Estonia’s 2030 National Energy and Climate Plan

(NECP 2030)

Estonia's Communication to the European Commission under Article 3(1) of Regulation (EU) No 2012/2018.

Final version 19 December 2019

CONTENTS

Annex II KPP 2050 policies and principles
Annex III Relation between the measures in NECP 2030 and the objectives of the plan
Annex IV Descriptions of the measures
Annex V Responses to the comments on the draft version of NECP 2030

SECTION A: NATIONAL PLAN

1. OVERVIEW AND PROCESS FOR ESTABLISHING THE PLAN

1.1. Executive Summary

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

The year 2019 marked 28 years since Estonia regained its independence. We have been a member of the EU for 15 of those years. In 2019, the main factors behind the ever-increasing energy demand were open offices and working from home, zero-energy buildings, air-conditioning and ventilation, electric scooters and parcel robots, social media, smart devices and cloud services, There are currently no exact projections of the impact of these new energy dependencies on the climate and the environment, on energy management or human health. The Estonia 2035 strategy[1], which assesses global megatrends and will influence lifestyles - and hence energy demand - is currently being drafted.

In 2019 there are 1.32 million people living in Estonia, with an average monthly gross salary of €1,419. The employment rate is 5.1%. GDP in the previous year was € 26 billion (€ 19,737 per capita), while exports totalled €14.4 billion and imports €16.2 billion. Economic growth was approximately twice as rapid as the EU average (in 2018, real GDP growth in Estonia was 3.9%, whereas the EU average was 2.0%=. The generation of electricity from oil shale and wind power decreased in 2018 compared to the previous year, while electricity generation from wood fuels increased. The production and export of wood pellets continues to increase. Estonia has three times as much organic farmland than the EU average, accounting for 20% of the land. The air in Estonia is among the world's purest - for example Tallinn ranks fourth on the list of capital cities with the purest air. There is still a need to address air pollution particulates (PM2.5) and related emissions from local heating that are due to ageing heating equipment and incorrect wood-based heating methods[2].

Under the Government's action programme[3], the current Government plans to develop the Estonian economy into a competitive, low-carbon economy by the middle of the century. On 3 October 2019, the Government decided to support the establishment of an EU-wide long-term climate neutrality objective by 2015 if there are sufficient transition measures and the differences and different baselines of Member States and sectors are taken into account. Member States should retain the right to select appropriate ways of achieving the targets, including making sovereign tax assessments to achieve climate neutrality. Measures for achieving a climate-neutral economy in Estonia by 2015 are currently under development and hence cannot be included in this plan.

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[1] Materials on the Estonia 2035 strategy can be found at: https://www.riigikantselei.ee/et/valitsuse-toetamine/strateegia-eesti-2035/materjalid

[2] This section uses data from the Statistics Estonia portal, www.stat.ee.

[3] See point 15.6 of the Government's action programme, https://www.valitsus.ee/sites/default/files/content-editors/valitsus/Ratasellvalitsus/vabariigi_valitsuse_tegevusprogramm_2019-2023.pdf

Estonia's 2030 National Energy and Climate Plan ('NECP 2030') is a communication that has been drawn up to meet the requirement laid down in Article3(1) of Regulation (EU) No 2018/1999 on the Governance of the Energy Union and Climate Action ('the Regulation'), according to which each Member State is to prepare and submit to the Commission its national Energy and Climate Plan every ten years. The plan must be submitted to the Commission by 31December 2019 and any updated versions or justifications for not updating the plan must be submitted by 30 June 2023 and 30June 2024. The Regulation sets out a template for the plan to ensure all Member State plans are comparable. The Commission will publish all the plans on its website.[4]

In Estonia, strategic planning by the State is based on the State Budget Act[5]. According to the Act, there are two types of development document in Estonia, namely those concerning fundamental elements of policy and development plans. Documents concerning fundamental elements of policy are approved by decision of the Estonian Government following discussion in Parliament. This means that in Estonia, the energy objectives and actions required in the national energy and climate plans of Member States are laid down primarily as sectoral development documents and documents on fundamental elements of policy.

1) The fundamental elements of Estonia's climate policy for 2050 (ENMAK 2050) are as follows[6]:
2) Estonia's energy development plan to 2030 (ENMAK 2030)[7]:
3) Plan for climate change adaptation by 2030[8];
4) 2014-2020 transport development plan[9] (2021-2030 plan is under preparation);
5) 2011-2020 forestry development plan[10] (2021-2030 plan is under preparation);
6) 2014-2020 national waste management plan[11] (2021-2030 plan is under preparation);
7) Estonian 2014-2020 rural affairs development plan (2021-2030 plan is under preparation);

NECP 2030 will be updated in future years based on the development plans being drawn up for the following decade and submitted to the European Commission by 30 June2013 and in connection with supplementing the national targets by 30 June 2024. NECP 2030 describes the provisions of these development documents and highlights the relevant measures and trends. The development plans on which the NECP 2030 is based are the strategic environmental assessments (SEA), in accordance with the Environmental Impact Assessment and Environmental

[4] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans
[5] The State Budget Act can be found at: https://www.riigiteataja.ee/akt/107072017040
[6] http://www.envir.ee/sites/default/files/362xiii_rk_o_04.2017-1.pdf
[7] https://www.mkm.ee/sites/default/files/enmak_2030.pdf.
[8] https://www.envir.ee/sites/default/files/kliimamuutustega_kohanemise_arengukava_aastani_2030_1.pdf
[9] https://www.mkm.ee/et/tegevused-eesmargid/transport
[10] https://www.envir.ee/et/metsanduse-arengukava-2011-2020
[11] https://www.envir.ee/et/eesmargid-tegevused/jaatmed/riigi-jaatmekava-2014-2020

Management System Act (KeHJS). **The NECP 2030 does not constitute a strategic planning document under Section 31 of the Act, as the requirement to draw it up is laid down in Regulation (EU) No 2018/1999. NECP 2030 includes both measures from national development documents and measures under discussion.** Future updates to the NECP 2030 will include case-by-case assessment of whether, depending on amendments to the document, the document fulfils the functions of a strategic planning document within the meaning of the Act. The Act lays down provisions concerning national strategic planning documents, but not the process of initiating and drafting the SEAs of documents required under EU and international agreements. For the reasons given above, no SEA procedure carried out for the NECP 2030 [12].

