Draft update of Estonia's National Energy and Climate Plan for 2030

Notification by Estonia to the European Commission pursuant to Article 14(1) of Regulation (EU) 2018/1999

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1.1. Executive summary

i. I. Political, economic, environmental, and social context of the plan

In recent years, countries' resilience has been tested in successive crises. Russia's military terror in Ukraine shows that security depends first and foremost on the ambition of the most aggressive country, not on the development of civilisation. The funding that countries could have contributed to, inter alia, climate change mitigation and adaptation will go to Ukraine in these years after the COVID-19 pandemic. As a Russian border state, Estonia has helped people in distress due to the war. At the same time, Estonia has stagnated on its energy and climate policy commitments: **energy savings and renewable energy targets for 2020 have been met[1], Estonia is a climate-neutral country by 2050 according to Estonia's 2035 strategy,[2] and new energy savings and renewable energy targets entered into force in 2022, with the target to cover Estonia's electricity consumption with 100 % renewable electricity by 2030.**

On the basis of the existing and planned measures set out in Annexes III and IV to this document, greenhouse gas (GHG) emissions are **projected to decrease by up to 95 % in 2050 compared to 1990, up to 88.5 % in transport and up to 41 % in agriculture. At the same time, the** LULUCF*sector (land use, land-use change and forestry*) becameemitting from the binding sector in **recent years and will remain on the[3] emissions side until 2050. Half of Estonia's local authorities and major cities have energy and climate plans for reducing greenhouse gas** emissions, energy savings and renewable energy[4].

In April 2022, the Government of the Republic took a decision in principle to improve Estonia's energy security and mitigate the risks of a rapid withdrawal of Russian gas, on the basis of which LNG reception capacities were built in Paldiski by autumn 2022, for which a hauling quay and the necessary infrastructure for receiving LNG floating terminals were built. **In Estonia, imports of natural gas from Russia have been banned since 1.1.2023.** Agreements on solidarity measures to ensure security of gas supply have been signed by Estonia with the Republic of Finland and the Republic of Latvia, and Estonia is directly connected to their gas systems. The objective is to integrate Estonia, Latvia, Lithuania and Lithuania into the common balancing zone in the regional gas market.

More forward looking analyses show that from 2027 onwards Estonian oil shale power plants may no longer be competitive in the electricity market. As electricity production from oil shale decreases (phasing out of direct combustion), new generation capacities and interconnections with neighbouring countries ensure security of electricity supply. In order to ensure security of supply of the electricity system, the possibility to apply a capacity mechanism in case of problems with meeting the reliability standard will be introduced in Estonia. **As of 2024, the Baltic system operators plan to start with a common electricity system reserve market to ensure the functioning of the electricity system and security of supply following the synchronisation of the Baltic electricity systems with the Continental European synchronous area.**

The significant reduction in energy consumption due to high energy prices (e.g. exceptionally high prices in August 2022) (e.g. natural gas consumption decreased by ¼ in 2022) demonstrates the potential, capacity,

[1] Seventh report on the state of the energy union (europa.eu)
[2] "Estonia 2035" | Government of Estonia
[3] Greenhouse gases in Estonia, | Ministry of the Environment (envir.ee)
[4] Local government climate and energy plans | Environment Investment Centre (kik.ee)
Tallinn Climate Plan | Tallinn
Tartu Energy and Climate Plan

willingness and awareness of energy savings to work towards a common goal. While excise duties on energy carriers were lowered in 2021 to mitigate the effects of the COVID-19 pandemic, in heating periods 2021/2022 and 2022/2023 Estonia supported commercial and household consumers totalling EUR 282 million to compensate for the high energy price. Asof 1 October 2022, Eesti Energia has been obliged to sell electricity to household customers as a universal service (a time-bound option by the State that sets a price cap for electricity and helps electricity consumers to mitigate risks and mitigate the increase in electricity prices).

Estonia's 2030 National Energy and Climate Plan (*NECP 2030*) is a communication designed to fulfil the requirement set out in *Article 3(1) of Regulation (EU) 2018/1999 on the Governance of the European Union (EU) Energy Union and Climate Action ('Regulation (EU)*2018/1999') to submit the NECP every 10 years to the European Commission, including the plan submitted to the European Commission on 19 December 2019. Regulation (EU) 2018/1999 sets out the format for the preparation of the plan. The European Commission published the Energy and Climate Plans of all EU Member States on its website[5].

The strategic planning carried out by the State in Estonia is based on the basis[6] described in the State Budget Act. According to the State Budget Act, the Estonian State has two types of development documents: fundamentals of policies and development plans. The basic principles of the policy are approved by a decision of the Riigikogu and the development plans are approved by the Government of the Republic after they have been discussed in the Riigikogu. The objectives and measures required by the Energy and Climate Plan, which are mandatory for the Member States, are set out in Estonia's sectoral development documents and policy fundamentals, on the basis of which this draft update has also been drawn up:

1) The country's long-term development strategy "Estonia 2035"
2) The fundamentals of Estonia's climate policy until 2050[7] (hereinafter referred to as *KPP 2050*);
3) Estonia's 2030 Energy Management Development Plan (hereinafter *ENMAK 2030, under preparation by ENMAK 2035*)[8];
4) The 2030 Agenda for Adaptation to Climate Change[9];
5) The 2030 Environment Development Plan (hereinafter "spring, drafting")
6) Transport and Mobility Development Plan 2021-2035
7) Forest Development Plan 2021-2030 (draft completed);
8) The National Development Plan for the Use of Oil Shale 2016-2030;
9) National waste management plan 2014-2020[10] (draft 2021-2028 finalised);
10) The Common Agricultural Policy Strategic Plan 2023-2027, the Agriculture and Fisheries Development Plan 2030, the Operational Programme for the European Maritime, Fisheries and Aquaculture Fund 2021-2027;
11) R & D, Innovation and Entrepreneurship Development Plan 2021-2035, including roadmaps for related focus areas
12) Ida-Viru Just Transition Territorial Plan;
13) A long-term strategy for the renovation of buildings;
14) NECA 2030 progress report data provided on e-platforms on 15/03/2023.

[5] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans
[6] State Budget Act https://www.riigiteataja.ee/akt/107072017040
[7] F https://www.riigiteataja.ee/akt/307042017001
[8] https://www.mkm.ee/sites/default/files/enmak_2030.pdf
[9] https://www.envir.ee/sites/default/files/kliimamuutustega_kohanemise_arengukava_aastani_2030_1.pdf
[10] https://www.envir.ee/et/eesmargid-tegevused/jaatmed/riigi-jaatmekava-2014-2020

In 2023-2024, the NECP 2030 will need to be updated on the basis of the development documents that have been finalised in the meantime and the draft of 30 June 2023 and the final version of 30 June 2023 will have to be submitted to the European Commission. The 2030 NEW describes the objectives set out in the development documents listed above, as well as the existing and planned actions. The sectoral development plans that led to the preparation of theREKK 2030 have been the subject of Strategic Environmental Assessments (SEAs) in accordance with the Environmental Impact Assessment and Environmental Management System Act (hereinafter 'the KeHJS'). The NECP 2030 is not a strategic planning document under Section 31 of the KeHJS because the requirement to prepare the NECP 2030 arises from Regulation (EU) 2018/1999. The KeHJS regulates the process of initiating and drafting SEAs for national strategic planning documents, but not for documents drawn up to meet European Union and other international requirements. For these reasons, no SEA process has been carried out during the preparation of the REKK 2030[11].

This document has been prepared as a joint work of the Ministry of Economic Affairs and Communications (MEC), the Ministry of the Environment (KeM) and the Ministry of Rural Affairs (MeM) on the basis of the above-listed development documents and studies and other relevant analyses based on the content and timetable of the EU 2018/1999 Energy Union Regulation.

Experts from companies, research institutions, local authorities and their representative organisations, community, environmental and professional associations were involved in the preparation of the above-mentioned development documents during the development of the REKK 2030.

ii. Strategy for the five dimensions of the Energy Union.

The NECP 2030 has been updated on the basis of existing development documents, which have been prepared taking into account other international environmental, energy and climate developments in the European Union. The integration of the five dimensions of the Energy Union into Estonian policies and measures is addressed in Chapter 1.2.ii. The objectives and measures set out in the draft updated version of the NECP 2030 are based on the following EU directives and regulations relating to the five dimensions:

Responsibility of the Ministry of the Environment

Directive 2003/87/EC amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission allowance trading scheme
Directive (EU) 2016/228415 on the reduction of national emissions of certain atmospheric pollutants
The Effort Sharing Regulation (EU) 2018/842 and its amendment Regulation (EU) 2023/857
Land Use, Land Use Change and Forestry (LULUCF) Regulation (EU) 2018/841 and amending Regulation (EU) 2023/839
Fluorinated Greenhouse Gas Regulation (EU) No 517/2014
Directive 2006/40/EC on emissions from air conditioning systems in motor vehicles
Tightening $CO2_{emission}$ performance standards for new vehicles (EU) 2023/851 to strengthen $CO2_{emission}$ performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition
Directive 91/676/EEC on the protection of waters against pollution caused by nitrates from agricultural sources

Responsibility of the Ministry of Economic Affairs and Communications

Renewable Energy Directive (EU) 2018/2001

[11] In accordance with the draft approval letter of the Minister for the Environment No 1-5/19/5595-2 of 11 November 2019

Directive (EU) 2019/944 on the internal markets for electricity
Energy Efficiency Directive 2012/27/EU as amended by Directive EU 2018/2002
Energy Performance of Buildings Directive 2010/31/EU Amendment (EU) 2018/844 to the Energy Performance of Buildings Directive 2010/31/EU and the Energy Efficiency Directive 2012/27/EU
Minimum stocks of crude oil and/or petroleum products Directive 2009/119/EC
Energy Union Regulation (EU) 2018/1999 Energy Infrastructure Regulation (EU) No 347/2013
Regulation (EU) 2019/943 on the internal market for electricity, Security of Supply of Natural Gas Regulation (EU) 2017/1938
Regulation (EU) No 715/2009 on access to the natural gas transmission networks
Fuel Quality Directive 2009/30/EC
Directive (EU) 2019/692 amending the Directive on common rules for the internal market in natural gas
Regulation (EU) 2017/460 on harmonised transmission tariff structures for gas
Regulation (EU) 2015/459 Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems
Regulation (EU) 2015/703 on rules for interoperability and data exchange
Regulation (EU) 1227/2011 on wholesale energy market integrity and transparency
New Alternative Fuels Infrastructure Regulation (AFIR)12
Proposal for a framework of measures to strengthen the European ecosystem for the production of zero-net products (Regulation on the Zero Net Industry)13

Responsibility of the Ministry of Finance

Energy Taxation Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity

The updated version of the NECP 2030 needs to be prepared taking into account European Union legislation in the relevant areas, for which negotiations on drafts and amendments have not yet been concluded as of March 2023. The content of these EU instruments will have to be incorporated into Estonia's legal space and development documents after the agreements and entry into force, including, if necessary, updating the related objectives and measures. In the context of the European Commission's plan to make Europe independent from Russian fossil fuels before 2030 (RePowerEU) following Russia's war of aggression in Ukraine in 2022, Member States will have to take into account the corresponding changes in the Renewable EnergyDirective and the Accelerating Authorisation Act for renewable energy production, the Energy Efficiency Directive, the Recovery and Resilience Facility Regulation (EU) 2021/241. In addition, the European Union's communications, such as the REPowerEU Communication, the Solar Strategy Communication, the Communication on the promotion of energy savings and the Hydrogen Strategy for a climate-neutral Europe, need to be taken into account.

In this context, the following processes contribute to the strategy for the five dimensions of the Energy Union:

- Green budgeting (public budgets)
- Sustainable finance processes (private financing/budgets)
- Speeding up planning and permitting
- Cooperation between national and local authorities, capacity of local authorities (including local energy and climate plans)
- Energy taxation (EU, EE)
- Development of energy efficiency and renewable energy

12New law agreed to deploy alternative fuels infrastructure (europa.eu)
13EUR-Lex – 52023PC0161 – EN – EUR-Lex (europa.eu)

- Just transition in Ida-Virumaa (Territorial Just Transition Plan)

iii. An overview table with the main objectives, policies and measures of the plan.

The main objectives of the draft updated version of the NEW 2030 are:

- **Estonia's net greenhouse gas (including LULUCF) target for 2035 is 8 Mt CO_2 eq (2021 = 15.6 Mt CO_2eq).**
- Estonia's long-term goal is to balance greenhouse gas emissions and removals by 2050 at the latest, **i.e. to net-zero greenhouse gas emissions by 2050.**
- In the**sectors covered by the Effort Sharing Regulation** (transport, small energy, agriculture, waste management, industrial processes), **total emissions could be around 4.7 Mt CO_2 eq. in 2030 (** 2005=6.3 Mt $CO2_{eq.}$), i.e. a 24 % reduction in greenhouse gas emissions by 2030 compared to 2005[14].
- **In the land use, land use change and forestry (LULUCF) sector, compared to the baseline level (2016-2018 average), the GHG removals by 2030 shall be 0.434 Mt CO_2 eq**, including offsetting the sector's emissions in the period 2021-2025 by carbon removals by the same sector and within the defined GHG budget for the period 2026-2029.
- **The share of renewable energy in gross final energy consumption in 2030 shall be at least 65 %**, including electricity consumption to be guaranteed by 100 % renewable electricity or 9.4 TWh (2018 = 2.1 TWh, 2022=2.6 TWh)
- **Final energy consumption needs to remain at up to 30.19 TWh/y until 2030, with** an overall energy savings obligation[15] of up to 21.28 TWh for the period 2021-2030 will help to maintain the same level of final energy consumption.
- An indicative**reduction in primary energy consumption by 2030 of up to 35 % (compared to peak consumption in 2016=69.8 TWh[16])**, in particular with a reduction in the use of oil shale and other fossil fuels, on the basis of Article 4 of the draft new Energy Efficiency Directive, primary energy consumption in 2030[17] must be up to 45.72 TWh.
- **Ensuring energy security by keeping imported energy dependency as low as possible,** reducing the use of fossil gas, maintaining full energy independence from the Russian Federation, increasing the use of indigenous renewable energy sources (wind on land and at sea, solar) and ensuring sufficient managed power in electricity.
- Meeting the**minimum electricity interconnection criteria by** maintaining at least 15 % of electricity interconnections between the Member States of the European Union by 2030, inter alia by synchronising the electricity grid with the Central European frequency band by 2025 and, where appropriate, strengthening interconnections between countries (EstLink 3 and Estonia-Latvia's 'fourth interconnection').
- **Deploying R & D & I to keep the economy competitive** by developing climate-neutral energy production, smart and sustainable energy solutions (green hydrogen, biomethane), the

[14] The annual national emission levels for the sectors covered by the ESR for the period 2021-2030 will be set at European Union level by means of implementing acts after the entry into force of the Regulation.

[15] Under the overall energy savings obligation (i.e. the obligation to achieve energy savings and improve energy efficiency), a distinction must be made between the objective of reducing primary energy consumption, by which the contribution to the overall EU target is indicative (indicative) and the end-use energy target, which is collectively binding and through which Member States contribute to the Union's final energy consumption target.

[16] https://ec.europa.eu/eurostat/databrowser/view/sdg_07_10/default/table?lang=en

[17] EU empowerment stronger rules to boost energy efficiency (europa.eu)

development of a flexibility market (including demand management, energy storage) and transmission networks.

A total of 106 measures have been developed to meet the updated targets and policies and forecast greenhouse gas emission reductions: energy 25, agriculture 23, transport 23, building stock 19, LULUCF 9, waste management 4, industry 2 and green technology 1. The[18] contribution of existing and planned measures to GHG reduction, renewable energy and energy efficiency is set out in Annex III of the Plan and descriptions of the measures in Annex IV. In addition, the draft includes descriptions of research, innovation and competitiveness measures and other relevant measures. The main measures are presented in Table 1.1.

Table 1.1 Main energy and climate action by sector:

Areas	Key actions
ENERGY:	Further development of high-efficiency cogeneration of heat and power Development of renewable energy, including under-supply Development of wind farms (including at sea) Developing heat management Development of electricity grids, including synchronisation with the Central European frequency band More efficient use of primary energy and final energy consumption Energy R & D programme Piloting of hydrogen production and deployment Developing and, where appropriate, supporting storage capacities
TRANSPORT:	Increasing the use of electro-mobility, light mobility, biofuels Increasing vehicle economy, energy and fuel efficiency Development of public transport Development of railway infrastructure Electrifying railways and ferries; Encouraging the uptake of biomethane
BUILDING STOCK:	Renovation of public (central and municipal) buildings, commercial and residential buildings and street lighting
AGRICULTURE:	Organic farming Environmentally friendly agricultural practices Improving manure management Investments in energy savings and renewable energy, including bioenergy Maintaining or increasing carbon stocks in soils Animal welfare Business advice, knowledge transfer and information Farm audits
WASTE MANAGEMENT:	Reducing the generation of biodegradable waste Reuse and recycling of waste materials Reduction of landfilling Reducing the environmental risk of waste
LULUCF:	Renovation of private forests Compensation for nature conservation restrictions in private forests Ensuring the protection of biodiversity (including precious habitats)

[18] Existing and planned measures are defined in accordance with Article 2 of the Energy Union Governance Regulation.

	Protection of habitats and populations of common species in Estonia Prevention of choke damage Replacement afforestation
INDUSTRIAL PROCESSES:	Reducing emissions of fluorinated greenhouse gases and replacing them with alternative substances
GREEN TECHNOLOGY INVESTMENT PROGRAMME:	Support scheme for green technology start-ups
RESEARCH, INNOVATION AND COMPETITIVENESS:	Smart and sustainable energy solutions Grants for entrepreneurship and innovation Grants for international research cooperation, knowledge transfer, centres of excellence

Estonia's main energy and climate policy objectives and policies are presented in Table 1.2.

Table 1.2 Estonia's main energy and climate policy objectives, policies (related measures are presented in Annexes 3 and 4).

2030 targets	Policy orientations
Binding national greenhouse gas emission reduction target for Estonia in the Effort Sharing Regulation sectors of 24 % by 2030 compared to 2005	In transport, agriculture, waste management and industrial processes, and small-scale energy production in installations with a nominal capacity of less than 20 MW, the reduction of fossil fuel use and energy savings will reduce $CO2_{emissions}$.
Emissions from the LULUCF sector for the years 2021-2025 shall be offset by at least equivalent carbon removals by the same sector. The 2030 target is 0.434 Mt CO_2 ev higher than baseline (2016-2018 average)	The carbon sequestration obligation for managed forest land as defined in the National Forestry Accounting Plan, which is supported by measures in the draft Forest Development Plan 2021-2030[19], will have a particular impact on the production and use of wood fuels.
Final energy consumption 30.19 TWh/y	In order to maintain final energy consumption between 2021 and 2030, annual energy savings of 0.8 % (up to 2023), 1.3 % (2024-2025), 1.5 % (2026-2027) and 1.9 % (2028-2030 and beyond) of the average final energy consumption in 2017-2019 are to be achieved. The cumulative savings[20] obligation for the 2021-2030 period amounts to 21 279 GWh.
Reduction of primary energy consumption by up to 14 %	Estonia's economy ranks fourth among the EU Member States with the highest primary energy intensity[21]. The projection for 2017-2030 is that primary energy consumption will decrease by up to a quarter.
65 % share of renewable energy in gross final energy consumption	The share of renewable energy in fossil fuels will be increased through the exchange of boilers for renewable fuels, fuel-free power generation, renewable fuels and electricity for vehicles.
100 % renewable electricity	The increase in production volumes in wind (land and offshore wind*farms)* and*solar energy*, as well as energy storage (pump hydroelectric power stations and batteries) shall be applied. In order to realise the potential of

[19] Ministry of the Environment 2019 National Forest Accounting Plan 2021-2025 Summary https://www.envir.ee/sites/default/files/riiklik_metsanduse_arvestuskava_eestikeelne_kokkuvote.pdf
[20] Cumulative means that the amount of savings achieved in previous years must be maintained throughout the period.
[21] European Union Primary Energy Intensity 2020 https://www.indicators.odyssee-mure.eu/online-indicators.html

	cogeneration, cogeneration of electrical capacity accounts for 1/4[22]
63 % share of renewable energy in the heat economy	In the field of heat and cooling, the potential of Estonian wood fuels is being exploited and the share of heat pumps is increasing.
Share of renewable transport fuels 14 %	Covered in particular by domestic biomethane in view of the perspective of using gaseous fuels in Estonia. Plans to produce up to 340 GWh of biomethane (real amount without multipliers). Increase in the use of electromobility based on renewable electricity.

The proposed measures will contribute to the following necessary changes in Estonia's 2035 strategy from a sectoral perspective, as follows:

- ENERGY: Overcoming climate-neutral energy production, ensuring energy security
- TRANSPORT: Deploy safe, green, competitive, needs-based and sustainable transport and energy infrastructure
- BUILDING STOCK: We plan and renew space in a holistic and high-quality way, taking into account society's needs, population change, health and the environment
- AGRICULTURE: Building capacity in key sectors of Estonia's economy
- WASTE MANAGEMENT: Introducing circular economy principles
- LULUCF: We plan and renew space in a holistic and high-quality way, taking into account society's needs, population change, health and the environment
- INDUSTRIAL PROCESSES: Creating a flexible and secure economic environment conducive to innovative and responsible business and fair competition
- GREEN TECHNOLOGY INVESTMENT PROGRAMME: Overcoming climate-neutral energy production, ensuring energy security
- RESEARCH, INNOVATION AND COMPETITIVENESS: Introducing new solutions to boost business R & D and innovation

1.2. Overview of current policy situation

i. National and EU energy system and policy context of the national plan

Since the last submission of the NECP 2030 in 2019, Estonia has taken important steps towards meeting the targets in the energy sector. We have set more ambitious targets for renewable energy, including general and renewable electricity targets. Namely, the overall target has increased from 42 % to 65 % of gross final energy consumption and the renewable electricity target from 40 % to 100 % of electricity consumption. In the context of raising targets, we have amended national legislation to make these targets legally binding.

As part of the REPowerEU scheme, we have carried out an audit to identify the biggest bottlenecks in planning, permitting and building renewable energy projects. As a result of the audit, a legislative package has been prepared to make permit granting procedures shorter and more transparent. For example, we have created a combined permit for the construction of offshore wind farms, which includes one instead of three permit-granting processes and has made planning processes significantly shorter (e.g. the obligation to provide a detailed solution has been removed in the case of a special national plan and a special local authority plan). Estonia's hydrogen roadmap was finalised in spring 2023. With fewer renewable electricity

[22] The metered cogeneration plants can be found in Annex 1 to the Security of Supply Report - https://elering.ee/sites/default/files/2023-05/elering_vka_2022.pdf

bids between 2019 and 2021, additional electricity of 0.5 TWh (mainly solar plants, one wind and solar hybrid park) was added to the market. In 2023-2025, additional renewable electricity capacity of 1.65 TWh for electricity generation will be built. Measures on biomethane infrastructure and use, storage and green hydrogen pilot programmes, as well as current energy and climate policies and measures related to the five dimensions of the Energy Union have been successfully launched.

The **additional measures proposed to address the increased climate ambition (including under the Recovery and Resilience Plan and the European Commission's REPowerEU plan) compared to the REC 2030 Communication in 2019, have been driven by the completion of pipeline gas and electricity interconnections** with Russia, which has accelerated the deployment of energy efficiency and renewable energy.

ii. Current energy and climate policies and measures related to the five dimensions of the Energy Union

The orientations and actions related to the five dimensions of the Energy Union are set out in Table 1.3.

Table 1.3 Estonia's policies related to the dimensions of the Energy Union (measures are presented in Annex III and Annex IV).

Dimension	Policy orientations
Reducing CO_2 emissions	By 2050, Estonia will be a climate-neutral country with a knowledge-based society and economy that provides a high-quality and species-rich living environment and is prepared and able to minimise and make the best use of the adverse effects of climate change.
Energy efficiency	Increasing energy efficiency in energy production, buildings and transport, agriculture
Energy security	Use of domestic fuels and fuel-free energy sources, diversification of energy sources and supplies, ensuring affordable energy supply, development of transmission and distribution networks, ensuring sufficient managed capacity, synchronisation of the electricity system with the Central European frequency band, adequate gas infrastructure in the region
Internal energy market	Development and availability of external interconnections, development of the market for flexibility services, decarbonisation of the gas network;
Research, innovation and competitiveness	Supporting the implementation of the measures of this plan, diffusion of new knowledge, studies and pilot projects for climate impact assessment

iii. Key issues of cross-border relevance

The main issues of cross-border relevance in Estonia's energy economy are:

- connection to the CE synchronous area;
- ensuring the adequacy of electricity generation capacities and grid connections in the region, integration of the electricity system services market;
- ensuring security of gas supply, the existence of adequate regional infrastructure and solidarity agreements between Member States, further integration of the gas market (including the harmonisation of regional gas retail markets);
- development of infrastructure for recharging or refuelling vehicles on alternative fuels (decarbonisation of the transport sector);
- achieving the renewable energy targets in the most cost-effective way (exploitation of wind potential in maritime areas adjacent to national borders and inclusion of cross-border interconnections to enable energy trade).

iv. Administrative structure of implementing national energy and climate policies

Estonia's climate target was set out in the Vision Paper entitled 'Basics for climate policy up to 2050', approved by the Estonian Parliament in 2017. The principles and policy orientations set out in this document served as a basis for the preparation of the NECF 2030. Estonia's 2035 strategy, adopted by the National Assembly in 2021 and prepared by the State Chancellery, envisages the creation of a climate-neutral state by 2050.

The Ministry of Economic Affairs and Communications (since 1 July 2023, Ministry of Climate) is responsible for the preparation, implementation and monitoring of the implementation of the plan, in Figure MKM. The plan is financed under the responsibility of the Ministry of Finance on the basis of the State budget drawn up in cooperation with other ministries. **The ministries responsible for the planning, implementation and monitoring of the implementation of the planned measures in the areas covered by the plan until 30 June 2023 (the change in ministries and related responsibilities will be reflected in the updated version of the NKK 2030)** are shown in Figure 1.1.

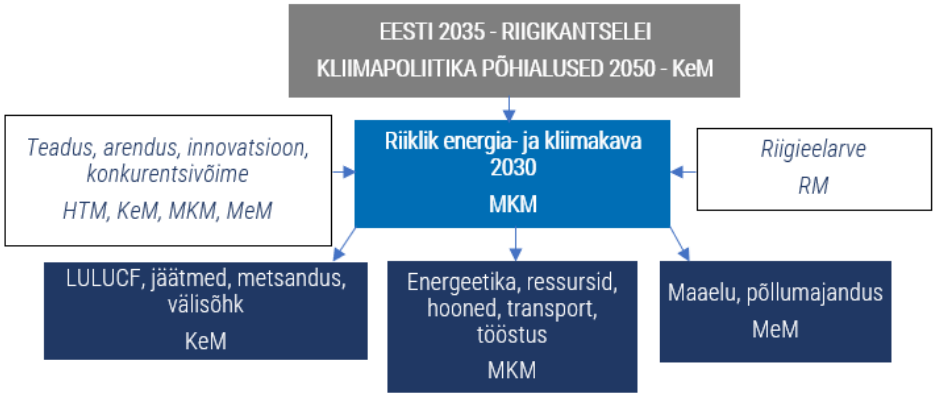


Figure 1.1 Climate and energy policies are designed and implemented by government authorities[23].

1.3. Consultation and involvement of Member States and EU entities and its outcome

i. Involvement of the national parliament

On 5 March 2023, elections to the Riigikogu were held and government amendments took place. Therefore, the updated version of the 2030 NECP will be presented to the new government and Parliament no later than June 2023.

ii. Involvement of local and regional authorities

A working group was set up to apply the REPowerEU plan in Estonian national law, involving the Ministry of Finance responsible for planning processes, the Ministry of the Environment responsible for environmental impact assessments and the Ministry of Economic Affairs and Communications responsible for building permits and the energy sector. The Environmental Agency (KAUR) was also involved as a sub-unit of the KeM, whose task is to map the go-to areas in order to meet the national renewable energy targets. As it is a cross-ministerial workflow, the working group is chaired by the State Chancellery. The joint work resulted in an audit which led to legislative changes (see 1.2 i.)

[23] The functions and titles of government departments will change from 1 July 2023, the corresponding changes will be reflected in the up-to-date version of the NECP 2030.

For an overview of the draft updated version of the NECP 2030, see Annex V, see Annex V.

Two inclusion seminars were held on 17 March and 10 May on the preparation of the draft version of the NEW 2030 update. Participants were involved through MKM ENMAK 2035 inclusion list, KeM and MeM stakeholder lists. The events were announced on the MKM REKK 2030 portal. The draft updated version of the REKK 2030 was made available for public consultation on the website of the Ministry of Economic Affairs and Communications.

The draft update of the NECP 2030, as revised on the basis of the proposals received by 30 June 2023, was approved by the Government on 10 August 2023.

Public consultation on the draft update of the 2030 REKK

From 6 April to 8 May 2023, the draft update of the NECP 2030 was available for comments on the MEAC portal[24]. The public consultation was notified by the Ministry of Economic Affairs and Communications through the inclusion list of MKM ENMAK 2035, the KeM and the MeM stakeholder lists.

The first working version of the draft update of the REKK 2030 was published by the ministries on 28 April 2023 in the Government of the Republic's draft information system for approval.[25]

Summary of the proposals for the draft update of the 2030 NECP

In the course of the public consultation and in the government bill information system with the side letters from ministerial coordination, **14 organisations received contributions from**: Latvian Ministry of Climate and Energy, Ministry of Interior, Ministry of Education and Research, Ministry of Rural Affairs, Viru Chemistry Group, European Commission Directorate-General for Regional and Urban Policy Estonia, Finland, Latvia and Lithuania, Society for Living and Population Development, Statistics Estonia, Estonian Association of Electricity Industries, Estonian Chamber of Environmental Associations, Estonian Renewable Energy Chamber, Ministry of Finance, Competition Authority and Fermi Energia OÜ.

The draft received technical and substantive proposals to specify the legal status of the NECP 2030, the input materials used (studies, analyses, etc.), the content of objectives and measures, targets, terminology, projections, development projects to be reported, spill-over effects, funding, cooperation and inclusion, implementation of draft legislation and plans related to the European Commission (Fit for 55, Recovery, RePowerEU, Clean Energy for EU Islands, Just Transition, etc.) in Estonia, substantive and numerical inconsistencies between the various chapters, drafting clarifications and formatting. **Complementing the draft on the basis of the proposals is reflected in Annex V.**

iii. Consultations of stakeholders, including the social partners, and engagement of civil society and the general public

Other stakeholders have been involved in the working groups preparing ENMAK 2035 and in the preparation of the draft update of the NECP 2030 in exactly the same way as local authorities, whose involvement is outlined in chapter1.3.ii.

Key stakeholder representatives are part of the Energy Council of the Ministry of Economic Affairs and Communications. The Energy Council of the Ministry of Economic Affairs and Communications can be considered as a multi-level climate and energy dialogue, the establishment of which is mandatory for Member States under Article 11 of Regulation (EU) 2018/1999.

[24] National Energy and Climate Plan | Ministry of Economic Affairs and Communications (mkm.ee)
[25] https://eelnoud.valitsus.ee/main/mount/docList/80cc82db-711d-481b-8b4f-82af433e3ee9

iv. Consultation with other Member States.

In April 2023, a summary of the main objectives and measures of the plan was sent to the Ministry responsible for energy in Finland, Latvia and Lithuania for comments.

v. Iterative process with the Commission

The draft version of the NECP 2030 update was prepared on the basis of the guidelines[26] and recommendations of the European Commission.

1.4. Regional cooperation in preparing the plan

i. Elements subject to joint or coordinated planning with other Member States

The objectives and measures of the draft version of the NECP 2030 update were sent to Lithuania, Latvia and Finland for information in April 2023.

ii. Explanation of how regional cooperation is considered in the plan

With regard to climate and energy policy, Estonia participates in various regional cooperation formats (Paris Climate Pact in the context of climate and energy policy), including:

- The Baltic Assembly[27];
- Baltic Prime Ministers' Summits;
- Baltic Council of Ministers (BCM);
- The European Union Strategy for the Baltic Sea Region (EUSBSR) and the Connecting Baltic Energy Market Plan (BEMIP);
- Baltic-Nordic Energy Research Programme[28].

The format of regional cooperation between the Baltic States is the Baltic Council of Ministers, within which a Committee of Senior Officials on Energy has been set up. The Committee shall meet regularly in accordance with the work programme of the Presidency's country (presidency rotates annually). Joint activities to develop regional electricity and gas markets and promote joint infrastructure projects will be discussed and planned in the framework of the Energy Committee. The Committee shall guide and monitor the work of the Regional Gas Market Coordination Group with a view to establishing a regional gas market operating on a unified basis, including the Baltic States and Finland. The work will be based on the Action Plan for the development of a single gas market.

Estonia participates actively in the Baltic Energy Market Interconnection Working Group (BEMIP), which discusses the possibilities for regional cooperation in the fields of electricity, gas, renewable energy (including offshore[29]wind farms) and energy efficiency. The implementation of the action plan on synchronisation of the Baltic States' electricity systems will be monitored and coordinated by the BEMIP

[26] Communication from the Commission on guidelines for Member States to update their National Energy and Climate Plans 2021-2030
[27] Cooperation among the National Parliaments of Estonia, Latvia and Lithuania
[28] Baltic Nordic Energy Research Programme https://www.nordicenergy.org/programme/the-joint-baltic-nordic-energy-research-programme/
[29] Study ON BALTIC OFFSHORE WIND ENERGY Cooperation UNDER BEMIP https://op.europa.eu/en/publication-detail/-/publication/9590cdee-cd30-11e9-992f-01aa75ed71a1/language-en

High Level Working Group on Synchronisation, composed of members from the Baltic States, Poland and the European Commission.

In autumn 2020, the Baltic Sea countries signed a Political Declaration on offshore wind energy development in Poland, building on the basis of which, at the end of 2020, under the lead of Elering, the cooperation of system operators under the Baltic Offshore Grid Initiative (Bog) was launched to jointly plan and develop networks for offshore wind farms in the Baltic region. At the beginning of 2023, Poland joined the cooperation, which was still far away from it as the country of the last region.

Atthe Marienborg Summit in Denmark in August 2022, Heads of Government agreed to step up energy cooperation with a focus on offshore wind energy. According to the Declaration, wind capacity in the Baltic Sea will have to rise 7 times to 19.6 GW by 2030. Energy ministers should also set targets and roadmaps for 2040 and 2050. The second meeting will be hosted by Lithuania on 15 September 2023.

At the EU Energy Directors General Meeting on 19 January 2023, the (non-binding) objectives for the development of EU marine wind energy were approved. In BEMIP (Baltic Sea) format, the 2030 target is 22.4 GW, i.e. as much as 3 GW higher than the Marienborg Declaration in August. Estonia's share is 1 GW by 2030, Latvia 0.4 GW and Lithuania 1.4 GW. Marienborg's political agreement was a preparatory step towards achieving it. While the targets are non-binding and can also be reviewed every two years, they are still the basis for the development of long-term network development plans for European network operators (which in turn serve as a basis for project development and EU funding requests). The next step is to agree on the ENTSO-E network development plan by the end of this year.

In the longer term, increased EU support for the Baltic Sea grid project will be important in order to create a network infrastructure to connect offshore wind farms, while also serving as new cross-border electricity interconnections.

Intensive coordination of Baltic energy policy issues takes place at the level of senior officials of the Baltic Council of Ministers, but broader regional cooperation also includes Finland, Sweden, Poland, Denmark and Germany.

In the context of the European Union, regional cooperation takes place in BEMIP format, including infrastructure planning and more efficient use of financial resources, including the Connecting Europe Facility, which only supports cooperation in the Baltic Sea region by boosting cross-border energy projects. Several joint projects have improved the security of electricity and gas supply in the Baltic region by helping to ensure efficient market development. The most important regional project is the synchronisation of the Baltic electricity system with the European electricity system. In addition, there are other important projects to ensure the efficient functioning of the market, such as the improvement of cross-border interconnections or the development of a regional gas market.

- ELLI gas interconnector project to secure regional gas supply between Latvia and Lithuania for the import of[30] gas from the Klaipeda LNG terminal and from Poland to the Inculkans storage facility for the supply of Estonia, Latvia and Finland
- Regional consultations have identified opportunities for regional cooperation in renewable energy and related technologies, in particular in the development of offshore wind farms at the Estonian-Latvia and Latvian-Lithuania borders, taking into account maritime planning. [31]According to the recently finalised study on the energy potential of offshore offshore farms in the Baltic Sea, the total potential capacity of the Baltic Sea wind farms is over 93 GW (i.e. a total of 187 wind farms with an electricity capacity of 500 MW), including:
- Estonia's 14 offshore wind farms with a capacity of 7 GW and an annual production of 26 TWh

[30] Enhancement of Latvia – Lithuania interconnection | Conexus

[31] Study ON BALTIC OFFSHORE WIND ENERGY Cooperation UNDER BEMIP https://op.europa.eu/en/publication-detail/-/publication/9590cdee-cd30-11e9-992f-01aa75ed71a1/language-en

- 29 offshore wind farms in Latvia with a capacity of 15.5 GW and an annual production of 49.2 TWh
- 9 Lithuanian offshore wind farms with a capacity of 4.5 GW and an annual production of 15.5 TWh.

Estonia has two existing maritime spatial plans (the Estonian marine area and the Pärnu marine area) with a total of 2 439 km 2(6.8 % of the total Estonian marine area) suitable for wind energy development. As of 2 June 2023, 40 applications for building permits for offshore wind farms with a total capacity of 52.3GW have been submitted, four building permits have been launched and one procedure has been launched for the planning of a wind turbine. TheHiiu marine plan is valid in the surrounding marine area of Hiiu, but it does not regulate wind energy.

Regional cooperation takes place in the gas market, electricity system synchronisation, electricity and gas cross-border projects. In the transport sector, there is cooperation in the implementation of the Rail Baltic project and in the decarbonisation of the transport sector.

The reduction of GHG emissions from agriculture cooperates in the realisation of Directive 91/676/EEC (nitrogen emissions) and the reduction of air pollution (ammonia emissions).

The Baltic States agreed to extend regional cooperation to energy efficiency and renewable energy development, in particular in the transport sector, including:

- Development of biomethane production and market;
- Coordination of biofuel requirements (blending and taxation issues);
- Coordination of customs duties on possible road user charges and heavy goods.

In addition, regional cooperation can be extended to the agriculture and forestry sector (e.g. land improvement, soil quality measurement, etc.) taking into account the cross-border impacts of agriculture, forestry and fisheries.

When designing and implementing long-term (to 2030 and 2050) energy or climate policies and measures, it is necessary to exchange experience and knowledge on decarbonisation and energy efficiency through mutual cooperation, as this will help to select appropriate techniques and activities to meet specific objectives.

Measures contributing to renewable energy, energy savings and climate change management and R & D activities have been and will be developed and implemented by the Baltic States, including the Nordic Council of Ministers; Nordic Energy Research; Baltic RCC established by Baltic TSOs (Elering, AST, Litgrid); Nord Pool, Nordic power exchange; regional *Gas Market Coordination Group* (RCMCG); the regional operator of the natural gas market, UAB GET Baltic and the International Energy Agency (IEA), in collaborative research projects and in the PhD exchange under the Baltic-Nordic Energy Research Programme. In cooperation between the various partners, a PCI will be carried out to synchronise the Baltic States' Central European frequency band with a subsea gas pipeline between EE and FI: Balticconnector, under construction the Rail Baltic transport infrastructure project and integrated cable connections for electricity systems (Estonia-Latvia IV electricity interconnector under ELWIND, Estlink 3 or third submarine electricity connection between Estonia and Finland). The MKM and the Estonian Research Agency also participate in a consortium of donors to the European Horizon Research Partnership 'Clean Energy Transition', which together develops the science needed in the field and involves most EU Member States.

2. NATIONAL TARGETS

2.1. Decarbonisation dimension

2.1.1. GHG emissions and removals[32]

i. Elements set out in Article 4(a)(1)

Across the European Union

The European Union's contribution to the 2015 Paris Agreement is binding and covers all sectors of the economy. The Glasgow Climate Pact, adopted at COP26, called on countries to accelerate their emission reductions and update their national climate targets by the end of 2022. Ahead of the COP26 climate negotiations, the European Union presented a renewed EU climate target to the UN, to which Estonia is also contributing. The EU-wide climate target of reducing net greenhouse gas (GHG) emissions by 55 % by 2030 compared to 1990 (previously -40 %) was agreed by the European Council in December 2020 and, together with the climate neutrality objective, is legally enshrined in the European Climate Law adopted in summer 2021. The European Commission has put forward a series of legislative proposals to change EU policies to meet the 2030 ambition of the updated European Climate Law to reduce GHG emissions by 55 % compared to 1990 levels. At the end of 2022, the Council and Parliament reached a provisional political agreement on the modernisation of the EU greenhouse gas emission allowance trading system (EU ETS) and the establishment of a Social Climate Fund. To reach the 2030 target, the sectors covered by the EU ETS will need to reduce their emissions by 62 % by 2030 compared to 2005. Under the new agreement, emissions from maritime transport will also be included in the scope of the EU ETS.

A new separate emissions trading system will also be established for fuels in the buildings and road transport sectors and additional sectors, to be implemented in 2027. The new system will apply to installations supplying fuels for buildings, road transport and certain other sectors. Part of the system's revenues will be used to support vulnerable households and micro-enterprises through a dedicated Social Climate Fund.

With regard to the sectors covered by the Carbon Border Measure (SPIM) – cement, aluminium, fertilisers, electricity generation, hydrogen, iron and steel, as well as some feedstocks and a limited number of downstream products – the Council and Parliament agreed to abolish free allowances for these sectors over nine years between 2026 and 2034.

Emissions from sectors not covered by the EU ETS, i.e. under the so-called Effort Sharing Regulation (transport, agriculture, waste management and industrial processes, and small-scale power generation in installations with a nominal capacity of less than 20 MW) will have to be reduced by 40 % by 2030 compared to 2005 levels in the European Union. The "55" proposal also concerned the *Land Use, Land Use Change and Forestry (LULUCF) Regulation,* which is intended to contribute to the EU's GHG reduction target. The Council and Parliament have agreed on an overall EU-level target of 310 Mkt CO_2 eq. net removals in the LULUCF sector by 2030. In addition, under the new agreement, the LULUCF sectors are subject to the principle that a country must ensure compliance with the no-debit rule in 2021-2025, i.e. the emissions of the sector must be offset by equivalent removals. However, for the period 2026-2029, Member States will be set a GHG removal budget and a relative target for LULUCF removals by 2030.

TheEuropean Commission's Climate Adaptation Strategy "Forging a climate-resilient Europe – the new EU Strategy on Adaptation to Climate Change" is one of the initiatives of the European Green Deal. This strategy

[32] Consistency to be ensured with long-term strategies pursuant to Article 15.

follows on from the 2013 climate change adaptation strategy "Adapting to climate change: Towards a European framework for action".

The strategy sets out a long-term vision for transforming the European Union into a society that is resilient to climate change and fully adapted to the inevitable impacts of climate change by 2050. It also aims to improve the Union's adaptive capacity and minimise vulnerability to the impacts of climate change, in line with the Paris Agreement and the proposal for a European Climate Law. The Adaptation Strategy has four main objectives:

1. smarter climate change adaptation – improving knowledge and data availability, while addressing uncertainties related to climate change; provide more high-quality and up-to-date data on climate-related risks and losses and transform the Climate-ADAPT platform into a reliable European information platform on adaptation and enhance its functioning;
2. more systemic adaptation to climate change – supporting policy-making at all levels of government, society, the economy and other sectors; enhance the development of adaptation strategies and plans; integrate climate resilience building into macroeconomic policies and promote nature-based adaptation solutions;
3. accelerating adaptation to climate change in all relevant areas – accelerating the development and deployment of adaptation solutions and measures; reduce climate-related risks and economic losses resulting from extreme weather events and ensure the availability and sustainable use of freshwater resources;
4. more effective adaptation to climate change at international level and strengthening global resilience to climate change.

Estonia's obligations towards the European Union

Estonia sets out the principles and milestones for achieving climate neutrality by 2050, mitigating climate change and adapting to the impacts of climate change through the Climate Law, which is in the process of being developed. In order to carry out the tasks necessary for the implementation of the law, the parties responsible and the forms of cooperation in the various fields shall be designated.

The binding GHG reduction targets for Estonia under the Effort Sharing Regulation and the LULUCF Regulation are set out in Table 2.1. The Effort Sharing Regulation establishes binding emission reduction targets for Member States of the European Union for the period 2021-2030 in sectors outside the scope of the EU ETS. Under the new agreement, Estonia aims to reduce greenhouse gas emissions in the above-mentioned sectors by 24 % by 2030 compared to 2005.

According to the accounting principles applied in theLULUCF Regulation, emissions between 2021 and 2025 must not exceed the amounts of carbon sequestrated (the *'no-debit* rule'). According to the update of the LULUCF Regulation, Estonia will need to increase its GHG removals by 0.434 Mt CO_2 eq. by 2030 compared to the baseline level (average for 2016-2018). The national budget for greenhouse gas removals for the period 2026-2029, within which to remain within the limits, will be set in the coming years by means of an implementing act of the Commission.

The European Climate Law, adopted in 2021, requires EU Member States to have national adaptation strategies and action plans, which are periodically reported on and updated regularly.

Table 2.1 Estonia's national binding GHG emission reduction targets for 2030

AIM	EU LEGISLATION

A 24 % reduction in greenhouse gas emissions by 2030 in sectors covered by the ESR compared to 2005	Regulation (EU) 2018/842 of the European Parliament[33] and of the Council and amending Regulation (EU) 2023/857[34]
Ensure that LULUCF emissions from 2021-2025 are offset by carbon sequestration by the same sector	Regulation (EU) 2018/841 of the European Parliament[35] and of the Council and amending Regulation (EU) 2023/839[36]
The relative 2030 removal target for the LULUCF sector, which requires Estonia to increase GHG removals by 0.434 Mt CO_2 eq compared to the baseline level (average for 2016-2018).	Regulation (EU) 2018/841 of the European Parliament[37] and of the Council and amending Regulation (EU) 2023/839

ii. Where applicable, other national objectives and targets consistent with the Paris Agreement and the existing long-term strategies. Where applicable for the contribution to the overall Union commitment of reducing the GHG emissions, other objectives and targets, including sector targets and adaptation goals, if available

On 12 May 2021, the Riigikogu adopted Estonia's long-term strategy, 'Estonia 2035', which sets out five long-term strategic objectives, which are value-based objectives and the basis for the country's strategic choices, and all Estonia's strategic development documents contribute to its implementation. These targets will also be taken into account in the preparation of the country's budgetary strategy and the government's action programme. In order to achieve the objectives, it is necessary to take into account Estonia's development needs, global trends, the European Union's policy framework and the global goals for sustainable development.

According to the strategy, Estonia will be a competitive and climate-neutral country by 2050, with a knowledge-based society and economy and a high-quality and species-rich living environment that wants and is able to reduce the adverse effects of climate change and make the best use of its benefits. Coordinated cultural, social, environmental and economic development is a prerequisite for achieving the SDGs. In Estonia, knowledge-based decisions are taken, with priority being given to efficient and innovative approaches in the choice of solutions.

The "Estonia 2035" action plan will be updated annually, if necessary, on the basis of domestic events affecting the country's development and changes in the external environment. Estonia's 2035 Action Plan is also Estonia's reform agenda presented in the context of the European Semester for economic policy coordination. The current action plan was approved by the government on 28 April 2022. The Action Plan sets a net GHG target of 8Mt CO2 eq. by 2035, including LULUCF. A net GHG emission target for transport of 1 700 kt CO 2 eq. has also beenset.

In March 2022, a proposal to amend the fundamentals of climate policy until 2050 (hereinafter referred to as KPP 2050) was submitted to the Riigikogu in a document setting Estonia's long-term objective of reducing greenhouse gas emissions by 80 % by 2050 in line with Estonia's long-term strategy 'Estonia 2035' to achieve a climate-neutral country by 2050 and to remove the intermediate targets for 2030 and 2040. The amendment to KPP2050 was approved by Parliament on 8 February 2023 (see Table 2.2).

[33] https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32018R0842&from=EN
[34] https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32023R0857&qid=1682600447962
[35] https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32018R0841
[36] https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32023R0839
[37] https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32018R0841

On 8 July 2021, the Government set up the Green Policy Steering Committee to coordinate the implementation of the green transition in Estonia to promote sustainable growth. The tasks of the Green Policy Steering Committee shall be to:

- formulate policy positions related to the green transition in matters falling within the competence of the Government of the Republic;
- find cross-sectoral solutions for implementing the green transition in Estonia;
- approve an action plan for the implementation of the green transition and assess the results of its implementation;
- assess the actions needed to implement the green transition and make proposals for their financing;
- coordinate the actions of executive authorities in implementing the green transition;
- perform other tasks assigned by the Government of the Republic.

On 18 October 2021, an expert group within the Green Policy Steering Committee to make proposals to the government for socially responsible implementation of climate policy was confirmed. The expert group analysed the know-how already developed in Estonia in relation to the green economy, as well as the objectives and basic principles of green policy, mapping existing and under preparation measures, activities and resources, barriers and gaps, and proposed ways to successfully overcome difficulties and effectively measure progress. Throughout the work process, the expert group exchanged information with the public and private sectors and with organisations and experts from outside the Commission. In early April 2022, the final report of the Expert Group was finalised, with the input of the **draft Green Transition Action Plan 2023-2025** being submitted to a public consultation at the end of 2022[38].

Table 2.2 Long-term national objectives for climate change mitigation and adaptation in development documents

AIM	DEVELOPMENT PAPER
The net greenhouse gas emission target for 2035 (including LULUCF) is 8 Mt CO_2 equivalent.	Estonia's 2035 action plan
Estonia's long-term goal is to balance greenhouse gas emissions and removals by 2050 at the latest, i.e. to reduce greenhouse gas emissions to net-zero by that date.	Fundamentals of climate policy up to 2050
A net greenhouse gas emission target for 2035 in the transport sector of 1 700 kt CO 2_{eq}.	Estonia's 2035 action plan
Increase Estonia's national, regional and local level's preparedness and capacity to adapt to the impacts of climate change.	Estonia's 2035 action plan; The 2030 Agenda for Adaptation to Climate Change

Climate Adaptation Development Plan

Adaptation to climate change has been included as a horizontal theme in a number of sectoral development documents and development plans and in the national long-term development strategy "Estonia 2035". The basic principles of the national long-term development strategy "Estonia 2035" have agreed that Estonia must ensure a high-quality and species-rich living environment, as well as preparedness and ability to reduce the adverse impacts caused by climate change and make the best use of the positive effects.

[38] https://www.valitsus.ee/media/5657/download

To achieve this, the aim is to roll out solutions that contribute to the green transition across the board and to support it, in cooperation with local authorities, to mitigate climate change, reduce and adapt to climate change, enhance and conserve biodiversity, diversify the living environment, promote environmentally friendly living arrangements and visitor environments.

In 2017, the Government of the Republic of Estonia adopted the 'Adaptation to Climate Change Development Plan to 2030' (hereinafter referred to as the 'Climate Change Adaptation Plan') together with an implementation plan. The process of drawing up the development plan was supported by the European Economic Association's financial mechanism. The strategic objective of the Climate Change Adaptation Development Plan is to increase Estonia's national, regional and local level's preparedness and capacity to adapt to the impacts of climate change. The implementation of the Development Plan will improve Estonia's preparedness and capacity to deal with climate change at local, regional and national level and identify the most vulnerable areas to climate change. The development plan will plan and manage adaptation in a comprehensive manner through a single strategy paper and consolidate and streamline the approach to adaptation to the impacts of climate change. This will ensure better coherence between the different sectors of adaptation to the impacts of climate change. The Development Plan sets eight sub-objectives according to eight priority areas. These areas are:

1. health and rescue capacity;
2. plans and land use, including coastal areas, other flood/soil risk areas, land improvement, irrigation and drainage, urban plans;
3. natural environment, including biodiversity, terrestrial ecosystems, freshwater ecosystems and environment, Baltic and marine environment, ecosystem services;
4. bioeconomy, including agriculture, forestry, fisheries, game and hunting, tourism, peat production;
5. economy, including insurance, banking and other financial institutions, employment, business and entrepreneurship, industry;
6. society, awareness and cooperation, including education, awareness and science, communication, society, international relations and cooperation;
7. infrastructure and buildings, including technical support systems, transport; and
8. energy and energy supply, including energy independence, security and security of supply, energy resources, implementation of energy efficiency, heat generation, power generation.

Territorial Just Transition Plan

The use of JTM funds is based on the territorial plan, which was drawn up with public participation as an annex to the Operational Programme for EU Structural Funds for the 2021-2027 funding period and negotiated with the European Commission in the same process.

The European Commission endorsed Estonia's territorial just transition plan on 4 October 2022[39]. The general objective of the opening is to enable the transition to a climate-neutral economy in Ida-Virumaa in a way that ensures the well-being of the local community, while supporting businesses in identifying and implementing new business opportunities linked to the transition.

To achieve this, the first and main challenge is to restructure the economy of Ida-Viru County in order to diversify it and create new high value-added jobs.

The development of modern manufacturing industries should be a priority in the context of the transition to a climate-neutral economy due to decades of industrial development, resilient infrastructure networks, the

[39] Ministry of Finance of Ida-Virumaa | (fin.ee)

potential for the development of a large number of unbuilt and brownfield sites and a strong science, technology, engineering and mathematics (STEM) workforce.

Irrespective of the sector of activity, the aim must be to develop future-proof products and services with higher added value, which in turn will create jobs above the average wage levels in the sectors concerned. In order to achieve this objective, it is necessary to use the expertise of local research institutions to increase the technological awareness of local companies and to support them in implementing their own RDI.

Diversification does not happen in itself. The creation of dedicated support infrastructure for the emergence of an active ecosystem for micro-enterprises, start-ups, creative industries, ICT and other aid sectors is therefore essential for the integrated transition of the region's economy. We also need to address the market failures related to access to capital, which have long been a problem for local small and medium-sized enterprises (*SMEs*).

Another major transition challenge is supporting people and communities affected by the transition process. It is necessary to provide a safety net for those for whom the transition means loss of income. If we want to avoid long-term unemployment and poverty, we need to encourage effective re - profiling and provide comprehensive labour market mobility solutions for workers in the oil shale sector.

Local social services need to be modernised to successfully cope with the increase in demand resulting from the economic and psychological consequences of the collapse of the oil shale industry for former workers in the sector and their families. The creation of a well-integrated, accessible and place-specific network of health and social services requires sectorial innovation and development, which is impossible to implement without attracting qualified health professionals to Ida-Virumaa.

Responding to different development needs needs to effectively address both the direct effects of the transition (e.g. labour subsidy schemes) and the long-term structural changes needed in Ida-Viru county (e.g. economic diversification, education, health care).

Renewable electricity target for 2030

According to the Energy Management Organisation Act, by 2030 renewable energy must be at least 100 % ofgross final consumption of electricity. Thus, the production of electricity from oil shale will gradually decrease at the same time as ensuring that there is a certain degree of controllable generation capacity.

Reducing the use of oil shale

The use of oil shale has gradually decreased. While 15.9 million tonnes of oil shale were extracted in 2018, mining volumes have been close to or below 10 million tonnes in recent years. The use of oil shale has changed and electricity production from oil shale has decreased, but the use of oil shale for the production of crude oil has increased. In electricity generation, oil shale electricity accounted for 86 % in 2013, but twice as low as 40 % in 2020, and has thus been on a decreasing trend. The reduction in electricity produced from oil shale is partly covered by biofuels, oil shale ewe gas and wind, but the main part was imported. Until 2018, Estonia was an exporting country for electricity. The situation changed in 2019, when Estonia's electricity production no longer covered the domestic consumption needs and the deficit had to be covered by imported electricity. In this context, the geopolitical situation in 2022 (the Russian-Ukrainian war) turned into a growing need to use local resources, including oil shale, to ensure energy security.

Reducing the use of oil shale must be guided by Estonia's long-term strategy 'Estonia 2035', which sets out to achieve a climate-neutral state by 2050. Reducing the use of oil shale plays an important role both in the deployment of renewable energy and in the development of storage technologies. According to the action programme of the Government of the Republic for 2023-2027, it is planned to pay attention to the construction of storage capacities in proportion to renewable energy. With regard to oil shale extraction, the aim is to favour the exploitation of existing ones rather than opening new mines, and an amendment to the Landground Act is envisaged to set out the principles for oil shale extraction in the future.

Estonian Recovery Plan

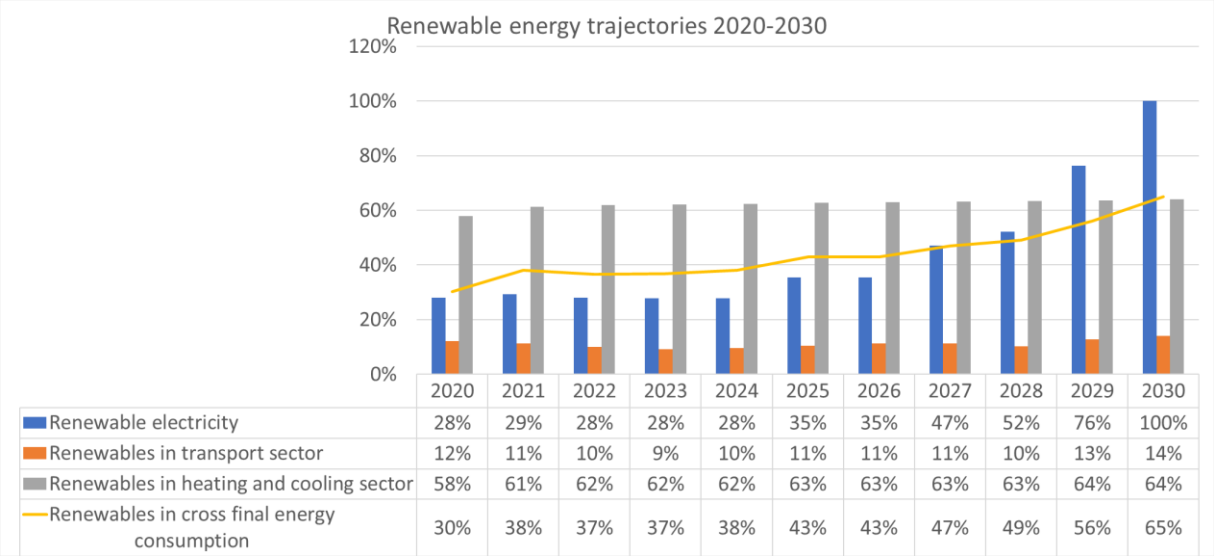
In the context of Estonia's recovery plan, the Council Implementing Decision on the approval of the assessment of the recovery and resilience plan for Estonia is planned as an annex to the reform "Increasing the green transition in the energy economy". The aim is to contribute to the decarbonisation of Estonia's energy production and consumption by updating Estonia's energy policy targets and measures (including the phasing out of oil shale) and by removing administrative barriers to the installation of renewable energy production facilities. Estonia's energy management development plan is updated and targets for renewable energy production, energy efficiency and security of supply are included. Measures to reduce Estonia's dependence on oil shale and targets for phasing out oil shale are also included in the National Energy Development Plan. The reform will also include the adoption of the necessary legislation and guidance material to accelerate the roll-out of renewable energy generation installations, as well as measures to alleviate the protective height limits for wind farms. The implementation of the reform shall be completed by 31 December 2025.

iii. The elements set out in Article 4(a)(2).

Estonia's renewable energy trajectory derives from national renewable energy targets that are more ambitious than the targets set in the Directives ((EU) 2018/2001 and (EU) 2018/1999) agreed at European Union level, with an overall EU target of 42.5 % + a possible 2.5 % and a domestic target of 65 %, including Estonia's renewable energy trajectory in line with milestones (at least 18 % of the overall target in 2022, at least 43 % of the overall target by 2025 and at least 65 % of the overall target by 2027). The trajectories' targets are based on projections that take into account today's trends in renewable energy production and consumption. Estonia's baseline level for renewable energy is the 2020 target of 25 %. From the levels shown in the renewable energy trajectories shown in Figure 2.1, the renewable energy statistics sold in the context of statistical trade shall be deducted.

The 2030 National Energy Development Plan (ENMAK 2030) aims to consume at least 50 % of final energy consumption by 2030 (~16 TWh). In view of the fact that the European Union is increasing its renewable energy targets, Estonia has taken a major step towards more ambitious targets in 2022 with an amendment to the Energy Economy Organisation Act: by 2030, renewable energy must account for at least 65 % (~20.4 TWh) of national gross final energy consumption. The changes in the shares of renewable energy in the different sectors up to 2030 are shown in the figure below. The objectives of the sectors set out in the Law on the Organisation of the Energy Economy in 2022 are as follows:

- At least 100 % renewable energy in gross final consumption ofelectricity
- Renewable energy usedin road and rail transport accounts for at least 14 % of total energy consumed in transport.
- Atleast 63 % renewable energy in gross final consumption ofheat



	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Renewable electricity	28%	29%	28%	28%	28%	35%	35%	47%	52%	76%	100%
Renewables in transport sector	12%	11%	10%	9%	10%	11%	11%	11%	10%	13%	14%
Renewables in heating and cooling sector	58%	61%	62%	62%	62%	63%	63%	63%	63%	64%	64%
Renewables in cross final energy consumption	30%	38%	37%	37%	38%	43%	43%	47%	49%	56%	65%

Figure 2.1 Estonia's share of renewable energy in final energy consumption in general and by sector. Figures for 2022 are based on forecasts. The statistical quantities of renewable energy sold to other Member States in the context of statistical trade must be deducted from the forecasts.

iv. Estimated trajectories for the sectoral share of renewable energy in final energy consumption from 2021 to 2030 in the electricity, heating and cooling, and transport sector

Renewable energy in the electricity economy

The expected trajectory for the share of renewable energy in electricity consumption is shown 2.1.1.iii in Figure 2.1 to this chapter. In the next decade, wind energy (both onshore and offshore) will also have the largest growth potential in solar energy, see Table 2.4.

Wind energy

We see more growth in terrestrial and offshore wind farms at the end of the decade, and we also see the introduction of regulatory and subsidising measures to boost their market entry (See policy measures). By 2030, we set a target for a total increase of 2 GW of capacity both on land and at sea (Table 2.4). An analysis of Estonia's compliance with the 2030 targets, including with the aid of onshore wind, is currently underway.

Solar energy

The target solar production target reached in 2019 at the NECP 2030 (415 GWh) has been met as of 2022. Further growth is seen, in particular, in the form of solar parks created as a result of lower bids, but the actual growth may turn out to be higher.

Hydrogen

In response to the growing demand for hydrogen and electrolysis technologies in Europe, the Government of the Republic decided on 6 January 2022 to allocate a maximum of EUR 67160000 to industrial research and initial recovery of electrolysers and fuel cells until 2026.

Renewable energy in heat management

The expected trajectory for the share of renewable energy in heat consumption is shown 2.1.1.iii in Figure 2.1 to this chapter. Heat pumps have the highest growth potential for heating and cooling, see Table 2.4. Wood in local heating is declining and is replaced by heat pumps and district heating. The use of heat pumps and the connection to district heating are therefore on an increasing trend. The latter is also supported by

the ongoing renovation of district heating infrastructure. The share of renewable energy in the heating and cooling sector continues to be influenced by energy efficiency, as illustrated by the figure below.

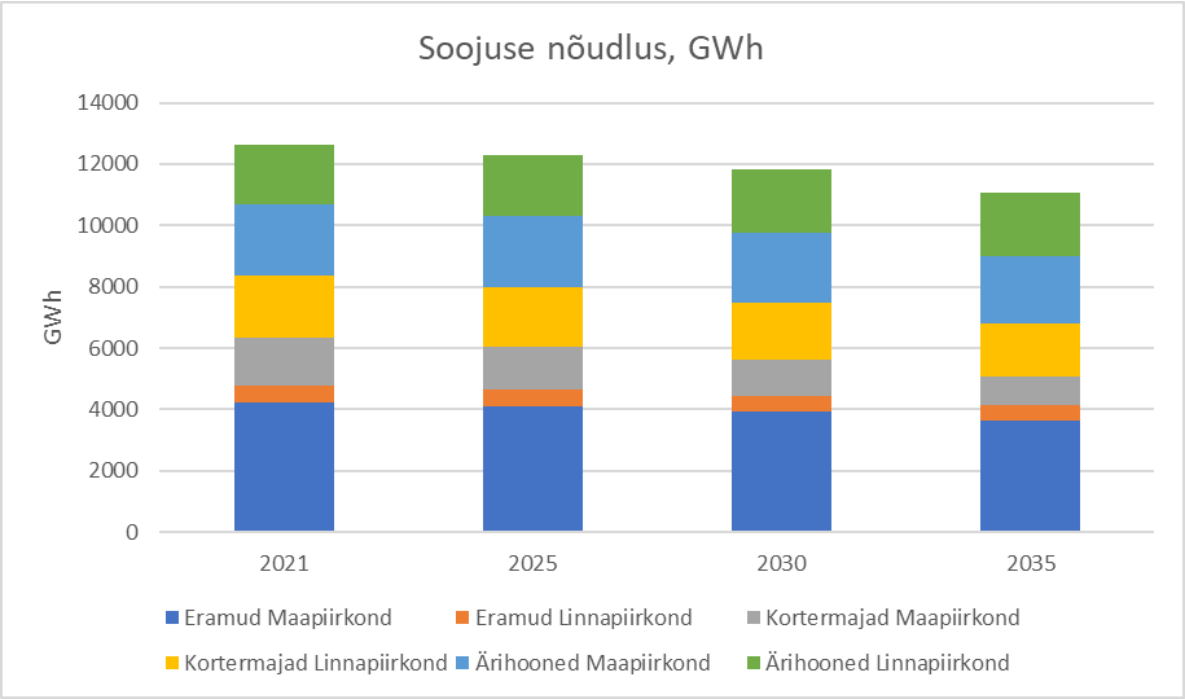


Figure 2.2 Heating demand excluding industry (Estonia's transition to a carbon-neutral heating and cooling economy by 2050)[40]

The study entitled 'Estonia's transition to a carbon-neutral heating and cooling[41]economy by 2050' modelled four scenarios to achieve a carbon-neutral heating and cooling economy by 2050. The action plan proposed by the study will be implemented from 2023. It is important to ensure the long-term sustainability of the heat and cooling economy, including economic viability and the mitigation of potential risks. The study takes into account the pace of renovation of buildings[42]as set out in the long-term strategy for the renovation of buildings. In practice, the pace of renovation is likely to be slower and the volume of consumption may therefore vary accordingly. The action plan resulting from the study includes, inter alia, improving the availability of data, which will allow for more accurate forecasts in the future.

Renewable energy in transport

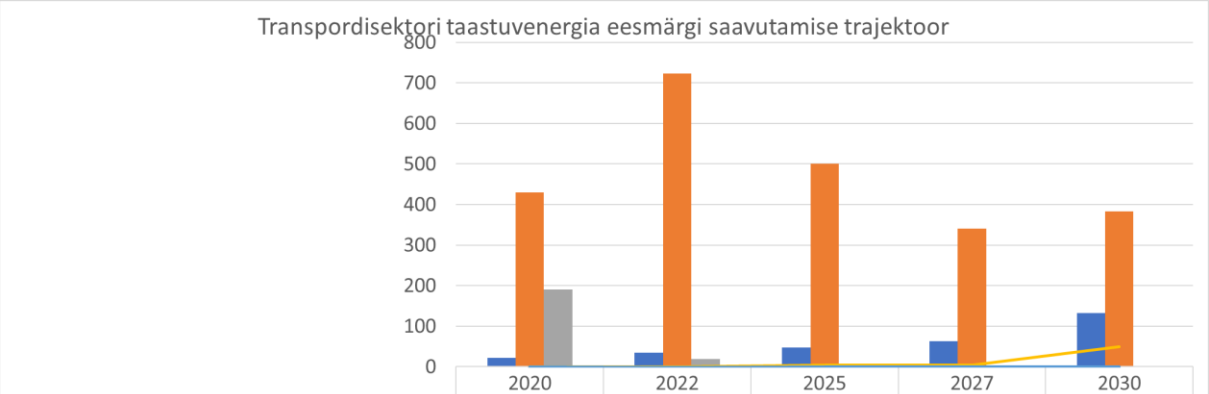
The expected trajectories for the renewable energy transport sector, in line with those set out in the transport article of the new Renewable Energy Directive, can be found in Figure 2.3. The share of biofuels and electricity in the second generation is increasing. We will work to minimise the share of generation I biofuels in transport as soon as possible. We want to cover the consumption of second generation fuels as much as possible with nationally produced fuels. The greatest potential is for domestic biomethane production and use in transport. By 2030, up to 383 GWh of biomethane will be needed to meet the targets (real amount needed, no multipliers). We see a major increase in biomethane use in public transport. As the price of biomethane is linked to the price of natural gas, the price of gas increased as a result of the war that started in 2022 has reduced the use of biomethane in private transport. As long as the price of biomethane is not

[40] Heat and cooling studies | Energies
[41] https://energiatalgud.ee/node/8931
[42] https://www.mkm.ee/media/155/download

decoupled from the price of natural gas, there is no significant increase in the use of biomethane in private transport.

