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Ministry of the Environment

2022

ESTONIA'S FIFTH BIENNIAL REPORT
under the United Nations Framework Convention on Climate Change

Estonian Environmental Research Centre has the responsibility for the preparation and finalization of Biennial Report and its submission to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat and the European Commission on behalf of the Ministry of the Environment.

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Contents

1. INTRODUCTION

Estonia is pleased to submit its Fifth Biennial Report (BR5) under decision 2/CP.17 of the Conference of the Parties under the United Nations Framework Convention on Climate Change (UNFCCC).

As defined in the UNFCCC biennial reporting guidelines for developed country Parties[1], the information is structured into:

- information on greenhouse gas (GHG) emissions and trends incl. information on the national inventory system (consistent with the information in Estonia's greenhouse gas inventory submission in 2022) (Chapter 2),
- quantified economy-wide emission reduction target (Chapter 3),
- progress in achievement of the quantified economy-wide emission reduction targets (Chapter 4),
- projections (Chapter 5) and
- provision of financial, technological and capacity building support to developing countries (Chapter 6).

Tabular information as defined in the common tabular format (CTF) for the UNFCCC biennial reporting guidelines for developed country Parties (decision 19/CP.18 and 9/CP.21.) are enclosed to the BR5 submission (BR5 CTF). The CTF submission has been made to the UNFCCC using the electronic reporting application, according to decisions 19/CP.18 and 9/CP.21.

2. INFORMATION ON GHG EMISSIONS AND TRENDS

2.1. Introduction and summary information from the national GHG inventory

This chapter is to provide an overview of Estonia's GHG emissions and their trends for the period of 1990–2020. It also provides information on Estonia's national inventory arrangements. The GHG data presented in the chapter is consistent with Estonia's 2022 submission to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat (National Greenhouse Gas Inventory Report 1990–2020, 2022). Common Reporting Format (CRF) tables were resubmitted in September 2022 (UNFCCC, 2022). Summary tables of GHG emissions are presented in CTF Table 1.

The chapter presents data on direct GHG: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). Chapter 5, Table 5.2 includes historical GHG data from 2022 NIR and GHG projections that are based on the 2022 NIR for the period of 2021–2050.

[1] Annex I to UNFCCC decision 2/CP.17.

2.1.1. Overall greenhouse gas emission trends

Total emissions of the greenhouse gases in Estonia (without LULUCF) decreased steadily from 40 175.17 kt CO2 eq. in 1990 to 11 555.8 kt CO_2 eq. in 2020 (Figure 2.1). From 1990 to 2020 emissions without LULUCF decreased by 71.24%. This decrease was predominantly caused by the transition from a planned economy to a market economy in the early 1990s and due to recent efforts made to transition to renewable energy sources and due to a high European Union Emission Trading System (EU ETS) allowance price. Estonia has made significant progress in improving its environmental performance by decoupling economic growth from the primary environmental pressures (Figure 2.2). The final energy intensity has decreased, due to some part of energy efficiency measures put in place pursuant to the EU Directive on Energy End-Use Efficiency and Energy Services (OECD, 2017). Also, the share of renewable energy in final consumption in Estonia has been increasing continuously since 2006. In 2006, the share was 16.1%, in 2010, it was 24.6%, and in 2020, it was as high as 30.2%.

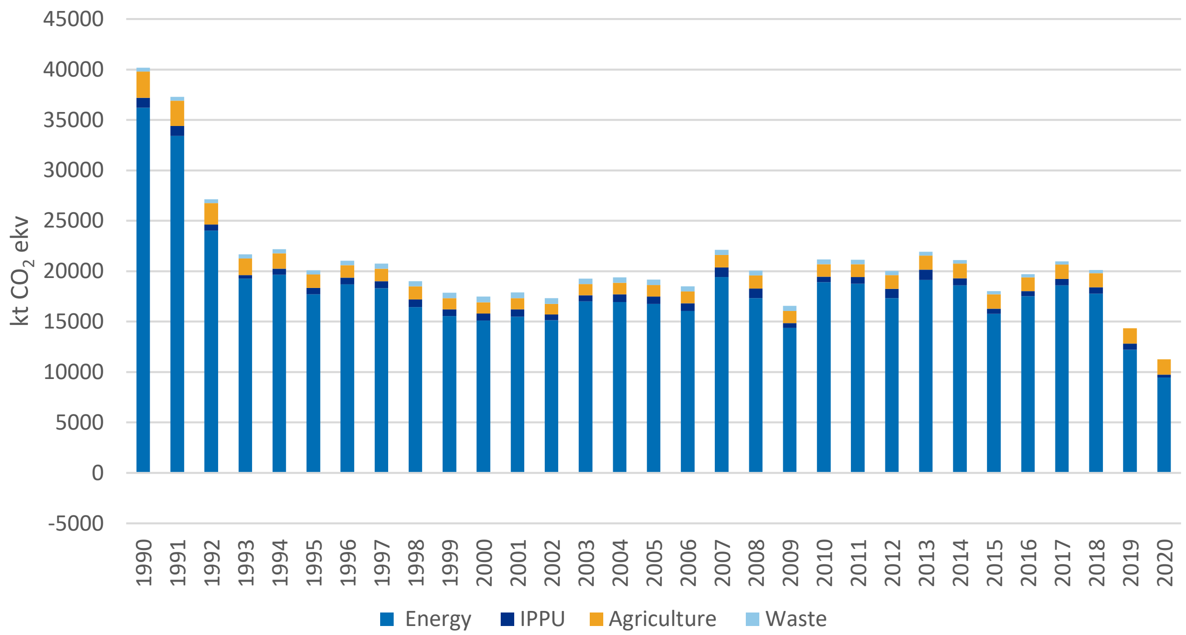

Figure 2.1. Estonia's GHG emissions by sector, 1990–2020, excluding LULUCF, kt CO_2 eq.

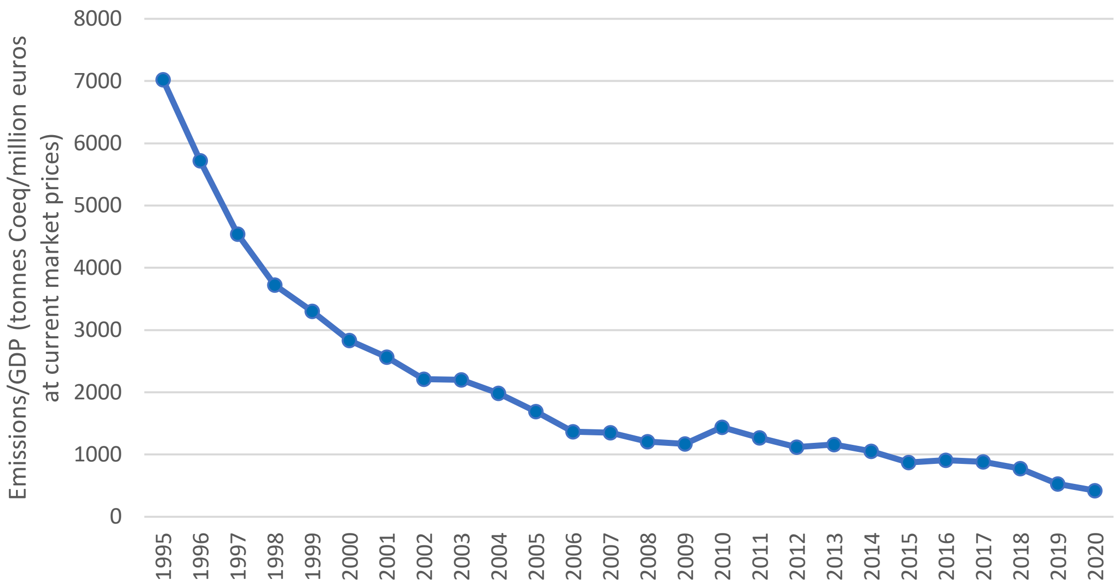

Figure 2.2. Estonia's GHG emissions per GDP from 1995 to 2020

The Energy sector is by far the largest producer of GHG emissions in Estonia. In 2020, the sector accounted for 81.9% of Estonia's total GHG emissions (Figure 2.3).

The second largest sector that contributes to the GHG emissions is Agriculture, which accounted for 13.1% of total emissions in 2020. Emissions from the Industrial processes and product use (IPPU) as well as Waste sectors accounted for 2.6% and 2.5% of total emissions, respectively.

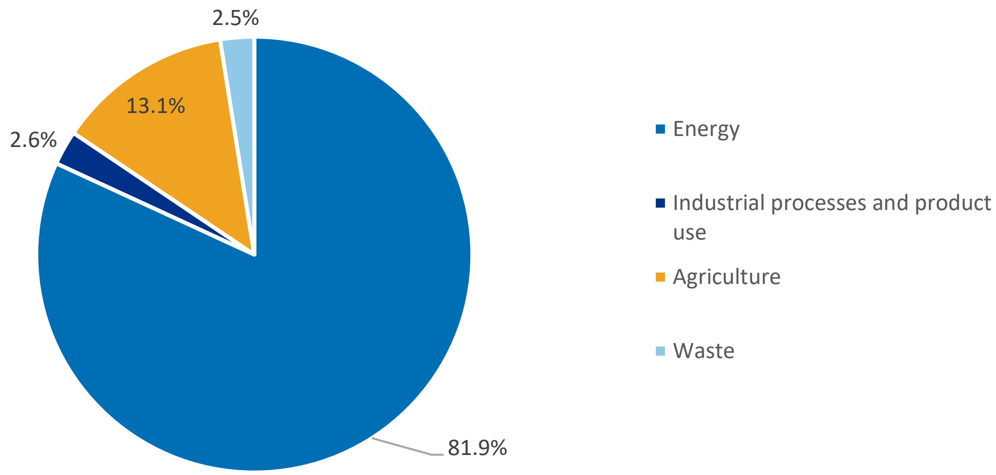

Figure 2.3 GHG emissions by sector in 2020, %

The LULUCF sector, acting as the only possible sink of GHG emissions in Estonia, plays an important role in the national carbon cycle. In 2020, net emissions from the LULUCF sector equalled 1 297.27 kt CO_2 equivalent. Compared to the base year (1990), uptake of CO_2 in the LULUCF sector has decreased by 141.1% and compared to the previous year (2019), by 487.7%. The LULUCF sector sink is mainly affected by the age structure of managed forests, management practices in forestry and agriculture, usage of peat soils and horticultural peat, and C sequestration in HWP.

In 2020, as in previous years, the main GHG in Estonia was CO_2 (Figure 2.4), accounting for 80.9% of the total GHG emissions (with indirect CO_2 and without LULUCF) expressed in CO_2 eq., followed by CH_4 with 9.5% and N_2O with 8.0%. Fluorinated gases (the so-called F-gases) collectively accounted for about 1.6% of overall GHG emissions.

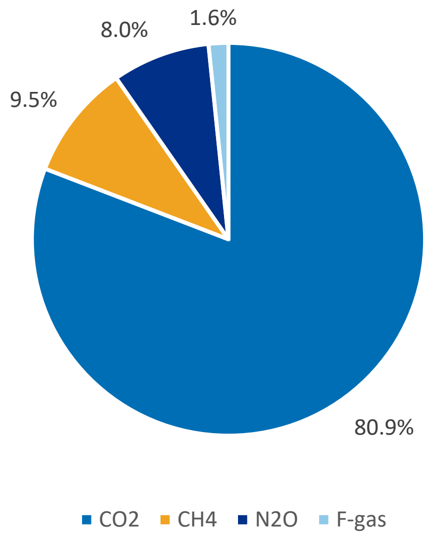

Figure 2.4 Greenhouse gas emissions by gas in 2020, %

Emissions of CO_2 (with indirect CO_2) decreased by 74.7% from 36,922.2 kt in 1990 to 9343.01 kt in 2020, especially CO_2 emissions from Energy subsector Public electricity and heat production, which is the major source of CO_2 in Estonia. After 1990 the use of fossil fuels decreased and the use of biomass increased during the period in this subsector. The use of biomass increased significantly in 2016/2017 since many new biomass-based capacities were added to the production of electricity and heat.

Methane is the second most significant contributor to greenhouse gas emissions in Estonia after CO_2. Emissions of CH_4 decreased by 42.7% from 1912.52 kt CO_2 eq. in 1990 to 1095.46 kt CO_2 eq. in 2020. The downturn was especially noticeable in the Agriculture subsector Enteric fermentation, which is a leading source of CH_4 emissions in Estonia. The main reason for that is the collapse of Soviet Union in 1991 and the disappearance of collective farms, after what the population of livestock started to decrease.

Emissions of N_2O have decreased by 29.3% from 1340.45 kt CO_2 eq. in 1990 to 929.68 kt CO_2 eq. in 2020, especially N_2O emissions from Agriculture subsector Agricultural soils, which is the main contributor of N_2O emissions in Estonia. This is mainly due to the decrease in the number of the livestock population (i.e., amount of animal manure applied on agricultural soils and emissions from grazing animals) and due to the decline in the quantity of fertilizers applied on agricultural land.

Emissions of the total F-gases (HFCs, PFCs and SF_6) increased from 0 kt CO_2 eq. in 1990 to 187.7 kt CO_2 eq. in 2020, especially HFC emissions from Refrigeration and air conditioning, which is the major source of halocarbons in Estonia. Until 2016, emissions from Refrigeration and air conditioning subsector grew rapidly because of substitution of ozone depleting substances with HFCs. In 2017–2020, emission curbing effects of EU Regulation No 517/2014 on this subsector can be seen. Since the refilling ban in 2020, the service companies reported much lower refilling rates and explain that the most leaking equipment has been decommissioned and that only minimal amounts of refrigerants needed for functioning were filled into equipment – hence the steep decrease in HFC emissions in 2020. The second largest source is Foam blowing agents, which showed relatively steady increase of emissions until 2007. In 2001, one of two big Estonian producers of one component foam replaced HFC-134a with HFC-152a, followed by the other producer starting from 2007. Due to much lower GWP of HFC-152a the emissions decreased suddenly in the corresponding years. See Table 2.1 for an overview of annual contributions of the various GHGs.

NF_3 emissions do not occur in Estonia.

Table 2.1. Greenhouse gas emissions in Estonia – annual contributions of the various GHGs, kt CO_2 eq., %

GHG EMISSIONS kt CO_2 eq.		CO_2 emissions excluding net CO_2 from LULUCF	CH_4 emissions excluding CH_4 from LULUCF	N_2O emissions excluding N_2O from LULUCF	HFCs	SF_6	Total (excluding LULUCF)
1990	**kt**	36,922.21	1912.52	1340.45	NO	NO	40,175.17
	%	91.90%	4.76%	3.34%			100%
1995	**kt**	18,066.41	1284.38	698.21	28.45	3.07	20,080.53
	%	89.97%	6.40%	3.48%	0.14%	0.02%	100%
2000	**kt**	15,500.38	1259.91	637.47	79.15	2.61	17,479.52
	%	88.68%	7.21%	3.65%	0.45%	0.01%	100%
2005	**kt**	17,109.78	1239.50	672.16	134.96	1.08	19,157.48
	%	89.31%	6.40%	3.80%	0.70%	0.01%	100%
2010	**kt**	19,002.52	1253.87	746.47	176.11	1.83	21,180.81
	%	89.72%	5.92%	3.52%	0.83%	0.01%	100%
2018	**kt**	17,935.07	1093.14	862.50	232.36	2.67	20,125.74
	%	89.12%	5.43%	4.29%	1.15%	0.01%	100%
2019	**kt**	12,380.19	1098.3	928.46	226.34	2.84	14,636.12
	%	84.59%	7.50%	6.34%	1.55%	0.02%	100%
2020	**kt**	9343.01	1095.46	929.68	184.74	2.92	11,555.81
	%	80.85%	9.48%	8.05%	1.60%	0.03%	100%

2.1.2. Greenhouse gas emissions by sector

Energy

Estonia's emissions from the Energy sector are divided into the following categories: Fuel combustion, including Energy industries; Manufacturing industries and construction; Transport; Other sectors and Fugitive emissions. Until 2020 submissions fuel consumption and emissions from military vehicles were included separately in the sector 1.A.5 Other, but from 2021 submission fuel consumption and emissions from military vehicles are included in category 1.A.4.a Commercial/institutional, because of the Joint Questionnaire dataset.

The Energy sector is the main source of GHG emissions in Estonia. In 2020 the sector contributed 81.9% of all emissions, totaling 9461.45 kt CO_2 eq. 99.8% of emissions in the sector originated from fuel combustion and just 0.2% were from fugitive emissions.

Energy related CO_2 emissions varied mainly in relation to the economic trend, the energy supply structure and weather conditions. The decrease of GHG emissions between 1990 and 1993 is related to major structural changes in the economy after Estonia regained its independence from the Soviet Union. There has been a drastic decrease in the consumption of fuels in Energy industries (closing factories, decrease of electricity import, etc.). A small increase of emissions in 1994 is related to the growing energy demand in the transport sector. After that, the emissions from the Energy sector were quite steady (slight decrease until 2002). In 2003 the emissions increased mainly due to the export of the oil shale-based electricity. The rise in emissions between 2006 and 2007 is related to the overall economic upturn and the decrease of emissions between 2007 and 2009 to the overall economic downfall. Since 2009 the GHG emissions are strongly related to the volume of exported electricity that is mainly produced from oil shale. The decrease in GHG emissions in 2019 and 2020 compared to the previous years was mainly in the energy industries, because of the EU ETS emission allowance price increase and lower electricity prices.

Emissions from the Energy sector decreased by 73.9% compared to 1990 (incl. Energy industries – 79.3%; Manufacturing industries and construction – 85.3%; Transport – 10%; Other sectors – 55.3%; and Fugitive emissions– 70.9%). There has been a drastic decrease in the consumption of fuels and energy in energy industries (closing of factories), agriculture (reorganisation and dissolution of collective farms), transport (the proportion of new environmentally friendly cars has increased, and the number of agricultural machines decreased), households (energy saving) and in the economy after 1991 when Estonia regained independence. The overall progression of GHG emissions in the Energy sector in CO_2 equivalent is presented in Figure 2.5. Since 2009, the GHG emissions are strongly related to exported electricity, which is mainly produced from oil shale. The GHG emissions from the energy sector in 2019 and 2020 have decreased significantly due to a significant reduction in oil shale electricity production, the main reason for which is the high emission allowance price of the EU ETS.

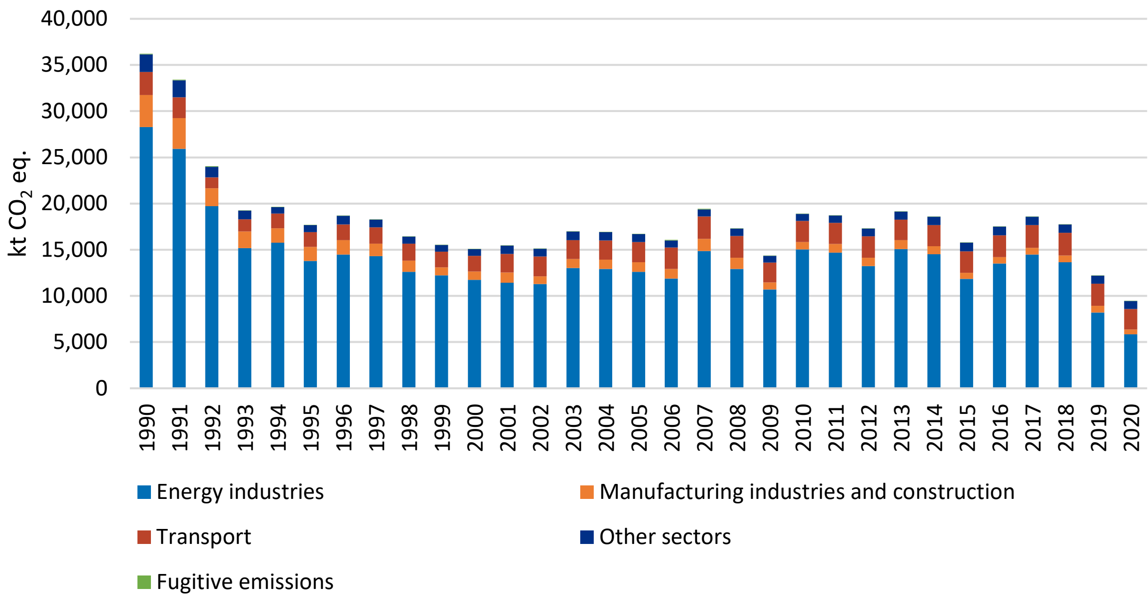

Figure 2.5 Trend in emissions from Energy sector 1990–2020, kt CO_2 eq.

Industrial processes and product use

Estonia's GHG emissions from the Industrial processes and product sector are divided into the following categories:

- Mineral industry (emissions from cement until 2020, lime, glass production and other process uses of carbonates);
- Chemical industry (historically ammonia and carbamide were produced);
- Metal industry (production of secondary lead and rare earth metal compounds)
- Non-energy products from fuels and solvent use (CO_2 emissions from lubricant and paraffin wax use and urea-based catalysts for motor vehicles, as well as NMVOC emissions from solvent use and road paving with asphalt and indirect CO_2 emissions calculated from these NMVOC emissions;
- Product uses as substitutes for ODS (HFC emissions from refrigeration and air conditioning, foam blowing, fire protection and aerosols);
- Other product manufacture and use (SF_6 emissions from electrical equipment, SF_6 and PFC emissions from other product use and N_2O emissions from product uses).

In addition, NOx, CO and SO_2 emissions from Pulp and paper are reported under the category 2.H Other production. The non-fuel based CO_2 emissions from pulp and paper industry are estimated to be negligible in Estonia. All N_2O emissions from the pulp and paper and food industry are reported as fuel-based emissions under the Energy sector.

In 2020, the Industrial processes and product use sector contributed 2.56% of all GHG emissions in Estonia, totaling 295.47 kt CO_2 eq. with indirect CO_2 and 270.73 kt CO_2 eq. without indirect CO_2. The most significant emission sources in IPPU sector were HFC emissions from refrigeration and air conditioning at 60.05% of total emissions from the sector (with indirect CO_2). Compared to 2019, the emissions from Industrial processes and product use (with indirect CO_2) decreased by 52.45% in 2020. This is because of closure of clinker production in cement plant in March 2020 and decreased F-gas emissions. The F-gas emissions decreased because of bans of the Regulation (EU) No 517/2014 that were implemented in 2020.

Industrial CO_2 emissions have fluctuated strongly during years 1990–2020.The decrease in emissions during the early 1990s was caused by the transition from a planned economy to a market economy after 1991 when Estonia regained its independence. This led to lower industrial production and to an overall decrease in emissions from industrial processes between 1991 and 1993. In 1994, the economy began to recover, and production increased. The total emissions of HFCs have increased significantly in 1993-2016, especially HFC emissions from refrigeration and air-conditioning equipment, which is the major source of halocarbons in Estonia. The decrease in emissions in 2002 and 2003 was caused by the reduction in ammonia production, as the only ammonia factory in the country was being reconstructed. The sudden increase in emissions in 2007 was mainly caused by an increase in cement production, as the only cement factory renovated its third kiln. In 2009 the industrial processes sector was affected by economic recession. Decline in production was mainly due to insufficient demand on both the domestic and external markets. CO_2 emissions raised in 2012 and 2013 because a power plant temporarily used large amounts of limestone for flue gas desulphurisation. Increase in 2017 emissions was largely caused by increase of cement production. Decrease in mineral (and cement) industry output was the main driver in overall decrease of industrial CO_2 emissions from 2014 to 2016. Emissions of F-gases have been halted since 2017 because of the effect of restrictions of the Regulation (EU) No 517/2017.In 2017-2018 emissions of HFCs have halted and in 2019-2020 significantly decreased because of bans and quota restrictions of EU Regulation No 517/2014 (the strictest ones started from 2020).

The share of emissions by category and overall progression of GHG emissions in the Industrial processes and product use sector in CO_2 eq. is presented in Figure 2.6.

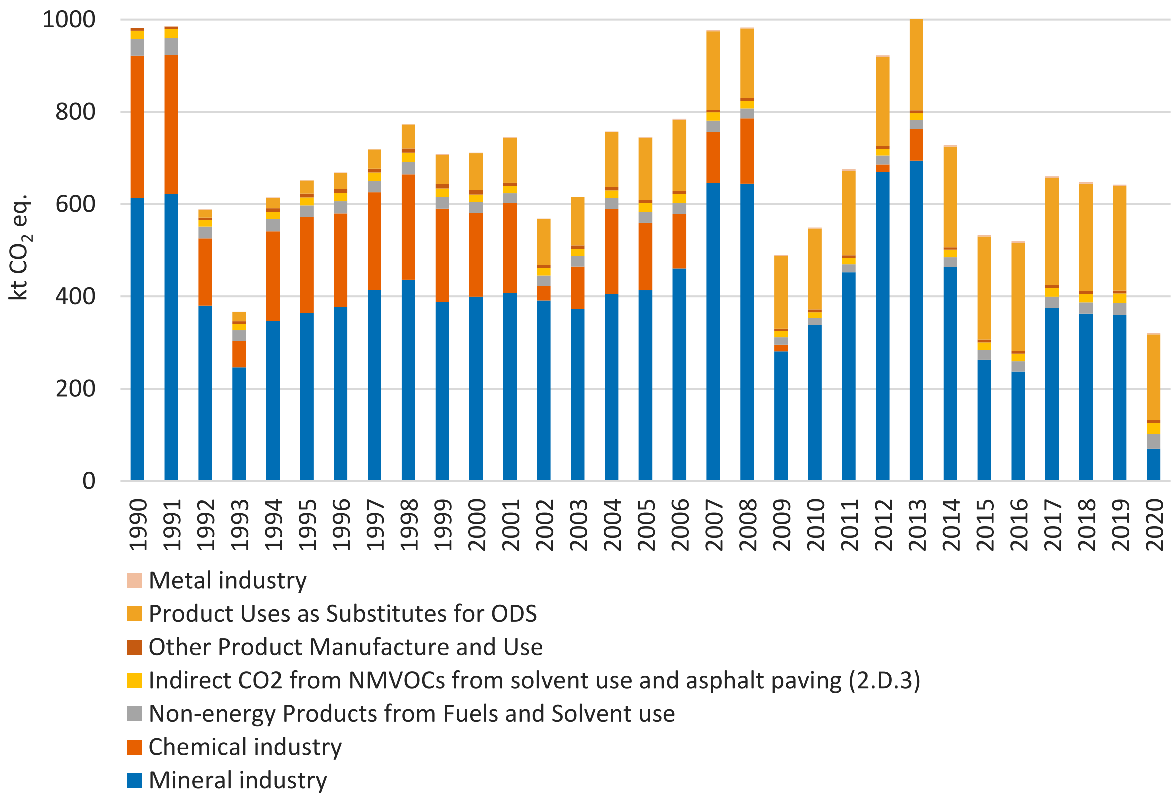

Figure 2.6 Trend in emissions from Industrial processes and product use sector, 1990–2020, kt CO_2 eq.

Agriculture

Agricultural GHG emissions in Estonia consist of CH_4 emissions from Enteric fermentation of domestic livestock, CH_4 andN_2O emissions from Manure management systems, direct and indirect N_2O emissions from Agricultural soils and CO_2 emissions from Liming and Urea application to agricultural soils. Direct N_2O emissions include emissions from synthetic fertilizers, emissions from animal manure, compost and sludge applied to agricultural soil, emissions from crop residues and cultivation of organic soils, mineralization associated with loss or gain of soil organic matter and emissions from urine and dung deposited by grazing animals. Indirect N_2O emissions include emissions due to atmospheric deposition and leaching and run-off from manure management.

The total GHG emissions reported in the Agricultural sector of Estonia were 1 508.38 kt CO_2 eq. in 2020. The sector contributed about 13.1%[2] to the total CO_2 eq. emissions in Estonia. In 2020, the emissions from Enteric fermentation decreased by 0.6% compared to the previous year while the emissions from Manure management increased by 4.2%, mostly due to the growing share of cattle and swine manure stored in liquid systems which have higher emission factors. The dairy industry has suffered a decline in production due to economic sanctions imposed by Russia on the EU starting from August 2014. Consequently, the number of dairy cattle in 2020 fell by 11.8% in comparison with 2014. The number of swine has fallen by 11.5% in 2020 compared to 2014 in Estonia because of the outbreak of African swine fever in the region in 2015. However, compared to 2018, the number of swine increased by 8.3% in 2020. The increase in the number of livestock is caused by the improved economic situation. Also, a high demand for pork in both inland and foreign markets as pork being the most popular meat in Estonia has helped, to some extent, to recover the number of swine after the low point that started after the African swine fever.

Emissions from Agricultural soils and Enteric fermentation of livestock were the major contributors to the total emissions recorded in the sector – 49% and 35% respectively.

As a result of the markets of the former Soviet Union collapsing in the early 1990's, Estonia was left with a large excess supply of agricultural production. Western markets remained closed to Estonian agricultural products, mostly for two reasons – high customs barriers and non-compliance of our products with the requirements and practices abroad. Producer prices in Estonia fell to a level up to 50% lower than prices on world markets and became insufficient to cover production costs[3]. All of which led to rapid decline of agricultural production in Estonia and which explains why the emissions from the Agricultural sector have declined by 48.9% by 2020 compared with the base year (1990). Emissions of N_2O have decreased by 29.3% from 1340.4 kt CO_2 eq. in 1990 to 929.7 kt CO_2 eq. in 2020, especially N_2O emissions from Agricultural soils subsector, which is the main contributor of N_2O emissions in Estonia. This is mainly due to the decrease in the number of the livestock population (i.e., amount of animal manure applied on agricultural soils and emissions from grazing animals) and due to the decline in the quantity of fertilizers applied on agricultural land.

Between 2002–2008, the most important driving force for Estonian agriculture was the EU accession and the application of accompanying supporting EU's common agricultural policy which significant effect appeared a few years before joining4. The positive impact on the agricultural production manifested years preceding the EU accession, and is reflected in the turnover of a downward GHG emissions trend that began in the 1990's.

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[2] GHG emissions related to LULUCF sector are not included.
[3] http://www.estonica.org/en/The_rural_economy_in_Estonia_until_2001/Crisis_in_agriculture_in_the_1990s/ .
[4] Estonian Universtity of Life Sciences. (2011). *Maaelu arengu aruanne.*

The overall progression of GHG emissions in the Agriculture sector is presented in Figure 2.7.

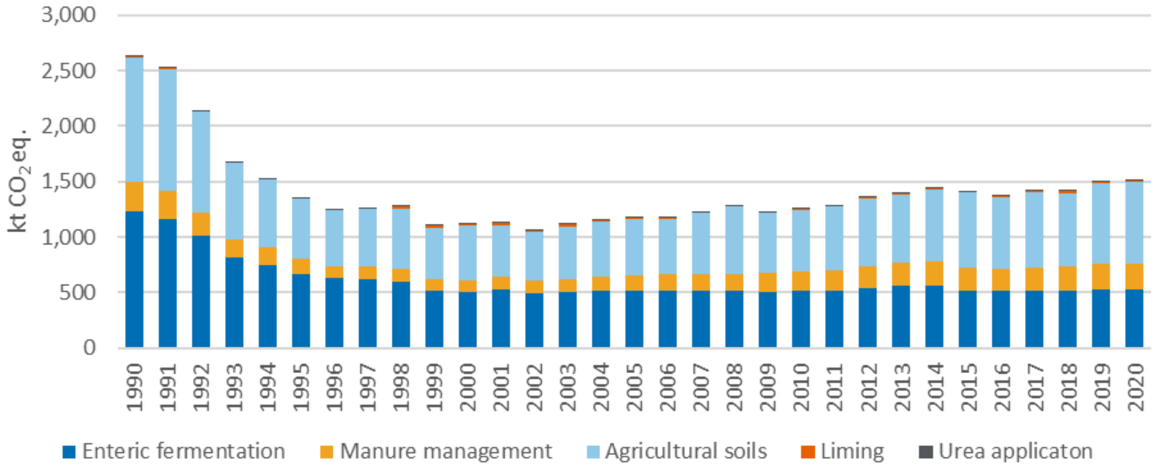

Figure 2.7 Trend in emissions from Agriculture sector, 1990–2020, kt CO_2 eq.

Land use, land-use change and forestry

The LULUCF sector, acting as the only possible sink of greenhouse gas emissions in Estonia, plays an important role in the national carbon cycle. Emissions and removals from the LULUCF sector are divided into the following categories: Forest land; Cropland; Grassland; Wetlands (peatland); Settlements; Other land and Harvested wood products (HWP). Each category, except HWP, is further divided into 'land remaining' and 'land converted to' subcategories.

The share of LULUCF sector emissions and removals by each land use category during the time period 1990–2020 is presented in Figure 2.8

In 2020, net emissions from the LULUCF sector equalled 1297.27 kt CO_2 equivalent. Compared to the base year (1990), uptake of CO_2 in the LULUCF sector has decreased by 141.1% and compared to the previous year (2019), by 487.7%. The LULUCF sector sink is mainly affected by the age structure of managed forests, management practices in forestry and agriculture, usage of peat soils and horticultural peat, and C sequestration in HWP.