In addition to the above-mentioned development documents, the following studies were used in the course of drafting to develop measures:

1. National general energy efficiency obligation for the period 2021-2030 and achievement of the renewable energy target (2018); https://www.mkm.ee/sites/default/files/180917_energiatohusus_2030_aruanne.pdf
2. Study to identify the most cost-effective measures for achieving climate policy objectives and the aims of the Effort Sharing Regulation in Estonia (2018); https://www.envir.ee/sites/default/files/news-related-files/aruanne_kliimapoliitika_kulutohusus.pdf
3. Analysis of the opportunities for increasing Estonia's climate ambition (2019) (drafted by SEI Tallinn, Finantsakadeemia OÜ) https://www.sei.org/publications/eesti-kliimaambitsiooni-tostmise-voimaluste-analuus/

This document has been drawn up jointly by the Ministry of Economic Affairs and Communications, the Ministry of the Environment and the Ministry of Rural Affairs based on the development documents and studies referred to above and other relevant analysis.

These development documents were drawn up during the creation of NECP 2030 and involved experts from business, research and development institutes, local government bodies and their representative organisations, and community, environmental and professional associations.

ii. Strategy relating to the five dimensions of the Energy Union.

NECP 2030 has been drawn up on the basis of the applicable development documents, which in their turn had been drafted taking into consideration EU and international environmental, energy and climate aims. Chapter 1.2.ii considers the five dimensions of the Energy Union in Estonian policy and measures. Together with the Nordic countries,

[12] According to the Ministry of the Environment's coordination letter on the draft NECP 2030, dated 11.11.2019 No 1-5/19/5595-2.

Baltic States and EU Member States, as well as various national organisations, Estonia is moving towards the development of an energy community that takes consumers into account and the markets, spreads best practices, applies the latest scientific developments and innovations and up-to-date technological solutions to achieve a climate-neutral, competitive, environmentally friendly and socially responsible, sustainable economic model.

The objective of the Energy Union[13] is to give EU consumers - households and businesses - secure, sustainable, competitive and affordable energy. It requires the creation of a Europe-wide energy system. The climate change strategy of the Energy Union to create a sustainable climate-friendly economy with reduced CO_2 emissions includes: consumer empowerment, alignment of the policies and legal frameworks of the Member States, elimination of barriers to entry and isolated areas, establishment of an integrated energy market, thereby ensuring affordable energy prices, upgrade of energy infrastructure to allow greater production capacities of renewable energy and increase investment, investments in new high-tech industries, business models, professions and competitive businesses to create new jobs.

To increase energy security, sustainability and competitiveness, the Energy Union aims to:

- Develop the internal energy market, make energy consumption more efficient, diversify energy sources and supply routes, work closely to ensure security of supply, increase Europe's role in the global energy market, and increase the transparency of the gas supply (the energy security, solidarity and trust dimension);
- Interconnect markets, fully implement EU energy legislation with the internal market for energy measures, enhance regional cooperation, empower consumers and make new deals with consumers, and decrease energy poverty (the fully integrated internal market dimension);
- create a more energy-efficient construction sector and an energy-efficient, decarbonised transport sector (the energy efficiency dimension);
- Plan an ambitious climate policy, retain leadership in the area of renewable energy (the decarbonising the economy dimension);
- Be at the forefront of next generation of renewable technologies, storage solutions, smart grid and home solutions, smart cities, building neutrality, clean transport, carbon capture and storage (CCS) and nuclear energy files under Horizon 2020 (the research, innovation and competitiveness dimension);

iii. Overview table with key objectives, policies and measures of the plan

[13] Energy Union package on A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy.
http://www.europarl.europa.eu/meetdocs/2014_2019/documents/com/com_com(2015)0080_/com_com(2015)0080_et.pdf

The key objectives of NCEP 2030 are as follows:

- **Achievement of an 80% reduction in GHG emissions by 2050 (including 70% by 2030);** In 1990, greenhouse gas (GHG) emissions were 40.4 Mt CO_{2ekv} (excl. LULUCF[14]), in 2017 they were 20.9 Mt CO_{2ekv} (incl. 14.7 Mt CO_{2ekv} from the energy sector). The projected GHG emissions for 2030 when the existing and additional measures under the NCEP 2030 are applied are 10.7-12.5 Mt CO_{2ekv}, (excl. LULUCF).
- **Achieve a 13% reduction of GHG emissions by 2030 compared to 2005 levels in the sectors falling under the scope of the Shared Effort Regulation (transport, small-scale power, agriculture, waste management, forestry, industry).** According to the 2019 GHG inventory, in 2005 GHG emissions in the sectors covered by the Shared Effort Regulation totalled 6.3 Mt CO_{2ekv}[15], i.e. in 2030 emissions from the sector might total 5.5 Mt CO_{2ekv} (the exact target for 2030 will become clear in 2020, when the national emission levels for the period 2021-2030 will be determined for the sectors under the Regulation).
- **The share of renewable energy in total final consumption must be at least 42% by the year 2030:** In 2030, production of renewable energy will be 16 TWh, which is 50% of final energy consumption, including 4.3 TWh renewable electricity (2018 = 1.8 TWh), renewable heat 11 TWh (2018 = 9.5 TWh) and transport 0.7 TWh (2018 = 0.3 TWh);
- **In 2030, final energy consumption must remain at 32-33 TWh:**
- Estonia's economy is growing, so significant measures are needed to keep consumption at the same level. The general energy saving objective of 14.7 TWh for the period 2020-2030 applicable under Directive 2012/27/EU (the Energy Efficiency Directive) will help keep final energy consumption at the same level. Making primary energy consumption more efficient will help reduce energy consumption.
- **Reduction of primary energy consumption to 14% (compared to the peak of recent years):** In the period 2020-2030, Estonia is capable of reducing primary energy consumption by steps such as modernising the shale industry.
- **Ensuring energy security by keeping the rate of dependency on imported energy as low as possible:** Use of local fuels is kept as high as possible (including increasing the use of fuel-free energy sources), developing biomethane production and potential uses.
- **Meeting the minimum criteria for interconnectivity of electricity grids**: Increasing capacity towards Latvia and synchronising the power grid with the Central European frequency band by 2025.
- **Use of research and development and innovation in measures to retain the competiveness of the economy:** Implementation of the energy sector's

