025 with an updated framework for reducing vulnerability and increasing readiness and capacity at the State, regional and local community level to adapt to the effects of climate change in the eight identified priority areas. The estimated cost of implementation of the action plan for 2021–2025 is EUR 296 million. The goals, measures and activities related to climate change adaptation are included in the Environmental Development Plan until 2030, which sets the goal of integrating the impact of climate change and climate change adaptation into national strategic documents and sectoral development plans. The Environmental Development Plan until 2030 is scheduled to enter into force in the second half of 2023. During the NC8 reporting period, the Party also developed several plans, including land improvement conservation plans, as well as integrated plant protection guidelines, and acquired several observational and monitoring devices, such as drones, to enhance its adaptation and response to the effects of climate change.

105. Table 11 summarizes the information on vulnerability and adaptation to climate change presented in the NC8 of Estonia, which is based on the Climate Change Adaptation Development Plan 2030.

Table 11
Summary of information on vulnerability and adaptation to climate change reported by Estonia

Vulnerable area	*Examples/comments/adaptation measures reported*
Health and rescue capability	Vulnerability: Increase in the human mortality rate due to increased heatwaves, poor air quality and the spread of vector-borne diseases.
	Adaptation: Developing information, monitoring and support systems and drawing up action plans to increase the efficiency of the management of health risks; and increasing rescue capability.
Land-use and planning sector	Vulnerability: Rising sea levels, heatwaves and heat islands, increased flood risk, soil erosion and land degradation.

Vulnerable area	*Examples/comments/adaptation measures reported*
	Adaptation: Capacity-building on spatial land-use planning; increasing awareness of the impacts of climate change; developing climate change risk maps and construction technology solutions (heat-reflecting, heat-absorbing and heat-retaining buildings); creating green areas in cities; developing nature-based rainwater solutions; and developing green areas.
Natural environment	Vulnerability: Introduction of invasive species, high frequency of drought and forest fires, soil and land degradation, change in species composition, and changes in quality and quantity of ecosystem services.
	Adaptation: Preserving biodiversity by creating reserve forests to act as gene banks; preventing the entry of invasive foreign species and eradicating and controlling such species; ensuring the favourable condition of biotas and the variety of landscapes, and nature conservation in the changing climate; monitoring the condition of surface water, the composition of biota, the external and internal loads of substances arising from changes in temperature and the hydrologic regime, and minimizing climate risks; minimizing the negative impacts of climate change to achieve good marine environmental conditions and the preservation of biological diversity; and ensuring the sufficient extent and quality of ecosystem services.
Bioeconomy	Vulnerability: Decreased agricultural productivity, increased pests and diseases for crops, livestock and fish, reduced number of livestock, increased fire hazards, land and soil degradation, changes in the diversity of fish species, new fish parasites and extensive mineralization of peat in extraction areas.
	Adaptation: Developing land improvement systems; creating and transferring knowledge on agricultural and fishery practices and increasing agricultural and fishery competitiveness; changing the fishing regime and methods; ensuring the productivity and viability of forests; diversifying the efficient use of forests; and diversifying tourism and increasing the satisfaction of visitors.
Economy	Vulnerability: Availability and increased price of raw materials, changes in supply chains and transport, and changes in consumer preferences.
	Adaptation: Supporting economic activities that could be negatively impacted by climate change; managing household risks; and supporting entrepreneurship that considers the impacts of climate change.
Society, awareness and cooperation	Vulnerability: Deepening social inequality, negative health impacts on children, the elderly and chronically ill people, and pressure from immigration on various sectors of the economy.
	Adaptation: Facilitating public access to climate change information; raising awareness of the impacts of climate change; developing a curriculum on climate change for preschool institutions upwards; and participating in international cooperation for the development of a strong international climate policy.
Infrastructure and buildings	Vulnerability: Interruptions to traffic, and vulnerability of transport technologies, fuels and building stock to extreme weather events.
	Adaptation: Ensuring safe traffic, delivery of goods and access to vital services; and ensuring the durability and energy efficiency of buildings and a comfortable indoor climate for people in changing weather conditions.
Energy and security of supply	Vulnerability: Changes in energy consumption patterns, and an increase in energy use for cooling systems.
	Adaptation: Developing economical cooling solutions; increasing the production capacity of renewable energy; and constructing a weatherproof electricity grid necessary for adaptation to climate change.

106. Estonia provided a detailed description of international adaptation activities and bilateral cooperation with developing countries on adaptation in the chapter of its NC8 on financial resources and technology transfer, rather than in the chapter on vulnerability and adaptation. Examples include a project on the use of moisture- and nutrient-encapsulating igneous composites in crop production and restoration of ecosystems in arid areas in Kenya, with a contribution from Estonia of EUR 217,556.00, and a project on the renewable energy closed-system hygiene module for use in areas with limited water resources in Burkina Faso, with a contribution of EUR 180,350.00. The ERT noted that providing a cross reference to

this information in the chapter on vulnerability and adaptation would improve the transparency of the reporting in the NC.

2. Assessment of adherence to the reporting guidelines

107. The ERT assessed the information reported in the NC8 of Estonia and identified an issue relating to transparency, and thus adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table I.5.

I. Research and systematic observation

1. Technical assessment of the reported information

108. In its NC8 Estonia provided information on its general policy and funding relating to research and systematic observation and both domestic and international activities, including on the Organization of Research and Development Act, and the research and development and innovation strategy Knowledge-Based Estonia. During the review, Estonia provided information on the identification of opportunities for and barriers to the free and open international exchange of data and information and on action taken to overcome such barriers.

109. Estonia has implemented and planned international and domestic policies and programmes on climate change research, systematic observation and climate modelling that aim to advance capabilities to predict and observe the physical, chemical, biological and human components of the Earth's system over space and time. Research and development activities are governed by the Organization of Research and Development Act. The Ministry of Education and Research is responsible for planning, coordinating, executing and monitoring education and research policies. Major developments since the NC7 include the development of the Estonian Research and Development, Innovation and Entrepreneurship Strategy 2021–2035, which was adopted in July 2021. The focus of the Strategy is to ensure synergies between the research system, the business environment and other systems in society. According to the NC8, Estonian researchers study different aspects of the climate, such as climate processes, the climate system, paleoclimates, impacts of climate change, and mitigation and adaptation technologies, as well as climate modelling and projections. In the NC8, Estonia reported that funding for research and development was 1 per cent of GDP, although the target in the NC7 and the NC8 is 3 per cent of GDP. This was due to the relatively small contribution by the private sector and the decrease in foreign funding. To achieve the projected 3 per cent, Estonia is planning action to mobilize funding from the private sector.

110. The several institutions listed in the NC7 are still involved in climate-related research in Estonia and the NC8 reports their updated research portfolios. Tallinn University is conducting research projects on climate change impacts, hydrodynamics of coastal areas, beach development models and wetlands ecosystems. The University of Tartu studies emissions and carbon stock dynamics, the aerosol and GHG contribution to climate change, coastal ecosystems, material cycling, landscapes and modelling, and ecotechnological regulations. The Estonian University of Life Sciences also has a diverse research project portfolio that includes ecosystem functions, biodiversity and adaptability, genetic research and smart regional planning for forestry and agriculture. Since the NC7, the Ministry of the Environment has initiated a multi-year development contract with EERC on a cross-sectoral project on developing the reporting on GHGs and ambient air pollutants, with several related studies completed in 2020–2022 (e.g. analysis of changes in agricultural land use depending on future scenarios and the mapping of Estonian manure management technologies and their impact), and several others are ongoing.

111. In terms of activities related to systematic observation, Estonia reported on national plans, programmes and support for ground- and space-based climate observing systems, including satellite and non-satellite climate observation. The Environmental Monitoring Act 2017 provides the framework for environmental observations and the collection, processing, analysis and storage of observation data. The Party has in place programmes to systematically observe the atmospheric, terrestrial, marine and cryosphere environments.

112. According to the NC8, Estonia contributes to international cooperation on systematic observation by cooperating with several organizations, including the European Centre for Medium-Range Weather Forecasts and the European Meteorological Network. The Estonian Environment Agency weather service fulfils the obligations of the national meteorological service in accordance with its statutes and the recommendations of WMO and participates in the WMO climate programme, including the Global Climate Observing System. It also takes part in the work of many other international organizations, such as the Group on Earth Observations.

113. During the review, the Party provided information on the assistance provided to developing countries in terms of support, capacity-building and establishing and maintaining observation systems. As an example, in 2019 the Party provided support for a project in Grenada to install devices measuring water quality that transmit measurement data in real time.

2. Assessment of adherence to the reporting guidelines

114. The ERT assessed the information reported in the NC8 of Estonia and identified issues relating to completeness and thus adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table I.6.

J. Education, training and public awareness

1. Technical assessment of the reported information

115. In its NC8 Estonia provided information on its actions relating to education, training and public awareness at the domestic and international level. The Party provided information on the general policy on education, training and public awareness; primary, secondary and higher education; public information campaigns; training programmes; education materials; resource or information centres; the involvement of the public and non-governmental organizations; and its participation in international activities.

116. The Ministry of Education and Research and the Ministry of the Environment collaborate in the provision of environmental education in Estonia. Through this cooperation, climate change is included in nature-based subjects in the national curriculum from preschool institutions to higher education levels. The curriculum for primary and upper secondary schools includes a compulsory cross-curricular topic on the environment and sustainable development. Schoolchildren also participate in various extracurricular environmental programmes and research competitions through targeted financing.