Due to the high proportion of mature and near-mature forest stands and increasing proportion of forest area belonging to the first development classes (treeless area, area under regeneration and young stands), the capacity of carbon sequestration in biomass has decreased in recent years. In addition, the annual increase in conversion from other land categories to Forest land (afforestation and reforestation) has been slowing – particularly in Cropland and Grassland conversion to Forest land, and the total forest area has stabilized. The annual estimate of average growing stock per hectare is also influenced by variability caused by the National Forest Inventory (NFI) sampling design, which is based on the systematic random sampling.

In the period 1990–2002, the area of Forest land remaining forest land category decreased due to the 20-year transition period (the total forest land area increased). However, carbon sequestration increased due to the rapid increase in forest growing stock. In 2004–2008, carbon sequestration decreased as the felling volume increased strongly in the previous few years. Felling volumes in 2004–2011 were lower compared to the previous period. The LULUCF sector sink is mainly affected by the age structure of managed forests, management practices in forestry and agriculture, usage of peat soils and horticultural peat, and carbon sequestration in HWP.

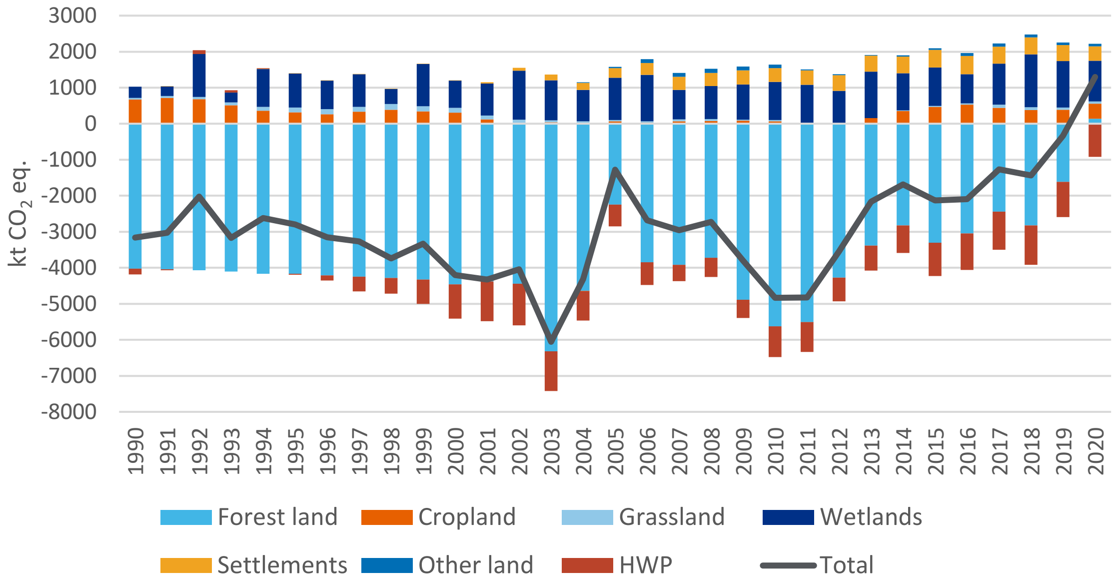

Figure 2.8 Trend in emissions from land use, land-use change and forestry sector 1990–2020, kt CO_2 eq.

Waste

Estonia's GHG emissions from Waste sector covers solid waste disposal sites which include solid municipal and industrial waste. The Waste sector also covers GHG emissions which include both CH_4 and N_2O emissions from waste incineration without energy recovery and open burning of waste, biological treatment of solid waste and wastewater treatment and discharge from domestic and industrial sector.

CO_2 emission is reported from non-biogenic incineration without energy recovery. CO_2 eq. emissions from the Waste sector were 290.5 kt in 2020 and covered about 2.5% of total GHG emissions. Total CO_2 eq. emissions from the Waste sector in 2020 decreased by 3.9% compared to 2019. In recent years, total emissions have followed a declining trend. Compared to the base year of 1990, the amount of CO_2 eq. emissions in 2020 were 21.5% smaller. Compared to the base year, CO_2 eq. emissions from Solid waste disposal (SWD) have decreased by 18.6%, CO_2 eq. emissions from Waste incineration and Open burning of waste by 78.9%, and from Wastewater treatment and discharge by 44.1%. On the other hand, CO_2 eq. emissions from Biological treatment of solid waste have, compared to the base year of 1990, increased by 2,586.3%.

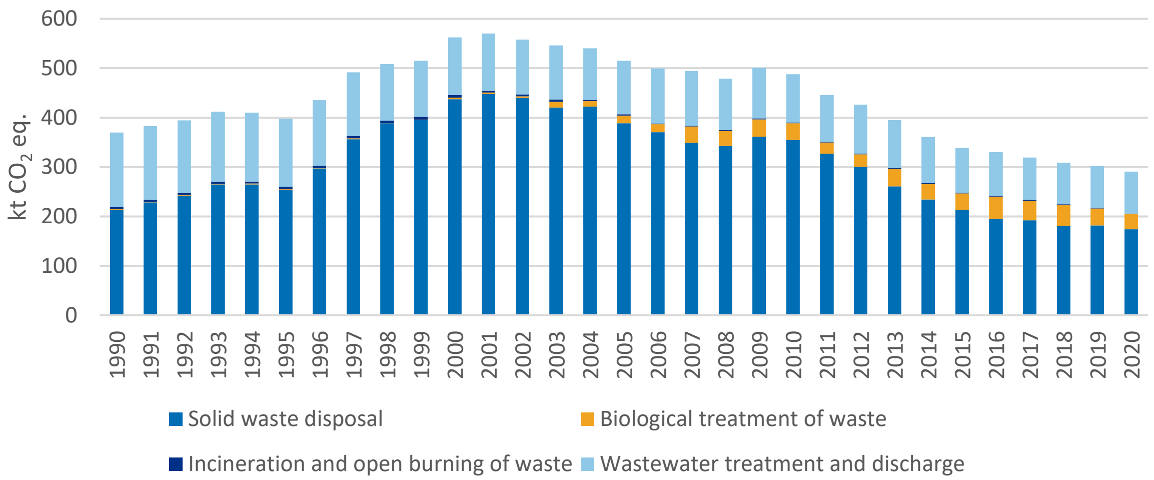

Figure 2.9 Trends of GHG emissions in the waste sector by source categories in 1990–2020, kt CO_2 eq.

As seen from Figure 2.9 in recent years GHG emissions from the Waste sector have followed a declining trend.

The lowest CO_2 eq. emissions during the whole time-series occurred in 2020, which was mainly connected to the decreasing amount of waste deposited in landfills. Low CO_2 eq. emissions in 1995 are related to decreasing CH4 emissions from paper and sludge disposal. The highest CO_2 eq. in 2000–2001 is related to the significant increase in emissions mainly from Solid waste disposal. The increasing trend of emission until 2001 is linked to the high amount deposited organics and food waste which were deposited due to low rate of waste sorting. Emissions from waste incineration have been marginal during the whole period compared to other activities involved. The decrease of GHG emissions from the Waste sector after 2004 relates to the increasing amount of CH_4 recovery from landfills. Emissions decrease starting from 2009 is connected with the financial crisis during 2007–2008. The financial crisis did not affect the Waste sector immediately, because companies had a prepared raw material reserve. The total CO_2 eq. in 2011 decreased significantly compared to previous years, mainly because of the change in the national currency, which raised prices in the country and therefore reduced consumption habits and waste generation. Also, opening the Iru waste incineration plant in 2013 had a decreasing effect on the amount of deposited waste trend since 2010.

2.1.3. Information on indirect GHG emissions

Air pollutant emissions reported in the CRF are based on the data reported in UNECE/CLRTAP inventories by the Estonian Environment Agency. The emissions are mainly calculated by using actual emissions data reported by the companies as well as by using the EMEP/EEA Guidebook 2019. More detailed information about methodologies used for estimating the indirect GHG emissions are presented in relevant sectoral chapters in the NIR2022. Figure 2.10 shows indirect GHG emission trends in 1990 to 2020.

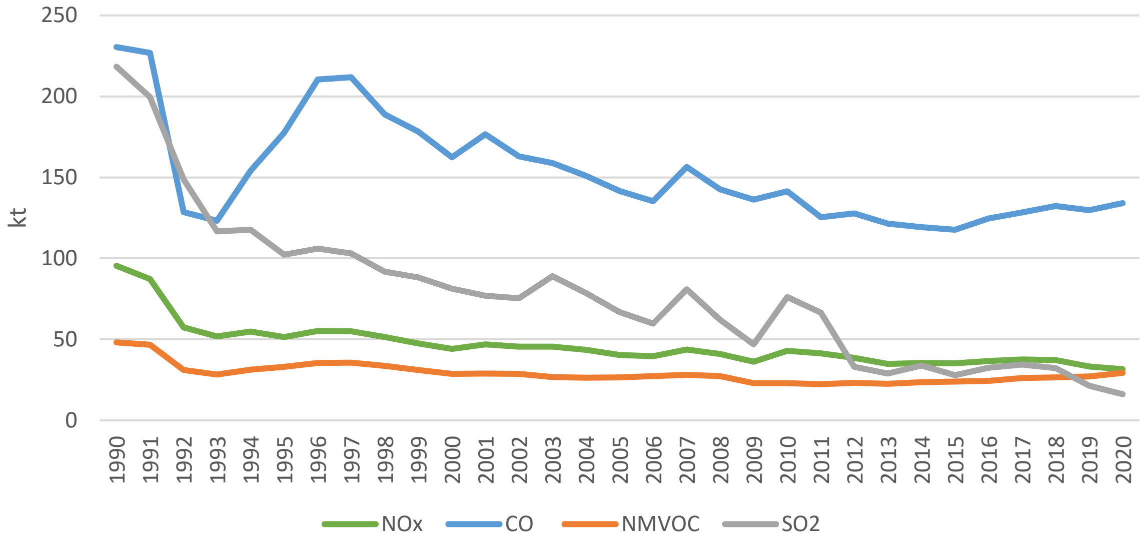

Figure 2.10 Estonia's indirect GHG emissions by gas 1990–2020 reported in the CRF, kt

2.1.4. Accuracy/Uncertainty of the data

The uncertainty estimate of the 2022 inventory submission (see Table 2.2) to the UNFCCC has been done according to the Tier 1 method presented by the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006). Tier 1 method combines the uncertainty inactivity rates and emission factors, for each source category and greenhouse gas, and then aggregates these uncertainties, for all source categories and greenhouse gases, to obtain the total uncertainty for the inventory. Uncertainty analyses has been done for the latest inventory year and time series. Estonia acknowledges the observation by ERT (FCCC/ARR/2020/EST/G.5) and UNFCCC Annex I inventory reporting guidelines requirement, however because of lack of activity data there is no separate information available for calculating separate uncertainty percentages for the base year. In many cases uncertainty values have been assigned based on default uncertainty estimates according to IPCC 2006 guidelines or expert judgement, because there is a lack of information. For each source, uncertainties are quantified for emission factors and activity data. In some categories Estonia is also using country specific / emission source specific uncertainty information that is unfortunately not representative for 1990. We are looking into possibilities of getting sufficient activity data for the base year estimations.

Uncertainties are estimated for direct greenhouse gases, e.g., CO_2, CH_4, N_2O, and F-gases. The uncertainty analysis was done for the sectors: Energy, Industrial processes and product use, Agriculture, LULUCF and Waste sector.

Table 2.2 Uncertainty in total 2022 inventory submission

	Combined as % of total national emissions in 2020	Introduced into the trend in total national emissions in 2020
	Uncertainty [%]	
Without LULUCF	8.54	1.99
With LULUCF	23.53	5.25

2.2. National inventory arrangements

2.2.1. Institutional arrangements

Single national entity with overall responsibility for the Estonian greenhouse gas inventory is Ministry of the Environment (MoE). In 2018 a change in the national inventory system was made when MoE appointed the Estonian Environmental Research Centre (EERC) to be the institution to have the overall responsibility of maintaining the national system, coordinating the inventory preparation process as a whole, being responsible for the final quality control and quality assurance and submitting the final inventory to the European Commission (EC) and to the UNFCCC on behalf of the MoE. The inventory will continue to be produced in collaboration between the MoE, EERC and Estonian Environment Agency (EstEA) as until now.

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The MoE is responsible for:

- entering into formal agreements with the inventory coordinator (EERC); and
- making the greenhouse gas inventory available to the public.

EERC is responsible for:

- maintaining the national inventory system;
- coordinating the inventory preparation process as a whole;
- compiling the National Inventory Report according to the parts submitted by the inventory compilers;
- coordinating the implementation of the QA/QC plan and final QA/QC of the inventory;
- sending the final inventory to the MoE and approving the inventory before the official submissions;
- reporting the greenhouse gas inventory to the EC and to the UNFCCC, including the National Inventory Report and CRF tables on behalf of MoE;
- coordinating cooperation between the inventory compilers, the EC and UNFCCC Secretariat;
- coordinating the UNFCCC inventory reviews and communication with the expert review team, including responses to the review findings.
- informing the inventory compilers of the requirements of the national system and ensuring that existing information in national institutions is considered and used in the inventory where appropriate;
- informing the inventory compilers of new or revised guidelines; and
- the overall archiving system.

The EERC is responsible for preparing the estimates for the Energy, Industrial processes and product use, Agriculture and Waste sectors. The Forest Department of the Estonian Environment Agency is responsible for LULUCF and KP LULUCF estimates. Sectoral experts collect activity data, estimate emissions and/or removals, implement QC procedures and record the results, fill in sectoral data to the CRF Reporter and prepare the sectoral parts of the NIR. These experts are also responsible for archiving activity data, estimates and all other relevant information according to the archiving system.

In addition, the GHG inventory team cooperates with the team in charge of the preparation of the atmospheric pollutant emission inventory to the UNECE's Convention on Long-range Transboundary Air Pollution (CLRTAP) by having annual meetings between the two teams to find possibilities to make the information coherent between the two reports. Sectoral experts meet bilaterally time to time with the aim of reducing differences in the estimates between the two inventories.

Financial resources for inventory compilation are planned in the National Administrative Agreement and in State Budget as MoE appointed Estonian Environmental Research Centre (EERC) to be the institution to have the overall responsibility of maintaining the national system, coordinating the inventory preparation process as a whole, being responsible for the final quality control and quality assurance and submitting the final inventory to the European Commission (EC) and to the UNFCCC Secretariat on behalf of the MoE. The three core institutions: MoE, EERC and EstEA work together to fulfill the requirements for the national system. The overview of the allocation of responsibilities is shown in Figure 2.11.

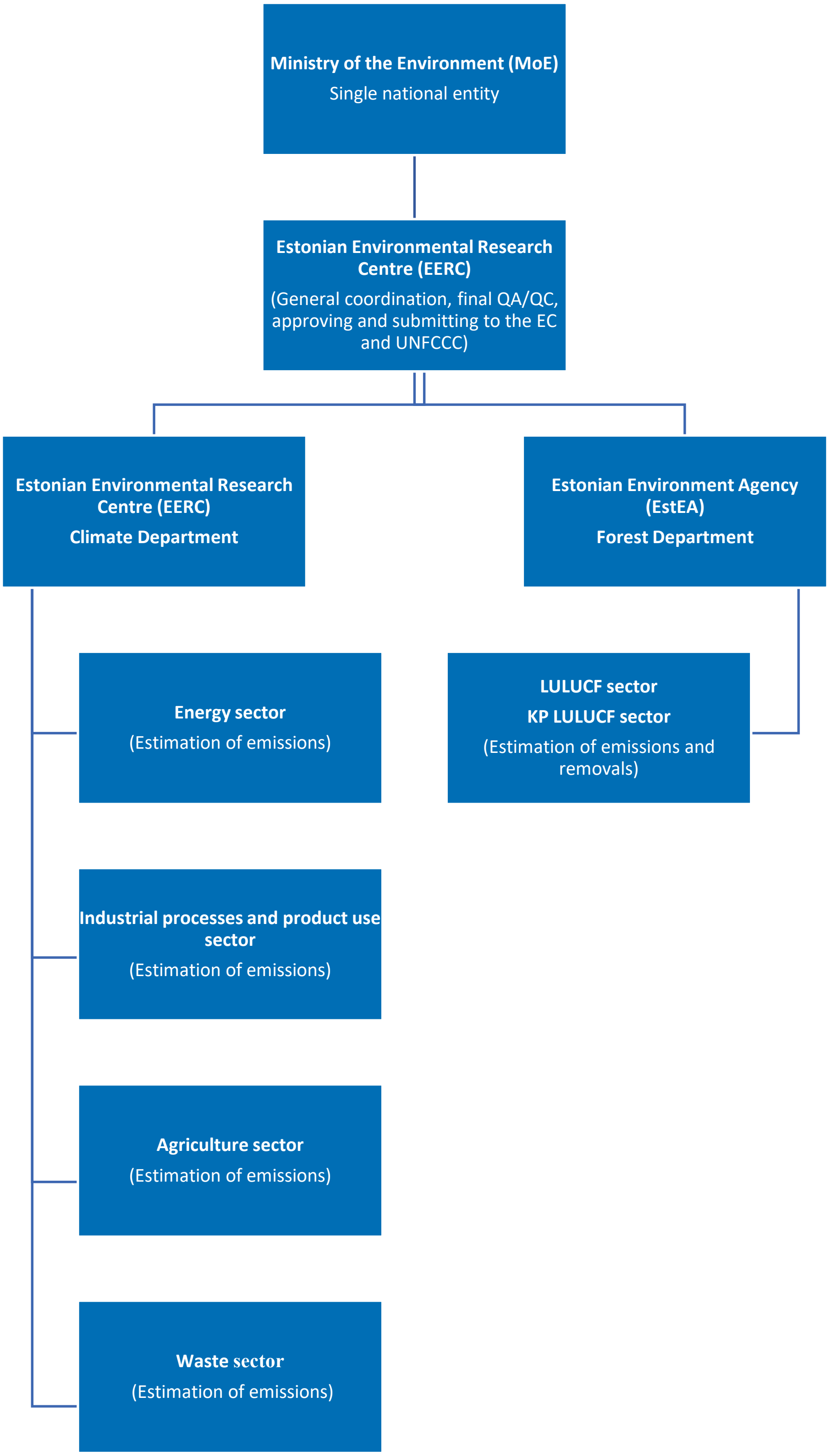

Figure 2.11 National System for GHG inventory in Estonia

Legal arrangements

In accordance with §143 of the Atmospheric Air Protection Act (RT I, 05.07.2016, 1), activities for the reduction of climate change are organised by the Ministry of the Environment on the basis of the requirements for the restriction of the limit values of emissions of greenhouse gases provided by the UNFCCC, the Kyoto Protocol, the Paris Agreement and the European Union legislation.

In accordance with §6 of the Statutes of the Ministry of the Environment (RT I 2009, 63, 412), the MoE is responsible for climate change related tasks and according to §23 section 8, the Climate Department task is to organize, develop and implement climate change mitigation and adaptation policies. In accordance with the Statutes of the Climate Department of the MoE, the department is responsible for organizing and coordinating GHG emission reporting activities under the UNFCCC, the Kyoto Protocol and the European Union legislation. In the beginning of 2018 with an aim to improve/optimize the inventory compiling process in Estonia, MoE decided to appoint the Estonian Environmental Research Centre to be the overall coordinator of the GHG inventories.

The Estonian Environmental Research Centre (EERC) is a state owned organization established for general interest, all of the shares in which are held by the Republic of Estonia. EERC belongs to the government area of the Ministry of the Environment. Any changes to and the approval of the statutes of the EERC are the responsibility of the Ministry of Environment.

As of 2018 according to §1.8 of the Statues of the Estonian Environmental Research Centre, EERC as a state-owned company guarantees the organisation and the timely submissions of the GHG inventories to the EC and to the UNFCCC. Statues of the EERC was amended in the beginning of 2018 according to decision made by the Minister of the Environment as it is the competence of the Minister of the Environment to amend the Statutes of the EERC. Also, EERC management supervision is carried out by the body 100% appointed by the Minister of the Environment.

EERC compiles the GHG inventory on the basis of National Administrative Agreement with the MoE.

The Estonian Environment Agency (EstEA), institution that is responsible for the LULUCF estimates, is a state authority administered by MoE, which was formed as a result of the merger of the Estonian Meteorological and Hydrological Institute (EMHI) and the Estonian Environment Information Centre (EEIC) in 2013. In accordance with §9 section 9 of the Statute of the EstEA, the tasks of the Forest Department include planning, organizing and carrying out statistical forest inventories, monitoring land use, land-use changes and carbon cycle and fulfilling national and international reporting obligations.

The Statistics Estonia collects and coordinates the production of official statistics on the basis of the Official Statistics Act § 9[5].

2.2.2. Inventory process

The UNFCCC, the Kyoto Protocol and the European Union (EU) GHG monitoring mechanism requires Estonia to submit annually a National Inventory Report (NIR) and Common Reporting Format (CRF) tables. The annual submission contains emission estimates for the years between 1990 and the year before last year.

[5] Official Statistics Act: https://www.riigiteataja.ee/en/eli/517122019002/consolide

Estonia’s national GHG inventory system is designed and operated according to the guidelines for national systems under article 5, paragraph 1, of the Kyoto Protocol to ensure the transparency, consistency, comparability, completeness and accuracy of inventories. Inventory activities include planning, preparation and management of the inventories.

The EERC and the MoE have developed an inventory production plan that sets out the schedule for inventory preparation. The schedule, which is annually reviewed, forms part of Estonia’s QA/QC plan and must be followed by all core institutions.

Regulation of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action (Governance Regulation) entered into force in December 2018 and fully integrates the provisions of the existing EU Monitoring Mechanism Regulation (MMR) while bringing them in line with the provisions of the Paris Agreement. According to the EU MMR and the Governance regulation, the annual inventory must be submitted to the Commission by 15 January. Member States may then complement and update their submissions by 15 March. The official GHG inventory is submitted to the UNFCCC Secretariat by 15 April.

The methodologies, activity data collection and emission factors are consistent with the 2006 IPCC Guidelines for National GHG Inventories (IPCC 2006 GL).

The inventory process for the next inventory cycle starts with an examination of previous years and an analysis of the available datasets in order to improve the inventory through new knowledge and the activity data developed. Activity data is mainly based on official statistics and data from companies and the National Forest Inventory. The emission factors are national values, values recommended in the IPCC GL or values taken from other countries’ GHG inventories.

Sectoral experts collect activity data, estimate emissions and/or removals, implement QC procedures and record the results, fill in sectoral data to the CRF Reporter and prepare the sectoral parts of the NIR. These experts are also responsible for archiving activity data, estimates and all other relevant information according to the archiving system. The EERC compiles the NIR according to the parts submitted by the inventory experts, evaluates the overall uncertainty of the inventory totals and performs key category analysis.

The uncertainty estimate of the 2022 inventory has been done according to the Tier 1 method presented by the IPCC 2006 GL. Tier 1 method combines the uncertainty in activity rates and emission factors, for each source category and GHG, and then aggregates these uncertainties, for all source categories and GHG-s, to obtain the total uncertainty for the inventory. In many cases uncertainty values have been assigned based on default uncertainty estimates according to IPCC guidelines or expert judgement, because there is a lack of the information. For each source, uncertainties are quantified for emission factors and activity data.

Key categories are those of emissions/removals, which have a significant influence on the total inventory in terms of the absolute level of emissions or trends in emissions (or both). Estonia uses the Tier 2 method to identify key categories, and emission categories are sorted according to their contribution to emission levels or trends. The key categories are those that together represent 90% of the inventory level or trend.

The results of key category analysis are important because they guide decisions on methodological choice. The goal is to screen the long list of category-gas contributions and find those that are most important in terms of the emissions level or trend. The list of key categories forms the basis of discussions with the sectoral experts on the quality of the estimates and possible need for improvement.

Recalculations are made if errors, overlaps or inconsistencies in the time series are identified, when a new source or sink is considered or if more accurate knowledge becomes available. The driving forces in applying recalculations to Estonia's GHG inventory are the implementation of the guidance given in IPCC 2006 GL and the recommendations from the UNFCCC inventory reviews. In order to ensure the consistency of the emission inventory, recalculations are carried out on the whole time series, as far as possible.

All institutions involved in compiling the GHG inventory keep close contact with one another. Several cooperation meetings are held annually to discuss and agree on methodological issues, problems that have arisen and improvements that need to be implemented.

2.2.3. Quality management

The starting point in accomplishing a high-quality GHG inventory is consideration of expectations and inventory requirements. The quality requirements set for annual inventories are continuous improvement, transparency, consistency, comparability, completeness, accuracy and timeliness. The setting of concrete annual quality objectives is based on these requirements.

EERC, in collaboration with the expert organizations responsible for the inventory calculation sectors, set yearly quality objectives for the whole inventory at the inventory planning stage and design the QC procedures needed for achieving these objectives. In addition, the expert organizations set their own, sector and/or category specified quality objectives and prepare their QC plans.

The next step is development of the QA/QC plan and implementing the appropriate quality control measures (e.g. routine checks, documentation) focused on meeting the quality objectives set and fulfilling the requirements. In addition, QA procedures are planned and implemented. In the improvement phase of the inventory, conclusions are made on the basis of the realized QA/QC process and its results.

The Estonia's QA/QC plan consist of seven parts: (1) production plan (see Table 1.1); (2) annual meetings; (3) QA/QC checks; (4) QA results documentation form; (5) archiving structure; (6) response tables to the review process and (7) a list of planned activities and improvements.

All institutions involved in the inventory process (MoE, EERC and EstEA) are responsible for implementing QC procedures to meet the data quality objectives. EERC as the inventory coordinator is responsible for overall QC and is in charge of checking on an annual basis that the appropriate QC procedures are implemented internally in EERC and EstEA. EERC is also responsible for QC of the data of the emission inventory. EERC as the inventory coordinator is responsible for the overall QA of the national system, including the UNFCCC reviews and any national reviews undertaken.

The inventory meetings with participants from all institutes participating in the inventory preparation are held three times a year and the bilateral quality meetings between the quality coordinator (EERC) and the expert organizations are held whenever necessary.

Communication and bilateral meeting are held with Statistics Estonia as needed to discuss activity data coming from the national Statistics.

Quality control procedures

The QC procedures used in Estonia's GHG inventory comply with 2006 IPCC Guidelines. General inventory QC procedures include routine checks of the integrity, correctness and completeness of data, identification of errors and deficiencies, documentation and archiving of inventory data and quality control actions. Once the experts have implemented the QC procedures, they complete the QA/QC checklist for each source/sink category, which provides a record of the procedures performed. The QA/QC checklists are part of Estonia's QA/QC plan. Also, assessment of completeness is evaluated.

EERC checks the QC checklists completed by EERC experts and EstEA. When EERC disagrees with the information provided in the checklists then the errors are discussed, and changes are made if necessary.

In addition to the general inventory QC procedures, Estonia applied category-specific QC procedures on some source/sink categories in the 2022 submission, focusing on key categories and on those categories in which significant methodological changes and/or data revisions occurred. More detailed information can be found under sectoral chapters in the NIR2022.

After the sectoral experts have completed entering data to the CRF Reporter, EERC carries out some general (including visual) checks on the data entered. When the CRF tables are complete, the experts start preparing the sectoral chapters of the NIR. These parts are sent to the compiler (EERC) who adds the introduction part and puts the draft NIR together. The compiler arranges the different chapters into one uniform document and makes sure that the structure of the report follows the UNFCCC guidelines. All figures on emissions and removals in tables and text are checked to make sure that they are consistent with those reported in the CRF. The sectoral experts and the inventory compiler also check that all methodological changes, recalculations, trends in emission, and removals are well explained.

In addition, the QA/QC of Member States' submissions conducted under the European Union GHG monitoring mechanism (e.g., completeness checks, consistency checks and comparison across Member States) produces valuable information on errors and deficiencies, and the information is considered before Estonia submits its final annual inventory to the UNFCCC.

Quality assurance procedures

The objective of QA implementation is to involve reviewers that can conduct an unbiased review of the inventory and who may have a different technical perspective. It is important to use QA reviewers who have not been involved in preparing the inventory. These reviewers should preferably be independent experts from other agencies or national experts, or groups not closely connected to national inventory compilation.

Estonia's GHG inventory is checked annually by one or more independent experts. From the 2009 to 2012 submission all data collected by institutions involved in the inventory process was checked by an independent expert from Tallinn University of Technology (TalTech). The 2013–2020 inventory submissions were reviewed in parts by the EERC, TalTech, University of Tartu, Estonian University of Life Sciences (EMÜ) and other national experts. The 2021 submission was checked by experts from TalTech, and other national experts. The findings of the independent experts are looked through by experts (in collaboration with the EERC) and adjustments carried out as a result, if necessary.

When the draft NIR is completed, it is sent to the MoE Climate, Forestry, Environmental Management, and Water Department to ensure that the submitted data is officially valid. The NIR draft is uploaded to the MoE website www.envir.ee where all the interested parties can comment on it. The inventory is also checked by other Ministries and institutions. The inventory will be sent to the Energy and Transport Departments in the Ministry of Economic Affairs and Communications, to the Agricultural Environment Bureau in the Ministry of Rural Affairs, and Statistics Estonia. Statistics Estonia is routinely involved in the quality checking of the data used in inventory. Also, the draft inventory is annually sent to Statistics Estonia for quality checking.

UNFCCC reviews are part of QA. The reviews are performed by a team of experts (sectoral experts and generalist) from other countries. They examine the data and methods that Estonia is using and check the documentation, archiving system and national system. In conclusion they report whether Estonia's overall performance is in accordance with current guidelines. The review report indicates the specific areas in which the inventory needs improvements. The review of Estonia's 2022 submission was carried out as a centralized review from 12 to 17 September 2022.

The GHG inventories submitted by Member States in 2016–2022 were subject to annual review of national greenhouse gas inventory data pursuant to Article 19(2) of Regulation (EU) No 525/2013. The review was performed in two steps. Step 1 was combined with the 'EU QA/QC procedures' (i.e., initial checks) and was carried out by the EU inventory team (ETC/ACM, JRC, Eurostat). All findings from the initial checks that were relevant for the Effort Sharing Decision (ESD) and that were not resolved within the initial check phase were followed up in the second step of the review. Step 2 of the ESD review of 2017–2022 was performed by TERT. In 2020, the European Commission carried out according to the review process established under the MMR IR and to Article 4(3) of the Effort Sharing Regulation (2018/842) a comprehensive review of Member States' GHG inventories for the years 2005 and 2016 to 2018.

2.2.4. Changes in national inventory arrangements since BR4

Since submission of Estonia's BR4 EERC compiles the GHG inventory on the basis of National Administrative Agreement with the MoE (starting from 2020). Financial resources for inventory compilation are planned in the National Administrative Agreement and in State Budget.

3. QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGET

3.1. The European Union and its Member States target under the Convention

Under the UNFCCC, the EU and its Member States committed to achieving a joint quantified economy-wide greenhouse gas emission reduction target of 20 per cent below the 1990 level by 2020 ("the Cancun pledge"). It is therefore a joint pledge with no separate targets for Member States under the Convention. The UK remains part of the joint EU 2020 target together with the 27 EU Member States.

The definition of the Convention target for 2020 is documented in the revised note provided by the UNFCCC Secretariat on the 'Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention' (FCCC/SB/2011/INF.1/Rev.1 of 7 June 2011). EU provided additional information relating to its quantified economy wide emission reduction target in a submission as part of the process of clarifying the developed country Parties' targets in 2012 (FCCC/AWGLCA/2012/MISC.1).

The EU's accounting rules for the target under the UNFCCC are more ambitious than the rules under the Kyoto Protocol, for example, including outgoing flights, and adding an annual compliance cycle for emissions under the Effort Sharing Decision (ESD) or higher Clean

Development Mechanism quality standards under the EU Emissions Trading System (EU ETS) (FCCC/TP/2013/7). Accordingly, the following assumptions and conditions apply to the EU's -20% commitment under the UNFCCC:

- The EU Convention pledge does not include emissions/removals from Land Use, Land Use Change and Forestry; however, this sector is estimated to be a net sink over the relevant period. EU GHG inventories include information on emissions and removals from LULUCF in accordance with relevant reporting commitments under the UNFCCC. Accounting for LULUCF activities only takes place under the Kyoto Protocol[6];
- The target covers the gases CO_2, CH_4, N_2O, HFCs, PFCs and SF_6;
- The target refers to 1990 as a single base year for all covered gases and all Member States. Emissions from outgoing flights are included in the target,
- A limited number of CERs, ERUs and units from new market-based mechanisms may be used to achieve the target. In the ETS, the use of international credits was allowed up to specific levels set in the EU ETS Directive, amounting to over 1500 million CER and ERU entitlements in the period up to 2020). Quality standards also apply to the use of international credits in the EU ETS, including not allowing the use of credits from LULUCF projects and certain industrial gas projects. International credits will no longer be used for EU ETS compliance in the system's fourth trading period (2021-2030). In the ESD sectors, the annual use of international credits is currently limited to up to 3% of each Member State's ESD emissions in 2005, with a limited number of Member States being permitted to use an additional 1% from projects in Least Developed Countries (LDCs) or Small Island Developing States (SIDS), subject to conditions; from 2021 onwards, as with the EU ETS, international credits will no longer be used for compliance under the ESD.
- The Global Warming Potentials (GWPs) used to aggregate GHG emissions up to 2020 under EU legislation were those based on the Second Assessment Report of the IPCC when the target was submitted. For the implementation until 2020, GWPs from the IPCC AR4 will be used consistently with the UNFCCC reporting guidelines for GHG inventories.