[14] Land Use, Land Use Change and Forestry.
[15] Estonian GHG emissions inventory1990-2017: https://www.envir.ee/et/eesmargid-tegevused/kliima/rahvusvaheline-aruandlus/kui-palju-eestis-kasvuhoonegaase-tekib

research and development programme will enable the application of measures using research and development results.

A total of 71 measures have been developed to meet the NECP 2030 objectives: 22 for agriculture, 16 for transport, 13 for energy, 8 for forestry, 6 for building stock, 4 for waste management and 1 for industry. One measure is cross-sectoral. The impact of these measures on GHG reduction, renewable energy and energy-efficiency is shown in Annex III of the plan and the measures are described in Annex IV. The main energy and climate measures of the plan are shown in Table 1.

Table 1. Main energy and climate measures by sector.

Sector	Key actions
ENERGY	Additional development of heating and electrical efficiency Reverse tenders of renewable energy Development of wind parks (including off-shore) Development of heating infrastructure Grid development, incl. synchronisation with Central Europe More efficient use of primary energy Energy sector research and development programme
TRANSPORT	Increasing use of electric transport, soft mobility, biofuels Increasing the affordability, energy- and fuel-efficiency of vehicles Development of public transport Development of railway infrastructure Electrification of railways and ferries

BUILDING STOCK	Redevelopment of public sector (central and local government) buildings, business and residential premises and street lighting Implementation of minimum requirements for zero-energy buildings
AGRICULTURE	Organic farming Environmentally-friendly agricultural practices Improved use of fertiliser Investments in energy savings and renewable energy, incl. mobilisation of bioenergy Storage and increase of carbon stock in soil Improving animal welfare and feed quality Promoting enterprise, knowledge transfer and information actions Audits of farming businesses
WASTE MANAGEMENT	Reducing biodegradable waste Reuse and reduction of waste materials Reduced landfilling Reducing environmentally hazardous waste

FORESTRY	Timely regeneration of forests Regeneration of privately-owned forests with tree species appropriate to habitat type Improving the health and viability of forests Replacing fossil fuels and non-renewable natural resources with wood-based products Natura 2000 support for privately-owned forest land Protection of habitats and species populations in Estonia
INDUSTRIAL PROCESSES	Reduction of fluorinated greenhouse gas emissions and their replacement by alternatives
CROSS-SECTORAL MEASURES	Green technology investment programme

Table 2 shows Estonia's main energy and climate policy objectives and the measures intended to achieve them.

Table 2. Estonia's main energy and climate policy objectives, policies and measures.

2030 targets	Policy Orientations	Annex III measures
Estonia's national target for GHG emission reduction compared to 1990 emissions levels is 70% by 2030	Estonia's long-term objective is to transition to a low-carbon economy, which means gradually reforming the economy and energy system to be resource-efficient, productive and environmentally-friendly in line with the objectives.	Most measures contribute towards meeting the objective
To meet the binding national objective of a 13% reduction in GHG emissions compared to the 2005 level by 2030	The use of fossil fuels will be reduced and CO_2 emissions will decrease due to energy savings in transport, agriculture, waste management and industrial processes and small-scale	EN3, EN4, EN7, TR2-TR16, HF1- HF6, PM1-PM6, PM8-PM10, PM12-PM22, JM1-JM4, IP1

	power production where energy is produced by facilities with a rated output of less than 20 MWh.	
Carbon emissions from land use, changes in land use and forestry (LULUCF) must not be greater than capture	The volume of wood fuel production and use are mainly determined by the carbon capture obligation of the managed forest land set out in the national forestry accounting plan [16] and the measures in the 2021-2030 forestry development plan.	MM1-MM8, IP1
Final energy consumption, 32 TWh/a	To maintain final energy consumption in the period 2021-2030 requires annual energy savings equivalent to 0.8% of the average final energy consumption in the period 2016-2018. The achieved energy saving must be cumulative, in other words the volume of the saving made in previous years must be stable throughout the period.	EN1, EN3, EN4, EN7-EN10, HF1- HF6, TR2-TR6, TR8-TR12, PM8, PM22, IP1
Reducing primary energy consumption to 14%	Estonia has the highest primary energy intensity of all the EU Member States.[17] Consumption of primary energy is forecast to drop by a quarter in the period 2017-2030.	EN1, EN3, EN4, EN7-EN10, HF1- HF6, TR2-TR6, TR8-TR12, PM8, PM22, IP1
Renewable energies share of total final energy	The share of renewables will be increased by changing fossil fuel boilers	EN1-EN7, TR1, TR7, TR14, TR15, TR16, PM7, PM11,