117. The Climate Change Adaptation Development Plan 2030 also contains various education activities. Vocational training schools, which previously had limited coverage of climate issues in their curricula, have been incorporated into the Plan. In addition, the Party participated in the Raising Climate Awareness programme of the European Economic Area aimed at developing learning materials on mitigation and adaptation to climate change for various educational levels. In addition to formal educational institutions, several organizations, such as the Estonian Environmental Education Association and the Centre for Science Education, provide informal education on nature and the environment.

118. Several climate-related environmental campaigns aimed at the public have been organized in Estonia. The majority of these campaigns are focused on energy efficiency and health. In 2018–2022, the Environmental Investment Centre provided funding of EUR 11.2 million to finance 2,822 projects on environmental awareness. Most awareness campaigns are conducted at the municipality level and in educational institutions. In 2020 Estonia carried out an environmental awareness study of inhabitants in Estonia, which showed an increase in awareness from 40 to 56 per cent between the NC7 and NC8 reporting periods. The Party also holds annual renewable energy conferences where technology developers and experts from public institutions meet.

2. Assessment of adherence to the reporting guidelines

119. The ERT assessed the information reported in the NC8 of Estonia and identified an issue relating to completeness, and thus adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table I.7.

III. Conclusions and recommendations

120. The ERT conducted a technical review of the information reported in the NC8 of Estonia in accordance with the UNFCCC reporting guidelines on NCs. The ERT concluded that the reported information mostly adheres to the UNFCCC reporting guidelines on NCs and that the NC8 provides an overview of the national climate policy of Estonia.

121. The information provided in the NC8 includes most of the elements of the supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. Estonia reported on the national system, the national registry, supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol, PaMs in accordance with Article 2 of the Kyoto Protocol, domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures, information under Article 10 of the Kyoto Protocol, and financial resources provided to developing country Parties. The Party did not report on national legislative arrangements and administrative procedures that seek to ensure the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol was provided by Estonia in its 2022 annual submission.

122. The ERT conducted a technical review of the information reported in the BR5 and BR5 CTF tables of Estonia in accordance with the UNFCCC reporting guidelines on BRs. The ERT concluded that the reported information mostly adheres to the UNFCCC reporting guidelines on BRs and that the BR5 and its CTF tables provide an overview of emissions and removals related to the Party's quantified economy-wide emission reduction target; assumptions, conditions and methodologies related to the attainment of the target; and the progress of Estonia towards achieving its target.

123. In its NC8 Estonia reported on its key national circumstances related to GHG emissions and removals, including information on the national climate policy framework, geoeconomic and climate profile, and structural changes in the economy, as well as sector-specific information. Despite the growth in Estonia's GDP over the past 20 years, GHG emissions (without LULUCF) remained at roughly 20,000 kt CO_2 eq/year between 2000 and 2018 and show a decreasing trend.

124. Estonia's total GHG emissions excluding LULUCF and including indirect CO_2 covered by its quantified economy-wide emission reduction target were estimated to be 71.2 per cent below its 1990 level. Emissions were the highest in 1990 and gradually decreased thereafter. The changes in total emissions were driven mainly by factors such as macroeconomic changes owing to the transition from a planned economy to a market-based economy combined with the increase in the contribution of renewable energy to total energy consumption, the improvements in energy efficiency and the high EU ETS allowance prices that impacted local oil shale/shale oil production and export.

125. As reported in the BR5, under the Convention Estonia committed to contributing to the achievement of the joint EU quantified economy-wide target of a 20 per cent reduction in emissions below the 1990 level by 2020. The target covers all sectors and CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, expressed using GWP values from the AR4. Emissions and removals from the LULUCF sector are not included. Under the ESD Estonia has a target of limiting its emission growth to 11 per cent above the 2005 level by 2020.

126. The EU has a joint 2030 emission reduction target of at least 55 per cent below the 1990 level. This will be primarily implemented through the EU ETS and ESR, which have targets to reduce emissions by 2030 by 62 and 40 per cent respectively compared with the 2005 level. Under the ESR, Estonia has a national target of reducing emissions from covered

sectors to 24 per cent below the 2005 level by 2030. In the Estonia 2035 development strategy and its respective action plan, Estonia has set the goals of transitioning to climate-neutral energy production and deploying new climate-neutral energy production and storage solutions in line with EU 2050 climate-neutrality targets.

127. The ERT noted that the total GHG emissions of the EU excluding LULUCF do not exceed the emission level corresponding to the target in 2020, and thus that the EU has achieved its joint target. The ERT therefore concluded that Estonia has met its 2020 commitment under the Convention through its contribution to achieving the joint target of the EU. See the report on the review of the BR5 of the EU for further details. The ERT noted that the Party met its 2020 ESD target and its ESD emissions in 2020 do not exceed its AEA for 2020.

128. The GHG emission projections provided by Estonia in its NC8 and BR5 correspond to the WEM and WAM scenarios. Under the WEM scenario, emissions in 2030 are projected to be 76.9 per cent below the 1990 level and 19.5 per cent below the 2020 level. Under the WAM scenario, emissions in 2030 are projected to be 77.2 per cent below the 1990 level and 20.6 per cent below the 2020 level. Estonia reported on the methodologies, key drivers and assumptions underlying these projections.

129. Estonia's main policy framework relating to energy and climate change is based on the implementation of the net zero emissions target and sectoral guidelines included in the General Principles of Climate Policy until 2050, and the implementation of the climate and energy policy and legislative framework of the EU. The Party described the mitigation actions that it has implemented to help it achieve its 2020 and longer-term targets, which include promoting heat generation and electricity based on renewable energy, promoting energy efficiency measures in buildings and electrification measures in the transport sector, applying best available technologies in industry, regulating the use of F-gases and implementing measures in relation to forests and peat carbon stock conservation. The PaMs projected to have the most significant impact are related to energy sector transformation, promotion of the use of wind and solar technology, and the enhanced use of renewable-based CHP plants, along with the implementation of EU F-gas legislation in the industrial sector. The measure on promoting energy efficiency in buildings in combination with the modernization of the district heating networks is also contributing towards the low-carbon transition of Estonia.

130. Estonia is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3–5, of the Convention. However, it provided information in its BR5 and NC8 on its provision of support to developing country Parties. In 2019–2020, financial, technological and capacity-building support was provided mainly via bilateral, regional and other channels as official development assistance. At the United Nations Climate Change Conference in Glasgow in 2021, Estonia announced a voluntary contribution of EUR 1 million to the Least Developed Countries Fund (operated by the Global Environment Facility).

131. In its NC8 Estonia provided information on the expected impacts of climate change in the country, the adaptation policies covering regional, sectoral and cross-sectoral vulnerabilities and considerations and some action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. The Party provided a description of climate change vulnerability, impacts and adaptation measures in relation to its eight priority areas. Estonia adopted the updated Climate Change Adaptation Development Plan 2030 in 2017, which will form part of the Environmental Development Plan until 2030 aimed at improving the capacity of Estonia to adapt to the effects of climate change. The plan puts greater emphasis on local and regional involvement in adapting to climate change, a more efficient use of primary energy, increasing the share of renewable energy in the final energy consumption and security of supply.

132. In its NC8 Estonia provided information on its activities relating to research and systematic observation. The Party adopted the Estonian Research and Development, Innovation and Entrepreneurship Strategy 2021–2035 aimed at enhancing the relationship between research, business and society. Estonia implements a diverse research portfolio on climate change issues that includes climate systems, paleoclimates, and mitigation and

adaptation technologies. The Party collaborates with the Global Climate Observing System and WMO in the systematic observation of atmospheric, terrestrial, marine and cryosphere environments.

133. In its NC8 Estonia provided information on its actions relating to education, training and public awareness. Through a collaboration between the Ministry of Education and Research and the Ministry of the Environment, Estonia provides training and public awareness education from the preschool to the tertiary education level. The Party has included climate change issues in the curriculum of vocational training schools and in dedicated public campaigns. As confirmed by a recent environmental awareness study of inhabitants in Estonia, the efforts have led to an increase in climate change awareness among the public from 40 to 56 per cent of the population between 2016 and 2020.

134. In the course of the review, the ERT formulated the following recommendations for Estonia to improve its adherence to the UNFCCC reporting guidelines on NCs in its next NC:

(a) To improve the completeness of its reporting by:

(i) Presenting the estimated and expected total effect of implemented and adopted PaMs for 15 years from the most recent inventory year on a gas-by-gas basis (see issue 4 in table I.4);

(ii) Providing information on the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention in the chapter of the NC on vulnerability and adaptation or including a cross reference to the information reported elsewhere in the NC (see issue 1 in table I.5);

(iii) Including information on action taken to build capacity on domestic and international research activities in developing country Parties and on international research and systematic observation activities in which the Party is involved, such as those of the IPCC, Future Earth or the Global Climate Observing System (see issue 1 in table I.6);

(b) To improve the transparency of its reporting by:

(i) Providing further information in its next NC on how its national circumstances are relevant to factors affecting GHG emissions and removals, including information on the share and impacts of oil shale production and use on national GHG emissions and the respective emission trends (see issue 1 in table I.1);

(ii) Including in the next NC information on any changes in the national inventory arrangements since the last NC and/or BR, if applicable, or clearly stating that there have been no such changes (see issue 1 in table I.2);

(iii) Including information on PFC and SF_6 emissions in the PaMs section of the NC, noting the complete elimination of the use of some F-gases as a result of the GHG mitigation impact of relevant PaMs (see issue 4 in table I.3);

(iv) Including further information on the mitigation impact of its PaMs or explaining why this may not be possible owing to the national circumstances (see issue 8 in table I.3);

(v) Using the definitions contained in the UNFCCC reporting guidelines on NCs for the projections under the WEM scenario (including implemented and adopted PaMs) and the projections under the WAM scenario (including planned PaMs) or clearly explaining any deviations from these definitions (see issue 2 in table I.4);

(vi) Providing information describing the factors and activities driving emission trends in each sector from 1990 onward and by explaining the trends and drivers for historical and projected years with a view to facilitating a general understanding of the emission trends (see issue 10 in table I.4).