Description of EU's quantified economy-wide emissions reduction target is provided in Table 3.1 and CTF table 2

[6] The LULUCF Decision (Decision 529/2013) requires to prepare and maintain annual LULUCF accounts according to the rules set out in the Kyoto Protocol; however, these accounts do not contribute to the achievement of the EU Convention pledge.

Table 3.1 Key facts of the EU's economy-wide emission reduction target

Parameters	Target
Base Year	1990
Target Year	2020
Emission Reduction target	-20 % in 2020 compared to 1990
Gases covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6
Global Warming Potential	AR4
Sectors Covered	All IPCC sources and sectors with the exception of LULUCF, as measured by the full annual inventory including international aviation (outgoing flights).
Land Use, Land-Use Change, and Forestry (LULUCF)	Accounted under KP joint EU target does not include LULUCF
Use of international credits (JI and CDM)	Possible subject to quantitative and qualitative limits

3.2. The EU target compliance architecture

3.2.1. The 2020 Climate and Energy Package

The EU has jointly committed to its UNFCCC target and implemented it internally through EU legislation in the 2020 EU Climate and Energy Package. In this package, the EU introduced a clear approach to achieving the 20% reduction in total GHG emissions from 1990 levels, by dividing the effort between the sectors covered by the EU Emissions Trading System (EU ETS) and the sectors under the Effort Sharing Decision (ESD). Binding national targets were set for Member States under the Effort Sharing Decision. The achievement of EU internal compliance under the 2020 Climate and Energy Package including the national targets under the ESD is not subject to the UNFCCC assessment of the EU's joint commitment under the Convention.

The EU 2020 Climate and Energy Package aims at a 21% reduction target compared to 2005 for emissions covered by the EU ETS, and a 10% reduction target compared to 2005 for non-ETS sectors. Whilst LULUCF is not counted towards the EU commitment or Member States targets, it does count towards the achievement of the Kyoto Protocol target (the LULUCF Decision, NO 529/2013, translates the Kyoto Protocol accounting rules for this sector into EU law).

Under the EU ETS Directive for the trading period 2013-2020, a single ETS cap covers EU Member States and three participating non-EU countries (Norway, Iceland and Liechtenstein), there were no further individual caps by country. Allowances allocated in the EU ETS from 2013 to 2020 decreased by 1.74 % annually, starting from the average level of allowances issued by Member States for the second trading period (2008–2012).

The vast majority of emissions within the EU, which fall outside the scope of the EU ETS, are addressed under the Effort Sharing Decision (ESD) (Decision 406/2009/EC). The ESD covers emissions from all sources outside the EU ETS, except for de minimis aviation emissions, international maritime emissions, and emissions and removals from land use, landuse change and forestry (LULUCF). It thus includes a diverse range of small-scale emitters in a wide range of sectors: transport (cars, lorries), buildings (in particular heating), services, small industrial installations, fugitive emissions from the energy sector, emissions of fluorinated gases from appliances and other sources, agriculture and waste.

The ESD establishes GHG emission limits for MS to be achieved by 2020 through binding annual targets between 2013 and 2020 (Annual Emission Allocations – AEA), in 2017 the allocations for the period 2017 to 2020 have been revised, to take into account changes introduced by the implementation of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

According to the ESD, each MS must define and implement national policies and measures to limit the GHG emissions covered by the ESD. The inclusion of the ESD within the EU's *2020 climate and energy package* ensures that the abatement potential from ESD sectors contribute to the delivery of the EU-wide target of reducing GHG emissions by 20% below 1990 levels by 2020. For Estonia, the GHG emission growth from ESD sectors have to be limited at least by 11% by the end of the period of 2013–2020 compared to 2005. Table 3.2 below includes Estonia's target path for Annual Emissions Allocation for the year 2013 to 2020.

Table 3.2 Estonia's target path for Annual Emissions Allocation for the year 2013 to 2020 (kt CO_2 eq.) calculated applying global warming potential values from the fourth IPCC assessment report

	2013	2014	2015	2016	2017	2018	2019	2020
Estonia's annual emission allocations	6,296.988	6,321.312	6,345.636	6,369.960	5,928.965	5,960.550	5,992.135	6,023.720

It is up to each Member State to decide how these targets will be achieved, which national policies and measures are needed to fulfil the targets.
The monitoring process is harmonized for all European MS, especially laid down in the Monitoring Mechanism Regulation (EC) No 525/2013. The use of flexible mechanisms is possible under the EU ETS and the ESD.

The ESD allows MS to make use of flexibility provisions for meeting their annual targets, with certain limitations. There is an annual limit of 3% for the use of project-based credits for each MS. If these are not used in any specific year, the unused part for that year can be transferred to other MS or be banked for own use until 2020.

3.3. Other emission reduction targets

In addition to the EU target under the Convention, the EU also committed to a legally binding quantified emission limitation reduction commitment for the second commitment period of the Kyoto Protocol (2013 - 2020).

A further target has been pledged to the Convention through the EU's Nationally Determined Contribution submitted under the Paris Agreement. The EU's initial nationally determined contribution (NDC) under the Paris Agreement was the commitment to reduce greenhouse gas emissions by at least 40% by 2030 compared to 1990, under its wider 2030 climate and energy framework. In December 2020, the EU submitted its updated and enhanced NDC the target to reduce emissions by at least 55% by 2030 from 1990 levels, and information to facilitate clarity, transparency and understanding (ICTU) of the NDC. The EU and its Member States, acting jointly, are committed to a binding target of a net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990 (EC, 2022).

The European Commission has put forward a series of legislative proposals to make its policies fit for delivering the updated 2030 greenhouse gas emissions net reduction target of 55% below 1990 levels, as set out in the 2030 Climate Target Plan and written into the European Climate Law. Legislative proposals under the so called 'Fit for 55' package are currently in different stages of negotiations in the EU Council and with the EU Parliament.

Beyond this period and beyond this goal, the first European Climate Law to enshrine the 2050 climate-neutrality target into law, entered into force on 29 July 2021.

The EU submitted its long-term strategy to the United Nations Framework Convention on Climate Change (UNFCCC) in March 2020.

3.4. National GHG targets

On 12 May 2021 the Parliament adopted Estonia's long-term strategy **Estonia 2035**. According to the strategy by 2050, Estonia will be a competitive, climate-neutral country with a knowledge-based society and economy and a high-quality and species-rich living environment, willing and able to reduce the adverse effects of climate change and make the best use of its positive aspects.

The Estonia 2035 action plan is updated annually, if necessary, by the Government based on domestic events affecting the development of Estonia and changes in the foreign environment. The current action plan was approved by the Government on April 28, 2022. The action plan sets a target level for net emissions of greenhouse gases (incl. the LULUCF sector) of 8 million tons of CO_2 eq by 2035. There is also a target level for net emissions of greenhouse gases in the transport sector of 1700 kt CO_2 eq.

The Parliament of Estonia has adopted (5 April 2017) General Principles of Climate Policy until 2050 (GPCP 2050) for moving towards long-term emission reduction target which is set to reduce the emission of greenhouse gases by about 70% by 2030 and by 80% by 2050 in comparison with the emission levels of 1990.

Proposal to amend the long-term target of Estonia to reduce the emission of greenhouse gases by 2050 by 80% set in the GPCP 2050 according to the 2050 climate neutrality goal set in Estonia's long-term strategy Estonia 2035 has been sent to the Parliament in March 2022.

Additional information on Estonia 2035 and Estonia's long-term strategy GPCP 2050 is provided in Chapter 4.2.1.

4. PROGRESS IN ACHIEVEMENT OF QUANTIFIED ECONOMY-WIDE EMISSION REDUCTION TARGETS AND RELEVANT INFORMATION

4.1. Introduction

The EU has substantially overachieved its reduction target under the Convention, which means that also its Member States and the United Kingdom have fulfilled their emission reduction obligations. As stated in the 2022 EU GHG inventory submission to the UNFCCC, the total GHG emissions, excluding LULUCF and including international aviation, decreased by 34% in the EU-27 + UK compared to the base year 1990 or 1.94 billion tons of CO_2e (carbon dioxide equivalent.

This chapter provides information on the Estonian general strategy documents as well as national key policies and measures implemented or under discussion to reduce GHG emissions. The information is presented separately for the 'With Measures' scenario (WEM) and the 'With

Additional Measures (WAM)' scenario. Both scenarios are used in the GHG projections presented in Chapter 5.

Emissions/removals in the LULUCF sector are not included in the EU target under the Convention. They are therefore not included in CTF Table 4 and CTF Table 4(a)I. However, mitigation actions in the LULUCF sector are described in Chapter 4.2.2 below and presented in CTF Table 3. Also, projections for the LULUCF sector are presented in Chapter 5.

4.2. Mitigation actions and their effects

4.2.1. General strategy documents

On 12 May 2021 the Parliament adopted Estonia's long term strategy **Estonia 2035**. The Estonia 2035 strategy sets out five long-term strategic goals that are value-based goals which are the basis for making the country's strategic choices and to the implementation of which all Estonian strategic development documents contribute. They are also taken into account in the state budget strategy and in the preparation of the government's action programme. In order to reach the goals, it is necessary to take into account Estonia's development needs, global trends, the policy framework of the European Union, and the global objectives of sustainable development.

According to the strategy, by 2050, Estonia will be a competitive, climate-neutral country with a knowledge-based society and economy and a high-quality and species-rich living environment, willing and able to reduce the adverse effects of climate change and make the best use of its positive aspects. Coordinated development of the cultural, social, environmental and economic fields is a prerequisite for achieving the goals of sustainable development. In Estonia, knowledge-based decisions are made, with effective and innovative approaches being preferred when choosing solutions.

The Estonia 2035 action plan is updated annually, if necessary, by the government based on domestic events affecting the development of Estonia and changes in the foreign environment. The Estonia 2035 action plan is also the Estonian reform plan submitted within the framework of the European Semester for the coordination of economic policies. The current action plan was approved by the government on April 28, 2022. The action plan sets a target level for net emissions of greenhouse gases (incl. the LULUCF sector) of 8 million tons of CO_2 eq by 2035. There is also a target level for net emissions of greenhouse gases in the Transport sector of 1700 kt CO_2 eq.

The Parliament of Estonia has adopted (5 April 2017) the **General Principles of Climate Policy until 2050 (GPCP 2050)** (MoE, 2016) for moving towards a long-term emission reduction target which is set to reduce the emission of greenhouse gases by around 70% by 2030 and by 80% by 2050 in comparison with the emission levels of 1990.

A proposal to amend the long-term target of Estonia to reduce the emission of greenhouse gases by 2050 by 80% set in the GPCP 2050 according to the 2050 climate neutrality goal set in Estonia's long-term strategy Estonia 2035 has been sent to the Parliament in March 2022.

The GPCP 2050 is a vision document that sets a long-term GHG emissions reduction target and policy guidelines for adapting to the impact of climate change or ensuring the preparedness and resilience to react to the impact of climate change.

Principles and guidelines in the document have to be taken into account when renewing and implementing the cross-sectoral and sectoral strategies and national development plans. Estonia will be transformed into an attractive environment primarily intended for the development of innovative technologies, products and services reducing the emission of GHGs. In addition, the export and global implementation of such technologies, products and services shall be facilitated for the resolution of global problems. The general sectoral policy guidelines and principles of GPCP 2050 include:

- Efficient interaction of the system as a whole when planning energy consumption centres and new production capacities.
- Facilitating the implementation of technologies with a low emission factor of CO_2 and the efficient use of resources in manufacturing processes.
- Considering the economy and energy efficiency of the system as a whole when renovating the existing building stock and planning and constructing new buildings.
- Considering the economy and energy efficiency when planning, building, managing and reconstructing grids within energy systems with the aim of achieving maximum energy and resource efficiency.
- Moving towards enhancing energetic value and the production of products with higher additional value to minimise GHG emissions in the oil shale treatment process in a way that does not entail an increase in other negative environmental impacts.
- Directing major participants in the energy and industry sectors towards a successful and cost-efficient reduction of GHG emissions while continuing the use of market-based mechanisms.
- Ensuring energy security and security of supply with a gradual wider exploitation of domestic renewable energy sources in all sectors of final consumption with a view to increasing the welfare of the society.
- Facilitating a well-functioning transportation system and reducing forced traffic through the integration of the planning of settlements and transportation and the design and implementation of mobility plans.
- Influencing the purchase of economical vehicles and sustainable alternative fuels through investments and tax policies of the public sector.
- Prioritising the development of public transportation, non-motorised traffic and energy-efficient carriage of goods.
- Increasing and maintaining the soil's carbon stock incl. developing and maintaining significant carbon stock of land areas.
- Encouraging the efficient and ecological use of agricultural land while avoiding the falling out of the agricultural use of such land.
- Enhancing the use of plant nutrients and replacement of mineral fertilisers with organic fertilisers and eco-friendly soil conditioners.
- Enhancing the production of bioenergy and using it in energy-intensive manufacturing processes.
- Increasing the productivity of agriculture, with a focus on eco-friendlier manure management for limiting ammonia emissions.
- Increasing forest increment and the ability to sequestrate carbon through the timely regeneration of forests.
- Promoting the use of wooden products and increasing carbon storage in wooden products and buildings will help replace non-renewable natural resources and develop domestic wood production.

- Promoting the preservation of the existing forest area and increasing carbon sequestration and emission reduction in other land-use categories.
- Preserving and increasing carbon stocks in wetlands. Avoiding further wetland drainage and already drained wetlands will be rewetted if possible to avoid further degradation.
- Preferring the development of research studies in the Land use and forestry sector that will help to increase carbon sequestration and to find alternative uses for wood.
- Continuing the reduction of waste generation and making the separate collection of waste more efficient.
- Facilitating research, development and innovation that will help to increase the development of efficient energy technologies, renewable energy production technologies, sustainable transportation and mobility, sustainable agriculture, carbon sequestration in forestry and finding alternative uses for timber will be preferred.

The Action Plan for 2021–2023 of the Government (2021), has set the following goals:

- the reuse amount of the total mass of municipal solid waste (MSW) is 48%;
- felling of timber does not exceed the yearly regrowth of wood;
- the share of renewables in final energy consumption is 27% (17% in final consumption of electricity and 53% in heat generation in district heating systems).

The **Climate Change Adaptation Development Plan until 2030** (adopted by the Government on 2 March 2017) was prepared in cooperation between the MoE, EERC and other institutions with support from the European Economic Association Financial Mechanism. The main objective of the Development Plan is to increase the readiness and capacity of the state, the regional, and the local level to adapt to the effects of climate change. The Development Plan is further described In Estonia's VIII National Communication Chapter 6 − Climate change impacts, vulnerability assessment and adaptation measures.

The Ministry of the Environment started the preparation of the strategic **Environmental Development Plan 2030 (KEVAD)** (MoE, 2022a). The aim is to integrate various subfields of the environment into one development document, which includes information on the current situation and trends, analysis of the main problems and most effective policy instruments and the goals and metrics. KEVAD is covering the circular economy; climate, ambient air and radiation; sea and water environment; biodiversity (and forestry management); environmental awareness and spatial data. The approval of the development plan is planned for February 2023.

In 2021 a framework for estimating the ex-ante and ex-post mitigation impacts of measures to reduce greenhouse gas emissions was established, the so-called MHR (MoE, 2021). The main goal of the MHR is to ensure a unified approach in designing and assessing the expected (ex-ante) and realised (ex-post) impact of planned and existing climate measures, and the applicability of these impact assessments in international GHG reporting. With the support of the MHR, implementing agencies (relevant policy-making ministries) and their implementing units should be able to independently assess the climate impact of the measures developed in their area of responsibility, regardless of the funding sources of the measures. Integrating the MHR in the wider climate measure design system is currently under way.

4.2.2. Cross-cutting policies and measures

The two main overarching EU policies are the **EU ETS** and the **ESD**, both establishing EU internal rules under the "2020 climate and energy package" which underpin the implementation of the target under the Convention.

Emissions trading under the EU Emissions Trading System

The European Union Emissions Trading System (EU ETS) is the cornerstone of the EU's policy to combat climate change and its key tool for reducing GHG emissions cost-effectively. It was established by Directive 2003/87/EC (the EU ETS Directive) and entered into force on 1 January 2005. The EU ETS covers energy production and energy intensive industry sectors. From 2012, it is also covering intra-EEA aviation.

Since 2013, a single ETS cap covers installations in the EU Member States and three participating non-EU countries (Norway, Iceland and Liechtenstein). There was no longer individual caps by country. The cap in the EU ETS decreased from 2013 to 2020 by 1.74 % annually, starting from the average level of allowances issued by Member States for the second trading period (2008–2012). For the fourth trading period (2021-2030) the cap decreases by 2,2% annually.

The overall quantity of allowances in the EU ETS is auctioned by Member States. Some allowances are also allocated free to installations, following the harmonised free allocation rules and Article 10a of the EU ETS Directive. Additionally, 300 million allowances were set aside in the New Entrants Reserve to fund the deployment of innovative renewable energy technologies and carbon capture and storage through the NER 300 programme.

Articles 10c of the EU Emissions Trading Directive (Directive 2003/87/EC as amended by Directive 2009/29/EC) allowed several Member States (incl. Estonia) to allocate over the period 2013-2020 limited number of emission allowances free of charge to installations. These Articles are covering district heating and high efficiency cogeneration for economically justifiable demand in respect of the production of heating or cooling and existing power plants, provided that the funds are used to modernize the energy system. In June 2012 the EC concluded that provisions of Estonia’s development plan for the electricity sector allocating free allowances are in line with EU state aid rules. During the transition period (2013-2019) Estonia was permitted to allocate 18 million of free allowances to electricity producers included in the EU ETS. While Article 10c is also applicable in the fourth trading period, Estonia decided not to implement it.

The share of Estonia’s EU ETS emissions from all sectors is high, comprising about 48.6% from total emission in 2020. As of year 2020, Estonia had 47 installations. Between 2013 and 2020, emissions in the sectors covered by the EU ETS in Estonia decreased by 64.7%.

July 14, 2021 the European Commission published its proposal “Fit for 55”, which included a set of legislative proposals to for the EU to reach its 2030 greenhouse gas reduction target -55% over 1990 levels, that was agreed by the council and the European Parliament ealier that year. End of June 2022 the Council reached general approaches on important legislative proposals in the ‘Fit for 55’ package, including a common position on EU ETS.

The Council agreed to increase the emission reduction to 61% by 2030 in the sectors covered by the EU ETS compared to 2005 levels. To increase the pace of emissions cuts in phase 4, the overall number of emission allowances was increased to decline at an annual rate of 4.2% from 2021 onwards, compared to 2.2% from the existing legal act.

The Effort Sharing Decision (2013-2020), the Effort Sharing Regulation and the LULUCF Regulation (2021-2030)

The Effort Sharing Decision (2013-2020), covers direct emissions from the non-ETS sectors such as buildings, transport (excluding aviation), waste and agriculture (excluding land use, land use change and forestry) for the period 2013-2020. It sets binding national emission targets for 2020, expressed as percentage changes from 2005 levels, and a trajectory of annual limits between 2013 and 2020 for each Member State. By 2020, these national targets will collectively deliver a reduction of around 10% in total EU emissions from the sectors covered compared with 2005 levels. Information of Estonia's progress in meeting the emission reduction targets set in the Effort Sharing Decision can be found in Chapter 4.3.

The main development since the BR4 is that on 14 July 2021, the European Commission submitted a proposal to review the collective and national targets set up in the Effort-sharing Regulation (ESR). In order to contribute to the -55% GHG emission reduction target, sectors covered by the ESR should achieve a collective reduction of 40 % in their emissions by 2030 compared to 2005. In November 2022 the Council and the European Parliament have reached a provisional political agreement on the proposal to amend the Effort sharing Regulation, where Estonia's new target by 2030 for reducing emissions in sectors covered under the ESR is -24% compared to 2005.

Excise duties

Excise duties (Table 4.1) are one of the fiscal measures in Estonia with an impact on GHG emissions. The excise duty rate has been temporarily reduced in the period of 01.06–31.12.2022.

Table 4.1 Excise tax on fuels and electricity (as of April 2022, ETCB)

Fuel/energy type	Unit	EUR/unit
Unleaded petrol	1,000 l	563
Leaded petrol	1,000 l	563
Aviation spirit	1,000 l	563
Kerosene	1,000 l	330.1
Diesel oil	1,000 l	372
Diesel oil for specific purposes	1,000 l	21[7]
Light heating oil	t	372
Heavy fuel oil	t	422
Heavy fuel oil[8]	t	58
Shale-derived fuel oil	t	414
Shale-derived fuel oil[9]	t	57
LPG (used as heating fuel)	t	55
LPG (used as motor fuel)	t	193
Natural gas (used as heating fuel)	1,000 m^3	40
Natural gas (to a gas-intensive undertaking with a permit for exemption from excise duty)	1,000 m^3	11.30
Motor natural gas (which is used as motor fuel, including in stationary engines)	1,000 m^3	40
Motor natural gas in liquefied form (which is used as used as motor fuel, including in stationary engines)	1,000 kg	55.79
Solid fuels (coal, brown coal, coke, oil shale; heat production	GJ (GCV)	0.93
Electricity	MWh	1
Electricity (to an electro-intensive undertaking with a permit for exemption from excise duty)	MWh	0.5

[7] The excise duty rate has been temporarily reduced in the period of 01.06–31.12.2022

[8] Heavy fuel oil, which density is >900 kg/m^3 at 15 °C, viscosity is >5 mm^2/s at 40 °C, contains >0.5% sulphur.

[9] Shale-derived fuel oil, which density is >900 kg/m3 at 15 °C, viscosity is >5 mm2/s at 40 °C, contains >0.5% sulphur.

Pollution charges

Pollution charges are a second fiscal measure in Estonia with an impact on GHG emissions. The government's tax policy is based on objectives aimed at reducing environmental impact by increasing the rates of charges on pollution and resource use.

The Environmental Charges Act (2006)

This Act provides the grounds for determining the natural resource charges, the rates of the pollution charge, the procedure for calculation and payment thereof, and the grounds and specific purposes for using state budget revenue obtained from environmental use. Environmental charges are established and imposed based on the need for environmental protection, the economic and social situation of the state and, in the events specified in this Act, also based on the value created by natural resources subject to the charge as well as the purpose and manner of use of the environment. A mineral resource extraction charge that exceeds the minimum rates provided for in this Act is established based on the state's goal of earning revenue. In the case of an energy mineral resource, the added value generated by the energy mineral resource is relied upon in addition to the goal of earning revenue.

In Estonia a pollution charge for releasing CO_2 into the ambient air was introduced in 2000. Currently, the Environmental Charges Act obliges the owners of combustion equipment to pay pollution charges for several pollutants emitted into the air. The pollution charge in the case of emissions into ambient air must be paid by all enterprises that are required to have an air pollution permit. The air pollution permit is obligatory for all enterprises which own and operate combustion equipment (utilising solid, liquid or gas fuel) with a rated capacity equal to or higher than 1 MWth in one location. Thermal power producers pay a pollution charge for the CO_2 emissions into the ambient air based on the quantity of CO_2 emitted into the environment upon the amount of CO_2 emitted. The CO_2 charge has been 2 EUR/t. Installations that emit sulphur oxide, carbon monoxide, particles, except heavy metals and compounds of heavy metals, nitrogen oxides, volatile organic compounds, heavy metals and compounds of heavy metals into the ambient air also pay a pollution charge. CH_4 and fluorinated gases (HFC – hydrofluorocarbons, PFC and SF_6) are not subject to pollution charges.

4.2.3. Sectoral policies and measures

Cross-sectoral and sectoral policies and measures in place as well as planned are presented in Table 4.2. Additional information on these policies and measures can be found in CTF Table 3. Estonia's VIII National Communication Chapter 4 includes, in addition to the implemented and planned measures reported in BR5, additional measures that have either a direct effect on GHG emissions or support the implementation of WEM/WAM measures. These additional measures are under discussion and therefore not part of the projection scenarios.

Table 4.2 Summary of policies and measures.

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
Cross-sectoral – Transport and IPPU										
1. *The GHG reduction from the usage of AdBlue in the Transport sector´s WEM scenario	CO_2	The decrease of Adblue consumption	Economic; Information; Regulatory	Implemented	For individual years, please see the measures under transport section	MoEAC, EIC	-1.13	-1.25	-0.73	-0.22
2. The GHG reduction from the usage of AdBlue in the Transport sector´s WAM scenario	CO_2	The decrease of Adblue consumption	Economic; Information; Regulatory	Planned		MoEAC, EIC		-1.19	-0.67	-0.20
Cross-sectoral – Energy and Agriculture										
1. *Investments into improved performance of agricultural holdings	CH_4, N_2O	The objective is to support the reconstruction or construction of new livestock facilities and provide investments into renewable energy through investments in bioenergy and promote its production.	Economic	Implemented	2015	MoRa	NE	NE	NE	NE
2. *Material and intangible investments by farmers	CH_4, N_2O	The objective is to promote resource efficiency in agricultural production, to prevent the generation of waste and emissions, to reduce the environmental impact of production and greenhouse gas emissions, and to improve biosecurity through tangible investments which may also lead to intangible investments.	Economic	Planned	2024	MoRa	NE	NE	NE	NE

[10] All PaMs marked with an asterisk (*) are included in the WEM scenario projections.

[11] NE – not estimated – Some policies and measures are either not yet quantifiable or do not have an impact in the whole time series. Not quantifiable but implemented measures are impacting the projections through the base year or base period and therefore their impact is included in the projections, although not quantified.

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
Cross-sectoral – LULUCF and Agriculture										
1. *Agri-environment-climate measures (including three sub-measures)	CO_2, CH_4, N_2O	This measure includes: • Support for environment-friendly horticulture – Promoting the use of environment-friendly practices in gardening. • Regional soil protection support – Ensuring the sustainable use of eroded and peat soils and to minimise soil degradation by improving management of soils and using other activities improving cropland management. • Support for maintaining semi-natural habitats –Ameliorating the conditions of semi-natural habitats and its species by improving grazing land or grassland management.	Economic; Education; Information; Regulatory	Implemented	2015	MoRa	NE	NE	NE	NE
2. *Environmentally friendly management	CO_2, CH_4, N_2O	The objective is to support practices that help reduce pressure on surface water, groundwater and human health and contribute to the preservation and enhancement of biodiversity.	Economic; Education; Information; Regulatory	planned	2023	MoRA	NE	NE	NE	NE
Electricity supply										
1. *The Electricity Market Act	CO_2, CH_4, N_2O	The act regulates the production, storage, transmission, sale, export, import and transit of electricity, as well as the economic and technical management of the electricity system.	Regulatory	Adopted	2003	MoEAC	NE	NE	NE	NE
2. *Renewable energy support through underbidding auctions (technology neutral)	CO_2, CH_4, N_2O	Increase in renewable energy	Economic	Implemented	2019	Elering	-2.95	-268.21	-268.21	-268.21
3. *Support for renewable and efficient CHP-based electricity production	CO_2, CH_4, N_2O	Increase in renewable energy	Economic	Implemented	2007	Elering	-769.16	-471.57	-471.57	-471.57

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
4. *Investment support for wind parks	CO_2, CH_4, N_2O	Increase in renewable energy	Economic	Implemented	2010	EIC	-412.63	-3864.76	-5927.89	-5927.89
5. *Increasing the share of solar energy in electricity generation	CO_2, CH_4, N_2O	Increase in renewable energy	Economic	Implemented	2019	EIC	-141.47	-383.15	-383.15	-383.15
6. *Introduction of renewable energy in maritime surveillance radar stations on small islands	CO_2, CH_4, N_2O	Increase in renewable energy	Economic	Adopted	2021	MoEAC	NE	-0.01	-0.01	-0.01
7. *Renewable energy support through underbidding auctions (technology specific)	CO_2, CH_4, N_2O	Increase in renewable energy	Economic	Adopted	2025	Elering	NE	-383.15	-383.15	-383.15
Heat supply										
1. *The District Heating Act	CO_2, CH_4, N_2O	Governs activities related to the production, distribution and sale of heat by way of district heating networks, and connection to district heating networks.	Regulatory	Adopted	2003	MoEAC	NE	NE	NE	NE
2. *Construction of local heating solutions instead of district heating solution	CO_2, CH_4, N_2O	Efficiency improvement in the Energy and Transformation sector	Economic	Implemented	2017	MoEAC	-0.21	-2.40	-2.40	-2.40
3. *Renovation of depreciated and inefficient heat pipelines	CO_2, CH_4, N_2O	Reduction of losses	Economic	Implemented	2016	MoEAC	-1.41	-14.07	-17.47	-17.47
4. *Renovation of district heating boilers and fuel change	CO_2, CH_4, N_2O	Increase in renewable energy; switch to less carbon-intensive fuels; efficiency improvement in the Energy and Transformation sector	Economic	Implemented	2016	MoEAC	-2.42	-35.03	-57.88	-57.88
5. *Oil boiler replacement programme	CO_2, CH_4, N_2O	Increase in renewable energy; switch to less carbon-intensive fuels; efficiency improvement in the Energy and Transformation sector	Economic	Implemented	2014	EIC	NE	-0.33	-0.33	-0.33
6. Additional renovation of depreciated and inefficient heat pipelines	CO_2, CH_4, N_2O	Reduction of losses	Economic	Planned	2025	MoEAC	NE	-15.16	-15.16	-15.16

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
7. Additional renovation of district heating boilers and fuel change	CO_2, CH_4, N_2O	Increase in renewable energy; switch to less carbon-intensive fuels; efficiency improvement in the Energy and Transformation sector	Economic	Planned	2025	MoEAC	NE	-37.75	-37.75	-37.75
8. Additional construction of local heating solutions instead of district heating solution	CO_2, CH_4, N_2O	Efficiency improvement in the Energy and Transformation sector	Economic	Planned	2025	MoEAC	NE	-2.58	-2.58	-2.58
Energy consumption – Manufacturing industries and construction										
1. *Support for energy- and resource audits in industries	CO_2, CH_4, N_2O	Increase in renewable energy; switch to less carbon-intensive fuels; energy usage efficiency improvement	Economic	Implemented	2016	EIC	NE	NE	NE	NE
2. *Energy and resource efficiency in industries	CO_2, CH_4, N_2O	Increase in renewable energy; switch to less carbon-intensive fuels; energy usage efficiency improvement	Economic	Implemented	2016	EIC	NE	-6.77	-6.77	-6.77
Energy consumption – Other Sectors (Commercial/Institutional and Residential sectors)										
1. *The Product Conformity Act	CO_2, CH_4, N_2O	The purpose of the act is ensure state surveillance over compliance of household appliances, heating appliances and devices with energy efficiency, energy performance labels and ecological design requirements.	Regulatory	Adopted	2010	MoEAC	NE	NE	NE	NE
2. *Energy Sector Organisation Act	CO_2, CH_4, N_2O	The act provides measures for achieving the national target of energy efficiency and promoting renewable energy	Regulatory	Adopted	2016	MoEAC, MoF	NE	NE	NE	NE
3. Minimum requirements for energy performance regulation	CO_2, CH_4, N_2O	The regulation establishes minimum requirements for the energy performance of buildings, including low energy buildings and nearly zero-energy buildings	Regulatory	Adopted	2019	MoEAC	NE	NE	NE	NE
4. *Support for making the processing of fishery and aquaculture products more energy and resource efficient	CO_2, CH_4, N_2O	Increase in renewable energy; switch to less carbon-intensive fuels; energy usage efficiency improvement	Economic	Implemented	2016	Agricultural Registers and Information Board (ARIB)	NE	-3.64	-3.64	-3.64

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
5. *Energy efficiency in local government buildings	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2020	The State Shared Service Center (SSSC)	-0.05	-0.05	-0.05	-0.05
6. *Energy efficiency in central government buildings	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2019	SSSC	-0.05	-0.05	-0.05	-0.05
7. *Arrangement of the basic school network	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2018	SSSC	-0.46	-0.72	-0.72	-0.72
8. *Arrangement of the gymnasium network	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2018	SSSC	-0.46	-0.72	-0.72	-0.72
9. *Reorganisation of special care institutions	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2017	SSSC	-0.15	-0.21	-0.21	-0.21
10. *Institutional development programme for R&D institutions and higher education institutions	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2016	SSSC	-0.02	-0.02	-0.02	-0.02
11. *Modernisation of health centres	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/ Tertiary sector; demand management/reduction	Economic	Implemented	2016	SSSC	-0.19	-0.44	-0.44	-0.44
12. *New childcare and pre-primary education infrastructure	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2016	SSSC	-0.10	-0.10	-0.10	-0.10