[16] Summary of the Ministry of the Environment's 2019 national forestry accounting plan for 2021-2025: https://www.envir.ee/sites/default/files/riiklik_metsanduse_arvestuskava_eestikeelne_kokkuvote.pdf
[17] European Union Primary Energy Intensity 2016 https://www.indicators.odyssee-mure.eu/online-indicators.html

consumption 42%	to renewable fuels, increasing electricity generation from fuel free sources and increased use of biofuels in transport.	PM22, IP1
Share of renewable electricity 40%	Increase in the volumes of wind power produced (both on-land and off-shore wind farms solar energy and the use of wood-based fuels and restrictions on hydro pump stations	EN1, EN2, EN5- EN7, IP1
Share of fuel-free energy sources in final electricity consumption >25%	Restriction of on-land and off-shore wind parks and use of the potential of solar power	EN1, EN2 , EN5- EN7, IP1
Total share of cogeneration in electrical power >600MW$_{el}$	If the potential of cogeneration were fully exploited, it would account for one quarter of electrical power	EN1, IP1
Renewable energy share in heating 63%	The potential of wood fuels is increasingly exploited for heating and cooling in Estonia and the share of heat pumps is steadily increasing.	EN3, EN4, IP1
Share of renewable transport fuels 14%	Primarily met by domestic biomethane, taking into account the use of gaseous fuels in Estonia. The plan is to produce up to 340 GWh of biomethane (actual volume required without multipliers	TR1, TR16, IP1

1.2. Overview of current policy situation

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

The preparation of NCEP 2030 began with the preparation of ENMAK 2030 at the end of 2012. Since then, international and EU climate and environmental requirements have become successively stricter, meaning more measures have been added to the plan.

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

Table 3 shows policies and measures related to the five dimensions of the Energy Union.

Table 3. Estonian policies and measures in relation to the dimensions of the Energy Union.

Dimension	Policy Orientations	Annex III measures
Reduction in CO_2 emissions	Estonia's long-term objective is to transition to a low-carbon economy, which means gradually reforming the economy and energy system to be resource-efficient, productive and environmentally-friendly in line with the objectives.	Most measures
Energy-efficiency	Increasing the energy-efficiency of power generation, buildings, transport and agriculture	EN1, EN3, EN4, EN7-EN10, HF1- HF6, TR2-TR6, TR8-TR12, PM8, PM18, PM22, IP1
Energy security	Use of domestic fuels and fuel-free energy sources, diversification of energy sources and supply, ensuring affordable energy supply, development of the distribution network	EN1-EN13, TR1, TR7, TR13-TR15, TR16, PM7, PM11, PM22, IP1
Internal Energy Market	Synchronisation of the electrical system with the Central European frequency band, developing international connectivity and preparedness, restriction of Rail Baltic*	EN8-EN13, TR13, IP1

Research, innovation and competitiveness	Supporting implementation of the measures in this plan, dissemination of new knowledge, studies and pilot projects assessing climate impact	EN7, PM4, PM22, IP1

** Rail Baltic connects Estonia with Central and Western Europe, and is expected to replace some road transport, thereby reducing emissions into the air, etc.[18].*

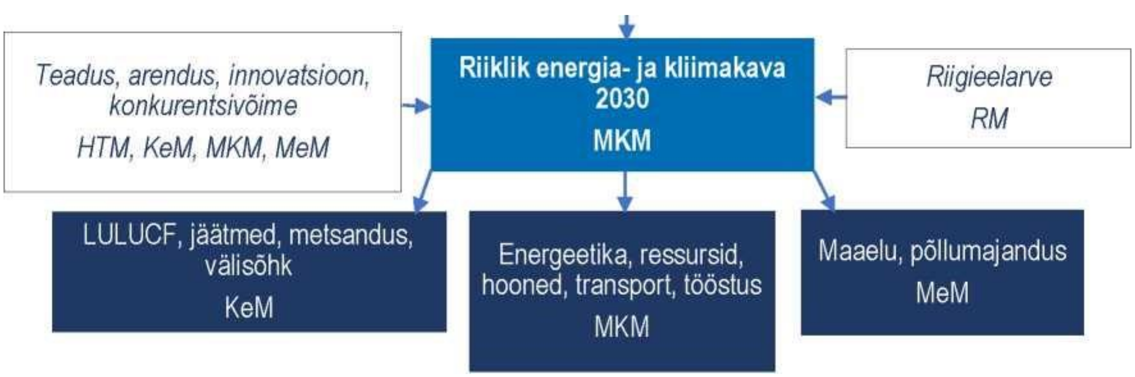
iii. Key issues of cross-border relevance

The key issues of cross-border relevance for Estonia's energy sector are as follows:

- Joining the synchronisation frequency of Continental Europe;
- Ensuring sufficient production capacity in the regions, integration of electrical system supply market;
- Ensuring security of gas supply; additional integration of the gas market;
- Development of charging and fuelling facilities for vehicles using alternative fuels;
- Achieving renewable energy objectives as cost-effectively as possible (using the potential of wind in areas close to the national border).

iv. Administrative structure of implementing national energy and climate policies

Estonia's climate targets were set out in 2017 in the vision paper 'General principles of climate policy for 2050', and the principles and policies in it formed a basis for drawing up NCEP 2030. The Ministry of Economic Affairs and Communications is responsible for drafting and implementing the plan, and for monitoring implementation. The Ministry of Finance is responsible for financing the plan on the basis of a budget prepared jointly with other ministries. Figure 1 shows the ministries responsible for planning, implementing and monitoring measures in the plan for the sectors covered by the plan.



[18] Rail Baltic Estonia https://rbestonia.ee/proiektist/korduma-kippuvad-kusimused/

Figure 1. Administrative bodies involved in the planning and implementation of climate and energy policy.