135. In the course of the review of Estonia's NC8, the ERT noted the following findings relating to adherence to the reporting guidelines for supplementary information:

(a) Issues with the completeness of its reporting relating to:

(i) Information provided on specific PaMs for promoting sustainable development within the meaning of Article 2, paragraph 1, of the Kyoto Protocol (see issue 1 in table I.8);

(ii) Information provided on national legislative arrangements and administrative procedures in place that seek to ensure that the implementation of activities under Article 3, paragraphs 3–4, of the Kyoto Protocol also contributes to the conservation of biodiversity and sustainable use of natural resources (see issue 4 in table I.8);

(b) Issues with the transparency of its reporting relating to:

(i) Information on steps taken to promote the decisions of ICAO and IMO to limit emissions from aviation and marine bunker fuels (see issue 2 in table I.8);

(ii) Information on how the Party strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties (see issue 3 in table I.8).

136. In the course of the review of Estonia's BR5, the ERT noted the following findings relating to adherence to the UNFCCC reporting guidelines on BRs, namely issues with the transparency of its reporting relating to:

(a) Providing clear statements on any changes in the national inventory arrangements since the last NC and/or BR (see issue 1 in table II.1);

(b) Improving the description of the Party's economy-wide emission reduction target reported in the CTF tables consistently with the information reported in the BR and across the CTF tables (see issue 1 in table II.2);

(c) Improving the description of the changes in the domestic institutional, legal and procedural arrangements for monitoring and evaluating PaMs by including further details regarding monitoring of PaMs (see issue 1 in table II.3);

(d) Including information on the mitigation impacts of its PaMs for the sectors for which estimates were not provided or explaining why this may not be possible owing to the national circumstances (see issue 3 in table II.3);

(e) Reporting consistent information in the CTF tables on progress towards achieving its target (see issue 1 in table II.4);

(f) Using the definitions contained in the UNFCCC reporting guidelines on NCs for the projections under the WEM scenario (including implemented and adopted PaMs) and for the projections under the WAM scenario (including planned PaMs) or clearly explaining any deviations from these definitions (see issue 2 in table II.5);

(g) Describing the factors and activities driving emission trends in each sector from 1990 onward and explaining the trends and drivers for historical and projected years with a view to facilitating a general understanding of the emission trends (see issue 8 in table II.5).

Annex I

Assessment of adherence to the reporting guidelines for the eighth national communication of Estonia

Tables I.1–I.8 summarize the ERT assessment of adherence to the UNFCCC reporting guidelines on NCs for Estonia's NC8.