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
13. *Kindergarten renovation	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/ reduction	Economic	Implemented	2017	EIC	-0.10	-0.10	-0.10	-0.10
14. *Supporting the reconstruction of apartment buildings	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2015	KredEx	-9.13	-37.93	-37.93	-37.93
15. *Supporting the reconstruction of small houses.	CO_2, CH_4, N_2O CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Implemented	2015	KredEx	-0.85	-0.97	-0.97	-0.97
16. *Street lighting reconstruction programme investments	CO_2, CH_4, N_2O	Demand management/ reduction	Economic	Implemented	2007	EIC	-4.89	-63.79	-63.79	-63.79
17. Supporting the reconstruction of non-residential buildings in the private sector	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Planned	2025	KredEx, EIC	NE	-2.2	-12.96	-36.36
18. Reconstruction of municipal building	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Planned	2025	SSSC	NE	-18.15	-29.85	-34.17
19. Reconstruction of central government buildings	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Planned	2025	SSSC	NE	-3.70	-5.77	-7.12
20. Additional reconstruction of apartment building	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Planned	2025	KredEx	NE	-35.32	-75.49	-110.59

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
21. Additional reconstruction of small houses	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Planned	2025	KredEx	NE	-9.27	-24.93	-51.39
22. Investments into energy saving of greenhouses and vegetable warehouses and dissemination of renewable energy	CO_2, CH_4, N_2O	Efficiency improvements of buildings; efficiency improvement in Services/Tertiary sector; demand management/reduction	Economic	Planned	2025	ARIB	NE	-0.13	-0.13	-0.13
Energy consumption – Transport										
1. *Liquid Fuel Act	CO_2, CH_4, N_2O	Grounds and the rules for handling liquid fuel	Regulatory	Adopted	2003	MoEAC	NE	NE	NE	NE
2. *Increasing the share of biofuels in transport	CO_2, CH_4, N_2O	Low carbon fuels	Regulatory	Implemented	2010	MoEAC	-112.62	NE	NE	NE
3. *Promoting the use of electricity in passenger cars	CO_2, CH_4, N_2O	Electric cars	Economic	Implemented	2015	MoEAC	-4.33	-74.31	-519.89	-676.20
4. *Promoting the use of biomethane in buses	CO_2, CH_4, N_2O	Low carbon fuels	Economic	Implemented	2015	EIC	-21.93	-90.96	-44.11	NE
5. *Promoting the use of electricity in buses	CO_2, CH_4, N_2O	Electric buses	Economic	Implemented	2020	EIC	NE	-18.80	-63.39	-97.84
6. *Promoting the use of biomethane in heavy-duty vehicles	CO_2, CH_4, N_2O	Low carbon fuels	Economic	Planned	2036	MoEAC	NE	NE	-46.85	-91.55
7. *Promotion of economical driving	CO_2, CH_4, N_2O	Modal shift to public transport or non-motorised transport; demand management/reduction; improved behaviour	Information	Implemented	2002	MoEAC	-14.06	-14.86	-10.89	-7.47
8. *Reduction of forced movement by passenger car	CO_2, CH_4, N_2O	Demand management/ reduction	Planning	Adopted	2015	MoEAC	NE	-18.58	-13.61	-9.34

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
9. *Reorganisation of city streets	CO_2, CH_4, N_2O	Modal shift to public transport or non-motorised transport; demand management/reduction; improved transport infrastructure	Regulatory, Planning	Adopted	2015	MoEAC	NE	-18.58	-13.61	-9.34
10. *Development of convenient and modern public transport	CO_2, CH_4, N_2O	Improved behaviour; improved transport infrastructure	Economic	Adopted	2015	MoEAC	NE	NE	NE	NE
11. *Road usage fees for heavy-duty vehicles based on time	CO_2, CH_4, N_2O	Demand management/reduction; improved behaviour	Fiscal	Implemented	2018	MoEAC	NE	-2.00	-2.00	-2.00
12. *Electric car purchase support	CO_2, CH_4, N_2O	Electric cars	Economic	Implemented	2020	EIC	NE	-14.32	NE	NE
13. *Promotion of clean and energy-efficient road transport vehicles in public procurement	CO_2, CH_4, N_2O	Efficiency improvements of vehicles	Economic	Adopted	2021	MoEAC	NE	-15.01	NE	NE
14. *The railroad electrification	CO_2, CH_4, N_2O	Efficiency improvements	Economic	Adopted	2021	MoEAC	NE	-29.43	-29.43	-29.43
15. *Acquisition of additional passenger trains	CO_2, CH_4 N_2O	Electric trains	Economic	Adopted	2020	MoEAC	NE	NE	NE	NE
16. *Developing the railroad infrastructure (includes the building of Rail Baltic)	CO_2, CH_4, N_2O	Modal shift to public transport or non-motorised transport; demand management/reduction	Economic	Adopted	2021	MoEAC	NE	-20.76	-61.16	-61.16
17. *Pilot project for hydrogen	CO_2, CH_4, N_2O	Hydrogen vehicles	Economic	Adopted	2021	EIC	NE	-1.00	-1.00	-1.00
18. *New tram lines in Tallinn	CO_2, CH_4, N_2O	Modal shift to public transport or non-motorised transport; demand management/reduction	Economic	Implemented	2021	MoEAC	-0.11	-0.11	-0.11	-0.11
19. *Making a domestic ferry climate neutral	CO_2, CH_4, N_2O	Efficiency improvements; electric ferry	Economic	Planned	2027	MoEAC	NE	-8.13	-8.13	-8.13

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
20. Additional spatial and land-use measures for urban transport energy savings to increase and improve the efficiency of the transport system	CO_2, CH_4, N_2O	Modal shift to public transport or non-motorised transport; demand management/reduction	Regulatory, Planning	Planned	2023	MoEAC	NE	-29.72	-21.78	-14.94
21. Making an additional domestic ferry climate neutral	CO_2, CH_4, N_2O	Efficiency improvements; electric ferries	Economic	Planned	2035	MoEAC	NE	NE	-8.13	-8.13
22. Additional promotion of economical driving	CO_2, CH_4, N_2O	Modal shift to public transport or non-motorised transport; demand management/reduction; improved behaviour	Information	Planned	2025	MoEAC	NE	-14.86	-10.89	-7.47
23. Road usage fees for heavy-duty vehicles based on mileage	CO_2, CH_4, N_2O	Demand management/ reduction; improved behaviour	Fiscal	Planned	2031	MoEAC	NE	-2.00	-2.00	-2.00
24. Vehicle tyre pressure and tyre energy label	CO_2, CH_4, N_2O	Efficiency improvements	Information	Planned	2021	MoEAC	NE	-17.52	-15.38	-10.14
Industrial processes and product use										
1. *Industrial Emissions Act	CO_2	Determines the industrial activities of high environmental hazard, provides the requirements for operation therein and liability for failure to comply with the requirements, and the organisation of state supervision.	Regulatory	Adopted	2013	MoE	NE	NE	NE	NE
2. *Bans and duties from the Regulation (EU) No 517/2014 on fluorinated greenhouse gases and Directive 2006/40/EC related to emissions from mobile air conditioners (MACs)*	HFC	Reduction of emissions of fluorinated gases; replacement of fluorinated gases by other substances	Regulatory	Implemented	2015	MoE	NE	-137.39	-196.45	-208.58
3. *Implement best available technologies (BAT)	CO_2	The emission limit values, equivalent parameters or technical measures provided for in integrated permits are based on best available techniques.	Regulatory	Implemented	2013	MoE	NE	-0.065	-0.062	-0.023

Name of policy or measure[10]		GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
						year	entity	2020 base year	2030	2040	2050
Agriculture											
1.	*Organic Farming Act	CO_2, CH_4, N_2O	The grounds and extent of supervision exercised over persons operating in the area of organic farming, and for the liability for violation of the requirements established by such legislation	Regulatory	Adopted	2007	MoRa	NE	NE	NE	NE
2.	*Water Act	N_2O	Grounds for planning and organising the use and protection of water, the implementation of which will promote sustainable water use	Regulatory	Adopted	2019	MoE	NE	NE	NE	NE
3.	*Agri-environment-climate measures (including three sub-measures)	CO_2, CH_4, N_2O	This measure includes: • Regional water protection support: The objectives are to prevent and reduce water nitrogen pollution to preserve the water quality by decreasing agricultural soil leaching. • Support for growing local plant varieties: The objective is to ensure the preservation of the local plant varieties valuable for cultural heritage and genetic diversity. • Support for keeping animals of local endangered breeds- The objective is to ensure the preservation of animal breeds that are endangered and considered important for cultural heritage and genetic diversity.	Economic; Education; Information; Regulatory	Implemented	2015	MoRa	NE	NE	NE	NE
4.	*Organic production	CO_2, CH_4, N_2O	The measure helps to reduce GHG emissions by using organic fertilisers instead of mineral fertilisers.	Regulatory; Economic	Implemented	2015	MoRa	NE	NE	NE	NE
5.	*Knowledge transfer and information actions	CO_2, CH_4, N_2O	The general objective of the measure is to develop and enhance the technical, economic and environmental knowledge of the enterprisers and their employees in the Agriculture, food and forest sector to improve the bioeconomy and adapt new challenges to use resources sustainably.	Information; Education	Implemented	2015	MoRa	NE	NE	NE	NE

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
6. *Advisory services, farm management and farm relief services	CO_2, CH_4, N_2O	The general objective of the measure is to enhance the sustainable management or effectiveness of agricultural holdings or enterprisers by providing high-quality advisory services to the people working for agriculture sector.	Information; Education	Implemented	2015	MoRa	NE	NE	NE	NE
7. *Eco-scheme for organic farming	CO_2, CH_4, N_2O	The support is granted to farmers who start conversion to organic farming and engage in organic farming.	Economic, Regulatory	Planned	2023	MoRa	NE	NE	NE	NE
8. *Eco-scheme for ecological focus areas	CO_2, N_2O	Promoting the creation of non-productive areas and landscape features on arable land in order to contribute to biodiversity and mosaic landscapes.	Economic	Planned	2023	MoRa	NE	NE	NE	NE
9. *Support for maintenance of ecosystem services on agricultural land	CO_2, N_2O	The preservation of landscape features and natural areas, with the aim of ensuring the natural enemies of arable land pests providing natural pest management ecosystem services.	Economic	Planned	2023	MoRa	NE	NE	NE	NE
10. *Soil and water protection support	CO_2, CH_4, N_2O	In terms of soil protection, the aim is to reduce carbon emissions and protect soil organic carbon stocks and peat soils.	Economic	Planned	2023	MoRa	NE	NE	NE	NE
11. *Support for the maintenance of valuable permanent grassland	CO_2, N_2O	The aim is to preserve permanent grasslands of high biological value, where natural vegetation has been developed or preserved and thus the conditions for species richness are guaranteed.	Economic	Planned	2024	MoRa	NE	NE	NE	NE
12. *Support for maintaining semi-natural grassland	CO_2, N_2O	Semi-natural grasslands plays an important role in adapting to climate change and the sequestration of organic carbon into soils.	Economic	Planned	2023	MoRa	NE	NE	NE	NE
13. *Animal welfare support	CH_4	The objective is to help to reduce the negative environmental impact of livestock farming on air and soil and to increase the number of animals grazed extensively in order to maintain grassland biodiversity without encouraging an increase in the total number of animals and stocking densities.	Economic	Planned	2023	MoRa	NE	NE	NE	NE

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
14. *Support for the development of knowledge transfer and advisory services (AKIS)	CO_2, CH_4, N_2O	Creating additional opportunities for the modernisation of agriculture and rural life, promoting and sharing knowledge, supporting innovation and digital transition, and encouraging their adoption.	Information, Education	Planned	2023	MoRa	NE	NE	NE	NE
15. *Support for Advisory Services	CO_2, CH_4, N_2O	The objective is to increase awareness of the mutual impact of climate, climate changes and agriculture.	Information, Education	Planned	2024	MoRa	NE	NE	NE	NE
16. *Cover crops	N_2O	The objective of this measure is aimed that arable land and land under permanent crops shall be at least 50% under winter vegetation cover.	Regulatory	Planned	2023	MoRa	NE	NE	NE	NE
17. Improvement of manure management	CH_4	CO_2 reduction potential of this measure is reflected by significantly lower CH_4 emissions from covered storages compared to uncovered storages with a natural crust.	Economic	Planned	2023	MoRa	NE	0.22	0.29	0.36
LULUCF										
1. *The Forest Act	CO_2, CH_4, N_2O	Regulates the directing of forestry, forest survey and management in order to ensure the protection and sustainable management of the forest as an ecosystem.	Regulatory	Adopted	2007	MoE	NE	NE	NE	NE
2. *Earth's Crust Act	CO_2, CH_4, N_2O	To ensure sustainable and economically efficient use of the earth's crust.	Regulatory	Adopted	2017	MoE	NE	NE	NE	NE
3. *Nature Conservation Act	CO_2, CH_4, N_2O	To promote the preservation of biodiversity, natural environments and sustainable use of natural resources.	Regulatory	Adopted	2004	MoE	NE	NE	NE	NE
4. *Supporting the reforestation in private forests with native tree species of best possible hereditary characteristics suitable for the site	CO_2	The aim is to support activities related to the timely regeneration of forests in order to improve the quality of forest resources and ensure the efficient use of forest land production potential.	Economic	Implemented	2012	MoE	NE	NE	NE	NE

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
5. *Reduction of environmental impacts related to the use of fossil fuels and non-renewable natural resources by increasing the Estonian timber production and use	CO_2	The measure helps to reduce GHG emissions of fossil fuels and deposit carbon in harvested wood products. Specific activities include information campaigns to promote the use of wood and encouraging the use of wood through green public procurement.	Economic; Information	Implemented	2012	MoE	NE	NE	NE	NE
6. *Compensation for nature conservation restrictions on private forest areas outside the Natura 2000 network	CO_2, CH_4, N_2O	Subsidies are paid to owners of private forests outside Natura 2000 areas in limited management zones, limited-conservation areas and in areas where protection proceedings have been initiated.	Economic	Implemented	2022	MoE	NE	NE	NE	NE
7. *Protection of woodland key habitats	CO_2, CH_4, N_2O	In state forests, the conservation of key habitats is organised by the State Forest Service. Private forest owners may conclude a contract for the protection of a key habitat for 20 years.	Regulatory; Voluntary; Economic	Implemented	2009	MoE	NE	NE	NE	NE
8. *Prevention of bark beetle damage	CO_2	Supported activities include the use of trapping trees, the acquisition and installation of pheromone traps and elimination of fresh storm damage.	Economic	Implemented	2021	MoE	NE	NE	NE	NE
9. *Ensuring the protection of biodiversity	CO_2, CH_4, N_2O	The objective of this measure is to ensure favourable condition of species and habitats, and the diversity of landscape. The measure also includes restoration of habitats (mires, semi-natural communities) to achieve their favourable status.	Economic, Regulatory, Informatio, Research	Implemented	2020	MoE	NE	NE	NE	NE
10. *Investments to support forest adaptation to climate change	CO_2, CH_4, N_2O	Maintenance felling in stands up to 30 years old is supported and investments are made for the development of nurseries. The measure also provides support for preventing and eliminating damage caused by fire, pests and storms.	Economic	Planned	2023	MoRA	NE	NE	NE	NE

Name of policy or measure[10]	GHG affected	Objective and/or activity affected	Type of instrument	Status	Implementation		Total GHG estimate of mitigation impact, kt CO_2 eq.[11]			
					year	entity	2020 base year	2030	2040	2050
11. *Promoting biodiversity in Natura 2000 private forests	CO_2, CH_4, N_2O	The measure aims to maintain biological and landscape diversity in Natura 2000 areas and outside the Natura 2000 protected areas in the conservation zone, covered with forests.	Economic	Planned	2023	MoRA	NE	NE	NE	NE
Waste										
1. *Waste Act	CO_2 CH_4 N_2O	Includes requirements for preventing waste generation and the health and environmental impact arising from waste.	Regulatory	Adopted	2004	MoE	NE	NE	NE	NE
2. *Limiting the percentage of biodegradable waste going to landfill and increasing the reuse and recycling of waste materials	CH_4 N_2O	The objective is to increase the volume of recycling of municipal waste, including increasing recycling of biodegradable waste and reducing the share of biodegradable waste in landfilling.	Regulatory; Planning	Implemented	2014	MoE	NE	NE	NE	NE
3. *Promoting the prevention and reduction of waste generated, including the environmentally sound management of waste	CH_4 N_2O	The objective is to improve the resource efficiency of the Estonian economy and to promote waste prevention in order to reduce the negative effects on the environment and human health.	Regulatory; information	Implemented	2014	MoE	NE	NE	NE	NE
4. *Reducing environmental risks arising from waste, improvement of monitoring and supervision	CH_4	The objective is to supplement methods used for the management of hazardous waste and to reduce the environmental risks associated from waste disposal.	Information	Implemented	2014	MoE	NE	NE	NE	NE
5. *Enhancing safe circular material use rate	CH_4	The objective is to promote the adoption of sustainable production and consumption models and improving material circularity	Regulatory	Implemented	2021	MoE	NE	NE	NE	NE

4.2.4. Information on changes in domestic institutional arrangements

Estonia's institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards economy-wide emission reduction target is shown in Figure 4.1.

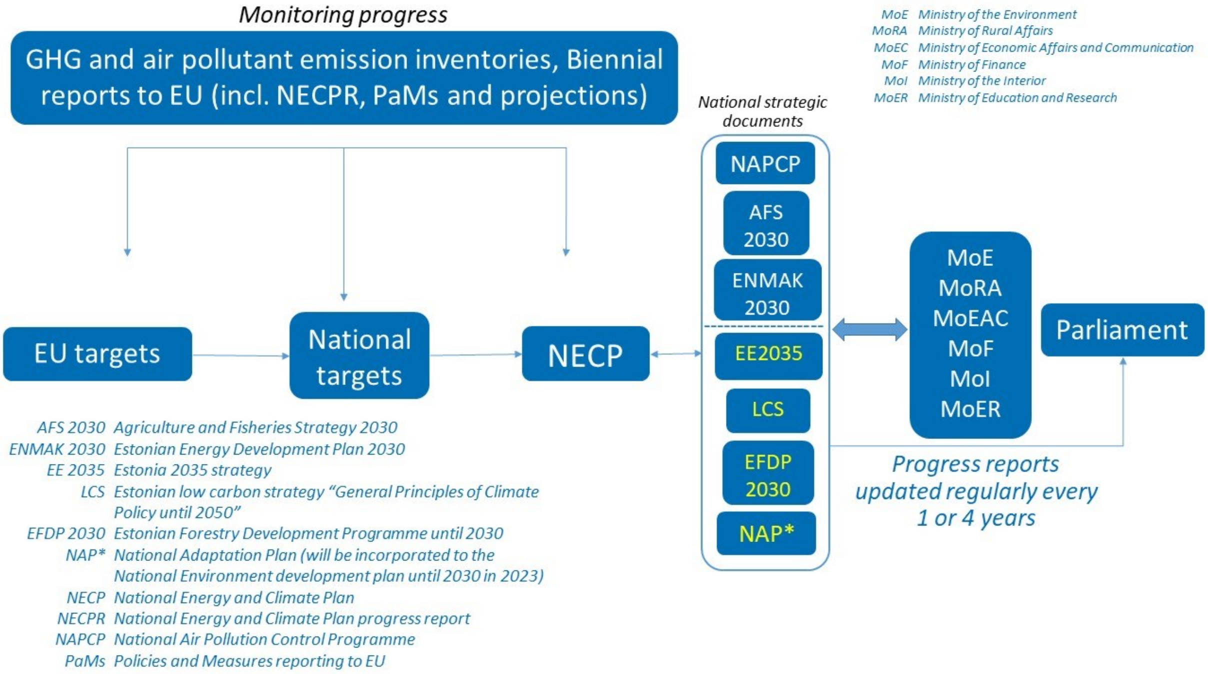

Figure 4.1 Estonia's institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards economy-wide emission reduction target

The regulation on Governance of the Energy Union and Climate Change Actions (so called *EU Governance Regulation*) requires that every EU member state prepare an integrated national energy and climate plan (NECP) by the end of 2019. Integrated national energy and climate plans should be stable to ensure the transparency and predictability of national policies and measures in order to ensure investment certainty. National plans should however be updated once during the ten-year period covered to give Member States the opportunity to adapt to significant changing circumstances. Each Member State shall report to the European Commission biannually on the status of implementation of its integrated national energy and climate plan by means of an integrated national energy and climate progress report (NECPR) covering all five dimensions of the Energy Union.

For the monitoring of GHG emissions EU Member States are reporting according to the EU Monitoring Mechanism Regulation (Regulation (EU) No 525/2013) to the European Commission annually the greenhouse gas inventories and other relevant data. Starting from 2023 the GHG reporting will be done under the EU Governance Regulation.

Monitoring, reporting and verification of the ESD national targets mainly takes place through the submission of the national GHG inventories.

Regarding *Low Carbon Development Strategy 2050*, the Government will present the Riigikogu with a report on considering the main principles of the climate policy in the preparation and implementation of cross-sectoral and sectoral strategies at least once in every

four years. Such report for the years 2017-2021 was presented to Riigikogu in the beginning of 2022.
Goals set in Estonia's long term strategy **Estonia 2035** are monitored annualy. Every member of the Government gives once a year an overview to Riigikogu on the activities in his field and plans to move towards the country's long-term goals set within the framework of the Estonia 2035 strategy, including Minister of the Environment on Estonia's´s 2050 climate neutrality goal. This process gives members of the Riigikogu the opportunity to get an overview of the main trends in all policy areas during the year.

In national level the monitoring and regular evaluation of policies and measures adopted and aiming to contribute to achievement of the set objectives and also GHG emission reduction targets is performed by the institution that is implementing the relevant strategy document or action plan.

4.2.5. Assessment of the economic and social consequences of response measures

To ensure that European Union's new policy initiatives potential adverse social, environmental, and economic impacts on various stakeholders, including developing country Parties, are identified and minimized, an impact assessment of new policy initiatives has been established. Specific guidelines for the impact assessment have been adopted in 2009, called "Impact Assessment Guidelines". The Impact Assessment guidelines were revised in May 2015, since then called "Better Regulation Guidelines". For details please refer to EU BR 1, BR 2 and Section 4.5.2 of the BR 3 (European Union 2014, 2015 and 2017) as well as Chapter 15 of the EU National Inventory Report 2022 (European Union, 2022).

In Estonia, impact assessments (which include the environmental impacts) are carried out in the early stages of the policy making process.

Estonia also takes measures aiming to reduce GHG emissions through energy savings and aiming the promotion of renewable energy sources to other Parties, including developing country Parties. Estonia is supporting achieving climate policy goals in developing countries. The objective of the application round is to bring knowledge and solutions in the field of green technology developed in Estonia to developing countries. Also being supported, are activities needed for increasing the capacity and capabilities of developing countries. The connection between the expected results of the project and climate change must be definable in connection with OECD methodology (so-called Rio markers).

4.3. Estimates of emission reductions and removals and the use of units from the market-based mechanisms and land use, land-use change and forestry activities

Estonia's total national GHG emissions without LULUCF sector are presented in CTF Table 4. Emissions in the LULUCF sector are not included under the Convention target, and therefore is reported as NA in the CTF Tables 4 and 4(a).

Estonia's emission level target, as part the joint EU target, is according to the Effort Sharing Decision to limit emissions from the non-ETS sectors such as buildings, transport (excluding aviation), waste and agriculture (excluding land use, land use change and forestry). Estonia's target under the ESD is explained in Chapter 3.2.

The use of flexible mechanisms takes place on the one hand by operators in the EU ETS, on the other hand by governments for the achievement of ESD targets. The progress of Member States in meeting the emission reduction targets set in the Effort Sharing Decision is assessed under the Monitoring Mechanism Regulation (Regulation No 525/2013).

The EU ESD reviews and compliance assessment for the years 2013 to 2020 have been completed and Estonia has met its 2020 emission limitation target (see Table 4.3) with national policies and measures. For years 2017-2019 Estonia used its emissions allocations banked from previous years to fulfil the annual targets and therefore did not require to use any other flexibility provision for compliance under the ESD.

Table 4.3 Non-ETS emissions and Assigned Emission Allocations, kt CO_2 eq.

Year	2013	2014	2015	2016	2017	2018	2019	2020	Total
Estonia's Annual emission allocation	6296.988	6321.312	6345.636	6369.960	5928.965	5960.550	5992.135	6023.72	49 239.266
Non-ETS Emissions	5752.962	6083.093	6144.412	6218.046	6205.022	6121.701	6208.760	5934.828	48 668.824
Target fulfillment	544.026	238.219	201.224	151.914	-276.057	-161.151	-216.63	88.89	570.442

5. PROJECTIONS

The main objective of this chapter is to give an indication of future trends of greenhouse gas (GHG) emissions in Estonia, given the policies and measures implemented and adopted. Projections are given for all greenhouse gases considered in the United Nations Framework Convention on Climate Change (UNFCCC), presented in the following sectors (CRF categories): Energy (incl. transport); Industrial processes and product use (IPPU); Agriculture; Land use, land use change and forestry (LULUCF); and Waste. Projections of GHG emissions have been calculated for the period of 2021–2050. 2020 has been used as a reference year. Activity data for the base year of 2020 is in accordance with the latest, 2022 National GHG Inventory (submitted to the UNFCCC on 15 April 2022). Projections have been calculated using AR4 GWP-s.

For indirect emissions, activity data for the base year 2020 and trends are in accordance with the Estonian Informative Inventory Report (Estonian Environmental Agency, 2022) submitted under the Convention on Long-Range Transboundary Air Pollution.

Two projection scenarios are presented. The With Existing Measures (WEM) scenario evaluates future GHG emission trends under the current policies and measures. In the second scenario, a number of additional measures and their impact are taken into consideration in forming the basis for the With Additional Measures (WAM) scenario.

5.1. Projections

5.1.1. Energy sector (excluding transport)

The Energy sector (excluding transport) includes GHG emissions from the consumption and production of fuels and energy (electricity and heat). The main sub-sectors in this sector are:

Energy industries; Manufacturing industries and construction; Other sectors (incl.Commercial/institutional, Residential and Agriculture/Forestry/ Fishing/Fish farms and Military) and Fugitive emissions from natural gas distribution. The GHG emission decrease in 2020 compared to the previous two years was primarily in the Energy industries, because of the EU ETS emission allowance price increase and lower electricity prices.

The Energy sector's projected emissions in the WEM scenario are presented in Figure 5.1. In the WEM scenario, the emissions are projected to decrease by 75.7% from 2020 to 2050. The largest absolute decrease occurs in the Energy industries.

The main electricity producer in Estonia is Enefit Power AS incl. the Eesti Power Plant and the Balti Power Plant. Both plants mainly use oil shale for electricity production. Enefit power plants are also the largest producers of GHG emissions in Estonia. This is due to the phasing out of oil shale pulverised combustion in these plants, the building of a more effective Auvere oil shale combustion plant, and the introduction of new shale oil production plants (fluidised bed combustion). It is planned by the companies to phase-out shale oil in solid heat carrier technology based shale oil plants, which causes a larger decrease in GHG emissions between 2040 and 2041 (Figure 5.1). The GHG emissions are projected to decrease by 95.4% by 2050 compared to 2020 in the Energy industries sector.

GHG emissions in the Manufacturing and construction sector (divided into iron and steel; non-ferrous metals; chemicals; pulp, paper and print; food processing, beverages and tobacco; non-metallic minerals; and other industries) are projected to increase by 28.3% by 2050 compared to 2020. In this sector, only the scenario is projected, as there are no additional planned policies or measures.

The emissions in Other sectors (Commercial/institutional, Residential, Agriculture/Forestry/Fishing/Fish farms and Military) are expected to decrease by 4.7% in 2050 compared to 2020.

The projected emissions together with the 2022 NIR information of the Energy sector in the WAM scenario are presented in Figure 5.1. In the WAM scenario, the emissions are projected to decrease by 78.3% in the period of 2020 – 2050. The increased reduction of GHGs in the WAM scenario results from higher energy efficiency requirements for buildings (entails additional funding for renovation purposes) and district heating networks, which help to decrease energy consumption for heat production. Decreased GHG emissions also result from an increased amount of energy unions that help to produce energy more efficiently for certain locations or interest groups. The largest absolute decrease occurs in the Energy industries sector. The decrease is projected to be 96.6% in the period of 2020 – 2050.

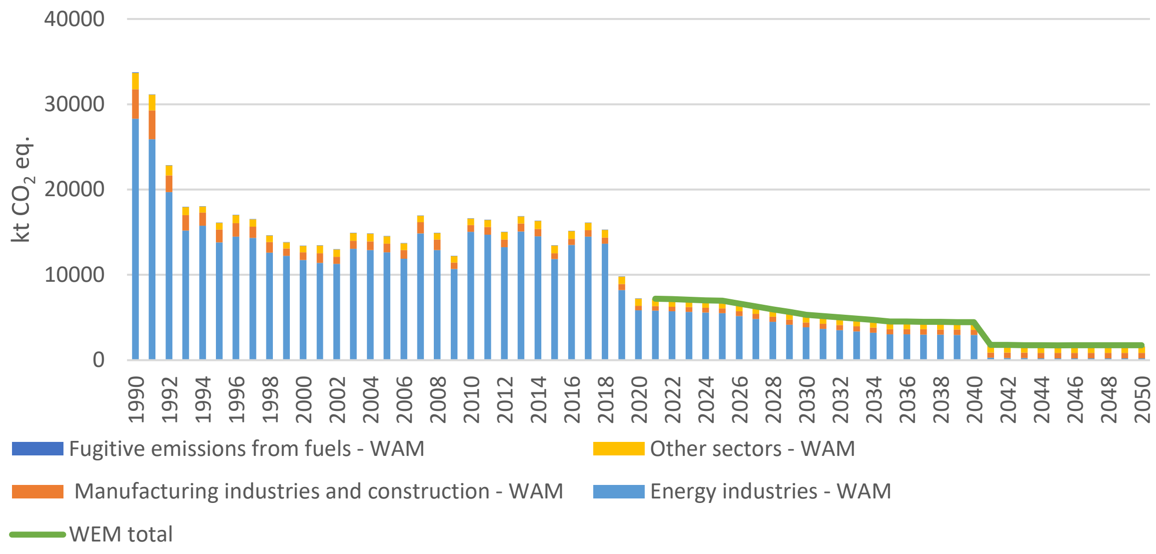

Figure 5.1 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) from the Energy sector according to the WEM and WAM scenarios, kt CO_2 eq.

5.1.2. Transport sector (excluding international aviation and marine bunkering)

The main share of GHG emissions in the Transport sector originate from road transport. In 2020, the share of GHG emissions from road transport was around 97.4% of total GHG emissions of the Transport sector.

The emissions in the Transport sector in the WEM scenario are expected to decrease by around 80.2% in 2050 compared to 2020. The emissions in Road transport are projected to decrease in both the WEM and WAM scenario. The total projected GHG emissions in the WEM and WAM scenarios are presented in the Figure 5.2.

The emissions in the Transport sector in the WAM scenario are expected to decrease by 82.0% in 2050 compared to 2020. Domestic aviation and Railway emissions are expected to stay at approximately the same level (as in the WEM scenario) during the period of 2018–2050. Domestic navigation and Road transport emissions are projected to decrease compared to the base year. The largest emission reductions occur in the Road transport sector – emissions are projected to decrease by 82.3% in 2050 compared to 2020 to a total of 384.90 kt CO_2 eq in the WAM scenario, which is the result of implementing additional measures that will help lower demand for private transport even more. However, the biggest driver for the steep decrement of GHG emissions in the WEM and WAM scenarios is the uptake of electric vehicles. This is reinforced by measures which support the promotion of electric vehicles and the notion that from 2035 all new passenger cars have to meet the criteria of 0 gCO2/km (in accordance with the Regulation (EC) No 2019/631 of the European Parliament and of the Council).

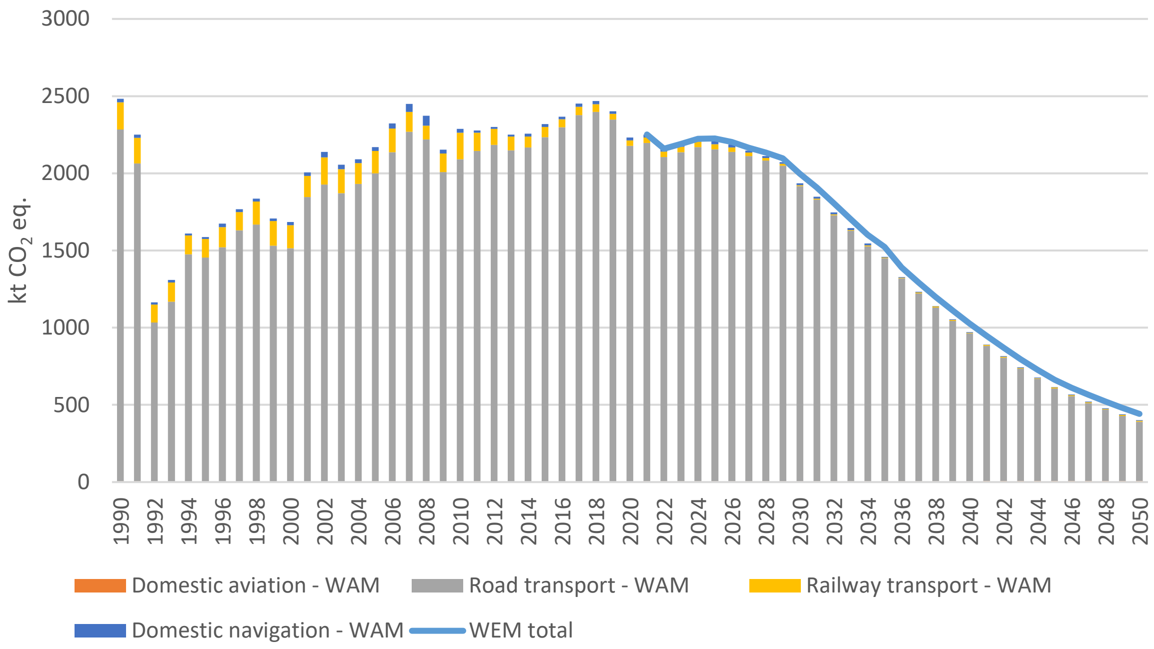

Figure 5.2 Historical GHG emissions (1990–-2020) (NIR, 2022) and projected emissions (2021–-2050) from the Transport sector in the WEM and WAM scenarios, kt CO_2 eq.