Key:

KLIIMAPOLIITIKA PÕHIALUSED 2050 KeM = GENERAL PRINCIPLES OF CLIMATE POLICY 2050, Ministry of the Environment

Teadus, arendus, innovatsioon, konkurentsivoime, HTM, KeM, MKM, MeM = Research, development, innovation, competitiveness, Ministry of Education and Research, Ministry of the Environment, Ministry of Economic Affairs and Communications, Ministry of Rural Affairs

Riiklik energia- ja kliimakava 2030 MKM = National Energy and Climate Plan 2030 = Ministry of Economic Affairs and Communications

Riigieelarve RM = State Budget, Ministry of Finance

LULUF, jäätmed, metsandus, välisohk KeM = LULUF, waste, forestry, ambient air, Ministry of the Environment

Energeetika, ressursid, hooned, transport, tööstus MKM = Energy, resources, buildings, transport, industry, Ministry of Economic Affairs and Communications

Maaelu, põllumajandus MeM = Rural affairs, agriculture, Ministry of Rural Affairs

1.3. Consultations and involvement of national and EU entities and their outcome

i. Involvement of the national parliament

The draft NECP 2030 and its drafting procedure was first introduced by the Ministry of Economic Affairs and Communication and the Ministry of the Environment to the Economic Affairs Committee of the Estonian Parliament (Riigikogu) on 13 November 2018. The final version of NECP 2030 was presented on 18 November 2019, 19 November 2019 and 2 December 2019 in accordance with the Parliamentary Committee for EU, Economic and Environmental Affairs.

ii. Involvement of local and regional authorities

Proposals made regarding the draft NECP 2030, and an overview of how these proposals were assessed, can be found in Annex V.

Preparations for drawing up the draft ENMAK 2030 began in October 2012, involving local government, organisations representing the energy sector and stakeholders in Estonian policy-making regarding energy. All local government bodies in Estonia were informed that ENMAK 2030 and a strategic assessment of its environmental impact were being drawn up. Local government representatives also took part in discussions related to the drafting of ENMAK 2030. They were similarly involved in the drafting process for the ‘General Principles of Climate Policy for 2050’ paper.

Local government bodies who had been actively involved in drawing up ENMAK 2030 were informed in June 2018 about the draft NECP 2030 by a joint letter from the Ministry of Economic Affairs and Communication and the Ministry of the Environment.

The joint letter invited interested parties to express their interest in participating in the process of drafting NECP 2030 using an online form[19].

Local government representatives and others were invited to attend a draft NECP 2030 introduction event on 9 October 2018. The Association of Estonian Cities and Municipalities, which is the organisation representing local government in Estonia, is a member of the Energy Council of the Ministry of Economic Affairs and Communications.

Before the introduction event, working documents related to the draft NECP 2030 were published on the cloud page of the Ministry of Economic Affairs and Communications[20].

The working version of the draft NECP, supplemented based on the proposals received by June 2019, was presented on 4 October 2019 after the presentation of the International Energy Agency's review of Estonia[21] to 165 representatives of the energy sector. There were also NECP 2030 discussions on the topic of the just transition and low-carbon technologies with 60 participants at the Ministry of the Environment on 18 October 2019. On 14 November 2019 the final draft version of NECP 2030 was presented to 150 participants at a conference on research into and use of renewable energy sources at the Estonian University of Life Sciences in Tartu[22]. The drafts were presented on 18 November 2019, 19 November 2019 and 2 December 2019 in accordance with the Parliamentary Committee for EU, Economic and Environmental Affairs.

Public consultation on draft 2030 NCEP

The first working version of the draft NECP 2030 was published in the Estonian Information System for Legal Drafts of the Government of the Republic (EIS)[23] on 10 December 2018 with an invitation to submit general comments on it by 20 December 2018 and detailed comments by 6 February 2019. The Ministry of Economic Affairs and Communications forwarded the notice about the public consultation on 7 December 2018, among others, all parties that had expressed a wish to receive information on the progress of NECP 2030 using the online form.

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[19] http://bit.ly/REKK_2030_huviline. As at 27 December 2018, 130 interested parties had registered their interest in the NECP 2030 procedure using the form.

[20] https://pilv.mkm.ee/s7WKCg4wfGoKZnzDR.

[21] Launch of IEA Estonia review on 4 October 2019. https://www.iea.org/newsroom/news/2019/october/new-iea-policy-review-offers-recommendations-for-estonias-energy-transition.html

[22] Review of the Estonia's national energy and climate plan for 2030 at the 21st Conference on research into and use of renewable energy sources, broadcast on 14.11.2019 https://tv.delfi.ee/live/

[23] https://eelnoud.valitsus.ee/main/mount/docList/80cc82db-711d-481b-8b4f-82af433e3ee9

Since 21 December 2018, the draft NECP 2030 has been available for comment in the EIS. The comments, in Annex V, were taken into account when drafting NECP 2030.

The NECP 2030 document submitted to the European Commission by the end of 2019 was coordinated with other ministries via the EIS and other interested parties were able to express their opinion about the draft during this process.

Executive summary of the initial considerations submitted about the draft NECP 2030

Comments submitted on the draft and how they were taken into account in the draft NECP 2030 can be found in Annex V to the draft. In 2019, the following institutions submitted their comments: the European Commission, Estonian Fund for Nature, Estonian Green Movement, Estonian Environmental Law Centre, Estonian Seminatural Communities Conservation Association, Estonian Energy Industries Union (ETL), Elektrilevi OÜ, Estonian Renewable Energy Association, Fermi Energia OÜ, the oil shale processing industry company Viru Keemia Grupp AS, the Ministry of Finance, Tiit Kallaste (Estonian Hydrogen Association), International Association of Oil & Gas Producers, AS Estonian Cell, Team Paldiski OÜ, Teet Randma, environmental organisations and the Competition Authority. On the whole the comments and proposals were related to energy supply and transmission, production capacities, production and carbon price projections; specification of plan targets, indicators and measures and implementation of measures. The Minister of the Environment and the Minister of the Rural Affairs approved the October 2019 working version of the draft NECP 2030 in the EIS, while the Ministry of Finance, Ministry of Defence, Ministry of the Interior and Ministry of Education and Research sent supplementary drafting proposals.