Table I.1
Findings on national circumstances relevant to greenhouse gas emissions and removals from the review of the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 3 Issue type: transparency Assessment: recommendation	The ERT notes that Estonia reported information on the importance of shale oil/oil shale for the energy sector in the NC8 and BR5, highlighting that oil shale extraction is one of the main economic activities in the country. However, no detailed information was provided on the contribution and impact of emissions from shale oil on the country's GHG emissions and emission trends, except for an indication that fugitive emissions account for only 0.2 per cent of national total emissions. During the review, Estonia clarified that there are no fugitive emissions (CO_2 and CH_4) from oil shale mines and that the related emissions are reported under subcategory 1.A.1.c (manufacture of solid fuels and other energy industries) in the annual GHG inventory. The Party provided information on the emission trend for 1990–2020 and indicated that additional information on shale oil production was provided in the 2022 NIR (chap. 3.2.4.2). The ERT noted that emissions for subcategory 1.A.1.c account for 16.9 per cent of total emissions from fuel combustion in 2020 according to CTF table 1.A. The NIR provides details on the production processes and methodology used for estimating the relevant emissions. The ERT recommends that Estonia increase the transparency of its reporting by providing further information in its next NC on how its national circumstances are relevant to factors affecting GHG emissions and removals, including information on the share and impacts of oil shale production and use on national GHG emissions and the respective emission trends.
2	Reporting requirement specified in paragraph 3 Issue type: transparency Assessment: encouragement	The Party reported in its NC8 that a green transition expert group and Green Policy Steering Committee were created in the context of Estonia's green transition efforts. However, information on these new institutions and their roles, responsibilities and impact on decision-making in climate change policies was not provided in the NC. During the review, Estonia explained that the green transition expert group analyses the know-how related to the action required to ensure an environmentally friendly economy, as well as the goals and basic principles related to green policy while exchanging information with the public and private sectors, scientists and experts outside the group to propose ways of overcoming any difficulties and effectively measuring progress in relation to a green transition. In April 2022, the final report of the green transition expert group was published and presented to the Green Policy Steering Committee. The outcomes of the report led to the development of the draft Green Transition Action Plan 2023–2025, which is currently undergoing public consultation. The ERT encourages the Party to improve the transparency of the reporting on its institutional arrangements and government structure in the next NC by providing information on the roles and responsibilities of relevant government and interministerial decision-making processes or bodies (such as the green transition bodies) in Estonia's overall climate strategy and planned future actions.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.2
Findings on greenhouse gas inventory information from the review of the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 8 Issue type: transparency Assessment: recommendation	The ERT noted that Estonia provided information on the national inventory arrangements in the NC8 but did not include a chapter (e.g. similar to chapter 2.2.4 of the BR5 on changes since the BR4) or clear information on any changes in the national inventory arrangements since the previous BR and/or NC. During the review, Estonia explained that there was a change in the national inventory system since the BR4, in that prior to 2020 the source of funding for GHG inventory preparation was the Environmental Investment Centre and the State Budget, while from 2020 onward this changed to the National Administrative Agreement and State Budget. The Party confirmed that this change was not reported in the NC8. The ERT recommends that Estonia improve the transparency of its reporting by including in its next NC information on any changes in the national inventory arrangements since the last NC and/or BR, or clearly stating that there have been no such changes.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.3
Findings on policies and measures from the review of the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 10 Issue type: completeness Assessment: encouragement	The ERT noted that the Party did not indicate in its NC8 the PaMs that are innovative and/or effectively replicable by other Parties, despite the encouragement from the previous review report. During the review, the Party explained that the innovative element of PaMs is not a mandatory aspect to be included in Estonia's development and action plans and it is therefore difficult to assess the innovative element of the reported PaMs. The Party also provided information on the development of its PaMs in relation to the modernization of its large number of district heating networks, which could be considered as replicable and forward-looking to address heating demand. Estonia has set a target of an 80 per cent share of renewables in district heating and a 63 per cent share of renewables in gross final consumption of thermal energy by 2030. The ERT reiterates the encouragement from the previous review report for Estonia to improve the completeness of its reporting by providing information on PaMs that are innovative and/or effectively replicable by other Parties in its next NC or clearly explain why this may not be possible.
2	Reporting requirement specified in paragraph 12 Issue type: completeness Assessment: encouragement	Estonia did not identify in its NC8 any policies and practices that encourage activities that lead to greater levels of anthropogenic GHG emissions than would otherwise occur, nor did it clearly state that there are no such policies in place. During the review, Estonia provided information on a measure in the agriculture sector that encourages activities that lead to greater levels of anthropogenic GHG emissions than would otherwise occur. The Improvement of Manure Management project results in an increase in GHG emissions in the agriculture sector under the WAM scenario. This measure contributes to a reduction of NH_3; however, because more nitrogen and NO_X is emitted from manure management, this leads to slightly higher indirect N_2O emissions from agriculture. The ERT encourages the Party to enhance the completeness of its reporting by including information in the next NC on any policies and practices that encourage activities that lead to greater levels of anthropogenic GHG emissions than would otherwise occur, or clearly state the absence of such practices in Estonia.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
3	Reporting requirement specified in paragraph 13 Issue type: transparency Assessment: encouragement	Parties are encouraged to provide in their NCs, to the extent possible, detailed information on the assessment of the economic and social consequences of response measures. Although Estonia included a section in the NC8 with a summary on this topic, the information provided is not detailed and does not contain examples of the assessment of the consequences of response measures. During the review, the Party clarified that the majority of national GHG emissions are produced in the country's eastern-most region, Ida-Virumaa (population in 2021: 133,888), by the oil shale sector, where the economic and social consequences of response measures are significant and the oil shale sector is already in transition as a result of response measures. Since the 1990s, the sector has been in decline, from over 14,000 people employed in the mines in the 1980s to only 5,000 people currently employed. By 2030 approximately 3,700 direct and indirect jobs in the oil shale sector are expected to be lost as a result of the transition. The transition has the potential to exacerbate the challenges already present in the region. The EU Just Transition Fund has allocated EUR 353 million to Estonia, which will be targeted towards the region of Ida-Virumaa. The general objective of the funding from the Just Transition Fund is to enable Estonia's transition to a climate-neutral economy in a way that takes into account the social, environmental and community aspects of the transition, while supporting entrepreneurs in identifying and implementing new business opportunities. The ERT encourages Estonia to increase the transparency of its reporting by including, to the extent possible, more detailed information on the assessment of the economic and social consequences of response measures in its next NC, including the information provided during the review.
4	Reporting requirement specified in paragraph 14 Issue type: transparency Assessment: recommendation	Estonia indicated in its NC8, BR5 and CTF table 3 that implementation of the EU regulation on F-gases and the EU directive relating to emissions from air-conditioning systems in motor vehicles is a measure in the industrial sector. However, Estonia did not indicate that this measure has an effect on PFC or SF_6 emissions and no other measures are linked to these gases. The ERT also noted that PFC emissions are reported as "NO" across the time series in the annual GHG submission. During the review, Estonia confirmed that implementation of the EU regulation on F-gases and the EU directive relating to emissions from air-conditioning systems in motor vehicles mainly limits the use of HFCs, which is reported as a policy with significant impact. The Party explained that it did not indicate that emissions of PFCs and SF_6 are significantly impacted by the measure because the use of these gases in products and equipment is not significant. Estonia referred to provisions of the EU regulation on F-gases that restrict and prohibit placing on the market the products and equipment listed in annex III thereto, which in effect excludes the use of PFCs and SF_6 in products and equipment, thus impacting their use. The ERT recommends that Estonia increase the transparency of its NC by including in the reporting on PaMs by sector and by gas information on PFC and SF_6 emissions, noting the GHG mitigation impact of relevant PaMs.
5	Reporting requirement specified in paragraph 15 Issue type: transparency Assessment: encouragement	The ERT noted that Estonia reported a different set of PaMs in its NC8 compared with its NC7 without providing references to previously reported PaMs. The information provided in the NC8 is not clear as to whether the PaMs reported in the NC7 and BR4 are no longer in place, with the exception of information indicating two expired measures in the energy sector. During the review, Estonia explained that the data-collection process for and compilation of the list of PaMs is complex, with a variety of status, starting and end dates. Estonia provided a list explaining whether the previously reported PaMs are still in place and indicated that it is working on an improved process for tracking PaMs throughout the implementation cycle. The ERT encourages Estonia to increase the transparency of its reporting by using consistent titles for its PaMs and providing relevant cross references in cases where a policy or measure has been maintained over time (if it is comprehensively described in the Party's previous NC and/or BR) and explanations in cases where PaMs are no longer in place why this is so, in order to facilitate the tracking of the continuity of the PaMs over time.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
6	Reporting requirement specified in paragraph 18 Issue type: completeness Assessment: encouragement	The ERT noted that Estonia did not report in its NC8 on the way in which progress with PaMs to mitigate GHG emissions is monitored and evaluated over time, nor on the institutional arrangements for monitoring GHG mitigation policy. The Party referred to the establishment of the MHR methodological framework for estimating the ex ante and ex post mitigation impacts of measures to reduce GHG emissions but did not clearly explain whether the framework is already operational and did not provide further details on its modalities. During the review, Estonia informed the ERT that the Ministry of the Environment and the State Shared Service Centre are currently working on establishing a system for using the MHR framework as the official guidelines when designing PaMs. It is expected that from 2024 onward, PaMs will be designed in line with the MHR framework guidelines. Furthermore, Estonia informed the ERT about changes in the arrangements for the legal framework on monitoring of PaMs under the Estonia 2035 development strategy and the updated General Principles of Climate Policy until 2050. The ERT reiterates the encouragement from the previous review report for Estonia to improve the completeness of its reporting by including in the next NC a description of the way in which progress with PaMs to mitigate GHG emissions is monitored and evaluated over time, including information on the institutional arrangements for monitoring.
7	Reporting requirement specified in paragraph 19 Issue type: transparency Assessment: encouragement	The Party reported information on its PaMs in its NC8, including the status of implementation (planned, adopted or implemented). The ERT noted that for adopted and implemented PaMs, Parties may include additional information on the funds already provided, future budget allocated and the time frame for implementation. Such information was not included in the NC8. During the review, the Party provided financial information for some of the PaMs and explained that the costs will be included in the integrated national energy and climate plan progress reports to be submitted to the European Commission biannually starting from 2023, for which Estonia will gather available indicative information on investments for PaMs that affect the national GHG emission projections. The Party also clarified that under the EU ETS, EU member States are auctioning EU allowances. In Estonia, half of the auctioning revenues are earmarked for climate- and energy-related measures under the four-year State Budget Strategy. The ERT encourages Estonia to include information on adopted and implemented PaMs in terms of the funds already provided, future budget allocated and time frame for implementation in order to increase the transparency of its reporting in the NC on efforts towards achieving its emission reduction targets.
8	Reporting requirement specified in paragraph 20 Issue type: transparency Assessment: recommendation	The Party reported in its NC8 on its PaMs, including the estimated mitigation impact for most of its PaMs. The Party did not provide mitigation impact estimates for PaMs in the agriculture, waste and LULUCF sectors and for some of the PaMs related to energy consumption. During the review, the Party explained that estimated impacts were not provided for some PaMs owing to the lack of quantifiable activity data or methods. Some of the measures reported are ‘soft’ measures, including activities such as trainings, advisory services, knowledge transfer and information activities, farm management services, studies and pilot projects, that are difficult to evaluate in terms of their contribution to GHG emission reductions or to quantify using the current projections compilation methodology. For estimating the impact of some measures in the LULUCF sector, a complex set of site-specific factors need to be taken into account simultaneously. Estonia is working towards the development of GHG reporting models integrated into a modern geoinformation system, which will allow the impact of specific PaMs to be assessed on a location-specific basis, thereby reducing the uncertainty of future assessments. It will also provide valuable information on which PaMs are most suitable for a specific land-use unit. The ERT recommends that Estonia improve the transparency of its reporting by including, as appropriate, a quantitative estimate of the mitigation impact of individual PaMs in all sectors, or explaining why this may not be possible owing to the national circumstances.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
9	Reporting requirement specified in paragraph 21 Issue type: completeness Assessment: encouragement	The Party did not report in its NC8 information on the costs of PaMs, non-GHG mitigation benefits or how PaMs interact with other PaMs at the national level. The ERT noted that in its National Energy and Climate Plan (pp.171–175) Estonia provided additional information on some PaMs (e.g. projections of air pollutants and air quality benefits of the PaMs), but no cross reference to this information was provided in the NC8. During the review, Estonia explained that in accordance with the EU regulation on the governance of the Energy Union and climate action, it has gathered available indicative information on investments for measures affecting the national GHG emission projections for inclusion in the integrated national energy and climate plan progress reports to be submitted biannually starting from 2023. For example, for the measure on enhancing energy efficiency in buildings, Estonia had made actual investments of approximately EUR 707 million as at the end of 2021. In addition, the Party provided information on the interlinkages between the measures in the agriculture sector and the measures on the promotion and production of bioenergy. The ERT encourages Estonia to improve the completeness of its reporting by including in the next NC information on the costs of PaMs, non-GHG mitigation benefits and how PaMs interact with other PaMs at the national level.
10	Reporting requirement specified in paragraph 23 Issue type: transparency Assessment: encouragement	Parties are expected to explain in their NCs why some of the PaMs previously reported are no longer in place. Chapter 4.6 of the NC8 contains general information indicating that most PaMs were discontinued in 2020 owing to the expiration of the target dates of the related development plans. It is also noted that in some cases, similar PaMs replaced the former ones, with some differences in the description of the relevant measures. The ERT noted that the NC7 was submitted in December 2017. Based on the information provided in the NC8, the reporting period covers one set of PaMs that were in effect until 2020 and a new set of policy documents that have replaced the former ones. However, on the basis of the information provided in the NC8, it was not clear which pre-2020 PaMs have been discontinued, updated or maintained following the expiration of the 2020 target dates. During the review, the Party provided a list of the PaMs that were discontinued as a stand-alone measure and ongoing measures, including those implemented under a new structure that were reported in the NC7 in comparison with those reported in the NC8. The ERT encourages Estonia to improve the transparency of its reporting by providing specific information on the PaMs no longer in place in its next NC.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.4
Findings on projections including aggregate effects of policies and measures reported in the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 25 Issue type: completeness Assessment: encouragement	The Party did not report a WOM scenario in its NC8 and BR5. During the review, Estonia explained that it is in the process of developing WOM scenario projections and that after validating the system for compiling WOM scenario projections, a WOM scenario could be reported in future submissions. The ERT reiterates the encouragement from the previous review report for the Party to continue its efforts to develop WOM scenario projections or provide a detailed explanation of the status of the development of a WOM scenario, or a detailed explanation as to why this may not be possible owing to the national circumstances.
2	Reporting requirement specified in paragraph 26	The Party reported both a WEM and a WAM scenario in its NC8 and BR5. However, the allocation of PaMs to the WEM scenario was not consistent with the UNFCCC reporting guidelines on NCs, according to which projections under the WEM scenario