5.1.3. Industrial processes and product use sector

Emissions from the IPPU sector are projected according to the WEM and WAM scenarios whereby WAM only affects the emissions from urea-based catalysts for motor vehicles.

The WAM scenario for IPPU is projected because additional measures in the transport sector– additional promotion of economical driving, road usage fees for heavy-duty vehicles, vehicle tyres and aerodynamics – have an effect on subsector 2.D.3 Other – Urea-based catalysts for motor vehicles. In the WAM scenario diesel fuel consumption decreases, as does the consumption of urea-based diesel exhaust fluid. The GHG emission impact is included in Table 4.2.

The overall emissions from the IPPU sector are projected to decrease by 45.17% from 2020 until 2050 in the WEM scenario and 45.18% in the WAM scenario.The main decrease comes from the mineral industry (because a large plant has ceased its clinker production) and product uses as substitutes for ODS (F-gases).

Emissions from the mineral industry already decreased in 2020 when the cement industry ceased burning clinker in wet process kilns because it was not economically feasible anymore (production only took place in the first 3 months of 2020). The plant does not foresee starting production again. Other mineral industries estimated future production volumes in 2025 either as the same as in 2020 or up to 50% higher. After 2025 the production volumes will stabilise. Nevertheless, total emissions from the mineral industry sector remain ca 5 times lower than before the shutdown of clinker production.

Estonia's chemical industry sector emissions originate from the ammonia industry. The plant operator has announced that it has sold all of its production equipment and no longer plans to continue ammonia production activities, as ammonia production in Estonia has not been profitable since 2014 due to low global market prices for ammonia and rising natural gas prices.

In the metal industry production volumes will rise by around 10% from 2020 to 2022, as will the emissions from this category, and then stay the same until 2050. The metal industry made up 0.47% of the emissions in the year 2020 (2.9 kt CO_2 eq.), therefore the rise will not strongly influence the overall emissions.

Emissions (both direct and indirect CO_2) from non-energy products from the Fuels and solvent subsector use (2.D.3) are projected to decrease in both the WEM and WAM scenarios –19.8% from 2020 until 2050. Emissions from most subcategories (Use of diesel exhaust fluid AdBlue and Use of paraffin wax and solvents) are projected to decrease and emissions from the subcategory lubricant use are projected to increase. A smaller part of these emissions are the CO_2 emissions from urea containing diesel exhaust fluid use which decrease by 80.2% from 2020 until 2050 in WEM scenario and 82.3% in the WAM scenario. This difference in WAM scenario is mainly caused by curbing diesel fuel consumption and urea containing diesel exhaust fluid consumption as a result of additional measures in the transport sector.

Emissions from lubricants are projected to increase by 20% (up to 0.6 kt CO_2 eq.) from 2020 until 2050. Consumption of these products depends on the economic situation of many small industries (linked to real GDP growth rate). Given the economic growth (the Ministry of the Finance) these emissions are projected to increase.

Emission of NMVOCs from the solvents sector and indirect CO_2 from NMVOCs is projected to decrease. Although the consumption of solvent containing products has an upward trend because of its correlation with GDP growth, the emission factors have a declining trend. Concerning paints (2.D.3.d Coating applications) probably the Directive 2004/42/CE on the limitation of emissions of VOCs from paints and varnishes and vehicle refinishing products has contributed to declining emission factors. The same declining trend of emission factors can be seen in the Domestic use of solvents (2.D.3.a) and it results from the restrictions of the regulations (EC) No 648/2004 on detergents, (EC) No 1223/2009 on cosmetic products and (EU) No 528/2012 on biocidal products. In some subcategories NMVOCs decrease because of the declining population. In comparison to 2020 the emissions are projected to decrease by 24% by 2030 and stay around the same level until 2050.

Emissions of HFC-s (substitutes for ozone-depleting substances (ODS) are projected to be the same in the WEM and WAM scenarios. HFC emissions projections will decrease by 68% from 2020 to 2050. The majority of R-404A containing equipment (to which installation and servicing bans are applying from 2020) should be decommissioned until 2035 and also most old split-type air conditioners and heat pumps.

Directive 2006/40/EC has a gradual effect on HFC emissions until 2030 when most old vehicles equipped with HFC-134a based air conditioners should have been replaced.

Emissions of SF_6 reported under the CRF subcategory Other product manufacture and use are projected to rise steadily until 2050 when they are projected to be 65% larger than today (according to the WEM and WAM scenarios). SF_6 insulated electrical equipment is not directly affected by Regulation (EU) No. 517/2014. Until 2030 new equipment is installed instead of old air insulated switchgear. After 2030 emissions continue to rise because many items of SF_6 insulated equipment exceeding their service life will be decommissioned. After 2040 it is assumed that no more medium-voltage switchgear with SF_6 will be installed.

N_2O emissions from the subcategory Other product manufacture and use are projected to decline from 2020 to 2050 by 76% as the use of N_2O is connected to declining population numbers.

The historical and projected emissions in 1990–2050 according to WEM and WAM scenarios are depicted in Figure 5.3.

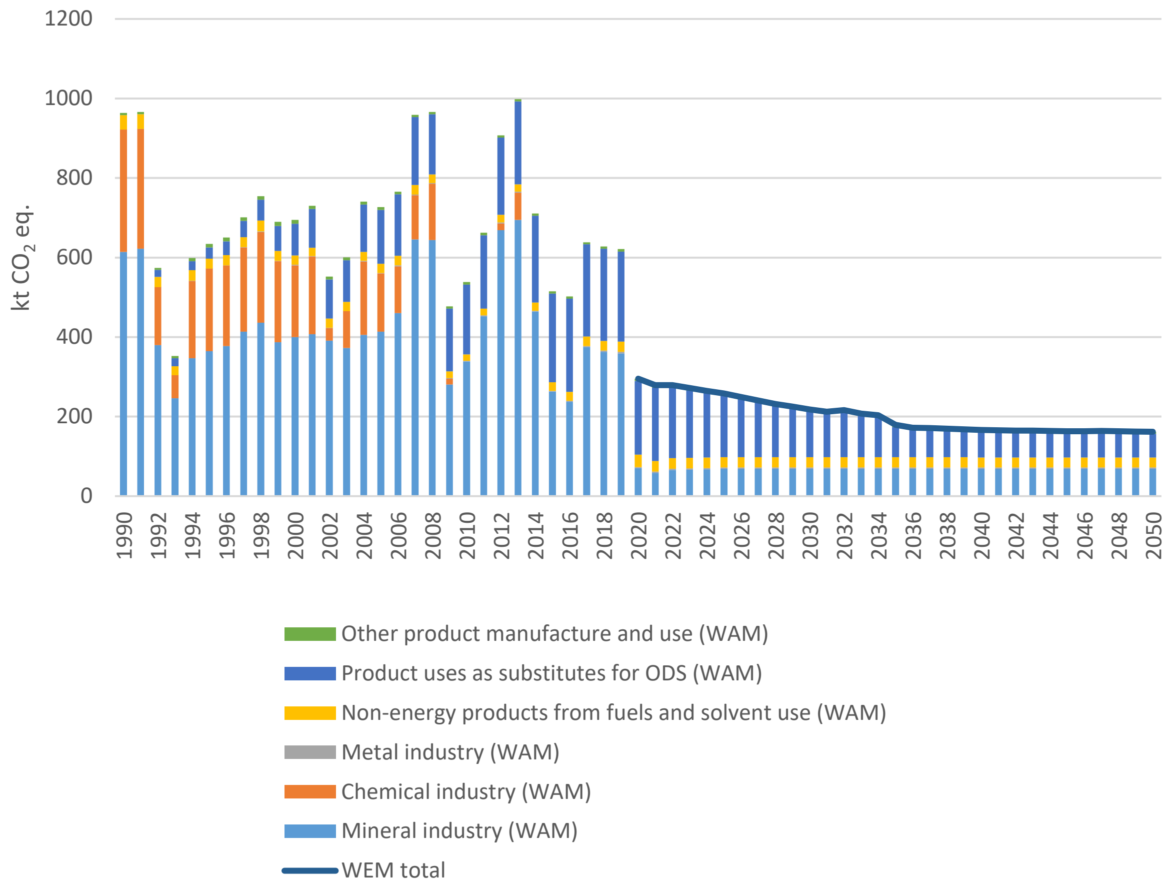

Figure 5.3 Historical GHG emissions (1990-–2020) (NIR, 2022) and projected emissions (2021-–2050) from the IPPU sector (with Solvent use) according to the WEM and WAM scenarios, kt CO_2 eq.

5.1.4. Agriculture sector

According to the WEM scenario, emissions from the Agriculture sector will increase from 1,508.38 kt CO_2 eq. in 2020 to 1,558.08 kt CO_2 eq. (3.30%) by 2050 (Figure 5.4). Increase in the Enteric fermentation sub-sector is projected to be 81.64 kt CO_2 eq., in Manure management 23.63 kt CO_2 eq., in Agricultural soils the emissions are projected to decrease by 61.88 kt CO_2 eq., in Liming to increase 6.31 kt CO_2 eq. and in Urea application to stay at the same level, at 0.13 kt CO_2 eq. in 2050 compared to 2020. According to the WAM scenario, emissions will increase from 1,508.38 kt CO_2 eq. to 1,558.44 kt CO_2 eq. (3.32%) by 2050.

Differences in WEM and WAM scenarios' results were caused by implementing the measure Improvement of manure management. The WAM measure only affected the Manure management and Agricultural soils sub-sectors due to the projected changes in the shares of types and covers of the manure stores. As the measure aims to increase the share the covering of manure storages, it decreases NH_3 emissions due to the decrease of direct sunlight (temperature impacts) and wind effects on the storage surface. On the contrary, covering the manure storages increases N_2O emissions as more N_2O is emitted in anaerobic conditions. This caused the increase of WAM scenario´s total GHG emissions from the Agriculture sector compared to WEM scenario.

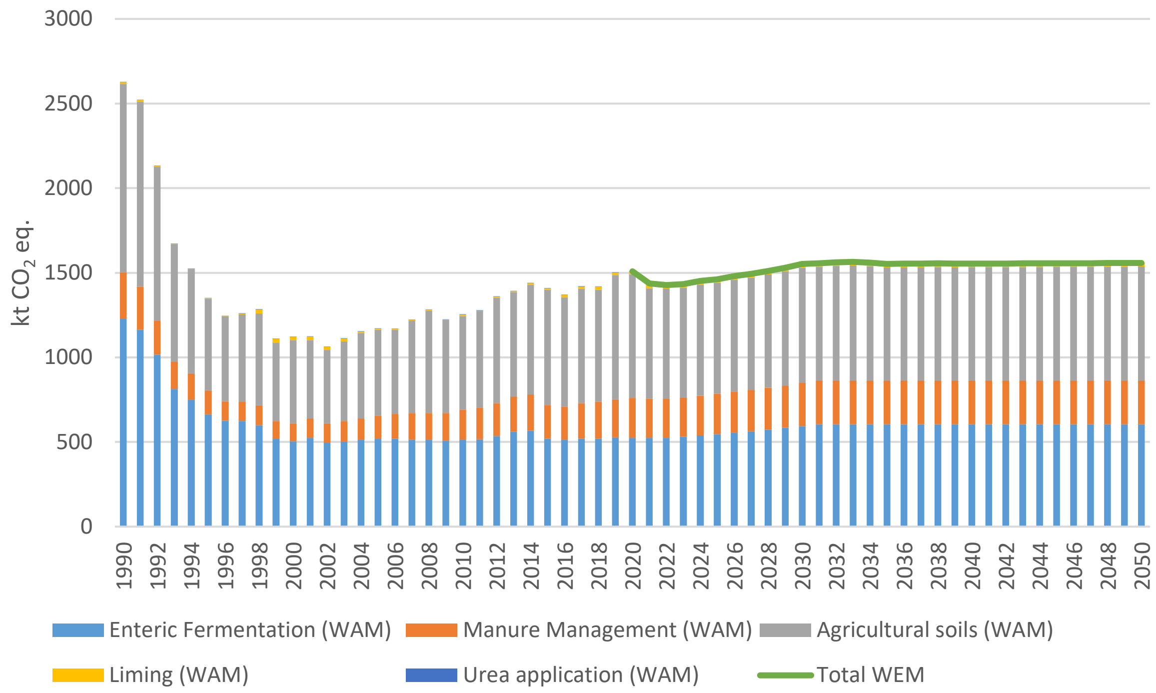

Figure 5.4 Historical GHG emissions (1990—2020) (NIR, 2022) and projected emissions (2021—2050) from the Agriculture sector in the WEM and WAM scenarios, kt CO_2 eq.

5.1.5. Land use, land-use change and forestry sector

GHG emissions from the LULUCF sector are projected according to the 'With Existing Measures' (WEM) and 'With Additional Measures' (WAM) scenarios. The WAM scenario only concerns the Forest land and HWP categories: the WEM scenario assumes the continuation of current forest management practices and intensity, whereas the WAM scenario is based on the assumption of uniform final felling which is proposed in the draft Forestry Development Plan until 2030 (Ministry of the Environment, 2022).

The projected area of land use by classes is the same for both the WEM and WAM scenarios and is presented in Table 5.1. Total Forest land and Cropland areas were expected to remain equal to the area in 2020. The projected areas of Wetlands and Other land categories are also relatively stable. Grassland area will decrease when the current land-use trends continue, even considering the planned deforestation due to restoration of semi-natural communities (heritage meadows). The area under Settlements will increase, as a result of the continuation of current trends and several planned large infrastructure projects.

Table 5.1 Projected land use in the LULUCF sector, thousand hectares

Land use class	2020 (2022 inventory)	2025	2030	2040	2050
Forest land	2,443.5	2,443.5	2,443.5	2,443.5	2,443.5
Cropland	985.6	985.6	985.6	985.6	985.6
Grassland	274.7	268.0	260.9	250.5	240.4
Wetlands	428.4	427.4	426.4	424.5	422.6
Settlements	359.8	366.9	374.3	385.4	396.2
Other Land	42.0	42.5	43.1	44.4	45.6
LULUCF Total	4,533.9	4,533.9	4,533.9	4,533.9	4,533.9

According to the projections, the LULUCF sector is expected to remain a source of GHGs in both scenarios (Figure 5.5 and Figure 5.6) meaning that total emissions arising from the sector will exceed total removals. The projected overall emissions from the LULUCF sector were 2,788.74 and 672.94 kt CO_2 eq. in 2050 according to the WEM and WAM scenarios, respectively.

In the WEM scenario (total felling volume is 11.5 mln m^3 year-1), Forest land will act as a net source. Projected changes in forest growing stock primarily depend on the age distribution of forests, growing stock changes were projected as ten-year averages. Due to the high proportion of mature and premature forest stands and increasing proportion of forest area belonging to the first development classes (treeless area, area under regeneration and young stands), the capacity of carbon sequestration in tree biomass has decreased in recent years and the decline is expected to continue during the next decades. According to the WEM scenario, total forest growing stock will be approximately 11% lower in 2050 than it is now. In addition, conversion from other land categories to Forest land has been slowing in recent years, and in the future, cumulative areas of Land converted to forest land categories will decrease further. Net emissions from the Forest land category are projected to increase from 139.28 kt CO_2 eq. in 2020 up to 1,502.29 kt CO_2 eq. in 2041. After that, net emissions will decrease to 668.11 kt CO_2 eq. in 2050 as the decline of the forest growing stock is expected to slow down.

In the WAM scenario (total felling volume is 9.4–9.8 mln m^3 year-1), Forest land and HWP will sequester carbon. It is expected that in 2022–2041 the forest growing stock will remain stable and CO_2 sequestration from Forest land will increase slightly over the period to -805.33 kt CO_2 eq. by 2041. Net removal from Forest land will increase due to increasing growing stock in 2042–2050 and net removal reaches -1,640.85 kt CO_2 eq.

Carbon sequestration in HWP will decrease in the WEM and WAM scenarios. According to the WEM scenario, removals from HWP will decrease from -922.24 kt CO_2 in 2020 to -520.35 kt CO_2 by 2050. In the WAM scenario, the removals are projected to decrease to -327.18 kt CO_2 in 2050. It is likely that the production of wood products will become more efficient and thus it can be assumed that production volumes and consequently carbon sequestration has been considered rather conservatively. Estonia is also planning to build a pulp mill, which will have a bigger impact in the first ten years, during which the HWP category would sequester an additional 200 kt CO_2 per year.

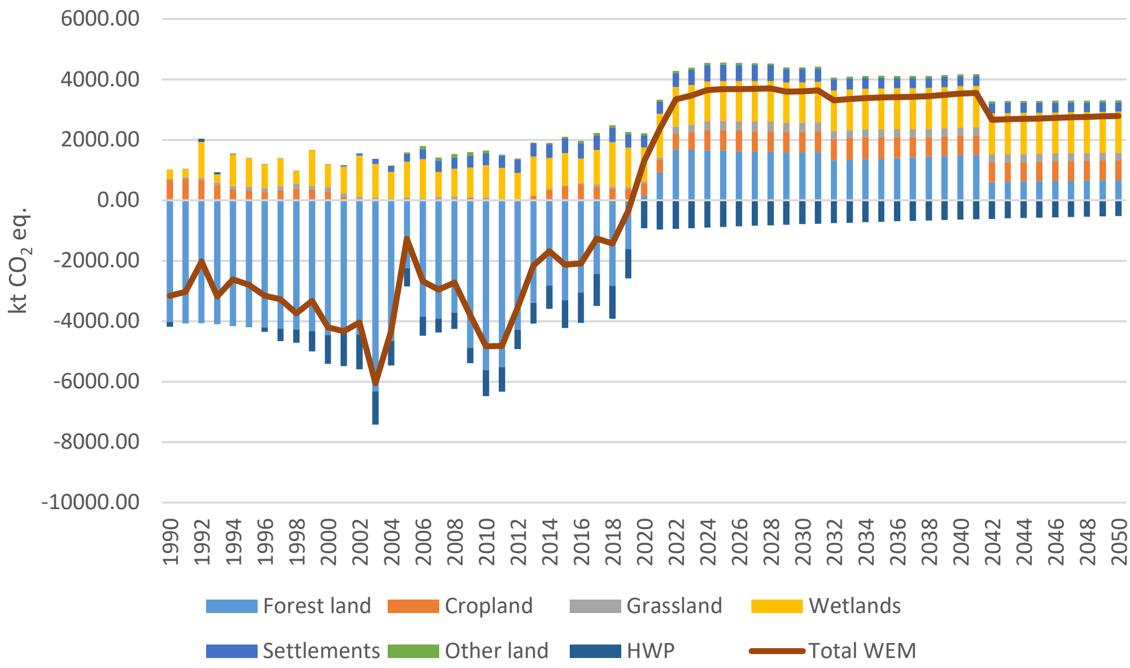

Figure 5.5 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) from the LULUCF sector by land use class according to the WEM scenario

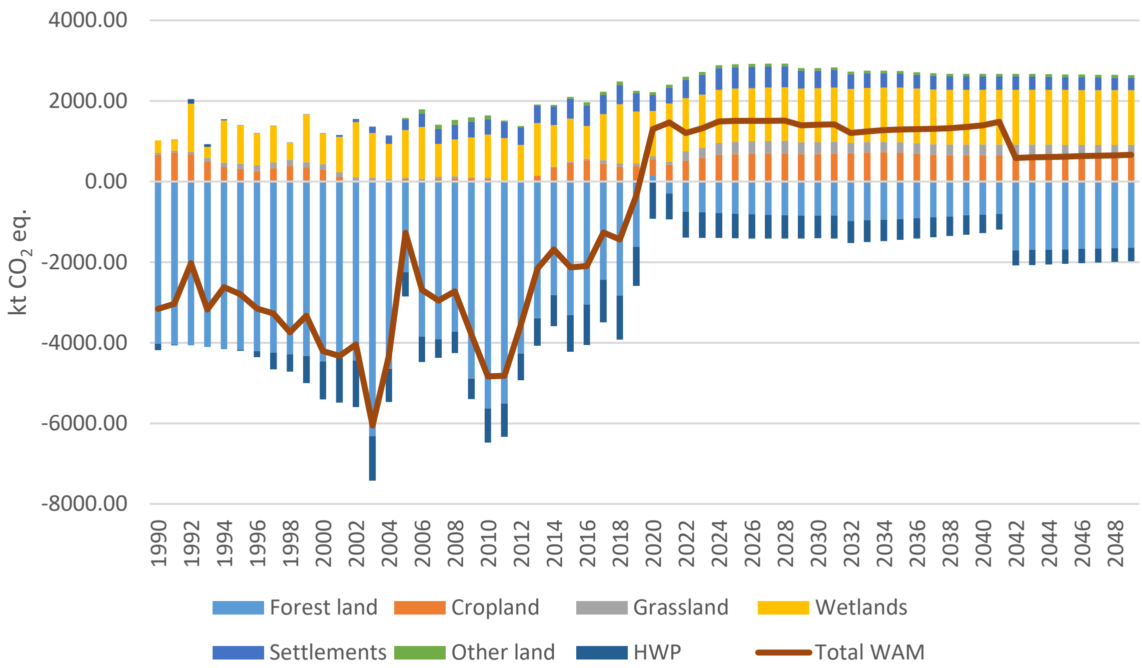

Figure 5.6 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) from the LULUCF sector by land use class according to the WEM scenario

Emissions from the Cropland category are expected to increase compared to the current level (417.73 kt CO_2 eq. in 2020), although the total cropland area, land use and management practices are expected to remain the same. This is because Estonia uses the default method with aggregated activity data for calculating C stock changes in cropland mineral soils. According to this methodology, soil organic C reaches a stable value over 20 years given that land use and management practices do not change during that period. In 2050, the projected emissions from the Cropland category are 651.65 kt CO_2 eq. Emissions mainly originate from the cultivation of organic soils, and smaller part also from land conversion to croplands.

Net emissions from the Grassland category are projected to increase from 64.14 kt CO_2 eq. in 2020 up to 255.61 kt CO_2 eq. in 2050. Currently, emissions mostly result from the drainage of organic soils; these emissions are expected to remain stable, but C losses from deforestation due to the restoration of heritage meadows will increase significantly in the future.

In total, estimated emissions from the Wetlands category are expected to increase by 20.2% in the 2020–2050 period, reaching up to 1,359.49 kt CO_2 eq. in 2050. Of this, 1,189.95 kt CO_2 results from the production and use of horticultural peat and 149.10 kt CO_2 eq. are emitted by active and rewetted peat extraction sites.

Under the Settlements and Other land categories, only emissions arising from the land conversions have been reported. Several planned infrastructure projects will increase land conversion to Settlements significantly in the period of 2022–2031. Projected emissions will reach the maximum value (538.49 kt CO_2 eq.) in 2024 and then decline to 309.93 kt CO_2 eq. in 2050. There are no quantitative estimates of land use changes for a number of proposed projects, such as military training grounds and onshore wind farms and due to this they are not included in the projections.

It was assumed that annual land conversions to Other land will continue to occur at the same level as the average of 2016–2020. The total cumulative area of Land converted to other land category and related emissions are expected to decrease slightly, to the level of 64.29 kt CO_2 eq. in 2050.

5.1.6. Waste sector

Since there are no additional measures intended in the Waste sector then the WAM scenario emissions are equal to the WEM scenario emissions (Figure 5.7).

Compared to 2020, the 2050 WEM scenario CO_2 eq. projections from the Waste sector are projected to decrease by 40.8%. Emission decrease is mainly related to the increase of reusing and recycling waste materials, decreasing amount of biodegradable waste deposited in landfills and to waste incineration in the Iru CHP plant. The decrease of 2050 emissions from the Solid waste disposal subcategory are projected to decrease by 83.9% compared to base year emissions.

Increase in GHG emissions from biological treatment of solid waste (121% increase in 2050 compared to 2020) is correlated to the decreased amount of biodegradable waste in the total amount of solid waste disposed in landfills.

Open burning of waste will end by 2030 and a marginal amount of waste will be incinerated without energy recovery, the emissions will decrease by 99.9%.

The emission decrease from wastewater treatment and discharge (11.8% in 2050 compared to 2020) is connected to the expanding sewerage network and upgrading wastewater treatment systems in low-density settlements.

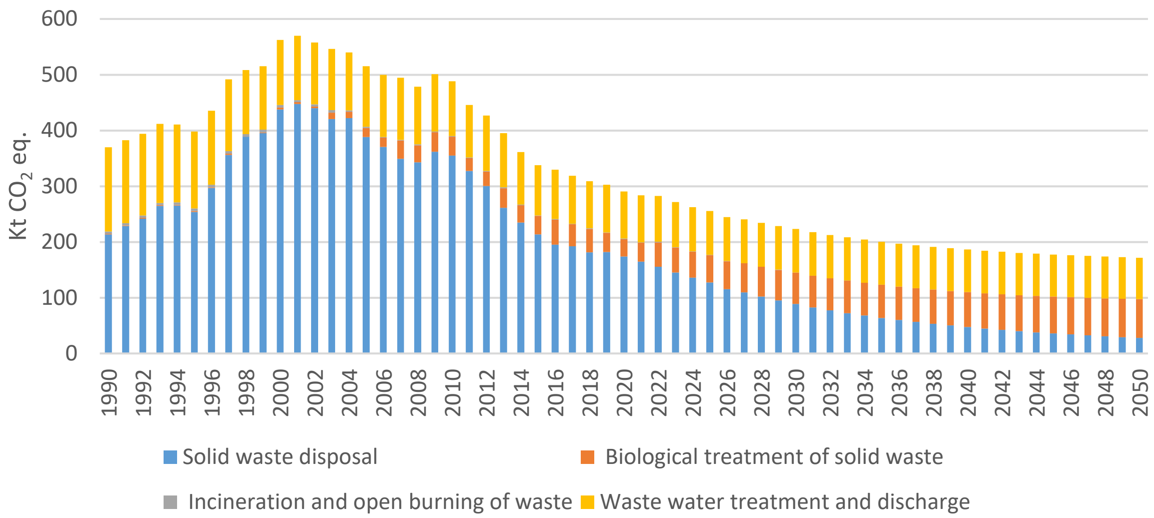

Figure 5.7 Historical GHG emissions (1990-–2020) (NIR, 2022) and projected emissions (2021-–2050) from the Waste sector according to the WEM=WAM scenario, kt CO_2 eq.

5.1.7. Total projected GHG emissions of Estonia

Estonia's total projected GHG emissions are presented in Figure 5.8 – Figure 5.12.

Estonia's GHG emissions are expected to decrease by around 64.61% in the WEM scenario (without LULUCF) and about 66.55% in the WAM scenario (without LULUCF) by 2050 compared to the base year of 2020. GHG emissions in the WEM scenario (with LULUCF) are expected to decrease by around 46.48% and in the WAM scenario (with LULUCF) about 64.69% by 2050 compared to the base year of 2020.

While the Energy sector´s subcategory Energy industries dominated total emissions in 1990, its emissions decreased sharply in the beginning of the time series and fluctuate but are projected to continue on a decreasing pathway, reaching a reduction of 99.1% by 2050 compared to 1990.

Emissions from the Transport sector, are driven by the Road transport category, as its share of the total transport sector was approximately 97.4% in 2020. Therefore, it will also be the biggest driver for the decrease of GHG emissions in the road transport sector due to the uptake of electric vehicles. The total decrease of emissions by 2050 compared to 1990 is projected to be 82% in the WEM scenario and 84% in the WAM scenario.

Historically, the IPPU sector emissions were driven by the Mineral industries subcategory, however the cement industry ceased burning clinker in wet process kilns and does not foresee future production, which will already decrease starting from 2020. HFC emissions projection will decrease by 68% from 2020 to 2050. It is projected that the majority of R-404A containing equipment and old split-type air conditioners and heat pumps are gradually decommissioned. The total decrease of emissions by 2050 compared to 1990 is projected to be 74% in the WEM scenario and 83% in the WAM scenario.

Agriculture emissions are projected to decrease by 40.7% compared to 1990 in the 2050 WEM scenario, however the projections foresee a slight increase of 3.30% compared to 2020 by 2050 (in the WAM scenario the emissions are projected to increase by 3.32% by 2050 compared to 2020). Estonia´s agriculture sector is driven by the Enteric Fermentation and Agricultural soils subcategories that are an important food source.

According to the projections, the LULUCF sector is expected to remain a source of GHGs in the WEM and WAM scenarios from –3,159.9 kt CO_2 eq. total sequestration in 1990 2,788.74 and 672.94 kt CO_2 eq. in 2050 according to the WEM and WAM scenarios, respectively. In the WEM scenario (total felling volume is 11.5 mln m^3 year-1), Forest land will act as a net source. Due to the high proportion of mature and premature forest stands and the increasing proportion of forest area belonging to the first development classes (treeless area, area under regeneration and young stands), the capacity of carbon sequestration in tree biomass has decreased in recent years and the decline is expected to continue during the next decades. In the WAM scenario (total felling volume is 9.4–9.8 mln m^3 year-1), Forest land and HWP will sequester carbon.

The increasing trend of waste sector emissions in 1990–2001 is linked to low rate of waste sorting. However, the emission decrease until 2050 is mainly related to the increase of reusing and recycling waste materials, the decreasing amount of biodegradable waste deposited in landfills and to waste incineration in the Iru CHP plant in 2013. The decrease of emissions by 2050 is reaching 53.4% compared to 1990 in WEM=WAM scenarios.

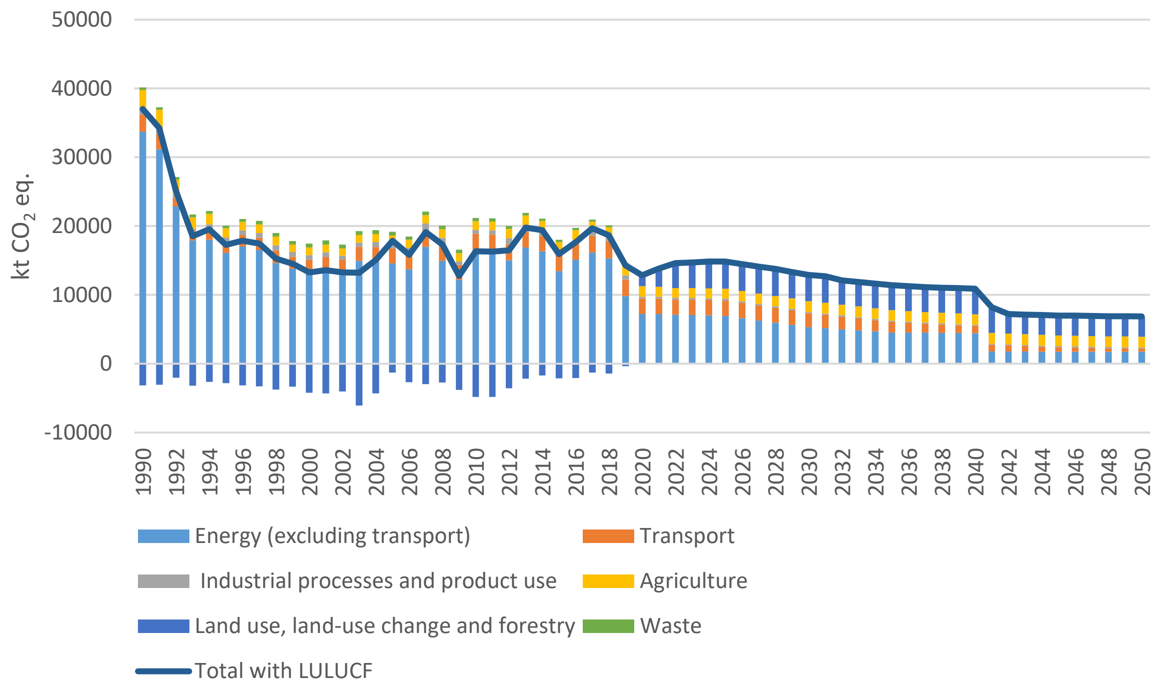

Figure 5.8 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) for the WEM scenario, kt CO_2 eq.