Evaluating the initial comments concerning the draft NECP 2030

The draft NECP 2030 has been publicly available for comments since December 2018. Comments received from the European Commission and other organisations as of 29 November 2019 have been taken into account in the preparation of NECP 2030 as shown in the table of responses to the comments 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 drawing up ENMAK 2030, KPP 2050 and NECP 2030 in exactly the same way as local governments, whose involvement was described in chapter 1.3.ii.

The most important stakeholder representatives of the stakeholders belong to the Energy Council of the Ministry of Economic Affairs and Communications The Energy Council is considered the multilevel climate and energy dialogue that Member States must establish pursuant to Article 11 of Regulation (EU) No 2018/1999.

iv. Consultations with other Member States

The draft NECP 2030 was presented to representatives of other Member States at the following events:

- Meeting of the Committee of Senior Environment Officials of the Baltic Council of Ministers on 26 April 2018 in Vilnius, introduction of climate topics;
- Meeting of Environment Ministers of the Baltic Council of Ministers on 23-24 May 2018 in Vilnius, introduction of climate topics;
- Nordic-Baltic Energy Conference, 29 September 2018 in Tallinn;
- Meeting of the Committee of Senior Energy Officials of the Baltic Council of Ministers on 30 October 2018.
- Meeting of the Committee of Senior Energy Officials of the Baltic Council of Ministers on 29 August 2019;
- Nordic-Baltic Energy Conference, 24-25 October 2019 in Tallinn.

A summary of the main objectives of the plan and the measures were sent for comments to the Baltic Council of Ministers in October 2019 and to the Finnish ministry responsible for energy issues. Cooperation chapters 1.4.ii and 5.4.i with harmonised content were drawn up on the initiative of Latvia.

v. Iterative process with the European Commission

Annex V shows the comments submitted by the European Commission concerning the draft NECP 2030 and our evaluation. There were several European Commission working groups in autumn of 2019 involved in the preparation of the national energy and climate plans and the suggestions made there were taken into account in supplementing the draft NECP 2030.

1.4. Regional cooperation in preparing the plan

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

The NECP 2030 objectives and measures were sent for coordination to Lithuania, Latvia and Finland in October 2019 but these countries have not sent amendment proposals.

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

Estonia participates in various forms of region cooperation on energy and climate policy (in the context of the climate and energy policy of the Paris Climate Agreement), including:

- Baltic Assembly[24];
- Summits of the Prime Ministers of the Baltic States;
- The Baltic Council of Ministers;

[24] Cooperation among the National Parliaments of Estonia, Latvia and Lithuania.

- European Union Strategy for the Baltic Sea Region EUSBSR) and Baltic Energy Market Interconnection Plan (BEIMP);
- Baltic-Nordic Energy Research Programme[25].

Regional cooperation takes the form of the Baltic Council of Ministers (BCM), within which the Committee of Senior Officials has been established. The Committee convenes regularly according to the working programme of the Presidency (the presidency rotates yearly). Joint activities for the development of the regional electricity and gas market and enhancement of joint infrastructure projects are discussed within the framework of the Energy Council. The Committee guides and monitors the work of the regional gas market coordination group, whose aim is to create a regional gas market that operates under common rules and covers the Baltic States and Finland. Its work is based the action plan for the development of a single gas market.

Estonia participates actively in the Baltic Energy Market Interconnection Plan (BEMIP) work group that discusses the regional cooperation options in the area of electricity, gas, renewable energy (including offshore wind farms[26]) and energy efficiency. The BEMIP synchronisation high level working group consists of the Baltic States, Poland and European Commission members. It monitors and coordinates implementation of the synchronisation action plan for the electricity systems of the Baltic States.

Intensive coordination of the energy policy of the Baltic States takes place on the level of senior officers of the Baltic Council of Ministers, but broader regional cooperation also covers Finland, Sweden, Poland, Denmark and Germany.

In the context of the European Union, regional cooperation takes place in the BEIMP covering the infrastructure planning and more efficient use of financial resources, including the Connecting Europe Facility that supports only cross-border energy projects by boosting cooperation in the Baltic region. Several joint projects have improved the security of supply of electricity and gas in the Baltic region by helping ensure effective market development. The most important regional project is synchronisation of the Baltic power system with the European power system. There are also other important projects to ensure the effective functioning of the market, like improvement of the cross-border interconnectors and development of the regional gas market.

The Baltic States consulted between themselves on the topic of NECPs within the BCM framework. Meetings of senior officials took place in the second half of 2018 and during 2019 generally and in connection with possible policy measures that could be applied jointly:

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[25] Baltic Nordic Energy Research programme; https://www.nordicenergy.org/programme/the-joint-baltic-nordic-energy-research-programme

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

- Meeting of the BCM Environment Senior Officials in Vilnius on 26 April 2018; introduction of climate policy measures;
- Meeting of the BCM, Environment Ministers, Vilnius on 23-24 May 2018; introduction of climate policy measures;
- Nordic-Baltic Energy Conference, 29 September 2018 in Tallinn;
- Meeting of the BCM Energy Senior Officials on 30 October 2018 and 29 August 2019;
- Nordic-Baltic Energy conference 24-25 October 2019 in Tallinn.

Estonia had a meeting and exchange of information with Finland in respect of NECP objectives, measures and strategic environmental impact assessments in September and October 2019.