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Issue type: transparency Assessment: recommendation	shall encompass only implemented and adopted PaMs, while planned PaMs shall be included in the WAM scenario projections. In CTF table 3, the Party reported 16 planned PaMs as included in the WEM scenario. Additionally, one planned measure (GHG reductions from the decrease in the use of AdBlue in the transport sector under the WAM scenario) was included in the WAM scenario despite being implemented in 2015. During the review, Estonia explained that 14 planned PaMs in the agriculture and LULUCF sectors are related to the EU Common Agricultural Policy Strategic Plan 2023–2027, approved on 11 November 2022. Estonia had already anticipated the adoption of the Strategic Plan and therefore included the related measures in the WEM scenario, but still reported them as "planned" in CTF table 3. Two further measures (promoting the use of biomethane in heavy-duty vehicles, starting in 2036; and making domestic ferries climate-neutral, starting in 2027) were included in the WEM scenario despite having a "planned" status, as there is general agreement within the Government to fund these projects, although implementation of the projects has not yet begun. Regarding the measure on GHG reductions from the decrease in the use of AdBlue in the transport sector, Estonia explained that the 2015 start year was incorrect, but did not provide the correct start year. The ERT recommends that the Party allocate its PaMs in line with the definitions contained in the UNFCCC reporting guidelines on NCs for the projections under the WEM scenario (including implemented and adopted PaMs) and the projections under the WAM scenario (including planned PaMs) and ensure consistent reporting between the chapters on PaMs and projections, transparently explaining any assumptions used in the allocation of PaMs across the scenarios.
3	Reporting requirement specified in paragraph 36 Issue type: transparency Assessment: encouragement	Parties may present the total expected effect of planned PaMs in their NCs. In the NC8 (chap. 5.2), Estonia provided an assessment of the projected total effect of PaMs under the WEM and WAM scenarios. However, the information provided on the WAM scenario was inconsistent as different values were reported for the total effect of PaMs under the WAM scenario in NC8 tables 5.5 and 5.6 (e.g. for 2030, table 5.5 quantifies the effect as 189.33 kt CO_2 eq, while table 5.6 contains a value of 2,321 kt CO_2 eq). During the review, the Party explained that table 5.5 contains information on the total effect of PaMs under the WAM scenario based on a summation of the effects of individual PaMs, while in table 5.6 the total effect of PaMs under the WAM scenario is calculated on the basis of the difference between the WEM and WAM scenarios, thus the two tables are not comparable. The ERT encourages Estonia to improve the transparency of its reporting on projections by clearly presenting the total expected effect of planned PaMs and explaining the differences between the methodological approaches used to calculate the total effect of PaMs included in the WAM scenario.
4	Reporting requirement specified in paragraph 37 Issue type: completeness Assessment: recommendation	Estonia appeared to provide an assessment of the projected total effect of PaMs under the WEM scenario in NC8 table 5.6. However, the information in this table is unclear, as the heading of the table, which refers to "implemented and adopted PaMs", implies that it refers to the WEM scenario, but the text of the NC8 explaining the contents of the table refers to the "difference between the WEM and WAM scenarios". During the review, Estonia clarified that, despite its heading, table 5.6 provides information on the total effect of PaMs under the WAM scenario and not the WEM scenario. The ERT reiterates the recommendation from the previous review report that Estonia improve the completeness of its reporting on projections by including in its next NC an estimate of the total effect of its PaMs for the WEM scenario, in accordance with the definition of the WEM scenario, compared with a situation without such PaMs, presenting the effect in terms of GHG emissions avoided or sequestered, by gas (on a CO_2 eq basis), and providing the data for the most recent inventory year and for subsequent years that end in either a zero or a five, extending at least 15 years from the most recent inventory year.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
5	Reporting requirement specified in paragraph 38 Issue type: transparency Assessment: encouragement	NC8 chapter 5.2 lacks a description of the methodological approach used to estimate the total effect of the PaMs included in the WEM scenario. Further, the Party did not report from which year onward it was assumed that the PaMs were implemented in calculating the total effect of PaMs in its NC8. During the review, Estonia explained that it calculated the total effect of PaMs under the WEM scenario by summing the effects of individual PaMs and that the cut-off date for the quantification of the effects of PaMs was the beginning of 2021 following the reference year 2020. The ERT encourages Estonia to improve the transparency of its reporting in the next NC on the expected total effect of PaMs by clearly stating from which year onward it was assumed that the PaMs were implemented and by clarifying the methodology used to estimate the total effect of PaMs under the WEM scenario.
6	Reporting requirement specified in paragraph 40 Issue type: transparency Assessment: encouragement	Although Estonia provided some information explaining the models and approaches used for the projections in its NC8 and BR5, information that would enable a full understanding of the chosen modelling approaches is missing. The Party did not transparently explain how it accounts for overlap between the transport sector and the energy sector, in particular how the increase in the number of electric vehicles affects the modelling of electricity generation. For the transport sector, Estonia explained in the NC8 and BR5 that the Sybil baseline model was used for road transport, but information on the modelling approach used for other transport modes was missing. The methods used for the projections for other energy sectors (residential and agriculture/forestry) were described only very briefly and do not contain all the required information (e.g. the strengths and weaknesses were not summarized and an explanation was not provided on how these approaches account for any overlap or synergies that may exist between different PaMs). During the review, Estonia explained that sectors were modelled separately and model coupling was not applied. Information on future demand for electricity was provided by the main grid operator, accounting for electricity demand in transport and electric heating, energy efficiency goals set by the EU and other factors (e.g. GDP growth, population, annual average temperature). Estonia also explained that emissions for other transport modes and other energy sectors were projected on the basis of fuel consumption trends and the results of the impact assessment of the PaMs. The ERT encourages the Party to increase the transparency of its reporting by including in its next submission the information outlined in paragraph 40(a–e) of the UNFCCC reporting guidelines on NCs for each model or approach used, such as a description of the type of model or approach, its original purpose and its strengths and weaknesses, and an explanation of how the model or approach used accounts for any overlap or synergies that may exist between different PaMs.
7	Reporting requirement specified in paragraph 41 Issue type: completeness Assessment: encouragement	The Party did not provide references to detailed information on the models used for the projection scenarios. During the review, Estonia provided weblinks to the models used, together with further details on the models. The ERT encourages Estonia to enhance the completeness of its reporting by including in its next NC references to documents containing more detailed information on the models and approaches used for the projection scenarios.
8	Reporting requirement specified in paragraph 43 Issue type: transparency Assessment: encouragement	The Party reported a sensitivity analysis for the WEM scenario in its NC8 and BR5; however, the methodology used for the sensitivity analysis was not described. Further, the GDP indicator used in the sensitivity analysis was inconsistently reported in the NC8: the GDP values reported in table 5.3 decrease from EUR 2.68 million in 2025 to EUR 1.26 million in 2050, while in CTF table 5 GDP is projected to grow from EUR 27.926 billion in 2025 to EUR 40.558 billion in 2050. The sensitivity analyses reported by Estonia in the NC8 are based on varying macroeconomic parameters (e.g. GDP and population), while in the NC7 the Party also reported sector-specific sensitivity analyses (e.g. a different number of shale oil plants in energy industries, alternative F-gas phase-down in the IPPU sector, different livestock numbers in the agriculture sector), without explaining the changes reported. Additionally, the Party did not report a sensitivity