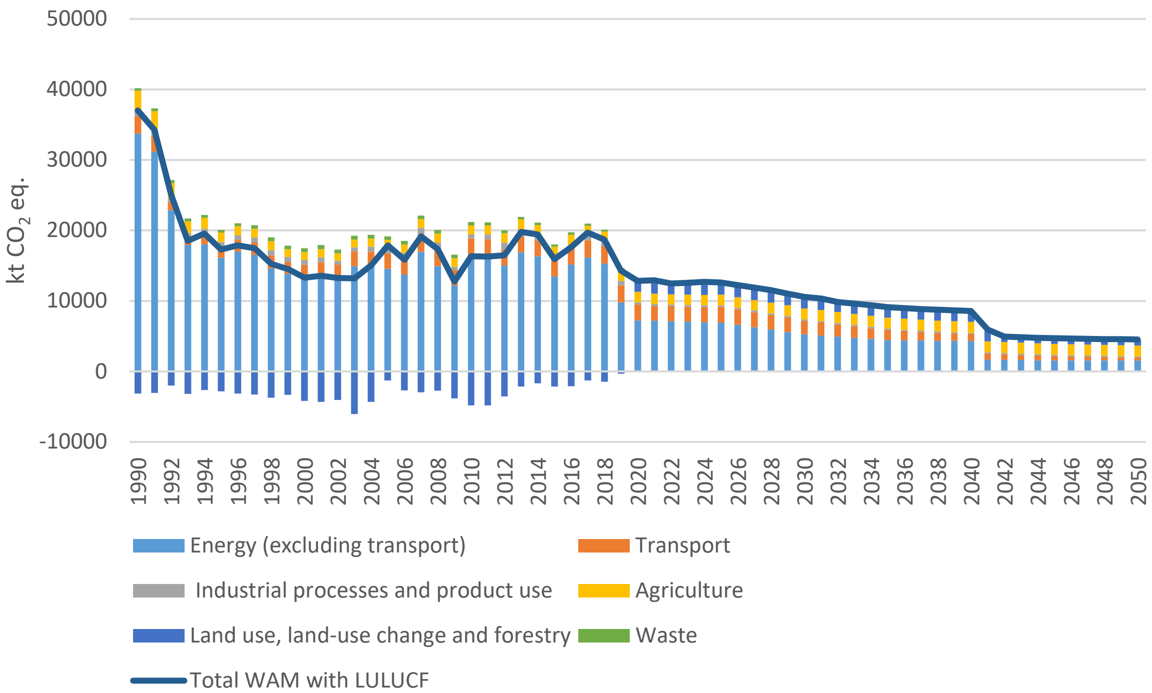

Figure 5.9 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) for the WAM scenario, kt CO_2 eq.

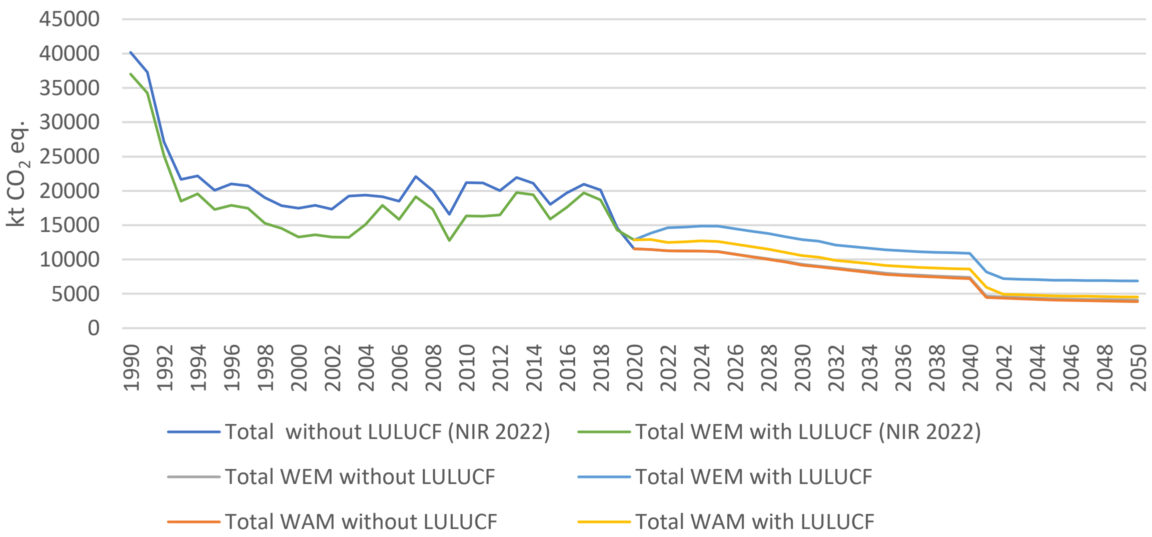

Figure 5.10 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) for the WEM and WAM scenarios, kt CO_2 eq.

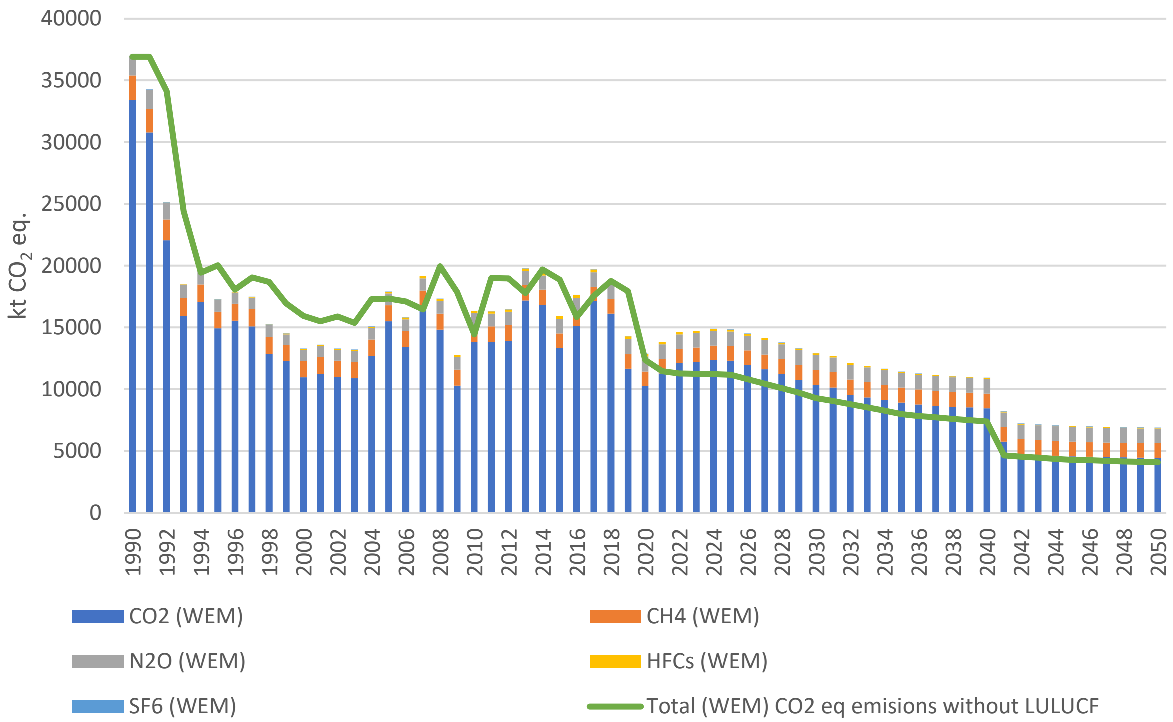

Figure 5.11 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) for the WEM scenario by gas, kt CO_2 eq.

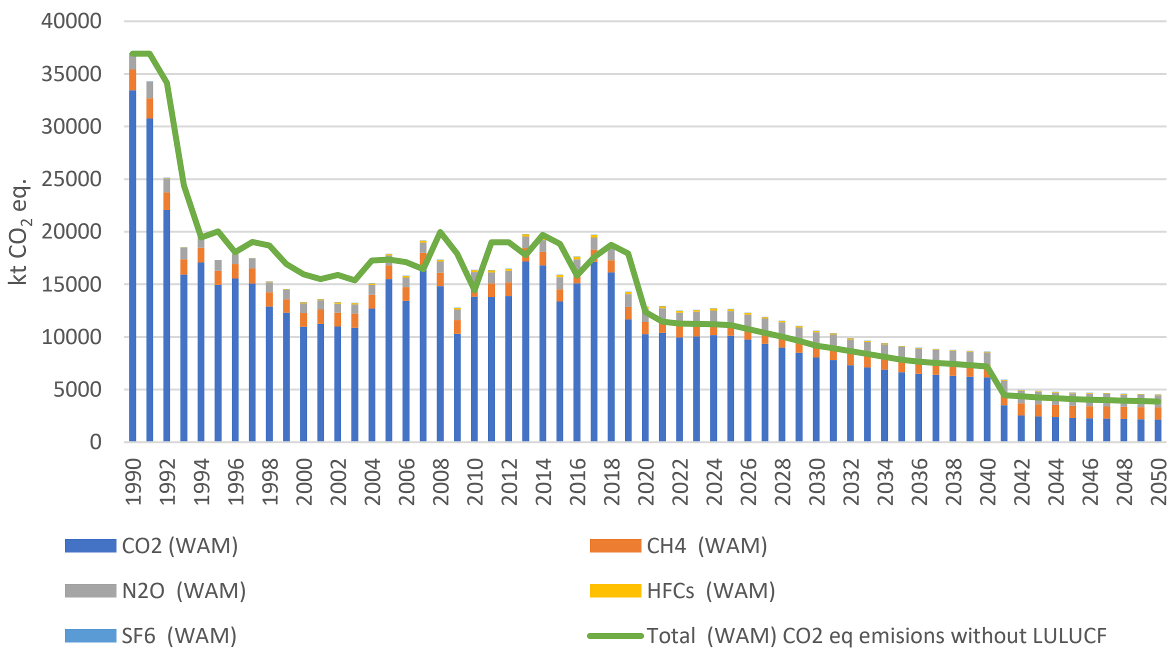

Figure 5.12 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021–2050) for the WAM scenario by gas, kt CO_2 eq.

Table 5.2 Historical GHG emissions in 1990–2020 (NIR, 2022) and projected emissions for 2025–2050 for the WEM and WAM scenarios kt CO_2 eq.

	GHG emissions and removals (kt CO_2 eq) (2022 NIR)							GHG projections (kt CO_2 eq)				
	1990	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2050**
By sector:												
Energy (excluding transport) WEM	33,731.25	16,110.33	13,414.02	14,573.18	16,611.11	13,454.95	7,228.91	6,966.79	5,308.79	4,548.08	4,453.24	1,756.48
Energy (excluding transport) WAM								6,940.43	5,249.14	4,441.52	4,320.35	1,572.05
Transport WEM	2,481.91	1,586.83	1,684.86	2,169.22	2,288.39	2,318.49	2,232.54	2,225.90	1,997.20	1,522.52	1,027.69	441.73
Transport WAM								2,209.05	1,935.10	1,458.82	971.52	401.04
Industrial processes and product use WEM	963.74	635.29	695.97	727.83	539.51	517.03	295.47	258.56	218.37	179.24	166.60	161.96
Industrial processes and product use WAM								258.53	218.30	179.05	166.54	161.94
Agriculture WEM	2,628.34	1,350.11	1,122.23	1,172.06	1,253.80	1,408.52	1,508.38	1,461.21	1,551.44	1,552.92	1,554.29	1,558.08
Agriculture WAM								1,461.34	1,551.67	1,553.18	1,554.59	1,558.44
Land use, land-use change and forestry WEM	-3,159.90	-2,799.39	-4,204.98	-1,275.73	-4,835.38	-2,128.02	1,297.27	3,672.52	3,607.67	3,403.91	3,525.24	2,788.74
Land use, land-use change and forestry WAM								1,507.47	1,407.83	1,292.22	1,392.25	672.94
Waste WEM=WAM	369.93	397.97	562.45	515.18	488.00	337.69	290.51	255.73	223.25	200.50	186.37	171.84
Total WEM (without LULUCF)	40,175.17	20,080.53	17,479.52	19,157.48	21,180.81	18,036.69	11,555.81	11,168.19	9,299.05	8,003.27	7,388.19	4,090.09
Total WAM (without LULUCF)								11,125.09	9,177.46	7,833.08	7,199.38	3,865.31
Total WEM (with LULUCF)	37,015.28	17,281.14	13,274.54	17,881.75	16,345.42	15,908.67	12,853.08	14,840.71	12,906.72	11,407.18	10,913.43	6,878.83
Total WAM (with LULUCF)								12,632.56	10,585.29	9,125.30	8,591.62	4,538.26
By gas, CO_2:												
Energy (excluding transport) WEM	33,527.13	15,914.55	13,232.02	14,390.63	16,388.24	13,261.52	7,016.80	6,719.34	5,040.12	4,263.34	4,178.47	1,482.31
Energy (excluding transport) WAM								6,695.24	4,987.56	4,172.58	4,072.08	1,345.45
Transport WEM	2,421.43	1,546.91	1,639.59	2,124.05	2,247.60	2,288.34	2,205.13	2,195.84	1,974.54	1,506.97	1,019.67	438.41
Transport WAM								2,179.19	1,913.14	1,443.98	964.13	398.17
Industrial processes and product use WEM	958.29	597.73	606.11	585.02	356.46	287.46	104.72	98.33	98.13	98.01	97.56	97.55
Industrial processes and product use WAM								98.31	98.07	97.81	97.50	97.53
Agriculture WEM	13.11	4.23	19.85	8.63	9.37	9.07	15.86	21.64	22.23	22.17	22.17	22.17
Agriculture WAM								21.64	22.23	22.17	22.17	22.17
Land use, land-use change and forestry WEM	-3,486.97	-3,127.98	-4,537.44	-1,612.85	-5,184.38	-2,487.19	932.20	3,288.36	3,224.12	3,023.01	3,144.97	2,408.45
Land use, land-use change and forestry WAM								1,123.32	1,024.28	911.32	1011.97	292.66
Waste WEM=WAM	2.25	2.99	2.82	1.46	0.84	0.51	0.49	0.35	0.00006	0.00005	0.00005	0.00004

	GHG emissions and removals (kt CO_2 eq) (2022 NIR)							GHG projections (kt CO_2 eq)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2050
CO_2 WEM emissions without net CO_2 from LULUCF	36,922.21	18,066.41	15,500.38	17,109.78	19,002.52	15,846.90	9,343.01	9,035.50	7,135.02	5,890.49	5,317.88	2,040.44
CO_2 WAM emissions without net CO_2 from LULUCF								8,994.73	7,020.99	5,736.54	5,155.88	1,863.32
CO_2 WEM emissions with net CO_2 from LULUCF	33,435.24	14,938.43	10,962.94	15,496.94	13,818.14	13,359.71	10,275.21	12,323.86	10,359.14	8,913.50	8,462.84	4,448.89
CO_2 WAM emissions with net CO_2 from LULUCF								10,118.05	8,045.27	6,647.86	6,167.85	2,155.98
By gas, CH_4:												
Energy (excluding transport) WEM	169.99	165.40	155.16	150.41	177.79	148.76	160.61	177.05	188.06	195.16	192.18	193.05
Energy (excluding transport) WAM								175.78	183.82	185.04	174.28	158.86
Transport WEM	21.91	12.37	11.51	9.67	6.31	4.00	3.03	5.79	5.34	4.19	2.84	1.70
Transport WAM								5.77	5.27	4.10	2.76	1.64
Industrial processes and product use WEM	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industrial processes and product use WAM								NO	NO	NO	NO	NO
Agriculture WEM	1,392.30	746.47	564.83	602.69	628.01	651.90	686.50	709.01	768.20	781.76	781.41	781.41
Agriculture WAM								709.01	768.20	781.76	781.41	781.41
Land use, land-use change and forestry WEM	64.14	64.47	65.85	65.25	65.49	66.23	66.26	83.95	88.63	89.58	90.52	92.40
Land use, land-use change and forestry WAM								83.95	88.63	89.58	90.52	92.40
Waste WEM=WAM	328.31	360.14	528.40	476.74	441.76	291.21	245.31	203.53	168.42	144.52	129.28	112.46
CH_4 WEM emissions without CH_4 from LULUCF	1,912.52	1,284.38	1,259.91	1,239.50	1,253.87	1,095.87	1,095.46	1,095.38	1,130.02	1,125.64	1,105.72	1,088.62
CH_4 WAM emissions without CH_4 from LULUCF								1,094.09	1,125.70	1,115.42	1,087.74	1,054.37
CH_4 WEM emissions with CH_4 from LULUCF	1,976.66	1,348.85	1,325.76	1,304.74	1,319.36	1,162.10	1,161.72	1,179.34	1,218.65	1,215.21	1,196.24	1,181.02
CH_4 WAM emissions with CH_4 from LULUCF								1,178.05	1,214.33	1,205.00	1,178.26	1,146.77
By gas, N_2O:												
Energy (excluding transport) WEM	34.14	30.37	26.84	32.14	45.09	44.67	51.50	70.39	80.61	89.58	82.59	81.12
Energy (excluding transport) WAM								69.40	77.76	83.91	73.99	67.74
Transport WEM	38.56	27.54	33.76	35.51	34.48	26.16	24.38	24.27	17.32	11.36	5.18	1.62
Transport WAM								24.09	16.70	10.74	4.63	1.23
Industrial processes and product use WEM	5.45	6.04	8.10	6.78	5.11	3.87	3.09	1.47	0.49	0.38	0.38	0.38
Industrial processes and product use WAM								1.47	0.49	0.38	0.38	0.38
Agriculture WEM	1,222.93	599.41	537.54	560.75	616.41	747.56	806.01	730.56	761.01	748.99	750.71	754.49
Agriculture WAM								730.69	761.24	749.25	751.00	754.86
Land use, land-use change and forestry WEM	262.93	264.11	266.61	271.87	283.51	292.95	298.80	300.20	294.91	291.33	289.76	287.89
Land use, land-use change and forestry WAM								300.20	294.91	291.33	289.76	287.89
Waste WEM=WAM	39.37	34.85	31.23	36.99	45.39	45.97	44.70	51.85	54.83	55.99	57.09	59.38

	GHG emissions and removals (kt CO_2 eq) (2022 NIR)							GHG projections (kt CO_2 eq)				
	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2050
N_2O WEM emissions without N_2O from LULUCF	1,340.45	698.21	637.47	672.16	746.47	868.22	929.68	878.55	914.27	906.29	895.94	896.99
N_2O WAM emissions without N_2O from LULUCF								877.51	911.03	900.26	887.09	883.58
N_2O WEM emissions with N_2O from LULUCF	1,603.37	962.32	904.09	944.03	1,029.98	1,161.16	1,228.48	1,178.76	1,209.18	1,197.62	1,185.69	1,184.88
N_2O WAM emissions with N_2O from LULUCF								1,177.71	1,205.94	1,191.58	1,176.85	1,171.47

By gas, F-gases:												
HFCs	NO	28.45	79.15	134.96	176.11	223.35	184.74	154.77	115.40	76.15	63.81	59.29
PFCs	NO	NO	NO	NO,NA	NO	NO	NO	NO	NO	NO	NO	NO
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	NO	3.07	2.61	1.08	1.83	2.35	2.92	3.86	4.21	4.56	4.71	4.60
NF_3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

5.1.8. Sensitivity analysis

During every projection compilation period, trajectories for parameters for reporting on national GHG projections are provided by the European Commission (EC) for all the EU Member States. These include harmonised values to be considered for the 2023 national GHG projections on the international oil, gas and coal import prices, the EU ETS emission allowance prices and GDP. For the projection compilation, it was possible to use Estonia's Ministry of Finance´s updated the long term real GDP growth rate from September 2022 and population projection by Statistics Estonia which were considered more up to date. The EC parameters were used for sensitivity analysis to validate national data used in the projections.

Energy

Manufacturing industries' and construction (1.A.2) and Agriculture/Forestry/Fishing/Fish farms and Military (1.A.4.c) GHG projections are based on the future GDP growth of Estonia. The GDP projections until 2050 by the Ministry of Finance were used. However, a GDP scenario was also provided by the European Commission. Therefore, an alternative scenario has been modelled (SEN scenario).

Comparing the GDP projections from the Ministry of Finance with GDP projections from the European Commission, it was seen that the Commissions GPD projections were somewhat more optimistic in the future growth of Estonia, which also reflects in the GHG projections. When comparing GHG emissions between the WEM and SEN scenarios, the emissions are projected to increase by 3.3% by 2050 in the SEN scenario. The results of the SEN scenario are presented in Figure 5.13. A sharp drop in the emissions in 2040–2041 is due to the companies phasing out shale oil in solid heat carrier technology based shale oil plants.

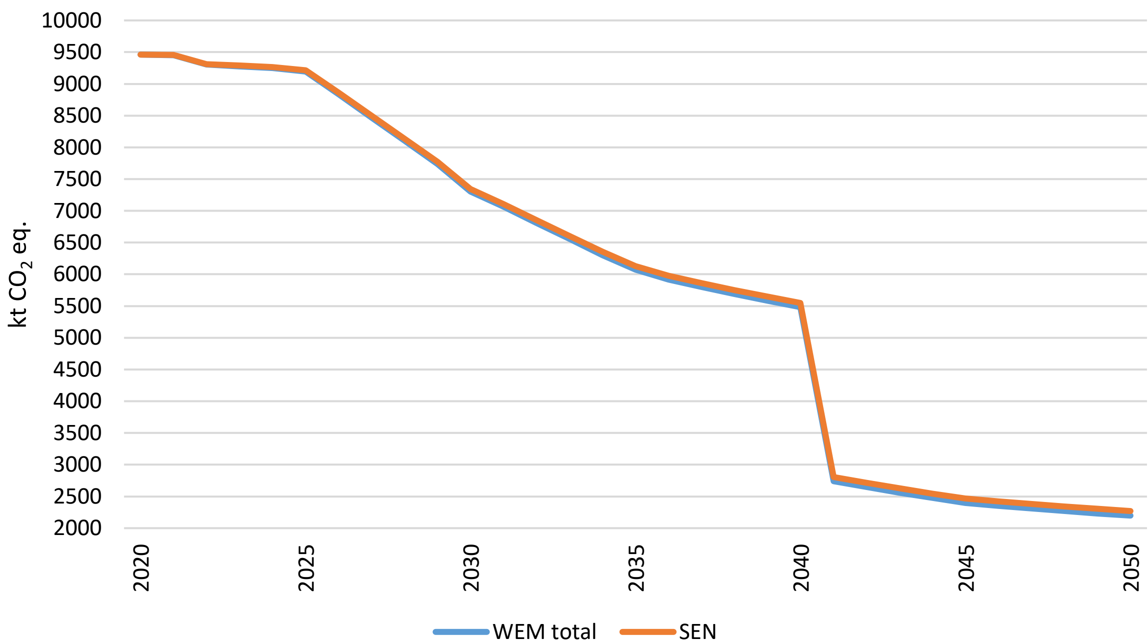

Figure 5.13 Comparison of GHG emissions of the WEM and SEN scenarios, kt CO_2 eq.

IPPU

Sensitivity analysis for IPPU sector emissions is based on the population and annual real GDP growth rate harmonised values Table 5.3) given by the European Commission (Trajectories for parameters for reporting on national GHG projections in 2023).

Table 5.3 Harmonised parameters given by the European Commission

Indicator	2025	2030	2035	2040	2050
GDP (in market prices), million euros	2.68	2.48	2.14	1.61	1.26
Population in Estonia, million	1.322	1.308	1.294	1.282	1.256

The results of the SEN analysis show that IPPU sector emissions in general are dependent on the population projections and changes in GDP estimations.

When comparing GHG emissions between the WEM and SEN scenarios, the emissions are projected to decrease by 0.68% (1.13 kt CO2 ekv) in 2040 and by 0.69% (1.12 kt CO_2 ekv) in 2050 in the SEN scenario compared to the WEM scenario. The results of the SEN scenario are presented in Figure 5.14.

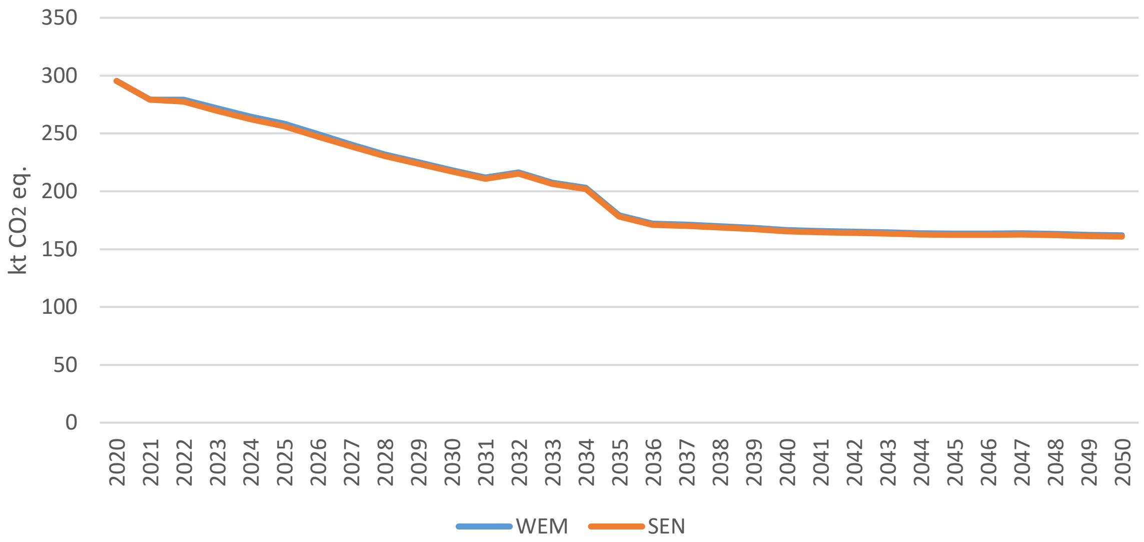

Figure 5.14 Comparison of GHG emissions of WEM and SEN scenarios, kt CO_2 eq.

Under the SEN scenario population and/or GDP growth rate values from Table 5.3 were used in the calculations of IPPU categories 2.D Non-energy products from fuels and solvent use (GDP and population), 2.F Product uses as substitutes for ODS according (GDP and population) and 2.G Other product manufacture and use (GDP and population) according to the methodology of the WEM scenario. The methodology for calculating the WEM scenario is provided in Chapter 5.4.3. Categories 2.A (mineral industry) and 2.C (metal industry) are not affected by the change of population or GDP growth rate.

Waste

Sensitivity analysis for Waste sector emissions is based on the scenarios, where population and annual real GDP growth rate (Table 5.3) are based on the harmonised values given by the

European Commission (*Recommended parameters for reporting on GHG projections in 2021* 30 June 2020).

Under the SEN scenario (Figure 5.15), population and GDP growth rate from Table 5.3 were both used in projection calculations. The methodology for calculating the SEN (and WEM) scenario is provided in Chapter . All subcategories in the Waste sector are affected by the change of population projections and fluctuations in GDP.

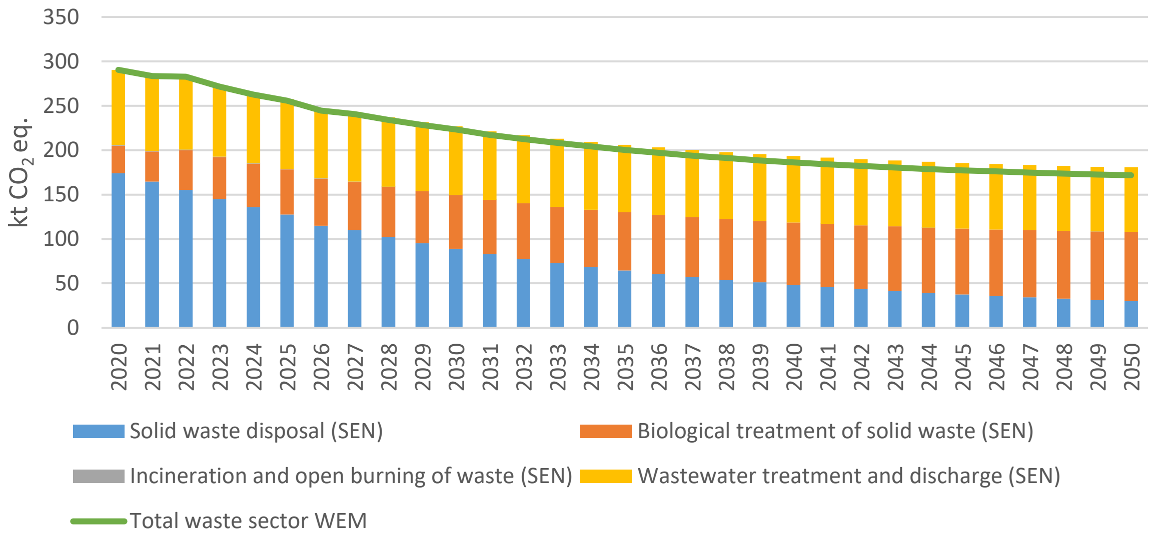

Figure 5.15 Comparison of GHG emissions of the SEN and WEM scenarios waste sector total emissions, kt CO_2 eq.

The results of the SEN analysis show that Waste sector emissions in general are dependent on the population projections and changes in GDP estimations. The Incineration and open burning of waste and Wastewater treatment and discharge categories are not highly affected when using SEN parameters. Incineration and open burning subcategory have a marginal share in the total share of emissions and the Wastewater treatment and discharge subcategory would be more affected by the change of different wastewater treatment methodologies. However, population and GDP growth are affecting the Solid waste disposal and Biological treatment of solid waste subcategories. When comparing 2050 emissions, total emissions are projected to decrease by 5.2% in the WEM scenario compared to the SEN scenario.

5.1.9. International bunker fuels

International bunkers cover International aviation and navigation.

Eurocontrol forecasts an annual 1.9% increase (Eurocontrol, 2018) in European aviation flights until at least 2040, which is taken into account in the Aviation bunkering projections. In the Marine bunkering projections, the International Maritime Organization forecast is taken into account, which states an increase in international shipping of 40% (ICCT, 2021).

Historically, the emissions from Aviation bunkering formed about 10% of all bunkering emissions. Due to the methodology change in activity data by Statistics Estonia, the emissions increased by around two times in 2012 compared to 2011 (Figure 5.16)

The emissions from Aviation bunkering are projected to increase 4 times by 2050 compared to 2020. The reason for the big difference is COVID-19, which halted most of the international aviation in 2020 and Tallinn Airports expansion plans to increase the number of passengers to

6 million by 2035. The total GHG emissions of Marine bunkering are expected to increase by 29.8% by 2050 compared to 2020, as regards the current trend (Figure 5.16 and Table 5.4). Overall, the GHG emissions from International bunkering are expected to increase by 57.0% in 2050 compared to 2020.

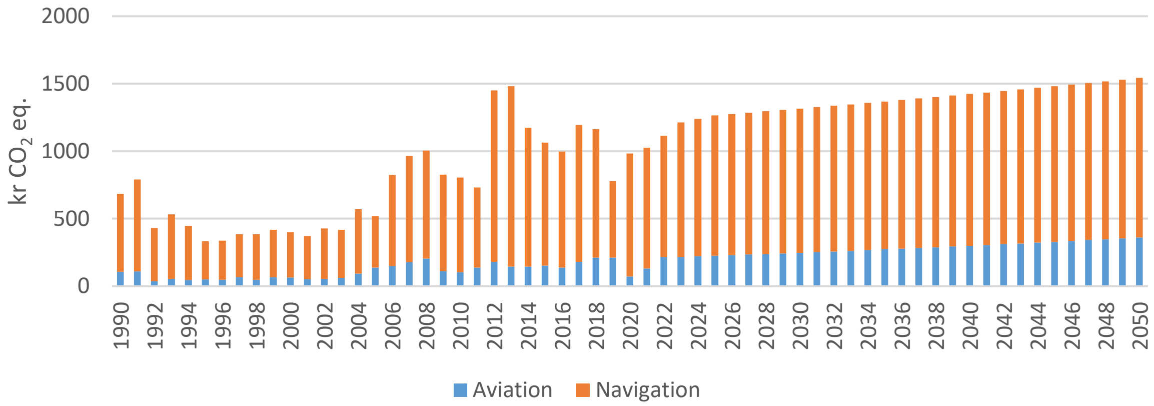

Figure 5.16 Historical GHG emissions (1990–2020) (NIR, 2022) and projected emissions (2021-2050) from International bunkering according to the WEM=WAM scenario, kt CO_2 eq.

Table 5.4 GHG projections of International bunkering, kt

	GHG	2020	2025	2030	2035	2040	2050
Aviation bunkering	CO_2	72.11	223.35	245.39	269.60	296.20	357.55
	CH_4	0.001	0.016	0.017	0.019	0.021	0.025
	N_2O	0.002	0.006	0.007	0.008	0.008	0.010
	Total CO_2 eq.	72.72	225.59	247.85	272.31	299.18	361.14
Marine bunkering	CO_2	900.99	1,029.99	1,058.10	1,086.21	1,114.32	1,170.82
	CH_4	0.084	0.098	0.100	0.103	0.106	0.111
	N_2O	0.023	0.023	0.024	0.024	0.025	0.025
	Total CO_2 eq.	909.90	1,039.42	1,067.70	1,095.98	1,124.26	1,181.11
International bunkering total	CO_2	973.09	1,253.34	1,303.49	1,355.81	1,410.52	1,528.36
	CH_4	0.085	0.113	0.117	0.122	0.126	0.136
	N_2O	0.025	0.030	0.031	0.032	0.033	0.035
	Total CO_2 eq.	982.62	1,265.01	1,315.55	1,368.29	1,423.44	1,542.25

5.1.10. Assessment of aggregate effects of policies and measures

Individual effects of single PaMs are included in Table 4.2 and total GHG emission impact is included in Table 5.5. As many policies and measures are either not yet quantifiable or do not have an impact in the whole time series, then the impact in Table 5.5 is not giving the total impact of the measures. Not quantifiable but implemented measures are impacting the projections through the base year or base period and therefore their impact is included in the projections, however this is not quantified.