Regional consultations determined the opportunities for regional cooperation on renewable energy and associated technologies, specifically in the development of the offshore wind farms on the border between Estonia and Latvia and Latvia and Lithuania taking into account maritime spatial planning. According to a recent study on the potential of Baltic offshore wind farm energy[27], the potential total capacity of the Baltic region is over 93 GW (187 wind farms with a total electrical generation capacity of 500 MW), incl. the following:

- 14 offshore wind farms in Estonia with a capacity of 7 GW and annual production of 26 TWh;
- 29 offshore wind farms in Latvia with the capacity of 15.5 GW and annual production of 49.2 TWh;
- 9 offshore wind farms in Lithuania with a capacity of 4.5 GW and annual production of 15.5 TWh;

As of 2019, a total capacity of 2.5 GW from offshore wind farm applications in Estonia has been applied for and according to maritime spatial planning, a further total capacity of 5GW is being planned.

Implementation of NECP 2030 involves regional cooperation on the gas market, synchronisation of the power system and cross-border electricity and gas projects. Cooperation in transport sector involves the implementation of the Rail Baltic project.

Cooperation concerning agricultural and GHG emission reduction requires implementation of Directive 91/676/EEC (nitrate emission) and the air pollution control plan (ammonia emissions).

The Baltic States agreed that the regional cooperation will be expanded to energy efficiency and development of renewable energy, especially in the transport sector, incl. the following:

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

- Biomethane production and market development;
- Coordination of biofuel requirements (topics related to mixing and taxes);
- Coordination of possible road charges and heavy duty cargo customs.

It is also possible to expand regional cooperation to include the agricultural and forestry sector (e.g. land improvement, measuring soil quality, etc.) by considering the cross-border impacts of agriculture, forestry and fishery

To plan and apply the long-term (until 2030 and 2050) energy or climate policy and measures, requires the exchange of experience and knowledge of reduction of carbon emissions and energy efficiency in mutual cooperation, as this makes it easier to select appropriate methods and actions for meeting specific targets.

The Baltic States have been and will continue to cooperate with the following bodies in the development and implementation of measures contributing to renewable energy, energy efficiency and climate change control and research and development: The Nordic Council of Ministers; Nordic Energy Research; The regional operational security coordinator Baltic RSC, created by the Baltic TSOs (Elering, AST, Litgrid); Union of Russia, Belarus, Kaliningrad, Lithuania, Latvia and Estonia for the Coordination of Transmission of Electricity BRELL; Nordic power exchange Nord Pool; Regional Gas Market Coordination Group (RCMCG); The natural gas market operator UAB GET Baltic and International Energy Agency (IEA), scientific cooperation projects and PhD exchange within the framework of the Nordic-Baltic Energy research programme. The project of common interest for synchronisation of the Baltic States with the Central Europe frequency band is carried out in cooperation between different partners, Balticconnector, Rail Baltic and building the electrical system integrated cable connections.

2. NATIONAL OBJECTIVES AND TARGETS

2.1. Dimension Decarbonisation

2.1.1. GHG emissions and removals[28]

i. The elements set out in point (a)(1) of Article 4

The agreement of the European Union to the Paris Agreement concluded in 2015 is binding and covers all economic sectors. The objective is to reduce GHG emissions by 40% compared to the 1990 level by 2030. To achieve the overall target, all sectors falling under the EU emissions trading system (EU ETS) will have to reduce their emissions by 43% compared to 2005 by 2030. Emissions from the sectors that fall outside the emissions trading scheme (transport, agriculture, waste management and industrial processes and small-scale energy production where energy is produced by equipment with a rated output less than 20 MW), must be reduced by 30% compared to

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

the 2005 level by 2030. The objective also concerns the land use, changes in land use change and forestry (so-called LULUCF) sector, which should contribute towards achieving the EU's GHG reduction target. The EU Member States reached a detailed agreement on how to meet the target of the Paris Agreement in early 2018, and EU internal legislation was adopted on reduction of GHG emissions. Agreement was reached on reform of the EU ETS reform, objectives of emissions reduction in sectors not covered by EU ETS and details of how the LULUF sector relates to the EU climate and energy framework.

Table 4 shows the binding GHG reduction/restriction targets for Estonia under the Shared Effort Regulation and the LULUCF Regulation in the relevant sectors. The Shared Effort Regulation lays down binding emission reduction targets for the Member States over the period 2021-2030 in the sectors falling outside the scope of the emissions EU ETS scheme. The objective for Estonia is to reduce greenhouse gas (GHG) emissions in the above indicated sectors by 13% by 2030 compared to 2005.

According to the calculation principles set out in the LULUCF Regulation, the emissions should not exceed the volumes of captured carbon (the 'no-debit rule').

Table 4. 2030 national binding GHG emission reduction targets for Estonia

Target	Legal act
Achieve 13% reduction in GHG emissions by 2030 compared to 2005 levels in the sectors covered by the Shared Effort Regulation	Regulation (EU) 2018/842 of the European Parliament and of the Council[29]
Ensure that the emissions of the LULUCF sector are compensated by carbon capture by the same sector and the total emissions of the LULUCF sector and carbon capture are at least in balance	Regulation (EU) 2018/841 of the European Parliament and of the Council[30]

To meet the targets, the Prime Minister established a Government Climate and Energy Committee on 11 July 2019. The Prime Minister chairs the committee and its members are the Minister for Education and Research, the Minister for Defence, the Minister for the Environment, the Minister for Economic Affairs and Infrastructure, the Minister for Finance and the Minister for Foreign Affairs. The Committee's tasks are to:

1) establish climate and energy policy-related positions for the issues within the Government's remit;

[29] https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32018R0842&from=EN
[30] https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:32018R0841&from=EN

2) find cross-sectoral solutions for reduction of the Estonian GHG emissions;
3) assess and make proposals for financing the GHG emission reduction measures;
4) find solutions to ensure national energy security and security of energy supply;
5) coordinate the activities of the competent bodies in implementation of the climate and energy policy;
6) carry out other duties assigned by the Government.