The role of electricity consumption in the transport sector will increase after 2025. The changes brought about by the Clean Vehicles Directive, the depreciation of electric cars and the resulting increase in popularity, as well as the electrification of railways and the completion of Rail Baltic by 2030, will significantly increase consumption. According to the Elering Electricity Consumption Forecast Survey, Rail Baltic adds 54.4 GWh to the electricity consumption. Given the current trends in the registration of primary electric cars, the forecast of electricity consumption4 assumes that by 2030 there will be almost 31000 electric cars on the roads. The contribution of the types of energy carriers and biofuels shown in the graph below is expressed in terms of 'no multipliers' or 'real' quantities, but the final target takes into account multipliers (e-mobility X 4 and electricity for rail transport 1.5 X, where the two-yearly renewable electricity share is taken into account in the calculation; biofuels produced from raw materials listed in Part A of Annex 9 to the Renewable Energy Directive shall be counted twice). The use of renewable electricity has been taken into account in terms of the share of renewable electricity two years ago.

In view of our obligations under the new Alternative Fuels Infrastructure Regulation[43] and the Renewable Energy Directive for hydrogen production and consumption, we have projected in the hydrogen roadmap for 2030 the construction of at least three hydrogen refuelling stations on the main national roads. To meet the resulting requirements, it is estimated that 1095 tonnes of green hydrogen will be needed annually by 2030. If consumption is expected to surpass in 2030, more green hydrogen can be produced. For example, 450 MWh of renewable electricity can be produced in the order of 8000 tonnes of green hydrogen per year. However, the lack of large-scale consumption of hydrogen, including fuels of non-biological origin, is important for the uptake of bottleneck hydrogen (i.e. there is no industry to boost the hydrogen market).



	2020	2022	2025	2027	2030
Elektritransport (taastuvelekter, GWh)	22	35	47	63	132
II generatsiooni kütused (GWh)	430	723	500	340	383
I generatsioonikütused (GWh)	191	19	0	0	0
Vesinik (GWh)	0	0	4	4	50
RES-T %	12%	10%	11%	11%	14%

Figure 2.3 Contribution of different energy carriers and biofuel types to the renewable energy target for transport (GWh)

Summary of renewable energy growth by sector

Table 2.3 below shows the total projected renewable energy increments of more than 7 TWh per sector in Gigawatt-hours.

[43] New law agreed to deploy alternative fuels infrastructure (europa.eu)

Renewable electricity production shows an increase with the target of producing the same amount of renewable electricity by 2030 as Estonia's gross final consumption. The objective is mainly achieved by solar and wind power.

In the transport sector, there is initially a decline in the use of renewable energy due to the shift from biofuels to electric cars, which are more energy efficient and for which multipliers are taken into account within the final target.

The production of heat and cooling from renewable sources is increasing mainly due to the deployment of heat pumps and the transition to the district heating network.

Table 2.3 Estimated renewable energy growth by sector

Sectoral increment (GWh)	2021	2030	increment
Renewable electricity production	2 885	9400	6 515
Use of renewable energy in transport (no multiples)	678	565	0
Production of heat and cooling from renewable sources	10 130	11 000	870
Total energy from renewable sources (total)	13 744	20 965	7221

v. Estimated trajectories by renewable energy technology that the Member State projects to use to achieve the overall and sectoral trajectories for renewable energy from 2021 to 2030, including expected total gross final energy consumption per technology and sector in Mtoe and total planned installed capacity (divided by new capacity and repowering) per technology and sector in MW

The renewable energy targets agreed at EU level and at national level will be achieved in the most cost-effective way, with high efficiency and market-driven keywords being keywords. We want to contribute to the development of renewable energy to solutions that make the most of Estonia's geographical and natural conditions. Biomass also plays animportant role, where we prefer solutions that maximise the value of this resource. Its use takes into account sustainability and biodiversity conservation aspects and the sustainability criteria for biomass stemming from the Renewable Energy Directive (EU) 2018/2001. Compliance with these criteria must be demonstrated (e.g. by means of corresponding certificates attesting to sustainable forest management and production of wood fuels). Key to achieving the objectives, we see important potential for synergies between sectors, such as energy efficiency, energy efficiency in buildings and renewable energy solutions.

Specific renewable energy trajectories by sector and technology are outlined in chapter 2.1.2.i. If as of 2021 a total of 13.1 TWh was produced in Estonia for electricity and heat generation, by 2030 there will be additional capacity to produce around 7.3 TWh. The contribution of renewable energy technologies to the renewable energy target compliance curve on a sector-by-sector basis is presented in Table 2.4.

Table 2.4 The contribution of renewable energy technologies to the renewable energy target trajectory on a sector-by-sector basis.

Contribution of renewable energy technologies to the targets (GWh)	2020	2022	2025	2027	2030
Gross final energy consumption (GWh):	34 336	35 750	34 410	34 275	34 000
Renewable electricity production:	2733	2570	3469	4619	9400*
Hydropower	30 (8 MW)	25 (8 MW)	25 (8 MW)	25 (8 MW)	25 (8 MW)
Wind energy	844 (310 MW)	664 (310 MW)	974 (520 MW)	2 624 (810 MW)	6 840 (2 310 MW)
Including onshore wind energy	844 (310 MW)	664 (310 MW)	974 (370 MW)	2 624 (810 MW)	3124 (1 310 MW)
Including offshore wind**	0	0	0	0	3 715 (1 000 MW)
Solar energy	245 (290 MW)	506 (607 MW)	936 (1 100 MW)	936 (1 100 MW)	1000 (1 200 MW)
Biomass***	1 746 (1 300 MW)	1 400 (1 050 MW)	1 540 (1 100 MW)	1 540 (1 100 MW)	1 540 (1 100 MW)
Renewable energy consumption in transport (no multipliers):	643	753	695	407	565
Electromobility (renewables (renewables)****)	22	35	47	63	132
Generation 2 fuels	430	723	500	340	383
Including biomethane*****	100	168	144	240	383
I Generative Fuels	191	19	0	0	0
Hydrogen	0	0	4	4	50******
Renewable energy consumption in the heat economy:	10130	10160	10475	10685	11000
District heating	5 063	4 960	4 900	4 860	4 800
District heating	4 046	4 160	4 400	4 560	4 800
Heat pumps	1022	1 040	1 175	1 265	1 400

**Given the Elering electricity consumption forecast[44], while the Estonian study on the transition to climate-neutral electricity generation based the scenario modelling on 11.3 TWh in 2030[45], the Estonian Renewable Energy Chamber estimated it to be 13 TWh[46]. When preparing the updated version of the NECP 2030, the forecast of electricity consumption shall be updated taking into account different inputs.*

***If the Government of the Republic of Estonia decides to support offshore wind farms. Otherwise, the offshore wind target will be recalculated according to the onshore wind target.*

****Thermal power, including electric power 1/3.*

***** Taking into account the share of renewable electricity two years ago (RED II methodology) and the electricity consumption of electric vehicles used in the GHG projections of 15.03.2023.*

****** Taking into account the projections for the consumption of biomethane in transport underlying the GHG projections of 15.3.2023.*

******* Application of AFIR fuelling station requirements*

In the heating and cooling sector, we see an opportunity to raise ambition. Estimates and explanations are provided in Chapter 4.2.2 for this purpose.

[44] Estonian report on security of electricity supply 2022 Table 4.2 elering_vka_2022.indd

[45] Electricity surveys | Energy Talks

[46] Estonia-Electricity Consumption – PROGNOOS-ASEAN-2030.pdf (Renewable Energy.ee)

vi. Where available, expected trajectories showing the demand for bioenergy, disaggregated by heating, electricity and transport sector, and the supply of bioenergy by source and origin (separately for domestic production and imports). For forest biomass, an assessment of its source and impact on the LULUCF sink, if available.

Estonia's bioenergy trajectories up to 2030 are shown in Figure 2.4.

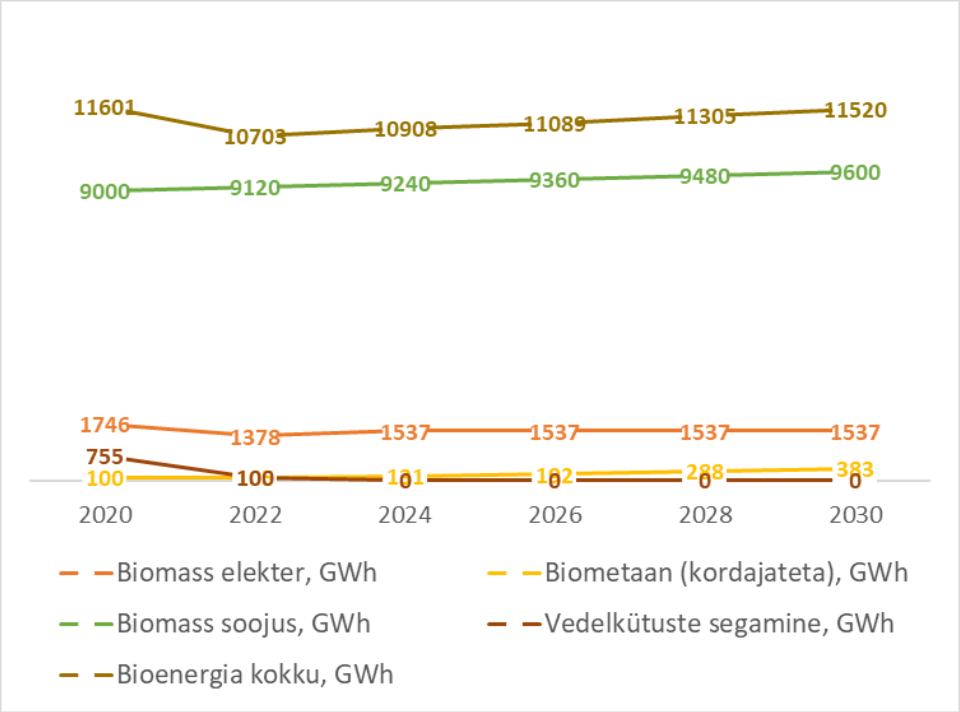


Figure 2.4 Estonia's bioenergy production (GWh) until 2030.

Coverage of bioenergy demand is limited by the ecological boundaries of the bioeconomy – weather conditions, tightening climate requirements (including the LULUCF carbon sequestration obligation), ensuring the functioning of the EU's green network to protect biodiversity, tightening sustainability criteria for biomass, increasing use of biomass as a substitute for fossil materials, and changes in fuel prices. The use of wood and wood fuels has continued to grow. In 2020, a total of 11.2 million m³ of wood was harvested from and outside forest land, using 5.9 million m³ of public energy and exporting 2.4 million m³ of wood in the form of wood pellets, i.e. more than half of the [47] total wood harvested. In 2017, 2.4 TWh of thermal energy was produced with wood-fired boilers and in 2021, power plants produced a record 6.1 TWh of heat and 3.4 TWh of electricity from wood fuels (total plant output of 9.5 TWh)[48].

A total of 17 biogas plants operate**in Estonia. Of which 5 agricultural biogas plants, 7 wastewater treatment and industrial waste water treatment plants and 5 landfill gas production units**. In 2022, Estonia produced **168 271 MWh of biomethane, of which** 35365 MWh was produced from sewage sludge, 55 277 MWh from animal manure, 35 988 MWh from food industry residues, 37 635 MWh from biowaste and 4 006 MWh from other biomass for Estonia[49]'s biomethane production potential, which is more[than]half of Estonia's natural gas

[47] Sirkas, F. (Environment Agency) 2022 Wood Balance. Overview of wood use volumes 2020. https://keskkonnaportaal.ee/sites/default/files/Teemad/Mets/Puidubilanss%202020.pdf
[48] Statistical data sheets KE033, KE035, KE043 www.stat.ee
[49] Biomethane certificates of origin | Elering and http://eestibiogaas.ee/

consumption in recent years.[50] In 2023, an additional audit is planned to update the prediction of biomethane potential in one activity, taking into account changes in the directives and rules in recent years.

Estonia has a forest area of 2.32 million hectares, of which about 25 % is subject to economic restrictions, including 30.3 % of forest land, and 17.5 % of forests are strictly protected[51]. Forest land timber stock in 2021 was 463.8 million m^3. The authorised logging volumes are defined in the forest development plans, which must be approved by the National Assembly, for a period of 10 years. The resulting Forest Development Plan 2021-2030, which has not yet been approved by the National Assembly, provides for an annual harvest of between 9 and 11 million m/year[during] this decade. Thus, the volume of logging was found to be the best solution when considering all aspects of sustainability.

vii. Where available, other national trajectories and targets, including long-term and sectorial (e.g. share of renewable energy in district heating, renewable energy use in buildings, renewable energy produced by cities, energy communities and self-consumers, energy from sludge from waste water treatment).

Share of renewable energy in district heating

In the heat sector, there has been a constant shift to renewable sources in recent years, which have now reached a share of 51.64 %. More and more boiler houses and CHP plants have switched to renewable fuels, and according to 2022 data, the share of renewable energy in district heating was 56[52]%, of which 93 % have received an efficient district heating label. The label "Efficient district heating" shall be awarded to a district heating system that uses at least 50 % renewable energy or 50 % waste heat or 75 % cogenerated heat or a 50 % combination of such energy and heat, as set out in the European Union Energy Efficiency Directive 2012/27/EU, for the production of heat. The label certifies the efficiency of the district heating system and the share of renewable or cogeneration energy in the heat transferred through the network. Biomass used in heat management must comply with the sustainability criteria under the Renewable Energy Directive (EU) 2018/2001 and take into account the waste hierarchy. InEstonia, 100 district heating network areas[53] and 3 district cooling systems are efficient[54].

Renewable energy use in buildings

The residential and energy sectors are very closely linked, the energy needs of buildings being an important part of Estonia's energy balance. At the same time, both have great potential for energy savings, with buildings accounting for around 40 % of total energy consumption in the European Union. In 2021, the energy consumption of buildings in Estonia was 53 % of the total energy balance. The main energy consumed is electricity, gas and heat, the latter representing the largest share of the energy consumed. The policies implemented by the State to improve energy efficiency are increasingly driving the uptake of energy-saving buildings and the renovation of buildings to reduce energy dependency and greenhouse gas emissions in the housing stock. We see that renewable energy solutions need to be implemented to make buildings more energy efficient, where possible and in terms of cost-effectiveness.

Renewable energy communities and self-generated renewable energy

The renewable energy community is defined in both the Electricity Market Act and the Energy Organisation Act, which provides the necessary legal clarity and certainty to those interested in community energy. For a

[50] Estonian Biogas Association http://eestibiogaas.ee/tootmine-ja-kasutamine/
[51] | Environment Portal for Forest Statistics
[52] Opinion OF THE GENERAL SYSTEM OF THE GENERAL CONCLUSIONS ON THE SECURITY OF THE SECURITY OF THE SECURITY ON THE SECURITY FOR 2050, calculated on the basis of | Energiatals
[53] Efficient district heating systems – EJKÜ (epha.ee)
[54] Efficient district cooling systems – EJKÜ (epha.ee)

more detailed explanation, see Chapter 3.2.v. Today's legal space in Estonia allows for the creation of renewable energy communities and the production of renewable energy for self-consumption. Estonia distinguishes in Western European energy market design with openness – in Estonia it is possible to create a legal entity in minutes and to define itself in accordance with the Energy Market Acts. The definition shall be made by a clause to be inserted in the statutes. The challenge for community energy is the creation of an appropriate value offer to the community, the identification of community shareholders and their role (local resident, regional company, not-for-profit association, local authority, housing association, etc.)The main objective is not to make a profit, which makes it unlikely to make a positive financing decision from financial institutions. A working group led by the Tartu Regional Energy Agency (TREA), closely involving the Ministry of Economic Affairs and Markets, RAM and all market players interested in the sector, is helping to kick-start energy communities. A handbook for renewable energy communities was finalised in 2020[55].

Local Energy and Climate Plans and Clean Energy Islands (CE4EUI)

Estonia has recently implemented national measures to facilitate the clean energy transition in municipalities, including islands. As regards the networks, EUR 60 million have been invested in strengthening Western Estonia's networks and expect the transmission system operator to build a 330 kV network in Saaremaa, which would strengthen the islands' interconnections.

The largest islands (Hiumaa, Saaremaa, Muhu and the municipality of Vorms as part of the Western Energy and Climate Plan) have also been leading the way in drawing up energy and climate plans.

In 2022, several workshops were allocated to local authorities, including islands, for the preparation and implementation of the energy and climate plans[56]. Regular contacts with local authorities are also taking place through quarterly roundtables.

Mapping of go-to areas

Under the REPowerEU scheme, the Environmental Agency is mapping go-to areas where a faster permit-granting process is in place. Given that there are ambitious targets for renewable electricity generation, that solar energy targets are being met in market conditions and that wind energy potential in Estonia is still largely untapped, go-to areas are designated primarily for the development of wind energy. At least 500 km^2 sites will be mapped to ensure that the 2030 national targets are met. The final mapping will be available in the first quarter of 2024.

Public energy use

Public electricity consumption accounts for around 12 % of Estonia's total consumption. The public sector purchases electricity through various bodies. Local authorities account for the largest share of public consumption (44.1 %) (Table 2.5).

Table 2.5 Share of public expenditure on electricity:

Subsector	Intensity
Local authorities	44.10 %
Central government SAs, entities and other entities	27.92 %
Public law entities of central government	9.41 %
Local government SA, NGOs, ÄÜs	9.31 %

[55] Co2mmunity_Manual.pdf (trea.ee)
[56] LA Workshops | Energiatals

Central government state budget agencies	9.05 %
Social security funds	0.20 %
Other public sector entities	0.01 %
Total:	100 %

The central purchasing body of the central government for electricity is Riigi Kinnisvara AS (RKAS). In order to gradually shift the public sector towards renewable energy consumption, in 2022 State Kinnisvara AS carried out a joint procurement of renewable electricity for all areas of government in order to contribute to the target. The objective of the tender was to shift nearly half of central government consumption to[57] renewable energy through the implementation of a long-term renewable power purchase agreement. As a result of the procurement, the public sector uses renewable electricity on a 10-year fixed-price contract. The call for tenders carried out in 2022 failed because the terms of the tender did not meet expectations. Due to high prices, developers were not prepared to submit bids with the set cap. The updated tender will be carried out either in 2023 or 2024.
When designing and implementing the procurement, there is a desire to lead by example with the purchase of renewable energy with long-term contracts. If the renewed tender is successful, other public parties will be able to implement the contracts and conditions developed. The planned procurement is a pilot procurement that will allow a similar approach to be further implemented by the central government in the further transition to renewable energy.

2.2. Dimension energy efficiency

i. The elements set out in Article 4(b)

Pursuant to Article 4(b) of Regulation (EU) 2018/1999, the NECP 2030 is to provide:

- the general objective of energy efficiency;
- cumulative end-use energy savings from 2021 to 2030;
- indicative milestones for the renovation of buildings by 2030, 2040 and 2050;
- total area of central government buildings undergoing renovation in 2022-2030.

Estonia had an EU average of 8 final energy consumption per capita in 2020 among the EU Member States. (2017=7) above, see Figures 2.5 and 2.6.

[57] Green procurement | Riigi Real Estate (rkas.ee)

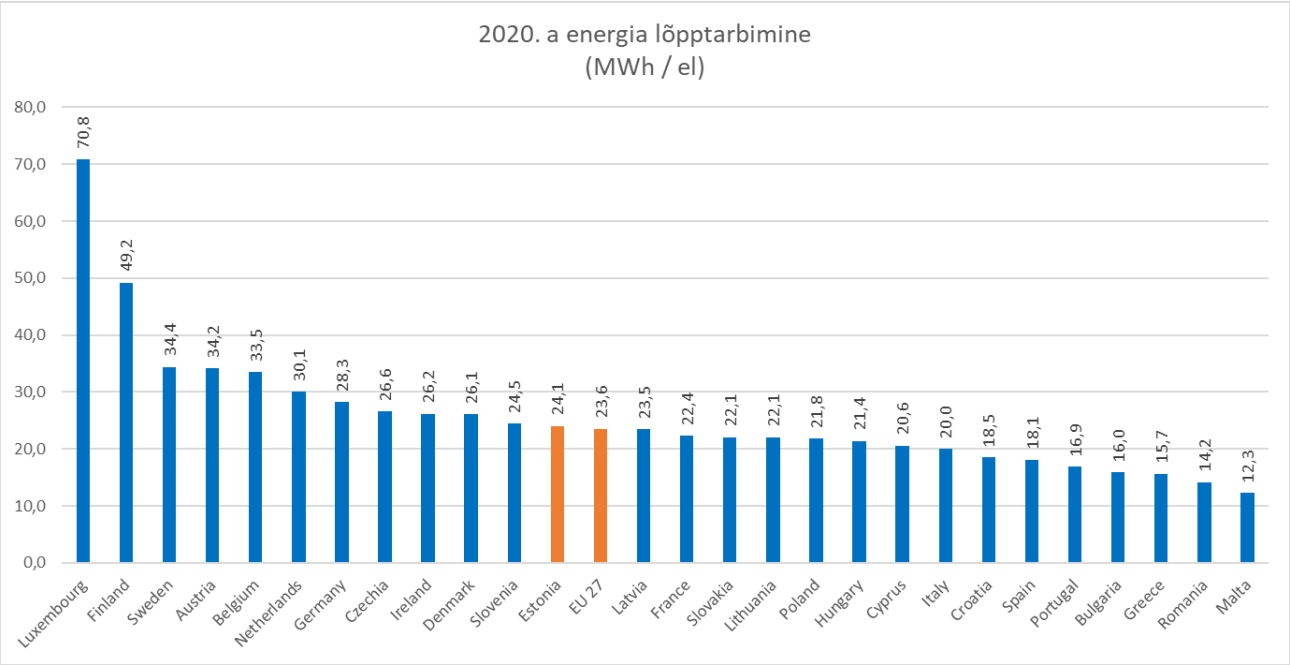


Figure 2.5 Final energy consumption per capita in EU Member States in 2020 (based on Eurostat data).

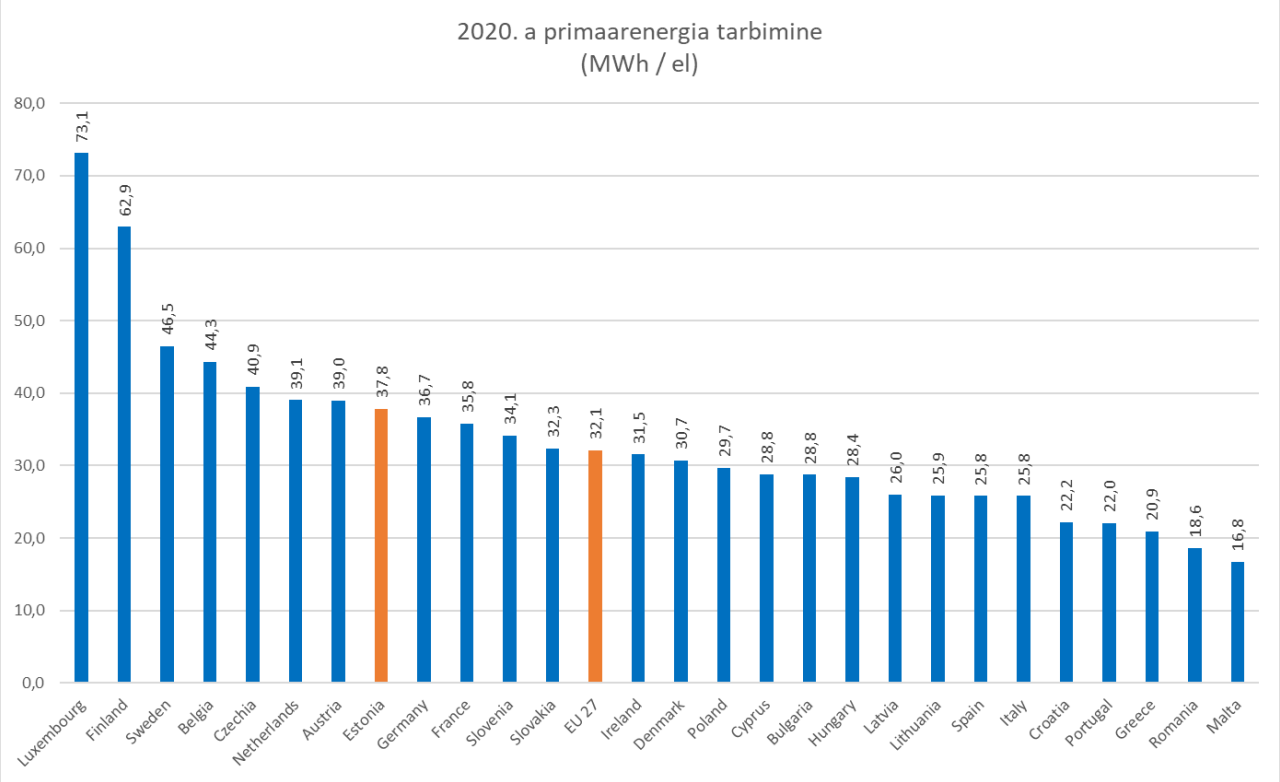


Figure 2.6 EU Member States' per capita primary energy consumption in 2020 (based on Eurostat data).

Estonia continues to account for the majority of electricity consumption in labour-intensive sectors. Figure 2.7, published by Odyssee-Mure below,[58] shows that the question is not such a high energy consumption, but a comparable picture of GDP, which is still growing, i.e. Estonia is still a developing economy.

[58] Odyssee-Mure. Final consumption by sector (EU countries, 2019), https://www.odyssee-mure.eu/publications/efficiency-by-sector/overview/final-energy-consumption-by-sector.html

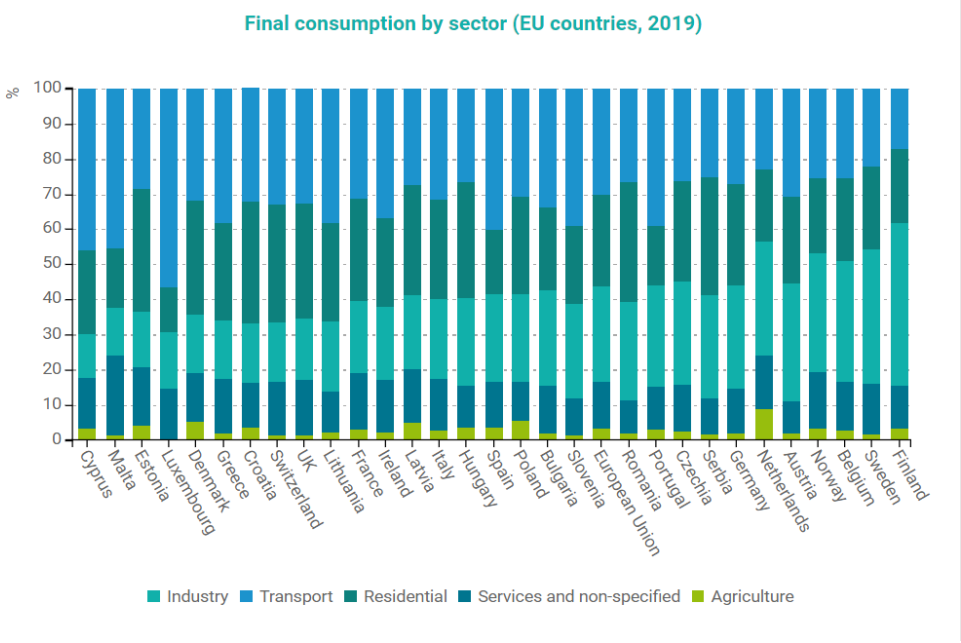


Figure 2.7 Share of different sectors in energy consumption in EU countries 2019[59]

Overall energy efficiency target

Each Member State must contribute fairly to the EU's overall energy efficiency target set in the Energy Efficiency Directive, according to which the EU's primary energy consumption in 2030 must not exceed 993 Mtoe and/or the EU's final energy consumption must not exceed 763 Mtoe. To this end, the Member State must set its own indicative contribution to the achievement of the EU energy *efficiency target (hereinafter the overall energy efficiency*target).

ENMAK 2030 describes primary energy consumption, final energy consumption and energy intensity in 2030 (see Tables 1.2 and 1.3 of ENMAK 2030) as expected results from the implementation of the measures. According to ENMAK 2030, the expected primary energy consumption in 2030 is 10 % lower than in 2012, the final[60]energy consumption is 32 TWh (115 PJ) and the Estonian economy has an energy intensity of EUR 2 MWh/1000 of GDP 2012.

As regards energy efficiency, the October 2014 European Council conclusions on the EU 2030 climate and energy policy framework[61] were based on a Communication from[62]the European Commission describing the different levels of Europe's 2030 primary energy consumption and the potential impacts of achieving those levels. In the context of the development of the EU's energy efficiency target, it is most appropriate to focus national energy policy on primary energy consumption as a whole and to base its overall energy efficiency target on primary energy consumption in 2030. Other possible bases for setting an overall energy efficiency target are final energy consumption, energy savings in primary energy consumption or final energy consumption in 2030 and energy intensity.

[59] Final energy consumption by energy sector in EU | ODYSSEE-MURE

[60] In 2012, according to EUROSTAT, Estonia's total inland energy consumption in 2012 was 256 PJ, i.e. according to ENMAK 2030 the primary energy consumption in Estonia can be up to 230 PJ.

[61] European Council (23-24 October 2014) – Conclusions, http://data.consilium.europa.eu/doc/document/ST-169-2014-INIT/et/pdf

[62] COM(2014) 520 final, Energy efficiency and its contribution to energy security and the 2030 climate and energy framework, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1528977372755&uri=CELEX:52014DC0520

The Regulation on the Governance of the EU Energy Union and Climate Action requires Member States to take into account in their overall energy efficiency targets the measures of the EU Energy Efficiency Directive, additional national measures to achieve energy efficiency at national and EU level, and may take into account other factors affecting primary and final energy consumption in the Member State. These other circumstances may include, for example:

- cost-effective future energy savings potential;
- changes in gross domestic product;
- changes in energy imports and exports;
- changes in national energy balances, development of carbon storage capacities;
- efforts made in the past to achieve energy efficiency.

Against this background, Estonia set a target for 2030 to maintain the current level of final energy consumption and to reduce primary energy consumption by up to 14 % compared to its peak in recent years (2013-69.4 TWh), Figure 2.8 (but the recast Energy Efficiency Directive will lead to a more ambitious primary energy consumption target of ~45 TWh, i.e. a 35 % reduction of primary energy consumption after its entry into force).

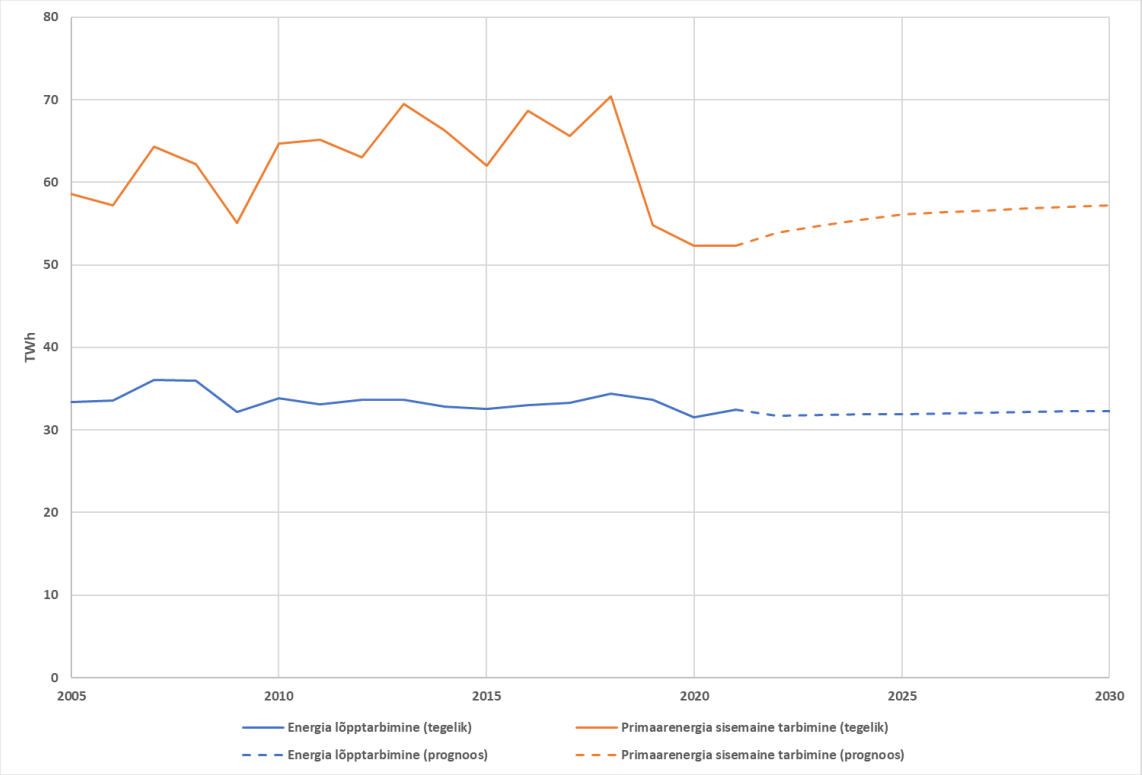


Figure 2.8 Estonia's actual and projected final energy consumption and domestic primary energy consumption up to 2030.

Cumulative end-use energy savings 2021-2030

Article 8 of the EED obliges Member States to achieve end-use energy savings. The amount of savings required shall be determined on the basis of the average final energy consumption. Next, between 2021 and 2030, annual energy savings will be 1.3 % (2024-2025), 1.5 (2026-2027), 1.9 % (2029-2030) of the average final energy consumption for the years 2017-2019. The achieved energy savings must be cumulative, i.e. the amount of savings achieved in previous years must be maintained throughout the period.

The calculation of the required cumulative energy savings is provided in Table 2.6.

Table 2.6 Cumulative energy savings required between 2021 and 2030

Difficulty	Value	Comments
Final energy consumption 2 017 TJ	120 038	Source of data: Eurostat table Simplified Energy Balances or nrg_bal_s[63]
Final energy consumption in 2 018 TJ	123 790	
Final energy consumption in 2019, TJ	121 189	
Average final energy consumption, TJ	121 672	2017-2019 average final energy consumption
Annual energy savings required, TJ	967 (0.8 %); 1571 (1.3 %); 1812 (1.5 %); 2296 (1.9 %)	0.8 %, 1.3 %, 1.5 %, 1.9 % of average final energy consumption
Total cumulative milestones over the period	55	Taking into account the principle of cumulation, the period 2021-2030 can be considered as 55 individual milestones where the energy savings target for each part is equal to the percentage of average final energy consumption corresponding to its period, Figure 2.9.
Required energy savings 2021-2030, TJ	76 604	See Figure 2.8
Required energy savings 2021-2030, GWh	21 279	1 GWh = 3.6 TJ

Different methods can be applied to calculate the required cumulative energy savings under the EED. However, the implementation of these methodologies will not change the amount of cumulative energy savings required between 2021 and 2030.

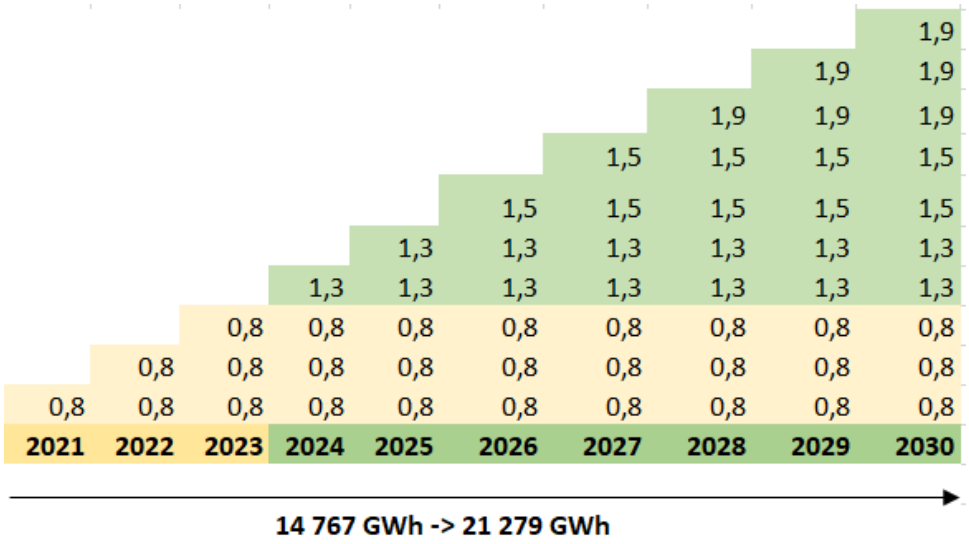


Figure 2.9 Cumulation of the principle of energy savings for the period 2021-2030

Total area of central government buildings undergoing renovation in 2022-2030

Under Section 5 of the Energy Management Organisation Act, 3 % of the total net surface area of buildings occupied by central government, where the central government uses more than 250 m² and which do not meet the minimum energy performance requirements, must be brought into compliance each year. As of 1 January 2022, the total useful floor area of buildings with a total useful floor area of more than 250 square metres occupied by the central government on the basis of an ownership or use contract located in the

[63] Simplified energy balances [NRG_BAL_S__custom_6386655]
https://ec.europa.eu/eurostat/databrowser/bookmark/a08acb54-9baa-4e17-8653-bce41446ec9a?lang=en

territory of the Republic of Estonia was 1 374 435 m². Of this, 539 125 m² met the requirements and the area not complying with the minimum requirements applicable in 2022 was 835310 thousand m². Thus, a total of 200 281 m² of central government buildings will have to be renovated in order to reach the target between 2022 and 2030. Compared to 2019, the target increased as the minimum requirements for buildings were amended as of 1 January 2019 and are higher than the class C energy label from that period onwards. In 2030, the minimum requirements would then be 739 406 m². [64]

Summary

Estonia's energy efficiency targets are presented in Table 2.7.

Table 2.7 Estonia's 2030 energy efficiency targets

ENMAK 2030 target: 2. More efficient use of primary energy: Estonia's energy supply and consumption is more sustainable	
Title of the objective	Aim
Overall energy efficiency target: primary energy consumption in 2030	≤ 230 PJ[65]
Cumulative end-use energy savings 2021-2030	21 279 GWh
Final energy consumption	120 PJ
Total area of central government buildings undergoing renovation in 2021-2030	296 185 m 2

According to primary energy consumption projections, primary energy consumption in 2030 is likely to be somewhat below the ENMAK 2030 target, assuming that we can achieve cumulative end-use energy savings (at least 21 279 GWh). According to the recast EED, the indicative primary energy consumption limit for Estonia is around 162 PJ and the final energy consumption limit at 108 TWh, but these figures will be further calculated after the entry into force of the Directive (expected in autumn 2023).

ii. The indicative milestones for 2030, 2040 and 2050, the domestically established measurable progress indicators, an evidence-based estimate of expected energy savings and wider benefits, and their contributions to the Union's energy efficiency targets as included in the roadmaps set out in the long-term renovation strategies for the national stock of residential and non-residential buildings, both public and private, in accordance with Article 2a of Directive 2010/31/EU

The long-term strategy for the renovation of buildings (REKS)[66] was submitted to the European Commission under the Energy Management Organisation Act and on the basis of ENMAK 2030 in 2020. The main objective of the strategy is the complete renovation of the building stock built before 2000 by 2050.

Table 2.8 Area of renovation of buildings (mm^2) until 2030.

Area distribution of renovation volumes reported in the REKS up to 2050 (area in m m^2)							
Period	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050	TOTAL
Private houses	0,4	0,95	1,9	3,1	3,9	3,8	14

[64] Ministry of Finance data 2023.
[65] ENMAK 2030 target
[66] https://energy.ec.europa.eu/system/files/2020-09/ee_2020_ltrs_official_translation_en_0.pdf

Apartment buildings	2,2	3,2	4	3,9	3	1,8	**18**
Private non-residential buildings	0,84	1,8	3,2	4,2	4,1	2,9	**17**
LA buildings	0,68	1,4	1,3	0,48	0,07	0	**4**
Central government buildings	0,2	0,24	0,23	0,15	0,07	0,02	**0,9**
Total	**4,4**	**7,6**	**10,6**	**11,8**	**11,1**	**8,5**	**53,9**

ENMAK 2030 sets targets and measures for the renovation of buildings. These targets can be achieved by producing more renewable energy in buildings. As a result of the implementation of ENMAK 2030 actions, results are expected, as described in Table 2.9.

Table 2.9 ENMAK 2030 benchmarks and measures for renovation of buildings

ENMAK 2030 target: 2. More efficient use of primary energy: Estonia's energy supply and consumption is more sustainable		
ENMAK 2030 action	Barometer	Indicative target
2.4.	The share of small residential buildings in the total building stock with an energy performance rating of at least class C or D.	≥ 40 %
2.4.	The share of multi-dwelling buildings in the total building stock with an energy performance rating of at least class C.	≥ 50 %
2.4.	The share of non-residential buildings in the total building stock with an energy performance rating of at least class C.	≥ 20 %

The renewed long-term renovation strategy was submitted to the European Commission in 2020[67]. This document does not address the indicative milestones for 2040 and 2050 of the EU's Energy Performance of Buildings Directive (EU) 2018/844, to be presented in 2020 under[68] Article 2a of the Building Renovation Strategy.

iii. Where applicable, other national objectives, including long-term targets or strategies and sectoral targets, and national objectives in areas such as energy efficiency in the transport sector and with regard to heating and cooling

ENMAK 2030 comprehensively addresses energy consumption in transport and the district heating sector, including cogeneration. ENMAK 2030 also attaches importance to the modernisation of street lighting and energy savings in manufacturing plants. The use of oil shale in Estonia's energy management has a

[67] Article 55(1)(b) of Regulation (EU) 2018/1999, Renovation Wave | Ministry of Economic Affairs and Communications (mkm.ee)
[68] http://data.europa.eu/eli/dir/2018/844/oj

significant impact on efficiency. One of the strategic objectives of the 'National Development Plan 2016-2030 for the Use of Oil shale', approved by[69] the *Estonian Parliament on 16 March*2016, is to increase the efficiency of the use of oil shale and to reduce the negative environmental impact. Measures to improve energy efficiency in the different sectors aim at achieving indicative targets, as described in Table 2.10.

In order to achieve clean transport, support must be given to the uptake of new fuels, such as (green) hydrogen, and to the testing and, where possible, deployment of other energy-saving and greening technologies. There is a need to support the development and deployment of hydrogen and other renewable gaseous fuels technologies at EU level and to make hydrogen technologies more accessible and competitive. In order to achieve technological maturity and a more competitive price, hydrogen must also be used in bus, rail and maritime transport[70].

The Transport and Mobility Development Plan foresees a transport energy consumption of 8.3 TWh by 2035, of which the share of renewable energy must be at least 24 %. This would be achieved by abalanced shift towards environmentally friendly modes of transport, i.e. the share of public transport, cycling and walking should be 55 % by 2035, including 60 % in urban areas. The baseline in 2020 was 38 %.

Table 2.10 Sectoral targets for energy efficiency

ENMAK 2030 target: 2. More efficient use of primary energy: Estonia's energy supply and consumption is more sustainable		
ENMAK 2030 action	Barometer	Indicative target
1.1	4. Electrical capacity of additional CHP plants producing district heating grid installed between 2020 and 2030, MW_{el}	25 MW_{el}
2.2	1. Transport demand[71] for passenger cars compared to 2010, % increase	growth ≤ 5 % (2030)
2.3	2. Fleet fuel consumption in 2030 does not exceed 2012 levels	≤ 8.3 TWh
2.6	1. Reduction of heat losses in district heating by 2030 (compared to 2012), TWh	TWh
2.8	1. Energy savings in production plants, GWh/y	460 (in 2023)
2.8	2. Number of renovated street lighting points	22000 (in 2023)
Pak 2030 strategic goal		
2.	1. Energy efficiency of shale oil production, %	more than 76 % (to be specified in 2025)

The measure to renovate depreciated and inefficient heat pipelines has achieved cumulative energy savings of 72.4 GWh/y as of 2021, while reducing CO2 emissions by 12760 tonnes per year.

The projected accompanying primary energy savings over the period 2021-2030 are 241.15 GWh and include the savings achieved in the previous period, totalling 424.52 GWh[72].

[69] https://www.riigiteataja.ee/aktilisa/3180/3201/6002/RKo_16032016_Lisa.pdf#
[70] Transport and Mobility Development Plan 2021-2035 (mkm.ee)
[71] Thedemand for transport makes it possible to monitor changes in the volume of passenger car movements and thus to assess the extent to which the various measures have contributed to the overall reduction of car use and forced movements. Baseline in 2010 is 6100 million passenger-kilometres
[72] Impact of EU Structural Funds on the country's energy economy objectives (2021).pdf Energy and Mineral Resources Analysis and Studies | Ministry of Economic Affairs and Communications (mkm.ee)

2.3. Dimension energy security

i. The elements set out in Article 4(c).

The crises of recent years, including Russia's war in Ukraine, have affected security of supply and pushed electricity prices sharply. Estonia has taken steps to overcome the crisis as painlessly as possible.

Regulation (EU) 2022/1032 of theEuropean Parliament and of the Council[73] obliges Member States which do not have the necessary storage facilities to store at least 15 % of their annual gas consumption at terminals located in other Member States. The Estonian government has set a more ambitious target for the volume of strategic gas reserves than the requirement set out in the EU regulation. The basis for establishing Estonia's strategic natural gas stock is the Government of the Republic's order to build up the state operational stock[74], according to which 1 TWh of gas must be kept in reserve. As of March 2023, the**Estonian Varude Centre has reached the 1 TWh gas stock target. Gas reserves are stored in the Inčukalns storage facility (Latvia).** This amount of gas corresponds to approximately 27 % of Estonia's average annual gas consumption. Estonia's consumption of natural gas was significantly reduced in 2022 and was estimated at 3.5 TWh over the next 12-month period instead of an average of 5 TWh in previous years[75].

As regards the country's energy security and the mitigation of the risks arising from the abandonment of natural gas supplied from Russia, the construction of the LNG terminal project and the associated gas infrastructure in Estonia has been an extremely urgent endeavour. On 7 April 2022, the Government of the Republic took a decision in principle to improve Estonia's energy security and mitigate the risks of rapid abandonment of Russian gas, as a result of which a **LNG reception capacity was built in Paldiski in autumn 2022, for which a hauling berth and gas installation were built for LNG** reception and transmission to the gas network. On 30 November 2022, the mechanical readiness for the reception of the LNG floating terminal was achieved. The network connection completed at the end of 2022 to connect the Paldiski LNG floating terminal provided an additional connection point with a design capacity of 81.2 GWh/day. The increase in reception capacity directly contributes to the security of gas supply should gas supply problems arise in Estonia[76].

Agreements on solidarity measures to ensure security of gas supply have been signed by Estonia with the Republic of Finland and the Republic of Latvia, and Estonia is directly connected to the gas system of those countries. The purpose of the agreements to be concluded is to provide a framework within which, in the event of failure to supply the gas market, the contracting parties can request and provide the other party with assistance in securing gas supply.

The obligation to conclude such agreements comes from Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 (OJ L 280, 28.10.2017, p. 1–56) concerning measures to[77] safeguard the security of gas supply ('the Regulation') and the European Commission Recommendation (EU) 2018/177 of 2 February 2018 concerning measures to safeguard the security of gas supply into the technical implementation of the solidarity mechanism between Member States pursuant to Article 13 of

[73] Regulation(EU) 2022/1032 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 June 2022 https://eur-lex.europa.eu/legal-content/ET/TXT/HTML/?uri=CELEX:32022R1032&from=ET

[74] The establishment of a state operational stockpile. RT III, 24 MAY 2022. 1https://www.riigiteataja.ee/akt/302082022003?leiaKehtiv

[75] The size and location of the gas stock. https://www.espa.ee/et/gaasivaru-suurus-ja-asukoht

[76] Elering AS. Estonia's gas transmission network 2023-2032. https://elering.ee/sites/default/files/2023-03/Eesti%20gaasiülekandevõrgu%20arengukava%202023-2032.pdf

[77] https://eur-lex.europa.eu/legal-content/ET/TXT/?uri=CELEX:32017R1938

Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of gas supply, the main elements to be included in the legal and financial arrangements (OJ L 32, 6.2.2018, p. 52-64) for the implementation of the solidarity mechanism under Article 13 of the[78] Regulation on key elements to be included in technical, legal and financial arrangements between Member States aimed at mitigating the impact of a serious emergency and ensuring that gas reaches solidarity-protected customers, taking into account the need to respect the principles of solidarity in order to ensure the security of gas supply to the Union.

According to Article 4(c) of Regulation (EU) 2018/1999, the NECY 2030 document shall provide information on objectives or targets:

- security of supply, i.e. diversification of energy sources and imports from third countries;
- increasing the flexibility of the energy system;
- in the event of difficulties in supplying the energy source(s).

The following is an overview of the sectoral targets for the different components of the energy system.

Flexibility in the electricity system

The adequacy and flexibility of the electricity system (including its increase) is ensured by a combination of the Electricity Market Act and the legislation enacted on the basis thereof. According to the Electricity Market Act in force, the network operator (including the transmission system operator) in Estonia develops the network in its catchment area in such a way as to ensure that it is possible to continuously provide network services to connected customers, producers, line holders and other network operators in accordance with the terms of the legislation and the licence, taking into account their justified needs, and to connect to the network a proper electricity installation of a market participant in its catchment area. When developing the network, the system operator shall respect the need for security of supply, efficiency, market integration and the possibility of using flexibility services, taking into account the results of research in these areas.[107] It is ofutmost importance to further promote participation in DSR in all electricity markets, in addition to what is provided for in European Union legislation, which is why activities are being undertaken to develop a single market model for DSR for all markets and the removal of legal barriers to promote storage. As of 2024, Baltic system operators plan to start the market for frequency reserves. A common market for frequency reserves is an important measure to ensure the functioning of the electricity system and security of supply following the synchronisation of the Baltic electricity systems with the Continental European synchronous area, when more important frequency control reserves triggered automatically and manually are needed to control the system than today[79].

Measures 1.1 of the ENMAK 2030 sub-objective on security of supply are used to ensure the adequacy of the electricity system and develop the flexibility of the energy system. (Development of electricity generation) and 1.2 (Responsive and efficient transmission of electricity economy) (see Table 2.11 and paragraph2.4.3).

Table 2.11Targets for electricity system adequacy and flexibility of the energy system[105]

ENMAK 2030 target: 1. Security of supply: Continuous energy supply is ensured in Estonia		
ENMAK 2030 action	Barometer	Indicative target
1.1.	Share of non-fuel energy sources (solar, wind, hydro) in final electricity consumption, %	> 25 % (2030)*

[78] https://eur-lex.europa.eu/legal-content/ET/TXT/?uri=CELEX:32018H0177&qid=1634040201782
[79] https://elering.ee/sagedusreservide-turg

1.1.	Total electrical capacity of CHP plants producing district heating grid, MW_{el}	> 600 (2030)
1.2	Average total duration of unscheduled or faulty interruptions in the distribution network in minutes per place of consumption per year, minutes	&90 (2030)
1.2	Amount of energy not provided in the transmission network, MWh	&150 (2030)

**In 2030, according to the updated renewable energy trajectory, the share of fuel-free energy sources will be > 70 %.*

Security of supply in the electricity system

Measures 1.1 of the ENMAK 2030 sub-objective for security of supply are used to ensure security of electricity supply. (Development of electricity generation) and 1.2 (Responsive and efficient transmission of electricity economy) (see Table 2.12 and paragraph2.4.3).

Table 2.12 Targets to ensure security of electricity supply[105]

ENMAK 2030 target: 1. Security of supply: Continuous energy supply is ensured in Estonia		
ENMAK 2030 action	Barometer	Indicative target
1.1.	Existence of local electricity generation capacity to meet the N-1-1[80] criterion	Completed (2030)
1.1.	Share of non-fuel energy sources (solar, wind, hydro) in final electricity consumption, %	> 25 % (2030)*
1.1.	Electrical capacity of combined heat and power plants producing district heating, MW_{el}	> 600 (2030)
1.1.	Share of imported fuels in electricity production	&50 %
1.1.	Share of domestic electricity in open market conditions	> 60 %
1.2	Average total duration of unscheduled or faulty interruptions in the distribution network in minutes per place of consumption per year, minutes	& 90 (2030)
1.2	Amount of energy not provided in the transmission network, MWh	& 150 (2030)
1.2	Availability of the country's external connections, %	96 % (2030)
1.2	Construction of new 330 kV lines (Sindi-Riga and Sindi-Harku)	Established (2020)
1.2	Estonia is connected to the EU-controlled synchronous area	Connected (2025)

**In 2030, according to the updated renewable energy trajectory, the share of fuel-free energy sources will be > 70 %.*

Investments in the Baltic synchronisation project (see section 2.4.2) will also contribute to the resilience of the electricity system by addressing network capacity constraints, increasing the availability of external connections and increasing the flexibility of the electricity system to rapid changes in electricity generation. As electricity production from oil shale decreases (phasing out of direct combustion), new generation capacities and interconnections with neighbouring countries ensure security of electricity supply.

In order to ensure security of supply of the electricity system, the possibility to apply a capacity mechanism in case of problems with meeting the reliability standard will be introduced in Estonia. In accordance with the principles laid down in Article 25 of Regulation (EU) 2019/943 and Article 14([1]) of the Network Code on

[80] N-1-1 is the emergency deactivation of one element of the electrical system when any element which significantly affects the operation of the electrical system is in maintenance or repair. Source: elering_vka_2022.indd

the Functioning of the Electricity System, the number of hours of restriction mustnotexceed nine and the average amount of energy not provided must not exceed 4.5 GWh. The reliability standard will be assessed by the capacity analysis of the pan-European electricity system (ERAA) as well as by the electricity system operator, which will consider whether it has been met within the next 10 years. Elering AS's 'Estonian Security of Supply Report 2022' highlights the need to implement a capacity mechanism to ensure that the reliability standard is met beyond 2027. More forward-looking analyses show that, from 2027 onwards, Estonian oil shale power plants may no longer be competitive in the electricity market and that in 2027 there may be, for example, 9.7 hours of containment. However, this exceeds the permitted level of security of supply of 9 hours.

In addition to the ENMAK 2030 targets described in Table 2.13, the electricity interconnectivity requirement shall be ensured (in particular in chapter 2.4.1).

Gas system

Under the Natural Gas Act, the system operator is responsible for ensuring the security of supply of the gas system. The system operator has the obligation to ensure security of supply and balance of the gas system at all times in accordance with the contracts entered into. The system operator shall develop the gas system on the basis of known demand and its forecast, including known new entrants to the network. The N-1 criterion of the infrastructure standard must be met at all[81]times.

Ensuring security of supply of the gas system is reflected in ENMAK 2030 Security of Supply sub-objective 1.3 (Securing gas supply).

Table 2.13 targets for the development of the gas system and market and diversification of gas supply.

ENMAK 2030 target: 1. Security of supply: Continuous energy supply is ensured in Estonia		
ENMAK 2030 action	Barometer	Indicative target
1.3.	1. Compliance with the infrastructure standard (N-1)	Completed
1.3.	2. Share of the largest source of gas supply	70 % (2030)
1.3.	3. Market share of the largest gas seller	&32 % (2030)
1.3.	4. Meeting the standard for security of supply	Completed (2030)
1.3.	5. Gas market concentration (HHI[82])	&2000 (2030)

In order to reduce the likelihood of factors affecting the security of gas supply and to ensure preparedness to cope with large-scale gas supply disruptions, the Minister responsible for the sector approves every two years the Estonian gas supply disruption plan and the preventive action plan to reduce the risks affecting gas security (based on Regulation (EU) 2017/1938). The latest plan was confirmed in 2019[83].

[81] The N-1 criterion is considered to be the assessment of the situation in the event of a disruption of one of the largest connections for the supply of gas. If, in the event of interruption, it is possible to reschedule supplies in such a way that there is no disruption in the supply, the N-1 criterion is met.

[82] HHI – Herfindahl-Hirschman index, varying between 0.10000 and obtained by summing the squares of the market share of each individual gas vendor [jam(x_i)^2]. Higher value characterises the increased dependence of the gas market on a single gas supplier. For HHI&2000, there are 7 gas sellers in Estonia, the largest of which has a market share below 32 %.

[83] Emergency plan for the Estonian gas system to deal with a supply disruption - https://energy.ec.europa.eu/system/files/2020-01/2019.12.13-ep-eesti_hadaolukorra_lahendamise_kava_2019_0.pdf

The availability of sufficient sources of supply in the region and an adequate gas infrastructure are essential for the security of gas supply. The Klaipeda and Inkoo terminals, but there is the capacity to create a Paldiski terminal, as there is a quay. The regional gas market provides security of supply – Estonia-Latvia is in a single gas balance zone, the objective is to include Finland and Lithuania, with the aim of extending the single tariff zone of EE, LV, FI and adding LT and PL. Estonia holds a strategic natural gas reserve of 1 TWh. Estonia's consumption of natural gas decreased significantly in 2022 and is estimated at 3.5 TWh over the next 12-month period instead of an average of 5 TWh in previous years. The strategic gas stock managed by the IGC is 1 TWh and corresponds to 28 % of the projected demand for the new annual consumption period[84]. The EVK stores strategic natural gas reserves in an underground storage facility in Inčulkans in Latvia.

ii. National targets to increase the diversification of energy sources and energy supplies from third countries and the resilience of regional and national energy systems.

Estonia's dependence on imported energy has been one of the lowest among the EU countries in the past, but for natural gas and motor fuels Estonia is highly dependent on imports. While a number of different supply channels are available for motor fuels, the potential for natural gas supply is more limited. As a result, the ENMAK 2030 document sets out targets for diversification of gas supply, as described in chapter2.3.i.

Estonia's consumption of natural gas accounts for less than 10 % of the energy balance. Consumption of natural gas for heating, industry and transport of buildings is decreasing, but its role in electricity generation to cover peak hours and reserves will remain (in the case of the construction of additional gas plants or the privatisation of the Kiisa Emergency Power Station, consumption may increase). As part of the diversification of energy sources, Estonia has started to produce biomethane from indigenous raw materials. By 2030, the country has committed to increase biomethane production to 380 GWh per year. In Estonia, 17 biogas plants, 5 agricultural biogas plants, 7 wastewater treatment and industrial waste water treatment plants and 5 landfill gas production units are active. In 2022, Estonia produced 168 271 MWh of biomethane, ofwhich 35 365 MWh was produced from sewage sludge, 55 277 MWh from animal manure, 35 988 MWh from food industry residues, 37 635 MWh from biowaste and 4 006 MWh from other biomass.[85] Estonia's biomethane production potential has been estimated at 450 million $m^{3/y}$, which is more than half of Estonia's natural gas consumption in recent years[86]. In 2023, an additional audit is planned to update the prediction of biomethane potential in one activity, taking into account changes in the directives and rules in recent years.

iii. Where relevant, national targets for reducing energy import dependency from third countries in order to increase the resilience of regional and national energy systems

In order to maintain a low dependence on imports, it is necessary to maintain the high contribution of domestic fuels to the energy balance. An overview of the targets has been integrated in the chapter2.3.i. In Estonia, imports of pipeline gas from Russia have been banned since 1 January 2023, in accordance with the Government of the Republic Regulation No 93.

[84] https://www.espa.ee/et/gaasivaru-suurus-ja-asukoht
[85] Biomethane certificates of origin | Elering
[86] Estonian Biogas Association http://eestibiogaas.ee/tootmine-ja-kasutamine/

iv. National objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response[87] and energy storage

The flexibility of the electricity system is described in chapter 2.3.i.

The strategic gas stock managed by the IGC is 1 TWh and corresponds to 28 % of the projected demand for the new annual consumption period[88]. As a result of the energy crisis, EU Member States, including Estonia, have implemented a number of electricity saving measures. EU member states agreed to reduce natural gas consumption by at least 15 %. Electricity consumption decreased by 6 % between 2021 and 2022[89] and **gas consumption in Estonia decreased by 26 % in 2022.**

Table 2.14 Changes in natural gas and electricity consumption 2021-2022

Sisemaine tarbimine, GW	Gaas 2021	Gaas 2022	Elekter 2021	Elekter 2022
Jaanuar	702,3	652,1	895	869
Veebruar	752,7	519,4	852	763
Märts	578	491,9	846	812
Aprill	392	332,3	730	728
Mai	280,5	221,1	682	661
Juuni	173,4	150,3	606	593
Juuli	167,3	133,3	618	574
August	210,4	138,3	647	621
September	272,7	161,2	675	613
Oktoober	324,4	201,5	720	666
November	453,1	320,2	784	725
Detsember	767,8	455	912	824
Kokku	**5 075**	**3 777**	**8 966**	**8 449**

2.4. Dimension Internal energy market

2.4.1. Electricity interconnectivity

i. The level of electricity interconnectivity that the Member State aims to achieve by 2030.

The electricity interconnection target of the Member States of the European Union shall be at least 10 % by 2020 and at least 15 % by 2030[90]. **Estonia's level of electricity interconnection exceeds the EU's targets several times, reaching 63 %.**

Cooperation between Member States is crucial to increase electricity interconnectivity. Member States should base their interconnection level on three minimum criteria:

a) the price difference between electricity exchange prices between regions, Member States or price areas exceeds EUR 2/MWh;
b) trans-national transmission capacity is & 30 % of peak demand;

[87] In English *demand response*
[88] https://www.espa.ee/et/gaasivaru-suurus-ja-asukoht
[89] Elering
[90] European Commission. Communication on strengthening Europe's energy networks. https://ec.europa.eu/energy/sites/ener/files/documents/communication_on_infrastructure_17.pdf

c) trans-national transmission capacity is & 30 % of renewable energy generation capacity.

Estonia 2021:

a) Ratio of transmission capacity to gross consumption between countries: 105 %;
b) Ratio of transmission capacity between countries to renewable generation capacity: 157 %;
c) Inter-country transmission capacity ratio to generation capacity: 450 %;
d) Average electricity exchange price difference at the Estonian-Finland border 2021: EUR 14.39/MWh and Estonia-Latvia 2021: EUR 2.05/MWh.

Based on these indicators, the price differential between Estonia and Finland in 2021 was more than EUR 2/MWh, i.e. the transmission capacity was not sufficient to create a single price. Prices would be much more uniform between regions if an additional EstLink3 cable was set up between Estonia and Finland.

The interconnection capacity in the EE->LV direction is 1 447 MW, the LV->EE direction is 1 259 MW, between EE-FI 1 016 MW. The ENTSO-E analysis (ENTSTO-E System Needs Study TYNDP) estimates that, from 2025 onwards, the price difference between Estonia and Finland will exceed EUR 2/MWh in all scenarios, indicating the need for an additional connection between Estonia and Finland.

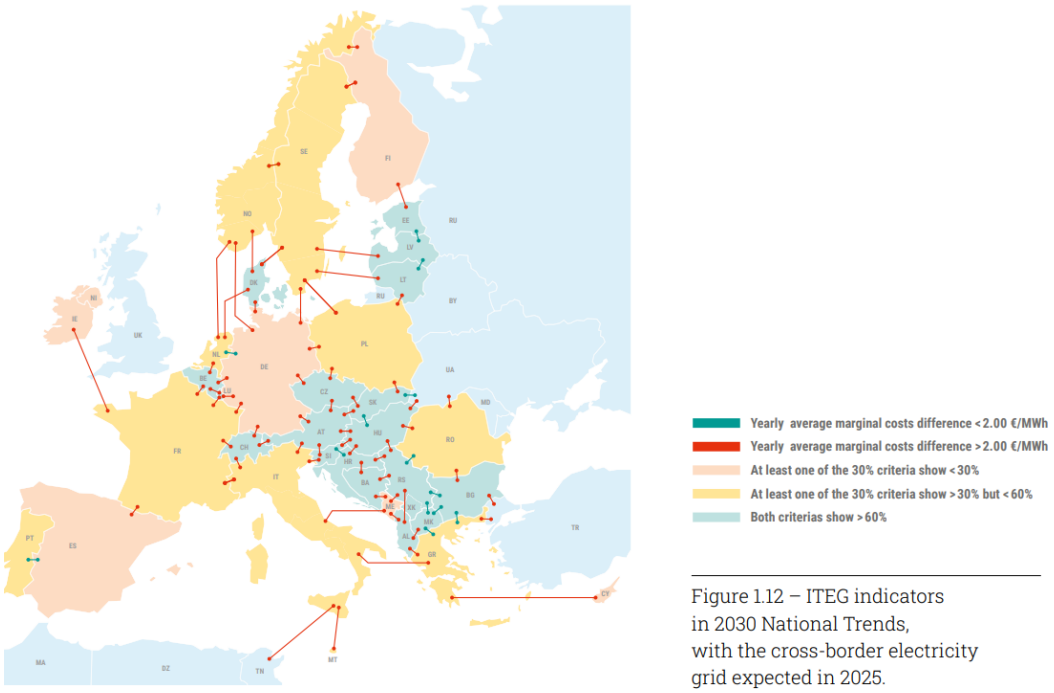


Figure 1.12 – ITEG indicators in 2030 National Trends, with the cross-border electricity grid expected in 2025.

Figure 2.10 fulfilment of electricity interconnectivity criteria in 2030 under the National Energy scenario [91]

The Baltic States' grids are not yet fully connected to the electricity networks of the European Union. The Baltic States are not located in the synchronous area under EU law. The electricity systems of Estonia, Latvia and Lithuania operate synchronously with the Russian interconnected energy system (IPS/UPS). Synchronisation of the Baltic States' electricity system in the synchronous area under EU law around 2025 is one of the most important energy policy objectives of Estonia and the other Baltic States and will have a significant impact on the long-term development of the electricity grid. In a roadmap signed in summer

[91] The National Trends scenario takes into account the plans set out in the Member States' development plans. https://eepublicdownloads.blob.core.windows.net/public-cdn-container/tyndp-documents/TYNDP2022/public/system-needs-report.pdf

2018, the Baltic Prime Ministers, the President of the European Commission and the Prime Minister of Poland[92] confirmed the importance of the synchronisation project and acknowledged the Baltic States' desire to synchronise the continental European band. **Among other things, the synchronisation project will strengthen interconnections between the Baltic States and will also contribute to increasing electricity interconnection in Poland** [93].

In spring 2021, the Estonian and Latvian TSOs concluded an agreement to jointly analyse the best possible solutions for the construction of a complementary or fourth transmission line with a transmission capacity between 70 and 1 000 MW.

In 2020, Elering, together with other system operators (Finland Fingrid Oyj, Rooti Affärsverket Svenska Kraftnät, Danish Energinet SOV, North of Germany 50Hertz Transmission GmbH, Latvian AS Augstprieguma tīkls and Lithuanian Litgrid AB), signed a memorandum of intent with a **view to establishing cooperation on the development of a common maritime energy network.**

In June 2022, the Estonian and Finnish electricity system operators Elering and Fingrid signed a Memorandum of Understanding (MoU) in which they agreed to launch a joint operational process for the construction of the third Estonian-Finland electricity interconnection (EstLink 3) with a DC capacity planned for EstLink 3 of between 70 and 1 000 MW, assuming that the new connection could become operational in 2035.94

2.4.2. Energy transmission infrastructure

i. Key electricity and gas transmission infrastructure projects and, where appropriate, retrofitting projects necessary to achieve the objectives of the five dimensions of the Energy Union Strategy

The main objective of the Estonian electricity system is the synchronisation of the Baltic States' electricity system in the band subject to European Union law by 2025. The Baltic synchronisation project has been on the European Union's*Projects of Common Interest (*PCIs) list since 2013, with activities taking place in Estonia, Latvia, Lithuania and Poland. In cooperation with other Member States and recognised external partners, it is important to develop offshore wind farms as potential projects of common European interest.