The the difference between the WEM and WAM scenarios (Table 5.5) gives an overview of the impact of additional measures compared to the WEM scenario.

Table 5.5 Total effect of implemented and adopted PaMs, kt CO_2 eq

	2020	2030	2040	2050
WEM measures	-1,500.88	-6,409.94	-9,045.18	-9,236.15
WAM measures	-1.13	-189.33	-263.18	-337.77

Table 5.6 Total effect of implemented and adopted PaMs based on the projections, kt CO_2 eq.

	2020	2025	2030	2035	2040	2050
CO_2	0	2,206	2,314	2,266	2,295	2,293
CH_4	0	0.05	0.17	0.41	0.72	1.37
N_2O	0	0.004	0.01	0.02	0.03	0.04
Total CO_2 eq.	0	2,208	2,321	2,282	2,322	2,341

5.1.11. Comparison of projections between BR4 and BR5

BR5, as well as BR4, have been both compiled by the EERC. The BR4 projections had 2016 as the base year with projections up to 2040, however current BR5 includes 2020 as a base year with projections up to 2050. In general, the main differences between the two projections include improved projection estimations, revised fossil fuel prices and economic growth assumptions. The renewed sectoral development plans with updated parameters and targets described under Chapter 4 allow for making projections that are more precise. For agriculture projection compilation, Agriculture Projection Model (APM) was used in BR5.

In the Energy sector there has been an update in historic trends (taking into account data until 2018), the update of EU ETS emission allowance price, new modelling with the Balmorel model, new input from the companies about their future plans, update of emission factors and changes in sources for the measures.

In the Transport sector there has been a recalculation of the measures´ impact on GHG decrement, update in the road transport mileage of the vehicle fleet, activity data update of the domestic aviation and update in the railway electrification measure. Emissions in Transport sector in BR5 have been calculated using Sibyl baseline instead of analysis of transport and mobility scenarios in ENMAK 2030 along with expert judgements used for BR4.

Some of the main assumptions and results of the previous and current BR projections are presented in Table 5.7.

Table 5.7 Comparison of projections of previous and current BR

	2020	2025	2030	2035	2040
BR4 Annual GDP growth rates, %	3.0	2.6	1.9	1.4	1.4
BR5 Annual GDP growth rates, %	-0.6	2.5	1.6	1.5	1.4
BR4 Population, thousand people	1,317.9	1,312.1	1,306.2	1,295.0	1,283.7
BR5 Population, thousand people	1,328.9	1 ,320.6	1,314.0	1,304.9	1,296.8
BR4 EU ETS carbon price EUR/EUA	26	23	34.7	43.5	51.7
BR5 EU ETS carbon price EUR/EUA	24	80	80	120	250
BR4 International (wholesale) fuel import prices - Electricity coal €/GJ	2.64	3.16	3.79	4.01	4.18
BR5 International (wholesale) fuel import prices – coal € (2020)/GJ	1.6	3.1	3.1	3.1	3.3
BR4 International (wholesale) fuel import prices – Natural gas €/GJ	8.91	9.64	10.49	11.2	11.58
BR5 International (wholesale) fuel import prices – Natural gas € (2020)/GJ	3.1	13.2	11.3	11.3	11.3
BR4 Area of cultivated organic soils, 1000 hectares	30	30	30	30	30
BR5 Area of cultivated organic soils, 1000 hectares	27.75	27.75	27.75	27.75	27.75

	2020	2025	2030	2035	2040
BR4 Number of total cattle, thousand heads	264	274	285	296	296
BR5 Number of total cattle, thousand heads	253.3	256.8	277.6	283.2	283.2
BR4 Municipal solid waste (MSW) generation, kt MSW	606.5	607.4	608.1	608.6	609.0
BR5 Municipal solid waste (MSW) generation, kt MSW	615.1	601.5	576.7	556.6	540.3
BR4 WEM total emissions, kt CO2 eq. (with LULUCF)	14,226.21	16,568.87	12,330.97	12,717.69	12,643.19
BR5 WEM total emissions, kt CO_2 eq. (with LULUCF)	12,852.98	14,840.71	12,906.72	11,407.18	10,913.43
BR4 WAM total emissions, kt CO_2 eq. (with LULUCF)	14,017.2	15,192.0	10,516.5	11,062.4	10,932.3
BR5 WAM total emissions, kt CO_2 eq. (with LULUCF)	12,852.98	12,632.56	10,585.29	9,125.30	8591.6

5.2. Methodology used for the presented GHG emission projections

5.2.1. Energy sector (excluding transport)

Two projections scenarios of GHG emissions have been calculated for the period 2021–2050. The reference year 2020 used in projections is consistent with Estonia’s 2022 submission to the UNFCCC on 15th of April 2022 (National Greenhouse Gas Inventory Report 1990–2020, 2022). The ‘With Existing Measures’ (WEM) scenario evaluates future GHG trends under current policies and measures. In the second scenario a number of additional measures and their impact are taken into consideration, forming the basis of the ‘With Additional Measures’ (WAM) scenario.

The scenarios projecting GHG emissions in the Energy sector are mainly based on the measures of the Ministry of the Environment and Ministry of Economic Affairs and Communications, which are funded through the Recovery and Resilience Facility, Environmental Investment Centre and the State Shared Service Center. In addition, the scenarios were updated based on the input received from the Ministry of Economic Affairs and Communication, the Ministry of Environment and input from the meeting points of the Government´s Climate and Energy Committee (2020).

The Balmorel model was used for the electricity generation projections in the Electricity generation sector. It is a model for analysing the Electricity and Combined heat and power sectors from an international perspective while minimising the total costs of the system. The Balmorel model combines the approach of bottom-up modelling in a classic technical modelling tradition with top-down economic analysis, projections and forecasts. Some of the key strengths of the Balmorel model include the flexible handling of the time and space dimensions and the combination of operation and investment optimisation. The existing functionality and structural suitability for extensions make it a useful tool for assessing challenges in the ongoing energy transitions. However, the downsides of the Balmorel model are complex user interface, the speed of the model and adding additional sectors to make the energy model more complete. The Balmorel model can differentiate, for example, the fuel consumption between the electricity and heat production, which is useful on order to avoid double counting. Furthermore, the Balmorel model makes estimated projections for both heat and power, to what extent it is reasonable to use a type of fuel (like biomass) to meet energy demand.

The main assumption for the projection was that step-by-step, the use of oil shale shall decrease for the production of electricity and increase for the production of shale oil. The retort gas that occurs as a side product during the production of shale oil is used for electricity production. The projected future usage of fuel based on the model was applied while using the emission calculations of the 2006 IPCC Guidelines.

The projections for heat generation in the Public heat and electricity generation sector are primarily based on the reconstruction rate of the Shared Service Center, Analysis of the opportunities to increase climate ambition in Estonia measuresand Long-term strategy (SEI-Tallinn, 2019) for building reconstruction scenarios (TalTech, 2020). The projections in the heat production are based on measures funded through the Environmental Investment Centre and measures highlighted in the Analysis of the opportunities to increase the climate ambitions in Estonia.

The projections of the GHG emissions of shale oil production in the Manufacturing of solid fuels and other energy industries were calculated based on input from the industry. The amounts of oil shale used and the construction of a new shale oil production plant were used for the GHG projections.

The GHG projections in the Manufacturing industries and construction sector and in Other sectors are also based on historical trends, long term real GDP growth rate (the Ministry of Finance), Shared Service Center measures and Long-term strategy for building reconstruction scenarios (TalTech, 2020). The emissions are calculated based on the methodology of the 2006 IPCC and EMEP/EEA 2019 Guidebook.

5.2.2. Transport sector

Two projections scenarios of GHG emissions have been calculated for the period 2021–2050. The reference year 2020 used in projections is consistent with Estonia's 2022 submission to the UNFCCC on 15th of April 2022 (National Greenhouse Gas Inventory Report 1990–2020, 2022). The 'With Existing Measures' (WEM) scenario evaluates future GHG trends under current policies and measures. In the second scenario a number of additional measures and their impact are taken into consideration forming the basis of the 'With Additional Measures' (WAM) scenario.

Sybil baseline model was used for the GHG projections in the road transport sector. The model uses a bottom-up approach requiring data about the vehicle fleet, technology (EURO class) and road activity. The biggest strength of the model is compatibility with COPERT, which is used for the compilation of road transport in the national inventory report and kept up to date by EMISIA, the same team as for COPERT. On the other hand, its weakness is the high time consumption of calculating the effect of each individual measure. For that reason, it is easier to calculate separately the effects of the measure and insert the sum effect into the model.

The projections in the Transport sector are based on the information from the ITF report "The Future of Passenger Mobility and Goods", the TalTech report "Traffic survey manual and the business as usual forecast", the Ministry of Economic Affairs and Communication, the Ministry of Environment and input from the meeting points of the Government´s Climate and Energy Committee (2020). To estimate GHG emissions emission factor data from the 2006 IPCC and EMEP/EEA 2019 Guidebook along with country-specific emission factors were used.

The projections for the WEM scenario are also in line with Regulation (EC) No 2019/631 of the European Parliament and of the Council. In addition, it is also taken to account that by 2035, the average emissions target for a new passenger car is 0 gCO_2/km and 130 gCO_2/km for light duty vehicles

5.2.3. IPPU sector

Two projection scenarios for GHG emissions have been calculated for the period 2021–2050. The reference year 2020 used in projections is consistent with Estonia's 2022 submission to the UNFCCC on 15th of April 2022 (National Greenhouse Gas Inventory Report 1990–2020, 2022). Emissions from the IPPU sector are projected according to the 'With Existing Measures' (WEM) scenario, which evaluates future GHG trends under current policies and measures and the 'With Additional Measures' (WAM) scenario, whereby WAM only affects the emission from urea-based catalysts for motor vehicles.

The Estonian industry sector is relatively small. The majority of emissions from subcategories, such as the Mineral industry, Non-energy products from fuels and solvents, and Other product manufacture, as well as their respective subcategories, comprise emissions from the activity of only a few companies who also influence the emissions' trend. In most subsectors bottom-up data gathering, companies' production forecasts, population projection (Statistics Estonia), the long-term real GDP growth rate (the Ministry of Finance) and expert judgements are combined and used. This approach ensures the most proximate projections that reflect the actual situation in subcategories with a limited number of emitting agents.

The Mineral industry's projected emissions are based on industries' operator projections taking into account planned production capacities and and/or maximal production capacities according to companies' environmental permits. The Chemical (ammonia) industry is no longer active in Estonia and emissions from that sector are 0. The Metal industry´s projected emissions are based on industries' operator production forecasts. Consumption of lubricants is based on 2014–2021 (as the data for the year 2021 were known while compiling the projections' consumption trend and projection of GDP growth rate and is slightly increasing. Consumption of paraffin waxes (candles and other paraffin waxes) is based on the average consumption of the years 2017–2021 (as the data for the year 2021 were known while compiling the projections) and will decrease compared to 2020 in the years 2021–2022 and then stabilise.

Indirect CO_2 emissions from the Solvent use sector, affected by both GDP growth and population decline, are projected to decrease a little because of decreasing emission factors in the Domestic solvent use and Coating (paint use) categories.

Emissions from urea-based catalyst AdBlue are projected taking into account:

1. broadening of NO_x emission standards to light vehicles (Euro 6 standards);

2. the forecast of the number of vehicles and their average fuel consumption is consistent with the projections of the Transport sector.

Emissions of fluorinated gases are projected according to the GHG inventory's calculation methods. Emissions from each group of HFC-containing equipment are projected separately. Bans and restrictions stipulated in the Regulation (EU) No. 517/2014 and Directive 2006/40/EC were taken into account. Trends in the domestic market of refrigeration and air-conditioning could be seen from the national database for F-gases (according Article 6 paragraph 2 of Regulation (EU) No. 517/2014). Some companies who service large commercial refrigeration systems were interviewed about their intentions towards restrictions of Regulation (EU) No. 517/2014. Trends in the import of pre-charged air conditioning equipment could be seen from import reports of companies.

Emissions were calculated from large and small commercial refrigeration equipment, industrial refrigeration and cooling, stationary air condi¬tioning/cooling, mobile refrigeration, mobile air conditioning, fire protection equipment and foam producing by taking the following bans into account:

1. Bans on placing on the market, e.g.:
    - stationary refrigeration equipment that contains HFCs with GWP of 2500 or more (from 2020);
    - commercial refrigeration equipment (hermetic equipment with HFCs, multipack systems (40 kW or more) with HFCs except multilevel cascade systems partly with HFC-134a (from 2020);
    - single split stationary air conditioners and heat pumps that contain HFCs with GWP of 750 or more (from 2025);
    - fire protection equipment with HFC-23 (additionally, HFC-227ea containing fire protection systems have a sharply decreasing trend);
    - one-component foams that contain HFCs with GWP 150 or higher;
    - ban of the sale of new vehicles with EU-type approval having refrigerant with GWP over 150 in the air conditioner since 01.01.2017 is taken into account (according to the Directive 2006/40/EC);
2. Ban of refilling equipment that contains HFCs with GWP of 2500 or more (from 2020).

It is assumed that an effect of a completed project of the promotion of alternative and low-GWP refrigerants is that the majority of commercial and industrial refrigeration is switching to alternative refrigerants (CO_2 and NH_3 based systems respectively). In categories where the use of banned, high-GWP HFCs was subtracted but there is no information about alternatives, substitutions with lower GWP HFC-s were taken into account.

It was assumed that HFC refrigerants are properly collected from discharged equipment.

Projection of emissions from subsector 2.F.2 Foam blowing agents is based on forecasts of foam producers, real GDP growth rate and population size. Projection of emissions from 2.F.3 Fire protection is based on expert opinion from service companies concerning new equipment and a method of calculating the stock based on the GHG inventory. Projection of emissions from 2.F.4 Aerosols is based on the trend of medical aerosol use in 2014–2020, population size and real GDP growth rate.

SF_6 emissions (from 2.G Other product manufacture and use) are not regulated by the Regulation (EU) No. 517/2014. SF_6 emissions were calculated according to the methods of GHG inventory while taking into account plans on equipment replacement by the electrical network operators in Estonia.

Regarding N_2O – consumption of medical N_2O was provided by wholesalers who explained that sales will decline and consumption of N_2O in aerosols was calculated with the projection of population size and average emissions of N_2O per population in 2020–2021 (as the data for the year 2021 were known while compiling the projections).

5.2.4. Agriculture projections

Two projections scenarios of GHG emissions have been calculated for the period 2021–2050. Reference year 2020 used in projections is consistent with Estonia's 2020 submission to the UNFCCC on 15th of April 2022 (National Greenhouse Gas Inventory Report 1990–2020, 2022). The 'With Existing Measures' (WEM) scenario evaluates future GHG trends under current policies and measures. In the second scenario one additional measure is taken into consideration forming the basis of the 'With Additional Measures' (WAM) scenario.

Estonia's agricultural GHG emissions are projected to increase due to global demand for meat- and dairy products along with suitable climatic conditions favouring cattle production in Estonia to expand. Therefore, the highest impact on CH_4 emissions comes from Enteric fermentation due to the projected increase of domestic livestock. Aricultural soils is the second largest GHG emission source in Estonia, of which emissions are mostly driven by synthetic N-containing fertilisers applied to soils, however also organic soils cultivation, crop production, other organic fertilisers applied to soils, data about mineralisation, and sewage sludge applied to soils are affecting the total projections. Other categories, e.g. Manure management (driven by the livestock numbers), CO_2 emissions from Liming and Urea fertilization do not have a significant impact on the GHG emission trend.

Projections of emissions are calculated based on the 2006 IPCC methodology applied in the Estonian Greenhouse Gas Inventory. The projected numbers of animals, crop productions and the amounts of mineral fertilisers used are based on the results of the Agriculture Projection Model (APM), developed in 2021 by Agricultural Research Centre. This model considers the characteristics common to Estonia and provides opportunities to analyse different policy scenarios and changing market and macroeconomic conditions. All animal numbers from the APM results were rounded to an integer. Also, average sheep, goat and poultry annual numbers were calculated for keeping consistency with the GHG inventory methodology. The quarterly sheep and goat numbers were divided with the last five-year average ratio of sheep and goats used in the inventory. The total number of broilers was projected based on the last five years in the 2022 NIR. The number of other hens and roosters was calculated based on the average ratio of the animal group used in the 2022 NIR. Poultry, layers and other poultry projections are based on the APM result.

Main activity data for calculating CH_4 emissions from Enteric fermentation and CH_4 and N_2O emissions from Manure management are livestock population, distribution of animal waste management systems (AWMS) and milk yield and pregnancy rate for dairy cows. Estonia-specific volatile solids (VS) and N excretion rates (kg/head/year) of dairy cattle have been calculated on the basis of projected milk yields. With the supporting mechanisms of the Common Agricultural Policy (CAP) Strategic Plan 2023-2027, the practise of raising sheep and goats may be presumed to grow moderately. Demand for lamb and goat meat, wool and milk will grow. The number of horses is projected to rise steadily until 2022 and then stay at that level. The population of rabbits is expected to grow steadily until 2031 and then stay at the same level until 2050. The population of fur animals will decrease steadily to zero in 2026, when fur farms will be banned in Estonia. The number of pigs is anticipated to decrease moderately until 2022, then start rising again until 2031 and then remain at that level until 2050. The level of poultry production is expected to fluctuate until 2031 and then remain at that level until 2050. Feed intake parameters and the methane conversion rate are harmonised with the national GHG inventory. Gross energy intake of dairy cows was calculated on the basis of projected milk yields. Average milk yield per cow is projected to increase until 2031. Projected values are in accordance with the projections in GPCP 2050. Fat content in milk (%) for the projected period is assumed to remain at the same level as in 2021 (3.9%) until 2050.

Projected N_2O emissions from the Agricultural soils subsector are based on the amounts of organic and synthetic N-containing fertilisers applied to soil, quantities of harvested crops, carbon stock change in mineral soils, and area of cultivated organic soils. Direct N_2O emissions include emissions from synthetic and organic fertilisers applied to agricultural soils, emissions from animal waste, emissions from crop residues, emissions from the cultivation of organic soils and emissions from mineralisation associated with loss of soil organic matter. Indirect N_2O emissions include emissions from atmospheric deposition and from leaching and run-off. The quantities of sewage sludge and composted organic waste applied to soils are harmonised with the Waste sector projections (see Waste sector GHG projections chapter), data for calculating carbon stock change in mineral soils and organic soils cultivation are provided by the LULUCF sector expert. The use of synthetic fertilisers increased in 2021 compared to 2020. From 2022, it is projected to drop back to around the same level as in 2020 and remain there until 2030, in 2031 it is projected to drop even more and then remain at that level until 2050. Estonia's crop production is projected to decrease in 2021 compared to 2020. From 2022, it is projected to fluctuate steadily until 2031 and then remain at that level until 2050.

The amount of lime applied to soil is calculated using the moving average of the last three years until 2031. Then it will remain at that level until 2050. Therefore, emissions from liming are projected to increase in 2021, then they are projected to decrease slightly and start steadily fluctuating until 2031, from then on they will remain at that year's level.Emissions from the Agriculture sector are projected according to the WEM and WAM scenarios. According to the WAM scenario, the use of low-emission manure storage technologies (storage of liquid manure in tented roof or concrete roof storage facilities, as well as in closed steel or plastic tanks) will increase by 2030 compared to 2020. The WAM scenario uses reduced NH_3 emission amounts from the Estonian Atmospheric pollutant emissions projections until 2050, as input data for GHG projections.

5.2.5. LULUCF sector

LULUCF sector 'With Existing Measures' (WEM) scenario and 'With Additional Measures' (WAM) scenario GHG projections have been calculated for the period from 2021–2050. The reference year 2020 used in projections is consistent with Estonia's 2022 submission to the European Commission on the 15th of March (National Greenhouse Gas Inventory Report 1990–2020, 2022). The WEM scenario evaluates future GHG emission trends under the current policies and measures. In the second scenario one alternative policy direction, uniform final felling, is taken into consideration forming the basis of the WAM scenario. It is based on the draft Forestry Development Plan until 2030.

The LULUCF sector includes emissions and removals of GHGs from Forest land, Cropland, Grassland, Wetlands, Settlements, Other land and Harvested wood products.

The projections of land use categories are based on the following assumptions and planned activities:

- Annual land conversions will generally continue to occur at the same level as the average of 2016–2020, except for the conversions described below;
- Forest land and Cropland total areas will remain equal to the area in 2020, annual land use changes to/from Forest land and Cropland are balanced by the Grassland category;
- Deforestation of 22 000 ha of Forest land due to the restoration of heritage meadows (Grassland category) was divided equally between 2022–2050 (MoE);
- The following changes in land use were expected due to the construction of Rail Baltic (Steiger, 2021) in the period of 2023–2028:
  - FL-SL 722.3 ha
  - CL-SL 157.5 ha
  - GL-SL 29.8 ha
  - WL-SL 38.8 ha
  - OL-SL 1 065 ha

- Deforested area due to the establishment of training grounds for the Defence Forces was assumed to be split in half between categories FL-GL and FL-SL. Total projected deforested areas were:
  - development of the central polygon of Defence Forces – deforested area 4,275 ha (Skepast & Puhkim, 2022) in the period 2022–2031
  - Sirgala training ground – deforested area 1,500 ha (Estonian Centre for Defence Investment), in the period 2023–2028
- Shares of drained organic soils from the total area of organic soils for Forest land remaining forest land and Grassland remaining Grassland were estimated as an average of 2016–2020.

Projected areas of land use categories Table 5.1 and methods described in the NIR 2022 chapter 6 were used for estimating GHG emissions and removals. Additional assumptions for specific categories are stated below.

Future harvesting rates in Estonia depend on adopted and planned policies. WEM projections for Forest land are based on the business as usual scenario and WAM projections on the uniform final felling scenario, both composed by the Estonian Environment Agency. The following assumptions and methods were applied in WEM scenario projections for Forest land category:

- Total final felling volume was expected to be 11.5 mln m^3 year-1, which is the average of years 2017–2021 (NFI, 2021). Felling rates was projected as a ten-year average;
- In modelling the final fellings, actual harvesting distribution between dominant tree species in recent years was used. The calculation of the final felling area is only applied in the case of forest available for wood supply. Strictly protected forests are modelled without fellings;
- Final fellings are projected by dominant tree species and site quality classes depending on the age, diameter and stocking of the stand;
- The improvement of forest growth (site quality class) was only projected in the areas that are regenerating during the period. Site quality class indicates the productivity of the habitat. However, the growing stock of young forests is small, and therefore the effect is insignificant (on average less than 1 mln m^3 additional growing stock by 2050);
- The growing stock volume in Forest land was projected by decade and was obtained by multiplying the area in age class with the average growing stock per hectare in the relevant age class;
- Distribution of forest area by dominant tree species remains the same during the entire period;
- The share of the forest not available for wood supply is 17.5% (NFI, 2021). It is projected to remain at the same level;
- In the case of forest available for wood supply with additional protective measures (excluding water protection forests on banks, 8.5% from total Forest land), half of the uniform final felling coupe intensity was applied;
- Growing stock in Forest land remaining forest land was calculated as the difference between projected total forest land and estimated Land converted to forest land growing stocks;
- Changes in dead wood C stock in Forest land remaining forest land were estimated by multiplying the 5-year average carbon stock change content per hectare by the projected area;

- Non-CO_2 emissions from drained organic forest soils were estimated as the average of the 2016–2020 period.

According to the WAM scenario, the uniform annual final felling area is assumed during the whole rotation period. The final felling volume is expected to be 9.4–9.8 mln m^3 year-1. The distribution of felling areas by dominant tree species is optimal and does not consider the actual harvesting distribution (as in WEM).

Estimations for the HWP pool are based on the projected harvest levels; therefore, both WEM and WAM scenarios have been projected. The fraction of harvest for the HWP commodity production and the share of HWP commodities were assumed to remain at the current level.

For calculating C stock changes in the mineral soils of the Cropland remaining cropland category, it was assumed that the present land use (shares of long-term cultivated, perennial and set-aside areas, as well as the shares of crops with different C inputs) and management practices (shares of areas under full tillage, reduced tillage and no-till) will continue; therefore average mineral soil SOC stock for the period 2016–2020 was used in calculations. Estimated annual SOC change values were smoothed using a moving average in order to reduce inter-annual variations.

The majority of emissions from the Wetlands category derive from the horticultural use of peat. The amount of peat removed for horticultural use is calculated as the difference between total peat production and the primary production of energy peat, and is assumed to be oxidised in the year of extraction. The long-term average total peat extraction was calculated as the average of the 2017–2021 period. The use of energy peat has had a declining trend which was expected to continue, and, after 2035, all extracted peat was projected to be used in horticulture. The area of active and unrestored peat extraction sites will decrease linearly from 25.55 kha in 2020 to 19 kha in the period 2026–2050. Land area by which the area of active extraction sites is smaller than the total peat extraction area as assumed to be rewetted. GHG emissions from rewetted sites were estimated according to the IPCC Wetlands Supplement (IPCC, 2014), Chapter 3. Default emission factors for the temperate zone nutrient-poor sites were applied.

CH_4 and N_2O emissions from wildfires were estimated as the average of the 2016–2020 period. Similarly, reported and projected CH_4 and N_2O emissions from biomass burning in the Grassland remaining grassland category also include emissions from Land converted to grassland and Wetlands categories. GHG emissions from wildfires were not estimated for Croplands and Settlements as they were considered insignificant in terms of the overall level and trend in national emission.

5.2.6. Waste sector

Waste sector 'With Existing Measures' (WEM) scenario GHG projections have been calculated for the period of 2020–2050. The reference year 2020 used in projections is consistent with Estonia's 2022 submission to the UNFCCC on 15th of April 2022 (National Greenhouse Gas Inventory Report 1990–2020, 2022). The WEM scenario evaluates future GHG emission trends under the current policies and measures.

GHG emissions emitted from the Waste sector include CO_2, CH_4 and N_2O. CO_2 is emitted from the Waste incineration category. The main share of CH_4 from the Waste sector comes from Solid waste disposal on land. CH_4 and N_2O emitted from Wastewater treatment and discharge, Biological treatment and Waste incineration.

CH_4 emission projections in the Solid waste disposal on land (SWD) subcategory are done using the 2006 IPCC Waste Model, which has been developed by the IPCC for estimating CH_4

emissions from solid waste disposal sites, for projections, additional sheets have been interlinked with the existing Waste model template sheets which are easy to adjust the to reflect the country specific needs. Also it is possible to interlink cells making the calculations easy. It is difficult to point out the weakness of the model as the calculations difficulties depend on the adjustments and activity data. In the IPCC 2006 Waste Model, synergies of waste decomposition over time period is taken into account in the calculation. There are no overlaps, because the input data is clearly divided to different waste groups.

The MSW generation projections take into account population projection (Statistics Estonia) and the long-term real GDP growth rate (the Ministry of Finance). The composition and the amount of generated MSW is taking into account, that from 2035 at least 65% of the municipal waste shall be prepared for re-use and recycled. In addition, starting from 2030 it is prohibited to deposit waste suitable for recycling or other recovery, in particular municipal waste. Also, from 2030 the quantity of municipal waste deposited in a landfill shall not exceed 10 % by weight of the total quantity of municipal waste generated in the same year. For textile waste, local governments will start separate collection of textile waste no later than 2025 and implement separate collection or recycling at source no later than 2023, which decrease the amount of degradable waste at landfills. Projections also take into account the amount of waste incinerated MSW in Iru CHP plant (emissions from this activity is included in the Energy sector projections).

Mixed Municipal Solid Waste Composition Study carried out in 2020 (SEI-Tallinn, 2020) was used for a MSW composition projection. Real GDP growth rate was also used for projecting industrial waste generation.

Projections in the subcategory Biological treatment of solid waste are based on the long-term real GDP growth rate (the Ministry of Finance) applied to the previous year’s biologically treated solid waste amount. While calculating, it is considered, that more biological waste is separated from the municipal solid waste and that there will be additional biodegradable waste from industrial sources (calculated under Solid waste disposal subcategory).

Only a small amount of waste gets incinerated without energy recovery. Projections in the subcategory Waste incineration and open burning were done using the assumptions of no open burning taking place after 2030 and that a small amount of waste will be incinerated without energy recovery (for burning contraband, utilising hazardous waste, etc.). Open burning of municipal solid waste is prohibited, nevertheless an expert judgment is used to evaluate the amount of waste that might be open-burned based on the amount MSW generated. The MSW generation is in accordance with the subsector Solid waste disposal on land. Activity data about generated MSW is projected under the SWD subcategory.

Projections of GHG emissions in Wastewater treatment and discharge subcategory account for population projection (Statistics Estonia) and an expert judgement given by the MoE on the usage of different wastewater treatment types and the coverage of centralised wastewater system. Different wastewater treatment systems are covering both high and low density settlements. GHG emissions from Industrial wastewater was conducted using stable production throughout the time series of 2021–2050.

5.3. Key assumptions used in the projections

The key underlying assumptions used in the projections are presented in Table 5.8 and Table 5.9.