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
		analysis for energy industries in the NC8, which is historically the largest source of GHG emissions in Estonia. During the review, Estonia explained that the sensitivity analysis was performed using the same methodology as for the projections under the WEM scenario. With regard to the GDP indicator, the Party clarified that there was a unit error in NC8 table 5.3 (the row contains data for GDP growth in per cent and not absolute GDP values). In addition, Estonia explained that there is no alternative sector-specific activity data and thus it was not able to provide any sensitivity analyses other than for GDP and population. With regard to energy industries, Estonia explained that, in contrast to the NC7, there is currently no uncertainty regarding the number of future shale oil production plants. The ERT encourages the Party to increase the transparency of its reporting by including further qualitative and, where possible, quantitative information on the sensitivity of the projections to underlying assumptions, specifying consistently, for example, the factors used in the sensitivity analyses for all projected sectors and explaining the rationale for the choice of factors used in the analyses.
9	Reporting requirement specified in paragraph 44 Issue type: transparency Assessment: encouragement	In table 5.7 in the NC8 Estonia provided detailed data on the key variables and assumptions used in the projections to help to understand the projected emissions. However, the table contains incomplete information on the historical years. During the review, Estonia explained that historical data for the years before 2000 were not used as indicators, as the economy went through a major restructuring in the 1990s after the collapse of the Soviet Union (which Estonia was part of), and the Party therefore considers the indicators for the years before 2000 as irrelevant. The ERT encourages Estonia, when reporting information on key underlying assumptions and the values of variables, to improve the transparency of its reporting by providing information for all the years specified in table 5 of the UNFCCC reporting guidelines on NCs, for example using notation keys where data are not available or are irrelevant to understanding the projections and providing a relevant explanation when data are not provided.
10	Reporting requirement specified in paragraph 45 Issue type: transparency Assessment: recommendationt	Estonia provided in NC8 chapter 5.3.7 tables with information on sectoral factors and activities for the WEM and WAM scenarios. However, that information was partly unclear because for some parameters (shares of manure storage, forest not available for wood supply, wood product indices) only projected data were available or the data were available until 2020 only (e.g. final energy consumption of electricity), or there were inconsistencies in the presented data (e.g. projected final energy consumption for the residential sector was reported as constant for 2030–2050 in the WEM scenario despite a decreasing population over that period). Some of the sectoral data were not clearly explained in the NC8 (e.g. in which sectoral models the projected EU ETS carbon price was used, and the lack of data on gross inland consumption of solid fossil fuels after 2040). The ERT further noted inconsistencies in the reported trends (e.g. due to the phase-out of shale oil plants) and a lack of reporting of data, for example on electricity and heat consumption, as well as on the use of the EU ETS carbon price in the modelling of electricity generation, but not for other models (e.g. for manufacturing industries or industrial processes). During the review, Estonia explained that it reported only final energy consumption of combustion fuels that directly cause GHG emissions but excluded energy carriers (i.e. electricity and heat) that only indirectly cause GHG emissions. With regard to the EU ETS carbon price, Estonia clarified that it was used only for the modelling of electricity generation using the Balmorel model but not for other models (e.g. for manufacturing industries or industrial processes). The ERT reiterates the recommendation from previous review reports that the Party improve the transparency of its reporting when presenting information on the factors and activities driving emission trends in each sector by explaining the trends and drivers for historical and projected years from 1990 to at least 15 years onward with a view to facilitating a general understanding of the emission trends.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.5
Findings on vulnerability assessment, climate change impacts and adaptation measures from the review of the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 46 Issue type: completeness Assessment: recommendation	The ERT noted that the Party did not report in its NC8 an outline of the action taken to implement Article 4, paragraph 1(e), of the Convention with regard to cooperation in the field of adaptation and on preparation of integrated plans for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods. During the review, Estonia referred to the chapters of the NC8 where information on international climate cooperation is provided, including references to projects in developing countries, including in Africa. For example, an automatic wastewater treatment plant for Kenya's Uhuru Park is under development, which will treat wastewater from buildings around the park. A project on the use of moisture- and nutrient-encapsulating igneous composites in crop production and restoration of ecosystems in arid areas in Kenya is also ongoing. The ERT recommends that the Party improve the completeness of the reporting in the next NC by providing an outline of the action taken to implement Article 4, paragraph 1(e), of the Convention in the chapter on vulnerability and adaptation or use a cross reference to such information if reported elsewhere in the NC.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.6
Findings on research and systematic observation from the review of the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 61 Issue type: completeness Assessment: recommendation	Estonia included information on its participation in international research and environmental monitoring programmes but did not provide specific information on its participation in activities of the IPCC, the World Climate Research Programme, Future Earth and the Global Climate Observing System or on action taken to support related capacity-building in developing countries. During the review, the Party clarified that it provided financial, technological and capacity-building support voluntarily and had two open project calls in 2019–2020 to support climate cooperation projects in developing countries. The capacity-building can be considered as part of the implementation of selected projects. The Party further clarified that a number of IPCC reports have been based on articles written by several Estonian scientists, who have also been involved in the preparation of the reports of the IPCC as authors. For example, the contribution of Working Group III to the AR6 on climate change impacts, adaptation and vulnerability includes references to several works on health and mortality prepared by scientists from the University of Tartu. Estonian scientists also participated in the preparation of the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. The ERT recommends that the Party improve the completeness of its reporting by including information on domestic and international research and systematic observation activities in which it is involved, such as those of the IPCC, Future Earth or the Global Climate Observing System, and on action taken to support related capacity-building activities in developing countries.
2	Reporting requirement specified in paragraph 65 Issue type: completeness Assessment: encouragement	The Party did not provide information on the opportunities identified for and barriers to the free and open international exchange of data and information, nor did it report on action taken to overcome such barriers. During the review, the Party explained that the main barrier to free and open international exchange of data and information is that information on Estonian projects is gathered in the Estonian Research Information System but its classifications are not harmonized with international classifications, such as those of the International Energy Agency, which inhibits the wider use of the results of national research.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
		The ERT encourages Estonia to improve the completeness of its reporting by including in its next NC information on opportunities identified for and barriers to the free and open international exchange of data and information and report on action taken to overcome such barriers, including the information presented during the review.
3	Reporting requirement specified in paragraph 67 Issue type: completeness Assessment: encouragement	The NC8 does not include summary information on the current status of national plans, programmes and support for ground- and space-based climate observing systems, including long-term continuity of data, data quality control and availability, and exchange and archiving of data in the different observation systems and on Estonia's support for developing countries to establish and maintain observing systems and related data and monitoring systems. The Party noted the support provided to developing countries in the chapter of the NC8 on financial, technological and capacity-building support. During the review, Estonia referred to the Environmental Monitoring Act 2017 as the framework for environmental monitoring, with data being stored and published in a database called KESE, managed by the Estonian Environment Agency. The country has also provided voluntary support to developing countries, including financial, technological and capacity-building support. One example was the support provided in 2019 for a project in Grenada to install devices measuring water quality in real time. The ERT encourages Estonia to improve the completeness of its reporting by providing in its next NC summary information (including the examples provided during the review) on the current status of national plans, programmes and support for ground- and space-based climate observing systems, including long-term continuity of data, data quality control and availability, and exchange and archiving of data in the different observation systems and on its support for developing countries to establish and maintain observing systems and related data and monitoring systems.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.7
Findings on education, training and public awareness from the review of the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 68 Issue type: completeness Assessment: encouragement	The ERT noted that the Party did not report on the extent of public participation in the preparation or domestic review of the NC. During the review, Estonia explained that the NCs are prepared mostly using publicly available information. The GHG inventory is made available on the web page of the Ministry of the Environment after the draft inventory submission to the European Commission in January each year. The information and assumptions used to compile the GHG emission projections are publicly available and verified by relevant institutions and/or companies. The NCs are made available on the website of the Ministry of the Environment after their submission to the UNFCCC. The ERT reiterates the encouragement from the previous review report that the Party improve the completeness of its reporting by including in its next NC information on the extent of public participation in the preparation or domestic review of the NC.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs.

Table I.8
Findings on minimization of adverse impacts and supplementary information related to the Kyoto Protocol reported in the eighth national communication of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 34 Issue type: completeness Assessment: recommendation	The Party did not report on PaMs for promoting sustainable development within the meaning of Article 2, paragraph 1, of the Kyoto Protocol and whether any steps have been taken to identify relevant priority actions. During the review, the Party explained that it applies sustainable forestry management principles, namely management of forests in a way that ensures their biological diversity, productivity, capability for regeneration, vitality and potential and enables those functions to be performed in the future without causing harm to other ecosystems. The Party further highlighted that the Forest Act provides the legal framework for managing Estonian forests to ensure the protection and sustainable management of forests as an ecosystem. The Forest Act encompasses reforestation measures aimed at the recovery of forests after logging or natural disasters and regulates the voluntary protection of key habitats through compensation (subsidies) for private forest owners. The ERT recommends that Estonia improve the completeness of its reporting by providing information on specific PaMs for promoting sustainable development within the meaning of Article 2, paragraph 1, of the Kyoto Protocol. The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.
2	Reporting requirement specified in paragraph 35 Issue type: transparency Assessment: recommendation	Estonia reported information in pursuit of Article 2, paragraph 2, of the Kyoto Protocol in its NC8 and NIR but did not identify the steps taken to promote the decisions of ICAO and IMO to limit emissions from aviation and marine bunker fuels. During the review, Estonia provided additional information regarding its current and planned PaMs on limiting GHG emissions from international transport. Regarding international aviation, Estonia updated and submitted its State Action Plan to ICAO at the end of September 2022, which includes measures to introduce sustainable aviation fuels. As the production costs of sustainable aviation fuels are significantly higher in comparison with traditional fuels, Estonia has explored different options to increase the availability of sustainable aviation fuels, including market solutions and domestic production options. One of the best long-term solutions considered by the Party is hydrogen-powered aircraft. Regarding international shipping, in 2022 the Maritime Economy White Paper 2022–2035 was adopted, in which an environmentally friendly, sustainable and safe maritime economy is specified as one of the priorities with the aim of moving the maritime transport sector towards climate neutrality. According to the White Paper, developing the use of sustainable alternative fuels both in sea transport and inland shipping is considered important. Increasing funding for research is also supported with the aim of identifying more efficient and environmentally friendly technological solutions for the use of alternative fuels in shipping, both for new and existing ship models. The Party noted that both aviation and maritime transport will be included in the EU ETS as of 2024, giving the sector a strong signal to decarbonize. The ERT recommends that Estonia increase transparency by reporting on the steps taken to promote the decisions of ICAO and IMO to limit emissions from aviation and marine bunker fuels. The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.
3	Reporting requirement specified in paragraph 36 Issue type: transparency Assessment: recommendation	The ERT noted that in its 2022 NIR Estonia provided more detailed information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties. Further references to specific initiatives already undertaken at the bilateral or multilateral level are provided in the chapter of the NC8 on financial, technological and capacity-building support. However, there is no explicit section of the NC8 explaining how the Party is striving to minimize adverse effects of PaMs or any cross references to such information. During the review, Estonia explained that it provided information, in line with Article 3, paragraph 14, of the Kyoto Protocol and the annex to decision 15/CMP.1, on supporting the achievement of climate policy goals in developing countries in the 2022 NIR (chap.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
		15.2) and brief information on an assessment of the economic and social consequences of response measures in NC8 chapter 4.5. Relevant references added by the Party include the BR1, BR2 and BR3 (chap. 4.5.2) of the EU, as well as chapter 15 of the NIR of the EU. The ERT reiterates the recommendation from the previous review report that the Party provide in its next NC more detailed information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties, or include relevant references to documents containing such information. The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.
4	Reporting requirement specified in paragraph 38 Issue type: completeness Assessment: recommendation	The Party did not report in its NC8 a description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and sustainable use of natural resources. During the review, Estonia explained that the Forest Act provides the legal framework for managing Estonian forests to ensure the protection and sustainable management of forests as an ecosystem. The Party further explained that all forest land is considered managed, as all forest land in Estonia is or has been covered with forest management plans and protected forests are covered under the protection scheme. The Party explained that it will enhance the transparency and completeness of its reporting by including in its next submission information on national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, also contributes to the conservation of biodiversity and sustainable use of natural resources The ERT reiterates the recommendation from the previous review report that Estonia improve the completeness of its reporting by including in its next submission the information provided during the review concerning any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and sustainable use of natural resources. The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol.

Note: Item listed under reporting requirement refers to the relevant paragraph of the reporting guidelines for supplementary information. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the reporting guidelines for supplementary information.

Annex II

Assessment of adherence to the reporting guidelines for the fifth biennial report of Estonia

The BR5 of Estonia is the final BR under the measurement, reporting and verification system established under the Convention.[1] Nevertheless, ERTs continue to provide recommendations and encouragements to Parties on completeness, transparency and adherence to the UNFCCC reporting guidelines on BRs. Parties may find these recommendations and encouragements relevant, as appropriate, when preparing their initial biennial transparency report under the enhanced transparency framework of the Paris Agreement. Tables II.1–II.5 summarize the ERT assessment of adherence to the UNFCCC reporting guidelines on BRs for Estonia's BR5.