[92] Political Roadmap on the synchronisation of the Baltic States' electricity networks with the Continental European Network via Poland. https://ec.europa.eu/energy/sites/ener/files/documents/c_2018_4050_en_annexe_acte_autonome_nlw2_p_v2.docx

[93] ENTSO-E. Project 170 – Baltics synchro with CE. Interconnection targets. https://tyndp.entsoe.eu/tyndp2018/projects/projects/170

[94] ELR report on security of supply - https://elering.ee/sites/default/files/2022-12/elering_vka_2022_pages.pdf

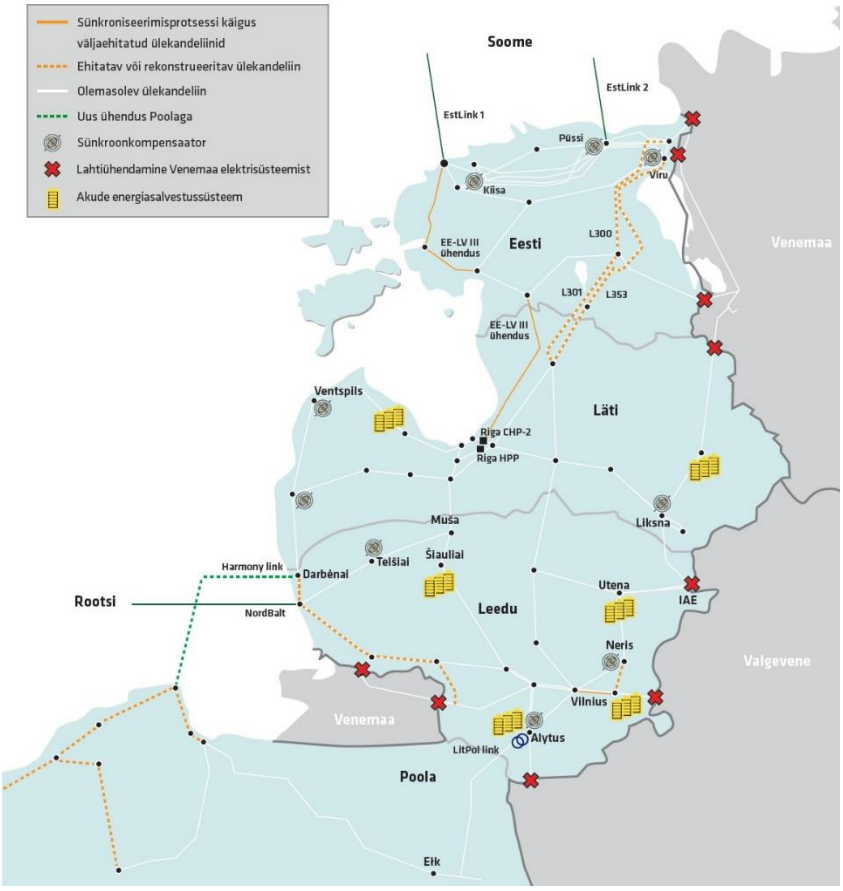


Figure 2.11 Synchronisation of the Baltic States' electricity system into the continental European band95.

The activities to be carried out under the synchronisation project in the Estonian electricity grid are set out in Table 2.15 below. The project will be implemented in cooperation between the Baltic States and Poland. An accurate overview of the status of the project and the activities can be found on the ENTSO-E website describing the project[93].

Timeline of synchronisation projects until 2025:

[95] https://elering.ee/sunkroniseerimine

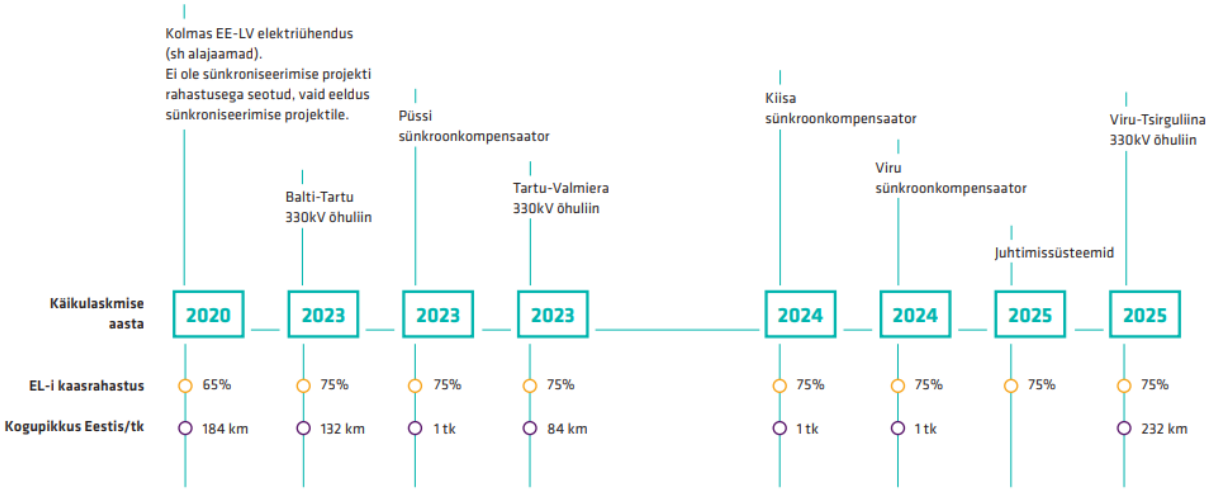


Figure 2.12 Timeline of synchronisation projects[96]

Table 2.15 activities of the synchronisation project in Estonia[93]

Name of the investment	PCI number	Investment volume, EUR million	Time;
L386 Kiling-Nõmme-Ri	4.2.1	8	2020
L735 Harku-Sindi	4.2.2	72	2021
L300 Baltic-Tartu	4.8.2	46	2023
L301 Tartu-Valmiera	4.8.1	30	2023
L353 Viru-Tirguliina	4.8.4	80	2025
Construction of synchronous compensations (Kiisa and Viru)	4.8.23	37	2024
Upgrade of Estonian electricity system control systems (including Püssi synchronous compensation)	4.8.9	69	2025
Total		342	

The synchronisation project will contribute to the following dimensions of the EU Energy Union Strategy:

- Energy security, solidarity and trust;
- A fully integrated internal energy market;
- Climate action – decarbonising the economy;
- Research, innovation and competitiveness.

Estonia's electricity system also needs to prepare for the reinforcement of the interconnections between West Estonia and the Saars due to the increase of large capacities from the development of offshore and onshore wind farms. From a forward-looking perspective, it is also expedient for LAs to consider including a guideline in the zoning plan for land-based infrastructure sites (e.g. cable connections to wind farms) related to activities at sea, through a public process. Consequently, by 1 January 2021, Elering AS West-Estonian Harku-Lihula-Sindi 330/110kV built a high-voltage overhead line with an increase in transmission capacity of around 600 MW. It was one of the largest national infrastructure projects and could integrate up to 1 000 MW of wind farms. Cooperation has been initiated with a view to developing joint projects with

[96] https://elering.ee/sites/default/files/2021-06/Elering_Synkroniseerimise-broz%CC%8Cyyr_A5_8lk_2%20lehte_20.01.2021.pdf

Latvia (such as the joint Latvian-Estonian wind farm in the Gulf of Riga) which would enable the Connecting Europe Facility (CEF) to co-finance the development of accessions.

Gas system

The Estonian natural gas transmission network consists of a 976.3 km pipeline network, 4 gas metering stations where the quantities of gas entering the transmission network are measured and gas quality determined, 36 gas distribution stations carrying out pressure reduction of gas leaving the transmission network, measuring quantities, odouring and ensuring an agreed consumption regime, and 1 gas regulator station (Kil GRJ), which allows parts of the transmission network to be operated at different operating pressures. Kil GRJ also conducts the measurement of gas outlets from the Balticconnector pipeline, but Kil GRJ does not directly qualify as a gas metering station. The Paldiski gas metering station allows for bi-directional measurements on the Estonian side of the gas flowing through the Balticconnector. In[97]early 2020, Balticconnector connecting the Finnish and Estonian transmission networks, with a length of 39.7 km, was completed. The introduction of Balticconnector made it possible to reconcile the Finnish-Estonia-Latvia market areas, with trade taking place today on the GET Baltic gas exchange. Lithuania is also planning to join the market area.

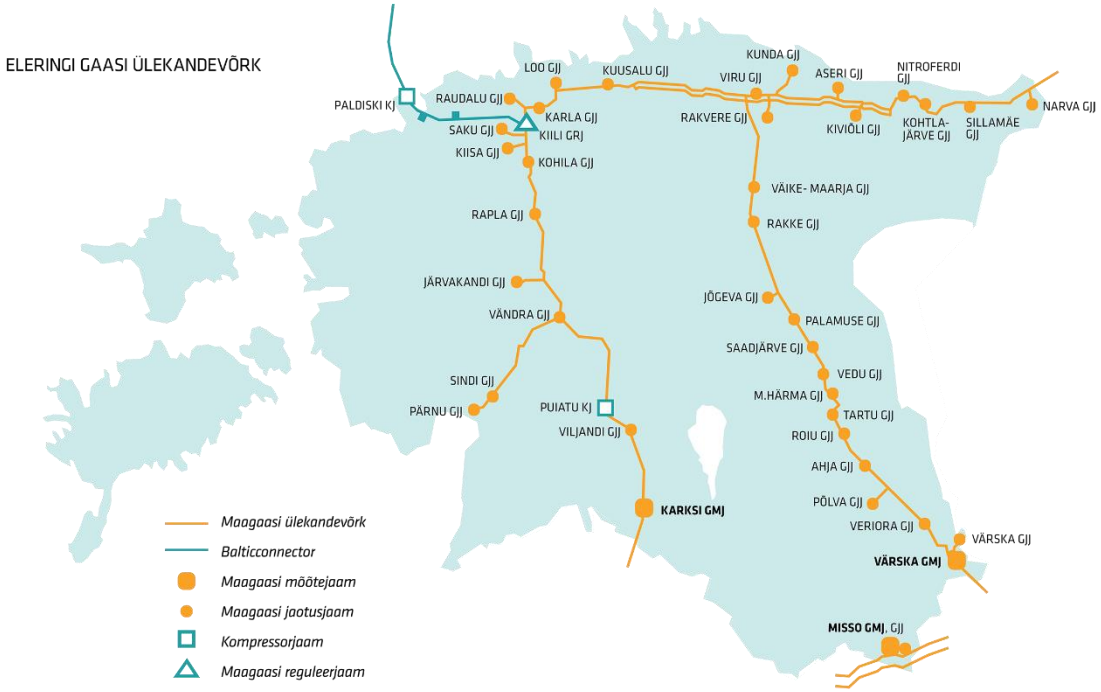


Figure 2.13 Gas transmission network (Elering)

At the end of 2022, the network connection was completed to connect a possible floating LNG (LNG) terminal to the transmission network. On 10 March 2023, the State acquired LNG hauling quay in Paldiski. The established transmission network and hauling berth will increase the region's security of supply and allow for the reception of the LNG floating terminal if necessary.[98]

[97] Estonia's gas transmission network 2023-2032. https://elering.ee/sites/default/files/2023-03/Eesti%20gaasiülekandevõrgu%20arengukava%202023-2032.pdf

[98] https://www.espa.ee/et/riik-omandas-eraettevotjatelt-paldiski-lng-kai-koos-sadamakinnistuga

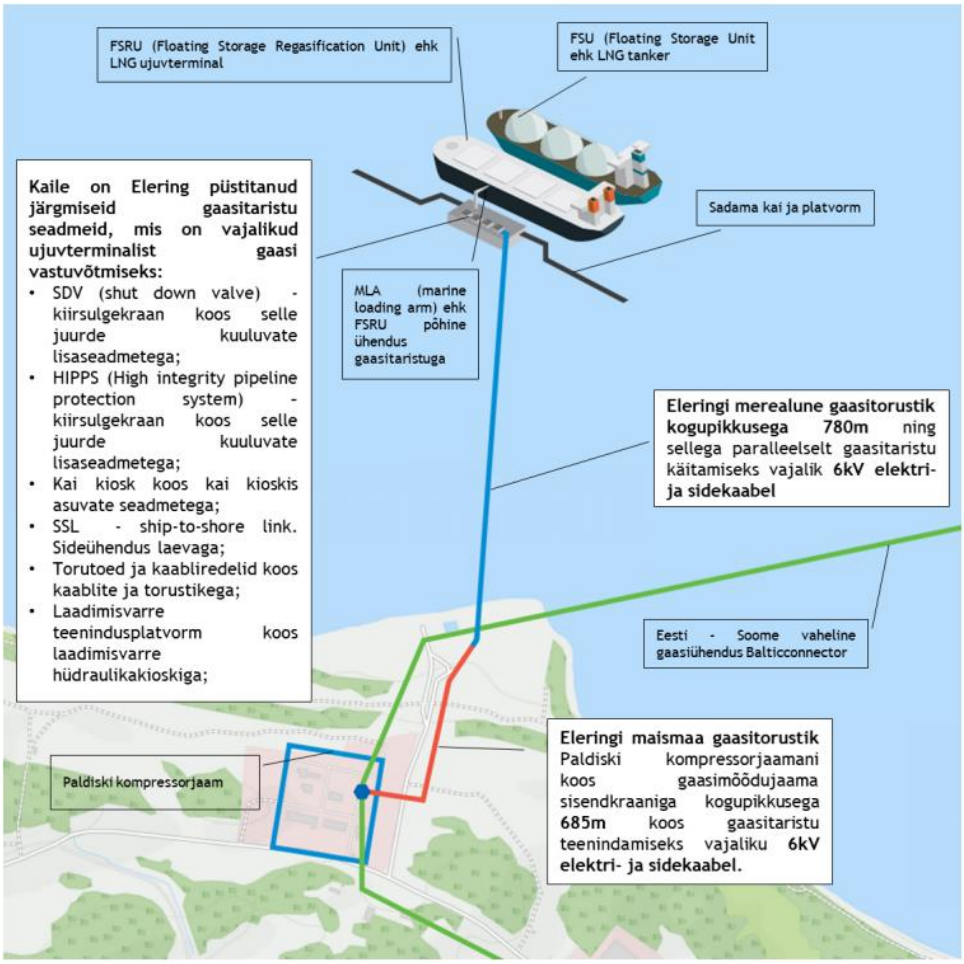


Figure 2.14 Paldiski FSRU Community diagram[99]

The security of the Finnish and Baltic gas markets will be enhanced by the Inkoo LNG terminal, which started operations in Finland in 2023. In Estonia, a port with reception capacity of the FSRU was completed in Paldiski, which also increases the region's security of supply.

ii. Where applicable, planned major infrastructure projects other than projects of common interest[100].

Integration and synchronisation of the Baltic States' electricity networks with European networks, including the following projects of common interest:

4.8.1 interconnection between Tartu (EE) and Valmiera (LV) – construction (end 2023)
Internal line between Baltic SEJ and Tartu (EE) – in construction (end 2024)
4.8.3 Interconnection between Sirguliina (EE) and Valmiera (LV) – authorisation procedure (final 2025)
4.8.4 National line between Viru and Tsirguliina (EE) – authorisation procedure (end 2025)

[99] https://elering.ee/sites/default/files/2023-03/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202023-2032_0.pdf
[100] In accordance with Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013, p. 39)

4.8.23 Synchronous capacitors providing inertia in the energy systems of Lithuania, Latvia and Estonia, voltage stability, frequency stability and short-circuit power (end 2025)
4.8.9 Additional infrastructure aspects to synchronise the Baltic States' electricity networks in Europe with nets

Estonia has supported the introduction of biomethane and the establishment of refuelling stations aimed at increasing the use of renewable gases in the transport sector[101].

With the support of the European Technical Food Instrument (TSI) and led by Estonia, a study on the decarbonisation of the regional gas network is under preparation, with the three Baltic States and Finland scoping. The main solution for decarbonisation is the maximisation of the biomethane resource. Estonia values biomethane in achieving the TE target in the transport sector in the period 2023-2035. Planning is under way to continue a previous support measure to encourage the transition of public services, waste transport and civil protection services to biomethane and to continue supporting the construction of refuelling stations.

European gas system operators have taken the initiative of *European Hydrogen Backbone* (EHB) to which Estonia has joined Elering. The initiative aims to analyse the need and potential of building a pan-European hydrogen infrastructure. Based on analyses carried out in 2021, five logical hydrogen supply corridors emerged in 2022 that could transport energy from Europe's external countries to a high energy demand centre. Hydrogen supply corridor according to the EHB vision:

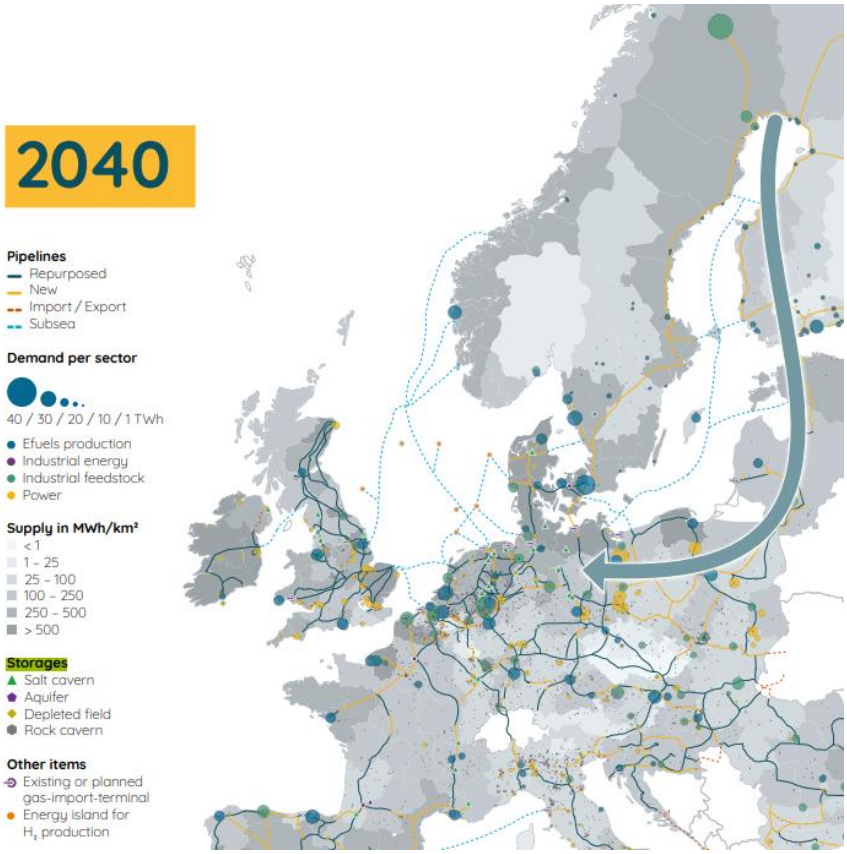


Figure 2.15 EHB visioned hydrogen supply corridor[102]

[101] https://www.kik.ee/et/toetavad-tegevused/biometaani-tootmine-ja-tarbimine
[102] https://ehb.eu/files/downloads/EHB-Supply-corridor-presentation-Full-version.pdf

2.4.3. Market integration

i. National objectives related to other aspects of the internal energy market, including a timetable for their achievement.

Electrical system

Over 90 % of the capacity of the Estonian electricity interconnectors to our neighbouring countries has been released from Estonia to the market. In 2021, transmission capacity was significantly more limited in Latvia than in 2020, due to reconstruction works on Latvian routes, which are part of the synchronisation project. At the same time, it is worth mentioning that at the end of 2020, the third Estonia-Latvia interconnector was also in operation, which significantly increased the transmission capacity at this border for 2021. From Estonia to Latvia, the maximum transmission capacity increases by 45 % and Latvia towards Estonia by 43 %. There were also somewhat more restrictions on transmission capacity between Estonia and Finland in 2021[103].

Table 2.16 External interconnection capacity placed on the market in Estonia in 2021[104]

Boundary	Direction	Maximum capacity, MW	Capacity made available to the market, MW	% Share
EE-FI	EE->FI	1016	988	97.2 %
EE-FI	FI->EE	1016	1006	99 %
EE-LV	EE->LV	1447	1132	78.2 %
EE-LV	LV->EE	1259	1089	71.3 %

The objectives and metrics related to market integration and coupling are defined in the Estonian Energy Economy Development Plan 2030 (ENMAK 2030)[105]. The Development Plan sets an indicative target of 96 % for the availability of external connections in 2030.

Table 2.17 Targets and metrics related to market integration and aggregation[105]

ENMAK 2030 target: 1. Security of supply: Continuous energy supply is ensured in Estonia		
ENMAK 2030 action	Barometer	Indicative target
1.2	3. Availability of the country's external connections, %	96 % (2030)
1.2	6. Estonia is connected to the EU-controlled synchronous area	Connected (2030)

In addition to the development of the electricity infrastructure, both the transmission system operator (Elering AS) and the largest distribution system operator (Elektrilevi OÜ) are undertaking development projects to encourage the uptake of flexibility services in the Estonian electricity system (e.g. the H2020 project EU-SysFlex; Introduction of a single market for balancing services in the Baltic States as of 1 January 2018). These activities are encouraged by the fact that since 1 January 2017 all Estonian electricity

[103] Estonian Electricity and Gas Market Report, Competition Authority - https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded

[104] Estonian Electricity and Gas Market Report, Competition Authority - https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded

[105] Government of the Republic. Estonia's 2030 Energy Development Plan https://www.mkm.ee/sites/default/files/enmak_2030.pdf

consumers have been equipped with remotely readable meters in accordance with the Government of the Republic's Regulation on the Network Rules established on the basis of the Electricity Market Act.

Gas system

The integration of gas markets is reflected in ENMAK 2030 security of supply sub-objective 1.3 (Securing gas supply).

Table 2.18 Targets for the development of the gas system and market and diversification of gas supply

ENMAK 2030 target: 1. Security of supply: Continuous energy supply is ensured in Estonia		
ENMAK 2030 action	Barometer	Indicative target
1.3.	1. Compliance with the infrastructure standard (N-1)	Completed
1.3.	2. Share of the largest source of gas supply	70 % (2030)
1.3.	3. Market share of the largest gas seller	32 % (2030)
1.3.	4. Meeting the standard for security of supply	Completed (2030)
1.3.	5. Gas market concentration (HHI[106])	&2000 (2030)

The integration of the Estonian gas market with the other Baltic and Finnish gas markets is in the process since 2016, when the relevant ministries, system operators and regulators in the Baltic States and Finland are working towards the creation of a single gas market. The parties are grouped together in a cooperation group aimed at achieving the creation of harmonised market rules and a common price for gas injection into the gas system (Estonia, Latvia, Lithuania and Finland). One of the most important challenges in the regional gas market is the elimination of gas transmission charges at national borders. The aim is to ensure that there is no gas transmission charge between Lithuania, Latvia, Estonia and Finland. Only the price of the gas flow entering the region (one-size-fits-all) and the outlet price of the gas flow (to be decided by each country) remain. In 2020, the common Estonian-Latvia balance sheet zone became operational, with a single rulebook and common standard balance sheet contract clauses. The aim is to include Finland and Lithuania in the common zone. A common tariff area between Estonia and Latvia has also been established. Baltickum, together with Finland, aims to extend the FINESTLAT market area and to include Lithuania in the Common Tariff Zone, however, negotiations on the Common Tariff Zone rules and cost-sharing principles are still ongoing and there is still no clarity as to when the common Baltic-Finland tariff area could enter into operation.

ii. Where applicable, national targets for electricity system adequacy and energy system flexibility for renewable energy production, including a timeframe for the achievement of those targets.

The adequacy and flexibility of the electricity system for the production of renewable energy is ensured by a combination of the Electricity Market Act and the legislation enacted on the basis thereof. According to the Electricity Market Act in force, the network operator (including the transmission system operator) in Estonia develops the network in its catchment area in such a way as to ensure that it is possible to continuously provide network services to connected customers, producers, line holders and other network operators in accordance with the terms of the legislation and the licence, taking into account their justified needs, and to connect to the network a proper electricity installation of a market participant in its catchment area. According to the Electricity Market Act, since 2007, household customers may also start producing

[106] HHI – Herfindahl-Hirschman index, varying between 0.10000 and obtained by summing the squares of the market share of each individual gas vendor [jam(x_i)^2]. Higher value characterises the increased dependence of the gas market on a single gas supplier. For HHI&2000, there are 7 gas sellers in Estonia, the largest of which has a market share below 32 %.

electricity for self-consumption and selling surpluses to the grid. In order to connect a generating installation with a net capacity of more than 15 kW to the network, a market participant shall be required to pay a deposit to the network operator or to provide a guarantee from a financial institution. The guarantee shall be returned to the market participant or count towards its subscription fee only if the market participant has started to produce electricity with the generating installation covered by the request for connection within the prescribed period or if the request for connection has not been accepted. Otherwise, the security shall not be returned. The envisaged period is one year for the installation of solar panels, three years for offshore wind farms and two years for other technologies. The technology for the generation of electricity specified in the connection application shall not be altered. Manufacturers who have not started production under a connection contract or which no longer produce under the network contract shall pay the system operator a fee for the non-utilised generation connection capacity. The funds paid shall be used by the network operator to cover the investment costs of increasing the capacity of its network. It is also possible to receive support for electricity produced from renewable energy sources. The target is 100 % renewable electricity by 2030. When developing the network, the system operator shall comply with the need to ensure security of supply, efficiency and market integration, taking into account the results of research in these areas[107]. **According to the Electricity Market Act, which entered into force on 25 March 2022, the network operator must submit its network development plan for the next 10 years to the Competition Authority at least every two** years. In the development plan, the network operator shall also set out, inter alia, the planned investments for the next five to ten years, as well as an action plan for finding solutions in problem areas. The Competition Authority may, if necessary, challenge the development plan and request that the plan be renegotiated. The Competition Authority has put particular emphasis on improving network quality in areas where this has been the biggest concern so far. The Competition Authority has the right and the possibility to direct the network operator to invest in areas where the quality of the network service has been the lowest. In recent years, electricity has made network investments of around EUR 100 million per year. In addition, EUR 8 million from the State budget was allocated to network investments by Elektrilev in 2022, which also became available for network development in 2022. In the period 2022-2026, the State plans to help the grid company carry out grid repairs to develop new renewable energy interconnection capacity and to improve the climate resilience of the grid with EUR 38 million. In the case of connection to the grid or change in consumption or generation conditions, the generator of electricity shall pay all the costs necessary to connect generation capacity or change existing generation conditions, including the costs of constructing new electrical installations and upgrading existing electricity installations.[108] **Distribution system operators and transmission system operator Elering shall draw up a ten-year network development plan every two years. The transmission system operator Elering AS submits an annual security of supply report**[109]110

Table 2.19 Ensuring electricity system adequacy and flexibility of the energy system for renewable energy production[105]

ENMAK 2030 target: 1. Security of supply: Continuous energy supply is ensured in Estonia		
ENMAK 2030 action	Barometer	Indicative target
1.1.	2. Share of non-fuel energy sources (solar, wind, hydro) in final electricity consumption, %	> 25 % (2030)*
1.1.	4. Electrical capacity of combined heat and power plants producing district heating, MW_{el}	> 600 (2030)

[107] The Estonian Parliament. Electricity Market Act. https://www.riigiteataja.ee/akt/125012017002?leiaKehtiv
[108] Government of the Republic. Network Code. https://www.riigiteataja.ee/akt/116022016014?leiaKehtiv
[109] https://elering.ee/varustuskindluse-aruanded

1.2	1. Average total duration of unscheduled or faulty interruptions in the distribution network in minutes per place of consumption per year, minutes	&90 (2030)
1.2	2. Amount of energy not provided in the transmission network, MWh	&150 (2030)

**In 2030, according to the updated renewable energy trajectory, the share of fuel-free energy sources will be > 70 %.*

The benchmarks guide network operators to make the necessary investments and develop solutions for a more efficient integration of renewable energy into the Estonian electricity system. A good example of such innovation is the e-Gridmap card application developed by the Estonian Transmission System Operator (Elering AS), which shows, on an annual basis, the spare capacity in the electricity network owned by the company, thus enabling renewable energy producers to plan their projects more effectively.

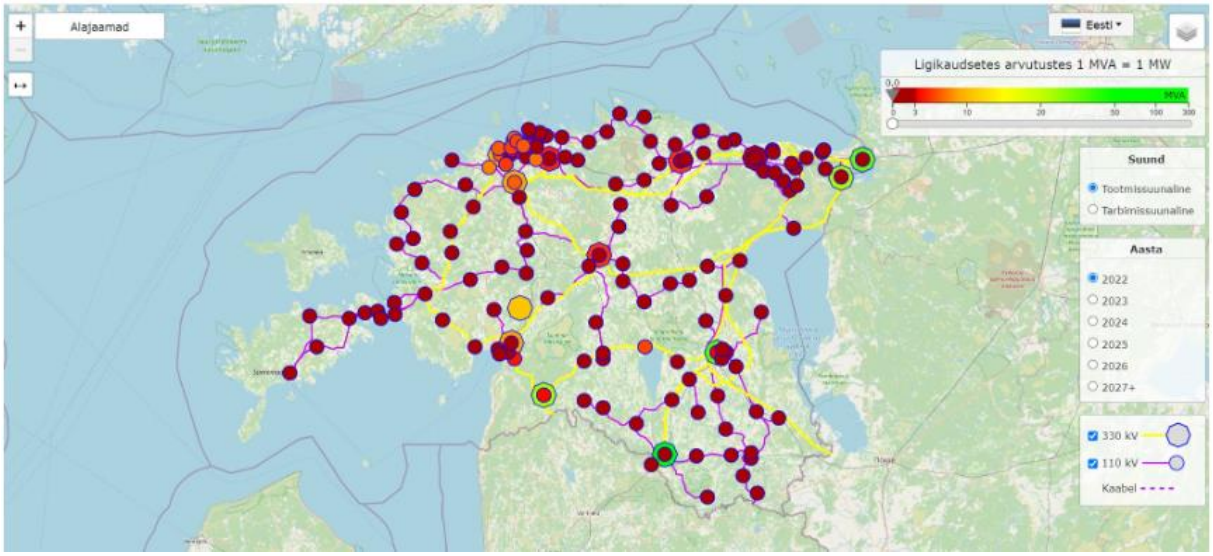


Figure 2.16 Leave connection capacity map application of Elering AS[111]

The synchronisation project (see chapter2.4.2) will also contribute to increasing renewable energy integration capacity by removing bottlenecks in the electricity system throughout the Balticku.

iii. Where applicable, national objectives to ensure that consumers participate in the energy system and benefit from self-generation and new technologies, including smart meters.

As of 1 January 2017, all Estonian electricity consumers had smart meters that store and transmit at least hourly data to a central database (data warehouse – e.elering.ee). Consumers have free access to their data. Consumers will also be able to give access to data to a service provider of their choice. From the beginning of 2025, the system operator shall ensure that at least the measuring point of the transmission network, the border measurement point, the power generating installations with a net power greater than 15 kW and the consumer with a main guard of more than 200 A shall be equipped with a measuring device measuring the amount of electricity taken from the grid and fed into the grid at an interval of 15 minutes. Since 2031, all meters have been moved to a 15-minute measurement[112].

[111] Elering AS. Free connection capacity map application. Connection capacity application e-Gridmap | Elering
[112] https://www.riigiteataja.ee/akt/112052021004

iv. National objectives with regard to ensuring electricity system adequacy, where applicable, as well as for the flexibility of the energy system with regard to renewable energy production, including a timeframe for when the objectives are to be met

Described in point 2.4.3 (ii).

v. V. Where applicable, national objectives to protect energy consumers and improve the competitiveness of the retail energy sector

Not applicable. Crisis measures are described in Section 2.3.

2.4.4. Energy poverty[113]

i. Where applicable, national targets related to energy poverty, including a timetable for their achievement.

Estonia's current national development documents do not consider energypoverty as an issue on its own. Household performance is considered comprehensively at both national and local government level. The 'Wellbeing Development Plan 2023-2030'[114] aims to reduce poverty and aims to reduce the absolute poverty rate to ≤ 2.2 % and the at-risk-of-poverty and social exclusion rate to 21 % by 2030.

In order to transpose the requirements of Article 7 of theEnergy Efficiency Directive (EU 2018/2002), the Energy Economy Organisation Act was supplemented in 2019, which clarified the development of procedures to address energy poverty. In order to achieve the energy efficiency objectives through different measures, the design of renovations or similar measures should take into account whether and how the risk group of energy purchase and those affected by energy poverty could be included in energy efficiency measures so that they can also benefit from measures to improve the energy efficiency of housing.

In the transposition of the Directive, a person affected by energy poverty was linked to maintenance support, which means that the number of beneficiaries of subsistence support is equal to the number of persons affected by energy poverty. A person affected by energy poverty is a person or family living alone within the meaning of the Social Welfare Act who has received at least one subsistence allowance in the last six months and whose income per family member in the previous month does not exceed the minimum wage. A total of 16508 people received maintenance support for housing costs, including a loan for apartment buildings, i.e. 1.2 % of the Estonian population in 2021. In the first nine months of 2022, maintenance grants had been paid out for EUR 27 million. In comparison to the nine months of 2021, EUR 12.4 million of grants were paid. The level of maintenance benefits paid out in 2022 is mainly based on the energy crisis in the same year, where people had to struggle to struggle with high energy prices.

The current Energy Efficiency Directive aims to improve the situation of natural persons and households in economically insecure situations who are unable to participate in energy saving measures without additional support. In order to achieve this, among the measures required to fulfil the overall energy savings obligation, the list of measures to be adopted by the Government of the Republic is to identify policy measures for natural persons, households or service providers targeted at them who are in an economically insecure situation, in order to alleviate energy poverty.

[113] In English *energy poverty*
[114] https://www.sm.ee/heaolu-arengukava-2023-2030

From the energy saving measures, the following energy efficiency measures shall be available to persons affected by energy poverty:

- Home support for families rich with children improves the living conditions of low-income child-rich households[115].
- Support for the renovation of small and multi-dwelling buildings improves the energy efficiency of housing and, in the case of apartment buildings, all members of a co-ownership association are supported in carrying out energy-saving works. The higher aid rate is in those regions where the value of the property is lower. As the property value and the income of residents in a given area are fairly well correlated, support measures based on the principle of regionality also reduce energy poverty for those who are beneficiaries.

1) Investment aid for the development of a municipal housing fund on a case-by-case basis. The support will improve the availability of rented dwellings for households that cannot acquire or rent rented dwellings from the rental market, including socio-economically less insured persons[116].

According to the Energy Poverty Advisory Hub, Estonia does[117] not seem to be very problematic. For example, 2 % of households faced the challenge of providing heating in 2021, compared to an EU average of 6.9 %. Energy bill arrears account for 4.1 % of households, compared to the EU average of 6.4 %. According to statistics from the European Energy Poverty Observatory, the share of energy payments made by[118] Estonian families in terms of income is very close to the EU average (16.3 %) – i.e. 16.2 %. The only issue is cooling where keeping the dwelling cooler is more problematic than in many other countries (Estonia 23.3 % compared to the EU average of 19.2 %). Overall, Estonia is slightly above the EU average in terms of energy poverty.

[115] https://kredex.ee/et/kodutoetus
[116] https://www.riigiteataja.ee/akt/124012023007?leiaKehtiv
[117] https://energy-poverty.ec.europa.eu/observing-energy-poverty/national-indicators_en
[118] European Energy Poverty Observatory. Member State Reports on Energy Poverty 2019, https://energy-poverty.ec.europa.eu/system/files/2021-09/EPOV%20member%20states%20report%20on%20energey%20poverty%202019.pdf

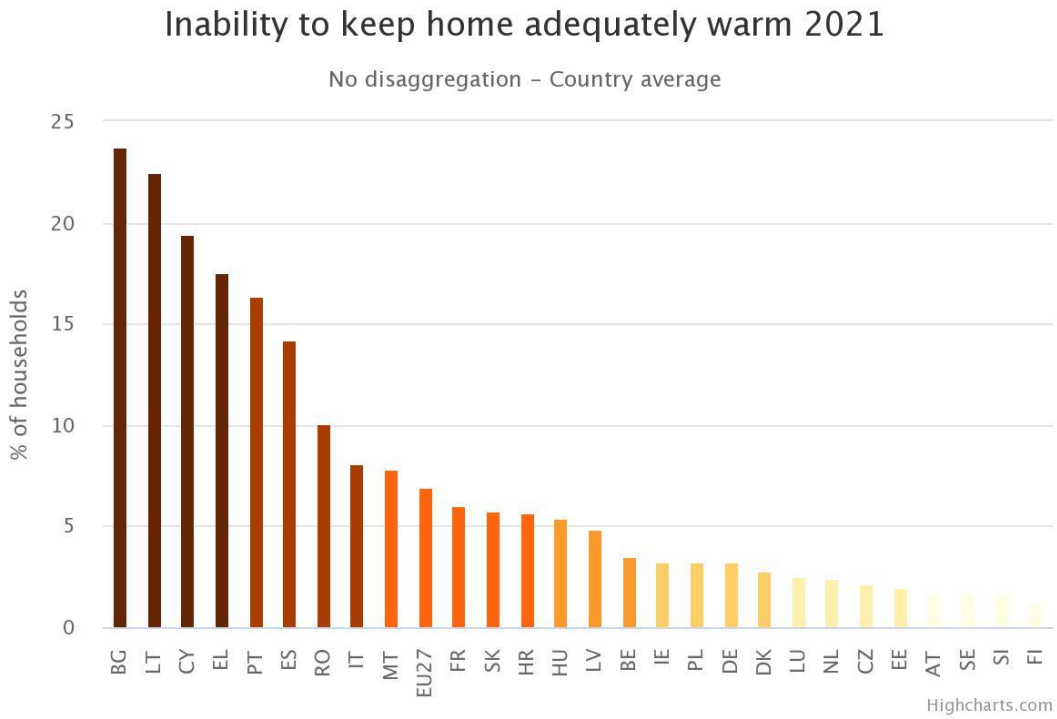


Figure 2.17 Possibility to keep home adequately warm – Situation by household in the EU in 2021[119]

2.5. Dimension Research, innovation and competitiveness

i. I. National objectives and funding targets for public and, where available, private research and innovation relating to the Energy Union, including, where appropriate, a timeframe for when the objectives are to be met

According to the**Estonian 2035 strategy action plan**, Estonia must contribute to increased productivity and international competitiveness by developing business innovation and R & D capacity. **New innovation services and grants for all stages of the development of enterprises and technologies** will contribute to this, such as market monitoring of new technologies and advice on intellectual property, new business models and engagement in creativity, re-organisation of support for applied research, R & D investments by state-owned companies.

The R & D, Innovation and Entrepreneurship Development Plan 2021-2035 (TAIE Development Plan) was approved by the Government of the[120] Republic on 15 July 2021. The TAIE Development Plan brings together in a single document the R & D, innovation and business development targets and orientations for the next 15 years. The**TAIE Development Plan aims to increase the well-being of Estonia's society and the productivity of its economy by providing competitive and sustainable solutions to the development needs of Estonia and the world through the interaction of research, development, innovation and entrepreneurship in Estonia.** Plan Asets out the following sub-objectives:

1. Estonia's development relies on knowledge-based and innovative solutions.
2. Estonian science is high, effective and diverse.

[119] https://energy-poverty.ec.europa.eu/observing-energy-poverty/national-indicators_en
[120] Presentation of the TAIE Development Plan | TAIE

3. The Estonian business environment encourages entrepreneurship and the creation and growth of knowledge-intensive entrepreneurship, the creation and export of higher value-added products and services, and investment in all Estonian regions.

The metrics of the TAIE Development Plan will serve as benchmarks, inter alia:

- The planned financing of TA in the national budget as a share of GDP is ≥ 1 % by 2035 (2019=0.75 %)
- Private TA spending level of 2 % of GDP by 2035 (2019=0.86 %)
- A place in the European Innovation Scoreboard will be an innovation leader by 2035 (Estonia was a moderate innovator in 2019-2022[121])

TAIE's focus areas, i.e. the priority areas of R & D, innovation and entrepreneurship, corresponding to Estonia's development needs and opportunities, are key to achieving the objectives of the Development Plan. Priority development implies that the objective is to increase the importance of focus areas in the Estonian economy, including exports and development needs, and that the necessary R & D activities will be further supported by the State.

TAIE's focus areas are covered by the respective roadmaps:

• digital solutions in all areas of life
• health technologies and services;
• valorisation of local resources;
• smart and sustainable energy solutions;
• vibrant Estonian society, language and cultural space.

The overall focus of smart and sustainable energy solutions is to: with R & D, innovation and entrepreneurship, Estonia produces energy in a climate-neutral way, makes Estonia's energy use more efficient and resource efficient and contributes to ensuring energy security.

The roadmap for smart and sustainable energy solutions[122] agreed that science-based forms of energy production that do not harm our environment are most in need of development. For example, wind energy solutions, biofuels, etc. Energy storage and load management solutions need to be developed, as well as transmission networks that help to store and use energy easily, for example when the price of energy is very high or when energy poverty occurs. This concerns e.g. the development of smart energy grids, batteries, etc. Equally important are energy consumption solutions that contribute to more efficient and sustainable use of energy, e.g. in transport and construction. In order to find appropriate science-based solutions to the needs addressed, the Roadmap agreed that the greatest need to support the uptake of research results in the field of energy, e.g. knowledge and technology transfer, through fundamental and applied research, research development, joint activities between businesses and researchers, peer-to-peer knowledge and experience sharing between researchers and businesses, provision of R & D services, international cooperation, etc. There is also a need to develop opportunities and environments for evaluating and testing the solutions to be created so that the solutions developed can be tested outside laboratory conditions on a larger (industrial) scale and in a real-life environment. It is crucial to ensure the follow-up and increment of scientists and engineers involved in the field. In addition, there is a need to foster wider cooperation between research institutions, businesses and the public sector, boost start-ups and growth, investment and exports.

The roadmap was approved for 3-4 years, after which it will be updated to take account of developments in the field. Developments in this area will be monitored and evaluated on a regular basis and will allow for changes to be made to the Roadmap as well as to its activities and funding. On the basis of the Roadmap,

[121] EIS 2022 – RIS 2021 | Research and Innovation (europa.eu)
[122] Smart and sustainable energy solutions | TAIE

HTM and MKM design support measures for the development of energy solutions, complemented by general research and business financing measures such as research grants, research infrastructure grants, business grants, etc., where there are no priority areas.

Estonia is one of the countries with the lowest resource productivity in the European Union[123] and therefore subsidies paid under the Roadmap, among other things, help reduce the resource and energy intensity of the economy.

Existing sectoral development plans to improve competitiveness through R & D & I:

- [124] Under the European Union's Common Agricultural Policy Strategic Plan 2023-2027, agriculture and food are carried out by a number of research and development institutions, with a good level of vocational and higher education, which provides a favourable environment for the emergence of new research solutions and cooperation in innovation. R & D, knowledge transfer (including advice) and innovation contributing to the competitiveness of the sector; the state provides grants to this end, but the budget does not cover all needs and the conditions for support measures have often been rigid. The level of R & D and education in agriculture is good, but the level of R & D in relation to climate and agriculture is uneven and there are few pilot projects. Soil maps are not updated, databases on different soil data are not integrated into a comprehensive system, and research and education in the field of soil are insufficient. Companies have low financial capacity to invest in R & D and innovation. The specific objective is to increase the competitiveness and market orientation of farms, with a particular focus on research, technology and digitalisation. Participation in the EIP will contribute to strengthening cooperation in research and knowledge transfer and learning from experiences in other countries. Public support for innovation must be flexible, simple and efficient. A comprehensive and flexible knowledge transfer and advisory system needs to be developed to ensure that the latest independent scientific and technological information reaches the producer and processor. Cooperation shall aim at facilitating the implementation of European Innovation Partnership (EIP) projects and innovation cooperation between applicants and R & D institutions and R & D performing institutions, thereby improving the position of rural businesses in the value chain, increasing climate and resource efficiency and mitigating resilience to market and production risks, while preserving biodiversity and the specificities of natural and climatic conditions. In order to develop and implement best environmentally friendly production and processing practices, cooperation with both Estonian and foreign R & D institutions and experts will be provided to support the implementation of EIB projects in both Estonia and external cooperation. Development vouchers can be used to support innovation cooperation between the company and the R & D institution (possibility to use the share to pre-test the idea of a larger collaborative innovation project, to create some smaller-scale innovative solutions, etc.). It is also planned to make use of the so-called AKIS component (AKIS=Linked Agricultural Knowledge and Innovation System) for which it is free to choose whether it will be used to obtain advisory services, participate in training, use a scientific expert or combine all of these options.
- The development of a tool to assess the carbon footprint of farms has started and a study on the socio-economic impact of climate action on the sector is planned.
- Axis 7 of the Agriculture and Fisheries Development Plan 2030 includes research and innovation and knowledge transfer activities that support the achievement of the objectives of agriculture and fisheries. A well-functioning R & I and knowledge transfer system, as well as the promotion and application of new technologies, including digital technologies, are key to enhancing the competitiveness and attractiveness of the rural economy, creating a positive image and improving society's understanding of the nature of modern production. The amount of R & D financed by the

[123] Eurostat Resource productivity [CEI_PC030]
[124] European Union Common Agricultural Policy Strategic Plan 2023-2027, | Ministry of Rural Affairs (agri.ee)

Ministry of Rural Affairs must be EUR 25 million in 2030 (2018=EUR 5 million). The aim is to develop a support system for innovation, encompassing product development and innovation at large in both the private and public sectors. The ecosystem-based approach to fisheries management will focus more on R & D and innovative solutions to capture, cultivate and valorise a biological resource, which in turn provides an opportunity to export products with higher added value. The share of healthy stocks is 65 % in 2030 (2019=45 %).

- According to the draftnational waste management plan 2022-2028, Estonia has a high potential for innovative recycling solutions in the form of research and development institutions. Innovation, R & D will be used to prevent food waste. In accordance with thewaste management hierarchy, waste generation must be avoided as a matter of priority. Waste prevention contributes to the efficient use of resources in the economy and to the reduction of negative impacts on the environment and human health resulting from the use of natural resources and waste management. Waste prevention also helps to reduce economic costs (e.g. by reducing waste of food and other essential resources and materials). Increasing resource efficiency and thereby reducing waste will help businesses to create new economic opportunities, improve productivity, reduce costs and increase competitiveness.
- The general objective of thedraft Estonian Forest Development Plan 2021-2030 is that Estonian forestry is designed and described in order to achieve sustainability through three sub-objectives:

1. Forestry helps to ensure the sustainability of forest ecosystems and their biodiversity, mitigates climate change and adapts to the impacts of climate change. 2. The forest sector is economically competitive. 3. Forestry is inclusive and respects social and cultural values. The Development Planpromotes the development of a strong, innovative and responsible economy by developing and increasing the capacity to better valorise the benefits of the forest ecosystem, including wood. This will lead to favourable conditions for business R & D, deployment of new technologies and innovation. New business models and operational mechanisms will develop a support system for private forest owners and develop the efficient use of other (non-wood) forest ecosystem assets. This will ensure better health, productivity and resilience of forests to climate change. The aim is also to improve the condition of forest habitats. As forests are part of our living environment, the development agenda focuses on promoting inclusion and empowering actors. Between 2011 and 2020, the total R & D expenditure in the Estonian timber sector amounted to an average of EUR 475000 per year. Over the same period, the number of R & D personnel in the sector has increased from 21 full-time employees in 2011 to 28 in 2020. However, it has been easier for companies to commission the necessary studies from foreign research firms with laboratories and a dedicated researcher. It may take longer to get a solution from Estonian universities as it is still necessary to obtain equipment, equip the laboratory and sometimes prepare specialists to solve a specific problem. However, Estonian small firms often do not have the financial means to commission research and development. Over time, there has been a knowledge gap in the high-tech processing of wood as a resource, there are few companies active in this field, and they have mainly relied on foreign knowledge. However, progress has been made in this direction in recent years. For example, the University of Tartu has taken a series of steps to establish a core biotechnological and chemical treatment competence for wood in cooperation with large multinational and domestic companies (e.g. Novo Nordisk, Graanul Invest). A rather exceptional and positive example is the EUR 5.9 million VEHICLE project launched under the EU's Horizon 2020 research and innovation programme, involving Fibenol from Estonia among eight European companies. As part of this project, Imaverre lignin and wood sugars were set up as a pilot plant, which reached production in the second quarter of 2023. The development of this type of cooperation with other timber companies in different networks from the European Union must also be fully supported through the development activities of the Estonian Research Agency and Enterprise Estonia. Projects in the forestry and timber industries have also been launched through the European Union's 2014-2020 structural support

programmes for R & D and research promotion. For example, a 'restaurant' programme has been launched to support business-driven R & D for the valorisation of timber, food and subsurface resources in order to foster the capacity-building of research teams in these fields, the growth of professionals and development cooperation between businesses and research institutions. As it is crucial to identify and develop new technologies to improve wood valorisation, one of the focus of the programme will be research into wood components and chemical valorisation.

- Under theTransport and Mobility Development Plan 2021-2035, in order to keep up with technological developments and successfully manage change, a roadmap for transport technologies on research and development, its financing, and principles for procurement and regulation of transport services needs to be drawn up. We will introduce self-conductive public transport if its cost-effectiveness is better than traditional public transport and if the continuity and competitiveness of the service is ensured to serve, inter alia, suburbs. We support R & D in this regard. We are working on a solution to more effectively target the population in sparsely populated areas in public transport through the use of last mile transport to serve the basic part of public transport. Through R & D, we will support research into opportunities and technology experimentation and applications where possible for new types of transport solutions (e.g. Hyperloop, Unmanned Air Traffic). Innovation and added value generated by companies linked to the rail sector must also be encouraged by applying new business trends and technologies. Companies in the rail sector have great potential for the uptake of different digital developments and processes. In order to be able to take the knowledge-based decisions needed to achieve the objectives, public actors involved in the design of the transport system must have the capacity to interpret world best practice and adapt and implement it for Estonia, involving, where appropriate, research organisations. An optimal amount of raw data of sufficient quality must be used to enable the development of science-based solutions. Show also the budget for R & D.
- The overall objective of the 2030 Energy Sector Development Plan (ENMAK 2030) is to ensure, inter alia, that the economy becomes more competitive: provide consumers with market-based prices and access to energy supplies that are consistent with the European Union's long-term energy and climate policy objectives, while contributing to the improvement of Estonia's economic and environmental climate and long-term competitiveness. In order to contribute to the implementation of ENMAK 2030, energy R & D activities decided in the context of the 2019-2022 National Fiscal Strategy 2019-2022, approved in spring 2018, were carried out for a total of EUR 1.6 million, i.e. EUR 400000 per year, for each of the four consecutive years. The ENMAK TA programme 2019-2022 carried out 25 studies and analyses, supported the Baltic-North Energy Research Programme, carried out activities related to local authorities (analysis of energy savings and renewable energy options, workshops programme "Climate change and energy management in local government", manual of local authorities on wind and solar energy), updated on the portal's energy winters.ee, modelling energy economy scenarios, prepared a long-term strategy for the renovation of buildings.
- Thelong-term strategy for the renovation of buildings requires the development oftechnological solutions in order to increase the volume of renovation. Assuming that the capacity of new buildings is maintained at the same level, the technologies currently in use make it very difficult to increase the volume of renovations by the necessary 5 times. There is not enough labour to cover a rapid increase in volumes. In addition to the challenges faced by the workforce, new technological solutions also make it possible to speed up processes and reduce the increase in construction costs due to the increase in demand. Prefabrication could first be used for renovating standard buildings (e.g. apartment buildings). In larger cities, such as Tallinn and Tartu, there are many apartment buildings that were constructed in the Soviet era by residential construction combines on the basis of standard designs. Use of prefabrication would allow the renovation process to be automated and accelerated and ensure better quality. Use of virtual tools would help to reduce the time spent on preparing energy labels and energy audits and therefore also the costs. Current

energy labels and energy audits are generally presented as documents in PDF format, which are not machine-readable and cannot therefore be easily used for analysis. In the environment, which is part of the Building Registry, audits could be linked to the data of the Building Registry and the energy use data entered in the audit would be automatically usable by the system for analysing the bigger picture of the energy use of buildings. Simplified digital tools for building owners would allow building owners to think about the first options at no cost. Research and Development allows the quality to be improved and the processing of data collected about buildings to be automated, the problem of labour shortages to be alleviated, productivity to be increased and the total cost of renovation to be reduced. Development of state registries improves the monitoring of renovation activities. The main bottleneck of preparing the renovation strategy was the lack of data. Mapping of decision-making processes provides the opportunity to understand why and when property owners decide to start renovation work. Thedevelopment of strategic spatial planning will enable good public space principles to be applied to building renovations. Analysis of wider impacts of renovation of buildings. The economic impact of building renovation measures, the impact of global warming on potential energy savings of buildings, the impact of building renovation on the achievement of climate neutrality, the options for broad-based implementation of innovative solutions, the results of pilot projects conducted in other countries and the potential to transfer international practices should be analysed in detail. Development of technical expertise allows to renovate with sustainable, healthy and real energy savings, which do not come at the expense of the interior climate. Having guidance materials and expertise allows designers and construction workers to know what is expected from them and contractors to develop economical and affordable standard solutions. To date, more than 10 doctoral theses have been defended on the topic of renovation of buildings and the results are well-implemented.

ii. National 2050 targets for the promotion of clean energy technologies, where available, and, where appropriate, national targets, including long-term (2050) targets for the deployment of low-$_{carbon}$ technologies, including technologies for decarbonising energy-intensive and carbon$_{-intensive}$ industrial sectors$_{and}$, where appropriate, for related carbon$_{2}$ transport and storage infrastructure.

The Development Paper 'Basics of Climate Policy to 2050' agreed at national level a long-term vision for Estonia's climate policy, sectoral and cross-sectoral policies setting a clear pathway for climate change mitigation. According to the *fundamentals of climate policy until 2050* adopted by Parliament in February 2023, Estonia will be a climate-neutral country with a competitive, knowledge-based society and economy by 2050. A high-quality, species-rich living environment and preparedness and capacity to adapt to climate change are ensured in order to minimise the adverse effects of climate change and make the best use of its positive effects. According to the first economy-wide policy guideline, Estonia is developing an attractive environment, in particular for the development of innovative technologies, products and services that reduce greenhouse gas emissions. Their exports and global implementation will also be encouraged to address global challenges related to climate change.

Encourage the uptake of low-carbon technologies and efficient use of resources, favour R & D & I strands promoting the development of energy-efficient technologies._Historically, the production of minerals has driven GHG emissions from industrial processes, but the cement industry is looking for new solutions to reduce $CO2_{emissions}$ (carbon sequestration, clay-[125]sinification). HFC emission projections are decreasing and most R-404A equipment and old split air conditioners and heat pumps are expected to be phased out. The

[125] I Kunda Nordic (knc.ee)

GHG savings from existing and planned measures in 2023 (Annex III and IV) are projected to decrease by 83.8 % by 2050 compared to 1990 for industrial processes. [126]

Compliance with the EED measures (energy audit for large companies) will also facilitate the uptake of renewable energy. Large companies are obliged to carry out an energy audit every four years to identify energy saving opportunities and encourage small and medium-sized enterprises to follow suit. Monitoring of energy audits of large companies (2022=146 companies) is carried out by the Consumer Protection and Technical Regulatory Authority[127]. Energy efficiency in industry can be achieved through the introduction of more efficient appliances, e.g. replacement of electric motors and drives, process automation.

Estonia's recovery and resilience plan boosts, inter alia, the deployment of renewable electricity generation facilities inindustrial sites and adjacent areas through support for connection to the distribution or transmission network (projects are under[128]assessment).

Estonia's target is to use 14 % renewable fuels in transport by 2030, some of which are planned to be covered by biomethane. Transport fuels are consumed in Estonia in excess of 9.1 TWh, almost two thirds of which are diesel and the rest petrol. In order to increase the consumption of biofuels in Estonia, the State has plans to develop the production of locally based biomethane based on raw materials and to move towards widespread use of biomethane in the transport sector. To this end, the country is developing the biomethane market, creating the necessary conditions to meet the target. The support will accelerate the expansion of biomethane consumption in Estonia with the aim of enabling final consumers to consume biomethane at the price of natural gas, while ensuring market-based intensification of production and investment security in the sector in order to switch to market-based biomethane production by mid-2024. The biomethane supported is produced by 5 companies[129]. Access torenewable energy (connectivity), sufficient transmission capacity between generation and consumption facilities (connection of offshore wind farms to the mainland, including, for example, Ida-Viru). A pilot project for the deployment of green hydrogen in public transport started at the end of 2021. Three IPCEI projects will be supported for the development of hydrogen technologies[130]. Support for the creation of a complete chain of green hydrogen production and consumption from renewable sources will be open until 15 May 2023[131].

In order to create hydrogen infrastructure, an analysis of the possibilities for blending hydrogen into the existing natural gas infrastructure and/or the possibility of installing separate pipeline infrastructure for hydrogen transmission is being prepared by Elering AS as the hydrogen system operator likely in the future.

In order to comply with theobligation to create a hydrogen refuelling option (Regulation on the establishment of an alternative fuels infrastructure in the European Union), there is a call for tenders.

In March 2023, ministers endorsed the Estonian hydrogen roadmap, which outlines the actions needed for the development of the hydrogen market in Estonia. The Roadmap aims to describe today's state of play and themes in which the role of hydrogen in achieving climate objectives, improving the competitiveness of the economy and decarbonising different sectors can be defined.

[126] Report on greenhouse gas policies, measures and projections 2023 (EN).pdf Greenhouse gasesin Estonia, | Ministry of the Environment (envir.ee)
[127] Energy efficiency | Ministry of Economic Affairs and Communications (mkm.ee)
[128] Accelerating the deployment of renewable electricity generation facilities in industrial sites, | Environmental Investment Centre (k.ee)
[129] Biomethane subsidy | Elering
[130] Hydrogen | Ministry of Economic Affairs and Communications (mkm.ee)
[131] The deployment of green hydrogen in the transport sector and the | Environmental Investment Centre as feedstock for the chemical industry (k.ee)

iii. Where applicable, national objectives with regard to competitiveness

The sub-objective of the TAIE Development Plan is: The Estonian business environment encourages entrepreneurship and the creation and growth of knowledge-intensive entrepreneurship, the creation and export of higher value-added products and services, and investment in all Estonian regions. The benchmarks for competitiveness-related metrics are:

- Nominal labour productivity is 110 % of the EU-27 average by 2035 (2019=78.7 %);
- A place in the European Innovation Scoreboard will be an innovation leader by 2035 (Estonia was a moderate innovator for 2019-2022[132]);
- Exports of goods and services amount to EUR 43 billion in 2035 (2020 = EUR 19 billion).

3. POLICIES AND MEASURES

3.1. Decarbonisation dimension

3.1.1. GHG emissions and removals

i. I. Policies and measures to achieve the target set under Regulation (EU) 2018/842 as referred in point 2.1.1 and policies and measures to comply with Regulation (EU) 2018/841, covering all key emitting sectors and sectors for the enhancement of removals, with an outlook to the long-term vision and goal to become a low emission economy and achieving a balance between emissions and removals in accordance with the Paris Agreement

In April 2017, the Estonian Parliament approved Estonia's long-term climate policy development document **entitled 'Basics of climate policy up to 2050'** (*hereinafter referred to as* KPP 2050). KPP 2050 is a vision document setting out a long-term GHG emission reduction target and policy guidance to ensure preparedness and resilience to climate change adaptation or to respond to the impacts of climate change. The principles and guidelines set out in this document must be taken into account when updating and implementing cross-sectoral and sectoral strategies and national development plans. The main economy-wide and sectoral policy guidelines and principles contained in the KPP 2050 contributing to the achievement of the objectives referred to in point 2.1.1 are set out in the Annex to this document (see Annex II KPP 2050 policy guidelines and principles). Detailed descriptions of the guidelines can be found in the KPP 2050 document[1].

On 12 May 2021, the Riigikogu adopted Estonia's long-term strategy, **'Estonia 2035'**, which sets out five long-term strategic objectives, which are value-based objectives and the basis for the country's strategic choices, and all Estonia's strategic development documents contribute to its implementation.

In addition, in 2021, the Ministry of the Environment started preparing **a strategic development document for the environment (spring)**. The spring sets out Estonia's vision, objectives and targets for the environment, with key policy instruments for 2030, and organises strategic planning in this area. The aim of the development plan is to support the achievement of Estonia's and the European Union's long-term strategic goals and the UN Sustainable Development Goals (SDGs), and to organise the system of existing strategic documents in the field of environment. The development plan will seek a broad agreement to maintain the good state of the environment, based on the link between the environment and the economic and social sectors and their impact on the surrounding natural environment and humans. Climate policy is one of the

[132] EIS 2022 – RIS 2021 | Research and Innovation (europa.eu)

three cross-cutting themes of spring, in addition to biodiversity and the circular economy. Spring will address the coordination level of climate policy and define the key policy instruments that will create the necessary preconditions for progress towards the objectives set by the "Fit for 55" climate policy and the "Estonia 2035".

In 2021, the US and the EU launched the **Global Methane Agreement**, to which Estonia also joined. The initiative aims to reduce methane emissions globally by at least 30 % by 2030 compared to 2020.

The Parties shall allow, inter alia:

- Take national measures to achieve the target, including all possible reductions in the energy and waste sectors and looking for ways to reduce emissions in the agricultural sector
- Introduce a higher IPCC inventory methodology
- Publish and keep up-to-date information on policies and actions – Action Plan

The European Union published its **Methane Action Plan** in November 2022. The Ministry of Environment started bringing together policies and measures in autumn 2022, and Estonia is currently preparing its draft methane action plan, which will be finalised by the end of 2023.

At the end of 2022, the Council of the European Union reached a general approach on a proposal for the monitoring and reduction of methane emissions in the energy sector. The proposal introduces new requirements for the oil, gas and coal sectors as regards the measurement, reporting and verification of methane emissions to the highest standards.

It is important for air quality improvements and climate policy to continue monitoring methane emissions measurement and emissions formation, including improved monitoring and reporting, in order to contribute to the reduction of methane emissions, both domestically and internationally.

A list of policies and actions contributing to the objectives mentioned in chapter 2.1.1 is set out below. In addition to the policies and measures already implemented and ongoing, a number of additional policies and measures (considered by additional measures in Chapter 5.1 when preparing projections) and planning (the impact of the measures has not been assessed when preparing greenhouse gas projections) are also presented below.

The mapping of existing measures has been agreed for the purpose of implementing the various development plans.

The link between the measures and GHG reduction is set out in Annex III and a more detailed description of the measures can be found in Annex IV to the plan. The implementation of existing and additional measures could lead to a total reduction of about a quarter of GHG emissions in the areas covered by the plan over the period 2005-2030.

Table 3.1 Reductions in GHG emissions per sector under the Complementary Measures Scenario 2005-2030.

2005, GHG emissions in Mt CO_2 eq (including LULUCF)	Areas	2030, GHG emissions Mt t	Change (%)
14,5	Energy (including HOONED)	5,3	−63,4
2,2	TRANSPORT	2,0	−9,1
1,2	AGRICULTURE, FARMING	1,6	33,3
−2,8	LULUCF	3,6	228.6
0,6	WASTE	0,2	−66,7

0,7	INDUSTRIAL PROCESSES	0,2	−71,4
16,4	TOTAL	12,9	−21.3

Cross-sectoral measures with potential to reduce greenhouse gas emissions

The following are the existing and planned cross-sectoral policies and measures with potential to reduce GHG emissions and increase removals.

PM2 Agri-environment-climate measures with three sub-measures.

- Support for environmentally friendly horticulture – the overall objective is to promote the use of environmentally friendly horticulture practices. One of the specific objectives is to reduce leaching.
- Regional support for soil protection – the general objective is to ensure the sustainable use of eroded soils and organic soils and to minimise soil degradation by improving soil management and using other activities that improve cropland management. The measure concerns the conversion of land with eroded soils and organic soils into grassland.
- Support for the maintenance of semi-natural communities – the overall objective is to improve the condition of semi-natural habitats and the species living there by improving pasture or grassland management.

In addition, the Common Agricultural Policy (CAP) Strategic Plan 2023-2027 includes an environmentally friendly management measure (PM6), the sub-measures of which are the cultivation of catch crops and the neutralisation of acidic soils. The objective of the measure to neutralise acid soils is to neutralise acidic soils in order to achieve optimal conditions for plant growth. As a result, losses of agricultural land in use can be avoided and soil carbon stocks increased. The measure to neutralise acid soils was proposed for the first time as a GHG reduction measure 'Assessment of options for increasing climate ambition in Estonia'.

Existing cross-sectoral policies and measures with greenhouse gas reduction potential in the energy and agriculture sectors are:

PM8 Investments to improve farm performance; and

In addition, the Common Agricultural Policy (CAP) Strategic Plan 2023-2027 (confirmed on 11.11.2022) covers tangible and intangible investments by farmers (PM3), which includes six sub-measures:

1. Investments in farm-friendly renewable energy solutions and energy savings.
2. Purchase of precision fertilisation sensor systems.
3. Purchase of environmentally sustainable cooling equipment or replacement of cooling equipment for greener ones.
4. Construction of manure and silos storage facilities, covering manure storage facilities and building leak-proof substrates for deep-shaded housing.
5. Investments in manure spreading equipment.
6. Purchase of filters that catch ammonia.

Investment aid for the valorisation of bio-resources is granted on the basis of the Estonian Recovery Plan. The first round of applications was at the end of 2022, project evaluations are still ongoing and therefore their impact is not reflected in the GHG projections scenarios. In addition, support is planned to encourage urgent up-front investments to increase biomethane production capacity to reduce dependence on Russian fossil fuel imports and accelerate the energy transition.

The following measures will mainly affect the transport sector, but will also have a minor impact on the forecasts of the industrial processes and product use sector through the reduction of final energy consumption for road transport and diesel (AdBlue use is presented in the IPPU sector).

TR2a Encouraging the use of electricity in passenger cars
TR2b Encouraging the use of biomethane in heavy-duty vehicles
TR3 Promoting sustainable driving
Reduction of forced traffic by passenger car TR4a
TR4b Restructuring of urban streets
TR5 Blue and modern public transport
TR 6 Time-based road user charge for heavy goods vehicles
TR 7 Subsidy for the purchase of zero-emission vehicles
TR8 Further promotion of sustainable driving
TR9 Additional spatial and land-use measures to increase transport energy savings in cities and improve the efficiency of the transport system
TR11 Introduction of a distance-based road user charge for heavy-duty vehicles
TR12 Vehicle pressure and energy label of tyres
TR13 Development of railway infrastructure (including Rail Baltic construction)
TR16a Promotion of Biomethane in buses
TR16b Encouraging the use of electricity in buses
TR17 transposition of the KHS Directive and greening of the public vehicle fleet
TR19 Hydrogen pilot project
TR 20 Tallinn new tram lines

Policies and measures to achieve the target under the Effort Sharing Regulation

Compared to the list of measures in the NEW2030 submitted in 2019, the draft update of the REKK2030 has updated the list of measures following the completion of previous development plans, the adoption of new development plans and the publication of further studies. The actions below are in line with those reported in the progress report submitted in 2023 under the REKK2030. Energy sector

Estonia's recovery and resilience plan includes the following measures, which are not included in the 2023 GHG projections scenarios:

EN21 Encouraging the uptake of biomethane
EN22 Promoting the uptake of integrated hydrogen technologies
EN23 Electricity grid reinforcement programme to increase renewable energy production capacity and adapt to climate change
EN24 Pilot Energy Storage Programme
HF7 Housing Investment Fund

Energy consumption – other sectors (commercial/public and residential)

The measures to be taken into account in residential and commercial/public sectors are mainly related to energy saving through renovation of buildings. As buildings account for a high share of total energy consumption, improving the energy efficiency of residential and commercial/public buildings also contributes significantly to reducing greenhouse gas emissions. European directives set minimum energy performance requirements for buildings, setting overall limits on the energy consumption of a building.