Table 5.8 Key assumptions used in WEM projections

PARAMETER USED ('WITH EXISTING MEASURES' SCENARIO)		UNIT	2000	2005	2010	2015	2020	2025	2030	2035	2040	2050
General parameters and variables												
Population		Count	1,401,250	1,358,850	1,333,290	1,313,271	1,328,889	1 ,320 ,618	1,313,906	1,304,849	1,296,836	1,278,110
Gross domestic product (GDP)	Real growth rate	%	10.1	9.5	2.4	1.9	-0.6	2.5	1.6	1.5	1.4	1.3
	Constant prices	EUR million (2015)	12,541	17,866	17,504	20,631	24,107	27,926	30,512	33,056	35,459	40,558
International (wholesale) fuel import prices -	Coal	EUR(2020) /GJ					1.6	3.1	3.1	3.1	3.3	3.7
	Crude Oil	EUR(2020)/GJ					6.4	15.4	15.4	15.4	16.3	19.7
	Natural gas	EUR(2020)/GJ					3.1	13.2	11.3	11.3	11.3	11.8
EU ETS carbon price		EUR (2020)/ EUA					24	80	80	120	250	410
Energy supply												
Gross inland consumption by fuel type source (total)	Solid fossil fuels	TJ	124,991	140,906	173,066	162,508	118,198	127,107	111,209	102,893	102,630	-
	Crude oil and petroleum products	TJ	36,817	42,926	41,063	42,734	39,529	39,288	36,345	29,879	22,951	15,341
	Natural gas	TJ	23,923	28,833	24,032	16,559	14,649	12,955	12,017	11,859	10,795	10,951
	Renewables	TJ	21,472	24,692	36,066	38,093	54,267	52,370	67,499	76,557	74,086	74,489
	Other	TJ	3,383	3,494	4,263	5,192	4,432	4,272	3,420	3,087	3,316	2,620
Energy consumption												
Final energy consumption	Total	TJ	58,857	71,158	71,513	71,940	69,565	70,488	68,775	64,318	60,917	58,070
Final energy consumption split	Solids	TJ	4,267	3,970	3,226	1,282	350					
	Oil	TJ	28,803	36,403	35,316	39,376	37,341	38,287	35,358	28,910	22,109	14,500
	Gas	TJ	7,422	11,022	8,670	9,312	9,976	9,894	9,738	9,831	9,908	10,064
	Electricity	TJ					52	578	681	2,199	4,934	9,076
	Renewable energy	TJ	17,788	18,778	23,675	20,520	21,007	20,174	21,444	21,822	22,411	22,876
	Other	TJ	577	984	627	1,450	840	1,555	1,555	1,555	1,555	1,555
Industry	*Total*	TJ	15,475	19,835	15,401	13,957	9,409	10,485	10,791	11,175	11,524	12,227
Industry split	*Solids*	TJ	3,253	2,884	2,927	1,174	260					
	Oil	TJ	3,714	3,751	2,547	2,896	2,699	2,907	3,040	3,164	3,278	3,506
	Gas	TJ	5,099	6,934	4,783	3,948	3,962	4,247	4,340	4,523	4,690	5,025
	Renewable energy	TJ	3,318	5,509	4,678	4,626	1,648	1,775	1,856	1,932	2,001	2,141
	Other	TJ	91	758	467	1,313	840	1,555	1,555	1,555	1,555	1,555
Residential	*Total*	TJ	17,911	15,749	20,903	17,980	19,426	19,337	19,259	19,259	19,259	19,259
Residential split	*Solids*	TJ	800	788	217	109	40					
	Oil	TJ	1,013	544	515	568	434	387	385	347	308	193
	Gas	TJ	1,769	1,883	2,299	2,065	2,352	2,224	2,119	2,022	1,926	1,733
	Renewable energy	TJ	13,888	12,342	17,728	15,133	16,600	16,726	16,756	16,890	17,025	17,333
	Other	TJ	442	192	144	106						
Tertiary	*Total*	TJ	3,247	4,804	3,333	4,836	4,893	4,862	4,860	4,860	4,860	4,860
Tertiary split	*Solids*	TJ	187	272	81		43					
	Oil	TJ	2,203	1,851	1,224	1,392	1,059	827	535	292		
	Gas	TJ	446	1,936	1,245	2,930	3,147	3,112	3,110	3,110	3,110	3,110
	Renewable energy		366	711	767	484	643	924	1,215	1,458	1,750	1,750
	Other	TJ	45	35	16	30						
Agriculture/ Forestry	Total	TJ	1,573	3,470	3,244	4,747	4,071	4,380	4,579	4,767	4,938	5,282
Agriculture/ Forestry split	Solids	TJ	27	27			6					
	Oil	TJ	1,223	2,963	2,720	4,324	3,715	4,002	4,184	4,356	4,512	4,827
	Gas	TJ	107	270	342	253	150	162	169	176	182	195
	Renewable energy	TJ	216	210	182	170	201	216	226	235	244	260
Transport	Total	TJ	20,650	27,300	28,632	30,419	31,766	31,425	29,286	24,257	20,337	16,441
Transport split	*Oil*	TJ	20,650	27,294	28,310	30,196	29,434	30,164	27,214	20,752	14,012	5,974
	Gas	TJ			2	116	364	150				
	Electricity	TJ					52	578	681	2,199	4,934	9,076
	Renewable energy	TJ		7	320	107	1,916	533	1,392	1,306	1,392	1,392
Agriculture												
Livestock	Dairy cattle	1000 heads	131	112.8	96.5	90.6	84.3	84.2	87.9	88.8	88.8	88.8
	Non-dairy cattle	1000 heads	121.8	136.7	139.8	165.6	169	172.7	189.7	194.4	194.4	194.4
	Sheep	1000 heads	33.3	55.5	95.8	88.1	75.3	96.8	113.6	116.3	116.3	116.3
	Pigs	1000 heads	300.2	346.5	371.7	304.5	316.8	299.4	304.3	303.9	303.9	303.9
	Poultry	1000 heads	2,366.4	1,878.7	2,046.4	2,161.8	2,148.8	2,164.1	2,141.7	2,131.7	2,131.7	2,131.7
Nitrogen input from application of synthetic fertilisers		kt nitrogen	22.4	20.08	28.63	36.28	41.49	41.83	42.06	38.42	38.42	38.42
Nitrogen input from application of manure		kt nitrogen	12,132	13 ,604	15,297	16,290	17,016	17,534	18,930	19,319	19,413	19,619
Nitrogen in crop residues returned to soils		kt nitrogen	16,086	18 ,802	17,932	29,146	33,497	28,884	30,216	30,520	30,520	30,520
Area of cultivated organic soils		1000 hectares	27.8	27.3	26.88	27.62	27.75	27.75	27.75	27.75	27.75	27.75
The share of lagoons with natural crust from cattle´s liquid manure storages		%					62.2	62.2	62.2	62.2	62.2	62.2
The share of ring storage tanks with natural crust from cattle´s liquid manure storages		%					37.2	37.2	37.2	37.2	37.2	37.2
The share of closed storage tanks from cattle´s liquid manure storages		%					0.6	0.6	0.6	0.6	0.6	0.6
The share of lagoons with floating cover from swine´s liquid manure storages		%					19.2	19.2	19.2	19.2	19.2	19.2
The share of ring storage tanks with floating cover from swine´s liquid manure storages		%					77.9	77.9	77.9	77.9	77.9	77.9
The share of closed storage tanks from swine´s liquid manure storages		%					2.9	2.9	2.9	2.9	2.9	2.9
Waste												
Municipal solid waste (MSW) generation (including biodegradable industrial waste)		t	1,416,442	2,302,511	1,322,199	924,058	615,056	601,502	576,652	556,598	540,281	525,096
Municipal solid waste (MSW) going to landfills (including biodegradable industrial waste)		kt	440,811	377,805	237,639	31,243	65,130	13,327	14,570	15,766	16,893	18,061

PARAMETER USED (‘WITH EXISTING MEASURES’ SCENARIO)		UNIT	2000	2005	2010	2015	2020	2025	2030	2035	2040	2050
Fraction of recovered methane		%	8	16	10	21	16	17	23	30	36	49
Biodegradable waste composted		tonnes / dry matter	3,042	37,431	78,001	77,254	181,994	284,047	328,018	347,220	365,360	403,857
Amount of municipal solid waste open burned		%	2.0	1.0	1.0	0.5	0.5	0.25	0	0	0	0
LULUCF												
Forest land remaining forest land	Mineral soils	1000 hectares	1,785.03	1,781.18	1,774.57	1,788.91	1,811.32	1,822.72	1,829.14	1,832.58	1,831.04	1,835.07
Forest land remaining forest land	Organic soils	1000 hectares	572.91	572.45	570.59	571.28	573.17	574.61	575.86	577.43	577.65	579.25
Cropland converted to forest land	Mineral soils	1000 hectares	24.49	32.02	35.82	28.65	14.05	6.85	3.03	1.36	1.36	1.36
Grassland converted to forest land	Mineral soils	1000 hectares	17.17	24.05	32.55	31.99	27.21	27.30	26.04	24.59	26.10	22.06
Grassland converted to forest land	Organic soils	1000 hectares	1.13	1.54	2.00	2.81	2.49	2.92	3.43	2.48	2.26	0.66
Wetlands converted to forest land	Mineral soils	1000 hectares	NO	NO	NO	0.14	0.18	0.24	0.31	0.24	0.27	0.27
Wetlands converted to forest land	Organic soils	1000 hectares	2.85	5.53	7.84	8.22	7.38	5.63	4.21	3.76	3.76	3.76
Settlements converted to forest land	Mineral soils	1000 hectares	4.01	5.51	5.71	4.20	2.44	1.05	0.61	0.47	0.47	0.47
Settlements converted to forest land	Organic soils	1000 hectares	0.69	0.82	1.11	0.80	0.63	0.50	0.17	NO	NO	NO
Other land converted to forest land	Mineral soils	1000 hectares	6.47	9.60	10.53	8.23	4.68	1.70	0.74	0.63	0.63	0.63
Cropland remaining cropland	Mineral soils	1000 hectares	978.69	960.59	944.99	937.48	934.51	933.20	938.96	942.95	946.18	946.29
Cropland remaining cropland	Organic soils	1000 hectares	27.56	27.09	26.13	26.03	26.16	26.14	26.66	27.58	27.71	27.75
Forest land converted to cropland	Mineral soils	1000 hectares	NO	NO	0.36	1.09	1.70	1.70	1.34	0.61	NO	NO
Grassland converted to cropland	Mineral soils	1000 hectares	1.64	1.64	9.98	16.13	21.64	22.95	17.55	14.29	11.67	11.55
Grassland converted to cropland	Organic soils	1000 hectares	NO	NO	0.54	1.46	1.60	1.61	1.09	0.17	0.04	NO
Grassland remaining grassland	Mineral soils	1000 hectares	222.44	212.93	192.30	185.17	192.95	193.43	191.95	186.17	178.93	169.61
Grassland remaining grassland	Organic soils	1000 hectares	52.06	51.57	50.40	49.78	50.73	50.40	50.21	50.21	50.36	51.74
Forest land converted to grassland	Mineral soils	1000 hectares	3.42	5.12	6.52	6.50	5.28	7.17	10.05	12.50	14.30	12.74
Forest land converted to grassland	Organic soils	1000 hectares	0.21	0.21	0.21	0.19	0.22	0.85	1.60	1.95	2.16	1.48
Cropland converted to grassland	Mineral soils	1000 hectares	21.49	30.79	39.10	35.81	21.72	13.49	6.18	4.30	4.30	4.30
Cropland converted to grassland	Organic soils	1000 hectares	2.42	2.85	3.63	2.32	1.47	1.04	0.18	NO	NO	NO
Wetlands converted to grassland	Mineral soils	1000 hectares	0.00	0.00	0.00	0.17	0.17	0.17	0.17	NO	NO	NO
Wetlands converted to grassland	Organic soils	1000 hectares	0.54	0.63	0.63	0.57	0.24	0.28	0.40	0.50	0.50	0.50
Settlements converted to grassland	Mineral soils	1000 hectares	1.06	1.50	1.71	1.51	0.69	0.25	NO	NO	NO	NO
Other land converted to grassland	Mineral soils	1000 hectares	NO	0.30	1.04	1.24	1.24	0.94	0.20	NO	NO	NO
Peat extraction remaining peat extraction	Active and abandoned unreclaimed sites	1000 hectares	24.71	23.74	23.37	24.28	25.02	20.22	19.00	19.00	19.00	19.00
Peat extraction remaining peat extraction	Rewetted sites	1000 hectares	NO	NO	NO	NO	NO	5.64	7.16	7.47	7.78	8.39
Forest land converted to peat extraction		1000 hectares	NO	NO	1.41	0.56	NO	NO	NO	NO	NO	NO
Wetlands converted to peat extraction		1000 hectares	0.17	NO	NO	0.25	0.53	0.38	0.38	0.38	0.38	0.38
Forest land converted to other wetlands	Mineral soils	1000 hectares	NO	NO	NO	0.28	0.56	0.56	0.56	0.29	NO	NO
Forest land converted to other wetlands	Organic soils	1000 hectares	0.17	0.21	0.41	0.62	0.82	1.11	1.20	1.20	1.34	1.34
Cropland converted to other wetlands	Mineral soils	1000 hectares	NO	NO	NO	0.02	0.10	0.10	0.10	0.08	NO	NO
Grassland converted to other wetlands	Organic soils	1000 hectares	0.20	0.28	0.48	0.48	0.41	0.32	0.12	NO	NO	NO
Settlements converted to other wetlands	Organic soils	1000 hectares	NO	0.21	1.20	1.45	1.45	1.24	0.25	NO	NO	NO
Forest land converted to settlements	Mineral soils	1000 hectares	0.07	2.05	5.89	11.58	15.25	16.67	15.66	13.25	11.85	9.38
Forest land converted to settlements	Organic soils	1000 hectares	NO	0.42	0.68	1.02	1.41	1.41	1.79	2.33	2.53	2.52
Cropland converted to settlements	Mineral soils	1000 hectares	0.41	1.59	3.85	6.80	7.75	7.97	6.67	5.52	5.52	5.40
Cropland converted to settlements	Organic soils	1000 hectares	0.00	0.03	0.13	0.13	0.13	0.13	0.12	0.04	0.04	NO
Grassland converted to settlements	Mineral soils	1000 hectares	0.60	1.55	4.07	5.24	6.36	6.75	5.11	5.34	5.34	5.32
Wetlands converted to settlements	Mineral soils	1000 hectares	NO	NO	NO	NO	0.03	0.03	0.05	0.08	0.10	0.10
Wetlands converted to settlements	Organic soils	1000 hectares	NO	NO	NO	NO	0.12	0.27	0.41	0.53	0.53	0.50
Other land converted to settlements	Mineral soils	1000 hectares	0.21	0.42	0.75	0.67	0.69	0.69	0.54	0.23	0.15	0.15
Forest land converted to other land	Mineral soils	1000 hectares	NO	0.17	1.96	2.17	3.05	3.55	2.43	2.89	2.68	2.68
Cropland converted to other land	Mineral soils	1000 hectares	NO	0.08	0.42	0.45	0.57	0.61	0.40	0.50	0.50	0.50
Grassland converted to other land	Mineral soils	1000 hectares	NO	0.04	0.26	0.26	0.26	0.21	NO	NO	NO	NO
Wetlands converted to other land	Mineral soils	1000 hectares	NO	NO	0.12	0.12	0.12	0.12	NO	NO	NO	NO
Forest not available for wood supply and forest available for wood supply with additional protective measures (excluding water protection forests on banks)		%						26	26	26	26	26
Felling volume		million m^3	10.6	8.0	8.2	10.1	10.6	11.5	11.5	11.5	11.5	11.5
Share of drained organic soils	Forest land remaining forest land	%	47.8	47.9	48.0	48.1	48.3	48.2	48.2	48.2	48.2	48.2
Share of drained organic soils	Grassland remaining grassland	%	14.9	14.3	14.1	15.2	16.6	16.6	16.6	16.6	16.6	16.6
Average SOC stock	Cropland remaining cropland	t C/ha	74.04	75.52	75.81	75.66	75.63	75.69	75.69	75.69	75.69	75.69
Production of horticultural peat		1000 tonnes	406.70	695.60	562.50	598.20	644.10	783.60	797.64	811.26	811.26	811.26
Index of produced sawnwood volume to felling volume		Index						0.2252	0.2252	0.2252	0.2252	0.2252
Index of produced wood–based panels volume to felling volume		Index						0.0635	0.0635	0.0635	0.0635	0.0635
Index of produced paper and paperboard volume to felling volume		Index						0.0097	0.0097	0.0097	0.0097	0.0097
Index of produced semi-chemical wood pulp volume to felling volume		Index						0.0216	0.0216	0.0216	0.0216	0.0216
Other parameters and variables												
Enefit280 oil shale plants		Count	0	0	0	1	1	2	2	2	2	2
Petroter oil shale plants		Count	0	0	1	3	3	3	3	3	3	3

Table 5.9 Additional key parameters used in WAM projections

PARAMETER USED ('WITH ADDITIONAL MEASURES' SCENARIO)		unit	2020	2025	2030	2035	2040	2050
Energy supply								
Gross inland consumption by fuel type source (total)	Solid fossil fuels	TJ	118,198	127,054	111,134	102,753	102,444	0
	Crude oil and petroleum products	TJ	39,529	39,003	35,360	28,784	21,966	14,494
	Natural gas	TJ	14,649	12,760	11,517	10,922	9,699	9,278
	Renewables	TJ	54,267	51,552	65,092	71,704	66,672	62,944
	Other	TJ	4,432	4,211	3,289	2,891	3,055	2,268
Energy consumption								
Final energy consumption	Total	TJ	69,565	70,032	67,160	61,664	57,016	51,655
Final energy consumption split	Solids	TJ	350					
	Oil	TJ	37,341	37,668	34,476	27,995	21,327	13,920
	Gas	TJ	9,976	9,805	9,459	9,266	9,030	8,684
	Electricity	TJ	52	945	659	2,156	4,829	8,861
	Renewable energy	TJ	21,007	20,060	21,011	20,692	20,275	18,634
	Other	TJ	840	1,555	1,555	1,555	1,555	1,555
Industry	*Total*	TJ	9,409	10,485	10,791	11,175	11,524	12,227
Industry split	*Solids*	TJ	260					
	Oil	TJ	2,699	2,907	3,040	3,164	3,278	3,506
	Gas	TJ	3,962	4,247	4,340	4,523	4,690	5,025
	Renewable energy	TJ	1,648	1,775	1,856	1,932	2,001	2,141
	Other	TJ	840	1,555	1,555	1,555	1,555	1,555
Residential	*Total*	TJ	19,426	19,231	18,868	18,214	17,275	15,179
Residential split	*Solids*	TJ	40					
	Oil	TJ	434	385	377	328	276	152
	Gas	TJ	2,352	2,212	2,075	1,912	1,728	1,366
	Renewable energy	TJ	16,600	16,635	16,415	15,974	15,271	13,661
Tertiary	*Total*	TJ	4,893	4,742	4,492	4,148	3,798	3,278
Tertiary split	*Solids*	TJ	43					
	Oil	TJ	1,059	806	494	249		
	Gas	TJ	3,147	3,035	2,875	2,655	2,431	2,098
	Renewable energy		643	901	1,123	1,245	1,367	1,180
Agriculture/ Forestry	Total	TJ	4,071	4,380	4,579	4,767	4,938	5,282
Agriculture/ Forestry split	Solids	TJ	6					
	Oil	TJ	3,715	4,002	4,184	4,356	4,512	4,827
	Gas	TJ	150	162	169	176	182	195
	Renewable energy	TJ	201	216	226	235	244	260
Transport	Total	TJ	31,766	31,195	28,431	23,360	19,481	15,688
Transport split	*Oil*	TJ	29,434	29,567	26,381	19,898	13,261	5,435
	Gas	TJ	364	150				
	Electricity	TJ	52	945	659	2,156	4,829	8,861
	Renewable energy	TJ	1,916	533	1,392	1,306	1,392	1,392
Agriculture								
The share of lagoons with natural crust from cattle´s liquid manure storages		%	62.2	61.0	59.0	59.0	59.0	59.0
The share of ring storage tanks with natural crust from cattle´s liquid manure storages		%	37.2	38.0	39.0	39.0	39.0	39.0
The share of closed storage tanks from cattle´s liquid manure storages		%	0.6	1.0	2.0	2.0	2.0	2.0
The share of lagoons with floating cover from swine´s liquid manure storages		%	19.2	15.0	12.0	12.0	12.0	12.0
The share of ring storage tanks with floating cover from swine´s liquid manure storages		%	77.9	81.5	83.0	83.0	83.0	83.0
The share of closed storage tanks from swine´s liquid manure storages		%	2.9	3.5	5.0	5.0	5.0	5.0
LULUCF								
Felling volume		million m^3	10.6	9.7	9.7	9.8	9.8	9.4

6. PROVISION OF FINANCIAL, TECHNOLOGICAL AND CAPACITY BUILDING SUPPORT TO DEVELOPING COUNTRIES

Estonia is not one of the Parties listed in Annex II to the Climate Convention; consequently, Estonia is not obliged to fulfil the commitments under Articles 4.3, 4.4 and 4.5 of the Convention. Despite this, Estonia has contributed to climate finance voluntarily.

The Government of Estonia is committed to fighting against global climate change, focusing especially on the situation in countries which are most affected by climate change, such as the Least Developed Countries and the Small Island Developing States.

Estonia recognises that the need for financing to reach the climate policy objectives is one of many important elements that need to be tackled continuously. Both public and private funding should support investments into programmes and policies aimed at reducing emissions and increasing resilience to climate change.

As stipulated by the Government of the Republic Act (Government of the Republic Act, 1995), the Ministry of Foreign Affairs (MFA) is responsible for administration of the provision of international development assistance. As a result of the development cooperation reform in 2021, the implementation and administration of development cooperation projects was transferred to the Estonian Centre for International Development on 1 January 2022, while the Ministry of Foreign Affairs continues to be responsible for planning the foreign policy for development cooperation (Terms and conditions of and procedure for the provision of development and humanitarian aid, 2021; MFA, 2022).

Estonia's foreign policy goal in development cooperation and humanitarian aid is to contribute to global security and sustainable development, in accordance with globally agreed Sustainable Development Goals and the priorities of the international partnership of the European Union (MFA, 2022). To achieve the Sustainable Development Goals, the sustainable use of the environment and natural resources is indispensable. Therefore, green transformation is one of the horizontal priorities of the development cooperation (MFA, 2022) to contribute to achieving Sustainable Development Goal 13 – Take urgent action to combat climate change and its impacts (UN General Assembly, 2015) that suggests strengthening resilience and adaptive capacity to climate-related hazards and natural disasters in all countries, integrating climate change measures into national strategies, improving awareness of climate change mitigation and adaptation, increasing relevant institutional capacity and support, and, above all, taking action in the Least Developed Countries by increasing climate change capacity. Cooperation on climate action is designed and implemented in cooperation with other relevant institutions, including the Ministry of the Environment (MoE) and others.

Estonia aims to develop environmentally sustainable solutions in partner countries as well as at the global level, through research and innovation projects which address energy issues (storage, efficiency) but also environmental awareness and forest management. In addition, Estonia's development cooperation addresses digitalisation issues which will also enable the partner countries to better address climate challenges. Estonia's development policy supports low-carbon and sustainable development.

Continuous efforts should be made to find more synergy with investments made in sectors with a high impact on climate change, such as energy, transport, and housing.

Estonia has decided to proceed with funding the needs of developing countries when supporting climate action and wants to continue with this principle in the future as well. Estonia aims to support all actions related to climate change mitigation and adaptation in developing countries, for example by supporting the development of renewable energy sources, energy- and resource-efficiency projects in the transport sector and industry, as well as by strengthening administrative capacity regarding climate action or supporting solutions climate change adaptation.

During the reporting period for the National Communication, in 2018 the MoE adopted a regulation (Terms and conditions of and procedure for providing support for achieving climate policy goals in developing countries, 2019) aiming to support developing country cooperation and stipulating specific rules for international climate cooperation. This regulation was developed in cooperation with various ministries to ensure that the use of resources will be conducted in a coordinated manner. Support will be provided in two ways: firstly, through international cooperation, and, secondly, through open project calls. The main aim of the regulation is to support both mitigation- and adaptation-related actions in developing countries through annual project calls. The regulation does not stipulate any preferences between adaptation and mitigation projects, but instead the needs of the destination country will be considered when choosing the projects for financing. For example, the needs of destination countries are identified from the countries of destination NDCs (Nationally Determined Contributions). During project evaluation, the description of the situation in the country of destination is reviewed, and the suitability of the project in the country of destination and compliance with the needs in the country of destination are assessed.

Gender equality is an important element when evaluating the project applications; there is a requirement in the evaluation of open round projects that no project should undermine gender equality.

Further information on provision of financial, technological and capacity building support to developing countries can be found in Estonia’s VIII National Communication Chapter 7.

REFERENCES

Chapter 2

Estonian University of Life Sciences. (2011). Maaelu arengu aruanne 2011 (in Estonian). [www] https://eesti2030.files.wordpress.com/2012/01/maaelu_arengu_aruanne_2011final.pdf (15.11.2022).

Laansalu, A. (2002). (14.10.2002). Crisis in agriculture in the 1990s. [www] http://www.estonica.org/en/The_rural_economy_in_Estonia_until_2001/Crisis_in_agriculture_in_the_1990s/ (15.11.2022).

National Greenhouse Gas Inventory Report 1990-2020. (2022). Contracting entity: The Ministry of the Environment. [www] https://unfccc.int/documents/461808 (15.11.22).

UNFCCC. (2022). National Inventory Submissions 2022. Estonia – Lastest submitted CRF. [www] https://unfccc.int/ghg-inventories-annex-i-parties/2022?gclid=Cj0KCQiA4uCcBhDdARIsAH5jyUmEgttdIQB6v6lg2EUhzYFKIRffIrur7VAO59eR_btV5x28W-0v4Y0aAgo9EALw_wcB (14.12.2022).

OECD (2017), OECD Environmental Performance Reviews: Estonia 2017, OECD Environmental Performance Reviews, OECD Publishing, Paris. [www] https://doi.org/10.1787/9789264268241-en (20.12.22)

Chapter 3

European Parliament and Council. (2019). Regulation (EU) No 525/2013. [www]

https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0525&from=EN (20.12.22)

European Commission. (2022). [www] https://ec.europa.eu/clima/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_en (20.12.22)

Commission Decision (EU) 2017/1471 of 10 August 2017 amending Decision 2013/162/EU to revise Member States' annual emission allocations for the period from 2017 to 2020. (2017). [www] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017D1471&from=EN (20.12.22)

Chapter 4

Estonia 2035 Action Plan. (approved by Government 28.04.2022). [www] https://valitsus.ee/en/media/4941/download (7.12.2022).

Estonian Tax and Customs Board (ETCB). (2022). Excise tax on fuels and electricity. [www] https://www.emta.ee/ariklient/ maksud-ja-tasumine/aktsiisid/kutus-ja-elektrienergia#aktsiisimaarad (7.12.2022).

European Union. (2014). Biennial report 1. [www] https://unfccc.int/documents/198954 (7.12.2022).

European Union. (2015). Biennial report 2. [www] https://unfccc.int/documents/198913 (7.12.2022).

European Union. (2017). Biennial report 3. [www] https://unfccc.int/documents/198246 (7.12.2022).

European Union. (2022). National Inventory report (NIR) 1990-2020. [www] https://unfccc.int/documents/461931 (7.12.2022).

MoE. (2016). General Principles of Climate Policy until 2050: Impact assessment. http://www.envir.ee/sites/default/ files/kpp_2050_mojudehindamise_lopparuanne_25.05.pdf (7.12.2022).

MoE. (2017). The Climate Change Adaptation Development Plan until 2030. [www] https://envir.ee/media/912/download (7.12.2022).

MoE. (2021). Kasvuhoonegaaside heidet vähendavate meetmete mõju hindamise raamistik (MHR). [www] https://envir. ee/media/7388/download (20.12.2022).

MoE. (2022a). Environmental Development Plan 2030 (KEVAD). [www] https://envir.ee/kevad (7.12.2022).

Strategy Estonia 2035 (Adopted by the Riigikogu on 12 May 2021). [www] https://valitsus.ee/media/4269/download (7.12.2022).

The Environmental Charges Act. (2006). (RT I, 09.08.2022, 27). [www] https://www.riigiteataja.ee/en/eli/508092022001/ consolide (7.12.2022).

The government of the Republic of Estonia. (2021). The Action Plan for 2021–2023 of the Government. [www] https:// valitsus.ee/media/3803/download (7.12.2022).

Chapter 5

Estonian Environmental Agency. (2022). Estonian Informative Report 2022. [www] https://cdr.eionet.europa.eu/ee/eu/nec_revised/iir/envyjax4g/Estonian_Informative_Inventory_Report_2022_v.1.pdf/manage_document (24.11.2022).

Eurocontrol. (2018). European aviation in 2040 Challenges of growth. [www] Challenges of growth - European aviation in 2040 | EUROCONTROL (24.11.2022).

European Parliament and Council. (2017). Regulation (EU) No 517/2014 [www] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014R0517&from=EN (7.12.2022).

European Parliament and Council. (2018). Regulation No. 2018/1999. [www] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1999&from=EN (24.11. 2022).

European Parliament and Council. (2019). Regulation (EC) No 2019/631. [www] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0631&from=EN (24.11. 2022).

ICCT. (2021). Zero-emission shipping and the Paris Agreement: Why the IMO needs to pick a zero date and set interim targets in its revised GHG strategy. [www] Zero-emission shipping and the Paris Agreement: Why the IMO needs to pick a zero date and set interim targets in its revised GHG strategy - International Council on Clean Transportation (theicct.org) (24.11.2022).

IPCC. (2014). 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands, Hiraishi, T., Krug, T., Tanabe, K., Srivastava, N., Baasansuren, J., Fukuda, M. and Troxler, T.G. (eds). Published: IPCC, Switzerland [www] https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/ (07.11.2022).

MoE. (2022). Estonian Forestry Development Plan until 2030 (draft as of 03.03.2022). [www] https://envir.ee/media/7243/ download (7.12.2022).

National Forest Inventory (NFI) 2021. (2022). Results of the NFI 2020. Environment Agency. (In Estonian) [www] https://keskkonnaagentuur.ee/media/917/download (28.01.2022).

National Greenhouse Gas Inventory Report 1990-2020. (2022). Contracting entity: The Ministry of the Environment. [www] https://unfccc.int/documents/461808 (25.11.22).

SEI-Tallinn. (2020). Segaolmejäätmete, eraldi kogutud paberi- ja pakendijäätmete ning elektroonikaromu koostise ja koguste uuring. (in Estonian). [www] https://envir.ee/media/5318/download (25.11.2022).

Sei-Tallinn. (2019). Analysis of the opportunities to increase climate ambition in Estonia. [www] https://envir.ee/media/1412/download (24.11.2022).

Skepast&Puhkim. (2022). Kaitseväe keskpolügooni eriplaneeringu detailse lahenduse keskkonnamõju strateegiline hindamine. Aruanne [Strategic environmental assessment of the detailed solution of the designated spatial plan of the Central Polygon of the Defence Forces. Report]. [www] kvkp_rep_ksh_aruanne.pdf (kaitseministeerium.ee) (24.11.2022).

Steiger. (2021). Rail Balticu kliimamõju trassilõigus Ülemiste – Kangru ja kumulatiivselt Eesti RB trassi ulatuses [Rail Baltic's climate impact on the route section Ülemiste - Kangru and cumulatively along the Estonian RB route]. OÜ Inseneribüroo STEIGER, juuni 2021, 33 pages.

TalTech. (2020). Long-term strategy for building reconstruction scenarios. [www] https://www.mkm.ee/media/155/download (24.11.2022).

Chapter 6

Government of the Republic Act. (1995). RT I, 09.08.2022, 5. [www] https://www.riigiteataja.ee/en/eli/ee/530082022002/consolide/current (18.10.2022).

Ministry of Foreign Affairs of Republic of Estonia (MFA). (2022). [www] https://vm.ee/en/foreign-economics-development-cooperation/development-cooperation-and-humanitarian-aid (28.10.2022).

Terms and conditions of and procedure for providing support for achieving climate policy goals in developing countries. (2019). RT I, 26.02.2022, 2. [www] https://www.riigiteataja.ee/akt/105012022003?leiaKehtiv (18.10.2022).

Terms and conditions of and procedure for the provision of development and humanitarian aid. (2021). RT I, 18.12.2021, 2. [www] https://www.riigiteataja.ee/akt/118122021002 (18.10.2022).

UN General Assembly. (2015). Transforming our world: the 2030 Agenda for Sustainable Development, A/RES/70/1. [www] https://www.refworld.org/docid/57b6e3e44.html (18.10.2022).

Appendix 1 Overview on CTF tables provided with the Fifth Biennial Report:

CTF Table 1	Emission trends
CTF Table 2	Description of quantified economy-wide emission reduction target
CTF Table 3	Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects
CTF Table 4	Reporting on progress
CTF Table 4(a)II	Progress in achievement of the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the counting of emissions and removals from the land use, land-use change and forestry sector in relation to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
CTF Table 4(b)	Reporting on progress
CTF Table 5	Summary of key variables and assumptions used in the projections analysis
CTF Table 6(a)/(c)	Information on updated greenhouse gas projections under a 'with measures' scenario and under a 'with additional measures' scenario
CTF Table 7	Provision of public financial support: summary information from 2019-2020
CTF Table 7(a)	Provision of public financial support: contribution through multilateral channels in 2019-2020
CTF Table 7(b)	Provision of public financial support: contribution through bilateral, regional and other channels in 2019-2020

Glossary

AEA	Annual Emission Allocation
AFS 2030	Agriculture and Fisheries Strategy 2030
ARIB	Agricultural Registers and Information Board
AWMS	Animal waste management systems
BAT	Best available technologies
CAP	Common Agricultural Policy
CERs	Certified Emissions Reductions
CH_4	Methane
CHP	Combined heat and power
CO_2	Carbon dioxide
COPERT	European road transport emission inventory model
CRF	Common Reporting Format
CRF	Common Reporting Format
EC	European Commission
EE 2035	Estonia 2035 strategy
EEA	European Environment Agency
EEIC	Estonian Environment Information Centre
EERC	Estonian Environmental Research Centre
EFDP 2030	Estonian Forestry Development Programme until 2030
EIC	Environmental Investment Centre
EMEP	European Monitoring and Evaluation Programme
EMHI	Estonian Meteorological and Hydrological Institute
EMÜ	Estonian University of Life Sciences
ENMAK 2030	Estonian Energy Development Plan 2030
eq.	Equivalent
ERUs	Emission Reduction Units
ESD	Effort Sharing Decision
ESR	Effort Sharing Regulation
EstEA	Estonian Environment Agency

EU ETS	European Union Emissions Trading System
EU	European Union
EUR	European Euro
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
GPCP 2050	General Principles of Climate Policy until 2050
GWP	Global warming potential
HFC	Hydrofluorocarbon
HWP	Harvested wood products
ICTU	Information to facilitate clarity, transparency and understanding
IPCC 2006 GL	Guidelines for National Greenhouse Gas Inventories
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial processes and product use
ITF	International Transport Forum
KEVAD	Environmental Development Plan 2030
KP	Kyoto Protocol
LCS	Estonian low carbon strategy
LULUCF	Land use, land-use change and forestry
MAC	Mobile air conditioners
MFA	Ministry of Foreign Affairs
MoE	Ministry of the Environment
MoEAC	Ministry of Economic Affairs and Communications
More	Ministry of Education and Research
MoF	Ministry of Finance
MoI	Ministry of the Interior
MoRA	Ministry of Rural Affairs
MSW	Municipal solid waste
N_2O	Nitrous oxide
NA	Not applicable
NAP	National Adaptation Plan

NAPCP	National Air Pollution Control Programme
NC	National Communication
NDC	Nationally determined contributions
NE	Not estimated
NEC	National Emissions Reduction Commitments
NECP	National energy and climate plan
NECPR	National energy and climate progress report
NF_3	Nitrogen trifluoride
NFI	National Forest Inventory
NIR	National Inventory Report
NMVOC	Non-methane volatile organic compounds
NO	Not occuring
ODS	Ozone-depleting substances
OECD	Organisation for Economic Co-operation and Development
PaM	Policies and Measures
PFCs	Perfluorocarbons
QA	Quality assurance
QC	Quality control
SEN scenario	Alternative scenario
SF_6	Sulphur hexafluoride
SSSC	The State Shared Service Center
SWD	Solid waste disposal
TalTech	Tallinn University of Technology
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WAM	With Additional Measures
WEM	With Excisting Measures