Table II.1
Findings on greenhouse gas emissions and trends from the review of the fifth biennial report of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 3 Issue type: transparency Assessment: recommendation	Estonia provided information on the national inventory arrangements in the BR5 and NC8 and included a section in its BR5 (chap. 2.2.4) on the changes since the BR4. However, it is not clear from the BR5 what the exact changes are since the BR4 and/or NC7. During the review, Estonia explained the main change in the national inventory system since the BR4, in that prior to 2020 the source of funding for GHG inventory preparation was the Environmental Investment Centre and the State Budget, whereas since 2020, EERC is responsible for compiling the GHG inventory on the basis of the National Administrative Agreement with the Ministry of the Environment. Financial resources for inventory compilation are accounted for in the National Administrative Agreement and the State Budget. The ERT recommends that Estonia improve the transparency of its reporting by including in the next BR clear information on any changes in the national inventory arrangements since the last NC and/or BR.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on BRs.

Table II.2
Findings on the quantified economy-wide emission reduction target from the review of the fifth biennial report of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 5 Issue type: transparency Assessment: recommendation	The ERT noted inconsistencies between the textual part of the BR5 and the CTF tables and across the CTF tables regarding the way in which the information on the economy-wide emission reduction target was presented, as follows: • In CTF table 2(b), PFC emissions, which are included in the EU target (as also stated in the BR5), were reported as "NA" and as "NO" in CTF table 1, while in CTF table 2(c) the cell for PFC emissions was left blank; • The use of market-based mechanisms is possible under the EU target, as specified in the BR5; however, in CTF table 2(e)I, the Party reported the

[1] The Conference of the Parties, by decision 1/CP.24, decided that the final BRs shall be those submitted to the secretariat no later than 31 December 2022 and reaffirmed that, for Parties to the Paris Agreement, following the submission of the final BR, the modalities, procedures and guidelines contained in the annex to decision 18/CMA.1 will supersede the measurement, reporting and verification system established under decision 1/CP.16, paras. 40–47 and 60–64, and decision 2/CP.17, paras. 12–62.

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
		use of such mechanisms as "NA" without explaining the use of the notation key in a footnote to the table; • Outgoing flights are included in the EU target but are not part of the national target of Estonia and are not included in the total emissions reported by the Party. However, they are included in CTF table 2(b) under the sector other. Although the Party explained that outgoing flights are included in the EU target, no further information at the national level was provided; • Cells were left blank in some tables (e.g. table 2(c) and 2(e)) without any explanations for doing so in the footnotes. During the review, Estonia indicated that notation keys and an explanation for the notation keys used were omitted from the CTF tables in error. Estonia also confirmed that PFC emissions should have been reported as "NO", that no units from market-based mechanisms have been used for compliance purposes, as indicated in chapter 4.3 of the BR5, and acknowledged that the explanatory text under CTF table 2(f) might be misleading, because it was provided in terms of covering all EU member States under the joint pledge. The ERT recommends that the Party improve the transparency of its reporting of the description of the economy-wide emission reduction target by providing consistent information in the BR and across the CTF tables. The ERT notes that the transparency of the reporting in the CTF tables could be improved by using notation keys (e.g. "NO" for PFC emissions) and footnotes (e.g. to explain the use of market-based mechanisms under the EU ETS, including a reference to the BR of the EU) and by explaining the notation keys used in the relevant cells in the CTF tables.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on BRs.

Table II.3
Findings on mitigation actions and their effects from the review of the fifth biennial report of Estonia

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
1	Reporting requirement specified in paragraph 7 Issue type: transparency Assessment: recommendation	The Party included information in its BR5 on the domestic institutional arrangements, the fulfilment of its reporting obligations under EU legislation via the integrated national energy and climate plan progress reports and monitoring of GHG emissions. However, the reported information does not include details of the monitoring of PaMs and changes in the domestic institutional arrangements. During the review, Estonia informed the ERT about changes in the domestic arrangements for the legal framework on monitoring of PaMs, as summarized in this review report (see paras. 42–45 of this document). The ERT reiterates the recommendation from the previous review report that Estonia improve the transparency of its reporting by providing information on changes in its domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target and in particular by including further details regarding monitoring of PaMs and changes in the related procedures.
2	Reporting requirement specified in paragraph 8 Issue type: transparency Assessment: encouragement	Estonia reported a description of the assessment of the economic and social consequences of response measures; however, no specific examples were provided and although the Party described the impacts, minimal information was provided explaining how these impacts are assessed. During the review, Estonia explained that impact assessments (which include environmental impacts) are carried out in the early stages of the policymaking process. For example, for a number of measures during the preparation of the Estonian Energy Development Plan until 2030 a strategic environmental assessment was conducted. The Party aims for a transition to a climate-neutral economy in a way that guarantees the

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
		well-being of the local community while supporting entrepreneurs in identifying and implementing new business opportunities. The ERT reiterates the encouragement from the previous review report that Estonia improve the transparency of its reporting by including detailed information on the assessment of the economic and social consequences of its response measures, including, for example, a brief explanation of how the impacts of response measures are assessed and using specific examples.
3	Reporting requirement specified in CTF table 3 Issue type: transparency Assessment: recommendation	The Party reported in the BR5 on its PaMs, including the estimated mitigation impact for most of its PaMs. The Party did not provide mitigation impact estimates for PaMs in the agriculture, waste and LULUCF sectors and for some PaMs related to energy consumption and other sectors or explain why the impact was not estimated. The Party explained during the review that estimated impacts were not provided for some PaMs owing to the lack of quantifiable activity data or methods. Some of the measures reported are 'soft' measures, including activities such as trainings, advisory services, knowledge transfer and information activities, farm management services, studies and pilot projects, that are difficult to evaluate in terms of their contribution to GHG emission reductions or to quantify using the current projections compilation methodology. For estimating the impact of some measures in the LULUCF sector, a complex set of site-specific factors need to be taken into account simultaneously. Estonia is working towards the development of GHG reporting models integrated into a modern geoinformation system, which will allow the impact of specific PaMs to be assessed on a location-specific basis, thereby reducing the uncertainty of future assessments. It will also provide valuable information on which PaMs are most suitable for a specific land-use unit. The ERT reiterates the recommendation from the previous review report that Estonia improve the transparency of its reporting by including further information on the mitigation impacts of its PaMs or explaining why this may not be possible owing to the national circumstances. The ERT notes that custom footnotes could be used in this respect.
4	Reporting requirement specified in paragraph 24 Issue type: completeness Assessment: encouragement	The Party did not report on the domestic arrangements established for the process of the self-assessment of compliance with emission reductions in comparison with emission reduction commitments or the level of emission reduction in its BR5. During the review, Estonia explained that there are currently no national arrangements for taking action against domestic non-compliance with national or EU emission reduction targets. In addition, Estonia explained the changes in the domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target since the BR4 (see issue 1 in this table above). The ERT encourages Estonia to report on the domestic arrangements established for the process of the self-assessment of compliance with emission reductions in comparison with emission reduction commitments or the level of emission reduction that is required by science.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs or to the CTF table number from the "Common tabular format for 'UNFCCC biennial reporting guidelines for developed country Parties'". The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on BRs.

Table II.4

Findings on estimates of emission reductions and removals and on the use of units from market-based mechanisms and land use, land-use change and forestry from the review of the fifth biennial report of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 10	The Party indicated in the BR5 that it does not intend to use units from market-based mechanisms under the Kyoto Protocol or other market-based mechanisms under the Convention to meet its commitment under the ESD. Given that the contribution of

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Issue type: transparency Assessment: recommendation	LULUCF activities is not included in the joint EU target under the Convention, the reporting of the contribution of LULUCF activities is not applicable to Estonia. Therefore, the contribution of LULUCF activities and use of units from market-based mechanisms were reported as "NA" in CTF table 4. However, in CTF table 4(a)II the Party reported data on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol without providing further clarification of the notation keys used or data reported in the footnotes to CTF tables 4 or 4(a)II. During the review, Estonia explained that the values reported in CTF table 4(a)II are for information purposes only, not for accounting under the EU target, as LULUCF is not included in the joint EU target for 2020 under the Convention. The Party confirmed that it does not use units from market-based mechanisms. The ERT recommends that the Party improve the transparency of its reporting by reporting consistent information in CTF tables 4 and 4(a)II. The ERT notes that the transparency of the Party's reporting could be improved by using relevant footnotes explaining the notation keys used and numerical data reported in the CTF tables.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on BRs.

Table II.5
Findings on projections reported in the fifth biennial report of Estonia