The energy performance of buildings in Estonia is regulated by the Regulation *on minimum energy performance requirements for* buildings.

Minimum energy performance requirements must be observed during the construction and major renovation of a building. Already when a building is planned, its compliance with the requirements has to be assessed on the basis of the construction project. Compliance with minimum energy performance requirements shall be demonstrated by means of an energy performance certificate. The main measures in place affecting GHG emissions are:

HF1 Reconstruction of public and commercial buildings, including:
HF1a Reconstruction of municipal buildings
HF1b Reconstruction of central government buildings
HF1c Correction of the primary school network
Cleaning of the HF1d secondary school network
HF1e Reorganisation of Special Care Services
HF1f Institutional development programme for R & D institutions and higher education institutions
HF1g Modernisation of Health Centres
HF1h Creation of new childcare and early childhood education infrastructure
HF2a Support for renovation of apartment buildings
HF2b Support for the reconstruction of private houses
HF4 Investments in street lighting renovation programme
EN16 Support for improving the energy efficiency of fishing vessels and mitigating climate change
EN17 Support for energy and resource audits of fishery and aquaculture products processing enterprises

Some of the additional measures are still under discussion or are awaiting the release of additional funds for their implementation (the action is planned in the sense of ANNEX IV to the plan). Such measures are:

HF3 Support for the renovation of non-residential buildings in the private sector
HF5a Additional municipal renovation of buildings
HF5b Additional renovation of central government buildings
HF6a Additional support for the renovation of private houses
HF6b Additional support for the renovation of apartment buildings
PM18 Investments for energy savings and renewable energy in greenhouses and vegetable warehouses – The objective of the measure is to support investments in energy and resource efficiency in agriculture.

Supply of electricity

The measures in the scenario with existing measures for the supply of electricity are:

EN1 Support for renewable energy and support for high-efficiency cogeneration of heat and power
Support for investments in wind farms in EN2
EN5 Renewable energy support through a low bid auction (technology neutral)
EN6 Renewable energy support through a low bid auction (technology-specific)
EN14 Renewable energy deployment at PPA maritime surveillance radar stations in small islands
EN15 Increasing the share of solar energy in electricity generation

In addition, there are additional electricity supply measures that either have a direct impact on GHG emissions or support the implementation of existing measures or additional measures, but are not included in the projected scenarios, such as:

EN12 Acquisition of air surveillance radars for the development of wind farms
EN112 Research and Development Programme of the Energy Economy Development Plan

Measures in the heat production sector

The main existing measure affecting GHG emissions from the heat generation sector is:

EN3 The development of heat management, which includes:
EN3a Construction of local heating solutions to replace district heating solutions
EN3b Renovation of depreciated and inefficient heat pipelines
EN3c Renovation of district heating boilers and fuel exchange

Some of the additional measures are still under discussion or are awaiting the release of additional funds for their implementation (the action is planned in the sense of ANNEX IV to the plan). Such a measure is:

EN4 Further development of heat management, including:
EN4a Further construction of local heating solutions instead of district heating solutions
EN4b Further renovation of depreciated and inefficient heat pipelines
EN4c Further renovation of district heating boilers and fuel replacement

Energy consumption – Processing industry and construction

Existing measures affecting the energy consumption forecasts of the manufacturing industry are:

EN19 Support for energy and resource audits in industry
EN20 Energy and resource efficiency in enterprises

Measures in the transport sector

The Transport and Mobility Development Plan 2021-2035 has a key focus on reducing the environmental footprint of transport vehicles and systems to contribute to the climate objectives by 2050. In order to manage human behavioural change, greater attention needs to be paid to the polluter pays principle in the future, including the taxation of fuels according to their specific emissions and energy content. The development plan also calls for the deployment of low-carbon fuels in all modes of transport.

Reducing greenhouse gas emissions from the transport sector is one of Estonia's most important issues in order to achieve the ESR objectives, as energy consumption has increased with gross domestic product. The main objectives of the measures implemented or planned in the transport sector relate to improving the energy efficiency of vehicles and reducing demand for domestic transport.

The main measures in place affecting GHG emissions in the transport sector are:

TR1 Increasing the share of biofuels in transport;
TR2a Encouraging the use of electricity in passenger cars
TR2b Encouraging the use of biomethane in heavy-duty vehicles
TR3 Promoting sustainable driving;
TR4 Spatial and land-use measures in urban areas for energy savings in transport to improve the efficiency of the transport system, including:
Reduction of forced traffic by passenger car TR4a
TR4b Restructuring of urban streets
TR5 Convenient and modern public transport
TR6 Time-based road user charge for heavy-duty vehicles.
TR7 Subsidy for the purchase of zero- emission vehicles
TR13 Development of railway infrastructure (including Rail Baltic construction)
TR14 Railway electrification
TR15 National ferry becoming climate neutral
TR16a Encouraging the use of biomethane in heavy-duty vehicles
TR16b Encouraging the use of electricity in buses

TR17 transposition of the KHS Directive and greening of the public vehicle fleet
TR18 Acquisition of additional passenger trains
TR19 Hydrogen pilot project
TR20 Tallinn new tram lines

The implementation of the following additional measures is still under discussion (the action is planned in the sense of ANNEX IV of the plan):

TR8 Further promotion of sustainable driving;
TR9 Additional spatial and land-use measures to increase energy savings in urban transport and improve the efficiency of the transport system;
TR10 Additional activities in the development of convenient and modern public transport;
TR11 Introduction of a distance-based road user charge for heavy-duty vehicles
TR12 Tyre pressure and energy label of vehicles
TR21 Complementary national ferry to become climate neutral

Measures in the industrial processes and product use sector

Emissions from the industrial processes and product use sector (the so-called IPPU sector) are regulated by the obligation of the manufacturing industry to apply best available techniques (as laid down in the Industrial Emissions Act (THS) (2013) and the Industrial Emissions Directive 2010/75/EU). The objective of the Industrial Emissions Act is to achieve a high level of protection of the environment as a whole by minimising emissions of pollutants into air, water and soil and waste generation in order to avoid adverse effects on the environment. In addition, the THS defines high-risk industrial activities, lays down requirements for their operation and lays down liability for non-compliance and the organisation of state supervision.

The production plant must comply with the BAT requirements (Ö2). The THS requirements include emission limit values and, when an environmental permit is issued, monitoring and emission reduction measures through the implementation of BAT. This does not lead to further emission reductions, as all production plants are obliged to comply with KETs in their operations.

The main GHG reduction measure for the industrial processes and product use sector is:

OS1 Prohibitions, restrictions and obligations under Regulation (EU) No 517/2014 on fluorinated greenhouse gases and Directive 2006/40/EC relating to emissions from air conditioning systems in motor vehicles

The GHG Regulation (EU) No 517/2014 (which entered into force on 1 January 2015) establishes a timetable for the phase-down of F-gases by 2030, to be implemented through the implementation of an allowed unit system and prohibitions/restrictions.

The objective of the action is to significantly reduce F-gas emissions and replace F-gases with low global warming potential (GWP) refrigerants by limiting the total quantity of the most important F-gases sold in the EU from 2015 onwards and gradually reducing their use to one fifth of 2014 sales by 2030. This is achieved through a phase-down plan for F-gases placed on the EU market, a ban on the placing on the market and maintenance of certain equipment, obligations for operators and maintenance staff (certification), an obligation to recover gases from end-of-life equipment.

Directive 2006/40/EC prohibits from 1 January 2017 the sale of new EU type-approved passenger cars, long-distance cars and vans with air conditioning systems containing a refrigerant with a global warming

potential higher than 150. Estonia has not imposed significantly stricter requirements than those laid down in Regulation 517/2014 and Directive 2006/40/EC.

Measures in agriculture

The development of the agricultural sector and the implementation of the various targeted measures are mainly governed by the Common Agricultural Policy (CAP) Strategic Plan 2023-2027 (confirmed on 11.11.2022) and the 2030 Development Plan for Agriculture and Fisheries (PõKa 2030). In addition, some of the measures under the Estonian Rural Development Programme 2014-2020 (RDP 2014-2020) are still applicable as funding for the implementation of the measures lasts until 2023 and/or 2024.

The CAP Strategic Plan 2023-2027 contains four specific objectives, including climate-related measures:

1. Contribute to climate change mitigation and adaptation, including by reducing GHG emissions and leveraging carbon sequestration, and promote sustainable energy. This specific objective shall cover the following identified needs:

    - favour green production, investment, circular bioeconomy solutions; and
    - increase carbon sequestration in soils and protect soil organic carbon stocks.

2. Promote sustainable development and efficient management of natural resources such as water, soil and air, including by reducing chemical dependence. This specific objective shall cover the following identified needs:

    – continued support for land improvement investments;
    – contribute to agricultural practices that conserve surface and groundwater;
    – neutralisation of acidic soils;
    – encouraging the development and deployment of green technologies;
    – development of environmental advice;
    – implementation of the requirements and measures resulting from the programme to reduce emissions of air pollutants; and
    – maintenance of soil fertility.

3. Contribute to halting and reversing biodiversity loss, enhance ecosystem services and preserve habitats and landscapes

4. Improving the response of Union agriculture to society's food and health expectations, including high-quality, safe and nutritious food produced in a sustainable manner, reducing food waste, as well as animal welfare and the fight against antimicrobial resistance. This specific objective shall cover the following identified needs:

    – increasing organic production in organic farming by reducing the processing of organic products as conventional products;
    – the diversity of arable and horticultural crops grown, the availability of varieties suited to local circumstances; and
    – improve animal keepers' knowledge of herd health in general.

The Agriculture, Food and Rural Programme 2022-2025 includes measures to reduce GHG emissions. Agri-environment activities aim to reduce the negative environmental impact of fertilisers, plant protection products and GHGs and to ensure that farmland biodiversity and landscape diversity are maintained. In addition, the programme's activities aim to ensure a wider use of environmentally friendly practices in agriculture. In order to further ensure respect for the environment, the introduction and continued use of environmentally sustainable management practices in agriculture will be encouraged, including through

subsidies. The purpose of land improvement activities is to ensure that drained agricultural and forest land is used for the intended purpose.

As regards the environmental impact, the Organic Farming Act (2007) is a key element of the legislation governing the agricultural sector, as it lays down requirements for activities in the field of organic farming which are not laid down in European Union regulations, as well as the basis and extent of public supervision of a person working in the field of organic farming and liability for non-compliance with the requirements laid down in that legislation. A number of secondary legislation has also been issued on the basis of this law to regulate aspects of organic farming.

The activities implemented to reduce nitrogen emissions from the agricultural sector, based on, for example, the Nitrates Directive, have reduced nitrogen emissions into the aquatic environment, which has an indirect positive impact on the reduction of GHG emissions. An important piece of legislation for the implementation of the Nitrates Directive is the Water Act, introduced in 1994 and subsequently amended, in particular in the context of accession to the EU. The updated Good Agricultural Practice and the Government of the Republic Regulation on water protection requirements for fertiliser and manure storage facilities and silage storage facilities (revised several times) were adopted. The Water Act (2019) is one of the main legal acts on which the central measures of the programme of measures 2015-2021 of the Estonian river basin management plan are based. Further measures to promote water protection in agriculture are mainly based on the Estonian Rural Development Programme (RDP) and its measures.

The measures in the RDP 2014-2020 that continue to contribute to the reduction of GHG emissions in the scenario with existing measures are:

PM1 Organic farming;
PM2 The agri-environment-climate measure and its sub-measures;
PM4 Knowledge transfer and communication; and
PM5 Advisory services, farm management and farm relief services.

Additional measures related to agriculture under the existing measures in the scenario stem from the CAP Strategic Plan 2023-2027 (confirmed on 11.11.2022). These measures are similar to those under the RDP 2014-2020. The key support measures and sectoral interventions in the CAP Strategic Plan that have an impact on GHG emissions are:

PM7 Climate and Environment Plan: eco-scheme for organic farming
PM9 Animal welfare aid
PM10 Soil and water protection aid
PM12 Climate and Environment Plan: EFAs
PM13 Climate and Environment Plan: maintaining ecosystem services on arable land
PM14 Support for maintenance of valuable permanent grassland
PM15 Minimum vegetation cover to avoid uncovered soil in the most critical periods
PM16 Support for the maintenance of yeast meadows
PM19 Support for the development of the Knowledge Transfer and Innovation System (AKIS)
PM23 Advisory allowance

The scenario of GHG projections with additional measures includes one additional measure:

Improvement of PM20 manure management

In addition to the existing measures, there are additional agricultural-related measures that either have a direct impact on GHG emissions or support their implementation. However, they are not taken into account in the GHG emission projections scenarios:

PM21 Audits on larger farms;
PM22 Studies and pilot projects (NIP)

The study to find the most cost-effective measures to achieve the objectives of the climate policy and the Effort Sharing Regulation in Estonia includes the replacement of mineral fertilisers by organic fertilisers (PM 17). The aim of replacing mineral fertilisers with organic fertilisers is to reduce N_2O emissions from agricultural soils.

Measures in the waste sector

The Waste Act (2004) lays down waste management requirements for the prevention of the generation of waste and the health and environmental risks arising from it, including measures to increase the efficiency of the use of natural resources and limit adverse effects and to gradually reduce landfilling of waste suitable for recycling or other recovery. The law also covers the organisation of waste management, including the basis and scope of state supervision.

In early 2021, the Minister for the Environment initiated the preparation of the State Waste Management Plan 2022-2028. Waste prevention is the vision of the 2022-2028 waste management plan. Products are reused and repaired, waste generated is collected separately, which is part of daily behaviour. The vision will be supported by a user-friendly, efficient, transparent, operational and innovative waste management system based on the waste hierarchy. It also creates new value from waste as a raw material.

The 2022-2028 waste management plan is based on three strategic objectives:

1. sustainable and informed production and consumption and promotion of waste prevention and reuse;
2. increasing safe material circulation;
3. taking into account the effects of waste management on the human and natural environment as a whole.

The main measures already adopted in the waste sector affecting GHG emissions are:

Limiting the percentage of biodegradable waste landfilled in JM1 and increasing reuse and recycling of waste materials

JM2 Increasing safe material circulation

JM3 Promotion of waste prevention and reduction, including waste risk reduction;

JM4 Reducing, monitoring and surveillance of environmental risks from waste.

In addition to existing measures, there are additional measures related to the waste sector that either have a direct impact on GHG emissions or support the implementation of existing measures. The following additional measures are under discussion and are therefore not taken into account in the projected scenarios.

Reducing food waste – the measure stems from the Estonian Food Waste Prevention Plan, which is implemented through other action plans. The objective of the measure is to reduce food waste and food losses throughout the food supply chain, i.e. primary production, food processing and preparation, retail, wholesale and other supply of food, as well as catering and households. This ensures savings on natural resources, economic resources and a burden on the social system.

Circulareconomy

The aim of the circular economy is to decouple economic growth from the use of primary raw materials by creating a circular production and consumption system with the lowest possible losses. The transition to a circular economy requires changes throughout the product value chain, from product design to new business models and consumption patterns. For new and existing products, the main focus is on the whole life cycle design, with a focus on sustainable material selection (avoidance or reduction of hazardous substances), quality (long product life, possibility of repair), optimisation of the supply chain (prioritisation of local raw materials) and reuse and reuse (possibility of separation and recycling of components). In addition to smart designs, R & D, eco-innovation, technological development, the collaborative economy also play an important role.

The circular economy is a cross-cutting principle, which makes cooperation between businesses and international agreements essential, creating significant opportunities for creating new markets and partnerships. The role of the state in the transition to a circular economy is to create favourable conditions for the implementation of circular economy principles and remove barriers. For the circular economy to reach its full potential, systemic thinking and changes in the whole socio-economic system are needed to bring about real changes in consumption, production, planning, politics, lifestyle, culture and values.

The circular economy has a direct contribution to reducing GHG emissions through, for example, more resource-efficient production and consumption, product lifetime extension, innovative business models that reduce dependence on primary raw materials or waste management and recycling development, reducing the need to produce new products and materials.

In 2022, the Ministry of the Environment finalised a circular economy white paper[133], which provides an overview of the potential for reaching a circular society, together with the challenges and possible solutions in the field.

The White Paper sets out six principles for the transition to a circular economy:

- Resources are used responsibly and according to demand, resource use is designed and waste generation has been minimised.
- The business models of Estonian companies are sustainable and circular.
- Estonia requires expertise and experts to implement the circular economy, as well as effective cooperation between different sectors and sectors.
- Workable digital solutions to support the circular economy have been put in place and quality data to monitor the situation has been ensured.
- The circular economy is well coordinated at national level and a legal and economic environment supporting the circular economy has been created for all sectors.
- Eco-conscious thinking and environmental behaviour have been established.

The implementation of circular economy solutions is supported by the Circular Economy Programme through the Environmental Investment Centre.

The Circular Economy Programme aims to support research and development activities on environmental management, waste, subsurface, chemicals and related activities, resource efficiency, the introduction of circular economy principles, the prevention of waste and emissions and the reduction of the environmental impact of activities, awareness raising on the circular economy and the development and wider use of sustainable consumption and production solutions.

[133] https://ringmajandus.envir.ee/sites/default/files/2023-02/Ringmajanduse%20valge%20raamat.pdf

Policies and measures towards meeting the LULUCF target

For land use, land use change and forestry (LULUCF), carbon stock changes shall be assessed in the following land use categories: forests, arable land, grassland, wetlands (including peat production areas), settlements and other land. Greenhouse gas emissions and removals from LULUCF are mainly influenced by the age structure of forests, management practices on forest and arable land (including harvesting volumes), deforestation, the cultivation of peat soils and the extraction and use of horticultural peat, as well as long-term carbon storage in harvested wood products. Thus, the future role of the LULUCF sector as a sink or source of GHG depends mainly on the maintenance of forest land and the reduction of deforestation, on forest management activities to increase forest backup and carbon sequestration capacity in the long term, as well as on the use of peat soil and horticultural peat, and on cropland and grassland cultivation methods.

The Forest Act sets out the legal framework for the management of forests in Estonia. The primary objective of the Forests Act is to ensure the conservation and sustainable management of forests as an ecosystem. The Forest Act includes a reforestation measure aimed at contributing to forest recovery following logging or natural disasters. Under the Forests Act, the forest owner is obliged to ensure reforestation no later than five years after the harvest or natural disaster. Support for rapid post-harvest reforestation promotes consistent carbon sequestration on forest land and thereby maintaining the level of GHG removal of Estonian forests.

The Ministry of the Environment has prepared a draft Forest Development Plan 2021-2030 and a programme for its implementation is under preparation. The aim of the development plan is to ensure sustainable forest management, taking into account social, economic, climate change, environmental and cultural aspects. Sustainable forest management refers to the use of forests in such a way as to ensure the diversity, productivity, regeneration, viability and potential of their biota and to enable forests to continue to perform all their functions without damaging other ecosystems. The Government of the Republic of Estonia has set itself the objective that economic forests must not lose their backup and agreed that forest management and wood valorisation as a whole must ensure that the forestry sector is a carbon sink.

The following planned policies in the draft FDP will affect the LULUCF sector:

1. Adaptation of forestry to climate change – The objective of the measure is to increase the carbon sequestration and storage capacity of forests in order to mitigate climate change and increase the resilience of forests to climate change;
2. Improving the biodiversity of forest ecosystems – forest management takes into account biodiversity, environmental and climate objectives;
3. Increasing the competitiveness of forestry – one of the objectives of the policy is to ensure higher productivity, quality and good health of forests;
4. Better valorisation of wood – F & W industries encourage and support more efficient and resource-efficient use of wood.

Under the Subsurface Act (2017), the holder of a mining licence is obliged to rehabilitate the mined land. The purpose of restoration is to adapt excavated land to forest land, water body, land of recognised value or other land for consumption.

The main objectives of the Nature Conservation Act (2004) are the promotion and conservation of biodiversity, the preservation of a culturally or aesthetically valuable natural environment and the promotion of the sustainable use of natural resources. The Act also provides for compensation measures to be implemented in Natura 2000 sites.

Estonia's Action Plan on Gender Protected (2016-2023) has been drawn up to maintain and restore the biodiversity and ecosystem services of the sexes that Estonia protects. One of the objectives of the plan is

to develop methodologies for the restoration of bowels and the restoration of near-nature hydrological regimes in the most degraded ones.

In order to contribute to the conservation of Estonia's semi-natural communities, an action plan on heritage sites (2021-2027) has been drawn up. By 2027, the objective is to maintain at least 50000 hectares of inheritances. Planned activities include continued funding for the maintenance of semi-natural communities and the restoration of new habitats, taking into account the coherence and species conservation aspect.

The European Structural and Investment Funds and the LIFE programme have supported a number of projects for the preservation and restoration of protected habitats and heritage sites in Estonia and the restoration of water levels in depleted peat deposits and degraded humid habitats.

A number of activities to support private forestry and to conserve heritage sites and Natura 2000 sites are (co-)financed through the Common Agricultural Policy. The objectives set out in Estonia's CAP Strategic Plan 2023-2027 include contributing to climate change mitigation and adaptation by reducing GHG emissions and increasing carbon sequestration and promoting sustainable and efficient management of natural resources.

Forest management measures

Greenhouse gas projections take into account the contribution of the following measures:

MM1 Compensation for nature conservation restrictions on private forest areas outside Natura 2000
MM2 regeneration of private forests with the best possible hereditary characteristics and native tree species more suited to the site;
MM3 Ensuring biodiversity protection
MM4 Reducing environmental impacts related to the use of fossil fuels and non-renewable natural resources by increasing the production and use of wood in Estonia
MM5 Promoting biodiversity in private Natura 2000 forests
MM6 Investments in forest adaptation to climate change
MM7 Protection of noble habitats
Support for the prevention of noble damage to MM8
MM9 Radiation compensation (substitute afforestation)

Estonia acknowledges that existing policies and measures are insufficient to meet the LULUCF target and that additional measures are needed in all sectors covered by the Regulation. The Ministry of the Environment is assessing the impacts and volumes of the implementation of additional measures needed to rebuild the land sector into a sink of greenhouse gases and to enable compliance with the commitments made as a state.

ii. Regional cooperation in this area, where appropriate.

A network of experts on greenhouse gas inventories and projections between the three Baltic States has been set up to improve the quality of the various greenhouse gas reports by sharing knowledge and experience.

There was a closer cooperation between LULUCF experts from the Baltic States. Integration of climate change policy into sectoral and regional policies (03.2021-02.2023). One of the objectives of the project was the development of a common plan to improve greenhouse gas inventories in the Baltic States in the area of LULUCF and the establishment of a joint research programme for its implementation. In addition, Estonian LULUCF experts participate in the Steering Committee of the LIFE project "Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland".

iii. Without prejudice to the applicability of state aid rules, financing measures, including Union support and the use of Union funds, in this area at national level, where applicable

Union support and Union funds have been and are planned to be used in the following existing and complementary actions:

EN3 Developing heat management
EN4 Further development of heat management
EN11 Synchronisation of the Baltic States' electricity system with the Continental European synchronous area
TR1 Increasing the share of biofuels in transport
TR4 Spatial and land-use measures to increase transport energy savings and improve the efficiency of the transport system in cities
TR9 Additional spatial and land-use measures to increase transport energy savings and improve the efficiency of the transport system in cities
TR13 Development of railway infrastructure (including the construction of Rail Baltic)
HF1 Renovation of public and commercial buildings
HF2 Renovation of private houses and multi-apartment buildings
HF5 Further renovation of public and commercial buildings
HF6 Additional renovation of private and apartment buildings

PM1 Organic farming
PM2 AGRI-environment-climate and sub-measures
PM3 Greening payment
PM4 Knowledge transfer and information actions
PM5 Advisory services, farm management and farm relief services
PM6 Natura 2000 payments for agricultural land
PM7 Investments to diversify economic activities in rural areas towards non-agricultural activities
PM8 Investments to improve farm performance
PM9 Animal welfare measure
MM5 Natura 2000 payments for private forest land
MM6 Investments in forest adaptation to climate change

3.1.2. Renewable

i. Policies and measures to achieve the national contribution to the binding 2030 target for renewable energy at Union level and following the trajectories referred to in Article 4(a)(2) and, where relevant or available, the elements set out in point 2.1.2, including sector- and technology-specific measures134.

The ENMAK 2030 document describes the various measures aimed at achieving the renewable energy targets described in the development plan. The following ENMAK 2030 measures are the most direct contributors to the increase in renewable energy use:

- Measure 1.1 Development of electricity generation;
- Measure 1.5 Heat efficient production;
- Action 2.1 Increasing the uptake of alternative fuels in transport;

In order to achieve the objectives Error! Reference source not found. described in Chapter 3, the following actions will be implemented, a detailed description of which is given in Annex IV to this document:

EN1 Support for renewable energy and support for efficient combined heat and power;
EN3 Developing heat management
EN4 Further development of heat management;
EN5 Renewable energy support through a low bid auction (technology neutral);

TR1 Increasing the share of biofuels in transport
TR7 Support for the purchase of zero-emission vehicles;
TR16 Transferring public transport to biomethane and electricity;
TR13 Development of railway infrastructure (including the construction of Rail Baltica);
TR14 Rail electrification;
PM8 Investments to improve farm performance
PM11 Increase in biomethane production
EN15 Increasing the share of solar energy in electricity generation
EN21 Encouraging the uptake of biomethane
EN22 Promoting the uptake of integrated hydrogen technologies
EN23 Electricity grid reinforcement programme for renewable energy generation capacity to increase and adapt to climate change
EN24 Pilot Energy Storage Programme
EN12 Acquisition of air surveillance radars for the development of wind farms
TR2a Encouraging the use of electricity in passenger cars
TR2b Encouraging the use of biomethane in heavy-duty vehicles

ii. Where relevant, specific measures for regional cooperation, as well as, optionally, the estimated excess production of energy from renewable sources which could be transferred to other Member States in order to achieve the national contribution and trajectories presented in 2.1.2

We are constantly mapping the countries of cooperation and have worked together in 2018 and 2020 with the Grand Duchy of Luxembourg, Malta and Ireland (see table below) to which we have been instrumental in meeting our renewable energy targets.

Table 3.2 Sale of surplus electricity from renewable energy sources.

[134] When planning these measures, Member States shall take into account the end of life of existing installations and the potential for repowering.

Electricity production	Luxembourg	Malta	Ireland
2018	300 GWh	–	–
2020	400 GWh	80 GWh	2 500 GWh

In the field of onshore wind energy in Estonia, first steps have been taken by developers to strengthen cooperation with Latvia in the form of joint projects. For example, OÜ Utilitas has submitted two onshore wind project applications for CEF funding as of spring 2023. The aim is to plan and build wind farms on Estonian territory and their production would go directly to the Latvian network. To date, it is not yet possible to say whether these projects will materialise, as only the first call for proposals is taking place. The German and Estonian system operators 50 Hertz and Elering signed a joint intent agreement in May 2023 to explore the possibility of creating a Baltic WindConnector (750 km of submarine cables) between the two countries.

The objective of maritime spatial planning is to agree on the long-term use of the Estonian marine area in order to promote the blue economy and contribute to achieving and maintaining good environmental status of the marine environment. The established marine area plan will in the future serve as a basis for the various decisions allowing the use of marine waters to be taken by ministries and agencies, and will also serve as a basis for the planning of their activities for businesses, investors, local authorities and coastal communities.

The Estonian marine area is almost as large as the land area. Although the sea area is large, its use is small but intense over time and, conversely, the pressure to protect natural values is increasing through the EU Biodiversity Strategy, etc. In terms of energy and economic terms, the potential of the marine area is huge and its use would make a major contribution to Estonia's development and GDP growth. The potential for wind energy in the Baltic Sea is in the order of 93 GW.

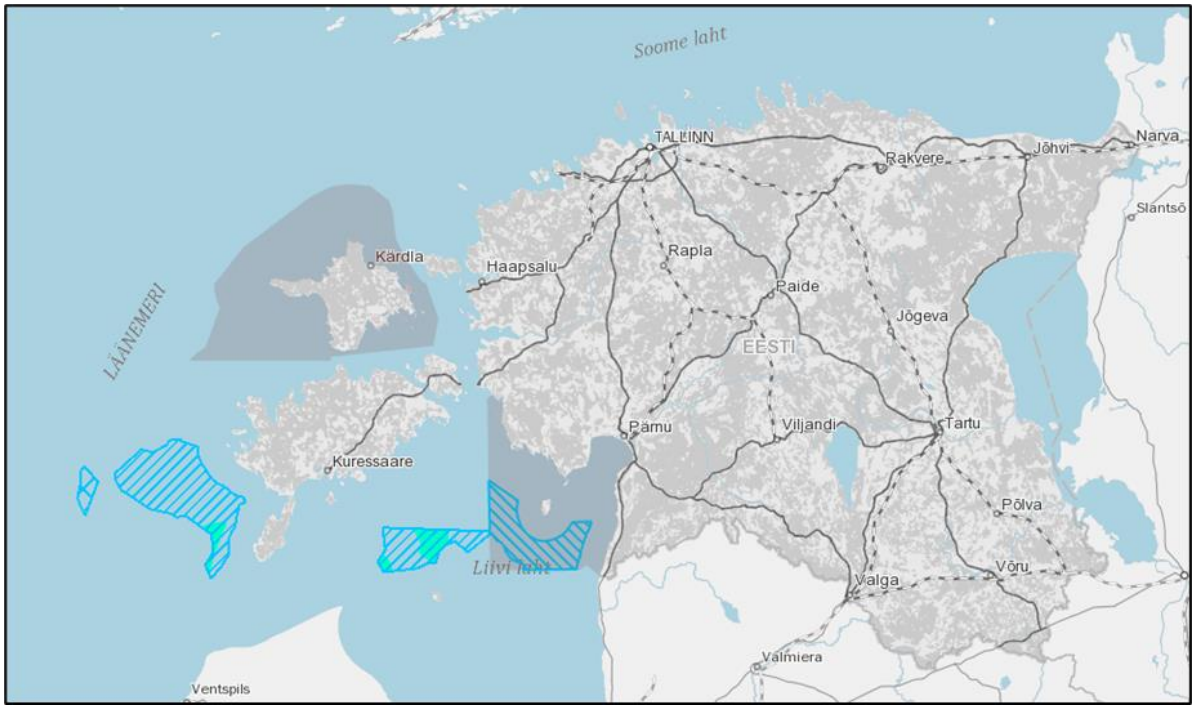
Estonia has two existing maritime spatial plans with a total of 2 439 km 2 of areas suitable for wind energy development· Under appropriate conditions, offshore wind farms in the wind energy areas established by the plans can be built in the order of 15-17 GW. Public-private cooperation, successful implementation of EIAs, favourable entry prices, etc. are needed to realise this potential.

The following plans are in force in the Estonian marine area:

1. The Estonian maritime spatial plan establishes areas suitable for the development of wind energy (see Figure) in an area of **1783 km²** representing 4.5 % of Estonia's total marine area. Of these, 225 km² are wind energy reserve areas (historical intensive trawling areas) that can be deployed from 2027, when the process processes and studies carried out in the remaining areas suitable for the development of wind energy have shown that it is not possible to develop sufficient offshore wind farms in these areas. The innovation area (88 km²) is primarily targeted at floating wind turbines. Possibilities have been created for planning power cables in the sea-basin building permit procedure. The plan establishes the basic locations of cable corridors for wind energy development areas in the planning area. An alternative location to the cable corridor may be found in the development of wind farms at the building permit stage, provided that there is no significant negative impact on wildlife and negative impacts on Natura 2000 sites.
2. The Pärnu Marine Plan establishes areas suitable for the development of wind energy in an area of **656 km²** (see Figure). Possibilities have been created for planning power cables in the sea-basin building permit procedure. The plan does not designate electric cable locations for connecting turbine parks to the onshore transmission system. The location of the power cables depends on

the specific location of the wind farm, the connection conditions, the natural and technical circumstances and circumstances that will only become apparent during the development. Therefore, the exact technical solutions and the location of the power cables will be provided by the project.

3. TheHiiu marine plan is valid in the surrounding marine area of Hiiu, but it does not regulate wind energy (see figure), as the Supreme Court's judgment of 8 August 2018 in case No 3-16-1472 annulled the plan for wind energy production areas because of shortcomings in the strategic environmental assessment carried out when the plan was drawn up, including the Natura impact assessment. In order to determine whether it is possible, in principle, to plan wind energy areas in the Hiiu marine area and their connection to the onshore transmission network, an analysis was carried out entitled 'Rumical ex-ante analysis for the planning of wind energy areas in the Hiiu marine area'.



alad, kus kehtib Pärnu mereala planeering ja Hiiu mereala planeering (ülejäänud alal kehtib Eesti mereala planeering)

Eesti mereala planeeringu tuuleenergeetika alad (1783 km²):

tuuleenergeetika ala tuuleenergeetika innovatsiooniala tuuleenergeetika reservala

Pärnu mereala planeeringu tuuleenergeetika ala (656 km²): :

tuuleenergeetika ala

Figure 3.1 Plan validity scheme for wind energy areas

The development of Estonian maritime spatial plans is linked to the development of transnational projects.

One of these projects related to the promotion of maritime spatial plans is ELWIND. ELWIND is a joint Estonian-Latvian offshore wind farm development project (including in Latvia with the Kurzemes loks transmission line as part of the Baltic-North interconnection Nord-Balt), which includes a specific maritime area in Estonian and Latvian economic and/or territorial waters and an electricity interconnection between the two countries. The total wind capacity planned for the project is around 70 to 1 000 MW. The

implementation of the project started in September 2020 with the signature of a Memorandum of Understanding between the Estonian and Latvian Ministries of Economy. The project will create a close link between Latvia and Estonia by strengthening technological, energy and economic cooperation.

The planning of an additional cross-border electricity interconnection as part of a collaborative project will allow for additional support from the Connecting Europe Facility (CEF) for cross-border projects in the European Union in the field of renewable energy and infrastructure.

In addition, there are offshore wind park projects developed by operators in the Estonian marine area. The depositclearance procedures have started for four offshore wind farms and one single turbine. The total capacities to be built are set out in the building permits. Applications for building permits have been submitted 40 as of 2.6.2023. Three offshore wind projects (Estonian Energia AS Live Bay in the Gulf of Riga and the Live-Saare offshore wind park and the Saare Wind Energy offshore wind park on the west coast of Saaremaa) are now in the environmental impact assessment phase and have the greatest potential to become projects of common European interest.

In addition, two pumped hydro-accumulation power plants (hereinafter PHEJ) with a total capacity of 550 MW and the potential to produce renewable energy from biomass are under development in Estonia. In view of Estonia's desire to build new electricity generation capacity, in particular on a market-based basis and through the implementation of flexible cooperation mechanisms, as well as Estonia's desire to increase energy security, in particular by establishing domestic primary energy resources or fuel-free electricity generation capacity in Estonia, the realisation of projects which comply with the above principles is supported.

iii. Specific measures on financial support, where applicable, including Union support and the use of Union funds, for the promotion of the production and use of energy from renewable sources in electricity, heating and cooling, and transport

The ENMAK 2030 document describes the various measures aimed at achieving the renewable energy targets described in the development plan. The following ENMAK 2030 measures contribute most directly to the increase in renewable energy use:

- Measure 1.1 Development of electricity generation;
- Measure 1.5 Heat efficient production;
- Action 2.1 Increasing the uptake of alternative fuels in transport.

In order to achieve the objectives described in chapter 2.1.2, the following actions will be implemented, the description of which can be found in Annex IV to this document:

Existing measures:

EN1 Support for renewable energy and support for high-efficiency cogeneration of heat and power
EN3 development of heat management
Further development of EN4 heat management
EN5 Renewable energy support through a low bid auction (technology neutral)

Table 3.3 Timeline of announcement of auctions

Year of launch of the under-tendering	Volume of under-offer

2019	5 GWh
2020	5 GWh
2021	540 GWh
2023	650 GWh
2024	500 GWh
2025	500 GWh

EN7 Research and Development Programme of the Energy Economy Development Plan
EN12 Acquisition of air surveillance radars for the development of wind farms, including the acquisition of aerial surveillance radars for the development of offshore wind farms
EN13 Pre-development of offshore wind farms (associations, planning), joint projects
N15 Increasing the share of solar energy in electricity generation
EN21 Encouraging the uptake of biomethane
EN22 Promoting the uptake of integrated hydrogen technologies

EN23 Electricity grid reinforcement programme to increase renewable energy production capacity and adapt to climate change
EN24 Pilot Energy Storage Programme
TR1 Increasing the share of biofuels in transport

TR2a Encouraging the use of electric vehicles
TR2b Encouraging the use of biomethane in heavy-duty vehicles
TR7 Subsidy for the purchase of zero- emission vehicles
TR13 Railway infrastructure development (including construction of Rail Baltic)
TR14 Railway electrification
TR16 Transfer of public transport to biomethane and electricity
PM8 Investments to improve farm performance
PM11 Increase in production of biomethane
The plan is to find, under the leadership of the Ministry of Rural Affairs, the necessary bottlenecks to increase the production and uptake of biogas and to provide for further investment support for the deployment of biogas outside the transport sector. Funding for planned investment grants (20 MEUR) comes from the Recovery and Resilience Facility (RRF).
PM18 Investments in greenhouses and vegetable warehouses for energy savings and renewable energy

In addition to the measures set out in Annex IV to this document, which are more financial or regulatory in nature, Estonia also implements other activities which can be classified as renewable energy support measures:

Other measures/activities supporting renewable energy production

In addition to financial support measures, it is necessary to provide developers with state support and solutions to potential problems in order to create new electricity generation capacity based on renewable energy in Estonia. For example, barriers to the development of wind energy are mainly related to national defence and environmental constraints, the resistance of local residents and the resulting development risks. In order to alleviate these bottlenecks, cooperation is being carried out between different ministries and authorities.

Application of the Regulation pursuant to Article 122 of the Treaty on the Functioning of the European Union (TFEU) speeding up permit granting processes for renewable energy projects.

At the end of 2022, the Council of the European Union developed a regulation establishing a framework to accelerate the deployment of renewable energy. The Regulation is directly applicable, but Member States have a margin of discretion to apply certain provisions, which means that it is necessary to specify into national law the manner and extent to which those provisions are implemented. The application of the provisions makes it possible to designate the planning, construction and operation of renewable energy projects and related networks as activities of overriding public interest and public safety and health. The Regulation also provides for the possibility, in certain cases, not to carry out an environmental impact assessment. We see that in the case of Estonia there would be an opportunity to use the content of the Regulation to boost wind energy projects.

Nature conservation restrictions and their mitigation. The establishment of each production unit in the natural environment has an impact, but it is important to bear in mind that nature conservation constraints and established nature reserves should not automatically exclude the production of renewable energy on the site. It is important to find so-called compromise areas. It is also important to encourage a system of mitigation measures and/or financial compensation.

Facilitating the deployment of offshore wind energy

An analysis of offshore wind farms and energy storage is under preparation with the aim of exploring whether and to what extent it would be important to set up a support scheme to boost the uptake of these technologies. It is also a task of the analysis to provide an answer to which aid scheme (fixed tariff, unilateral/bilateral CfD, etc.) would be most appropriate if such a scheme were necessary.

Looking for ways to shift the transport sector to renewable energy

Taking into account the ambitious renewable energy targets and the end of sales of internal combustion engines by 2035, it is important to find alternatives to increase the share of renewable energy in the transport sector. Therefore, analysing the need for additional measures to meet the 14 % target of 13 % GHG reduction is also a cross-cutting activity.

Future energy solutions

With regard to clean energy technologies, the private sector plans to build pumped hydroelectric power stations in Paldiski (500 MW)[135] and Estonia (> 225 MW) in Estonia136. The development of technologies contributing to climate neutrality is a growing trend.

For example, the private sector plans to start extracting heat from seawater to cover the loads of district heating and to install a heat pump for this purpose in the sea area.

Ensuring the availability of sufficient controlled capacities to which electricity storage technologies contribute is essential. Estonia intends, in particular through market-based measures, to promote the market entry of storage, including by removing market barriers arising from the legislation. A pilot energy storage programme has also been launched[137]to support electricity storage.

The increasing share of uncontrolled renewable capacities in the electricity system makes it important to balance these capacities with demand response, storage and controlled capacities. Ambitious renewable

[135] Paldiski receives a second type of power plant https://majandus24.postimees.ee/6139227/paldiski-saab-teistsorti-elektrijaama

136https://www.err.ee/857972/estonia-kaevandusse-kavandatakse-pumphudroelektrijaama

[137] https://kik.ee/et/toetatavad-tegevused/energiasalvestuse-seadmete-pilootprojektide-arendamine

energy targets also create the need to promote DSR and storage technologies. In addition to integrating renewables into the grid and stabilising electricity prices, demand management and storage allow to take advantage of surplus renewable electricity generation in order to subsequently produce it into the grid and delay grid developments. Discussions and analyses to date, as well as examples from other Member States, have led to the conclusion that one of the possible market models to **promote DSR is the central settlement market model**, whereby data exchange and cash settlement are concentrated in the hands of the central authority, which is the system operator (Estonia Elering) based on examples from other countries.

The**Baltic system operators plan to start the frequency reserve market in 2024**, i.e. the Baltic Frequency Reserve Market will jointly procure the spectrum reserves with the three Baltic States. In order to ensure that each country has access to the quantity of frequency reserves they need, a certain amount of transmission capacity is also reserved for spectrum reserves on routes between the Baltic States. More specifically, the Elering website[138] and the Frequency Reserve Market Road Map[139].

iv. Where applicable, the assessment of the support for the production of electricity from renewable sources carried out in accordance with Article 6(4) of Directive (EU) 2018/2001.

Under Section 59(4)(1) of theElectricity Market Act (OJS), a producer of electricity is to receive support in order to achieve the 203020 target for electricity production from renewable energy sources (100 %). The national target for 2030 is set out in the Energy Management Organisation Act. While in 2017 the national target was set according to ENMAK 2030 for the share of renewable electricity in domestic electricity consumption to be 30 % in 2030, the target of 100 % is set by the Energy Economy Organisation Act, based on specified projections and development curves for renewable energy production.

The Estonian support scheme was amended in June 2018 when the existing direct support was replaced by a scheme based on low supply[140]. The current support scheme allows the State to find in a flexible and cost-effective manner electricity generators whose production contributes to the national renewable electricity target. The proposal to the Riigikogu of the Government of the Republic for the setting of targets and the mechanisms for achieving the targets enables the State to find the most appropriate way of achieving the objectives. The State shall periodically carry out analyses of changes to the market for renewable energy and the principles of reduced bids and, if necessary, propose amendments to these mechanisms to the Riigikogu.

Support for renewable energy will no longer be paid for generating installations built as of 1 January 2021. In the future, price stability mechanisms will be valued through lower bids. As a result of the low bids, the value of the price stability mechanism will bedetermined, and as a result of the low bids for renewable energy almost 500 GWh of electricity from renewable sources has been added to the market as of 2021.

[138] https://elering.ee/sagedusreservide-turg
[139] https://elering.ee/sites/default/files/2022-10/Baltic_Balancing_Roadmap_update_19102022_0.pdf
[140] Electricity Market Act-Riigi Teataja

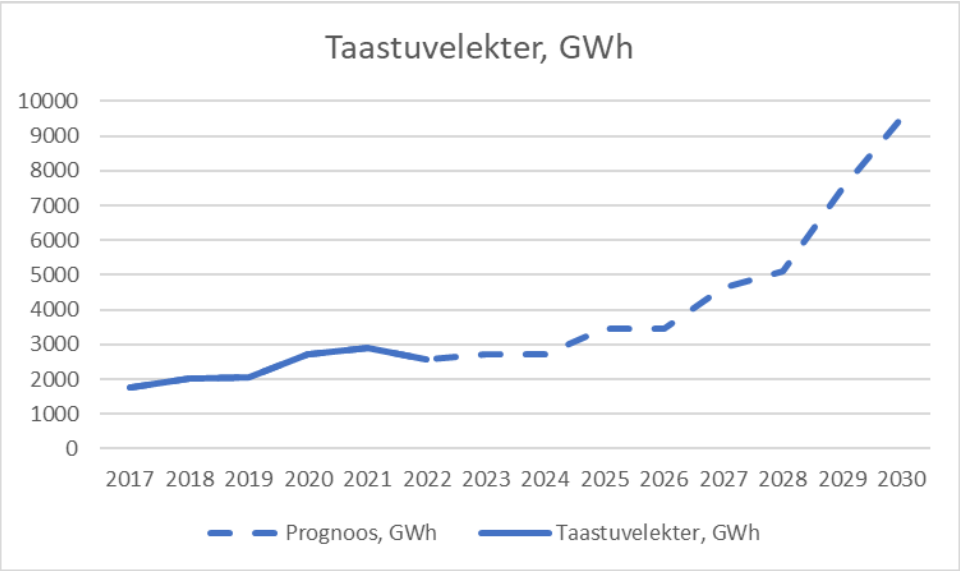


Figure 3.2 Renewable electricity generation 2017-2030, GWh/a

Taking into account the ENMAK 2030 target (100 % RES-E), there is an additional need to bring to the market generating capacity of 6.5 TWh/y from renewable energy sources by 2030. According to the Electricity Market Act, the Government of the Republic organises a reduced offer if the State does not meet the target for electricity produced from renewable energy sources. The person offering the lowest rate of aid will win the lowest offer.

The Ministry of Economic Affairs and Communications will analyse the market situation and present a vision to the Government of the Republic in autumn 2023 on whether and to what extent it is necessary to continue or organise technology-specific renewable electricity auctions in order to achieve the 2030 renewable energy targets.

The analysis and decision are important as they provide clarity to project promoters whether, in addition to the already planned lower bids (2024-500 GWh, 2025-500 GWh), additional offers are planned to be announced or, on the basis of the analysis, it is possible to achieve the 2030 renewable energy target and provide certainty for producers by contributing to the development of renewable energy through other activities (simplification of procedures, improvement of electricity market design, etc.).

v. Specific measures to establish one or more contact points, to improve administrative procedures, to provide information and training and to facilitate the roll-out of power purchase agreements[141]

Under the Electricity Market Act, connection conditions for connection to the grid for electricity generating installations with a capacity of less than 15 kW using renewable energy sources have been simplified. The connection to the network of a production unit with a capacity of up to 15 kW or built on a building in co-ownership is not subject to a deposit either. Similarly, a producer of electricity shall not be required to obtain a licence if the net capacity of the generating installation is less than 1 MW.

As of March 2023, requests for connection of generating installations to the electricity grid and valid subscription offers and connection contracts shall be made public. These can be found on the websites of

[141] A summary of the policies and measures under the enabling framework that Member States are to apply pursuant to Article 21(6) and Article 22(5) of Directive (EU) 2018/2001 with a view to promoting and facilitating the development of*renewable self-consumption communities and renewable energy*communities.

the network operators in the future. This amendment will make the market more transparent, as all applicants for membership, together with other detailed information, will be in the public domain.

In the context of long-term electricity supply contracts (PPA), the network operator may procure under PPA up to 50 % of the forecast loss of electricity (loss electricity) to cover network losses. The electricity purchased under the long-term supply contract must come from renewable energy sources. If a system operator wishes to enter into a long-term contract for more than 50 % of the amount of electricity lost, further analysis must be carried out and agreed in advance with the Competition Authority.

In Estonia, renewable energy installations are built primarily through spatial planning. In order to speed up the plans, the conditions of the special local authority plan and the special national plan were amended. The amendments to the Planning Act give wind farm developments the option of abandoning the second stage of the plan, i.e. drawing up a detailed solution. The use of such a relaxation requires a more detailed approach in the first phase of the plan, so that the design specifications of the wind farm can subsequently be issued immediately. In the future, the wind farm planning process, which may have taken 3 to 5 years in the past, can be carried out with easing in about 1.5 years.

An important supplement to the Planning Act provides for the possibility, in the case of a special national plan for offshore wind farms, of conducting, as a general rule, a competitive procedure for building permits before the launch of the special national plan, which means that the developer will be able to obtain the necessary assurance from the outset of the process that, when a special national plan is established, the developer has the right to implement that plan.

The impact assessment, the involvement of experts, etc. There were also changes in this area will also play an important role in the planning phase. In particular, a standardised environmental impact assessment (EIA) programme will be established, requirements for EIA lead experts were relaxed. Another important change was that windmill blades can reach the no-construction zone.

vi. Assessment of the necessity to build new infrastructure for district heating and cooling produced from renewable sources

The measure to upgrade district heating boilers and existing inefficient heat pipelines will continue for 2021-2027. The study entitled 'The transition to a carbon-neutral heating and cooling economy in Estonia by 2050' assesses the action plans and investment needs to achieve a carbon-neutral heating and cooling economy[142].

The district heating boiler of Ülemiste, located inTallinn's quarter of Tsellulose, has been the first district cooling station to provide cooling services to surrounding buildings since autumn 2019. The district cooling pipeline is currently also being built in the town of Ülemiste City and in the future the district cooling network will cover the city centre of Tallinn[143]. There are two district cooling plants operatingin Tartu, 13 MW in the central city and 5.4 MW in Aardla, with an overall length of 2.9 km. The sources of district cooling in Tartu and Pärnu are river water and solar electricity[144].

The Roosna-Allik pilot project explores the possibility of shifting district heating from the base to geothermal energy[145]. The potential of Geoenergia has been assessed in five pilot areas in Tallinn, Viimsis, Maardus and various cities in north-eastern Estonia[146].

[142] Heat and cooling studies | Energies
[143] District cooling – Utilitas
[144] https://gren.com/ee/kaugjahutusest/
[145] Roosna-Alliku receives a cheap room warmer (postman.ee) at a depth of 500 metres
[146] Summary of the geothermal potential mapping study | Energiatals

vii. Where appropriate, specific measures to promote the use of energy from biomass

ENAMK 3030 Measure 2.1 "Increasing the uptake of alternative fuels in transport" will contribute most directly to the uptake of new biomass resources. Furthermore, the measures listed in Annex III and IV of the document in the table of measures will contribute to increasing the uptake of biomass:

EN1 Support for renewable energy and support for efficient combined heat and power
TR1 Increasing the share of biofuels in transport
PM8 Investments to improve farm performance;
PM11 Increase in biomethane production

Biomass energy production needs to take into account sustainability criteria for biomass, waste hierarchy, sustainable forest management principles, while preserving natural diversity. On the[147] basis of the report on technical assistance for amendments to the Renewable Energy Directive, it can be concluded that **in Estonia the compliance of timber supply with the sustainability criteria (Forest Act, Nature Conservation Act, EU Timber Regulation) is presumably ensured. Therefore, timber harvested from Estonian** forests in accordance with legal requirements meets the sustainability criteria. Nevertheless, Estonia needs to implement the long-term CCS target more effectively. The relevant discussions and policy guidance will come from the adoption of the Mine Economy Development Plan.

The sustainability requirements and criteria for biomass are laid down in Section 32 of the Energy Economy Organisation Act and, in order to implement it, energy producers in Estonia have the possibility either to use a voluntary scheme recognised by the European Commission or to establish an internal control mechanism. For the latter, in order to **demonstrate compliance with the sustainability requirements and criteria for biomass, the economic operator must collect, for the different categories of biomass fuels produced from biomass sourced from Estonia, origin information to prove that the biomass meets the sustainability criteria and requirements** (established by Decree of the Minister responsible for the sector 1.7.2023).

3.1.3. Other elements of the dimension

i. Where relevant, national policies and measures affecting the EU greenhouse gas emission allowance trading system and an assessment of how they complement and affect the EU ETS.

Estonia is the largest participant in the EU greenhouse gas emission allowance trading system (EU ETS) and the influencer is the production of electricity and liquid fuels from oil shale. Today, in the light of current environmental requirements and climate objectives, only a certain amount of liquid fuels are produced from oil shale in electricity generation units, and the by-products and residual heat generated by the production are in turn used to produce electricity. The profitability of oil shale production depends primarily on world oil prices, as well as on unit costs of the EU ETS and local environmental fees, and is affected by the depreciation of equipment. International fuel quality requirements (e.g. sulphur limits) are also an important factor. At the same time, companies in the oil shale sector are reshaping their production. The aim is to produce more and more chemicals (light naphta, LPG, reformat and hydrogen-treated heavy fractions) in the future, which are an important raw material for the chemical and material industries. Such activities are also less greenhouse gas intensive.

[147] TECHNICAL ASSISTANCE FOR THE PREPARATION OF GUIDANCE FOR THE IMPLEMENTATION OF THE NEW BIOENERGY SUSTAINABILITY CRITERIA SET OUT IN THE REVISED RENEWABLE ENERGY DIRECTIVE – PUBLICATIONS OFFICE OF THE EU (EUROPA.EU)

In order to ensure a balanced long-term use of oil shale, the 2016 'National Development Plan for the Use of Oil Shale 2016-2030', which defines the direction of exploitation of oil shale as a national strategic domestic energy source. Their planning shall include an assessment of the use of shale oil and gas, taking into account economic, social, security and environmental aspects.

In addition to developments in the oil shale industry, including more efficient use of oil shale, the reduction in emissions is influenced by excise duties on electricity and fuels and environmental charges.

Excise duties

The[148] fuels subject to excise duty are unleaded petrol, leaded petrol, aviation gasoline, kerosene, diesel, special purpose diesel, light fuel oil, heavy fuel oil, shale fuel oil, motor LPG and motor natural gas, coal, lignite, coke and oil shale, LPG, natural gas, fuel-like product, liquid combustible substances and biofuels. Biogas, including biomethane, is exempt from excise duty. In order to ensure the competitiveness of energy-intensive consumers, Estonia has introduced excise differentiations. Applications for anenergy exemption permit may be submitted by electro-intensive and intensive gas-consumption operators. In order to apply for an authorisation, the undertaking's energy management system shall comply with EVS-EN ISO 50001. The rate of excise duty on electricity for an electro-intensive undertaking benefiting from an exemption from energy duty shall be EUR 0.5 per megawatt hour of electricity. The preferential rate of excise duty on natural gas for an intensive gas consuming undertaking benefiting from an energy exemption shall be EUR 11.30 per 1 000 m $3^{\text{natural gas}}$.

In agriculture and until 30 April 2024 special purpose diesel is allowed to be used for the extraction of oil shale. Special purpose diesel used for professional fishing is exempt from excise duty.

Environmental charges

Another fiscal measure affecting emissions in Estonia is environmental charges. The Government of the Republic's tax policy is based on the objective of reducing the environmental impact by increasing pollution charges and fees for the use of natural resources. The Environmental Charges Act provides the basis for setting fees for the use of natural resources and pollution charges, establishes the procedure for their calculation and payment, and lays down the basis for the use and specific purposes of the State budget revenue from the use of the environment. Environmental charges are established on the basis of the need to protect the environment, the economic and social situation of the State and, in the cases specified by law, the value of the natural resources created. A fee for the extraction of mineral resources above the statutory minimum is applied for the purpose of generating State revenue. In the case of energy minerals, in addition to the objective of generating revenue, the added value generated by the energy resource is also relied on.

The pollution charge for the release of CO_2 into the ambient air was introduced in Estonia in 2000. Currently, the Environmental Charges Act (which entered into force in 2006) obliges owners of combustion plants to pay pollution charges for pollutants released into the ambient air. All companies requiring an ambient air pollution permit must pay the pollution charge for emissions released into the atmosphere. According to the Regulation of the Minister for the Environment, an ambient air pollution permit is mandatory for companies that own or operate combustion plants (with solid, liquid or gaseous fuels) with a nominal capacity of 1 MW or more when burning fuel. By way of exception, only companies producing heat must pay the CO_2 pollution charge. Since 2009, the rate of the pollution charge for CO_2 has been EUR 2/t. The pollution charge is also due for installations that emit nitrous oxide into the ambient atmosphere. The pollution charge shall not apply to methane and fluorinated greenhouse gases (HFC, PFC and SF_6). By way of exception, the Environmental Charges Act provides for the possibility of replacing the pollution charge (including the CO_2 pollution charge) with environmental investment by companies. The pollution charge shall be replaced

[148]Alcohol, Tobacco, Fuel and Electricity Excise Duty Act https://www.riigiteataja.ee/akt/120062019003

where the polluter implements, at its own expense, environmental protection measures that reduce the amount of pollutants or waste by 15 % compared to the pre-investment period.

Through the environmental fees received, the State has financed environmental projects through the Environmental Investment Centre for the last 20 years (including the replacement of fossil fuel boilers with renewable fuels boilers, renovation of district heating systems, etc.).

Pursuant to Section 23(3) of the Environmental Charges Act, undertakings producing heat (installations with an installed thermal input exceeding 20 MW) in the European Union's greenhouse gas emissions trading system shall not pay any pollution tax for CO_2 at the increased rate if the amount of CO_2 exceeding the permitted amount is covered by the emission allowances purchased and recorded in the annual report. In other words, an increased charge if the permitted amount of CO_2 is exceeded is not charged if it is covered by additional emissions.

Measures in the electricity generation sector

In the past, Estonia has implemented the following measures with significant impact, which have a significant impact on Estonia's CO_2 emissions up to 2030:

1) From 2004 to 2005 in Narva's power plants, two pollinator boilers were replaced by units of fluidised bed boilers (2x215 MW), and
2) The construction of an additional fluidised bed boiler block (with a capacity of 300 MW) started in 2011, which is the Auvere oil shale-based power plant. The cost of the investment was around EUR 640 million. The power plant was launched in 2015 and completed in 2018. The new power plant is designed in such a way that 50 % of the fuel input used can be biomass.

ii. Policies and measures to achieve other national targets, where applicable

Adaptation to climate change

Adaptation to climate change and measures are slowly but consistently becoming a horizontal theme in Estonia, helping to link all relevant sectors and administrative levels to adaptation measures. Adaptation to climate change has been included as a horizontal theme in a number of sectoral development documents and development plans and in the national long-term development strategy "Estonia 2035". The basic principles of the national long-term development strategy "Estonia 2035" have agreed that Estonia must ensure a high-quality and species-rich living environment, as well as preparedness and ability to reduce the adverse impacts caused by climate change and make the best use of the positive effects.

To achieve this, the aim is to roll out solutions that contribute to the green transition across the board and to support it, in cooperation with local authorities, to mitigate climate change, reduce and adapt to climate change, enhance and conserve biodiversity, diversify the living environment, promote environmentally friendly living arrangements and visitor environments.

For example, the continuous development of environmental and weather monitoring information systems supports the preparation of municipalities for climate change. The risks posed by climate change have been taken into account by a number of municipalities in their local development plans, as well as in the renovation of water, sanitation and other routes, and in the development of detailed and comprehensive plans. Estonia's national strategic development documents include direct and indirect actions that can help society adapt to the impacts of climate change. Most of them concern climate change mitigation and emergency regulation (based on the Emergency Act and the Water Act).

The overall objective of the'2030 Climate Adaptation Agenda 2030' (KOHAC) adopted in 2017 is to reduce Estonia's vulnerability to climate change through an operational framework and to achieve preparedness and capacity to cope with the impacts of climate change at local, regional and national level. In addition, the

Development Plan has eight specific objectives directly linked to the vulnerability of the priority areas, describing them and formulated accordingly. Their implementation will be supported by measures to adapt to the impacts of climate change set out in the implementation plan of the development plan, together with activities, results and costs. (see Table 3.4) Adaptation objectives, measures and actions will be reviewed, updated and integrated into the new (spring) strategy paper for the environment. With the entry into force of spring, the COURT will cease to be valid as an independent document. The implementation of the spring targets will be implemented through programmes in the areas of performance, e.g. in the area of environmental performance "Environmental Protection and Use Programme" and relevant programmes in other ministries.

Table 3.4 Sectoral overview of vulnerability to climate change and climate change adaptation actions

Area and objective	Vulnerability	Sector Adaptation Actions
1. Health and Rescue Capabilities Improved rescue capacities and people's ability to protect their health and property have reduced the negative effects of climate change on health and the living environment.	The main sources of health vulnerability are the ability and readiness of health systems to adapt to changing climates and extreme weather events (interruptive medical care), the sensitivity and inequalities of the population, the share of vulnerable populations (elderly, children, chronically ill) and the existence and functioning of alert systems. In terms of rescue capacity, vulnerability depends on the procedure for mass emergency (flood, forest and wildfire) emergency notifications, on people's learning and disruption of rescue and public order.	1.1. Development of information, monitoring and support systems and operational plans to improve and mitigate the management of health risks from climate change 1.2. Increasing rescue capacity
2. Land use and planning The risk of flooding, flooding and erosion has been mitigated, the heat island effect has been mitigated, the climate resilience of settlements has been increased by selecting the best solutions for land use and its planning.	The materialisation of climate risks in land use depends on the maintenance or non-maintenance of drainage systems, as well as on their natural amortisation. The main risks of climate change are felt and amplified by extraordinary weather events in cities where human activity is planned for limited areas of land with specific land use, built environment and urban landscapes. The vulnerability of Estonian cities to climate change depends primarily on demographic processes, such as depopulation and ageing, but also growing spatial polarisation and increasing Harjumaa polarisation, suburbanisation, the decline of small towns, outlying and large-scale exodus.	2.1. Raising awareness of the impacts and risks of climate change in land use, urban planning and planning, developing planning methodologies for risk areas and organising the regulatory framework 2.2. Managing flood risks and developing green areas and urban areas to manage climate risks
3. The natural environment In a changing climate, the diversity of species, habitats and landscapes, as well as the favourable status and integrity of terrestrial and aquatic ecosystems, as well as the provision of socio-economically important ecosystem services in	In the natural environment, the greatest vulnerability to changes in the hydrological regime (including ice and snow cover) is the vulnerability of all ecosystems (land ecosystems, freshwater ecosystems, marine environments) to favourable status and integrity and the volume and quality of ecosystem services, and habitat professionals are the most vulnerable in terms of biodiversity.	3.1. Preserving biodiversity in changing weather conditions 3.2. Prevention, control and management of invasive alien species in a changing climate 3.3. Ensuring favourable status of communities and diversity of landscapes and managing

Area and objective	Vulnerability	Sector Adaptation Actions
sufficient quantity and quality, are ensured.		nature protection in a changing climate
		3.4. Ensuring stability, favourable status, functions, resources and diversity of terrestrial ecosystems and habitats in a changing climate
		3.5. Monitoring the status of surface water bodies due to changes in temperature and hydrological regime, structure of biota communities, external and internal pressures of substances and minimising climate risks
		3.6. Minimising the negative impacts of climate change in order to achieve a good state of the marine environment and preserving biodiversity
		3.7. Ensuring adequate scale and quality of socio-economically important ecosystem services, taking into account climate risks
4. Bio-economy The sustainability of the bio-economy sectors that are important for Estonia is ensured through climate-conscious planning for agriculture, forestry, water, fish, recreational and peat extraction.	The unconscious planning of agriculture, forestry, water, fish and recreation and peat extraction (not taking into account changes in the hydrological regime and the increase in average temperature) poses a threat to the sustainability of key bioeconomy compartments for Estonia.	4.1. Ensuring food supply in a changing climate through the development of land improvement systems, increasing the competitiveness of agriculture and knowledge creation and transfer
		4.2. Ensuring the productivity and viability of forests and their diverse and efficient use in a changing climate
		4.3. Ensuring the sustainability of fish stocks in a changing climate and the well-being of people living from fishing (income)
		4.4. Diversifying tourism and increasing visitors' satisfaction

Area and objective	Vulnerability	Sector Adaptation Actions
5. Economics Economic agents make the best use of the opportunities and risks of climate change.	The relative slowness of climate change and the responsiveness and adaptability of Estonian companies to external changes ensure low vulnerability of the economy, even if adaptation consists of the cessation of activities in areas significantly affected by climate change or a marked change in its nature. Vulnerabilities will increase if the economy as a whole is unable to seize the new opportunities brought about by climate change.	5.1. Mitigating the risks of climate change for households
		5.2. Encouraging entrepreneurship that is responsive to the impacts of climate change
6. Society, awareness and cooperation Citizens understand the risks and opportunities of climate change.	Societal vulnerability and adaptation to climate change are strongly influenced by the level of understanding of the risks and opportunities involved, and by the level of research and education in the country. The most vulnerable to climate change are people under-informed, insecure, in poor socio-economic condition and with lower social capital.	6.1. Enhancing risk management and ensuring the capacity of national and LA staff to mitigate climate change risks
		6.2. Supporting the adaptation of pre-primary schools, general education and recreational schools, environmental education centres and vocational training institutions to the impact of climate change
		6.3. Ensuring up-to-date and comprehensive information on climate change, including the spillover effects of global climate change on Estonia
		6.4. Participation in international cooperation on climate change mitigation and adaptation and in the development of a strong international climate policy
7. Infrastructure and buildings The impact of climate change does not reduce the availability of vital services and the energy efficiency of buildings.	The increase in extreme weather events is testing the entire transport system, where a combination of factors may lead to unpredictable risks and unpredictable situations. In comparison between modes, all road transport is the most vulnerable, and the mobility of people due to infrastructure-related traffic disruptions, the risk of slippage, the loss of load capacity of uncovered secondary roads and changes in the safety of light traffic are the most vulnerable. With an unknown trend, transport technologies and fuels as a whole are vulnerable in the second half of the century. The vulnerability of buildings is exacerbated by an energy-intensive housing stock with poor construction quality.	7.1. Ensuring safe traffic, freight transport and access to essential services in changing weather conditions
		7.2. Ensuring the resilience of buildings, energy efficiency and a comfortable indoor climate for people in changing weather conditions

Area and objective	Vulnerability	Sector Adaptation Actions
8. Energy and security of supply Climate change does not reduce energy independence; —security, —security of supply and usability of renewable energy resources and do not increase the volume of primary energy final consumption.	Energy independence and security of supply, which rely heavily on the oil shale industry, depend in particular on the availability and availability of domestic energy resources and on the adequacy of the generation capacity needed to produce energy (electricity, heat and fuels), are generally low in vulnerability to projected climate change by the end of the century. The use of renewable energy sources such as biomass is more vulnerable than oil shale energy due to seasonality of stockpiling and the need for interim storage.	8.1. Ensuring the usability of renewable energy resources and the energy and heat supply of consumers in changing weather conditions

Low-carbon transition initiatives

On the initiative of the Ministry of the Environment, the Ministry of the Environment completed its analysis of the potential for low GHG-emission technologies in 2021:

- Project to analyse the potential for minimising GHG emissions from the Estonian oil shale industry at Tallinn University of Technology "Climate Change Mitigation through CCS and CCU technologies", the main objective of which was to assess the suitability of different carbon capture technologies and to develop scenarios for the application of these technologies in the Estonian oil shale industry[149];
- The objective of the analysis of the deployment of hydrogen resources in Estonia was to identify the potential and uptake capacity of green and blue hydrogen production, distribution and consumption in Estonia and to map opportunities, bottlenecks, market barriers and risks for the future, including by identifying and assessing potential business projects. The analysis focuses on the period 2020-2030[150].

In addition, a road map for the decarbonisation of energy intensive industries, including financial instruments for its realisation, is under preparation at the Ministry of Economic Affairs and Communications.

The Environmental Investment Centre and the Ministry of the Environment have a support scheme for green technology start-ups under the Recovery and Resilience Facility (RRF) at its launch. It consists of two parts:
(1) development accelerators programme in five focus areas
2) a call for proposals for start-ups to support the development of prototypes and piloting of technologies.

Until 2026, five different development accelerators will be carried out in Estonia, targeting different focus areas and helping start-ups to develop green technologies, from the scaling up to the investor-ready start-up.

Accelerators include topics such as material science, resource valorisation, reduction of chemical use, energy and mobility. Accelerators are generally a development programme lasting several months, where the accelerator helps start-ups in the technological development of their product or service and train them on business issues, as well as mapping potential sources of funding and improving the skills needed to raise money. The speeds approach the development needs of start-ups as personally as possible, with experts

[149] Presentation of the "Climate Change Mitigation through CCS and CCU Technologies" project https://www.ttu.ee/projektid/climmit/
[150] Final Report of theEstonianHydrogen Resource Deployment Analysis-Local Report-Hydrogen Resource Use-Analytical.pdf (Sei.org)

playing an important role, providing practical advice and supporting the journey. One important value of the accelerator is the network.

Acall for applications for start-ups is planned to be opened in the second half of 2023.

Fair transition

The creation in 2020 of the so-called 'Just Transition Fund' (JTF) by the European Union ('EU') aims*to 'enable regions and people to address the social, employment, economic and environmental impacts of the transition towards the Union's 2030 targets for energy and climate and the transition to a climate-neutral economy of the Union by 2050 under the Paris Agreement*'.

The amount of support from the Fund for Estonia is ~EUR 340 million + technical assistance totalling EUR 353 million, and in Estonia, due to the oil shale industry, Ida-Virumaa is the target area for support. The time horizon for the use of the Fund is 2029. Estonia receives the most money per inhabitant compared to other European countries. The ETF funds are divided into two strands. The first strand aims to help restructure and diversify the economy and workforce of the Ida-Viru region; the second strand will address the social, environmental and community aspects of the transition. 80/20 or 80 % of the funds go to entrepreneurship and 20 % to support the living environment. The timetable for the use of the ETF funds is tight: the absorption period is 2021-2029, but 2/3 of the volume of grants has to be disbursed already in 2026 (as a large part of the fund is made up of NGEU resources). According to the ETF regulation, activities related to fossil fuels (including oil shale) are not supported, including their production, processing, storage, distribution, combustion. In addition to the ETCF, other EU structural funds are available in Ida-Virumaa (including some activities specifically targeting Ida-Virumaa); at national level, the development of Ida-Virumaa, as an economically and strategically important region, has been supported by the Ida-Virumaa programme.

The oil shale sector has been declining in Ida-Virumaa for years. The peak of oil shale extraction and processing was in Ida-Virus 1980, where more than 14000 people were employed in mines alone. As of 2021, around 5000 people were employed in core companies in the Ida-Viru oil shale sector. By 2030, around 1000 additional people (in addition to indirect job losses – around 2700 people) are expected to lose jobs in the oil shale sector, with the potential to further exacerbate existing challenges in the region (low wages, unemployment, shrinking and ageing population, etc.).

The effects of the transition and the resulting intervention needs in Ida-Virumaa received the "Territorial Just Transition Plan" (LAP) underlying the use of the analysed JAF funds[f] under[151] preparation. Key development needs in the context of the transition to a climate-neutral economy were transformed into the mapped Ida-Viru economy with the aim of diversifying it and creating new high value-added jobs, supporting people and communities affected by the transition, and mitigating the environmental impacts of mining and oil shale processing. In order to meet these challenges, the Estonian JAP envisages a number of measures, broadly divided into two strands: the first strand aims to help restructure and diversify the economy and workforce of the Ida-Viru region, while the second will address the social, environmental and community aspects of the transition. 80/20 or 80 % of the funds go to entrepreneurship and 20 % to support the living environment. Activities related to the treatment of fossil fuels shall be excluded as activities supported by the Fund.

TheEstonian ÕÜ scheme was approved by the European Commission as part of the EU Structural Funds Operational Programme on 4 October 2022 and is in the process of being implemented.

The term "fair transition" now has a specific meaning in the Estonian context: a just transition takes place in Ida-Virumaa and includes EU co-funded measures to mitigate the negative socio-economic impacts of the transition to a climate-neutral economy in the region. However, in its 2022 report, the Expert Group set

[151] Estonia's territorial just transition plan: https://pilv.rtk.ee/s/eSpt2Tzmqs39B2k

up within the Steering Committee of the Government of the Republic of the Republic on Green Policy gave a broader[152] interpretation of "just transition": in addition to the just transition issues in Ida-Virumaa, the expert group drew attention to the wider socio-economic impacts of climate policy across Estonia, i.e. also outside Ida-Virumaa. This "just transition" interpretation is relevant to Estonia's long-term climate objectives, but goes beyond the current approach to just transition and requires a broader debate. In any case, Ida-Virumaa remains the target region of the EU Just Transition Fund in Estonia.

The JTF will only address part of the challenges that exist in Ida-Virumaa and, in addition, the transition to climate neutrality is a long-term process beyond 2029. Given the scale of the challenge that Ida-Virumaa is facing, in addition to the resources of the JAF, it is necessary to continue to support Ida-Virumaa with other national and European instruments.

According to the action programme of the Governmentof the Republic for 2023-2027, it is planned to pay attention to the construction of storage capacities in proportion to renewable energy. With regard to oil shale extraction, the aim is to favour the exploitation of existing ones rather than opening new mines, and an amendment to the Landground Act is envisaged to set out the principles for oil shale extraction in the future.

iii. Policies and measures covering low-emission mobility, including electrification of transport.

In February 2023, a support round for zero-emission vehicles (TR7) opened, providing EUR 9 million to support the purchase of both electric cars (including hydrogen fuel cells) and electric boxes. The objective of the support measure is to increase the share of vehicles used in Estonia using electricity produced from renewable energy sources and to contribute to wider environmental-conscious choices in the business sector and by private individuals.

The direct impact of some 1743 M1 and N1 vehicles and 675 boxes of vehicles to be purchased with the aid on the reduction of CO_2 emissions is expected to be around 27000 tonnes over four years, taking into account the indicative amount of unconsumed petrol and diesel fuels. At the same time, the owners of the electric vehicles acquired with the support must also obtain renewable energy certificates to the same extent as the energy used for travel. Renewable energy certificates prove the use of renewable energy in the balance sheet of the energy system in different areas.

Through the measure to boost the uptake of biomethane, the objective is to increase the use of biomethane for public service machinery (district line busses, waste machinery, civil protection and firefighting), while also supporting the development of the filling station network outside the attraction centres (outside Tallinn, Tartu, Pärnut).

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iv. Where applicable, national policies, timelines and measures planned to phase out energy subsidies, in particular for fossil fuels

An overview of the energy subsidies used in Estonia is grouped in a chapter4.6.iv. The most important of these relate to the consumption of fossil fuels, in particular support for diesel used in agriculture with a lower rate of excise duty, also provides support under the Electricity Market Act for the production of electricity from high-efficiency cogeneration from peat or oil shale-processing ewe gas. There are no plans to amend these two measures, as the lower excise duty rate on diesel contributes to the competitiveness of agriculture and the State does not have the objective of encouraging the further entry of fossil fuel cogeneration plants onto the market.

[152] Reportof the Green Policy Expert Group: https://valitsus.ee/media/4870/download

The general objective of ENMAK 2030, approved by the Government of the Republic in 2017, is to make energy supply to consumers market-based andaccessible, in line with the European Union's long-term energy and climate policy objectives, while contributing to the improvement of Estonia's economic and environmental climate and long-term competitiveness. Based on the amendments made to the Organisation of theEnergy Economy Act in 2022, renewable energy will represent at least 65 % of gross final consumption of energy, at least 100 % of gross final consumption of electricity, at least 63 % of gross final consumption of heat and renewable energy used in road and rail transport by 2030 for at least 14 % of the total energy consumed in transport. In order to grow renewable energy production, the current support scheme ended in 2020 and fewer renewable electricity offers are being carried out in 2021-2025, which should gradually reduce the need for fossil fuels, including electrification of other sectors (increase in heat pumps, use of electric vehicles).

3.2 Dimension energy efficiency

This chapter describes the planned policies, measures and programmes to implement the indicative national energy efficiency target for 2030 and other targets as set out in point 2.2, including the planned measures and instruments (including financial) to promote the energy performance of buildings. The ENMAK 2030 document describes the various measures that aim to achieve one of the two sub-objectives of the Development Plan – Estonia's energy supply and consumption is more sustainable – and quantified measures. The following ENMAK 2030 measures will most directly contribute to energy efficiency:

- Action 2.1 Increasing the uptake of alternative fuels in transport;
- Measure 2.2: Reducing demand for motorised individual transport;
- Measure 2.3 Effective vehicle fleet;
- Measure 2.4 Increasing the energy efficiency of the existing building stock;
- Action 2.5 Increasing the expected energy efficiency of new buildings;
- Measure 2.6 Effective transmission of heat;
- Action 2.7 The public sector exemplary role; and
- Measure 2.8 Energy savings in other sectors:

i. I. Energy efficiency obligation schemes and alternative policy measures under Articles 7a and 7b and Article 20(6) of Directive 2012/27/EU and to be prepared in accordance with Annex III to this Regulation

In order to achieve the objectives described in Chapter 2.2, taxation of energy carriers and measures in the final consumption sectors will be implemented.

Energy carriers are subject to VAT and excise duties on fuel and electricity, see also Chapter3.1.3.i. The following measures will be implemented to improve final energy consumption (descriptions are provided in Annex IV to this document):

TR2	Increasing fuel efficiency in the transport sector
TR3	Promoting sustainable driving
TR4	Spatial and land-use measures to increase transport energy savings and improve the efficiency of the transport system in cities
TR5	Developing convenient and modern public transport
TR6	Introduction of road user charges for heavy-duty vehicles
HF1	Renovation of public and commercial buildings
HF2	Renovation of private houses and multi-apartment buildings.

In addition, the following actions are envisaged:

TR8	Further promotion of sustainable driving
TR9	Additional spatial and land-use measures to increase transport energy savings and improve the efficiency of the transport system in cities
TR10	Additional activities in the development of convenient and modern public transport
TR13	Development of railway infrastructure (including the construction of Rail Baltic)
HF5	Further renovation of public and commercial buildings
HF6	Additional renovation of private houses and apartment buildings.

ii. Long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private, including policies, measures and actions to stimulate cost-effective deep renovation and policies and actions to target the worst performing segments of the national building stock, in accordance with Article 2a of Directive 2010/31/EU

A long-term strategy for the renovation of buildings[153] was prepared under the Energy Union Regulation EU 2018/1999 and submitted to the European Commission in 2020. The main objective of the strategy is the complete renovation of the building stock built before 2000 by 2050.

In 2022[154], a research development project started, updating and implementing the objectives of the long-term strategy for the renovation of Estonian buildings and addressing the green transition in terms of energy efficiency and climate proofing of buildings. There are 18 project partners, with the MKM as the lead partner. The project is co-financed by the European Climate, Infrastructure and Environment Executive Agency (CINEA) through the LIFE IP (Integrated Projects) sub-programme dedicated to environment and climate action projects. The total budget is around EUR 16.3 million, of which EUR 9.5 million is a European contribution. The LIFE IP Build EST project runs until 2028.

iii. Description of policies and measures aimed at promoting energy services in the public sector and measures to remove regulatory and non-regulatory barriers to the use of energy performance contracting and other energy efficiency service models[155]

The development of the energy services market is regulated by Sections 31 and 32 of the Energy Management Organisation Act. In the development of the energy services market, the Ministry of Economic Affairs and Communications (MKM), in cooperation with SA Environmental Investment Centre (KIK), the Development Fund and SA KredEx, have analysed the potential of the energy services market and potential market barriers. There are also several roundtables on energy services. In 2019, the topic of Energy Performance Contracts (EPCs) was mainly addressed to provide assistance to the public sector in the procurement of energy services, corresponding guidance material and model contract were developed. An outreach event to different actors on this topic was also held in February 2019. Thus, the objectives laid down in Section 31 of the Energy Management Organisation Act are pursued in close cooperation with stakeholders.

A number of instruments have been developed by the State (SA KredEx, KIK) contributing to the financing of energy efficiency projects. For example, Kredex offers various grants to both apartment associations and

[153] https://ec.europa.eu/energy/sites/ener/files/documents/ee_building_renov_2017_et.pdf.
[154] https://mkm.ee/buildest
[155] In accordance with Article 18 of Directive 2012/27/EU.

private individuals for the renovation of houses. More detailed information is published on their homepage, as well as a list of specialists in the renovation of the apartment building[156].

The Ministry of the Environment is implementing the measure 'Resource efficiency of enterprises', which inter alia develops the energy services market. The resource efficiency measure will also support the procurement of public energy services. The measure covers four activities: awareness raising, training of professionals, carrying out audits/resource use analyses and investing[157].
Several companies are active in the Estonian energy services market, such as Adven[158], Fortum[159], AU energy service OÜ[160], Eesti Energia, etc.[161] Their website provides information on the conclusion of energy performance contracts and the projects carried out.

iv. Other planned policies, measures and programmes implementing the indicative national energy efficiency target for 2030 and other targets as set out in point 2.2 (e.g. measures to promote the exemplary role of public buildings and energy-efficient public procurement, measures to promote energy audits and energy management systems[162], information and training measures for consumers and[163] other measures to promote energy efficiency[164]).

Exemplary role of public buildings

In order to fulfil the exemplary role of public buildings, measures will be implemented for the renovation of public buildings (descriptions in Annex IV to this document).

Pursuant to Section 5 of the Energy Management Organisation Act, the central government coordinator for energy saving of real estate organises that 3 % of the total useful floor area of buildings occupied by the central government is renovated each year. The Ministry of Finance currently acts as coordinator for energy saving in the central government's real estate.

Table 3.5 Renovation rate of central government buildings.

Year	Execution m²	%
2014	17 000	1.50 %
2015	56 321	6.20 %
2016	30 740	3.00 %
2017	40 700	5.20 %
2018	30 222	3.90 %
2019	22 549	2.50 %
2020	9 471	1.10 %
2021	18 681	2.20 %
2022	8 436	1.00 %

[156] http://www.kredex.ee/korteriuhistu/korteriuhistu-toetused/rekonstrueerimise-toetus/tehniline-konsultant-7/
[157] http://ressurss.envir.ee/
[158] https://adven.com/ee/lahendused-toostusele/energiatohusus/
[159] https://www.fortum.com/products-and-services
[160] http://energiateenus.ee/
[161] https://www.energia.ee/et/tark-tarbimine/kokkuhoid
[162] In accordance with Article 8 of Directive 2012/27/EU.
[163] In accordance with Articles 12 and 17 of Directive 2012/27/EU
[164] In accordance with Article 19 of Directive 2012/27/EU.

Promoting energy-efficient public procurement

The promotion of energy-efficient public procurement in Estonia is based on the Energy Economy Organisation Act. Section 6 of the Act lays down the obligation for central government authorities to purchase only products, services and buildings with high energy efficiency. More specific requirements are laid down in the Government of the Republic Regulation on Energy Performance Requirements for Products, Services and Buildings purchased by the Central Government[165].

In addition, the Ministry of Economic Affairs and Communications must encourage public authorities, including those at regional and local level, by sharing best practices, to follow the example of the central government and to purchase only highly energy-efficient products, services and buildings. Specific activities for this purpose will be carried out on a project-by-project basis.

From a circular economy perspective, green public procurement is important[166]. The main objective of these procurements is to reduce the negative environmental impacts of products and services from production, use and disposal, i.e. throughout the life cycle of the product/service. In this way, risks to human health and the environment can be reduced. A green product and service is not only an environmentally friendly product and service, but also high-quality, energy- and resource-efficient, produced from reusable or reusable material, eco-innovative, etc. It is important that the environmental impact of the product or services and the whole life cycle are taken into account when procuring.

Energy auditing:

Section 28 of the Energy Management Organisation Act (EnKS) concerns the obligation for large enterprises to carry out periodic energy audits. In accordance with Section 28(1) of the EnKS, an undertaking that is not a small and medium-sized enterprise or a distribution system operator or a transmission system operator must carry out an internal energy audit every four years, based on Article 8 of the European Union Energy Efficiency Directive 2012/27/EU.

According to the law, a large enterprise is defined as an enterprise with more than 250 employees and where at least one economic indicator is fulfilled: it has a turnover of more than EUR 50 million and/or an annual balance sheet of more than EUR 43 million. Under the new Energy Efficiency Directive, companies with a total energy consumption above 10 TJ (2.77 GWh/a) and companies with a total energy consumption above 85 TJ (23.6 GWh/a) will be required to implement the standard on energy management systems (e.g. ISO 50001) (around 2025). The list of large enterprises is drawn up and published on its website by the Energy Efficiency Coordinator, the Ministry of Economic Affairs and Communications. The purpose of drawing up and publishing a list of large undertakings is both to inform large undertakings and to assist the Consumer Protection and Technical Regulatory Authority (TTJA) in organising surveillance.

The minimum energy audit requirements are laid down in Regulation No.76 of the Minister of Economic Affairs and Infrastructure (available on 12 June 2018)[167]on 'Minimum energy audit requirements', which was adopted on 22 December 2016 and is renewed by Q4 2023 at the latest. Minimum requirements can also be used to estimate the areas in which energy is consumed. Two areas can be identified – production processes or energy needed for the main activities of companies (with the largest share of 846 GWh/a), followed by the energy consumption of buildings (310 GWh), with a separate lighting component of 25 GWh. In Estonia, the first deadline for the energy audit of large companies was 23 April 2017. In accordance with Paragraph 12 of Regulation No 76, undertakings had the opportunity, by the first deadline, to submit an energy audit in a simplified manner. The next energy audit deadline is 5.12.2023 and every 4 years thereafter.

[165] https://www.riigiteataja.ee/akt/110032017016
[166] https://envir.ee/ringmajandus/ringmajandus/keskkonnahoidlikud-riigihanked
[167] https://www.riigiteataja.ee/akt/123122016003

A total of 32 energy audits were carried out in 2020. Article 8(4) of the Energy Efficiency Directive (2012/27/EU) defined large enterprises as 128. In 2021, 25 energy audits were carried out, with a total of 153 large companies.

The obligation to carry out an energy audit for large companies is in line with the planned company energy and resource efficiency measure under the leadership of the Ministry of the Environment during the current period of EU structural funds. The aim of this action is to lay the foundations for future resource efficiency growth in industry, targeting in particular small and medium-sized enterprises. The measure covers four activities:

- awareness-raising;
- training of professionals;
- carrying out audits, i.e. analyses of resource use; and
- investment.

Replacement of piping

The reduction of the diameter of district heating pipelines and the installation of priority insulated pipelines are eligible for support under the development of heat management under measure EN3. 2021-2027 will continue to support projects to renovate boiler equipment and heat pipelines.

v. V. Where applicable, a description of policies and measures to promote the role of local renewable energy communities in contributing to the implementation of policies and measures in points i, ii, iii and iv

Under the recast Renewable Energy Directive EU 2018/2001, renewable energy communities need to be promoted. A renewable energy community is a legal entity whose primary objective is to provide environmental, economic or social community benefits to its shareholders, shareholders or members or to the local areas in which it operates rather than making financial profits (Article 2). Renewable energy communities shall have the right to:

(a) produce, consume, store and sell renewable energy, including on the basis of renewable power purchase agreements;

(b) share renewable energy produced by generation units owned by a renewable energy community within that renewable energy community in accordance with the other requirements set out in this Article and retaining the rights and obligations of the members of the renewable energy community as consumers;

(C) access in a non-discriminatory manner, either directly or through aggregation, to all suitable energy markets (Article 22).

Cooperative cooperation is common in Estonia, e.g. apartment associations, consumer cooperatives, forest cooperatives, agricultural cooperatives. For example, it is possible for local communities to benefit from the support envisaged by measures related to building renovation and heat management, in particular through the association of apartments. All the above-mentioned cooperative activities can still install renewable energy production facilities today and do not have to call itself a renewable energy community. Projects involving consumers in energy production so far have shown that the emergence of local energy communities in Estonia requires raising awareness, fixing the community problem that cooperative activities are seeking to address, finding leadership and providing advisory services[168]. Building a renewable energy community requires knowledge of the relevant technologies and very good expertise in the operation

[168] See also energy cooperatives https://energiatalgud.ee/index.php?title=Energia%C3%BChistud

of the electricity market – at the same location, a project can be profitable or loss-making, depending on how the project is structured.

The experience of the Energy Cooperative Programme with ten potential energy cooperatives (including 7 municipalities) between 2014 and 2015 showed that the prerequisites for forming an energy community in Estonia are a certain population density, experience of cooperative cooperation, the existence of fuel-free and other renewable energy sources and suitable energy technologies, the capacity to renovate buildings and the possibility to sell energy to the grid. Eight to nine years have passed since the programme was carried out, and the electricity market has become more open, regulation has been improved, but cooperative activities compete with the so-called 'normal' business. Technologies are more advantageous, electricity prices and additional costs (network charges, etc.) have increased, making e.g. PV panels project reasonably profitable (estimated). While the community has sufficient financial resources to jointly realise a renewable energy project, the definition of an energy community must not have the primary objective of making a profit – so the community needs a value-based problem that is being tackled together for the community – this does not mean that cooperative activities must not be profitable.

The definition of the community creates a challenge and forces the leaders to examine the needs of the community in depth, to map possible solutions, and to set out separately why acting together will benefit all parties. The alternative is to merge together under the legal body of OÜ, KÜ, TÜ, etc., without any restrictions on profit making.

Banks play a key role in the process of activating cooperative energy production. However, banks have a high risk sensitivity due to a lack of reliable experience. Profit is also not the primary objective of banks and, according to the definition of community energy, of energy. However, high-interest capital absorbs a relatively large part of the income generated by, for example, a solar power plant to be installed by a co-ownership association and thus makes the activity unattractive.

Reducing social inequalities could be one of the outcomes of the creation of energy communities. For example, in order to improve the livelihood of vulnerable households, a community park has been set up in which it is possible to participate without significant investment, but it is possible to cancel the household's energy costs. A household with basic needs in distress or borderline condition is not technically, financially or mentally able to drive or manage such a project. Therefore, in order for a community energy project to succeed, the success and sustainability of the project, whether with the participation of the LA or otherwise, must be ensured. In Estonia, the European Federation of Renewable Energy Cooperatives has used the[169] practice of the European Federation of Renewable Energy Cooperatives to define the role of energy communities and define them as energy cooperatives. Estonian legislation does not define energy communities or energy cooperatives separately, but their activities overlap with the forms set out in the Commercial Code, i.e. renewable energy communities can operate as a limited liability company within the meaning of the Commercial Code and also as a public limited company. In this context, an energy cooperative is defined as a community-based collective activity whose main purpose is to produce, distribute and sell electricity and heat to its members to cover self-consumption through its equipment, i.e. also to minimise energy costs through a collective activity of consumers that centrally generates and distributes electricity and heat to its members to cover self-consumption. Public renewable energy production refers to decentralised renewable energy production owned (at least 50 %) or operated by citizens, local initiatives, communities, local authorities, philanthropic or non-governmental organisations, farmers, cooperatives or small and medium-sized enterprises that create local value that can remain in the area.

[169] REScoop https://www.rescoop.eu/

The potential and socio-economic impact of Estonian energy cooperatives[170] were assessed in 2015 under the Energy Cooperative Mentor Programme. **The greatest energy potential for energy cooperatives is in multi-dwelling buildings and public buildings that are not located in district heating areas or are located in district heating network areas with low consumption density.** The total potential of local cooperative electricity generation with solar panels is 30 GWh/a (3 % of the annual electricity needs of buildings in case the investment price is lower than the price of purchased electricity). **Local electricity generation on the existing local distribution network has a positive impact on the possibility to increase network capacity by a few percentage points**. In addition, the potential for wood gasification is 22 GWh/y. The wind energy production potential in Estonia does not coincide with the location of apartment buildings and non-residential buildings. The share of local electricity production would be 0.33 % of final electricity consumption in all buildings. Buildings with the potential of a heating cooperative account for between 8 % and 10 % of the final heat consumption of all buildings.

The potential of communities in energy production can be harnessed primarily at local level. More than 9200 cities[171] have joined the Global Covenant of Mayors for Climate and Energy, including Tallinn, Tartu, Rakvere, Jõgeva, Kuressaare, Rõuge and Võru from Estonia. The Pact requires reducing $CO2_{emissions}$ from urban territory by 40 % by 2030, making cities carbon-neutral by 2050 and improving resilience to the impact of climate change[172]. In the framework of the Horizon 2020 project 'Energy Roadmaps – R4E', a Road Map for Tallinn Energia was prepared. Various international energy community projects are managed in Estonia by the Tartu Regioon Energy Agency[173,] e.g. Interreg project Co2mmunity, Horizon 2020 PANEL 2050 and Smart EnCity.

vi. Description of measures to develop measures to exploit the energy efficiency potential of gas and electricity infrastructure[174]

The use of the energy efficiency potential of gas and electricity infrastructure is regulated by[175] Section 7 of the Energy Management Organisation Act, which obliges transmission and distribution system operators to define measures to improve the energy efficiency of their network, the necessary investments and the timetable for their deployment, and to submit an overview thereof to the energy savings coordinator. Paragraphs 3 and 4 of that section provide that the cost of energy efficiency measures is to be taken into account when setting network charges for network operators. The network charge shall not hinder the overall efficiency of the gas and electricity system, including energy efficiency, improvement, demand management, participation of market participants in the balancing market or the procurement of additional services. ENMAK 2030 measures are the most direct contributors to the energy efficiency potential of electricity infrastructure.

Table *3.6 Measurements of measures to exploit the energy efficiency potential of electricity infrastructure*[105]

Objective 2: Security of supply: Continuous energy supply is ensured in Estonia		
Measure No.	Barometer	Indicative target

[170] Estonian Development Fund 2015 report by the Energy Cooperatives POTENTSIALI AND SEEIGANY https://energiatalgud.ee/img_auth.php/1/13/Eesti_Arengufond._Energia%C3%BChistute_potentsiaali_ja_sotsiaalmajandusliku_m%C3%B5ju_anal%C3%BC%C3%BCs._2015.pdf

[171] Global Covenant of Mayors for Climate and Energy https://www.globalcovenantofmayors.org/our-cities/

[172]Tallinn City Government decision file:///C:/Users/Irje.Moldre/Downloads/04.04.2019_otsus_59%20(1).pdf

[173] TREA www.trea.ee

[174] In accordance with Article 15(2) of Directive 2012/27/EU.

[175]The Estonian Parliament. Organisation of the Energy Economy Act. https://www.riigiteataja.ee/akt/129062018074?leiaKehtiv

1.2	1. Average total duration of unscheduled or faulty interruptions in the distribution network in minutes per place of consumption per year, minutes	&90 (2030)
1.2	2. Amount of energy not provided in the transmission network, MWh	&150 (2030)
1.2	4. Share of weather-proof grid in the distribution network	75 % (2030)

In addition to the overview of related measures in the Energy Development Plan presented in the table above, the installation of remotely readable meters for all consumers (completed on 1 January 2017) and the optimisation of customer connections (see further description below) are important measures to improve the energy efficiency of electricity networks. In Estonia, remotely readable meters are installed for all consumers.

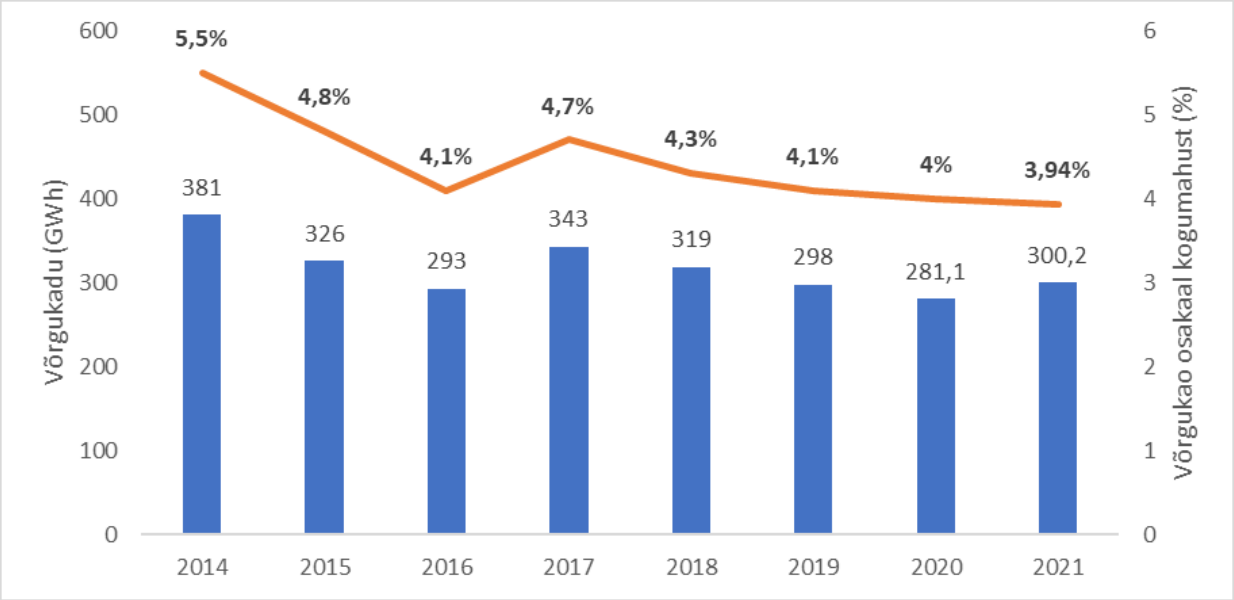

Figure 3.3 Grid losses in the network of Elektrilevi OÜ[176]

In terms of final consumption, Elektrilevi OÜ has the largest sales volume of distribution networks, with a market volume of 86.5 % in 2021. Elektrilevi OÜ's share of total network losses has shown a steady decline, standing at 4 % in recent years.

Further improvements in the efficiency of electricity grids can be achieved through the reduction of the underutilised grid[177]. Unusable lines and substations increase losses and significantly reduce system efficiency.

Losses in the transmission system depend, inter alia, on the amount of energy transferred, cross-border energy trade and the distribution of power flows in the interconnected energy system and the resulting transit and weather conditions (air humidity, precipitation). In 2021, the core network lost 1 097 GWh, or 5.1 %.[178]

[176] Annual reports of Elektrilevi OÜ - https://www.elektrilevi.ee/et/ettevottest/elektrilevi-tutvustus
[177] Development Fund. Today's electricity grid situation. Possible development scenarios. https://energiatalgud.ee/img_auth.php/1/12/Eesti_Arengufond._Elektriv%C3%B5rgu_t%C3%A4nane_olukord._V%C3%B5imalikud_arengustsenaariumid.pdf
[178] Electricity and Gas Market Report 202, Competition Authority - https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded

The potential for improving the energy efficiency of the gas network lies in nodes that use energy.

The energy consumption of the gas system consists of three major components: electricity consumption, self-consumption of the gas system and loss of gas. The energy efficiency potential of the gas network and possible measures have been analysed in the 2020 energy efficiency improvement report of the Estonian gas system[179].

So far, the following actions have been implemented under the gas loss reduction programme[180]:

- Upgrade of measuring equipment at gas measurement stations;
- Replacement of obsolete meters in GJJ;
- The execution of the gas meter correction function of the measurement error in the volumetric meters;
- Actions to achieve compliance of the gas meter's measuring range and consumption;
- Clarification of the methodology for the calculation of gas losses from maintenance and repairs;
- Set the operating parameters of the line controllers at gas distribution stations to the widest possible range to prevent small gas flows from flowing through the line in the reserve.

The**following activities are planned for 2023-2027**[181]:

- The replacement of gas meters that have been introduced for more than 8 years;
- In all exchanged measurement systems, which enable the gas meter correction function to be realised in volume conversion meters;
- Aligning the measuring range of the gas meters with the actual consumption quantity;
- Clarification of the methodology for the calculation of gas losses from maintenance and repairs;
- The setting of the setting parameters or the provisions for the adjustment lines of the gas stations has been carried out and the spare parts of the higher-wear controls detected during the execution of the works are ordered or ordered. The exchange of wear and tear will take place within the resources of the business budget, planned
- to be carried out on an ongoing basis within the years 2023-2027.

Losses in the gas transmission network amounted to 6.14 GWh in 2020 and 13.81 GWh in 2021[182].

vii. Regional cooperation in this area, where appropriate.

Estonia participates in the Baltic Energy Market Interconnection Working Group on energy efficiency. Energy efficiency issues will also be addressed, as appropriate, in the Baltic Council of Ministers' Committee of Senior Energy Officials. These cooperation formats are described in chapter1.4.ii.

viii. Financing measures, including EU support and the use of EU funds in this area at national level

Energy efficiency and emission reduction measures for buildings and transport are set out in Annex IV.

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[179] Improving the energy efficiency of the Estonian gas system, KPMG - https://energiatalgud.ee/sites/default/files/2022-05/Gaasis%C3%BCsteemi%20energiat%C3%B5hususe%20suurendamine%20%282020%29.pdf

[180] Estonian gas transmission network development plan 2023-2032, Elering - https://elering.ee/sites/default/files/2023-03/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202023-2032_0.pdf

[181] Estonian gas transmission network development plan 2023-2032, Elering - https://elering.ee/sites/default/files/2023-03/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202023-2032_0.pdf

[182] Electricity and Gas Market Report 202, Competition Authority - https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded

According to the agreements reached at the end of 2022 at EU level – the corresponding EU legislation has not yet been published in the Official Journal as of March 2023 – **starting from 2026, in particular in the run-up to the launch of the EU Emissions Trading System for buildings and road transport (the "new EU ETS"), the Social Climate Fund (SKF)** will be launched. The SKF is a new fund, which can be used to support activities to reduce GHG emissions and increase energy efficiency and promote the use of renewable energy in the heating and cooling of buildings and road transport sectors. As at the end of 2022, Estonia's SCF funding is estimated to be available for a total of approximately EUR 186 million over the period 2026-2032.

In Estonia, the use of SCF funds is planned in the long-term strategic planning process, by analogy with the planning of the use of EU funds for the 2021-2027 budget period under the coordination of the Ministry of Finance, taking into account the synergies and synergies between the various public co-financing activities. The aim is to achieve the best possible synergies between the resources of the SKF and other State-supported activities and measures.

Therefore, the use of SCF funds is planned on the basis of relevant sector-specific strategy papers (some of which are in the process of being updated or under preparation as of March 2023) and concrete decisions will be taken before the launch of the SKF in the country's budgetary strategy process.

Therefore, the planning of the use of SCF funds, i.e. the so-called Social Climate Plan, will be based on the relevant sector-specific strategy papers (some of which are in the process of being updated or under preparation as of March 2023) and concrete decisions will be taken before the start of the SCF in the country's budgetary strategy process. The Social Climate Plan will be linked to the next version of the 2030 NECP following its preparation.

3.2. Dimension energy security[183]

i. Policies and measures related to the elements set out in point 2.3[184].

The central principles for ensuring energy security in Estonia are set out in the 'Basis of Estonia's security policy' approved by the Riigikogu185, which were adopted in 2017. The Fifth Framework Document, the 2023 'Basis of Security Policy', which describes the changing security environment, also builds on186the foundations of the 2017 Security Policy. Energy security, which is a strategic challenge for Estonia, is primarily linked to economic security and vital services. Estonia aims to achieve and maintain full energy independence from the Russian Federation and to diversify its energy portfolio. In order to reduce the risks to security of electricity supply, sufficient controllable capacity shall be secured. Estonia, together with Latvia and Lithuania, will strengthen its electricity systems, with the completion of the process allowing the Baltic States to disconnect from those of the Russian Federation and Belarus in order to connect to the mainland European electricity system.

According to the foundations of security policy, Estonia's economic model must be sustainable, competitive and future-proof. This will be done by increasing the share of renewable energy in the energy balance and implementing a strategically managed green transition in Estonia. Estonia aims to produce the same

[183]Policies and measures shall reflect the energy efficiency first principle.
[184]Consistency shall be ensured with the preventive action and emergency plans under Regulation [as proposed by COM(2016) 52] concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010, as well as the risk preparedness plans under Regulation [as proposed by COM(2016) 862] on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC.
The basis for185 Estonia's security policy
https://www.riigiteataja.ee/aktilisa/3060/6201/7002/395XIII_RK_o_Lisa.pdf#
186The basis for security policy (2023).
https://www.kaitseministeerium.ee/sites/default/files/eesti_julgeolekupoliitika_alused_est_22.02.pdf

amount of renewable electricity in 2030 as the total annual consumption. Estonia is also developing in parallel innovative technological solutions that could also be offered to democracies, including by developing energy production and valorisation of future minerals needed to deliver on the green transition. Estonia will ensure secure supply chains and transparency of foreign investment in priority areas.

Estonia's long-term development strategy 'Estonia 2035' highlights187 the transition to climate-neutral energy production as one of the necessary changes, while ensuring energy security. The transition to climate-neutral and good air quality energy production requires consideration of alternatives and choices. According to the development strategy, energy security and security of supply must be ensured both during and before the transition towards climate-neutral energy production. The development strategy calls for a solution to increase renewable energy that takes into account security, environmental protection and the interests of the population. It also highlights openness and support for new solutions such as offshore wind. In order to move away from oil shale for electricity generation, the transitional period will support mitigation of the socio-economic impacts of reduced production of electricity from oil shale and develop and implement a package of services and investments for Ida-Virumaa that will help people, businesses and local authorities in the region benefit from the changes and ensure a just transition to the new economy. Furthermore, the development strategy highlights that energy security and security of supply issues need to be addressed in energy infrastructure.

Estonia's "Internal Security Development Plan 2020-2030" does188 not directly address energy security, but highlights the evolving nature of security threats in the example of hybrid threats, which may also have an impact on Estonia's energy security. According to the Internal Security Development Plan, internal security needs to continue to be taken into account in the development of different policy areas, including hybrid threats. Strengthening the country's resilience, capabilities to counter cyber-attacks, strategic communication, critical infrastructure protection and improving the continuity of critical services will play an important role in addressing hybrid threats, including mitigating the risks of hostile sanctions. 189 Under Section 36 of the Emergency Act, essential services are the supply of electricity and natural gas. Critical energy infrastructure under the European Council Directive 2008/114/EC190 is infrastructure related to electricity and natural gas.

Cybersecurity

The Action Plan of the long-term development strategy "Estonia 2035"191 highlights key principles for ensuring cybersecurity in society. These include ensuring the cybersecurity of the digital society, including systematic and consistent assessment of cyber risks, updating their management measures to ensure the security and reliability of cyberspace and developing the necessary capabilities to manage cyber incidents and crises (including the development of common EU procedures).

The requirements to ensure cybersecurity are laid down in the Cybersecurity Act192. The Cybersecurity Act imposes obligations on service providers, including providers of essential services (supply of electricity and natural gas). According to the law, the service provider must implement permanent security measures to prevent, resolve and, as a consequence, prevent or mitigate the impact of a cyber incident on the continuity of the service or on the security of the system. In addition, the service provider is obliged to prepare a risk analysis and to ensure that a description of the implementation of security measures is available and up-to-date. The e-Government Academy is developing the Cybersecurity Index, which ranks Estonia as the third

187Development strategy 'Estonia 2035' https://valitsus.ee/media/4022/download
188Internal Security Development Plan 2020-2030. https://www.siseministeerium.ee/media/748/download
189Emergency Act. RT I, 03.03.2017.www.riigiteataja.ee/akt/117052020003?leiaKehtiv
190Council DIRECTIVE 2008/114/EC. https://eur-lex.europa.eu/legal-content/ET/TXT/HTML/?uri=CELEX:32008L0114&from=ET
191Estonia's 2035 action plan. (28.4.2022). https://valitsus.ee/media/4771/download
192Cybersecurity Act. RT I, 22 May 2018 https://www.riigiteataja.ee/akt/122052018001?leiaKehtiv

largest cybersecurity world in the world after Belgium and Lithuania in May 2023[193]. This position shows Estonia's readiness and systemic approach to cybersecurity.

In Estonia, the Ministry of Economic Affairs and Communications coordinates the development ofcybersecurity policy and the implementation of the strategy and organises the relevant cooperation between public authorities and the wider community. At strategic level, coordination takes place through the Cyber Security Council of the Government of the Republic Security Commission. In addition to the State Chancellery and ministries, the Estonian Information System Authority, the Consumer Protection and Technical Regulatory Authority, the Estonian Internet Foundation, the State Infocommunication Foundation, the joint agency ofEnterprise Estonia and KredEx and Startup Estonia are the organisations contributing to ensuring cybersecurity in Estonia[194].

Digitalisation involves an increasing number of traditional industrial sectors, including energy. As a result, in the future, cyber-attacks or failure of information systems could be one of the significant threats of power cuts, along with storm damage and reduced trees. In 2021, the transmission network had not provided any energy caused by cyber incidents. The activity of the electricity system operator, Elering AS, is aimed at preventing the supply of energy for these reasons in the future. Over the past year, Elering has implemented a number of cybersecurity-enhancing development projects, which have increased situational awareness and reduced the impact of data leaks and attacks. In addition, Elering has improved its internal procedures and requirements to better respond to the challenges of a changing world. The security of critical information systems, the monitoring of computer networks and processes related to the construction and management of critical infrastructure are planned to be improved over the coming years.

Electrical system

The following ENMAK 2030 measures will most directly contribute to the security of supply of the electricity system and the related objectives:

- Measure 1.1 Development of electricity generation; and
- Action 1.2 Responsive and efficient transmission of electricity economy

In order to assess and ensure the security of supply of the electricity system, Estonia has established a reliability standard based on Regulation (EU) 2019/943 of the European Parliament and of the Council. The reliability standard is laid down in the Electricity System Operations Network Code, which provides that the number of curtailment hours shall not exceed nine hours per year and that the amount of electricity expected not to be supplied as a result of DSR and other activities carried out to ensure security of supply does not exceed 4.5 gigawatt hours per year.

Elering AS's 2022 Security of Supply Report estimates that the reliability standard will be exceeded in 2027, as oil shale electricity may no longer be competitive in the electricity market. The Trans-European Electricity Adequacy Assessment (ERAA) prepared by ENTSO-E will exceed the security of supply standard in Estonia in 2027 as the available capacities are not economically sustainable. Elering's follow-up analysis found that if oil shale blocks were to be held on the market, the reliability standard was ensured in order to ensure security of supply, according to Elering AS, in the example of the strategic reserve of the capacity mechanism in 2027.

In order to achieve the objectives 2.3 described in Chapter 3, the following actions will be implemented:

EN1 Support for renewable energy and support for efficient combined heat and power
EN9 Increasing the share of weather-proof nets

[193] Cybersecurity Index https://ncsi.ega.ee/
[194] Cyber security https://www.mkm.ee/et/tegevused-eesmargid/infouhiskond/kuberjulgeolek

EN11 Synchronisation of the Baltic States' electricity system with the Continental European synchronous area

Investments in the Baltic States under the Baltic synchronisation project (see paragraph2.4.2) will also contribute to the resilience of the electricity system, which will help to remove bottlenecks both in Estonia and in the other Baltic States and increase the availability of external connections and the flexibility of the electricity system to rapid changes in electricity generation.

According to**the Competition Authority's report, the adequacy of the Estonian electricity system has been ensured in the next decade**[195]. Estonia's production capacity in 2021 can be found in the table below.

Table 3.7 Estonian production capacity as of 2021 (Elering[196])

Power plant	Net installed capacity MW
Estonian Power Plant	866
Balti power plant	192
Auvere Power Plant	272
IRU Power Plant	94
Kiisa Emergency Power Plant	250
Cogeneration plants	351,8
Hydropower	4,1
Wind farm	310.3
Solar power plants	335,2
Total	**2365,1**

Gas system

ENMAK 2030 will contribute to the security of gas supply and the related objectives:

- Action 1.3 Ensuring gas supply:

The security of supply of the gas system is further addressed in Chapter 2.4.2.

District heating systems

In order to ensure security of supply in district heating systems, the District Heating[197] Act provides for additional obligations for heat operators. In district heating systems where heat is supplied to consumers in excess of 50 GWh/y and located in a local authority with a population of at least 10000 inhabitants, the heat company is a vital service provider.

In very large systems with a heat consumption of at least 500 GWh/y, the option of using a reserve fuel at a level that guarantees the heat supply within three days is mandatory.

In order to improve security of supply, support measures for district heating will continue:

[195] Electricity and Gas Market Report 2021, Competition Authority - https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded
[196] https://elering.ee/sites/default/files/2021-12/Varustuskindlus%202021%20lk.pdf Annex 2.
[197] https://www.riigiteataja.ee/akt/103032017012?leiaKehtiv

- Substituting inefficient district heating with local heating, provided that the district heating company continues to provide the service through a local heating solution. At least 34.36 MW of heat production facilities will be renovated as a result of the activity of the measure.
- Renovation of depreciated and inefficient heat pipelines and/or construction of new heat pipelines. The measure will result in the reconstruction of 130 km of depreciated inefficient heat pipelines.
- Renovation and/or construction of district heating boilers and fuel switching. As a result of the measure, at least 193 MW of district heating boilers will be renovated.

Security of supply will be improved by increasing network and production efficiency and reducing the risk of failure. The price of heat is better controlled.

Liquid fuels

In order to ensure the continuous availability of liquid fuels, Directive 2009/119 is guided by Directive 2009/119 EC, Implementing Directive EU2018/1581 and the Liquid Fuel Stocks Act198 and, as of 19 November 2013, stockholding requirements set out in the IEA Energy Programme Agreement and one ENMAK 2030 action is implemented:

- Measure 1.4 Maintenance of fuel reserves.

In addition to the general stock quantity, the Liquid Fuel Stock Act provides that a quantity corresponding to at least 30 days' national consumption of the corresponding energy product in the previous calendar year must be kept in the reserve in Estonia.

Oil shale

Opportunities for oil shale use and demand for oil shale products are linked to a tightening of international energy and climate policy objectives.

Estonia's oil-shale power plants will have a capacity of at least 1 000 MW according to new owner expectations until the end of 2026, and thereafter according to the forecast provided by the producer. According to the 2022 Security of Supply Report of the electricity system operator Elering AS, forward looking analyses show that, despite high electricity prices, already in 2027, the market may turn so that Estonian oil shale power plants may no longer be competitive on the electricity market. This is also demonstrated by the ERAA (European Resource Adequacy Assessment[199]) analysis, according to which oil shale units in Estonia will not be economically sustainable as of 2027 and should be closed in case of market-based behaviour. "[200]According to the ELS report, the production of electricity from oil shale is not competitive, but sufficient managed capacity is necessary to ensure security of supply. In order to ensure security of supply even in a future situation where oil shale plants are no longer present in the market, Elering has proposed the implementation of a strategic reserve, which will result in maintaining sufficient capacity to ensure security of supply in Estonia.

[201] According to Eesti Energia's Strategy Paper, the production of electricity from oil shale will be phased out by2030, which will be replaced by biomass and euttegase. Electricity generation from ewe gas will be phased out by 2035 and the objective of carbon-neutral electricity generation will be maintained by that time. The Strategy Paper foresees that by 2045 all production of Eesti Energia will be carbon neutral. Security of supply of electricity and natural gas also has a very strong focus. However, while in the past, before the start of the war in Ukraine in 2022, Estonia's oil shale production blocks did not fit on the market, they will play a crucial

[198] https://www.riigiteataja.ee/akt/101072017019?leiaKehtiv
[199] https://www.entsoe.eu/outlooks/eraa/
[200] Estonia's report on security of electricity supply, Elering - https://elering.ee/sites/default/files/2022-12/elering_vka_2022_pages.pdf
[201] https://www.energia.ee/ettevottest

role in ensuring security of supply in our region in the coming years. In the long term, it will be very intense in CO2 but, given the transition of newer blocks to wood, they will be sustainable for some time[202].

ii. Regional cooperation in this area

Baltic Council of Ministers

The Baltic Council of Ministers' Committee of Senior Energy Officials cooperates regularly on energy issues in the region. Meetings at the level of senior officials from the Baltic States will take place on a rotating basis.

In summer 2022, a Baltic Regional Security Coordinator (Balti RCC) was established by the Baltic system operators. The Baltic RCC is responsible for organising the coordination of the regional activities necessary for the functioning of the electricity system between system operators. In essence, this means that RCC provides certain operational planning functions that have so far been performed by electricity system operators. As things stand, the Baltic RCC provides the Baltic system operators with five main services (the number of services will increase in the future)203:

- Creation of common grid models. The main objective is to harmonise the principles for grid modelling and their day-to-day validation and aggregation into a central grid model that could be used in different systems robustness processes and calculations.
- Coordinated operational security analysis, including an assessment of corrective actions (e.g. counter-trading). Using the common grid model, identify possible emergency situations where the normal operation of the network could be disrupted by modelling of the network conditions and the actions to be taken to remove corrective actions when identifying such situations.
- Coordinated regional planning of power system equipment interruptions. Plan and evaluate system interruptions to ensure system reliability in case of potential accidents.
- Regional, week-ahead, to at least day-ahead system adequacy forecasts and preparation of risk mitigation measures.
- Support the consistency assessment of system operators' defence plans and restoration plans during periodic reviews. From 1 January 2018 until synchronisation with the electricity grid in Central Europe, coordinated balance-sheet management has been implemented in the electricity systems of Estonia, Latvia and Lithuania. Estonia, Latvia and Lithuania are considered as a single balancing zone and one of the Baltic system operators is responsible for balancing the total balance of the whole Ballastic. In order to minimise the deviation of the total AC balance of the Ballasty, the necessary amount of reserve capacity shall be launched from the common bidding list.[204]

Gas system

As a gas system operator, Elering AS is involved in the*Regional Gas Market Coordination Group* (RCMCG) for the Baltic States and Finland. The working group includes not only the relevant national system operators but also regulators and ministries responsible for the field.

In addition, in accordance with Article 3(7) of Regulation EU 2017/1938 on security of supply of natural gas, a working group has been set up between the 3B+FI countries (North Eastern gas supply risk group) to

[202] Electricity and Gas Market Report 201, Competition Authority - https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded

203https://elering.ee/book/export/html/1177

[204] Elering AS. Rules for securing the balance sheet. https://elering.ee/sites/default/files/attachments/Bilansi%20tagamise%20ehk%20tasakaalustamise%20eeskirjad%2001.2018.pdf

prepare jointly the risk analysis and emergency prevention and response plans for the region in terms of security of natural gas supply. The working group shall include representatives of ministries, regulators and gas system operators.

Solid fossil fuels

Estonia has no regional or international agreements on the supply of solid fossil fuels. However, Estonia has acceded to a single international agreement which may theoretically affect the supply of fossil solid fuels. The Act of Accession to the Treaty on Spitsbergen, adopted by the Estonian Parliament on 4 February 1930[205], which ratified the "Legal Spitsbergen"[206], allows Estonian companies to carry out, among other economic activities, the extraction of mineral resources in the Spitsbergen. Estonia does not plan to carry out mining-related economic activities on the Spavmäge.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

The financing of the implementation of the measure "Synchronisation of the Baltic States' electricity system with the Continental European synchronous area" is organised by the Estonian Transmission System Operator (Elering) in cooperation with the TSOs of Latvia, Lithuania and Poland. Transmission system operators finance activities related to the development of the electricity network by means of a network fee charged to consumers, and cross-border interconnections are also financed by the so-called 'bottleneck charge'. Co-financing from the European Union is to be used to finance the action. The Baltic synchronisation project has been on the list*of Projects of Common Interest (PCIs) in*the European Union since 2013. For example, the construction of the 3 Estonian-Latvia connection (330 kV connection as Riga CHP 2 and Klingi-Nõmme substations and the 330 kV connection of Harku-Sindi opened in 2021) has been co-financed for the implementation of the measure. Projects have been requested for funding under the current financial period and will need to be funded in the next EU financial period.

3.3. Dimension Internal energy market[207]

3.3.1. Electricity infrastructure

i. Policies and measures to achieve the level of electricity interconnection set out in point (d) of Article 4

The electricity interconnection target of the Member States of the European Union shall be at least 10 % by 2020 and at least 15 % by 2030[90].

Electricity transmission infrastructure measures (see more details in chapter2.4.2) are primarily aimed at synchronising the Baltic States' electricity system in a band subject to European Union law and increasing the availability of existing external connections. Activities under the Baltic synchronisation project take place in Estonia, Latvia, Lithuania and Poland. Investments under synchronisation will strengthen both transnational interconnections and national electricity transmission networks. This will remove the bottlenecks in the electricity system and increase the interconnection between the Baltic States and Poland. The interconnection capacity was 1 447 MW in the EE-LV direction, 1 259 MW in the LV-EE direction, 1 016 MW in the EE-FI direction. The following ENMAK 2030[4] actions will most directly contribute to ensuring electricity interconnectivity:

[205] https://dea.digar.ee/article/AKriigiteataja/1930/02/18/4
[206] https://dea.digar.ee/article/AKriigiteataja/1930/02/18/5
[207] Policies and measures shall reflect the energy efficiency first principle.

- Measure 1.2 Responsive and efficient transmission of electricity economy.

In order to achieve the objectives described in Chapter 2.2, the following measures will be implemented:

EN8	Improving the quality of network services
EN9	Increasing the share of weather-proof nets
EN10	Switch to remote reading system
EN11	Synchronisation of the Baltic States' electricity system with the Continental European synchronous area

ii. Regional cooperation in this area[208].

The Baltic synchronisation project will be implemented in cooperation between the Baltic States and Poland. An accurate overview of the project status and activities can be found on the ENTSO-E website[209] and in the chapter describing the project2.4.2. The synchronisation project is discussed in more detail in chapter 2.4.2.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

see previous point.

3.3.2. Energy transmission infrastructure

The financing of the implementation of the measure "Synchronisation of the Baltic States' electricity system with the Continental European synchronous area" is organised by the Estonian Transmission System Operator (Elering) in cooperation with the TSOs of Latvia, Lithuania and Poland. Transmission system operators finance activities related to the development of the electricity network by means of a network fee charged to consumers, and cross-border interconnections are also financed by the so-called 'bottleneck charge'. Co-financing from the European Union is to be used to finance the action. The Baltic synchronisation project has been on the list*of Projects of Common Interest (PCIs) in*the European Union since 2013. For example, the 3 rd Estonian-Latvia link has received co-financing for the implementation of the measure in the past. Projects have been requested for funding under the current financial period and will need to be funded in the next EU financial period.

i. Policies and measures related to the elements set out in point 2.4.2, including, where applicable, specific measures to enable the delivery of Projects of Common Interest (PCIs) and other key infrastructure projects

The measures for the execution of electricity system PCIs and other key infrastructure projects are described in Section 3.3.1. Input to the gas system in paragraph 2.4.2.

ii. Regional cooperation in this area[210].

For electricity transmission infrastructure, all relevant information is described in section3.3.1. Input to the gas system in paragraph 2.4.2.

[208] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.
[209] https://tyndp.entsoe.eu/2016/insight-reports/baltic-synchronisation/
[210] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

iii. If applicable, financing measures in this area at national level, including EU support and the use of EU funds

For electricity transmission infrastructure, all relevant information is described in section3.3.1. Input to the gas system in paragraph 2.4.2.

3.3.3. Market integration

i. Policies and measures related to the elements set out in point 2.4.3.

Electrical system

The following ENMAK 2030 actions will most directly contribute to market integration and coupling for the objectives 2.4.3.i set out in this chapter:

- Action 1.2 Responsive and efficient transmission of electricity economy

In order to achieve the objectives 2.4 described in Chapter 3, the following actions will be implemented:

EN8	Improving the quality of network services
EN9	Increasing the share of weather-proof nets
EN10	Switch to remote reading system
EN11	Synchronisation of the Baltic States' electricity system with the Continental European synchronous area

Investments in the Baltic States under the synchronisation project (see chapter2.4.2) will contribute significantly to market integration, which will help to remove bottlenecks in all Baltic States and increase the resilience of the electricity system to rapid changes in electricity production and consumption.

Gas system

The most important investment in physical infrastructure for gas market integration was the construction of Balticconnector in 2019. At the end of 2022, the network connection in Estonia was completed to connect a possible floating LNG terminal to the transmission network. On 10 March 2023, the State acquired LNG hauling quay in Paldiski. The established transmission network and hauling berth will increase the region's security of supply and allow for the reception of the LNG floating terminal if necessary. In 2022, an additional LNG floating terminal was also built in Inko Finland. Both investments increase the region's security of supply.

ii. Measures to increase the flexibility of the energy system for renewable energy production

Chapter 3 deals with measures to increase the flexibility of the energy system for renewable energy production, such as smart grids, aggregation, demand response, storage, distributed generation, distribution, redispatching and curtailment mechanisms, and real-time price signals, including the deployment of intraday market coupling and cross-border balancing markets. These measures will be implemented in order to achieve 2.4.3.ii the objectives mentioned in Chapter.

Electrical system

Electricity system adequacy and flexibility of the energy system shall be ensured through ENMAK 2030 under measures 1.1 of the security of supply sub-objective. (Fulfil the development of electricity generation) and 1.2 (Responsive and efficient transmission of the electricity economy). The metrics of these measures will

guide network operators to make the necessary investments and develop solutions for a more efficient integration of renewable energy into the Estonian electricity system. A good example of such innovation is the map application developed by the Estonian Transmission System Operator (Elering AS), which shows, on an annual basis, the available capacity in the electricity network owned by the company, thus enabling renewable energy producers to plan their projects more effectively. More specifically, Chapter 2.4.2 relates to the electricity system.

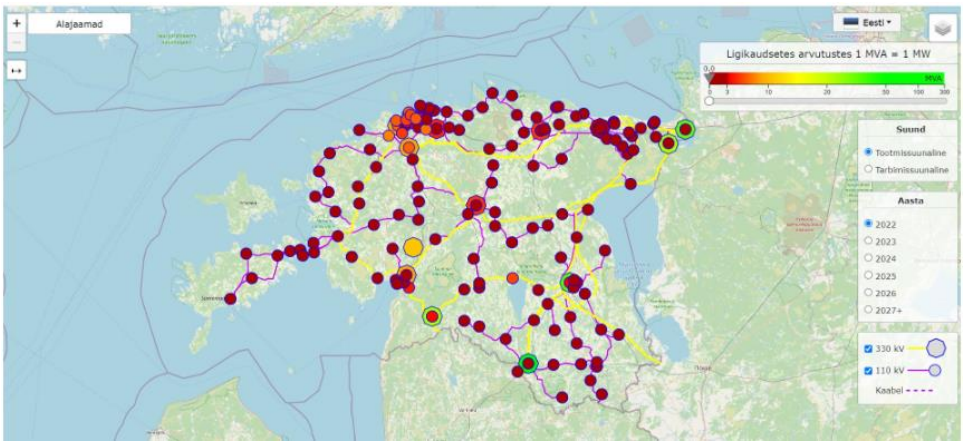

Figure 3.4 A map application of Elering AS's free connection capacities[211]

The synchronisation project (see chapter2.4.2) will also contribute to increasing renewable energy integration capacity by removing bottlenecks in the electricity system throughout the Balticku.

The system operator (Elering AS) has set up the Estfeed data exchange platform to develop the flexibility services market. Estfeed allows the secure exchange of messages in the energy sector – different data sources can be interfaced with the platform and applications that want to use these data. The Estfeed consists of a legal, software and hardware solution that manages the exchange of energy metering data between market participants, supports the process of switching electricity suppliers in the open market and allows access to metering data (e.g. for consumption monitoring and control) for software applications authorised by the

[211] Elering AS. Free connection capacity map application. Connection capacity application e-Gridmap | Elering

consumer.[212]

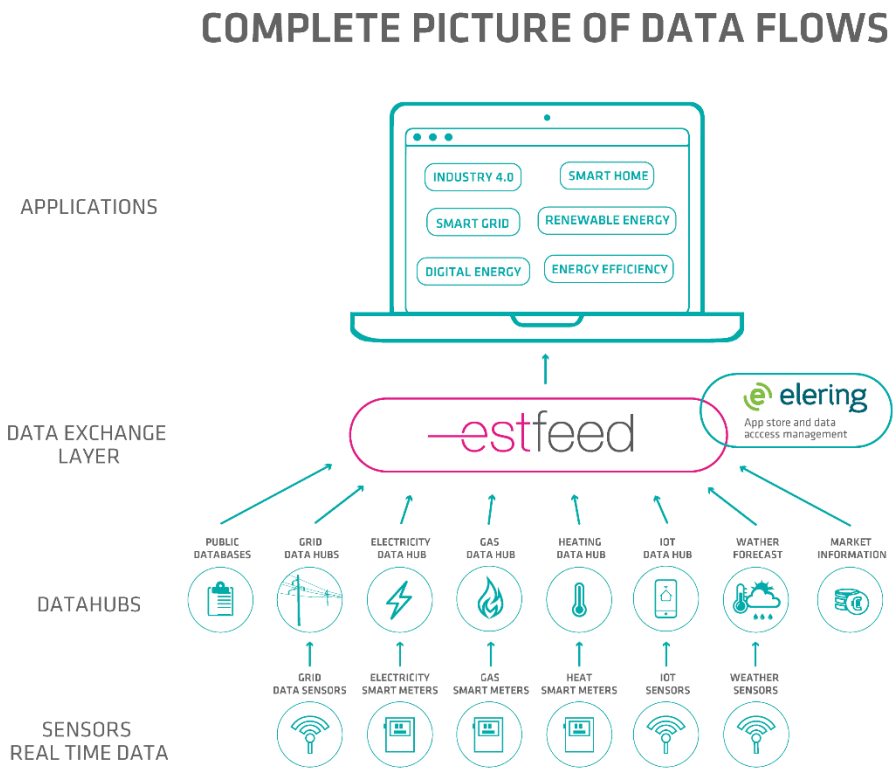

Figure 3.5 Data movements and access rights management[212]

The Estfeed Platform will be able to integrate different data sources (e.g. also in the future also from district heating and other remote meters and sensors) and provide suitable services to translate data into valuable information in consumption management, flexibility management, auditing and comparison. E.g. gas and electricity data warehouses connected to Estfeed, Business Register, Population Register, Foreca weather information, ENTSO-E Transparency platform for electricity pricing.

Nii transmission system operator (Elering AS) as well as the largest distribution system operator (Elektrilevi OÜ) are also engaged in development projects to facilitate the uptake of flexibility services in the Estonian electricity system (e.g. H2020 project EU-SysFlex; Introduction of a single market for balancing services in the Baltic States as of 1 January 2018). Flexibility has also created the need for a project such as INTERRFACE (ongoing project), the main objective of which is increased coordination between TSOs and DSOs in order to facilitate the procurement of services at both transmission and distribution levels, in order to enable more efficient and effective network management and increase demand response levels and renewable energy generation, in order to also enable final customers to become active market participants. In 2020, the OneNet project was launched with the development of a TSO-DSO coordination platform to optimise flexibility under the leadership of Elering.[213]

Baltic system operators plan to start the frequency reserve market in 2024. In the market for Baltic Frequency Reserves, spectrum reserves are jointly procured with the three Baltic States. In order to ensure that each country has access to the quantity of frequency reserves they need, a certain amount of

[212] Elering AS. Estfeed. https://elering.ee/elektrituru-kasiraamat/6-kauplemine-avatud-elektriturul/64-tarkvork-ja-andmevahetus-avatud-0
[213] https://elering.ee/paindlikkusturg

transmission capacity is also reserved for spectrum reserves on routes between the Baltic States. More specifically, the Elering website[214] and the Frequency Reserve Market Road Map[215].

The Estfeed platform shall also reflect the measurement data of the gas system (e.elering.ee). On the platform, consumers can see themselves and mandate gas sellers to see gas consumption data. In the case of remotely readable measuring devices, the data reach the platform once a day, for on-site meters once a month. Given that by 2020 all gas measurement points have to be equipped with meters that allow remote reading, all consumers will be able to see their gas consumption in real time as of 2021.

iii. Where applicable, measures to ensure non-discriminatory participation of renewable energy, demand response and storage, including through aggregation, in all energy markets

The Electricity Market Act prohibits discrimination between market participants. At the request of a customer, a producer, a line holder or another system operator in its catchment area, a system operator shall be required to connect to the network at the connection point an appropriate electrical installation in its catchment area and to change consumption or generation conditions.[107] As of 20 February 2018, aggregators will be able to contract with the system operator (Elering AS) for the provision[216]of a regulatory service, which means that aggregators can participate in the electricity market on the same basis as other market participants. As regards independent aggregators and energy storage, the regulation was supplemented in accordance with Directive 2019/944 on the EU internal market for electricity. The conditions for participation in demand response are developed by the Competition Authority in cooperation with market participants and the results are published on its website. If necessary, the MEAC supplements the regulation.

Under the Natural Gas Act, the system operator has the obligation to ensure third-party access to the transmission system as provided for in Regulation (EC) No 715/2009.

Elering is developing competence to assess the capacity of the existing gas pipeline to transfer to a limited extent hydrogen and biomethane. Biomethane can already be transferred to the existing gas system today, provided that it complies with the network gas quality standard and is injected into the transmission network at the correct pressure. Limited capacity for hydrogen transfer requires more in-depth analysis, as hydrogen differs significantly from methane in terms of chemical properties. In addition, Elering is exploring the necessary and possible creation of a clean hydrogen transmission pipeline with a view to contributing to Estonia's and the European Union's climate policy objectives and to supporting the competitiveness of the Estonian economy. More specifically in the Estonian Gas Transmission Network Development Plan 2023-2032[217] and Chapter 2.4.2 prepared by Elering.

Estonia supports the uptake of green hydrogen in the transport sector and as a feedstock for the chemical industry. The action will contribute to the launch of the hydrogen market.

[214] https://elering.ee/sagedusreservide-turg
[215] https://elering.ee/sites/default/files/2022-10/Baltic_Balancing_Roadmap_update_19102022_0.pdf
[216] Elering AS. The regulatory market. https://elering.ee/reguleerimisturg
[217] https://elering.ee/sites/default/files/2023-03/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202023-2032_0.pdf

iv. Policies and measures to protect consumers, especially vulnerable and, where applicable, energy poor consumers, and to improve the competitiveness and contestability of the retail energy market

Consumer protection is ensured in Estonia in conjunction with the Consumer Protection Act[218], the Electricity Market Act[107], the District Heating Act and the Natural Gas Act. Monitoring and dispute resolution related to the electricity market and the gas market are shared between several agencies. The Consumer Protection and Technical Regulatory Authority deals with matters relating to contractual conditions and monitors the advertising and sales activities of electricity and gas companies. On the basis of the Electricity Market Act, the District Heating Act and the Natural Gas Act, the Competition Authority supervises the functioning of the market and the activities of market participants. The Technical Surveillance Authority shall deal with matters relating to electrical safety and metering.

The Consumer Protection Act provides that the consumer has the right to:

a) require and receive goods or services that meet the requirements, are safe for the life, health and property of the consumer and are not prohibited from possessing and using them;
b) obtain the necessary and truthful information about the goods and services offered in order to make an informed choice and timely information on the risks associated with the good or service;
c) receive information on consumer law and consumption;
d) receive advice and assistance in the event of a breach of consumer rights;
e) claim compensation for the material and non-material damage suffered;
f) seek to take their interests into account and be represented through their associations and associations in the decision-making process that shapes consumer policy.

Thus, the Consumer Protection Act lays down general requirements which are specified in a specific Act (Electricity Market Act, District Heating Act and Natural Gas Act).

Under Section 90 of the Electricity Market Act, between 1 October and 30 April, a consumer who is a natural person may not interrupt the network connection in a building or part of a building which is a dwelling and which is used as a permanent residence and is heated entirely or mainly by electricity or for the operation of a heating system consuming all or mainly a fuel used for heating purposes, the use of electricity being unavoidable before 90 days after notification.

Section 17 of the District Heating Act provides that, if the consumer has failed to pay the fee provided for in the contract concluded with the network operator, the heat supply for heating the dwelling may be interrupted during the period from 1 October to 30 April only after 90 days have elapsed since the date of receipt of the relevant notification and the consumer has not removed the reason for the interruption of the heat supply within that period. At any other time, the heat company must give at least 7 days' notice of the interruption caused by the debt.

Under Paragraph 26 of the Law on natural gas, if a household customer has failed to pay the fee provided for in the contract concluded with the seller and the household customer uses the gas for heating the dwelling used as usual residence, the gas supply may be interrupted between 1 October and 1 May only after 90 days have elapsed from the date of receipt of the relevant notification.

Furthermore, the competitiveness of the electricity and gas retail market is strengthened by both regulatory and IT developments (04.2019 implemented network codes, AVP developments, etc.).

Emergency measures in light of high energy prices and the COVID crisis in winter 2021-2022[219]:

- The fall in excise duties on energy carriers to alleviate theconsequencesof the COVID crisis;

[218] The Estonian Parliament. Consumer Protection Act. https://www.riigiteataja.ee/akt/TKS
[219] https://energiatalgud.ee/node/8916?category=1700

- Compensationof50 % of the fee for the service from October 2021 to2022;
- Energy price compensation for households whose income is below the at-risk-of-poverty threshold.

Crises in recent years, including Russia's war in Ukraine, have affected livelihoods and drastically pushed up electricity prices. In order to mitigate the impact of the increase in energy prices on household customers, the State developed a universal service and grants various temporary subsidies. They partially compensated household customers for electricity, gas and district heating bills issued for the energy consumed between 1 October 2022 and 31 March 2023. Subsidies are 'automatic', i.e. the energy seller reduces the unit price of electricity, gas or district heating itself in their energy bills for household consumers and invoices the volume reduced to the country.