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 25 Issue type: completeness Assessment: encouragement	The Party did not report a WOM scenario in its NC8 and BR5. During the review, Estonia explained that it is in the process of developing WOM scenario projections and that after validating the system for compiling WOM projections, a WOM scenario could be reported in future submissions. The ERT reiterates the encouragement from the previous review report for the Party to continue its efforts to develop WOM scenario projections or provide a detailed explanation of the status of the development of a WOM scenario, or a detailed explanation as to why this may not be possible owing to the national circumstances.
2	Reporting requirement specified in paragraph 26 Issue type: transparency Assessment: recommendation	The Party reported both a WEM and a WAM scenario in its NC8 and BR5. However, the WEM scenario was not consistent with the UNFCCC reporting guidelines on NCs, according to which projections under the WEM scenario shall encompass only implemented and adopted PaMs, while planned PaMs shall be included in the WAM scenario projections. In CTF table 3, the Party reported 16 planned PaMs as included in the WEM scenario. Additionally, one planned measure (GHG reductions from the decrease in the use of AdBlue in the transport sector under the WAM scenario) was included in the WAM scenario despite being implemented in 2015. During the review, Estonia explained that 14 planned PaMs in the agriculture and LULUCF sectors are related to the EU Common Agricultural Policy Strategic Plan 2023–2027, approved on 11 November 2022. Estonia had already anticipated the adoption of the Strategic Plan and therefore included the related measures in the WEM scenario, but still reported them as "planned" in CTF table 3. Two further measures (promoting the use of biomethane in heavy-duty vehicles, starting in 2036; and making domestic ferries climate-neutral, starting in 2027) were included in the WEM scenario despite having a "planned" status, as there is general agreement within the Government to fund these projects, although implementation of the projects has not yet begun. Regarding the measure on GHG reductions from the decrease in the use of AdBlue in the transport sector, Estonia explained that the 2015 start year was incorrect, but did not provide the correct start year. The ERT recommends that the Party allocate its PaMs in line with the definitions contained in the UNFCCC reporting guidelines on NCs for the projections under the WEM scenario (including implemented and adopted PaMs) and the projections under the WAM scenario (including planned PaMs) and ensure consistent reporting between the chapters on PaMs and projections, transparently explaining any assumptions used in the allocation of PaMs across the scenarios.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
3	Reporting requirement specified in paragraph 32 Issue type: completeness Assessment: encouragement	The Party did not report projections of indirect emissions of carbon monoxide, NO_X, NMVOCs or SO_X in its BR5, although such information was included in the NC8. During the review, Estonia explained that a cross reference to NC8 chapter 5.1.8, where such information was provided, should have been included. The ERT reiterates the encouragement from the previous review report for the Party to improve the completeness of its reporting by including projections of carbon monoxide, NO_X, NMVOCs and SO_X in its next submission.
4	Reporting requirement specified in paragraph 40 Issue type: transparency Assessment: encouragement	Although Estonia provided some information explaining the models and approaches used for the projections in its NC8 and BR5, information that would enable a full understanding of the chosen modelling approaches is missing. The Party did not transparently explain how it accounts for overlap between the transport sector and the energy sector, in particular how the increase in the number of electric vehicles affects the modelling of electricity generation. For the transport sector, Estonia explained in the NC8 and BR5 that the Sybil baseline model was used for road transport, but information on the modelling approach used for other transport modes was missing. The methods used for the projections for other energy sectors (residential and agriculture/forestry) were described only very briefly and do not contain all the required information (e.g. the strengths and weaknesses were not summarized and an explanation was not provided on how these approaches account for any overlap or synergies that may exist between different PaMs). During the review, Estonia explained that sectors were modelled separately and model coupling was not applied. Information on future demand for electricity was provided by the main grid operator, accounting for electricity demand in transport and electric heating, energy efficiency goals set by the EU and other factors (e.g. GDP growth, population, annual average temperature). Estonia also explained that emissions for other transport modes and other energy sectors were projected on the basis of fuel consumption trends and the results of the impact assessment of the PaMs. The ERT encourages the Party to increase the transparency of its reporting by including in its next submission the information outlined in paragraph 40(a–e) of the UNFCCC reporting guidelines on NCs for each model or approach used, such as a description of the type of model or approach, its original purpose and its strengths and weaknesses, and an explanation of how the model or approach used accounts for any overlap or synergies that may exist between different PaMs.
5	Reporting requirement specified in paragraph 41 Issue type: completeness Assessment: encouragement	The Party did not provide references to detailed information on the models used for the projection scenarios. During the review, Estonia provided weblinks to the models used, together with further details on the models. The ERT encourages Estonia to enhance the completeness of its reporting by including in its next NC references to documents containing more detailed information on the models and approaches used for the projection scenarios.
6	Reporting requirement specified in paragraph 43 Issue type: transparency Assessment: encouragement	The Party reported a sensitivity analysis for the WEM scenario in its BR5; however, the methodology used for the sensitivity analysis and the choice of indicators used were not described. Additionally, the Party did not report a sensitivity analysis for energy industries, which is historically the largest source of GHG emissions in Estonia. During the review, Estonia explained that the sensitivity analysis was performed using the same methodology as for the projections under the WEM scenario. With regard to energy industries, Estonia explained that there is currently no applicable data for sensitivity analyses. The ERT encourages the Party to increase the transparency of its reporting by including further information on the sensitivity analysis, covering all projected sectors, and by explaining the rationale for the choice of factors used in the analysis.
7	Reporting requirement specified in paragraph 44 Issue type: transparency	Estonia provided detailed data on the key variables and assumptions used in the projections analysis to help to understand the projected emissions. However, CTF table 5 contains some omissions, such as: (1) there are no data for 1990–1995 for any of the indicators reported in the table; (2) some cells for historical years (e.g. 2016–2019) and

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Assessment: encouragement	projections (e.g. for solid fuels) were left empty; and (3) for some parameters (fuel and CO_2 prices) only projected data were reported. During the review, Estonia explained that historical data for the years before 2000 were not used as indicators, as the economy went through major restructuring in the 1990s after the collapse of the Soviet Union (which Estonia was part of) and the Party therefore considers the indicators before 2000 as irrelevant. Estonia provided an updated CTF table 5, which contains additional data and notation keys for 2016–2019 for some indicators (GDP, gross inland consumption, final energy consumption and manure storage). The ERT encourages Estonia to improve the transparency of its reporting by providing a complete time series for all the years specified in CTF table 5, for example using notation keys where data are not available or are irrelevant to understanding the projections.
8	Reporting requirement specified in paragraph 45 Issue type: transparency Assessment: recommendation	According to the UNFCCC reporting guidelines on NCs, Parties are required to present relevant information on factors and activities for each sector from 1990 to at least 15 years from the most recent inventory year. Estonia provided information on sectoral factors and activities for both the WEM and WAM scenarios. However, that information was partly unclear because for some parameters (shares of manure storage, forest not available for wood supply, wood product indices) no historical data were provided or the data were available until 2020 only (e.g. final energy consumption of electricity), or there were inconsistencies in the presented data (e.g. projected final energy consumption for the residential sector was reported as constant for 2030–2050 in the WEM scenario despite a decreasing population over that period). In addition, the comparison with the BR4 shows significant differences (e.g. in final energy consumption for 2000–2015, as well as for projected years). Some of the sectoral data were not clearly explained in the NC8 (e.g. in which sectoral models the projected EU ETS carbon price was used, and the lack of data on gross inland consumption of solid fossil fuels after 2040). The ERT further noted inconsistencies in the reported trends (e.g. due to the phase-out of shale oil plants) and a lack of reporting of data, for example on electricity and heat consumption, as well as on the use of the EU ETS carbon price in the modelling for electricity generation, but not for other models (e.g. for manufacturing industries or industrial processes). During the review, Estonia explained that it reported only final energy consumption of combustion fuels that directly cause GHG emissions but excluded energy carriers (i.e. electricity and heat) that only indirectly cause GHG emissions. With regard to the EU ETS carbon price, Estonia clarified that it was used only for the modelling of electricity generation using the Balmorel model but not for other models (e.g. for manufacturing industries or industrial processes). The ERT reiterates the recommendation from previous review reports that the Party improve the transparency of its reporting by providing information describing the factors and activities driving emission trends in each sector from 1990 onward and by explaining the trends and drivers for historical and projected years with a view to facilitating a general understanding of the emission trends.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs, as per para. 11 of the UNFCCC reporting guidelines on BRs. The reporting on the requirements not included in this table is considered to be complete and transparent, and thus adheres to the UNFCCC reporting guidelines on NCs and on BRs.

Annex III

Documents and information used during the review

A. Reference documents

2022 GHG inventory submission of Estonia. Available at https://unfccc.int/ghg-inventories-annex-i-parties/2022.

BR4 of Estonia. Available at https://unfccc.int/documents/208372.

BR5 CTF tables of Estonia. Available at https://unfccc.int/documents/626517.

BR5 of Estonia. Available at https://unfccc.int/documents/626518.

BR5 of the EU. Available at https://unfccc.int/documents/624694.

"Common tabular format for 'UNFCCC biennial reporting guidelines for developed country Parties'". Annex to decision 19/CP.18. Available at https://unfccc.int/resource/docs/2012/cop18/eng/08a03.pdf.

"Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention". FCCC/SBSTA/2014/INF.6. Available at http://unfccc.int/resource/docs/2014/sbsta/eng/inf06.pdf.

Estonia's 2030 National Energy and Climate Plan. Available at https://energy.ec.europa.eu/system/files/2022-08/ee_final_necp_main_en.pdf.

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"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/2019/13/Add.1. Available at https://unfccc.int/documents/210471.

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NC7 of Estonia. Available at https://unfccc.int/documents/198238.

NC8 of Estonia. Available at https://unfccc.int/documents/626519.

NC8 of the EU. Available at https://unfccc.int/documents/624694.

Report on the individual review of the annual submission of Estonia submitted in 2020. FCCC/ARR/2020/EST. Available at https://unfccc.int/sites/default/files/resource/arr2020_EST.pdf.

Report on the technical review of the BR3 of Estonia. FCCC/TRR.3/EST. Available at https://unfccc.int/documents/180319.

Report on the technical review of the BR4 of Estonia. FCCC/TRR.4/EST. Available at https://unfccc.int/documents/250045.

Report on the technical review of the NC7 of Estonia. FCCC/IDR.7/EST. Available at https://unfccc.int/documents/180318.

"UNFCCC biennial reporting guidelines for developed country Parties". Annex I to decision 2/CP.17. Available at http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Cris-Tiina Pärn (EERC), including additional material. The following references were provided by Estonia and may not conform to UNFCCC editorial style as some have been reproduced as received:

State Budget Strategy (https://www.fin.ee/media/7588/download).

Maritime Economy White Paper 2022–2035 (https://mkm.ee/media/8055/download).

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Kaaret, K. et all (2022). *Reaching climate neutrality in Estonia: a progress update.* Available at https://www.sei.org/publications/reaching-climate-neutrality-in-estonia-a-progress-update/.

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