To mitigate high energy prices, Estonia implemented a number of measures in winter 2022-2023[220], including:

- Household electricity is compensated, net of VAT, from the average monthly price of electricity in excess of 8 cents per kilowatt hour (kWh), up to 5 cents/kWh;
- The domestic gas customer is compensated by the State for 80 % of the average monthly gas price in excess of EUR 80/MWh excluding VAT, i.e. EUR 0,8264 per cubic metre. However, a maximum of 2.6 MWh (or 251.7 cubic metres) is compensated, which is the average monthly consumption of private house gas.
- Heat costs above EUR 80/MWh (excluding VAT) are compensated by 80 % for household customers for district heating similar to gas.
- Implementation ofuniversal service. As of 1 October 2022, Eesti Energia has been obliged to sell electricity to household and household customers as a universal service. A universal service will be provided to small enterprises from 1 November until the end of 2023. Household customers shall have access to the universal service from 1 October 2022 until the end of April 2026.[221] The sale of electricity to household customers and certain other groups of consumers as a universal service is a time-bound option by the State to help electricity consumers mitigate risks and mitigate the increase in electricity prices. Universal service was made possible as a result of the so-called electricity market reform, thereby obliging the state-owned company Eesti Energia to sell electricity to Estonian household consumers, some commercial consumers, local authorities and all electricity distributors as universal service from autumn 2022. Other electricity sellers may also provide their customers with electricity as a universal service and are entitled to purchase the necessary electricity from an electricity producer designated by the State. Universal service is essentially an electricity package that can be subscribed to on a voluntary basis. The final price offered to the customer consists of the cost of production of electricity, a reasonable profit for the electricity producer and the selling costs of the electricity seller.

v. Description of measures to enable and develop demand response, including measures using tariffs to support dynamic pricing222

Demand response is allowed in the regulatory market with a self-aggregated model and the introduction of the self-aggregation model to the day-ahead market is currently underway. Dynamic pricing is provided to the consumer. More specifically, the electricity market is described in Section 3.4.3(ii).

[220] https://mkm.ee/energiakulude-huvitised
[221] https://www.mkm.ee/universaalteenus#mis-on-universaaltee
[222] In accordance with Article 15(8) of Directive 2012/27/EU.

3.3.4. Energy poverty

i. If applicable, policies and measures to achieve the objectives set out in 2.4.4

Public policies related to energy poverty are covered by the Social Welfare Act[223], according to which the State supports people in need with financial assistance. The local government pays maintenance benefits to people in need, the application, calculation, award and payment of which are regulated in Section 8 of the Social Welfare Act. Section 133(5) of the Social Welfare Act, entitled 'Basis for calculating the subsistence allowance', lays down, inter alia, the housing costs to be taken into account for the calculation of the subsistence allowance (subparagraphs 5 to 8):

- the cost of thermal energy or fuel consumed for the supply of hot water;
- the cost of heat or fuel consumed for heating;
- the cost of electricity consumption;
- the cost of household gas.

In order to improve living conditions, Kredex offers the following grants to[224] individuals and apartment associations:

- support for the renovation of small residential buildings;
- support for the modernisation of heating systems in small residential buildings;
- renovation support for the association of apartments;
- home support for child-rich families:
- support for the renovation of electrical installations to a private individual or a housing association.

In January 2019, a municipal advisory unit was set up within the Social Insurance Board with the aim of ensuring, in addition to the administrative reform, the provision of social welfare assistance measures of equal and high-quality quality by local authorities to adults.

The objective of the advisory unit within the Social Security Agency since 2019 is to increase the level of government-organised support to local authorities in carrying out social welfare tasks, to harmonise and improve the quality of assistance measures and to contribute to the development of a strong primary care system for adults. It provides strategic, operational and case-by-case advice to local authorities.

In order to alleviate energy poverty that mayarise during the heating period, there are differences in the District Heating Act, the Electricity Market Act and the Natural Gas Act that significantly limit the normal interruption of energy supply. According to theDistrict Heating Act[225] and the Electricity Market Act, the energy supply may be interrupted between 1 October and 30 April only if a period of 90 days has elapsed from the date of receipt of the notification. The Natural Gas Act establishes the same principle for the period from 1 October to 1 May[226].

3.4. Dimension Research, innovation and competitiveness

i. I. Policies and measures related to the elements set out in point 2.5

Theroadmap for the focus area of the TAIE Development Plan on Smart and Sustainable Energy Solutionsprovides the basis for supporting collaborative projects between R & D institutions and companies in the clean energy transition. Support measures will open in 2023 for the implementation of the respective

[223] https://www.riigiteataja.ee/akt/130122015005?leiaKehtiv
[224] http://www.kredex.ee/toetus/
[225] District Heating Act §17(4)([1])
[226] Section 26(3)([1]) of the Natural Gas Act

cooperation projects. The actions will cover all TAIE focus areas, i.e. not only focus on smart and sustainable energy solutions. The overall objectives of the focus area "Smart and sustainable energy solutions" are to: with the support of R & D, innovation and entrepreneurship,Estonia expects energy to be climate neutral, makes energy use more efficient and resource-efficient in Estonia, and contributes to ensuring energy security.

The general starting points for R & D, formulated together with the target and stakeholders, are:

- integrated consideration of the environmental footprint for energy generation, storage and consumption technologies and solutions (from component production to disposal);
- the cascading use of bio-resources, i.e. products with higher added value are first produced;
- addressing energy production, consumption and security of supply issues from the perspective of the community, consumer behaviour and socio-economic and cultural aspects;
- interdisciplinary cooperation and combination of competences.

The substreams of R & D & I with higher potential are:

- Development of components needed for windmill erection and wind power generation, development of technologies for the maintenance of offshore wind farms (e.g. development of allveerobots), development of electronic equipment and systems (e.g. solar and wind farm management solutions)
- Development of bioenergy production (e.g. solid oxide fuel cells, development of biogas cryo-cryo-cleaning technologies at market maturity, algae-based biofuel production technology, conversion of all organic residues and waste into products through anaerobic digestion).
- Develop and pilot integrated renewable energy (solar, wind, wave, geothermal) and stored energy cooperative models and develop carbon capture and utilisation technologies.
- Development of hardware and software for novel flexicurity technologies (e.g. development of green hydrogen production technologies based on solid oxide electrolysers, which also allows for a wider use of CO2, buildings and industrial processes' energy flexibility potential, hybrid storage, pump hydro-accumulation technology or water storage).
- Studies on the flexibility of energy storage and load management in the business and public sectors, industry and households will provide a more effective picture of the needs and opportunities of flexibility technologies.
- There are a number of devices that function as energy storage devices (e.g. electric car batteries, electric water heaters, industrial intermediates, thermal mass of buildings and technical systems) and therefore system services should also be developed to control consumption and connect these devices as flexibility service providers to the electricity grid or develop community-based autonomous energy solutions.
- District-based district heating is supported by heat storage and all possible digitalised energy system developments ("stable grids") to help balance real-time production and consumption, taking into account the different energy carriers.
- Applied research on AI to integrate it more effectively in smart grids or networks with multi-energy carriers will make it possible to increase the reliability of energy systems.
- Research and development of "wise grids" technologies will help to improve the overview of processes in the energy system and data analytics.
- 'Power to X' and energy storage technologies help to improve the capacity and reliability of the electricity system.
- The development of various electronics, automation and IT systems is a prerequisite for the R & D mentioned above.

- Addressing energy storage technologies and network development issues from the perspective of the community and consumer behaviour and socio-economic and cultural aspects (contribution of social sciences and humanities).
- Creating and piloting cost-optimal, widely applied energy efficiency solutions with good replication potential.
- Development of a knowledge-based monitoring system to support the achievement of objectives.
- Research on energy use of products and services, development of components, systems and services across value chains and piloting savings opportunities.
- Development and implementation of dynamic pricing solutions for electricity, heating and cooling.
- Development of efficient renovation demonstration solutions for buildings, including the development of district cooling systems and heat recovery systems, the creation of building technology solutions for energy-saving buildings, and the creation of zero-emission building solutions.
- Smart and sustainable transport and mobility solutions (e.g. channelling traffic flows towards public transport and light traffic, autonomous and connected vehicles, smart transport infrastructure, smart solutions for people's mobility and freight transport, digitalisation and automation of logistics processes).
- Addressing the issues of making energy use more efficient and resource-efficient from the perspective of community and consumer behaviour and socio-economic and cultural aspects (the contribution of social sciences and humanities) in order to translate the planned energy saving potential into practice. It is also important that making energy use more efficient and resource efficient can save the costs of achieving climate neutrality and improve people's environment and quality of life.

The roadmap for the focus area "Digital solutions in all areas of life" has the following substreams:

- R & D for the development of the data theme
- R & D to boost the competitiveness of the cybersecurity sector
- Digital solutions to support innovation in business processes
- Science-based digital solutions for education and lifelong learning
- Sustainable digital solutions in energy, construction and transport
- R & D for the development of electronic devices and systems enabling digital solutions

Research and development (R & D) on topics related to the implementation of climate and energy policies is carried out primarily in universities (Tallinn Technical University, Tartu University, Tallinn University and Estonian University of Life Sciences), but also with the support of various consultancy firms.

During the funding period, Tallinn University of Technology, for example, manages two (theIT Centre of Excellence Excite and the Centre of Excellence for Knowledge-Based Construction ZEBE) and participates as a partner in the work of four research centres of excellence. Research centres of excellence are funded through two actions: A measure to support research centres of excellence through the Regional Development Fund, the State budget and the development of Centres of Excellence services. The actions are carried out by the Estonian Research Agency. TheCentre*of Excellence (Centre*of excellence in research) creates new ideas and innovations by bringing together different research teams. The 'New materials and advanced equipment for energy storage and conversion systems' activity of theEstonian Science Centre,run by the University ofTartu, aims at developing functional materials for environmentally friendly and sustainable energy technologies, sensory and nanoelectronics. The activities of the Centre of Excellence are supported by the European Union Regional Development Fund. The Centre of Excellence Working Groups work together to develop in a complex manner a wide spectrum of energy sources, storages and converters, design and synthesis the materials and components necessary for this purpose, and study

their physical, chemical and technological properties, compile and test laboratory and small series prototypes of energy sources. The more general objective is to develop know-how in advanced materials and equipment for an innovative society and to prepare a frame for innovative energy and material technologies[227].

The following studies related to climate neutrality have been carried out for policy-making in recent years:

•Estonia's transition to a carbon-neutral heating and cooling economy by 2050
•Analysis and proposals for the launch of the energy storage market
•Spatial and legal analysis of Hiiu maritime space (commissioned with the Ministry of Finance)
•Analysis of the construction of wind farms on deposits and minerals perspectives and ranges (separate work in the North-Eastern, Central Estonia and West-Estonian regions)
•Wind farms survey (2021)
•Sensitivity survey of citizens, businesses and municipalities on energy efficiency
•Preliminary evaluation of the Estonian geoenergy potential and overview of available technologies, expert opinion for using these technologies in the Estonian (2021)

Estonia has been an active user of the Technical Support Instrument for policy-making and reform implementation of the European Commission[228], including studies related to the transition to a climate-neutral energy economy funded by TSI:

- Gas decarbonisation pathways for Estonia (Pan-Baltic, Finland, ongoing study)
- Options for transitioning to a climate neutral electricity production in Estonia
- Support to the renovation wave – energy efficiency pathways and energy saving obligation in Estonia
- Development of a Sustainable Finance Roadmap for Estonia

Other activities include the Local Government Workshops programme "Climate Change and Energy Management in Local Government" in 2022.

Additional opportunities for climate and energy projects are the pan-European LIFE programme supporting climate and energy projects[229] and the European Union Innovation Fund supporting the deployment of innovative technologies[230].

In order to support the green transition in enterprises, Decree No 208 of the Minister of Education and Research of 30 June 2022 lays down the conditions for granting support for investment 1 'Green skills to support the green transition of enterprises' of the RRF reform 'Green transition of enterprises'. The objective of the support is to create flexible learning opportunities in business that are responsive to the development of the labour market, and to provide learning for the green transition.

The action plan of Estonia's 2035 strategy envisages the introduction of new solutions to encourage business R & D and innovation, including:

- Consolidation and development of existing innovation services and support (market monitoring of new technologies, advice on e.g. intellectual property, new business models, etc., engagement with creative competences, support for participation in strategic value chains in the EU, provision of support services supporting the legitimate use of artificial intelligence or other data-driven services)

[227] Centres of excellence (Tallinn Technical University.ee)

[228] TSI projects in Estonia Estonia (europa.eu)

[229] | Environment Investment Centre, a pan-European LIFE programme to support environment and climate projects (k.ee)

[230] Introduction of innovative technologies | Environmental Investment Centre (kic.ee)

- Development of knowledge-intensive start-ups (ecosystem services with emphasis on knowledge-intensive entrepreneurship, access to venture capital)
- Restructuring of support to enterprises for applied research (including in cooperation with other countries)
- Increasing investment in R & D by state enterprises (as part of State ownership policy)
- New technological solutions and advice to implement the digital and green transitions in the business sector (support for digitalisation and automation (including robots), development of a coherent system for advising businesses to support their awareness and capacity in areas related to the green transition)
- Ensuring cooperation on TA between TA institutions and businesses in key focus areas for Estonia's and its regions' economies (digital solutions in all areas of life, health technologies and services, valorisation of local resources, smart and sustainable energy solutions)
- Designing a regulatory framework conducive to the uptake of new technologies (e.g. cyclists, autonomous cars, drones) and business models (platform, digital, real-time) and TA
- Diversifying and facilitating access to finance for businesses (including for companies operating in areas away from centres of attraction and for investments reducing the environmental footprint of companies)
- Making Estonia one of the world's centres of attraction for a safe digital economy, where it is good to create and provide digital services to the world
- Development of a voluntary national carbon market framework to encourage companies to contribute to climate objectives
- Legislation supporting the green transition
- Encouraging responsible business conduct
- Developing and strengthening banking and capital markets
- Developing a regional business environment in cooperation with local authorities
- Creation of incentive mechanisms to increase the take-up interest that supports developments at local level

The long-term strategy for the renovation of buildings will be implemented through activities with the LIFE IP[231] BUILDEST project partner for 7 years, including the creation of new digital and technological solutions and demo projects, taking into account the principles of climate adaptation and circular economy, creating and raising awareness.

The project will contribute to TA in all its activities, the activities to be implemented:

a. Detailed mapping of the situation; analysis of obstacles, opportunities and impacts; the development of policies and measures and the development of new ones;
b. Further development of technical solutions and development of new ones (factory reconstruction);
C. Pilot renovation in different building types and innovative ways (e.g. neighbourhood learning laboratory);
D. Solutions to ensure that the built environment is resilient to a changing climate (e.g. stronger winds – loads on boundaries, more precipitation – flood risk, etc.);
e. Solutions to minimise the generation of waste during the Estonian Renovation Wave and to renovate in an environmentally responsible manner (construction waste = resource);

[231] Research and development programme LIFE IP BUILDEST – starter for building renovation Marathon | Ministry of Economic Affairs and Communications (mkm.ee)

F. Smart solutions and digital tools to enhance the implementation of a long-term renovation strategy (e-construction platform – building log book – EHR, renovation passport);
g. Increasing renovation capacity and market demand (including expert training)

Impacts of the project:

- Building owners can use financial and building technical information and solutions to renovate their house completely.
- The financing measures for the implementation of the REKS are in place, the processes are efficient and convenient for market participants, and the rules are clear. The measures developed take account of socio-economic and regional differences.
- Standardised renovation solutions will create a more climate-proof and environmentally friendly building stock
- Construction companies carrying out renovations have taken on board sustainable and climate-proofing technologies
- The authorities responsible for the implementation of the REKS have the necessary instructions, databases, digital tools in place.

ii. Where relevant, cooperation with other Member States in this area, including information on how the objectives and policies of the SET-Plan are reflected in the national context, as appropriate.

Cooperation between industry and R & D institutions is being developed through the focus areas of the TAIE Development Plan. Cooperation with other Member States takes place, for example, through the Clean Energy Transition Partnership, where Estonian researchers have actively participated in the first round of applications.

Estonia is actively cooperating with other countries in the development of research in the field in the framework of the European Horizon research partnerships. Both the Estonian Research Agency and the MKM are members of the consortium of donors to the Clean Energy Transition (CET) Partnership. The partnership will co-organise an annual call for proposals in 2022-2027 and co-finance the best collaborative research projects from different countries. The CET partnership is closely linked to the priority setting of the SET-Plan and also monitors them in shaping the content of its calls for proposals. In addition, both organisations are also funding the DUT Partnership, where one of the sub-themes is the "positive energy regions".

It is important for Estonia to support innovation and green technologies in $_{carbon}$ capture (CC), storage (CCS) and use (CCU) technologies in line with the Do No Significant Harm and Taxonomy principles. We also see a need for greater clarity on CCS and CCUS accounting methodology, etc., which should also be supported by the negotiated regulation of carbon removal certification.

iii. If applicable, financing measures in this area at national level, including EU support and the use of EU funds

Public funding for R & D in the energy sector has increased in recent years:

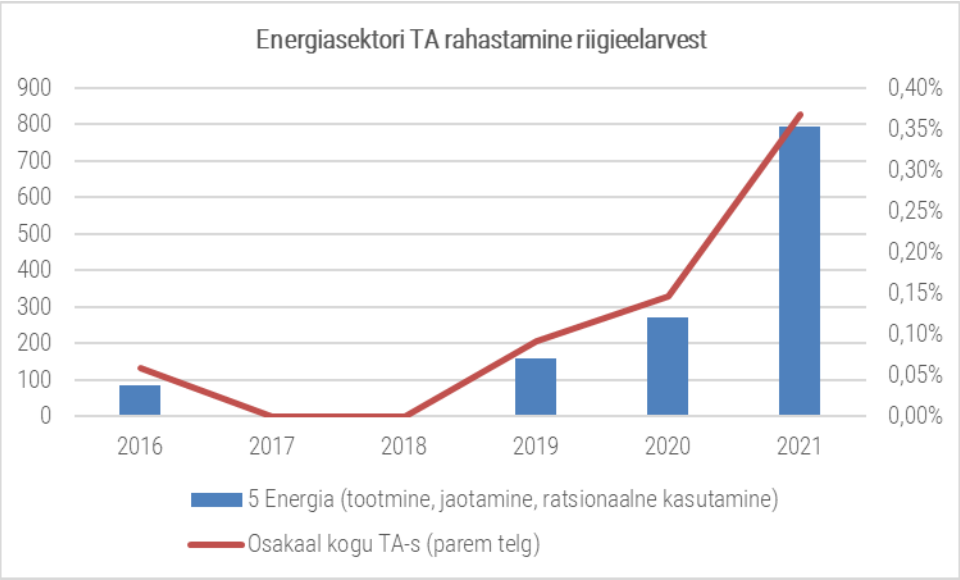

Figure 3.6 Financing of energy R & D (R & D) from the State budget[232].

At the same time, expenditure on TA by companies in the energy sector has decreased:

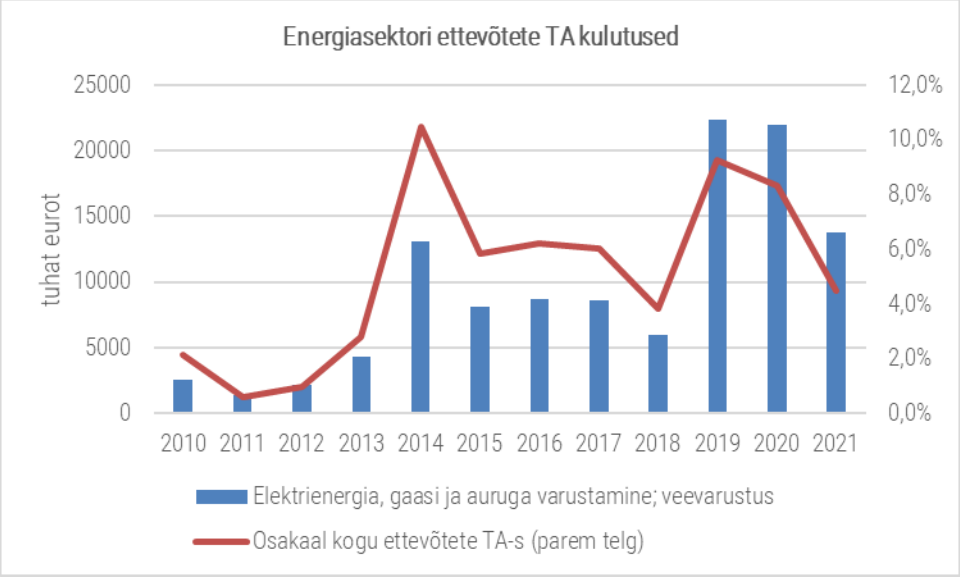

Figure 3.7 Energy industry R & D expenditure[233].

The financing measures are organised through the following implementing bodies:

<u>Enterprise and Innovation Foundation</u>
- Applied research programme (RUP)
- Development and innovation window
- Support for product development
- Business development programme
- Supportfor innovation-promoting procurement
- Raising awareness and capacity of R & D & I companies

<u>Measures planned by the Estonian Research Agency</u>
- Thematic TA programmes

Support measure for centres of excellence
- Centres of Excellence and Research Infrastructure Services Action
- National TA capacity action (RITA+)
- Institutional Knowledge Transfer Capacity Action (ASTRA+)

[232] TD054: Socio-economic objective | socio-economic objective (NABS 2007) and Year www.stat.ee
[233] TD024: Corporate SERVICES AND development in the business sector www.stat.ee

•Inter-sectoral mobility, including knowledge transfer doctorate (SekMo)
•Its action for international scientific cooperation and mobility (Mobilitas++)

The Environmental Investment Centre and the Ministry of the Environment have a support scheme for green technology start-ups under the Recovery and Resilience Facility (RRF) at its launch. It consists of two parts:

The Development Accelerators Programme in five focus areas2. The call for proposals for start-ups to support the development of prototypes and piloting of technologies.

From next year to 2026, five different development accelerators will be carried out in Estonia, targeting different focus areas and helping start-ups to develop green technologies, from the scaling up to the investor-ready start-up.

Accelerators include topics such as material science, resource valorisation, reduction of chemical use, energy and mobility. Accelerators are generally a development programme lasting several months, where the accelerator helps start-ups in the technological development of their product or service and train them on business issues, as well as mapping potential sources of funding and improving the skills needed to raise money. The speeds approach the development needs of start-ups as personally as possible, with experts playing an important role, providing practical advice and supporting the journey. One important value of the accelerator is the network.

Acall for applications for start-ups is planned to be opened in the second half of 2023[234].

Data related to research projects can be found in the[235]Estonian Research Information System.Estonia has been successful in applying for EU Horizon 2020 energy R & D funding. In the field of energy, several dozens of projects funded by Horizon 2020 will involve Estonian partners in 2020[236].

In recent years, the volume of projects financed has been as follows:

Horizon2020 funding of EUR 8,5 million, including EUR 5 million provided by an additional Green Deal call

2021-2022 11 Horizon Framework Programme projects worth EUR 6.7 million and 2 Clean Hydrogen Partnerships (1+ 3 partners) with a total of EUR 1.2 million

2023-2024 CET partnership EUR 0.45 million (if all three applications submitted by Estonia were to be successful)

Next generation of buildings, energy sufficiency approach, heat pumps, smart usage of waste heat, 5th generation district heating and cooling, offshore wind energy hubs, stability of transmission grids, approach of hard to reach energy users, electrical vehicles in distribution system, in exchanges of doctoral students and researchers and drafted reports on “Heat Pump Potential in Baltic States” and “Baltic-Nordic Roadmap for Co-operation on Clean Energy Technology”[237].

[234] Development services for green technology start-ups | Environmental Investment Centre (k.ee)
[235] Estonian Scientific Information System (etis.ee)
[236] Successful projects Successful projects (etag.ee)
[237] The Joint Baltic-Nordic Energy Research Programme – Nordic Energy Research

SECTION B: ANALYTICAL BASIS[238]

4. THE CURRENT SITUATION AND PROJECTIONS OF EXISTING POLICIES AND MEASURES[239, 240]

4.1. Projected evolution of main exogenous factors influencing energy system and GHG emission developments

i. Macroeconomic forecasts (GDP and population growth).

Estonia's gross domestic product decreased by 0.3 % in 2022 compared to 2021. The table below shows the population data used for greenhouse gas projections and the actual GDP growth rate for the period 2025-2050.

Table 4.1 Estimates of Estonian population and GDP growth

Parameter	2025	2030	2035	2040	2045	2050
Population, million people	1,32	1,31	1,30	1,29	1,28	1,27
GDP growth, real growth rate %[241]	2,5	1,64	1,475	1,41	1,371	1,26

ii. Sectorial changes expected to impact the energy system and GHG emissions

The main changes affecting greenhouse gas emissions between 2021 and 2030 are:

- changes in oil shale energy. Old oil shale power plants are depleted or subject to environmental constraints that provide for the closure of oil shale blocks. Shale oil producers are expected to be the largest users of oil shale. The shift from oil production and fuel production to chemical products will reduce CO2 emissions in the industrial sectors using oil shale.
- increased use of renewable energy (wind and solar) by electricity producers;
- a major source of greenhouse gas emissions in the transport sector is the deployment of less emitting means and modes of transport.

[238] See Part 2 for a detailed list of parameters and variables to be reported in Section B of the Plan.
[239] Current situation shall reflect the date of submission of the national plan (or latest available date). Existing policies and measures encompass implemented and adopted policies and measures. Adopted policies and measures are policies and measures that have been formally decided by the government by the date of submission of the national plan and are firmly committed to implementation. Implemented policies and measures are policies and measures which, at the date of submission of the national plan or progress report, meet one or more of the following conditions: directly applicable Union or national legislation is in force, one or more voluntary agreements are in place, financial resources have been allocated, human resources are involved.
[240] The selection of exogenous factors may be based on the assumptions made in the EU Reference Scenario 2016 or other subsequent policy scenarios for the same variables. Besides, Member States specific results of the EU Reference Scenario 2016 as well as results of subsequent policy scenarios may also be a useful source of information when developing national projections with existing policies and measures and impact assessments.
[241] Real GDP growth rate (09/09/2022): Ministry of Finance, https://www.rahandusministeerium.ee/et/riigieelarve-ja-majandus/majandusprognoosid

iii. Global energy trends, international fossil fuel price, EU ETS$_{CO2}$price.

Global energy trends

According to the **World Energy Council's Energy Sustainability Index, Estonia shared 9 out of 127 countries with Slovenia in 2022**, the first being Sweden[242]. COVID and the war in Ukraine make domestic energy security and independence a new global reality. A rapid and fair energy transition is a complex challenge in the current context of mistrust, fragmentation and polarisation. The transition to decarbonisation technologies is overshadowed by climate adaptation and the circular economy, the sustainability of financial systems and the reduction of market volatility are critical[243]. In order to ensure energy sustainability, Estonia needs to ensure that it is prepared to respond to different geopolitical situations and international agreements affecting energy security. The European Green Deal, adopted to tackle the negative effects of climate change, transforms the EU into a modern, resource-efficient and competitive economy, ensuring that:

- net greenhouse gas emissions would be zero by 2050;
- that economic growth is decoupled from resource use;
- No one or no region is left behind.

In the context of the energy crisis, Els came to 2022. In 2009, the REPowerEU initiative aims to:

- save energy;
- produce energy green;
- diversifying energy sources.

International price of fossil fuels

Estonia uses the fossil fuel price projections recommended by the European Commission in the energy models applied to produce the greenhouse gas projections presented in this document.

Table 4.2 Prices of fossil fuels used in the design[244].

International Fuel prices, EUR/GJ	2020 (base year)	2025	2030	2035	2040	2045	2050
Oil	6,4	15,4	15,4	15,4	16,3	17,6	19,7
Gas (NCV)	3,1	13,2	11,3	11,3	11,3	11,3	11,3
Coal	1,6	3,06	3,10	3,13	3,33	3,50	3,66

EU greenhouse gas emission allowance trading system$_{CO2}$price

The carbon price of the EU greenhouse gas emission allowance trading scheme has gradually increased in$_{recent}$years. As of the end of May 2023, the auctioning price of the EU ETS allowances is EUR 79.79/tCO_2, but has also increased in some cases to close to EUR 100 per tonne. There are a number of different reasons

[242] World Energy Trilemma Index | 2022 | World Energy Council

[243] Press Release: World Energy Pulse Survey reveals National Security Interests And Green Technology Arms Race considered Greatest Obstacles To Energy Transition Progress | World Energy Council

[244]This is a document transmitted by the Commission by e-mail with the name: COM Recommendations for MS projections_ (Meeting_260422)

behind the price increase. Another important reason was the 'Fit for 55' package proposed by the European Commission in 2021, which proposed the modernisation or adoption of various regulations that would contribute to the European Union's greenhouse gas reduction target of at least 55 % greenhouse gas emission reductions by 2030 compared to 1990 levels, as set out in the European Union Climate Law. Amendments to the EU ETS Directive were also published in May 2023, with the EU ETS aiming to reduce emissions from the sectors covered by the EU ETS by 62 % compared to 2005. Moreover, the price is affected by Russia's war of aggression against Ukraine and the associated energy crisis. While international agencies, as well as the European Union, predict price increases in the longer term, prices are expected to remain relatively stable in the short term until 2030, at an average level of EUR 80-90.

The figure below shows the European Commission's proposed estimate$_{of}$the EU ETS CO2 price up to 2050, which Estonia has used to produce the greenhouse gas projections presented in this document in the energy models applied.

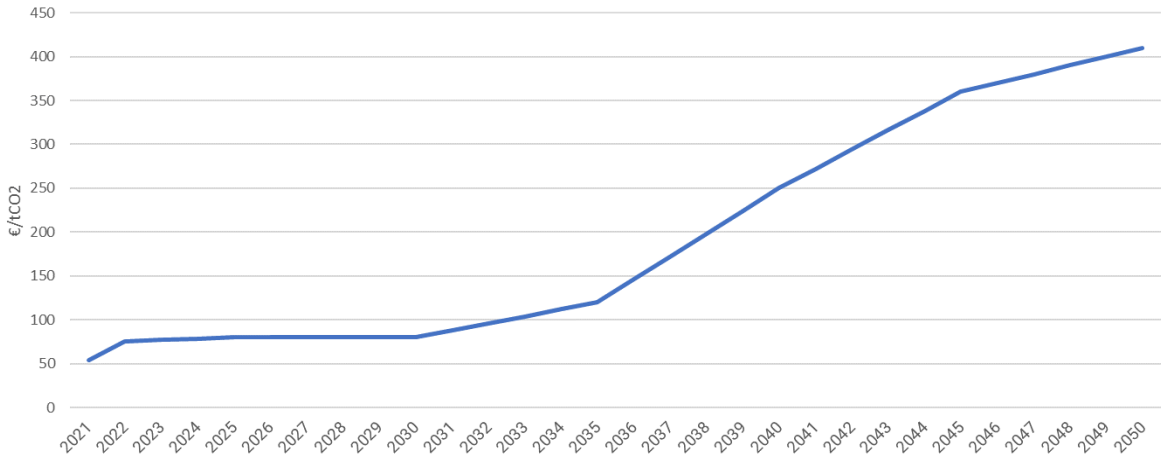

Figure 4.1: EU ETS CO2 price$_{forecast}$ 2021-2050 (Source: European Commission)

As an overall trend in electricity generation, the share of renewable generation capacity such as wind, solar and biomass can be predicted in the future, depending on the depreciation of technologies and the EU ETS allowance price.

The proposed trajectory for the EU ETS allowance price is set out in the current scope of the EU ETS (electricity, industry, centralised heat, maritime transport and aviation) until 2030, corresponding to a legally binding climate target of -55 %. The short-term values for 2022-2025 are estimated to be in line with the projected trajectory for international fuel prices and the value for 2030 is in line with the assumption of the EU ETS allowance price in the ETS impact assessment for the period 2026-2030. Price projections beyond 2030 are based on the assumption of EU climate neutrality.

4.2. Decarbonisation dimension

4.2.1. GHG emissions and removals

i. Trends and sinks of current greenhouse gas emissions into the EU Emissions Trading System (ETS) and trends from effort sharing and land use and forestry sectors as well as across different energy sectors.

In 2021, Estonia's total GHG emissions were 12.6 million t CO_2 eq. (excluding net emissions from the land use, land use change and forestry (LULUCF) sector) and 15.5 million t CO2 eq.$_{\text{together with}}$ net emissions from the LULUCF sector. Between 1990 and 2021, greenhouse gas emissions (including LULUCF) decreased by 57.6 %. The main reasons for this decline were the transition from the planned economy to the market economy and the successful implementation of the necessary reforms.

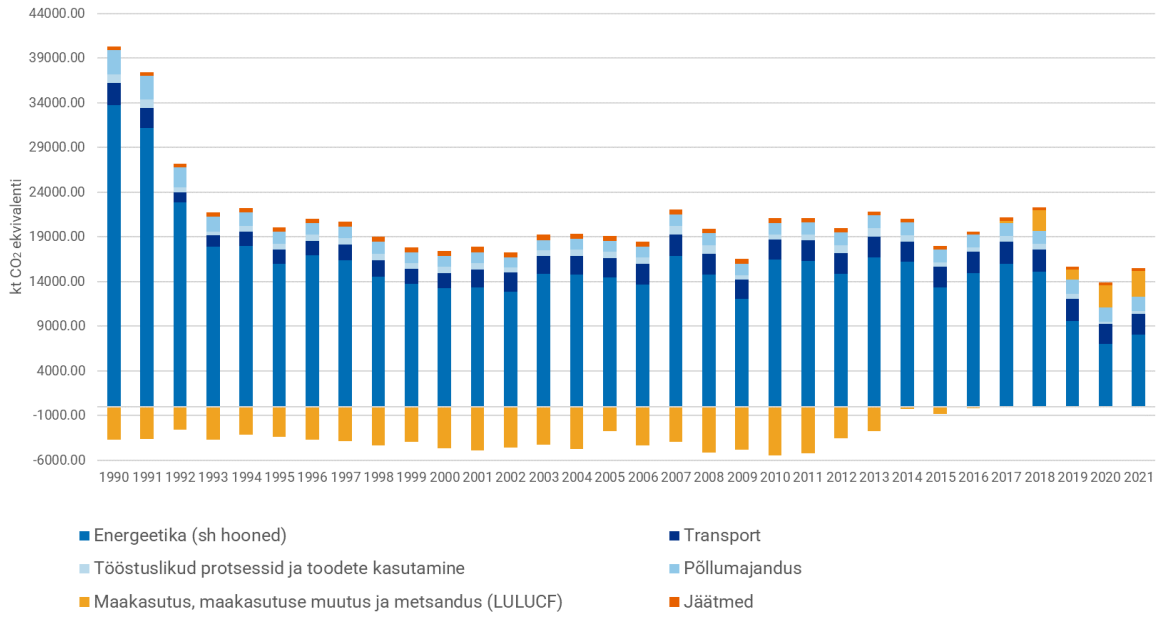

Figure 4.2 Emissions and removals of Estonian GHGs by sector 1990-2 021 kt CO_2 eq. (Source: Greenhouse gas Emissions Inventory 1990-2021, 2023[245])

In the context of the greenhouse gas inventory, the transport sector is reported as a sub-category in the energy sector, but for the sake of clarity, emissions from the transport sector from the energy sector are shown separately in Figure 4.2. The energy sector (excluding transport) is by far the largest source of GHG emissions in Estonia. In 2021, it accounted for 52 % of Estonia's total GHG emissions (including LULUCF). The LULUCF sector was the second largest source of emissions in 2021 at 19 %, followed by transport at 15 %, while the agricultural sector accounted for 10 % of total emissions in 2021. Emissions from waste and from industrial processes and the use of products accounted for 2.05 % and 1.91 % of total emissions, respectively.

[245] Estonian greenhouse gas emissions inventory 1990-2021: https://envir.ee/media/9350/download

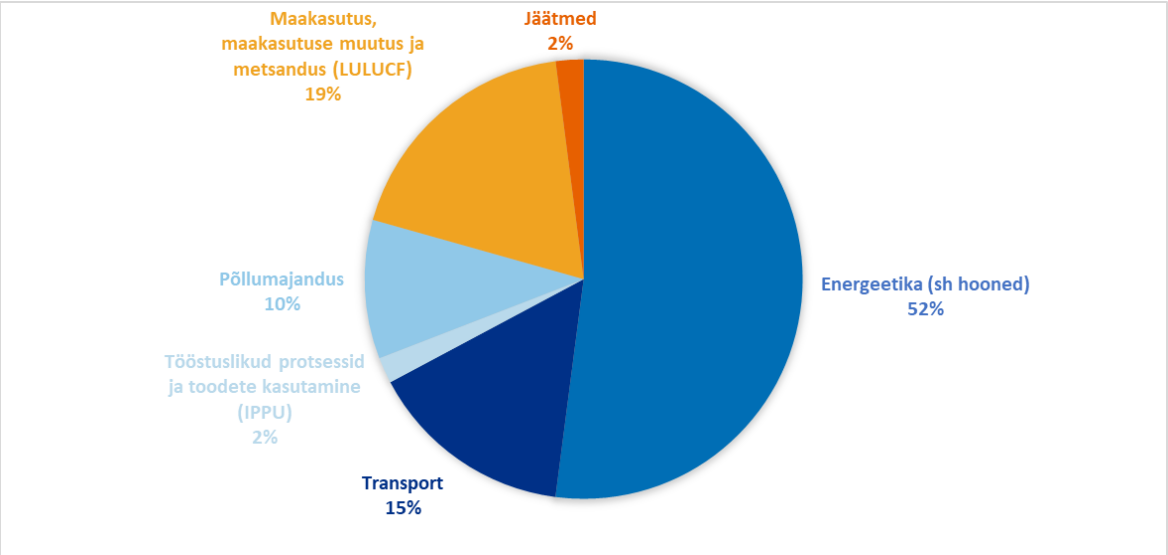

Figure 4.3 GHG emissions by sector in 2021, % (Source: Greenhouse gas Emissions Inventory 1990-2021, 2023[246])

Greenhouse gas trends in the European Union Emissions Trading System

In 2021, the EU accounted for 99.1 % of ETS emissions and only 0.1 % of emissions from industrial processes and the use of products. CO2 emissions from industrial processes and the use$_{of}$ products have fluctuated significantly between 1990 and 2021. The decrease in 2020 compared to 2019 was due to the cessation of clinker burning in the cement industry in the first quarter of 2020. Emissions from heat and power generation in the energy sector accounted for 67.5 % of total energy emissions (excluding transport) in 2021. EstoniaFigure 4.4 Emissions from the EU ETS of will report emissions from the EU ETS for the period 2005-2021.

$CO2_{emissions}$ from the energy sector have historically varied mainly due to economic trends, energy supply structure and climate conditions. GHG emissions decreased between 1990 and 1993 as a result of major changes in the structure of the economy following the dissolution of the Soviet Union and the restoration of the independence of the Republic of Estonia. Since then, energy sector emissions have remained rather stable. In 2003, emissions increased mainly due to the export of electricity produced from oil shale. The significant increase in emissions between 2006 and 2007 is linked to overall economic growth and the decrease in emissions between 2007 and 2009 is linked to the overall recession. Since 2009, GHG emissions have been closely linked to the volume of electricity exported, mainly produced from oil shale. Greenhouse gas emissions from the energy sector decreased significantly between 2019 and 2020 due to the reduction in the use of oil shale in electricity generation, mainly due to low market prices for electricity and the high EU ETS unit price. In 2021, emissions increased due to cold winter and high electricity prices.

[246] Estonian greenhouse gas emissions inventory 1990-2021: https://envir.ee/media/9350/download

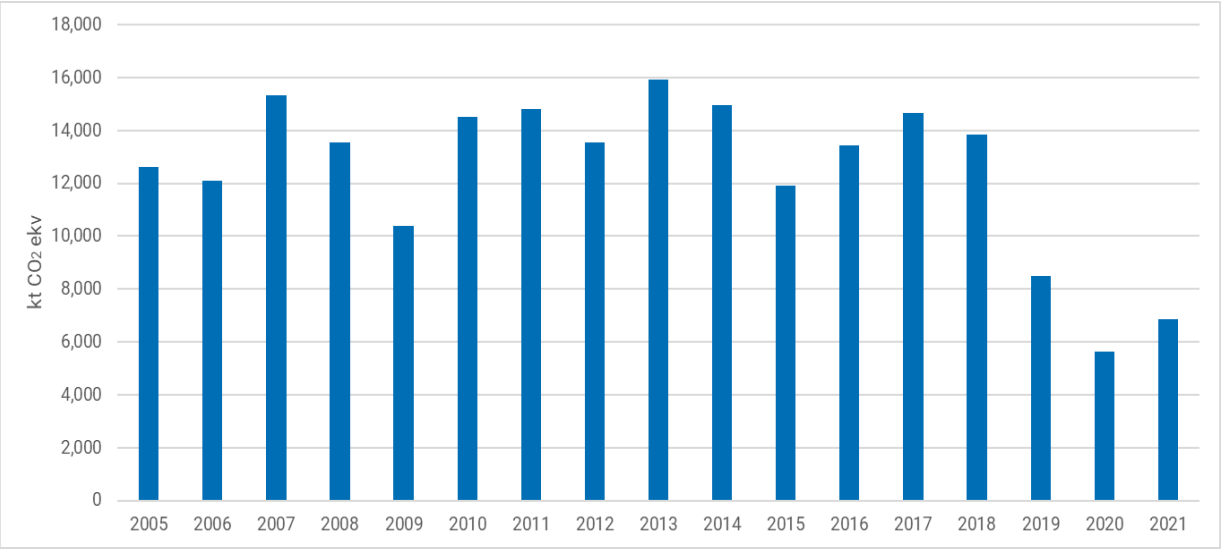

Figure 4.4 Emissions from the EU ETS of Estonia 2005-2021, tCO_2 eq. (Source: Ministry of the Environment,2023)

GHG trends in ESR sectors

The sector with the highest greenhouse gas emissions in sectors outside the ETS was the transport sector in 2021. In 2021, the transport sector accounted for 23 % of the energy sector and 40.7 % of the ESR emissions. Emissions in the transport sector have decreased by 5 % compared to 1990 and increased by 8.5 % compared to 2005.

In 2020, GHG emissions decreased in all transport sub-sectors due to internal lockdowns due to the COVID-19 pandemic and reduced fuel use in road transport. In 2021, transport emissions increased by 4.9 % year-on-year due to increased diesel consumption in road transport, increased use of aviation gasoline in domestic aviation and the lifting of lockdown measures.

Emissions from the small-scale energy sector (including buildings) accounted for 22.2 % of ESR emissions in 2021. Emissions from the manufacturing and construction sector in the energy sector have decreased by 89 % compared to 1990.

In 2021, GHG emissions from industrial processes and the use of products in the ESR scop represented 1.5 % of Estonia's total GHG emissions (including LULUCF) and 4.1 % of ESR emissions. The highest GHG emissions from industrial processes and product use within the scope of the ESR were 80.2 % of the sector's emissions (including indirect CO2)from refrigeration and air-conditioning systems.

In 2021, total GHG emissions from the agricultural sector in Estonia were 1 583.9 kt CO $2_{eq.}$, 42 % lower than in 1990. In 2021, the agricultural sector accounted for 27.5 % of ESR emissions. Since August 2014, the dairy industry has suffered a decline in production volumes as a result of the economic sanctions imposed on the EU by Russia. As a result, the number of dairy cows also decreased by 12.5 % between 2014 and 2021. Due to the spread of African swine fever in 2015, the number of pigs in Estonia has decreased by 13.9 % in 2021 compared to 2014. Since 2017, the number of pigs has been growing steadily again. The increase in livestock numbers is due to the improvement of the economic situation. To some extent, following the low pig population following the 2015 African Swine Fever outbreak, the high demand for pig meat both on the domestic market and on external markets also contributed to restoring pig meat, as pork is the most popular meat in Estonia. Compared to 2021, the abundance of pigs has decreased by 2.8 %. As the buying-in prices on the free market for pigmeat have been at least 1/3 lower than the actual production

costs, several pork producers have been forced to cease production[247]. Moreover, imported pork is cheaper to the buyer, which has led people to prefer it to domestic pork[248].

Total emissions from the waste sector have been on a downward trend in recent years. Emissions were 21.7 % lower in 2021 compared to the base year (1990). In 2021, the waste sector accounted for 5.5 % of ESR emissions. Emissions from solid waste landfilling have decreased by 17.7 % compared to the base year, emissions from incineration and bulk incineration have decreased by 76.7 % and emissions from waste water treatment and discharge by 44.4 %. Emissions from biological solid waste management have increased by 2424.1 % compared to the base year (1990).

The figure below shows Estonia's Effort Sharing Decision/Regulation emissions for the period 2013-2021.

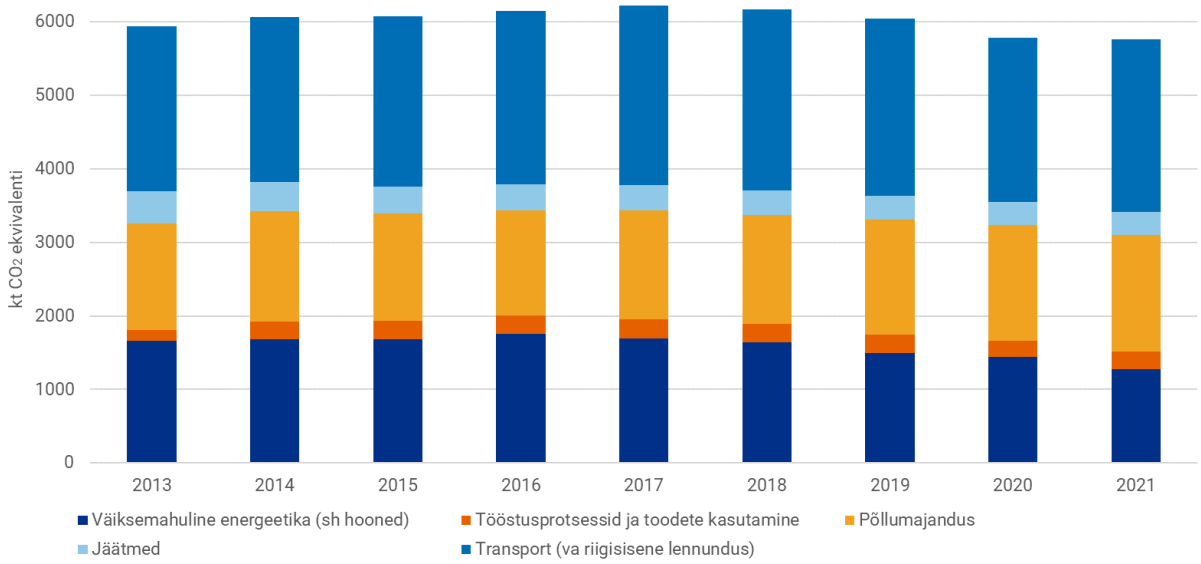

Figure 4.5 Estonia's Effort Sharing Decision/Regulation sector emissions 2013-2021, $tCO_2eq.$

Greenhouse gas trends in the LULUCF sector

The LULUCF sector is the only one where carbon sequestration is possible. In 2021, the LULUCF sector was a net emitter of greenhouse gases of 2 882.57 $kt_{CO2\ equivalent}$. Greenhouse gas emissions have increased by 14.9 % compared to the previous year. In the base year (1990) greenhouse gases were sequestrated in the LULUCF sector at 3 695.48 kt CO 2_{eq}. The only categories that absorbed carbon in 2021 were harvested wood products and, to a lesser extent, grassland. Forest land and wetlands are the highest net emissions. Greenhouse gas removals and emissions from the LULUCF sector are mainly influenced by the age structure of forests, management practices in forestry (including logging) and agriculture, the use of peat soils and horticultural peat, and carbon storage in harvested wood products.

The greenhouse gas balance of forest land depends mainly on changes in forest stock. In order to reduce year-to-year fluctuations in estimates of changes in living biomass carbon stocks, a 15-year trend is used as a method for mathematical statistics to reduce fluctuations in values. The average dead wood volumes have been calculated on the basis of 5-year measurements. Estimates of the living and dead timber stocks for the period 1990-2003 have been extrapolated using a linear trend as there is no exhaustive measurement data for these years.

[247]https://epkk.ee/statistika-toob-valja-ohusignaalid-eesti-loomakasvatuses-sealihaturu-olukord-endiselt-nukker/ (21.3.2023)
[248]https://epkk.ee/kodumaine-seakasvatus-vajab-tarbija-toetust-vastasel-korral-haabub/ (21.3.2023)

As the age structure of Estonian forests is dominated by mature stands (around 39 % of stands are over 60 years old), annual net root growth has been lower than in previous years. The relatively high harvesting rate over the last decade, the steady increase in the total share of flat, unclear areas and adolescents, as well as the stabilised forest area, have reduced the carbon sequestration of biomass in recent years.

Emissions from the wetlands category are predominantly related to peat extraction, with a smaller share coming from the soil of peat production areas and most from the use of horticultural peat. 25510 hectares of peat were extracted in 2021. The amount of peat removed for horticultural use is calculated as the difference between the total peat production and the production of heating peat (based on Statistics Estonia data). The production of horticultural peat has increased slightly since 1990, but the variability between years is high, as peat extraction is dependent on weather.

Carbon sequestration in harvested wood products is linked to harvesting volumes, and higher wood valorisation also allows more wood products to be produced.

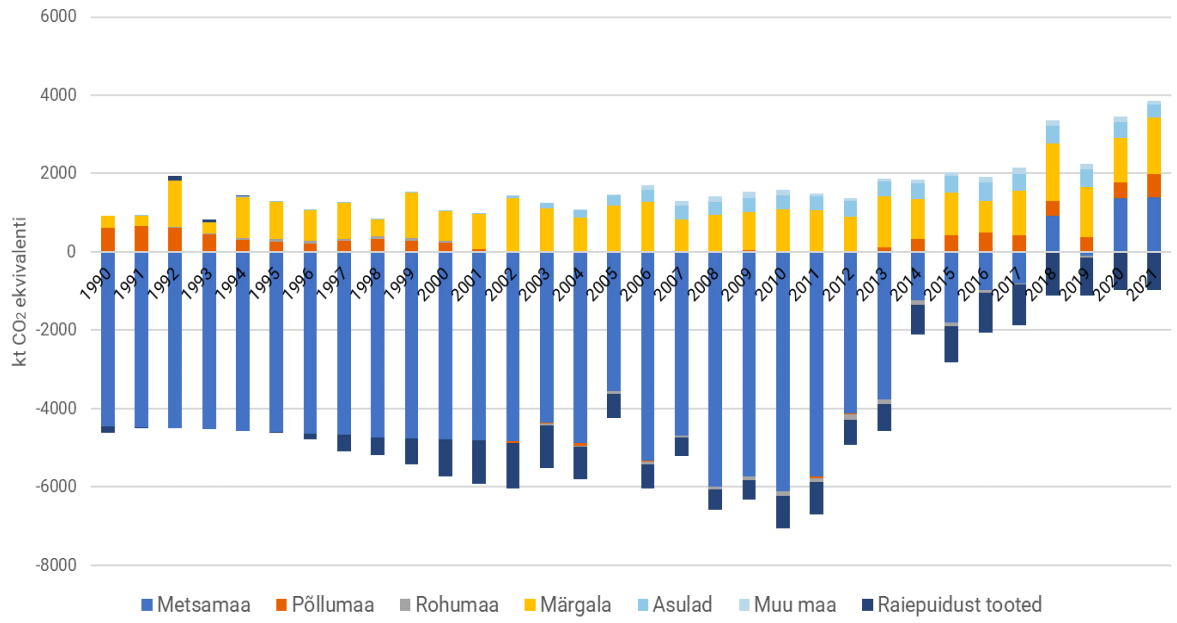

Figure 4.6 Emissions from the Estonian LULUCF sector 1990-2021, tCO_2eq

ii. Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

Projections of GHG emissions in the scenario with existing measures are presented below (i.e. projections take into account directly or indirectly the impact of measures implemented and/or adopted). The projections provided are the same as those submitted to the European Commission in March 2023 in accordance with Articles 17 and 18 of the Energy Union Governance Regulation.

Projections of GHG emissions have been calculated for 2021-2050 and 2020 was used as base year (base year).

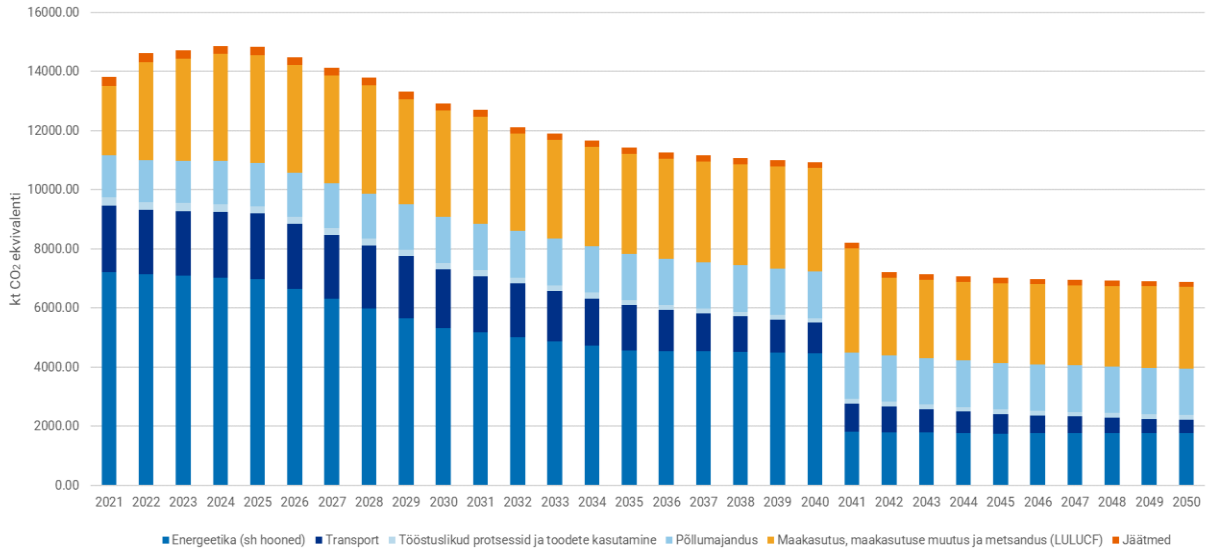

Figure 4.7 Emissions of projected GHGs and removals by sector with existing measures in scenario 2021-2 050 kt CO_2eq.

More detailed projections by sector are presented below.

Greenhouse gas projections in the energy sector

The energy sector includes GHG emissions from the consumption and production of fuels and energy (electricity and heat). In thecontext of greenhouse gas projections, the transpor sectoris reported as a sub-category of the energy sector, but for the sake of clarity, the emissions from the transport sector from the energy sector are set aside below. The energy sector also includes the following sub-sectors: energy industry, manufacturing and construction, other sectors (including business and public, housing, agriculture, forestry, fisheries and fish farming and military sub-sectors) and diffuse emissions from the natural gas distribution network.

Figure 4.8 Figure 4.8 shows the projected GHG emissions from the energy sector (excluding transport) in the scenario with existing measures, broken down by sub-sector. Emissions are projected to decrease by 75.5 % by 2050 compared to 2020. The biggest decrease occurs in the energy industry.

The largest electricity producer in Estonia is Enefit Power AS, whose assets include, inter alia, the Estonian and Baltic power plants. Both use oil shale as the main fuel. Enefit's power plants are also the largest emitters of GHG emissions in Estonia. The decrease in greenhouse gas emission projections for the energy industry in the period 2021-2050 is due to the phasing out of oil shale in the above-mentioned plants, the introduction of a more efficient Auvere power plant (live bed combustion) and the introduction of new shale oil production facilities. Based on the information provided to prepare projections, companies plan to phase out shale oil solid heat carrier technologies in their existing form, leading to a significant reduction in greenhouse gas emissions between 2040 and 2041. Greenhouse gas emissions in the energy industry sector are projected to decrease by 95.4 % by 2050 compared to 2020.

GHG emissions from manufacturing and construction are projected to be divided into iron and steel; non-ferrous metals industry; for the chemical industry; pulp, paper and printing industries; for the food industry; for the beverage and tobacco industry; non-metallic mineral and other industries) will increase by 28.3 % by 2050 compared to 2020.

Emissions from other sectors (commercial/public, residential and agricultural/forestry/fishery/farming, military) are estimated to decrease by 4.7 % by 2050 compared to 2020.

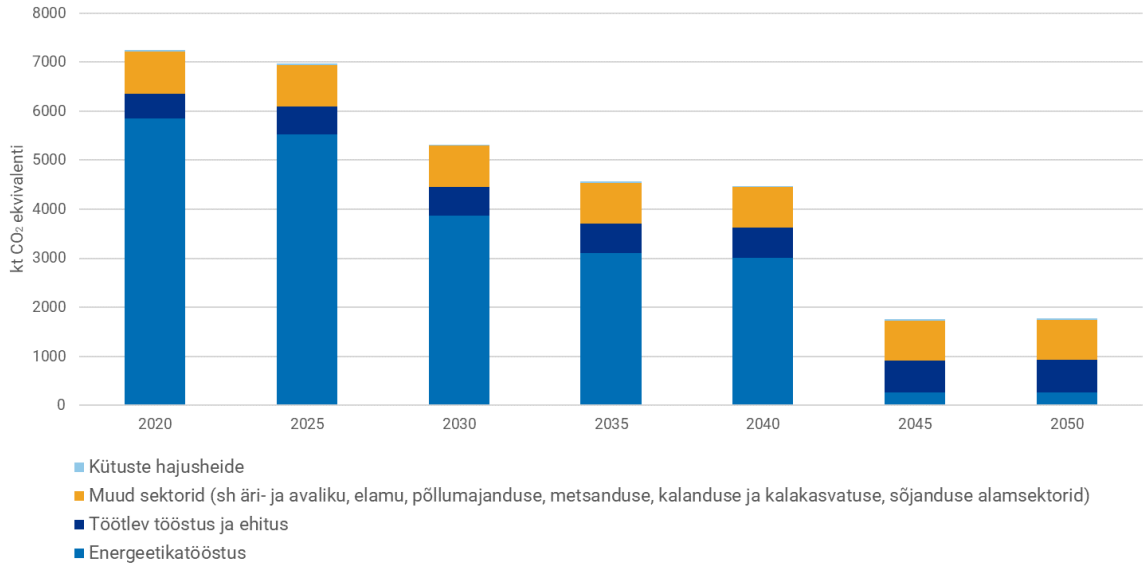

Figure 4.8 Energy GHG projections by sub-sector (excluding transport), kt CO_2 eq.

Greenhouse gas projections in the transport sector

The main share of greenhouse gas emissions from the transport sector comes from road transport. Historically, the share of GHG emissions from road transport has been over 95 % of the total GHG emissions from transport. In 2020, the share of greenhouse gas emissions from road transport was around 97.4 % of total transport greenhouse gas emissions.

Total GHG emissions from the transport sector are expected to decrease by around 80.2 % by 2050 in the scenario with existing measures compared to 2020. For the period 2018-2050, domestic aviation and rail emissions are expected to remain close to the same level. Emissions from domestic shipping and road transport are projected to decrease compared to the base year. The biggest impact on the drastic reduction in greenhouse gas emissions is the wider deployment of electric vehicles. This will be reinforced by measures to support the promotion of the use of electric vehicles and the European Commission's proposal that from 2035 all new passenger cars will have to meet the $0_{gCO\ 2/km}$criterion.

Figure 4.9 shows the projected GHG emissions from the transport sector in the scenario with existing measures, broken down by sub- sector.

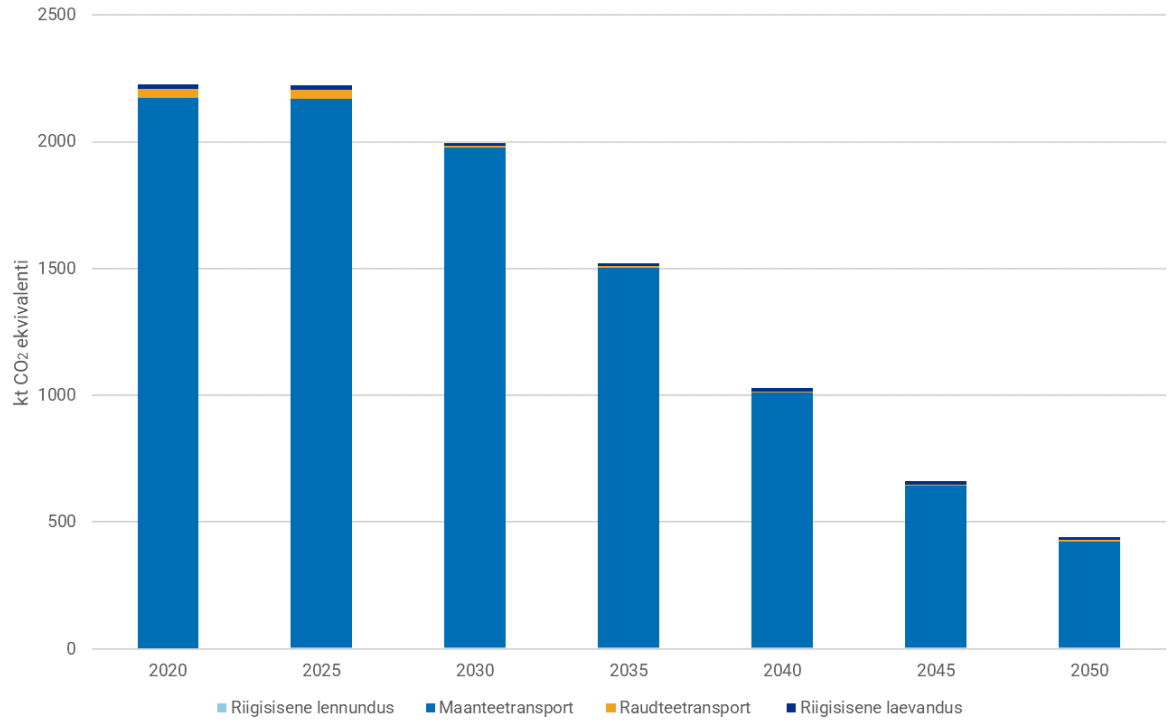

Figure 4.9 Estimates of GHG in the transport sector by sub-sector, kt CO_2 eq.

Greenhouse gas projections in the industrial processes and product use sector (so-called IPPU)

Overall emissions from the IPPU sector are projected to decrease by 45.17 % between 2020 and 2050 in the scenario with existing measures. The main decrease is due to the mineral industry (as one large plant has stopped producing cement clinker) and the use of products as substitutes for ozone depleting substances (F-gases).

Emissions from the mineral materials industry decreased already in 2020, when the cement industry stopped burning clinker in wet process kilns as it was no longer economically viable (production only took place in the first three months of 2020). The plant does not provide for the resumption of production. Other mineral industries estimate production volumes in 2025 either to remain at the same level as in 2020 or to be up to 50 % higher. Production volumes will stabilise after 2025. Nevertheless, emissions from the mineral sector are still around 5 times lower than before cement clinker production ceased.

Emissions of fluorinated greenhouse gases (substituents of ozone depleting substances) are projected to decrease by 68 % between 2020 and 2050. Most equipment containing the refrigerant R-404A (the installation and maintenance of which has been prohibited since 2020) should be decommissioned by 2035, as well as most old multi-part air conditioning and heat pump equipment. Directive 2006/40/EC will have a gradual impact on HFC emissions until 2030, when most old vehicles equipped with HFC-134a air conditioning systems should be replaced.

Figure 4.10 shows the projected GHG emissions from the industrial processes and product use sector by sub-category.

Emissions from the use of fuels and solvents for non-energy purposes are projected to increase by 17 % between 2021 and 2040. The consumption of such products depends heavily on the economic situation of many small industries and the use of solvents also depends heavily on the size of the population.

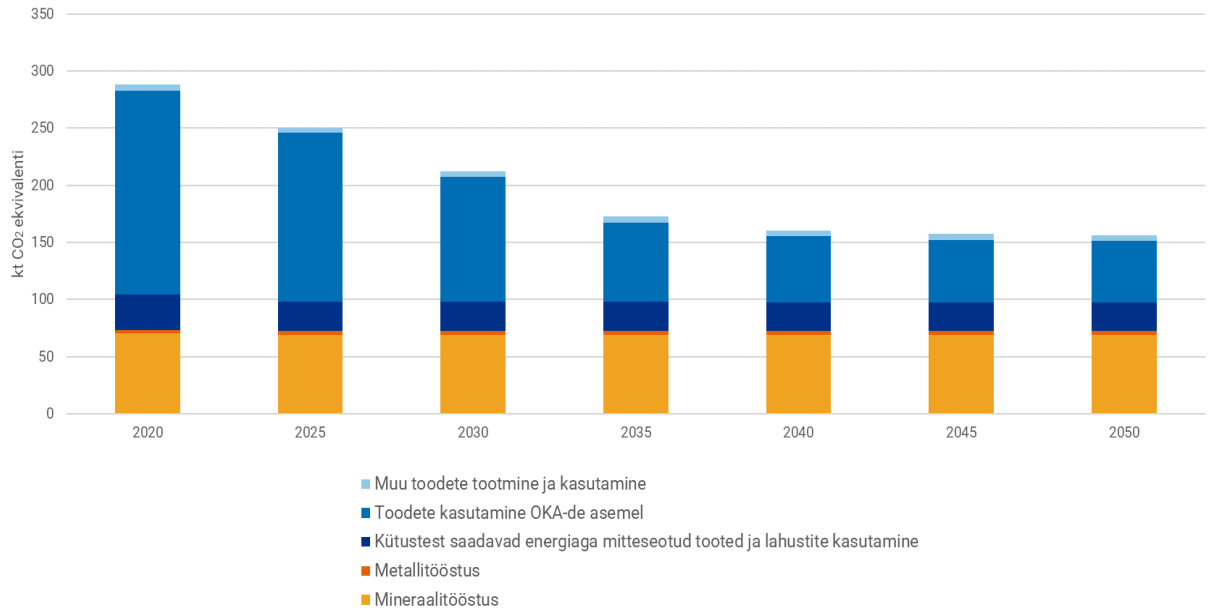

Figure 4.10 GHG projections for industrial processes and product use sector by sub-sector, kt CO_2 eq.

Greenhouse gas projections in the agricultural sector

Under the scenario with existing measures, emissions from the agricultural sector will increase by 4.5 % by 2050 compared to 2020. The growth trend in GHG emissions in the agricultural sector is due to an increase in the number of animals in the intestinal fermentation, manure management and farmland sub-sectors and the increasing milk production of the dairy herd. The increase in emissions from agricultural land is due to the predicted increase in the use of synthetic and lime fertilisers.

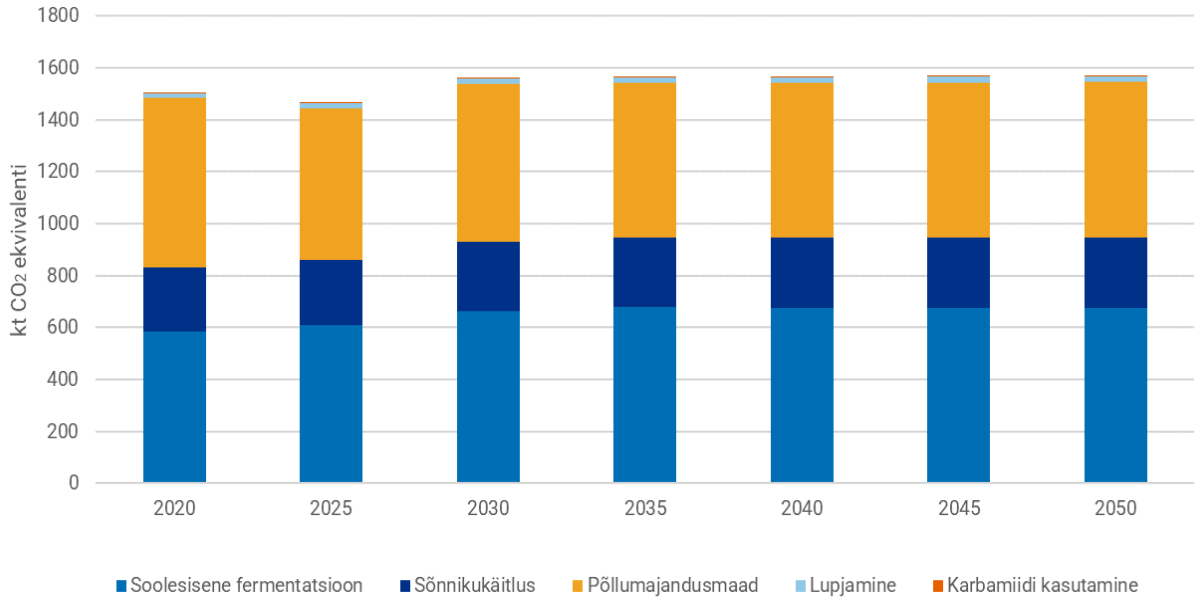

Figure 4.11 Agricultural sector GHG projections by sub-sector, kt CO_2 eq.

Greenhouse gas projections in the waste sector

Emissions in the waste sector are projected to decrease by 43.3 % by 2050 compared to 2020 in $CO2_{equivalents}$. The reduction in emissions is mainly related to the increase in the recovery and recycling of waste, the reduction in the volume of biodegradable waste landfilled and the incineration of waste in the Iru CHP plant,

as emissions are mainly generated by the disposal of solid waste. Emissions from the solid waste sub-category are projected to decrease by 83.9 % by 2050 compared to base year emissions. The increase in GHG emissions from the biological treatment of solid waste is linked to the reduction in the volume of biodegradable waste in the total volume of solid waste landfilled. The reduction in emissions from waste water treatment and discharge (11.8 % in 2050 compared to 2020) is linked to the expansion of the sewage network and the modernisation of waste water treatment systems in low population density settlements. Open incineration will end by 2030 and a marginal amount of waste will be incinerated without energy recovery, emissions will be reduced by 99.9 %.

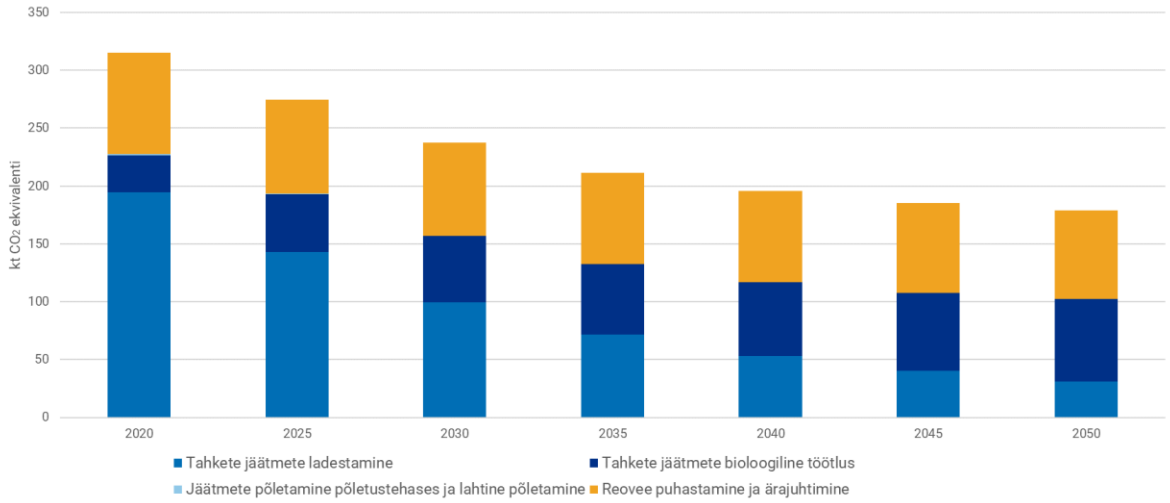

Figure 4.12 Estimates of GHG in the waste sector by sub-sector, kt CO_2 eq.

Greenhouse gas projections in the LULUCF sector

The scenario with existing measures assumes that current management practices will continue. The projections assumed that the total area of forest and arable land would remain at the 2020 level. In general, land use changes were expected to continue at the average level of 2016-2020, including deforestation linked to the restoration of legacy sites and the impact of the construction of larger known infrastructure sites such as Rail Baltic and military drills. The share of protected forests is calculated at 30.3 %, including 17.5 % under strict protection (SMI 2021).

Changes in forest cover depend mainly on the age distribution of forests and management practices, whereas changes in stock were estimated as 10-year averages. As the age structure of Estonian forests is dominated by mature stands (around 39 % of stands are over 60 years old), annual net root growth has been lower than in previous years. The relatively high volume of felling in thedecade, the steady increase in the[249] total share of open-ended areas, unknown areas and juveniles, and the stabilised forest area have reduced the carbon sequestration of biomass in recent years. In the scenario with existing measures (11.5 Mm/year), forest backup will be around 11 % lower in 2050 than at present and net issuer of forest land. The Government of the Republic of Estonia has set itself the objective that economic forests must not lose their backup and agreed that forest management and wood valorisation as a whole must ensure that the forestry sector is a carbon sink.

Most of the emissions from the wetland category come from the use of horticultural peat and peat production areas. The annual horticultural peat extraction volumes were estimated as the difference between the total peat extracted and the peat produced, and it was assumed that emissions would occur in the same year as the extraction. The long-term average annual peat production volume was calculated as

[249] Development grades Annex 3 (State Notice.ee)

an average for the period 2017-2021. As the production of peat fuel is decreasing, it was expected that all extracted peat will be used in horticulture from 2035 onwards. The area of peat production areas in active use and of disorganised residual concessions is expected to decrease linearly from 25.55 kha to 19 kha in 2026-2050; the remaining areas are expected to be rehabilitated into wetlands.

The estimates of harvested wood products are based on the projected logging scenario and the projections assumed that the shares of wood products (wood panels, chemothermo-mechanical pulp, sawn wood and paper and board) would remain at their current levels. Carbon sequestration in timber products will decrease with existing measures in a scenario. It is likely that production will become more efficient in the future and it can therefore be expected that production volumes and, consequently, carbon sequestration have been rather conservatively taken into account in such an approach.

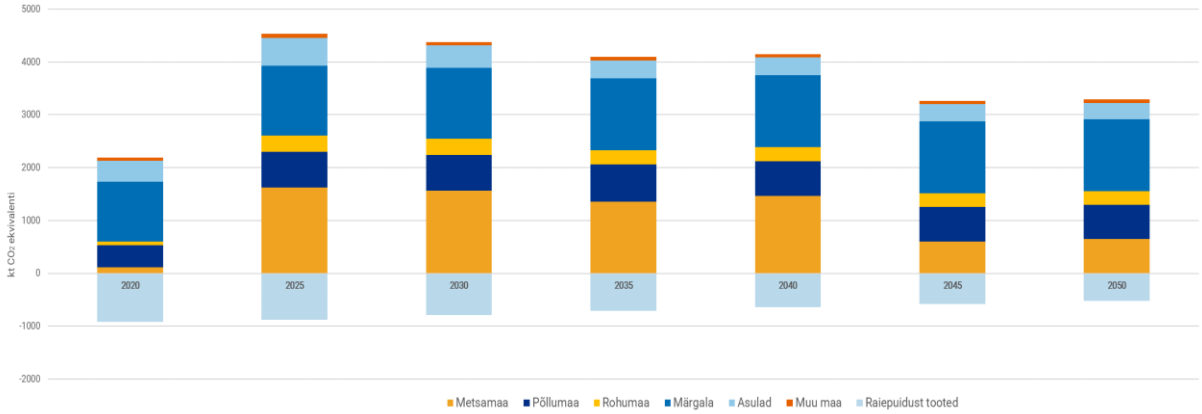

Figure 4.13 Estimates of GHG for the LULUCF sector by sub-sector, kt CO_2 eq.

**Indirect N_2O emissions from arable land (leaching) are reported in the GHG inventory as indirect emissions and therefore their emissions are not projected.*

4.2.2. Renewable

i. I. Current share of renewable energy in gross final energy consumption and in different sectors (heating and cooling, electricity and transport) as well as per technology in each of these sectors

<u>Current situation</u>

The share of renewable energy in 2021 was 38.01 % of gross energy consumption, including 29.34 % of gross electricity consumption, 61.32 % of gross heat and cooling consumption and 11.24 % of gross transport consumption, according to the Eurostat SHARES model[250].

<u>Transport sector overview by technologies:</u>

The share of renewable energy in transport was 11.2 % in 2021. Advanced biofuels together accounted for 7.43 % of the fuels released due to the mandatory inclusion of a bio-component for liquid fuel suppliers. The share of fuels in the first generation was 0.17 % of fuels released for consumption. Biomethane accounted for 4.5 % (around 168 GWh) of total gas consumption in 2021, 100 % of which was consumed in the transport sector. Renewable electricity accounted for 0.6 % of total renewable energy consumed in transport.

[250] https://ec.europa.eu/eurostat/databrowser/view/sdg_07_40/default/table?lang=en

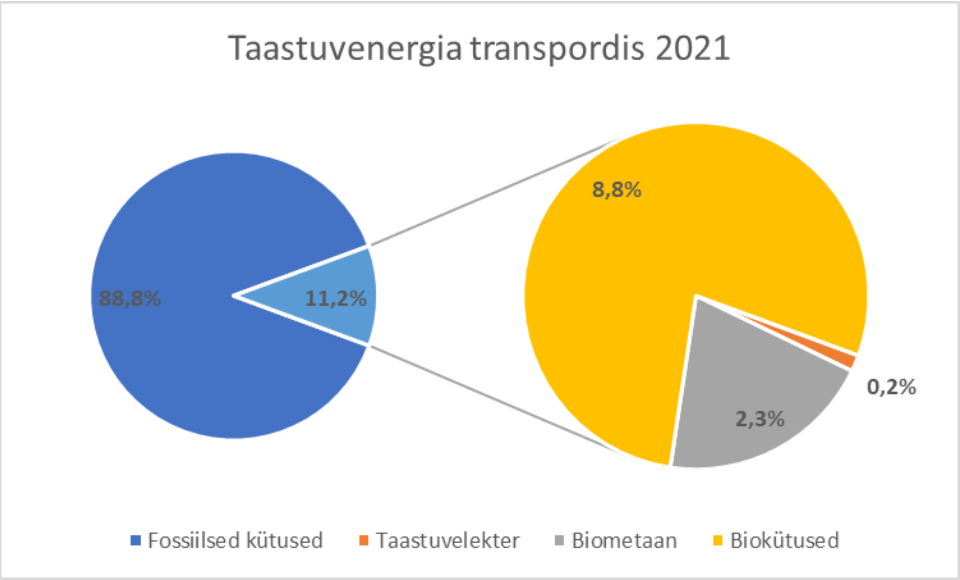

Figure 4.14 Share of renewable energy in transport in 2021

Overview of renewable electricity by technologies:

By the end of 2021, a share of 29.34 % of renewable electricity, supported by 26.7 GWh of hydropower, 730.4 GWh of wind energy, 353.5 GWh of solar energy, 1 700.3 GWh of biomass and other renewable 74.4 GWh.

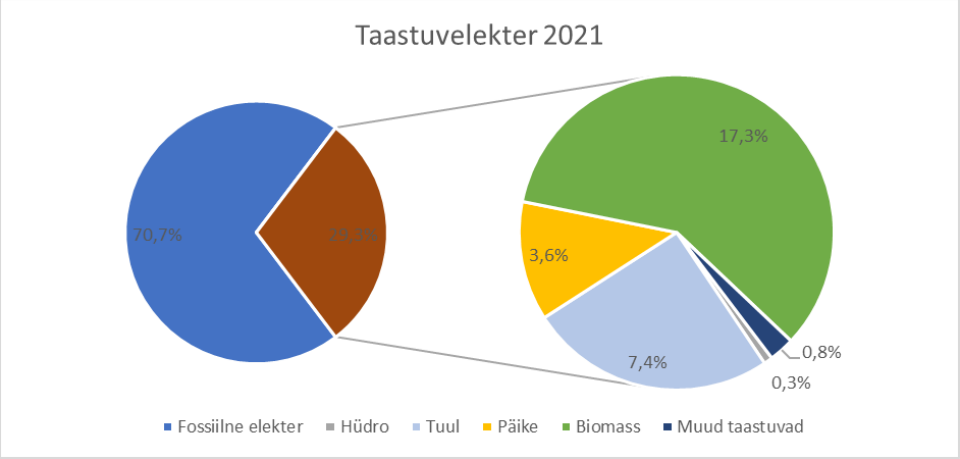

Figure 4.15 Share of renewable electricity in 2021.

Heating and cooling from renewable sources:

In 2021, the share of renewable energy in the heat economy amounted to around 61.32 % of final energy consumption from wood in the form of local heating of 4 934.6 GWh, converted heat consumption at 4 083.3 GWh and heat pumps 116.5 GWh.

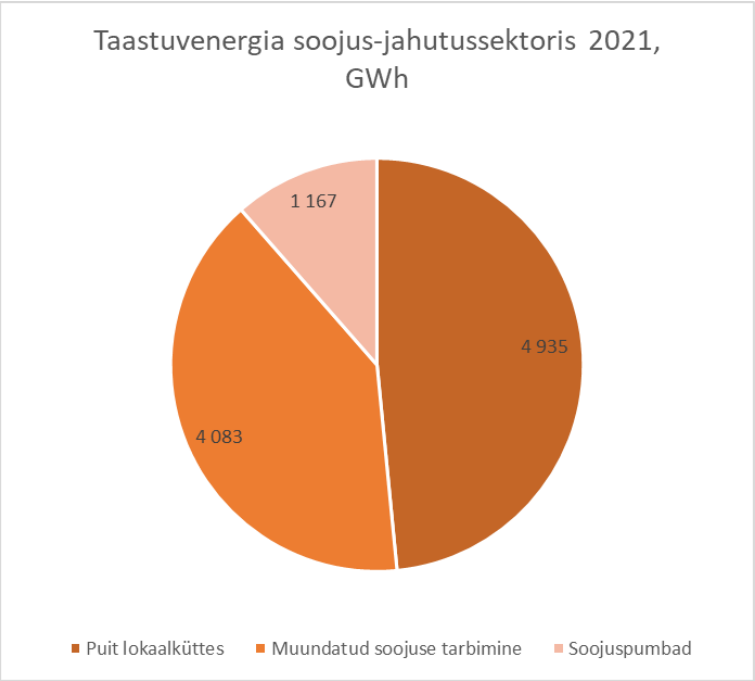

Figure 4.16 Renewable energy use in the heat-cooling sector in 2021.

Foresight

Estonia has carried out a detailed assessment of the achievement of the overall renewable energy target by 2030. According to this, the share of renewable energy in gross energy consumption in 2030 is at least 65 %[251]. By 2030, the shares of renewable energy by sector shall be as follows:

- at least 100 % of final electricity consumption
- at least 63 % of final heat consumption
- 14 % of transport consumption.

More detailed projections and analysis for the renewable electricity, transport and heat cooling sectors are described in chapter 2.1.2.

We see an additional ambition to generate renewable electricity above the share set out in the national targets. For example, the biomass energy capacity of - 0.3 TWh of additional electricity sold to the grid and 0.7 TWh of self-generated electricity will increase in the coming years. For solar energy, the national targets assume an increase in installed solar parks due to lower bids. However, the construction of rooftop panels is also growing, which also increases the potential of solar energy, but it is not known to what extent. In the case of wind energy, one alternative is the possibility to meet the targets with only onshore wind, which would mean that electricity produced as offshore wind, as shown in Table 2.4, will be placed on the export market. Overall, this means that Estonia has the potential to generate electricity above its 2030 consumption volume.

It is possible to add ambition in the heating and cooling sector. Taking into account the increase in current trends and the increase in the uptake of heat pumps and district heating, the share of renewable energy in this sector could potentially rise to 69 % by 2030 (see table and graph below). The corresponding projections have not yet been translated into the national targets, as the study on heat management with an action plan prepared by consultants has just been finalised and we will develop more precise measures on how to realistically ensure the projected share of renewable energy in the heating and cooling sector.

[251] This share is calculated taking into account the agreed statistical trade transactions for renewable energy.

Table 4.3 Renewable energy consumption in the heat economy

Renewable energy consumption in the heat economy:	10130	10344	10685	10912	11253
District heating	5 063	4 960	4 900	4 860	4 800
District heating	4 046	4 180	4 470	4 663	4953
Heat pumps	1022	1 204	1 315	1 389	1500

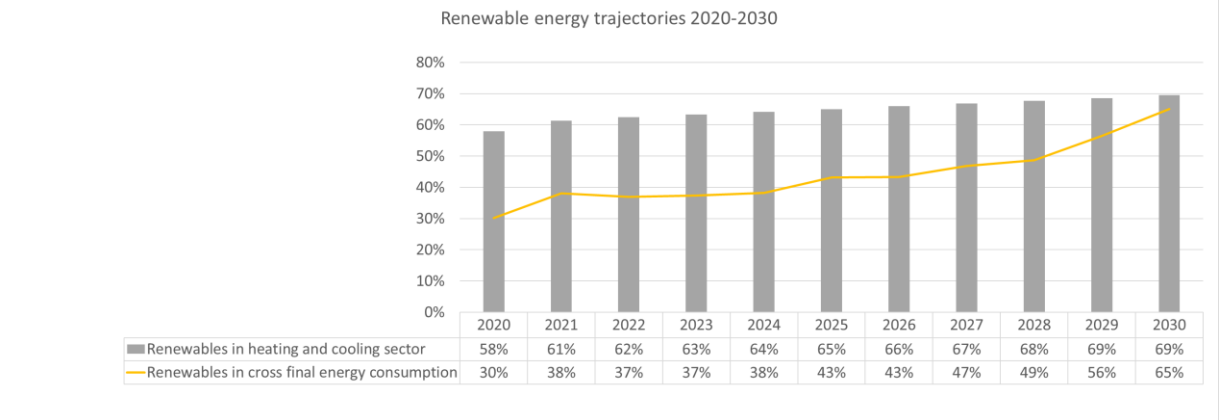

Figure 4.17 Estimates for the share of renewable energy in the heating and cooling sector.

ii. Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

The development of the renewable energy sector by 2030 and the evolutionary curves that take into account today's trends in renewable energy production and consumption are described in chapter 2.1.2. The renewable energy trajectories for 2040 shall take into account the overall climate policy objectives set by the European Union and at national level.

In the future, we can increasingly see inter-sectoral cooperation and synergies leading to increased deployment of renewable energy and energy savings, both at the level of primary energy production and at the level of secondary energy use in all sectors, in order to move towards a carbon-neutral economy.

The trends towards which the Estonian renewable energy sector is moving from 2040 perspectives depend heavily on megatrends that we can see in Europe and globally, where carbon-neutral energy production, energy savings and storage and smart consumption are keywords.

It is clear that fossil fuels are increasingly being replaced by renewable energy. Renewable energy is produced where it has the best geographical and climatic conditions, both micro (self-consumption) and at macro level. The resulting ability to see large wind and solar farms, both onshore and offshore, and on water bodies, as technology develops and prices depreciated, will no longer play an important role, e.g. sea depth (using anchored floating foundations). In order to maximise benefits and meet national targets, different countries are actively cooperating in the field of renewable energy, in the form of joint projects, support schemes and statistical trade. Due to the exponential development of storage technologies, the pump-hydroaccumulation power plant (PHAEJ), hydrogen as an energy carrier and accumulator, it is also possible to harmonise grid consumption in the 2040 perspective, as peak loads are covered by stored energy.

In order to ensure security of electricity supply in Estonia, a combination of renewable energy generation and storage (including seasonal storage) technologies, carbon capture, storage and sequestration technologies, as well as a new generation of modular nuclear reactors (expected to be decided by the

government) may be used in the future. The use of new technologies and their combinations requires extensive preliminary work in the form of research, preparation and construction.

Nuclear energy, as one of the potential options to cover Estonia's electricity needs after 2030, requires thorough political preparatory work at national level, training of suitably trained people and the establishment of a legislative base. The introduction of nuclear energy requires the creation of legislation laying down the conditions and process for the construction of a nuclear power plant in Estonia and, where necessary, the establishment of the necessary structures. At present, Estonia does not have the necessary legal framework, competent authorities and sectoral experts for the construction of nuclear power plants. According to the Radiation Act, such an activity can only be applied for after the Riigikogu has adopted a decision on the commissioning of a nuclear installation (in 2024). The roadmap for the development of nuclear infrastructure will be prepared by the Nuclear Working Group approved by the VV on 8 April 2021[252]. According to the interim report of the Nuclear Working Group, all generating installations meeting the requirements (including technical conditions for connection, environmental requirements, safety requirements, etc.) with a connection capacity of less than 350 MVA can be integrated into the Estonian electricity system. Small modular reactors in the Estonian electricity system would therefore be suitable. There is still no world practice on the experience of the construction of small reactors that are considered conditionally suitable for Estonia and the time it takes to deploy it[253].

In order to[254] find the best solution for Estonia to ensure security of electricity supply, a study was carried out in 2020-2022 to identify the roadmaps for climate-neutral electricity generation for Estonia, risk, socio-economic impact and sensitisation analyses and action plans of the different road maps. According to the risk analysis carried out in the framework of this study, Estonia is the most risky nuclear scenario. The final outcome of the study was the assessment of the most appropriate renewable energy and storage scenario for Estonia and the least suitable carbon capture and use scenario[255].

Increasingly towards energy and greener solutions on the consumption side. As a result of the renovation of the building stock, buildings are increasingly energy efficient and smarter. Buildings use energy efficient solutions, including automation and control systems for technical building systems and localised renewable energy solutions (e.g. PV panels), and use low carbon footprint solutions to produce thermal energy such as heat pumps, solar panels. Building renovations will install ventilation systems with heat recovery to ensure a high-quality indoor climate and comfortable indoor temperature. Increased deployment of technical systems, including e.g. ventilation systems and recharging infrastructure for light-duty vehicles, will lead to an increase in the consumption of certain electricity, but this will be offset by savings in heat production through energy efficiency improvements. Due to the increase in periods of higher temperatures due to climate change, the building sector is seeing an increasing need for cooling.

In the transport sector, an exponential electrification can be seen in both road and rail transport. Alternative fuels replace fossil fuels. Thanks to convenient public transport and the increased use of light roads and light means of transport, cities become essentially car-free, leading to a convenient and cleaner urban environment.

[252] Nuclear Energy Working Group | Ministry of the Environment (envir.ee)
[253] Nuclear Energy Working Group | Ministry of the Environment (envir.ee)
[254] 'Transitioning to a climate neutral electricity generation in Estonia', Trinomics - https://energiatalgud.ee/node/8924?category=1711
[255] Electricity surveys | Energy Talks

4.3. Dimension energy efficiency

i. Current primary and final energy consumption in the economy and sectors (including industry, housing, services and transport).

According to Statistics Estonia, primary energy consumption in 2021 was 193 PJ (53.5 TWh) and final energy consumption 117 PJ (32.2 TWh). The structure of final consumption is described in the figure below. Compared to the past, energy consumption in the transport sector, as well as in commercial and public services, has been steadily increasing. At the same time, household energy consumption has rather remained at similar levels over the years. Industry's energy consumption has been almost doubled in comparison between 2005 and 2021, while value added at current prices has more than doubled. The share of total value added has decreased by two percentage points[256].

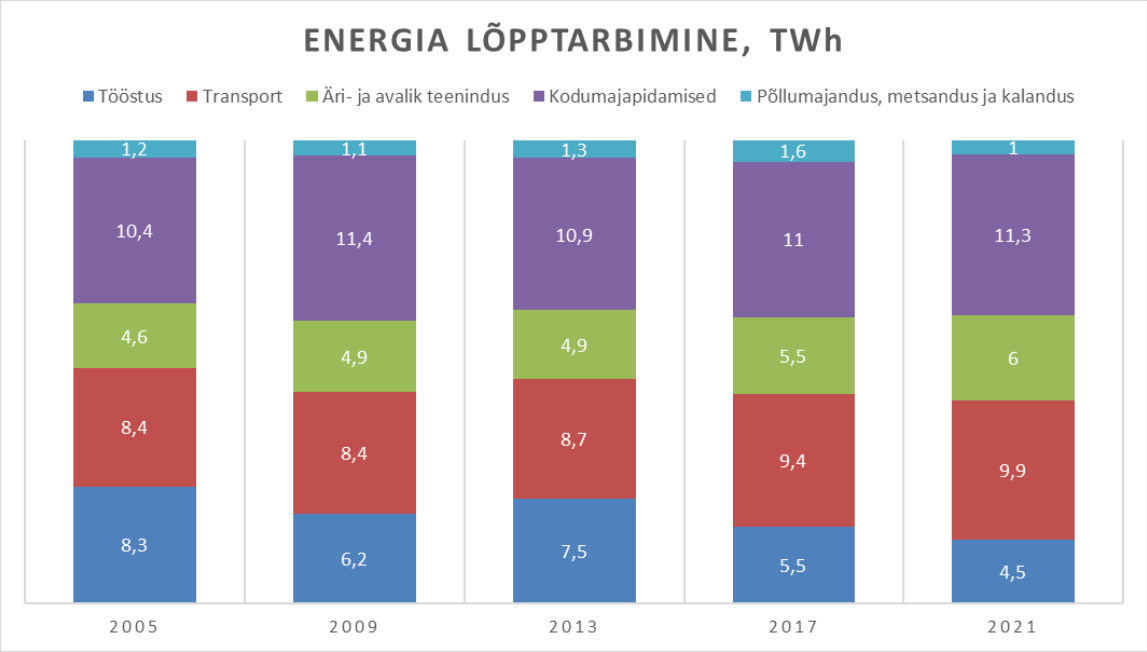

Figure 4.18 Structure of final energy consumption in Estonia 2005-2021 (Statistics Estonia's table KE024)

ii. Current potential for the use of high-efficiency cogeneration and efficient district heating and cooling[257].

In 2017, the second production plant of Tallinn Power Plant, with a thermal capacity of 76 MW, started operation. In 2019, a cogeneration plant with a thermal capacity of up to 47 MW (with an electrical capacity of 10 MW) was added to Mustamäe in Tallinn. Currently, the market for district heating is around 5 TWh and the main fuel is local wood chips, in addition to natural gas and industrial waste heat.

The district cooling sector has not been widely recognised in Estonia, but the first Estonian district cooling system was already built in Tartu in 2015 (13+ 5.4 MW), followed by district cooling plants in Pärnu (7 MW) and Tallinn (10 MW) in 2019. The current development plans have seen the city centre of Tallinn and Tartu as promising areas. In 2020, electricity produced by CHP plants accounted for 27.7 % of the total electricity produced (most of which is based on local wood chips).

The study 'Estonia's transition to a carbon-neutral heating and cooling economy by 2050' estimated cooling demand at around 700 GWh by 2030. This is mainly due to the cooling needs of commercial buildings.

[256] Statistical office data table RAA0042
[257] In accordance with Article 14(1) of Directive 2012/27/EU.

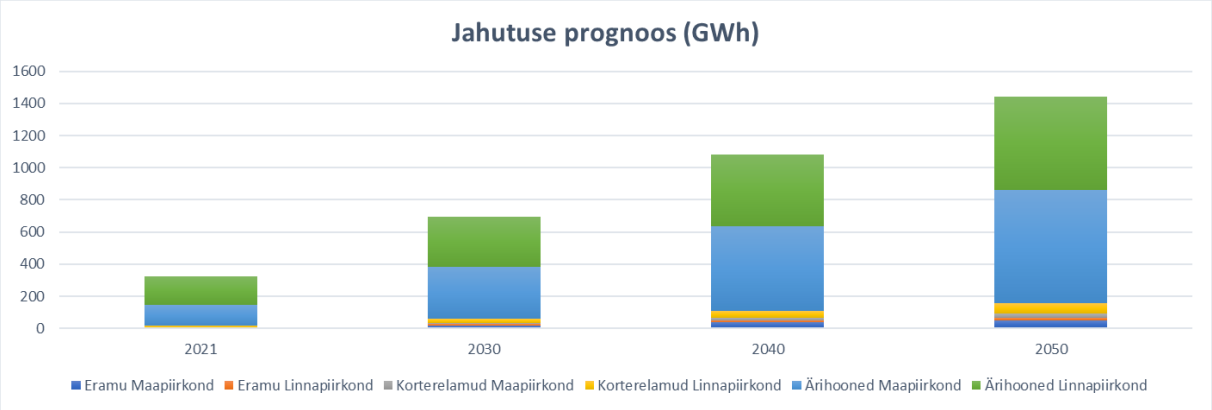

Figure 4.19 Cooling forecast 2021-2050 in Estonia. (Estonia's transition to a carbon-neutral heating and cooling economy by 2050)[258]

The cost-effectiveness of district cooling must be assessed on a regional basis according to real needs and the suitability of suitable technologies should be assessed.

iii. Projections for primary and final energy consumption in each sector until at least 2040, including 2030, taking into account existing energy efficiency policies, measures and plans referred to in point 1.2.(ii)[259].

Domestic primary energy consumption (fuels used in Estonia + imports – exports) is planned to be significantly reduced by 2030 (to 45.72 TWh/y; up to -14 % compared to the peak in recent years). Final energy consumption must remain stable at levels similar to those of the previous years (30.19 TWh/y). In terms of final consumption, no significant changes in the distribution of consumption between sectors are projected, i.e. the achievement of the primary energy consumption reduction target depends in particular on developments in the oil shale sector, domestic use of wood fuels and the use of transport fuels.

[258] Heat and cooling studies | Energies

[259] This reference business as usual projection shall be the basis for the 2030 final and primary energy consumption target which is described in 2.3 and conversion factors.

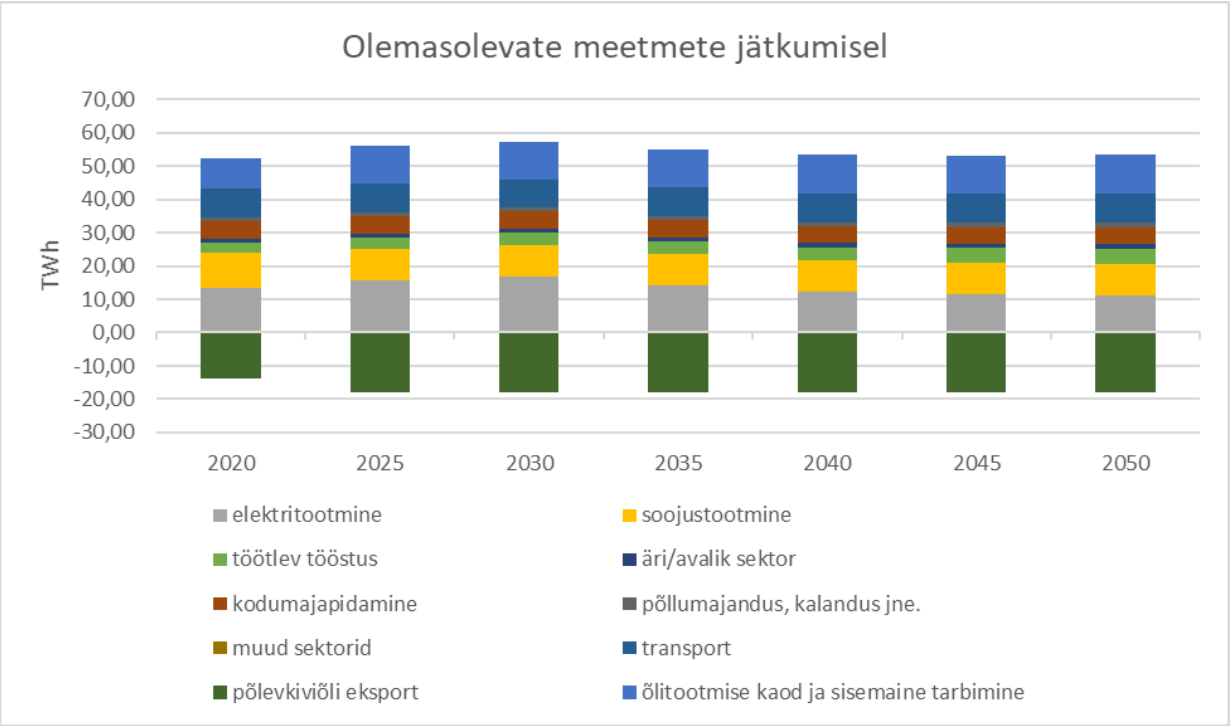

Figure 4.20 Estimates of primary energy consumption by sector up to 2050, TWh[260]

iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, in accordance with Article 5 of Directive 2010/31/EU

Cost-optimal levels of minimum energy performance requirements have been identified in the study 'Analysis of cost-optimal minimum energy performance levels in buildings' commissioned by the Ministry of Economic Affairs and Communications and finalised in 2022. The results are summarised in the tables below. The table shall also be analysed taking into account weighting factors for energy carriers, of which the weighting factor of 0.65 for renewable fuels is the most important one; 0.65 for efficient district heating; for natural gas and 2,0 for electricity.

The cost-optimal energy performance of new buildings is shown in the table below. For comparison, cost-optimal energy efficiency figures for 2011 and 2017 and a proposal to update the nearly zero-energy requirement by 2024 are included.

Table 4.4 Cost-optimal energy performance figures for new and existing buildings, unit: kWh/(m²·a)

Building	Cost-optimal kWh/(m² a)	2017 cost-optimal kWh/(m² a)	Cost-optimal kWh/ (m² a) 2022	*Narly Zero Energy in 2024 Class A kWh/(m² a)
Small residential building 100 m²	–	79	107	120
Small residential building 200 m²	140	87		
Row house	–	71	80	90
Apartment building	145	103	92	100
Office building	140	93	83	95

[260] Estonian Environmental Research Centre forecast, author's calculations, N.B. Graph WEM forecast/base scenario, or *With Existing Measures*

** Proposal for 2024*

Table 4.5 Cost-optimal energy efficiency ratios for buildings undergoing major renovations and a proposal for an update of the nearly zero-energy renovation requirement by 2024.

Building	Cost-optimal kWh/(m^2 a) 2017	2022 cost- optimal kWh/(m^2 a)	Approximate zero energy for major renovations in 2024 kWh/(m^2 a)
Small residential buildings	160	170	180
Apartment building[1]	150	125-130	135
Office building	160	140	150

[1] higher value applies to gas heating
** Proposal 2024. Year*

4.4. Dimension energy security

i. Current energy mix, domestic energy resources, import dependency, including relevant risks

Estonia's primary energy consumption structure in 2021 is characterised by the figure below (calculation based on Statistics Estonia's table KE0240).

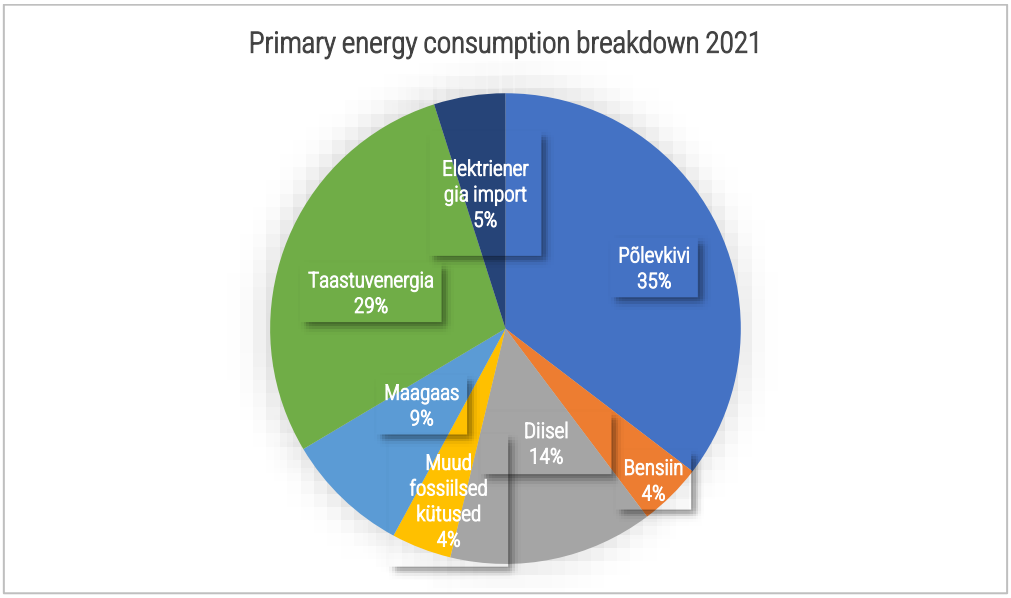

Figure 4.21 Distribution of primary energy consumption 2021 (calculation based on Statistical Office table KE0240)

The figure below shows the distribution of electricity produced from recognisable sources.

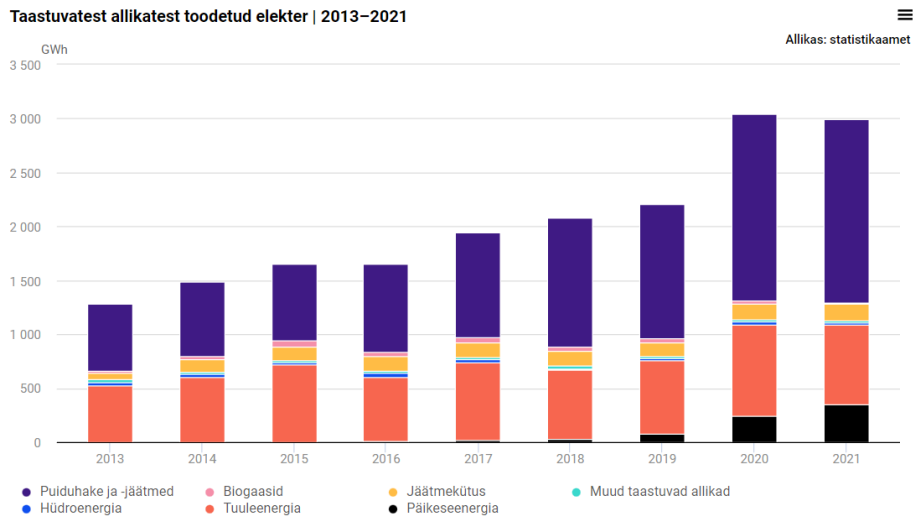

Figure 4.22 Electricity from renewable sources 2013-2021 (Statistics Estonia)

The energy dependency rate is visible in the figure below.

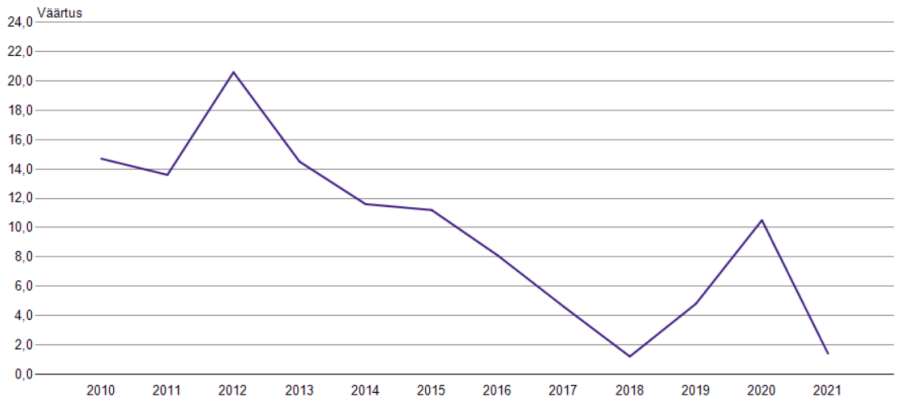

Figure 4.23 Energy dependency ratio, % (KE36 www.stat.ee)

The vast majority of Estonia's primary energy needs are met by domestic energy sources. Due to oil shale, renewable energy sources and peat, Estonia's lowest energy dependency rate in the European Union is 10.5 % in 2020 (see upper figure)[261]. However, this share is likely to decrease in the near future due to reduced competitiveness of oil shale power generation. The increase in domestic renewable energy production will mitigate the increase in the energy dependency rate.

Despite a good overall picture, all liquid motor fuels consumed in Estonia, as well as natural gas, are imported. As a result of the energy crisis and high natural gas prices, the consumption of natural gas in Estonia has decreased significantly.

ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

The structure of Estonia's primary energy consumption (fuels and imports consumed in Estonia) will change significantly in the coming decades, with the share of domestic renewable fuels increasing.

[261] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_energy_mix_and_import_dependency#EU_energy_dependency_on_Russia

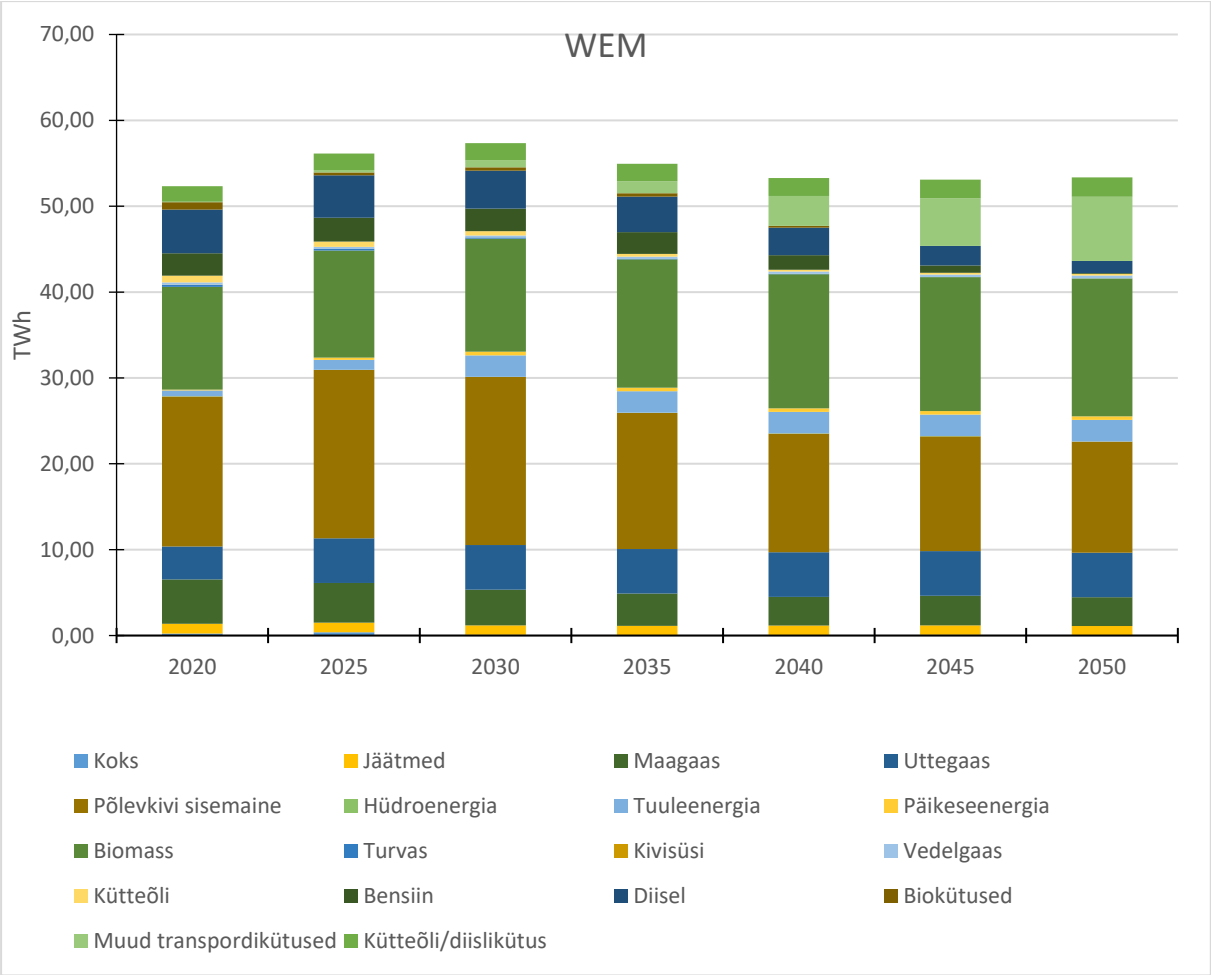

Figure 4.24 Forecast of primary energy production up to 2050(WEM forecast)[262]

4.5. Dimension Internal energy market

4.5.1. Electricity interconnectivity

i. The level of electricity interconnection and the main interconnections[263].

Electricity interconnectivity is dealt with in Chapter 2.4.1.

Existing electricity transmission infrastructure shall be addressed in the following annual analyses:

1. Elering AS. Report on security of supply of the Estonian electricity system. https://elering.ee/varustuskindluse-aruanded
2. Competition Authority. Report on the electricity and gas market in Estonia. https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded

[262] Estonian Environmental Research Centre forecast, author's calculations
[263] With reference to overviews of existing transmission infrastructure by TSOs.

ii. Projections of connectivity expansion needs (including for 2030)[264].

Electricity interconnectivity is dealt with in Chapter 2.4.1.

4.5.2. Energy transmission infrastructure

The main characteristics of the existing electricity and gas transmission infrastructure[265].In Estonia, one of the transmission system service providers (Elering AS) is the system operator. The total transmission lines owned by the TSO (110 kV to 330 kV) shall be 5 135 km and substations 156.[266][267]

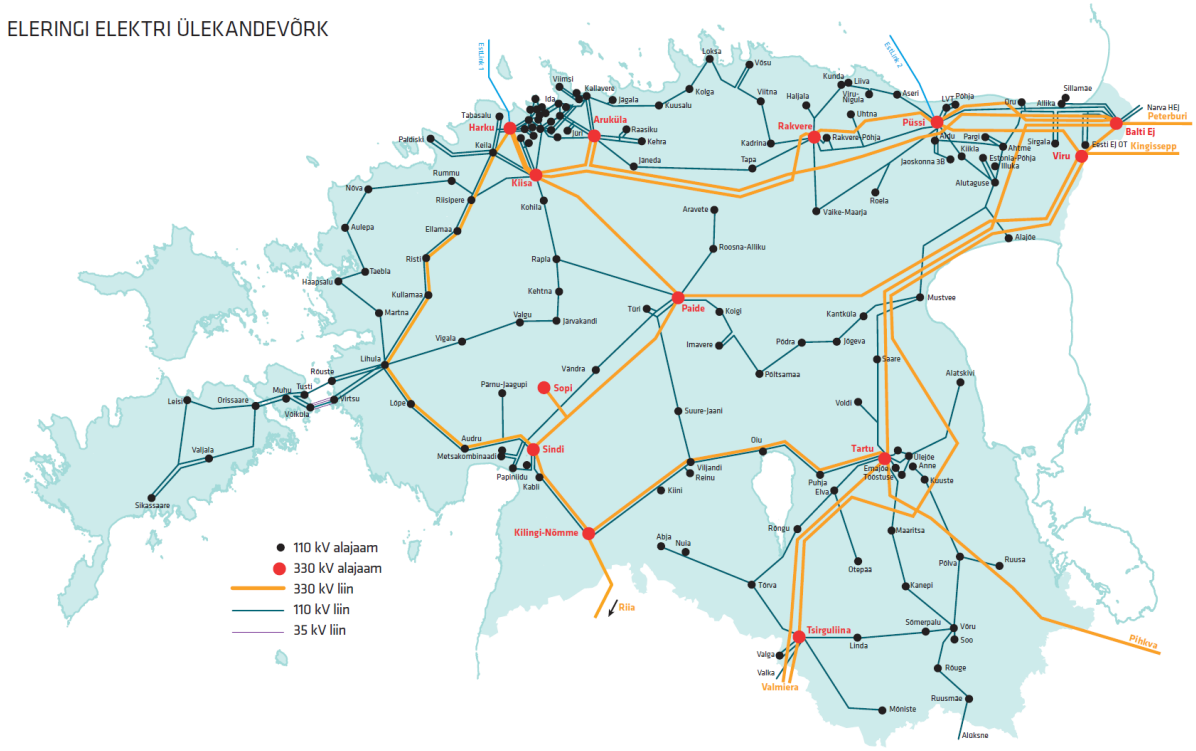

Figure 4.25 map of the Estonian electricity system[268]

Existing electricity transmission infrastructure shall be addressed in the following annual analyses:

1. Elering AS. Report on security of supply of the Estonian electricity system. https://elering.ee/varustuskindluse-aruanded
2. Competition Authority. A report on the electricity and gas markets in Estonia. https://www.konkurentsiamet.ee/et/ametist- According to the Natural Gas Act, the Estonian gas system is one of the transmission system operators, which is also the system operator. The gas system and the electricity system have one system operator, Elering AS. The Estonian gas system

[264] With reference to national network development plans and regional investment plans of TSOs.
[265] With reference to overviews of existing transmission infrastructure by TSOs.
[266] https://elering.ee/elektri-pohivorgu-kaart
[267] https://elering.ee/eleringile-kuuluvad-liinid
[268] Elering AS. Map of the Estonian core network. https://elering.ee/elektri-pohivorgu-kaart

is a dead end system – gas is injected from three entry points, but no bilateral flow from Estonia can take place.

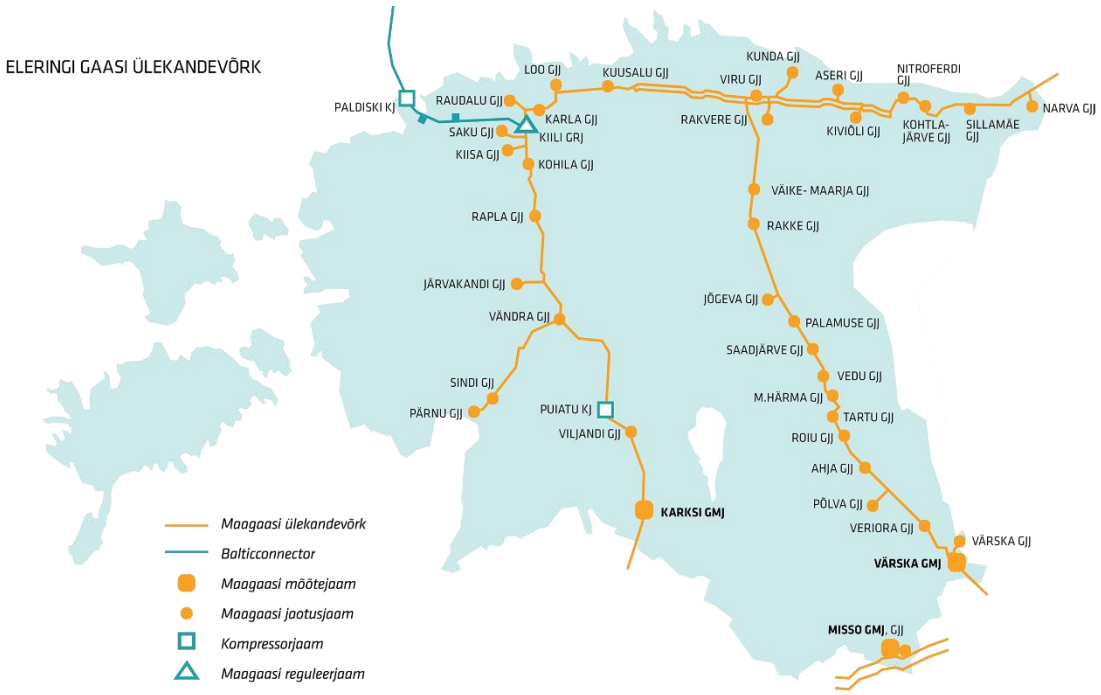

Figure 4.26 Map of the Estonian gas system[269]

The Estonian gas system is part of the regional gas system and is directly connected to the gas systems of Russia, Latvia and Finland, and indirectly to the Lithuanian gas system, now via GIPL to the Central European gas system. In addition, Estonia's transmission network was also a transit corridor between Latvia and Finland and, to some extent, between Russia and Latvia. The Estonian system is connected to Russia through the Narva-Värska interconnection points. As of 1 January 2023, there are no deliveries of natural gas to Estonia via the gas network in Russia. Estonia's gas system is connected to Latvia, Russia and Finland. In the direction of Latvia, the connection is through Karks (7 million m^3 days), while the connection to Russia is through Narva (1.2 million m^3 days) and Värska (3.4 million m^3 days) and Finland through Balticconnector (5.4 million m/day). The total interconnection capacity is thus 14 million m/ day. There are no gas storage facilities, liquefied gas terminals or compressor stations in the Estonian gas system. The highest consumption of natural gas in the last 20 years was 6.7 million m^3 (on 19 January 2006). Thus, the N-1 criterion is 104.5 %, i.e. the security of supply of the system is technically guaranteed. In total, the gas system has 885 km of pipeline, three gas metering stations and 36 gas distribution stations. The list of pipelines in the gas system is given in the table below. The minimum capacity of the gas system at these points is 7 million m in total^3 days.

[269] Elering Web – https://elering.ee/gaasisusteem

Table 4.6 Piping of the Estonian gas system. [270]

Piping	Length [km]	Nominal diameter [mm]	Maximum working pressure [barg]	In service age [a]
Vireši – Tallinn	202,4	700	49,0	30
Vändra – Pärnu	50,2	250	54,0	16
Tallinn – Jõhvi D38	97,5	200	≤ 30,0	69
Tallinn – Jõhvi D38	149,1	500	≤ 30,0	59
Kohtla-Järve – Narva	45,1	350/400	≤ 30,0	67
Irboska – Värska GMJ	10,1	500	48,0	47
Värska GMJ – Tartu	75,8	500	39,5	47
Tartu – Rakvere	132,8	500	30,6	44
Irboska – Inčukalns	21,3	700	50,3	38
Pihkva – Riga	21,3	700	50,3	50
Balticconnector onshore pipelines	53,7	700	54,0	3
Balticconnector sea pipelines	39,0	500	80,0	3
Branch lines	78,0			
Total	**976,3**			

The Estonian gas system is also connected through Latvia to the gas system in Lithuania and Poland and via Balticconnector to the Finnish gas system.

[270] Estonian gas transmission network development plan 2023-2033f

Figure 4.27 map of the Estonian gas system (ENTSO-G)

The peak loads of the gas system and the forecast of loads are shown in the figure below.

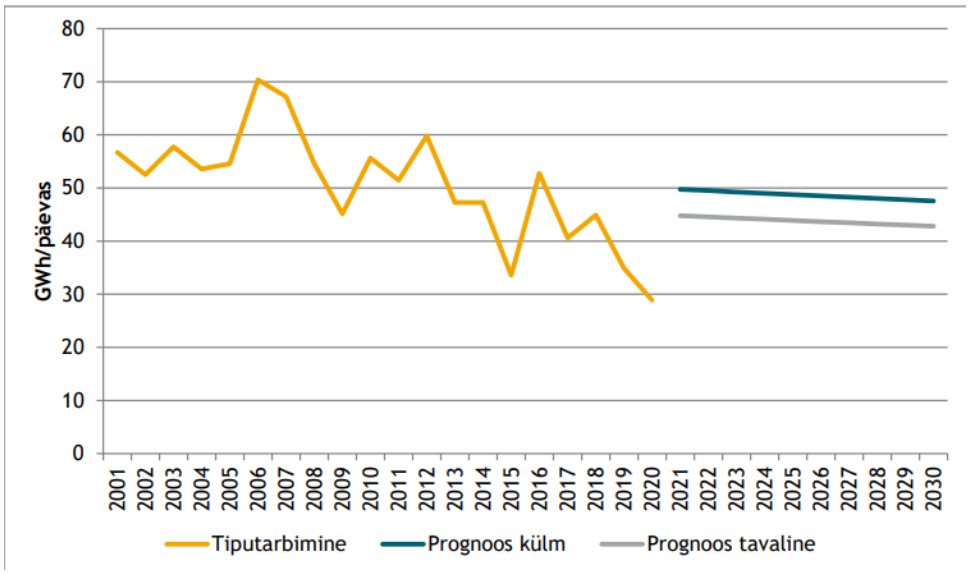

Figure 4.28 peak consumption and forecast 2001-2030of the gas system[271]

The gas system development plan drawn up by the system operator shall be publicly available[272]. The Competition Authority prepares an annual review of the functioning of the gas market for the European Commission[273].

i. Projections of the need to extend connections until at least 2040 (including for 2030)[274].

Electrical system

The activities of the Estonian electricity transmission system operator (Elering AS) in maintaining the Estonian electricity system and making the necessary investments to ensure security of supply derive directly from the Electricity Market Act, the Network Code and the electricity and energy management development plans.

Elering shall base its investments on the following objectives[275]:

1) contributing to security of supply;
2) supporting the development of the electricity market (external links);
3) ensuring capacity to allow for new connections and increased loads;
4) halting the obsolescence of the network;
5) improving reliability (voltage quality and interruptions);
6) improving the efficiency of the company, reducing losses;

[271] Source – Elering AS
[272] Estonian gas transmission network development plan 2021-2030 pdf (elering.ee)
[273] Reports and assessments by the | Competition Authority
[274] With reference to national network development plans and regional investment plans of TSOs.
[275] https://elering.ee/elektrituru-kasiraamat/3-eesti-elektrisusteem/33-elektrisusteemi-pikaajaline-planeerimine/331

7) new customer connections (consumers, producers).

Investments shall be planned in advance in the network development plans for at least 10 years. The core network development plan for2022-2031 sets out four main development perspectives:

Investments in Continental European frequency band synchronisation

As part of the synchronisation with the continental European band, the third 330 kV connection between Estonia and Latvia has now been completed and the reconstruction of the 330 kV overhead lines north-south is underway. The project is planned to be completed by the end of 2025.

Cross-border network investments

The third and fourth connections Estonia-Finland and Estonia-Latvia are under planning and a Baltic Sea marine network development project.

Strengthening the electricity grid in Western Estonia and islands – investments in the recovery package

Network investment programme to increase distributed and renewable electricity volumes in Western Estonia and islands foresees investments in 110 and 330 kV electricity grids

Network developments within Estonia

Investments to ensure the reliability, capacity and efficiency of the electricity grid and to halt the ageing of the grid

A more detailed list of planned investments can be found on Elering AS's website: https://elering.ee/investeeringud-2023-2032

Gas system

Elering AS, the Estonian gas system operator, prepares a gas transmission network development plan for the following 10 years[276]. During the budgeting of the investment plans included in the development plan, the various investment projects are validated and a reasonable selection of investment projects is carried out. The selection is based on the principle that, in a context of limited resources, investments must primarily be made in sites that bring the greatest socio-economic benefits to society.

These benefits may take the form of:
– reliability of energy supply;
– better functioning energy markets;
– Increasing the effectiveness of Elering's activities;
– better customer service.

In the case of investments in regulated assets, the following inputs, analyses and studies shall be considered: (a) network development

– network development plans, ENTSO-G ten-year development plans, Estonia's energy policy development plans, Elering and customer development plans, other studies.

An investment qualifies if the investment builds a new network element (e.g. pipelines, gas distribution stations, gas metering stations, etc.) due to insufficient transmission capacity or the need to ensure reliability under the Quality Requirements Regulation. Among the most important recent investments were the construction of the Balticconnector gas pipeline between Estonia and Finland and the construction of

[276] https://elering.ee/sites/default/files/2023-03/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202023-2032_0.pdf

related ancillary projects such as a measuring point at the Estonian-Latvia border and the construction of a compressor station. Project finalised in 2021

The Estonian gas transmission network development plan for the years 2021 to 2030, prepared by the gas system operator Elering AS, points out that, over the next 10 years, the priority project is the reconstruction of the Vireši-Tallinn gas pipeline network, which helps to increase the pressure of the gas pipeline and thus the capacity allowed to Balticconnector. The project is expected to be completed by 2025.

4.5.3. Electricity and gas markets, energy prices

i. Current situation of electricity and gas markets, including energy prices

In April 2010, the electricity exchange Nord Pool AS (NP) started operating in Estonia. In 2010, the electricity market was open at 28.4 %. As of 1 January 2013, the electricity market opened up to everyone, i.e. all electricity consumers with a valid network contract, are free to choose the appropriate electricity seller and price package for electricity.

Thanks to the *EstLink 1 and EstLink 2* link between Estonia and Finland and *NordBalt* between Lithuania and Sweden, the Baltic States' electricity system is highly integrated with the electricity system in the Nordic countries (Norway, Sweden, Finland, Denmark) and ensures access to the single European electricity market.

In 2021 (net generation) electricity production in Estonia was 6.31 TWh, with an increase of 31.2 % in electricity production compared to 2020. Electricity imports into Estonia amounted to 7.46 TWh in 2021, an increase of 4.2 compared to 2020. Electricity consumption was 7.85 TWh in 2021, with consumption increasing by 3.8 % compared to 2020. Estonia exported 4.83 TWh in 2021, an increase of 36.9 % compared to 2020. Network losses on the Estonian core network amounted to 1.10 TWh in 2021[277].

Table 4.7 Electricity balance

Electricity balance, GWh	2020	2021	% Change
Production (net)	4 810	6 312	31,2
Imports	7 160	7 464	4,2
Consumption	7 560	7 847	3,8
Loss	874	1 097	25,5
Export	3 530	4 832	36,9

[277] Competition Authority Electricity and Gas Market Report 2021

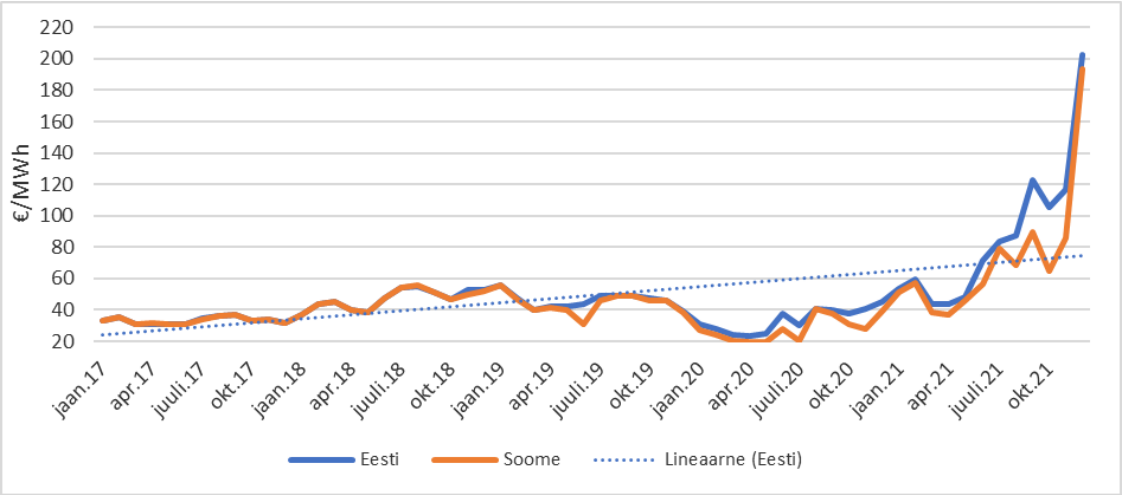

Figure 4.29 Comparison of average prices between NPS Estonia and NPS Finland price zones

The above graph shows that electricity prices in Estonia and Finland have historically been fairly similar, since EstLink 2 started in December 2013, which has led to sufficient transmission capacity between Estonia and Finland (1 016 MW). Price differences between Estonia and Finland have been mainly due to interruptions in EstLink 1 and EstLink 2 when transmission capacity between Estonia and Finland has decreased. However, there has been a resurgence of price differences since 2020, while Estonia's capacity reduction has led to a deficit in transmission capacity between Estonia and Finland – the import will from Finland to Estonia has often been higher than interconnection capacity has allowed. The bottleneck has occurred in this direction 35 % of the time in 2020 and 41 % in 2021, meaning that price differences between the bidding zones have also emerged and the price in the Estonian region has risen above the Finnish price.

In 2021, EstLink 1 was out of 58 hours due to accidents or repairs. Estlink 2 was 505 hours out of work.

Figure 4.29 shows a strong increase in electricity prices in the course of 2021. This trend is visible in the European market as a whole, mainly due to the strong increase in natural gas prices. Regional price increases are reflected in Nord Pool's electricity market day-ahead (Elspot) prices[278]. Notable is that the increase in the system price has been as high as 470 %, almost six times. The increase in bidding zone prices is somewhat lower but still significant. The difference in the system price is due to the fact that the emerging bottlenecks at bidding zone borders have increased the price compared to the system price. In the Estonian price area, the electricity market price in 2021 has been 158 %, i.e. more than 2, 6 times higher than in 2020, being also 16.58 % higher than in Finland and 2.36 % lower than in Latvia.

Table 4.8 Price comparison on NP power exchange

Price area	Average price EUR 2 020/MWh	Average price EUR 2 021/MWh	% Change	Maximum price EUR 2 020/MWh	Minimum price EUR 2 020/MWh
NP System	10,93	62,31	**470,1**	420,03	−0,08
NP Finland	28,02	72,34	**158,2**	1000,07	−1,41
NP Estonia	33,68	86,72	**157,5**	1000,07	−1,41
NP Latvia	34,05	88,77	**160,7**	1000,07	−1,41
NP Lithuania	34,04	90,45	**165,7**	1000,07	−1,41

[278] https://www.konkurentsiamet.ee/et/ametist-kontaktid/aruanded

Table 4.9 the volume of electricity traded in the NP price area.

Volumes traded in NP's price area in Estonia	Unit	2020	2021	% Change
Quantity of electricity sold day-ahead (Elspot) in the Estonian price area of NP	TWh	3,32	5,28	59,0
Amount of electricity purchased day-ahead (Elspot) in NP's Estonian price area	TWh	7,00	7,94	13,4

The total amount of electricity sold on the day-ahead (Elspot) market in 2021 was 5.28 TWh, which is 59 % higher than the quantity sold in 2020, and the total amount of electricity purchased was 7.94 TWh.

Table 4.10 volumes traded on the intraday market in NP's price area in Estonia

Volumes traded in NP's price area in Estonia	Unit	2020	2021	% Change
Quantity of electricity sold within the Estonian price area of NP in Elbas	GWh	149	207	38,9
Quantity of electricity purchased within the day (Elbas) price area NP in Estonia	GWh	195	216	10,8

The total amount of electricity sold on the intraday (Elbas) market in 2021 was 0.21, an increase of 38.9 % compared to 2020 and the total amount of electricity purchased was 0.22 TWh.

All consumers with a valid network contract will be able to choose the electricity supplier they want.

In 2021, there were 9 BRPs in Estonia and 39 independent electricity sellers in their portfolios, but a large proportion of them are also DSOs acting as sellers only within their own network customers. In 2021, the switching rate for household customers was 12 %, compared to just 1 % for the year before 2020, compared to 39 % for household customers and 10 % for 2020 instead of household customers. Thus, it can be seen that the increase in the market price of electricity in 2021 led to a significant increase in the level of activity at the choice of the electricity supplier from the consumer's perspective. 80 % of consumers buy electricity on the basis of a contract with an electricity vendor and 20 % use a generic service, i.e. they do not have a valid electricity contract. The share of the balance sheet portfolio of the largest wholesale electricity seller (Estonian Energia AS) at the end of 2021 was 53.4 %, followed by Elektrum Eesti OÜ 12.9 % and Scener OÜ 12.8 %. The average share of the balance sheet portfolio in 2013 was 71.9 % for Eesti Energia AS, when compared to 2021 it appears that the market share of Eesti Energia AS, the largest electricity seller in Estonia, has decreased. It can therefore be concluded that competition between electricity sellers has increased in the electricity market.

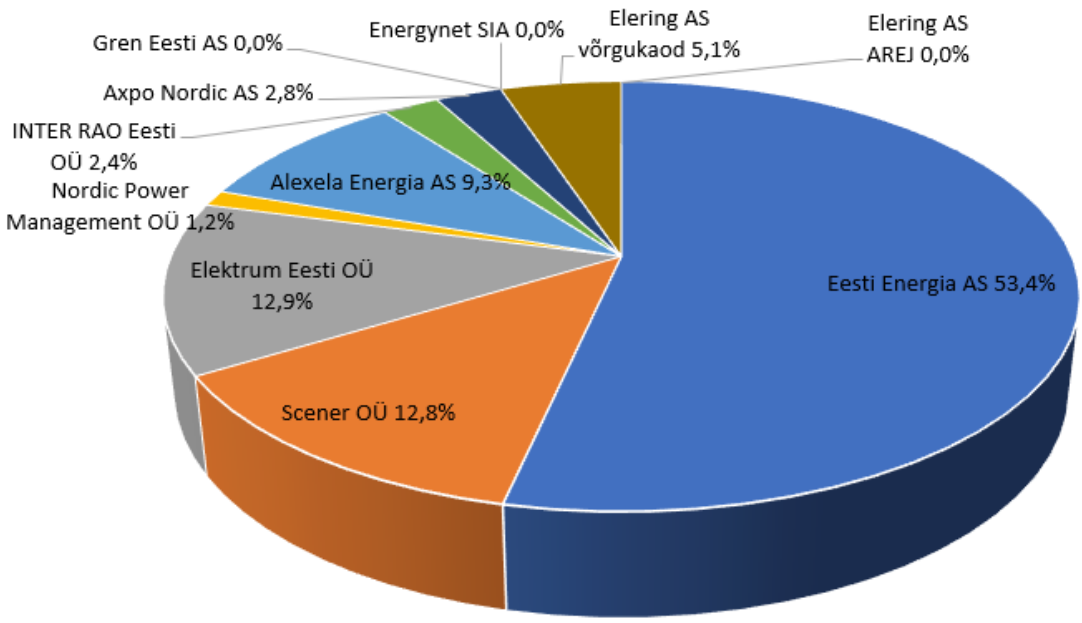

Figure 4.30 Breakdown of market shares among BRPs by consumption in 2021 (Competition Authority)

The Estonian gas market has been opened since 2007. Since 2015, Elering AS has been the independent system operator for the Estonian gas system. Previously, the Estonian gas system was a dead end system, receiving natural gas from Russia and Lithuania (re-gasified LNG). In 2020, Finland was also connected through Balticconnector to the undersea gas pipeline system. In 2022, the gas interconnector GIPL between Lithuania and Poland became operational, so the Baltic-Finland gas system is now connected to the central European gas system. Up to the first half of 2022, the beginning of the Ukrainian war, gas used in the region, as well as in Estonia, was imported on a larger scale from Russia, while LNG imports through Lithuania were rather small. However, in the course of 2022, the region's gas supply was reversed and Russian pipeline gas was completely abandoned. Since 1 January 2023, imports of Russian gas into Estonia have also been prohibited by law. LNG is now the main source of gas supply in the region. In 2022, an additional LNG floating terminal was also built in Inko Finland. A quay was set up in Paldiski, Estonia, for the reception of the LNG floating terminal and, if necessary, it is possible to bring the terminal located together to Pladisk. In2021, most of the natural gas imported into Estonia came from Russia and entered the Estonian gas system either directly through the Värska point or through the Latvian system from Karksi. As natural gas of LNG origin brought into Estonia via the Karksi point also enters Estonia at the Klaipeda terminal, it is difficult to show precisely the full weight of gas of Russian origin in the total gas consumed. The table below presents an overview of the balance sheet of the Estonian gas system.

Table 4.11 Estonian gas balance, GWh (Competition Authority)

	2018	2019	2020	2021
Ülekandevõrku sisenenud gaas kokku	20 395,55	23 988,51	12 977,92	11 371,20
Ülekandevõrku piiripunktides sisenenud gaas (ilma transiidita)	5 241,04	4 808,34	12 977,92	11 371,20
Karksi GMJ	1 123,66	2449,88	10 100,65	10 525,57
Värska GMJ	3 713,89	2357,4	2 876,22	776,37
Narva GMJ	402,39	0	0	0
Misso GMJ	1,09	1,06	1,05	1,24
Balticconnector			0	68,03
Ülekandevõrgust väljunud gaas kokku	20 379,76	23 967,71	12 961,99	11 359,98
Sisemaine ülekandeteenus	5 216,4	4 773,22	4 480,13	5 074,56
Kaod ülekandevõrgus	12,38	12,62	6,14	13,81
Eksport			8 481,22	6 276,94
Karksi GMJ			10,46	3,11
Balticconnector			8 470,76	6 273,83

Since the beginning of July 2017, the gas exchange started in Estonia and between the Baltic States and, since 2020, Finland too, natural gas can be traded regardless of the country in which the seller or buyer of the gas is located. The gas market covering the Baltic States and Finland is managed by UAB GET Baltic. The launch of the single gas market was made possible by the agreement of national gas system operators to implement an implicit auction for the allocation*of*cross-border gas transmission capacity, where gas prices also include transmission capacity in cross-border transactions. For example, an Estonian market participant may purchase gas from Lithuania without having to organise the transport of gas from Lithuania to Latvia and from there to Estonia.

The sales volume of the Estonian gas market has been steadily decreasing over the last ten years.

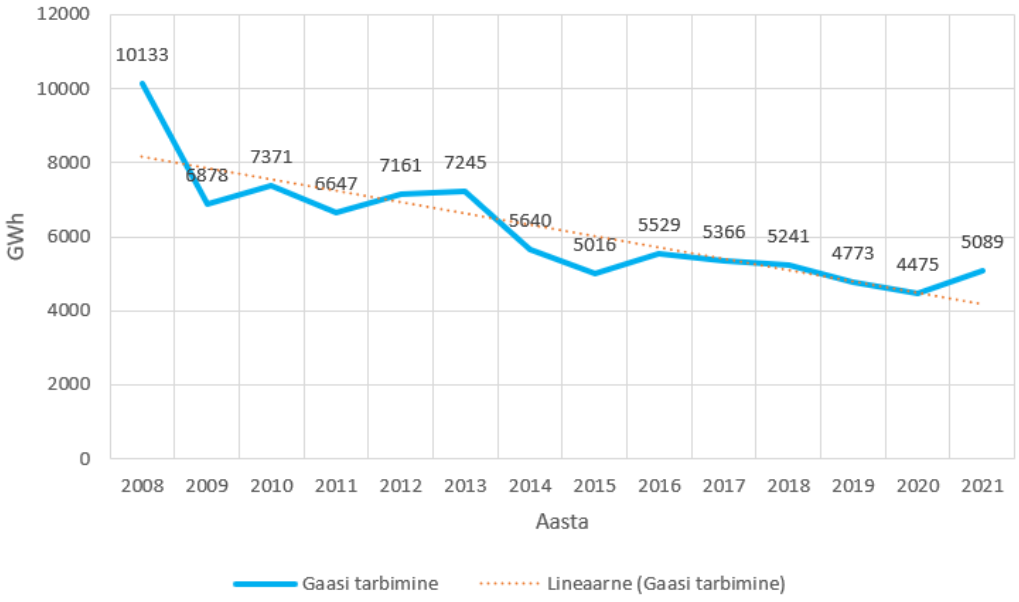

Figure 4.31 Gas consumption volume, GWh/a (2008-2021) (Competition Authority)

The number of gas purchasers on the gas retail market is around 61.8 thousand customers, including 48.08 as household customers. The average share of switching among consumers is 8 %.

In the last year, the number of customers in the retail market has increased by 7.5 %. Compared to the previous year, both household and non-household consumers have increased. The share of household consumers in 2021 has increased by almost 8 % compared to the number of household customers in 2020,

and the volume of consumption has increased by 15 %. Similarly, the share of non-household consumers has increased by 6 % and the volume increased by 13.6 %.

The total number of distribution system operators is 23 (total length of the network 2 275 km). A total of 55 persons are active in the retail market as gas suppliers, 21 as active suppliers. Most of the sellers sell gas in their network area. The highest market share is 62.15 %.

In the wholesale market, six undertakings operate as balance sheet managers in Estonia. The share of the largest balance responsible party is 55.6 % of the supply volume.

ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

Electricity and gas as an energy carrier are priced in the respective markets (e.g. Nord Pool for electricity). In the winter of 2022-2023, Estonia implemented measures to mitigate electricity, gas and heat prices for consumers. The compensation measures for energy carriers had a temporary effect. In 2022, the possibility for consumers to purchase electricity at the price of the universal service was introduced. Universal service will have a more long-term impact, as household customers will be able to purchase electricity at the price of the universal service until 2026. The fuel and ETS price projections underlying the GHG projections are presented in Annex 1a.

4.6. Dimension Research, innovation and competitiveness

i. The current state of the low-$_{carbon}$technology sector and, to the extent possible, its position on the global market (this should be analysed at European and/or global level).

Estonia was the first OECD country to invest in green start-ups as a share of GDP in 2016-2020.

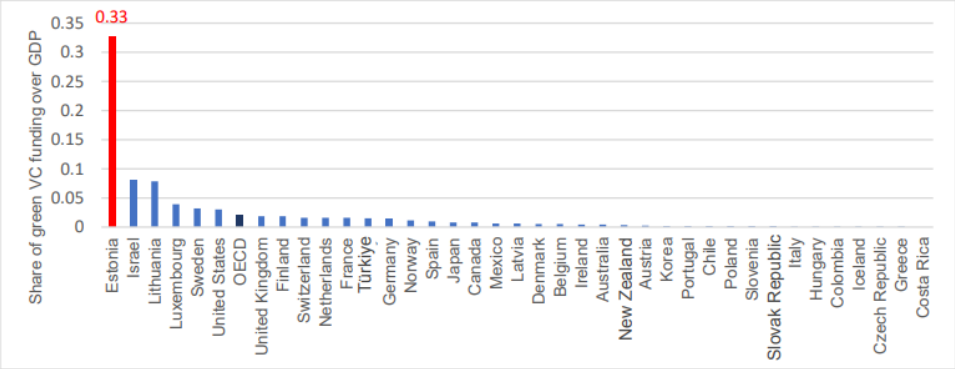

Figure 4.32 Share of green start-ups' venture capital investment in GDP 2016-2020[279]

Of the total venture capital investment, investments in green start-ups in Estonia accounted for 67.19 % (OECD average 7.53 %).

[279] OECD Start-up database calculations, Factsheet Green start-ups and Venture Capital Investment: Estonia

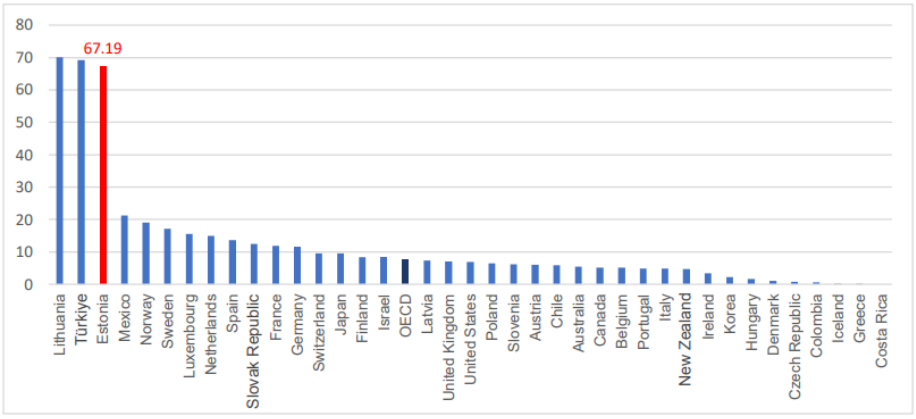

Figure 4.33 Share of investments in green start-ups as a share of total venture capital investments in 2016-2020[280].

In doing so, Estonia's green start-up ecosystem has focused primarily on batteries and low-carbon mobility.

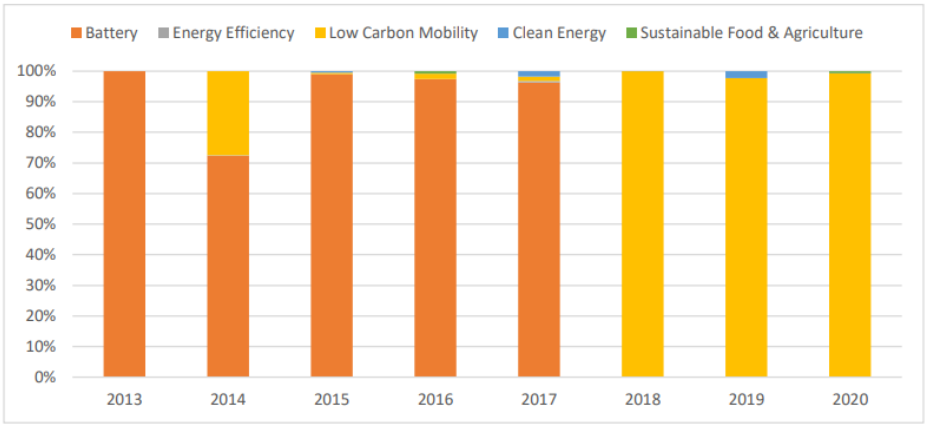

Figure 4.34 Share of sectors in green venture capital investments[281].

With the exception of energy efficiency, venture capital investments from green sectors by digital start-ups are higher than the OECD average in Estonia.

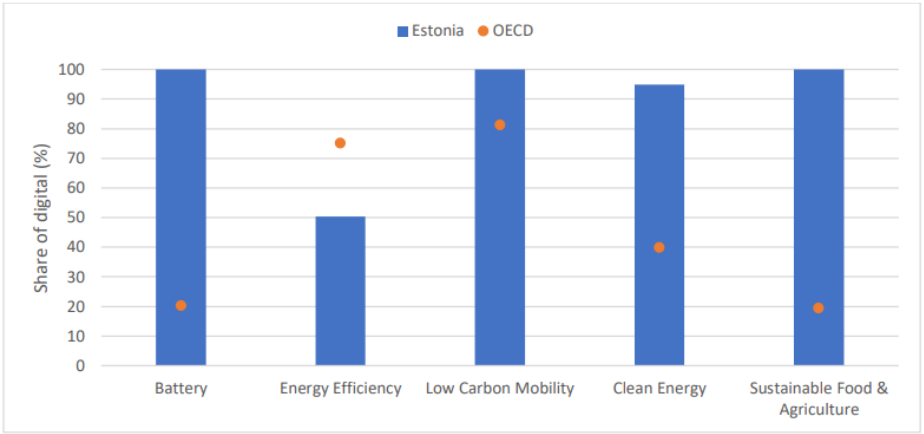

Figure 4.35 Breakdown of risk capital investments in green sectors in digital start-ups[282].

[280] OECD Start-up database calculations, Factsheet Green start-ups and Venture Capital Investment: Estonia
[281] OECD Start-up database calculations, Factsheet Green start-ups and Venture Capital Investment: Estonia
[282] OECD Start-up database calculations, Factsheet Green start-ups and Venture Capital Investment: Estonia

According to current knowledge, there are no geological conditions suitable for the storage of CO_2 in Estonia[283]. The project 'Climate Change Mitigation Potentials in Clustering and Use of Carbon in Industry', concluded in 2021, found that a gradual move towards climate neutrality is technically feasible also by adapting existing technologies used in the oil shale industry, but this may not be financially viable:

- From a technological point of view, absorption and oxygen combustion would be the most suitable technologies for the application of the oil shale industry in the near future.
- Newer technologies can be more efficient, but they are not ready to be used on an industrial scale.
- Current knowledge is the most suitable location under the North Sea for potentially captured CO2 storage.
- Only a small part of the world's CO2 emissions can be used at present.
- The implementation of CO2 capture would allow the carbon footprint of electricity produced in power plants to become negative.
- Oxygen combustion can be applied in oil shale boilers without major changes.
- The cost of capture and purification of CO2 would also be so high in the most favourable scenario than those identified that its implementation by the oil shale industry in Estonia (at least on the basis of today's EU ETS prices) is not expected to be economically viable.
- Cost-effective options for the use of potentially exploited CO2 in the Estonian industry were not clearly identified and the solution to release would be transport under the North Sea for storage.
- The capture and storage of CO2 in the oil shale industry in the North Sea is not economically viable under the current circumstances and its public support is questionable and would require further analysis compared to other alternatives to energy production.
- The study did not reveal a cost-effectively justified large-scale use in Estonia of technologies that have currently achieved a high level of readiness for CO2 potentially caught in the oil shale industry in Estonia.
- The application of CO2 capture technologies is technologically possible, but requires further handling of captured CO2.
- It remains up to the State to decide whether considerations of security of energy supply and reduction of price volatility or other externalities not covered by this study justify supporting and/or obliging the capture of CO2 in the oil shale industry.
- The main conclusion of the study is that a gradual move towards climate neutrality is also technically feasible by adapting existing technologies used in the oil shale industry, but this may not be financially viable.

ii. Current costs of public and, where available, private R & I related to low-$_{carbon}$technologies and the current number of patents and researchers.

The number of scientists and engineers per 100000 inhabitants has never been as high as today.

[283]A.Shogenova et al. 2009 Possibilities for Geological storage and mineral trapping of industrial CO_2 emissions in the Baltic region https://www.sciencedirect.com/science/article/pii/S1876610209006894?via%3Dihub#aep-abstract-id15

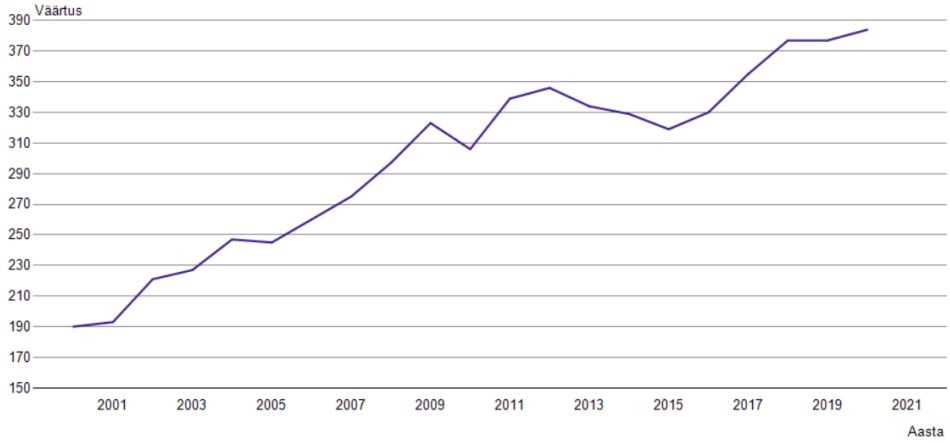

Figure 4.36 Number of scientists and engineers per 100000 inhabitants (SN10: sustainable Development Indicators www.stat.ee).

TheEstonian Scientific Information System (ETIS) provides data on research projects carried out, including with private funding. Estonian Electricity Industry Association has analysed R & D in the energy sector in Estonia[284]: According to theETIS portal, 156 T&A projects have been registered in the Energy Sector (CERCS classification T140 Energy) since the beginning of 2016 with a total funding of approximately EUR 22 million. Publicly funded research and mobility grants amounted to around EUR 3.5 million, while the domestic private sector provided funding for a total amount of approximately EUR 4.8 million. Of course, most money has been raised from Horizon 2020 – in the order of EUR 11 million. The Estonian public sector has been identified as a funder for 9 projects for a total amount of approximately EUR 358 thousand. Tallinn University of Technology (151 times), Tartu University (25 times) and Estonian University of Life Sciences (10 times) are the most likely to carry out the works. Of the companies, Enefit Energia Production AS and Elering AS have been the largest contributors to energy companies. With regard to the works, it is pointed out that the most large-scale projects are related to oil shale technology. Similarly, larger-scale projects have mostly been funded by Horizon 2020 and smart specialisation programmes. Thereare approximately 2000 companies operating in the energy sector. From applied research, the analysis highlights the development of technologies, e.g.:

- Skeleton, one of its projects leading to the development of a charging system operated by supercapacitors to allow fast charging of city-line buses from stop to stop."
- The e-Pavement OÜ project will create a smart road lining solution that allows the weathertight installation of various electronic components in the road surface and the production of the electricity (PV) needed to feed them using solar radiation.
- The aim of the Eleon AS project is to develop and construct an Eleon 5+ SCG test turbine and to carry out all necessary tests and certification of the wind turbine model, which is a prerequisite for final validation and serialisation of the wind turbine model.

Estonia has received the highest amount of funding in the field of energy through H2020, with 55 projects submitted to calls for proposals amounting to more than EUR 23.2 million. The most successful participant was Tallinn University of Technology (14 projects, including two coordinated), followed by the Tartu Regioon Energy Agency (11 projects, including one coordinated), five projects were partnered by Elering AS, four projects were followed by Tartu University (including one coordinated). Support was

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given to biogas technologies from different raw materials, the involvement of communities in the development of distributed energy, the development of cross-border electricity grids and the achievement of carbon neutrality in cities. Solutions to the problems of district heating were sought, new generation of materials, etc. In the field of energy, the Tallinn University of Technology, under the coordination of the Institute of Electrical Energy and Mechatronics, also received funding for the smart network project SMAGRINET. In short, Smagrinet is the European Union's Smart Network Knowledge Competence Centre with the aim of collecting and transferring the knowledge of the smart network. 9 organisations from six EU countries participate in SMAGRINET. The project coordinator and lead partner was the Institute for Electro-Energy and Mechatronics of Tallinn University of Technology. The project is now over and it can be said that Estonia now also has a smart network competence centre and knowledge in smart network is being developed, which is of utmost importance in light of developments in the sector.

iii. Splitting the current price elements that make up the three main price components (energy, grid, taxes).

Electricity

Final electricity prices depend to a large extent on the voltage level of the connection point. Network service prices depend on the voltage level of the connection point – higher voltage at the connection point means a lower investment cost for the system operator. Therefore, the price of a higher voltage network service is lower than the price for a lower voltage network service. On this basis, Estonian consumers can be divided into three categories in terms of the final price of electricity: household customers (low voltage connected customers), industrial customers (connected customers at 110 kV) and large customers (connected customers at 330 kV). For low-voltage and up to 63 A customers, to which household customers also qualify, the average price for network services excluding VAT in 2022 was 6.08 cents/kWh[285]. For industrial consumers connected to the 110 kV network, the average price of the network service excluding VAT was on average 1.09 ct/kWh for large consumers connected to the 330 kV network in 2022[286] and 0.653 cents/kWh excluding VAT for large consumers connected to the 330 kV network.

The final electricity price components for household customers in 2021 are presented in the table below.

Table 4.12 price components by household consumer 2021 (Source: Competition Authority[287])

Price components	Unit	Consumer
Network service (basic tariff)	EURcent/kWh	5,12
Price of electricity without network service	EURcent/kWh	8,92
Electricity excise duty	EURcent/kWh	0,1
Support for renewable energy	EURcent/kWh	1,13
Total VAT excluded	EURcent/kWh	15,27
20 % VAT	EURcent/kWh	3,05
Household price inclusive of VAT	**EURcent/kWh**	**18,33**

The excise duty on electricity in Estonia is largely the same for all consumers – EUR 1/MWh, in force since 1 May 2020, instead of the previous rate of EUR 4.47/MWh. In addition, the State has introduced a lower

[285] Electricity Võrk 1 package.
[286] https://elering.ee/vorguteenus#tab0
[287] Electricity and Gas Market Report 2021

excise duty rate for electro-intensive consumers, i.e. consumers with[288] an electro-intensity of more than 20 % and whose energy management system complies with ISO 50001. Such consumers are subject to a lower excise duty rate of EUR 0.5/MWh.

An important component of the final price of electricity is also the renewable energy charge used to finance the national support scheme for electricity produced from renewable energy sources. Given that the largest producers of electricity from renewable sources started to exit the support scheme from 2021, a significant reduction in the renewable energy fee is expected in the near future. In addition, the State has made the support scheme for electricity from renewable sources based on low bids, which in turn significantly reduces the pressure on the renewable energy fee.

Natural gas

Estonia's gas consumption has decreased significantly in recent years. The main reason is the reduction of gaseous fuels in the production of electricity and heat due to the relatively high and sometimes unstable final price of natural gas. The largest share of the final gas price is the price of gas as a product. This is followed by national taxes and network charges.

The components of the final gas price in 2021 for household customers are shown in the figure below.

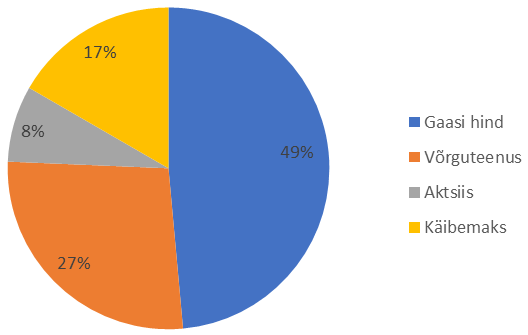

Figure 4.37 Domestic consumer natural gas price components 2021 (Source: Competition Authority).

The price of natural gas accounts for the largest share of the final price. The value added tax (VAT) is the same in the country, at 20 %. Gas excise duty is largely the same for all consumers, but a lower rate of excise duty has been regulated for gas intensive consumers. As of May 2020, the excise duty on natural gas in Estonia was temporarily lowered (until 30 April 2022) to EUR 40/uh m^3 due to the COVID-19 crisis, compared to EUR 63.31/uh m^3 in 2019. A lower rate of excise duty can be applied to a person with a gas consumption intensity of at least 13 % and whose energy management system complies with ISO 50001. In this case, the rate of excise duty on gas shall be EUR 11.30 per thousand m^3.

iv. Description of energy subsidies, including for fossil fuels

Among the measures in this plan (see Annexes 3 and 4), there are no financially supported measures for the deployment of fossil fuels. Regulation (EU) 2018/1999 does not provide for the concept of energy support, but according to recital 20 of the Regulation, Member States may refer to the concept of energy support for

[288] Electrointensity is the percentage of the total cost of electricity consumed or consumed by enterprises as a percentage of the value added created or generated by the undertaking in the same period. Alcohol, Tobacco, Fuel and Electricity Excise Duty Act-State Gazette

international organisations. According to the OECD, energy subsidies are defined as measures that make energy cheaper or more consumed in a given market segment than in a non-intervention energy market.

Energy subsidies are available to natural and legal persons. **Support measures totalling EUR 282 million were implemented for business and household consumers in heating periods 2021/2022 and 2022/2023 to compensate for the high energy price.**

Table 4.13 2021/2022 actual cost of support measures for commercial and household consumers in the heating period.

Expenditure 2021/2022 (in EUR)	(Including VAT)
Support to reduce the impact of high final electricity prices (Oct-March)	112 985
Support to reduce the impact of high final gas prices (January-March)	29 896
Support to reduce the impact of high final district heating prices (February-March)	13 549
Measure for vulnerable households (oct-April)	13 000
TOTAL	**169 431**

Table 4.14 Support measures for household consumers between October 2022 and March 2023.

2022 okt – March 2023 cost (EUR)	(Including VAT)
Electricity	59 969
Gas	28 377
District heating	24 402
TOTAL	**112 748**

Subsistence allowance

People in difficulty can receive a subsistence benefit, which takes into account the housing costs of the household, including the cost of heat or fuel consumed for heating, when calculating subsistence benefits. The application, calculation, award and payment of maintenance benefits are regulated by the Social Welfare Act. Local authorities shall determine in their legislation the conditions under which housing costs are to be calculated. By regulation, local authorities may set caps on costs, including, for example, maximum energy costs. Issues related to energy poverty are further discussed in chapters 2.4.4 and3.3.4.i.

The calculation of the subsistence allowance is based on the net income of the person or all members of the family living alone in the previous month, the housing costs due in the current month and the subsistence limit. As of 1 June 2022, the subsistence limit for a person living alone or for the first member of a family is EUR 200 per month. The subsistence limit for each minor member shall be EUR 240 per month. The subsistence limit for the second and every next adult member of the family is EUR 160 per month. A beneficiary of income support whose family members are minors shall be entitled, together with the subsistence allowance, to a supplement of EUR 15 paid by the local authority from the State budget.

The amount of the subsistence limit shall be established by the Estonian Parliament in the state budget. It shall be calculated for a person living alone or for the first member of a family for each financial year.

Exemptions and reductions in the rate of excise duty

In Estonia, solid fuels used as heating fuel in households (coal, peat briquettes, firewood, etc.) are not subject to excise duty. The main domestic fuel in Estonia is wood and wood-based fuels, which, according to Statistics Estonia, accounted for 85.5 % of fuels used for heating in households in 2021 (natural gas

13.3 %). Since wood and wood-based fuels are not taxed in any sector in Estonia, the exemption from excise duty on wood and wood-based fuels does not qualify as energy support.

Despite the exemption for fossil fuels used in households, the quantities of solid fossil fuel used by natural persons are modest. According to Statistics Estonia, in 2017, fossil solid fuels accounted for 0.5 % of fuels used for heating in households.

Energy subsidies for legal persons

In Estonia, energy subsidies to legal persons have been gradually reduced. An overview of energy subsidies for legal entities is summarised in the table below. In 2021, a more favourable excise duty rate for dedicated diesel amounted to 80 % of fossil fuel subsidies.

Table 4.15 Amounts of energy subsidies, including fossil fuel subsidies, in 2020 and 2021.

Energy support, EUR	2020	2021
48 Total energy support	**237 976 000**	**174 221 000**
including subsidies for fossil fuels	**40 005 000**	**37 476 000**
share of fossil fuel subsidies	**17 %**	**22 %**
More favourable excise duty rate for dedicated diesel	29 052 000	29 957 000
Exemption from excise duty for the use of kerosene used in national water traffic	3 684 000	2 409 000
(Aktsiisierand) Electricity and fuel (NG) used for electricity generation and electricity used to maintain the capacity to produce electricity	1 769 000	1 071 000
Fuel used in mineralogical processes	1 568 000	1 200 000
Exemption from excise duty on fuel for fishermen	1 451 000	981 000
Reduction in excise duty for an intensive gas-consumption company	945 000	910 000
Electricity duty rebate for electro-intensive business	874 000	272 000
Exemption from excise duty for the use of kerosene used in national air traffic	481 000	546 000
Electrical energy used for chemical reduction and electrolytic, metallurgical and mineralogical processes	141 000	100 000
Natural gas used for the operation of the natural gas network	40 000	30 000

5. ASSESSMENT OF THE IMPACT OF PROPOSED POLICIES AND MEASURES[289]

5.1. The impact of the proposed policies and measures under point 3 on the energy system and greenhouse gas emissions and sinks, including a comparison with projections of existing policies and measures (as described in Section 4).

i. I. Projections of the development of the energy system and GHG emissions and removals as well as, where relevant of emissions of air pollutants in accordance with Directive (EU) 2016/2284 under the planned policies and measures at least until ten years after the period covered by the plan (including for the last year of the period covered by the plan), including relevant Union policies and measures.

Projections of greenhouse gas emissions in the scenario with additional measures have been calculated for the years 2021-2050 and 2020 was used as the base year (base year). In the scenario with additional measures, the projections of GHG emission trends take into account the additional measures set out in Annex 4 to this plan and their impact. In the context of greenhouse gas projections, the transport sector is reported as a sub-category of the energy sector, but for the sake of clarity, transport emissions from the energy sector are shown separately in the graph below.

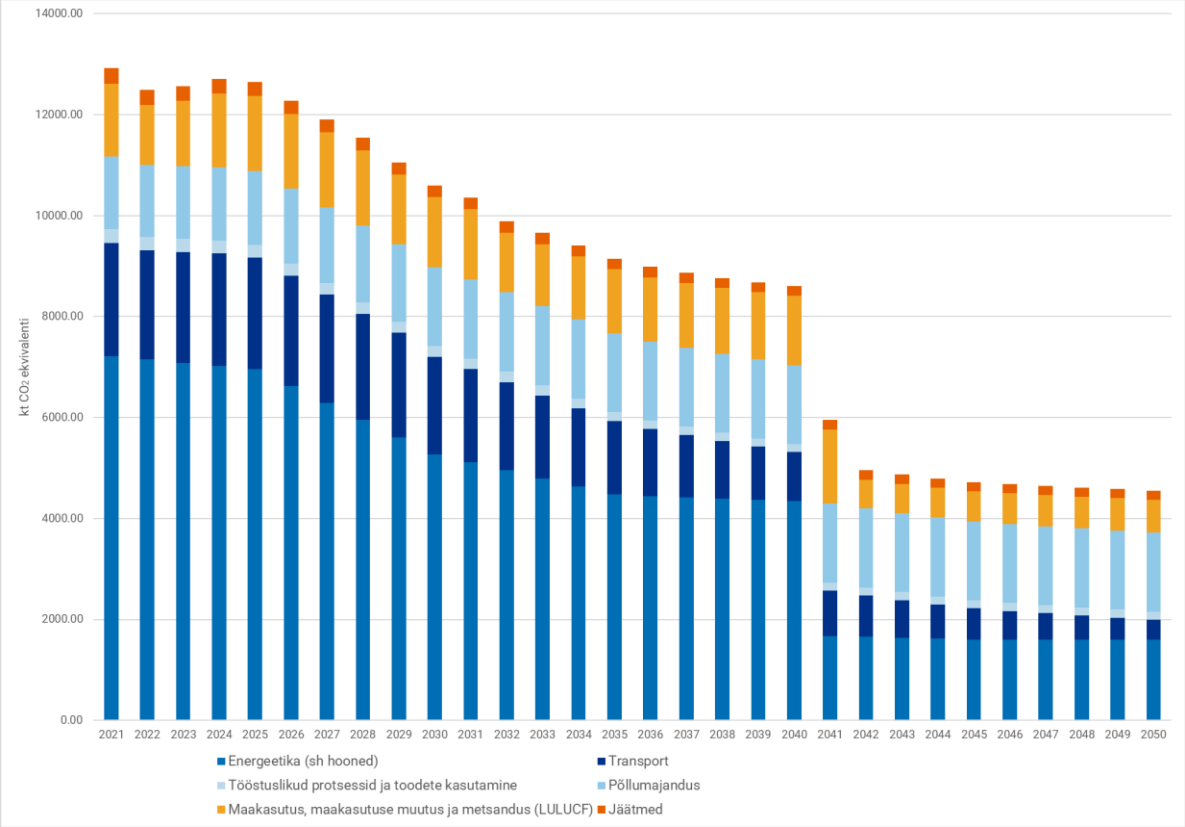

Figure 5.1 Emissions of projected GHGs and removals by sector with additional measures in the scenario kt CO_2 eq.

Projections for the evolution of air pollutant emissions pursuant to Directive (EU)2016/2284

[289] Planned policies and measures are options under discussion and having a realistic chance of being adopted and implemented after the date of submission of the national plan. The resulting projections under section 5.1.i shall therefore include not only implemented and adopted policies and measures (projections with existing policies and measures), but also planned policies and measures.

In early 2019, the European Commission received a National Programme for the Reduction of Emissions of Certain Air Pollutants for the period 2020-2030 (the so-called ÕVP programme) which outlines the potential and potential for further reducing emissions of pollutants into ambient air from stationary and mobile emission sources in Estonia. The updated programme was submitted by Estonia to the European Commission by 1 April 2023.

The graph below shows the projections of ambient air pollutants by sector in the update of the JAVP programme.

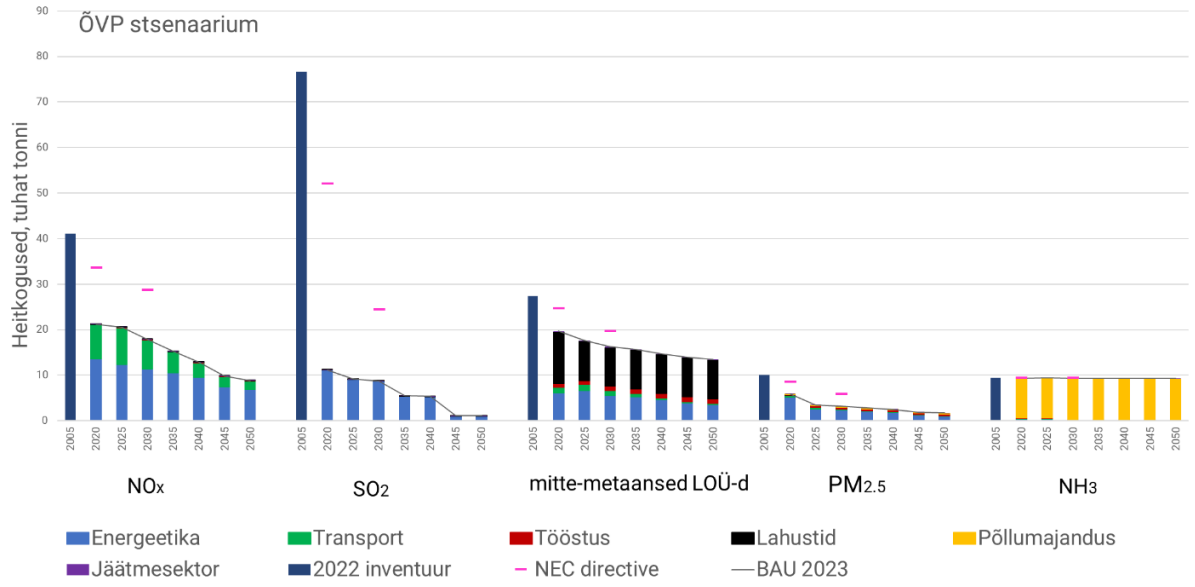

Figure 5.2 Ambient air pollutant projections 2020-2 050 kt[290]*—*

The impact on air pollutants of the proposed policies and measures outlined in chapter 3.1.1 is described in Tables 5.1 to 5.3 in the agricultural sector. The impact of policies and measures on air pollutants has been identified in the 2018 study on 'the most cost-effective measures to achieve the objectives of the Climate Policy and Shared Commitments Regulation in Estonia'[291].

Table 5.1 Impact of planned policies and measures on air pollutants in the agricultural sector

The measure	Impact on air pollutants
Improvement of PM20 manure management	The measure will have a positive impact on reducing emissions of ambient air pollutants, contributing to the achievement of the NEC Directive's objective of reducing ammonia emissions by 1 % by 2030 compared to 2005. The measure will also help mitigate the problem of odour and reduce nutrient leaching in water bodies.

Table 5.2 Impact of planned policies and measures on air pollutants in the transport sector

The measure	Impact on air pollutants

[290] 2023 Update of the Air Pollutants Reduction Programme | Ministry of the Environment (envir.ee)
[291] https://www.kik.ee/sites/default/files/aruanne_kliimapoliitika_kulutohusus_final.pdf

TR8 Further promotion of sustainable driving TR9 Additional spatial and land-use measures to increase transport energy savings and improve the efficiency of the transport system in cities TR11 Introduction of a distance-based road user charge for heavy-duty vehicles TR12 Tyre pressure and energy label of vehicles	The associated effects on air pollutants can be assessed as positive: from an ambient air perspective, the measure contributes to the reduction of air pollutant emissions (SO2, PM2.5, NOx, VOC). The effects on emissions of H2S and NH3 are known to be neutral.

Table 5.3 Impact of planned policies and measures on air pollutants in the energy sector

The measure	Impact on air pollutants
Further development of EN4 heat management	The impact of substituting district heating on natural gas and/or wood-fired local heating can be assessed as negative, i.e. emissions in ambient air may increase by replacing more controlled and high boilers in district heating boilers with many local boilers. The effects on emissions of H_2S and NH_3 are known to be neutral. Kidistrict heating is replaced by fuel-free local heating, the environmental impact of this replacement on ambient air may be assessed as positive.
	The impact of renovating heat pipelines on ambient air can be assessed as positive. By reducing the need for heat production, ambient air emissions ($SO_{2,\ NO\ 2}$, NO_x, particulate matter, VOC) will also be reduced. The effects on emissions of H_2S and NH_3 are known to be neutral.
	The impact of the refurbishment of boiler plants on ambient air can be assessed as positive. As the efficiency of heat production increases, ambient air emissions ($SO_{2,\ NO\ 2}$, NO_x, particulate matter, VOC) will also be reduced. The effects on emissions of H_2S and NH_3 are known to be neutral. The exact extent of the impact will depend on the fuel to be replaced by biofuels (scraps).
HF5 Further renovation of public and commercial buildings	The impact of the renovation of office buildings on ambient air can be assessed as positive. By reducing the need for heat production, ambient air emissions ($SO_{2,\ NO\ 2}$, NO_x, particulate matter, VOC) will also be reduced. The effects on emissions of H_2S and NH_3 are known to be neutral.

ii. An assessment of policy interactions (between existing and planned PaMs within a single policy dimension and between existing and planned PaMs within different dimensions).

This section needs to establish a solid understanding of the impact of energy efficiency/energy saving policies on the size of the energy system and reduce the risk of failure of investments in energy supply.

Reducing CO_2emissions

In order to meet the objectives set by the ESR, it is important to focus the planning of activities on the most effective use of measures, e.g. to increase support for measures already in place or also to look at the possibilities for grouping measures when planning measures.

The main objectives of the measures implemented or planned in the transport sector are to increase vehicle efficiency and reduce demand for public transport. The Transport and Mobility Development Plan 2021-2035 has a key focus on reducing the environmental footprint of transport vehicles and systems to contribute to the climate objectives by 2050. In order to manage human behavioural change, greater attention needs to be paid to the polluter pays principle in the future, including the taxation of fuels according to their specific emissions and energy content. The development plan also calls for the deployment of low-carbon fuels in all modes of transport.

iii. Assessment of interactions between existing policies and measures and planned policies and measures, and between those policies and measures and Union climate and energy policy measures

For a number of measures, the scenario of projections with additional measures outlines the estimated mitigation effect of GHG emissions if additional funds are released for their implementation. Additional measures in the transport sector would reduce its emissions by 2 % compared to projections, reducing emissions by 82 % by 2050 compared to 2020.

Estonia's national (environmental, climate and energy) activities are guided by the EU's environmental, climate and energy policies and the related legal framework. In the context of the preparation of the sectoral development plans, the national thematic objectives and the national measures needed to achieve them shall be defined. Sectoral development plans are subject to a Strategic Environmental Assessment (SEA). Annex III shows the link between the measures and the reduction of greenhouse gas emissions, increasing energy efficiency and increasing the use of renewable energy.

5.2. Macroeconomic and, to the extent possible, impacts on health, the environment, employment and education, skills and social impacts of the proposed policies and measures under point 3

The NECP 2030 measures are mostly planned by existing development plans, the implementation of which is expected to result in an environmental impact assessment[292] under the Environmental Impact Assessment and Environmental Management System Act. The NECP 2030 measures are expected to have a positive environmental impact compared to the situation if they were not implemented. The negative effects of the measures can be mitigated in the implementation of the NECF 2030. The expected environmental impacts of the proposed NECP 2030 are described in the table below. The table below shows the macroeconomic impact of the proposed policies and measures in section 3 of this plan. The impact assessments come from the ENMAK 2030 SEA report and the 2018 study on "the most cost-effective measures to achieve the objectives of the Climate Policy and Shared Responsibility Regulation in Estonia"[293]. The proposed measures are set out in Annex 4 (Measures in the KHG forecast WAM scenario)

Table 5.4 The expected impact of the proposed measures.

No.	Proposed measures	Implications
EN4a	Additional construction of local heating solutions instead of district heating solutions	In energy, an increase in the use of wood fuels would have a significant impact on biodiversity due to growing harvesting needs, and in addition to burning wood fuels, local heating and local heating will have a health impact on PM2.5. The proposed measures will lead to more efficient, lower fuel demand and
EN4b	Further renovation of depreciated and inefficient heat pipelines	

[292] https://www.riigiteataja.ee/akt/112122018045
[293] https://www.kik.ee/sites/default/files/aruanne_kliimapoliitika_kulutohusus_final.pdf

EN4c	Further renovation of district heating boilers and fuel exchange	emission heating solutions. At the same time, emissions in ambient air can increase if more controlled and high district heating boilers are replaced by many local boilers. The measure can create a favourable environment for the development of new solutions, i.e. innovation. Reducing the use of imported fossil fuels in fuel switching will have a positive impact on energy security. Kidistrict heating is replaced by fuel-free local heating, the environmental impact of this replacement on ambient air may be assessed as positive.
EN4	Further development of heat management	
TR8	Further promotion of sustainable driving	The impact of transport on biodiversity is lower compared to electricity and heat management, and the proposed measures will result in lower emissions from fuels, GHG and air pollutants, etc. Reduced air pollution (fine particles) marginally reduces the risk of heart and lung disease, which in turn increases healthy life time (including working time) and minimises pressure on healthcare spending. Increasing energy security by reducing dependence on imported oil-based automotive fuels. In addition, the promotion of sustainable driving, road user charges and tyre measures will reduce the cost of vehicle repairs.
TR9	Additional spatial and land-use measures to increase transport energy savings and improve the efficiency of the transport system in cities	
TR11	Introduction of a distance-based road user charge for heavy-duty vehicles	
TR12	Tyre pressure and energy label of vehicles	
TR21	Making an additional national ferry climate neutral	
HF5a	Additional renovation of LA buildings	The renovation of a building reduces its heating energy needs by up to half at the same time by reducing the need for fuels and the emissions resulting from their combustion. At the same time, when installing ndv ventilation systems, heat pumps, smart-home solutions, etc., the electrical energy needs of the building. In order to cover the growing electricity needs, renewable energy, high-efficiency cogeneration and security of supply measures are energy measures. As a result of the measures in the building stock, the energy efficiency of the Estonian building stock, the quality of the indoor climate of buildings and human health (people spend 80-90 % of the time indoors) will increase, the lifespan, usability and value of buildings will increase. The measure will lead to marginal health benefits (reducing the risk of heart and lung diseases) that prolong healthy life years (including healthy years of work) and minimise pressure on health expenditure (reduction of heat production needs, thus reducing emissions to the ambient air from fuel combustion). Reducing the use of imported fossil fuels and increasing the uptake of indigenous fuels, including local renewable energy sources, will have a positive impact on national energy security.
HF5b	Additional renovation of central government buildings	
HF6a	Additional support for the renovation of private houses	
HF6b	Additional support for the renovation of apartment buildings	
HF3	Support for the renovation of private non-residential buildings	
PM18	Investments for energy savings and renewable energy in greenhouses and vegetable warehouses	Competitiveness of the horticulture sector, regional development, employment and reduced imports of natural gas will increase.
PM20	Improving manure management	Large-scale investments in manure management will boost economic activity in rural areas and increase tax revenues.

According to the 2020 long-term strategy for the renovation of buildings, renovation of buildings is a regional and social and long-term measure shaping the living environment, and the renovation of buildings has to take into account not only a direct reduction in the energy use of buildings but also other important factors:

- Energy povertyis not currently a widespread problem in Estonia. According to[294] data from the European Energy Poverty Observatory, 2.7 % of households (EU average = 8.7 %) and 7.9 % of households face energy bill arrears in 2016 (EU average=8.1 %). When planning full renovation of existing buildings, it must be remembered that some households are not capable of carrying out renovation. Renovation of a building requires the owner to make a financial contribution even if there are support measures available and households with lower incomes are not able to provide that. Households in an economically insecure situation need additional support to participate in energy saving measures.
- The ways of ensuring accessibility in buildings are currently very different. The occupants of the buildings are changing and therefore renovation must take into account that the building is accessible to all groups of the population (parents with parents, children, elderly people, disabled people). A Task Force on Accessibility has been launched at the State Chancellery to ensure accessible public spaces and buildings for all and to raise awareness of accessibility[295].
- In thecase of shrinking cities, the principles of settlement and infrastructure development must be taken into account in the zoning plan and the need to strengthen urban centres. The doctoral work protected in 2019 at Tallinn University of Technology39 points out that declining municipalities must focus primarily on the quality of life of their inhabitants and the attractiveness of urban space is essential to achieve this objective. Abandoned and underused buildings affect people's lives in their neighbourhood, as they have a strong negative symbolic value. Therefore, in shrinking towns, buildings should above all be renovated in the town centre (defined with zoning) and sustainable residential areas planned in the zoning.
- Renovation of buildings plays an important role in designing good public spaces. Without taking a whole approach to each building, the architectural result of renovated buildings in the same area becomes a so-called laptop. In order to ensure the regional architecture as a whole and the development of good public spaces, local authority master plans and architectural guidelines for the renovation of buildings in different areas are necessary.
- Increased deployment of local renewable energy, combined with renovation of buildings. The best technical solution for densely populated areas is the installation of solar panels for producing electricity. As a general rule, renovation will result in an increase in the electricity consumption in buildings without ventilation systems, where mechanical ventilation systems with heat recovery are installed during renovation – due to installed sensors, automation, electricity consumption for ventilation (except in cases where electricity is initially heated). The increase in electricity consumption due to ventilation systems can be set off by producing electricity locally using solar panels. For example, in private houses, where renovation results in the replacement of the existing furnace by a heat pump, the building's CO2 emissions will increase as a result of the renovation, as the existing zero-emission wood fuel is replaced by high specific emissions of electricity. The increase in electricity use can be set off by installing solar panels. Overall, however, energy consumption in the building is decreasing.
- In order to ensure the safety of buildings, renovation allows buildings to be brought into line with today's safety requirements. The post-design life cycle of a majority of buildings has either ended or coming to an end, which has created an immediate need to repair their load-bearing structures (such as balconies and shelters). According to a survey conducted by the Technical Regulatory Authority in 2012 and 2013, 53 % of the balconies of the 26 surveyed buildings showed severe structural deficiencies. Only 16 % of balconies met all of the requirements. In addition to structures, the electrical systems and water and sanitation piping of buildings require safety upgrades. When renovating buildings, attention must also be paid to the fire safety of the building (fire doors, building

[294] panureport2018_updated2019.pdf (europa.eu)
[295] Task Force on Accessibility | State Chancellery

services system penetrations, gas equipment safety, shutdown of installed ventilation systems in the event of a fire, etc.). Work required to ensure the safety of the building must be considered eligible in support measures. For instance, installation of fire doors, replacement of indoor air-dependent gas water heaters with a centralised hot water supply system and automation required for ensuring fire safety.

- In order to ensure regional balance, priority must be given to areas outside the region of Tallinn in the case of national measures supporting reconstruction. If support measures are distributed on similar market conditions, they are concentrated in more capable areas, which exacerbates the uneven development of regions. The Estonian regional economy scenarios prepared by the Foresight Centre[296] point out that for the regional economy to function, changes are also required in regional living environments – renovation and upgrading of buildings and availability of high-quality office spaces. In addition to giving an advantage to regions outside the capital in support measures, extra measures, such as state guarantees for home loans and renovation loans outside larger cities and greater inclusion of the local government level in measures supporting renovation of buildings, should be taken.
- Theenergy sector will also have a significant impact on the renovation of buildings. The use and import of fossil fuels and sales volumes of district heating companies will diminish. The need to invest in new energy production capacities will reduce. Buildings requiring less energy also allow for harnessing the potential of renewable energy solutions and distributed energy and an increase in energy independence and the security of the energy supply.

In agriculture, the impacts of CAP Strategic Plan interventions have been assessed. The CAP Strategic Plan will continue to pay a wide range of environmental payments aimed at supporting biodiversity conservation, sustainable and rational use of environmental resources, climate change mitigation activities, etc. The planned interventions will contribute to the development of more environmentally friendly farming. For example, support for environmentally friendly management, continued support for organic production, maintenance of permanent grassland, eco-schemes, support for soil and water protection, promotion of biomass and renewable energy production, support for non-productive investments under various interventions, etc. In summary, CAP Strategic Plan interventions were generally considered to have neutral or positive externalities on different environmental elements (biodiversity, surface and groundwater, landscape, soil, ambient air, climate) and positive impacts on the socio-economic environment.

The proposed measures include investments in agriculture for energy savings and renewable energy in greenhouses and vegetable warehouses, which would contribute to increasing the share of renewable energy in the horticultural sector. The externalities involved are the increase in the competitiveness of the Estonian horticulture sector, regional development, the increase in employment and the decrease in natural gas imports. In addition, improving manure management is proposed. Large-scale investments in manure management will boost economic activity in rural areas and increase tax revenues.

5.3. Overview of investment needs

i. I. existing investment flows and forward investment assumptions with regard to the planned policies and measures

In order to achieve the national targets and implement the measures of the National Energy and Climate Plan for this purpose, it is necessary to combine contributions from the private, public and non-profit sectors. This has been the case for many years. It is also essential to identify and negotiate appropriate changes to the legal framework, requirements and standards, to improve the availability of data and

[296] Estonia-regional-economic scenarios-2035.pdf (National Assembly.ee)

information, which would help both to monitor the existing situation and to monitor progress towards the desired changes, as well as to facilitate the availability of advice and expertise, including both under market conditions and with partial support. Estonia has also shifted from the current system of support for renewable energy to the most favourable option through less bids to encourage the market introduction of renewable energy generation capacity in recent years. The interaction of different types of activities can contribute to the awareness, prioritisation and smart combination of activities and techniques needed to progress towards the objectives, which in turn helps to anticipate and reduce aggregate investment needs.

To finance support measures and financial instruments contributing to energy and climate objectives, Estonia combines various EU budget funds, trading revenues from the European Union (EU) Emissions Trading System (EU ETS) and other national budget resources, together with the own contribution of the promoters to the vast majority of activities under the measures. While the EU's resources for the 2021-2027 budgetary period will be used to achieve the 2030 energy and climate objectives, the legal framework, priorities and distribution between objectives and funds for the next budgetary period starting in 2028 will be the subject of preliminary proposals for negotiations in 2025, thus by 2023 no delineation is yet available for support possibilities for 2028 and subsequent years alongside national budget revenues.

The table below provides an overview of the size classes of the main EU funds for the 2021-2027 budgetary period and of the EU Emissions Trading System (EU ETS) revenues that are planned to contribute to Estonia's energy and climate objectives (EU ETS trading revenues from 2023 onwards are based on projections as of April 2023, actual revenue may differ). In addition to these sources, actions targeting the 2030 targets will be implemented e.g. under the sub-programmes of the NEP. At the same time, it is important to encourage action towards energy and climate objectives not only through measures specifically targeted at them, but also through other activities and measures supported by the State and local authorities, e.g. through appropriate threshold and/or project selection criteria, definition of target groups, etc. The longer term target is increasingly "regular" investments in the light of energy and climate objectives and related considerations, without the need for separate additional investments.

Table 5.5 – The so-called climate contribution rate and indicative volume of the proposed EU budgetary framework for 2021-2027 and the EU ETS trading income (Ministry of Finance).

Source	Indicative volume of the source of funding, in current prices (EUR million)	Minimum climate contribution (%), EC methodology	Indicative volume of climate contribution (EUR million)	Actual planned climate contribution rate
EU structural instruments:				
The European Social Fund (ESF)	534	*0 %*	0	(0 %)
European Regional Development Fund (ERDF)	1 702	*30 %*	601	35 %
Cohesion Fund (CF)	780	*37 %*	514	66 %
Just Transition Fund (JTF)	354	*100 %*	354	100 %

ReactEU (I and II), 2020-2023	**207**	*25 %*	53	26 %
Recovery and Resilience Facility (RRF), including RePowerEU supplement	953	*37 %*	567	59 %
Social Climate Fund (SKF) from 2026	53	*100 %*	53	100 %
Agricultural policy instruments: CAP Strategic Plan				
Total CAP Strategic Plan including direct payments+EAFRD+EAGF	1 448		446	31 %
CAP 2021-2022 additional resources (2014+ under the extension of RDP)	643		215	34 %
EMFF/EMFF	97	*30 %*	43	44 %
The **EU's "central" funds** (the actual amount of support depends on the success of the application)				
CEF: Transport	350..500	100 %	350..500	
CEF: Energy	80..100	60 %	80..100	
Horizon**Europe: framework Programme**for Research and Development-Innovation	100	35 %	35	
In addition, some activities financed by other EU programmes:				
Life, programmes in the field of internal security, European Internal Market Programme, Digital Europe Programme, InvestEU, etc.			30	
Total EU funds for the 2021-2027 budget period*:			***3 426***	
** This does not take into account Estonia's own contribution, i.e. the investment volume to be triggered by the support measures is higher*				
Sources linked to the EU's carbon trading system (EU ETS):				
"Carbon trading income" (under the existing EU ETS): Based on projections as of April 2023 – 2023-2027	*2 179*	50 % (until 2023), 100 % (from 2024)	*1 705*	
Modernisation Fund	*587*	100 %	*587*	
"Carbon trading income" (created under the new EU ETS under the ETS): Kem forecast from 2027 onwards	*103*	100 %	*103*	
Total for the 2021-2027 budget period (EU funds, EU ETS trading revenue)*:			***5 820***	
** This does not take into account Estonia's own contribution, i.e. the investment volume to be triggered by the support measures is higher*				

More information on the specific objectives and actions to be supported can be found on the EU structural instruments, the Just Transition Fund and the Recovery and Restart Facility https://www.rtk.ee/toetusfondid-ja-programmid/euroopa-liidu-valisvahendid/2021-2027-toetusperiood; On the planned use of EU common agricultural policy instruments in the CAP Strategic Plan 2023-2027 https://www.agri.ee/euroopa-liidu-uhise-pollumajanduspoliitika-strateegiakava-2023-2027 and the European Maritime, Fisheries and Aquaculture Fund (EMFAF) plan https://www.agri.ee/euroopa-merendus-kalandus-ja-vesiviljelusfond-2021-2027; The use of the resources of the EU ETS trading income and the use of the Estonian part of the Modernisation Fund in the budgetary strategy https://www.fin.ee/riigi-rahandus-ja-maksud/riigieelarve-ja-eelarvestrateegia/riigi-eelarvestrateegia.

At the same time, the needs for progress towards the 2030 targets and targets are important than those of the public sector, therefore the use of the latter is particularly important to stimulate and mobilise private and third sector activities and contributions. The trend in recent years that both commercial banks and

(international) development banks are increasingly important in making debt finance available is also of great importance to the design of activities and projects, interlocking with criteria set against different frameworks, etc. In addition, prices of (fossil) energy, which have risen quite sharply since 2021 and remain at relatively high levels in spite of fluctuations, have led, among other things, to a reduction in payback times for projects that improve energy efficiency and promote renewable energy production, consumption and storage, and have also improved the availability of investment finance for such projects.

The following are examples of research results related to progress towards energy and climate objectives in different sectors, as well as forecasts and ex ante assessments of investment needs. As these studies, forecasts and scenarios have been carried out at different times, in different ranges and under slightly different assumptions, the forecasts/ex ante estimates of investment needs in them are not directly comparable or aggregated, but they give an indication of the order of magnitude of needs in different areas. However, as of March 2023, the cross-sectoral and cross-sector scenarios developed in the different domains have not yet been finalised and the effects of these different combinations are not assessed ex ante. In particular, as important TSI (Technical Support Instrument) projects co-financed by the European Union are still ongoing until autumn 2023:

- study analysing and detailing energy efficiency measures, 'Support to the renovation wave – energy efficiency pathways and energy saving obligation in Estonia' (REFORM/SC2022/067);
- sustainable finance project EU Taxonomy Implementation and Sustainable Finance Roadmap for Estonia and Latvia.

According to the long-term strategy for the renovation of buildings completed in 2020, the total annual volumes[of] the different building categories are to be fully renovated up to 2.3 million m² per year in the years with the highest renovation activity, which represents an almost 5-fold increase compared to current annual volumes, which can largely be achieved by adjusting the shares of new construction and renovation in the construction sector. In 2019 prices, the total cost of the complete renovation of the 54 million m^2 building stock would be close to EUR 22 billion and the average full renovation cost for the whole building stock would be EUR$^{400/m^2}$. If the full cost of renovation of public buildings is taken into account, the total cost of the complete renovation of the building stock would be EUR 24 billion. As of spring 2023, this order of magnitude is likely to be around EUR 30 billion due to the price increase.

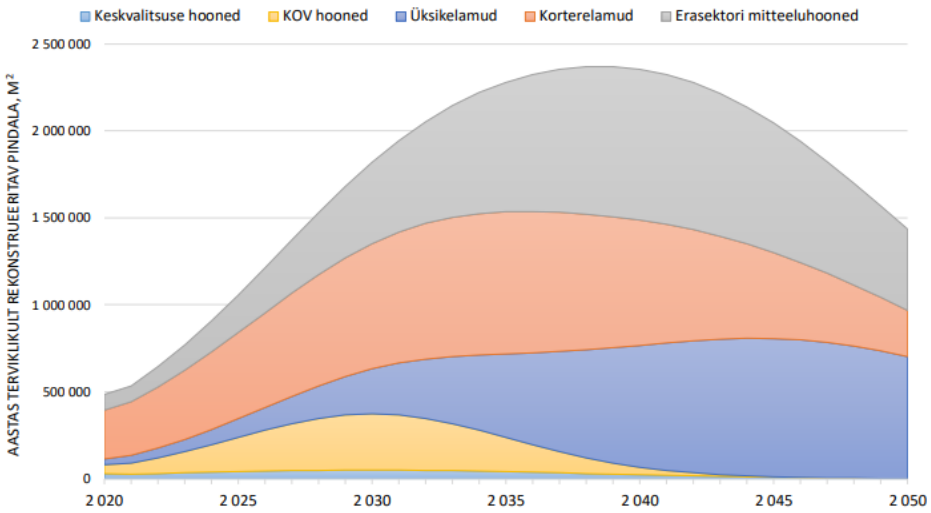

Figure 5.3 Annual reconstructed surface of buildings (REKS)

[297]According to the study on 'carbon-neutral heating and cooling by 2050', completed in 2022, the investment needs assessed are as follows:

- renovation of buildings EUR 16,739 billion
- heating and cooling technologies up to EUR 2.274 billion (for maximum switching to heat pumps)
- district heating and cooling infrastructure up to EUR 1.012 billion.

[298]According to the study 'Transition to climate-neutral power generation', completed in 2022, the investment needs assessed are as follows:

- Capital costs for renewable electricity and storage up to EUR 14,293 billion (including interest payments of EUR 3.253 billion, offshore wind farms EUR 7.748 billion, onshore wind parks EUR 1.264 billion, batteries EUR 1.034 billion, solar panels EUR 388 million)
- Pumped hydropower plants would cost between 184 and EUR 368 million
- Reinforcement of the electricity grid up to EUR 355 million
- Renewable energy subsidies up to EUR 209 million in 2030
- The cost of deploying nuclear energy would be up to EUR 2329 million.

List of Projects of Common Interest[299]:

- EE Pumped Hydroaccumulation Power Plant
- Integration and synchronisation of the Baltic States' electricity networks with European networks

Additional potential PCIs in the future:

- Estlink 3;
- Fourth connection Estonia-Latvia

The support measures presented in Annex XIII of the NECY 2030 progress report are set out in the table below, including EUR 2.4 billion of support paid up to 2021 and a total of EUR 3.1 billion in support measures for 2022-2027

Table 5.6 Support measures until 2027 and private funding related to the use of grants up to 2021 million euro (based on the Annex to the Progress Report 2030/Annex XIII 15.3.2023)

Sector	Support measures up to EUR 2021 million	Private funding linked to grants up to EUR 2021, million	Support measures 2022-EUR 2 027 million
Energy	1288	147	567*
Transport	190	5	1461
Buildings	723,6	270	368,3
Agriculture, Farming	180,5	0	651,4
Waste	13,5	0	76,5
LULUCF	16,9	0	19,2
IPPU	0	0	0
ROHETEHN.	0	0	6,14

[297] Opinion OF THE GENERAL SECURITY OF THE GENERAL CONCLUSIONS ON THE SECURITY PRODUCTS FOR 2050 | Energiatals
[298] Estonia Action Plan D7 Figures and data Computers (Excel Table) sheet F3-6 Electricity surveys | Energytals
[299] https://eur-lex.europa.eu/legal-content/ET/TXT/HTML/?uri=CELEX:32022R0564

TOTAL	2412,5	422	3149,5

**Including EUR 518 million of grants channelled through Elering AS in 2022-2027*

ii. Sector or market risk factors or barriers in the national or regional context

The main risk factors for the energy economy, including the market, are continuous variables related to balancing uncontrolled and/or weather-dependent energy sources (solar, wind, hydropower, sustainably produced biomass) and controlled capacities during peak demand, developing flexibility mechanisms aimed at adjusting energy consumption; the volatility$_{of}$ fuel and CO2 prices, the speed with which storage facilities and other necessary technological solutions are developed, and the speed at which sufficient maturity is reached, and the price levels of the result of their wider deployment become more affordable; continuous tightening of the requirements defined in the legal framework (including as a result of negotiations on legislative changes at EU level, some of which are still ongoing as of March 2023), (technological developments), geopolitical situation and technical security of supply. Competence at different levels (including avoiding investments that run counter to national objectives) is an obstacle; underdevelopment and insufficient dissemination of climate, environmental, technological knowledge) to continually cope with these variables, including to keep up with innovation in digital technologies etc. The implementation of most of the measures listed above, including related investments, requires the following conditions to be met:

- Monitoring the global and local energy market
- Stable regulatory environment/Making the regulatory framework more stable, including improved predictability of future changes (including strategic planning)
- Existence, continuous raising and awareness-raising in the public, private and third sectors
- Promoting technology availability and technical capabilities
- Cross-sectoral cooperation, including exchange of experience and search for and dissemination of best practices at all levels
- Systematic monitoring of the implementation of measures, feedback to improve their targeted performance and more synergies between measures
- In addition to national strategic development documents, government decisions (including the government action programme, the recovery and resilience plan, including the RePower EU chapter).

iii. Analysis of additional public finance support or resources to fill identified gaps identified under point ii

In Estonia, the public resources needed to progress towards the country's targets are planned on the basis of sectoral and cross-sectoral strategic planning documents and in the national budgetary strategy process[300]. There is therefore no separate financing plan related to the NECP 2030 objectives in Estonia.

In order to implement the measures, including the definition of the resources needed for investments, it is necessary to:

- Establishment of indicators and platform to monitor energy market changes, participation in international cooperation
- Timely involvement of the sector in the application of EU legal requirements (to be taken into account in time for the transposition of legal requirements and for public consultation in the timetable for the implementation of the measures)

[300] State budget strategy | Ministry of Finance (fin.ee)

- Organisation of training and internships (analysis of knowledge and training needs related to the implementation of the measures), information campaigns, continuous improvement of study programmes (periodic analysis of training needs) in order to improve the competences related to the implementation of the new requirements.
- Availability of affordable technologies and workforce (periodic technologies and labour analysis)
- Diversifying forms of cooperation
- Annual evaluation of the implementation of the measures and, where appropriate, proposals to increase their positive impact

5.4. Impact of the proposed policies and measures on other Member States and regional cooperation

This chapter shall cover the impact of planned policies and measures under point 3 on other Member States and regional cooperation until at least the last year of the period covered by the plan, including a comparison with projections of existing policies and measures.

i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible

The achievement of the NECPs targets is not expected to have significant negative impacts on the energy systems of other countries, including the Baltic States. On the contrary, e.g. synchronisation of the electricity system with Central Europe, development of the regional gas market, development of offshore wind farms have a positive impact on the region's energy supply. Electricity infrastructure measures (see section for details2.4.2) are primarily aimed at synchronising the Baltic States' electricity system in a band subject to European Union law. Activities under the Baltic synchronisation project take place in Estonia, Latvia, Lithuania and Poland. Investments under synchronisation will strengthen both transnational interconnections and national electricity transmission networks. This will remove the bottlenecks in the electricity system and increase the interconnection between the Baltic States and Poland. In addition, offshore wind and storage projects have a significant regional impact.

Ideally, offshore wind farms could become natural positive by 2030[301] (negative effects over the entire life cycle of the project must not outweigh the irreversible effects on species, habitats, marine and coastal ecosystems) and their construction should take into account the principles of a sustainable blue economy[302]. Thelocation, guidelines and conditions for the construction of offshorewind farms in Estonia are determined by the maritime spatial plan and the development of offshore wind farms in Estonia is based on best practice so far and in synergy with other countries[303].

ii. Impacts on energy prices, utilities and energy market integration

The integrated electricity system of the Baltic States also results in the convergence of electricity exchange prices in the Baltic States. Siiski was the average electricity exchange price of EUR 192,82/MWh in Estonia in 2022, while in Latvia EUR 226,91/MWh, Lithuania EUR 230,23/MWh and Finland EUR 154,04/MWh. It can be seen that price differences between price areas were significantly higher in 2022 than in previous years, pointing to the need to build additional cross-country transmission capacities. The proposed electricity infrastructure measures will have a positive impact on both energy exchange prices and electricity market integration.

[301] Ore go-to-areas_21APRIL2023.pdf (CDN-website.com)
[302] Principles for a Sustainable Blue Economy | WWF (panda.org)
[303] Maritime planning by the Ministry of Finance of | (fin.ee)

iii. Where appropriate, the impact on regional cooperation.

The project on synchronisation of the Baltic States' electricity systems has a huge impact on the Baltic States and Poland and has led to the need for very intensive regional cooperation. The most important forms of cooperation within the Energy Committee of the Baltic Council of Ministers and the BEMIP High Level Working Group on Synchronisation and Technical Working Groups have intensified in recent years. In both forms of cooperation, the implementation of the project is monitored and the issues and problems raised are addressed on a regular basis.