To carry out its duties, the Energy and Climate Committee may:

1) give duties to the competent bodies and receive documents and information from them;
2) start preparing analyses and make enquiries;
3) receive documents and data from the competent bodies necessary for its work.

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

At the end of 2018, the European Commission published the Communication ‘A Clean Planet for all’ which is a European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy. Numerous political discussions took place among the Member States in 2019 and it is planned to reach the joint position at the European Council at the end of 2019.

The analysis of the opportunities to increase climate ambition in Estonia commissioned by the Government Office was completed in September 2019. This analysis was compiled by SEI Tallinn and OÜ Finantsakadeemia Eesti and it assessed Estonia's opportunities to achieve climate neutrality by 2050, including which changes should be made and their impacts. This analysis is part of the input in reviewing Estonia’s climate policy objectives. On the basis of this analysis, the Estonian Government decided on 3 October 2019 to support the establishment of an EU-wide long-term climate neutrality objective by 2015 if there are sufficient transition measures and the differences and different baselines of Member States and sectors are taken into account. Member States should retain the right to select appropriate ways of achieving the targets, including making sovereign tax assessments to achieve climate neutrality.

The ‘General Principles of Climate Policy until 2050’ paper sets Estonia the long-term objective of transitioning to a low-carbon emission economy, which means iterative, purposeful reorganisation of the economy and energy system to make it more resource-efficient, productive and greener. This means changes not only in power generation, transport, forestry and agriculture but also in people’s everyday habits. The target for Estonia by 2050 is to reduce the GHG emission by approximately 80% compared to the level in 1990 (see Table 5).

Table 5. National long-term GHG emission reduction targets

Target	Legal act
Approximately 70% reduction in GHG emissions by 2030 and 80% reduction by 2050 compared to 1990 level in Estonia	General Principles of Climate Policy until 2050[31]
To increase Estonia's preparedness and capacity to adapt to the impact of climate change at national, regional and local level.	Plan for climate change adaptation by 2030[32];

<u>Adaptation to climate change</u>

The strategic objective of the development plan for climate change adaption is to increase Estonia's preparedness and capacity to adapt to the impact of climate change at national, regional and local level. Implementation of the development plan will improve Estonia's preparedness and capacity to adapt to the impact of climate change at national, regional and local level and identify the areas that are most vulnerable to climate change. The development plan will plan and control how we adapt to the impact of climate change as a whole using a single strategy document. The approach to climate change adaptation will be coordinated and harmonised. This will ensure cohesion between sectors in adapting to climate change. The development plan sets eight sub-objectives according to the eight priority areas: These are:

1. health and rescue capability;
2. planning and land-use, including coastal areas, other areas with flood risk/soil risk, land improvement, irrigation, drainage, urban planning;
3. natural environment, including biodiversity, terrestrial ecosystems, freshwater ecosystems and environment, the Baltic Sea and marine environment, ecosystem services;
4. bioeconomy, including agriculture, forestry, fishing, game and hunting, tourism, peat extraction;
5. economy, including, insurance, banking and other financial institutions, employment, business and entrepreneurship, industry;
6. society, awareness and collaboration, including education, awareness and scientific research, communication, society, international relationships and collaboration;
7. infrastructure and buildings, including technical support systems, transport; and

[31] http://www.envir.ee/sites/default/files/362xiii_rk_o_04.2017-1.pdf
[32] https://www.envir.ee/et/eesmargid-tegevused/kliima/klNmamuutustega-kohanemise-arengukava

8. energy and energy supply, including energy independence, security and safety of supply, energy resources, application of energy efficiency, heating, electricity production.

A just transition

Estonia signed the Solidarity and Just Transition Silesia Declaration at the end of 2018 at COP24 in Poland. The aim of the Declaration is to consider the rights and opportunities of the workforce in planning and implementing climate policy and to involve the labour market parties to ensure public support for long-term emission reduction and to enable countries to achieve the long-term targets of the Paris Agreement.

2.1.2. Renewable energies

i. The elements set out in point (a)(2) of Article 4

Estonia's renewable energy trajectory is based on the national renewable energy targets that comply with the agreed EU targets laid down in Directives (EU) 2018/2001 and (EU) 2018/1999), including milestones (at least 18% of the general target must be achieved by 2022, at least 43% by 2025 and at least 65% of the general target by 2027). The target levels of the trajectories are based on projections that take into account current renewable energy generation and consumption trends Estonian renewable energy target for 2020 is 25%. This will remain Estonia's baseline. The renewable energy statistics sold within the framework of statistical transfer must be deducted from the levels indicated in the renewable energy trajectories shown in Figure 2.

Figure 2 below shows the share of renewable energy and the final target of different sectors and their achievement. The national goal for 2030 set in National Energy Development Plan 2030 (ENMAK 2030) was that the volume of renewable energy consumed would be at least 50% of final energy consumption (~16 TWh). The communication 'Estonian national energy and climate plan 2030' will describe the targets using the common EU format and methodology. Hence the renewable energy target (42%) set in NECP 2030 is somewhat different from the description in ENMAK 2030; the NECP 2030 sets out the renewable energy targets towards the gross final consumption of energy, while the targets in ENMAK 2030 are for final energy consumption. The gross final consumption of energy is higher than the final energy consumption since it also contains the own consumption of the production equipment of electricity and heating and the energy network losses. As with ENMAK 2030, renewable energy consumption in 2030 will be ~16 TWh according to NECP 2030. **It is important to note that the higher the share of renewable energy in 2030, the more successful we are in meeting our energy efficiency targets.**

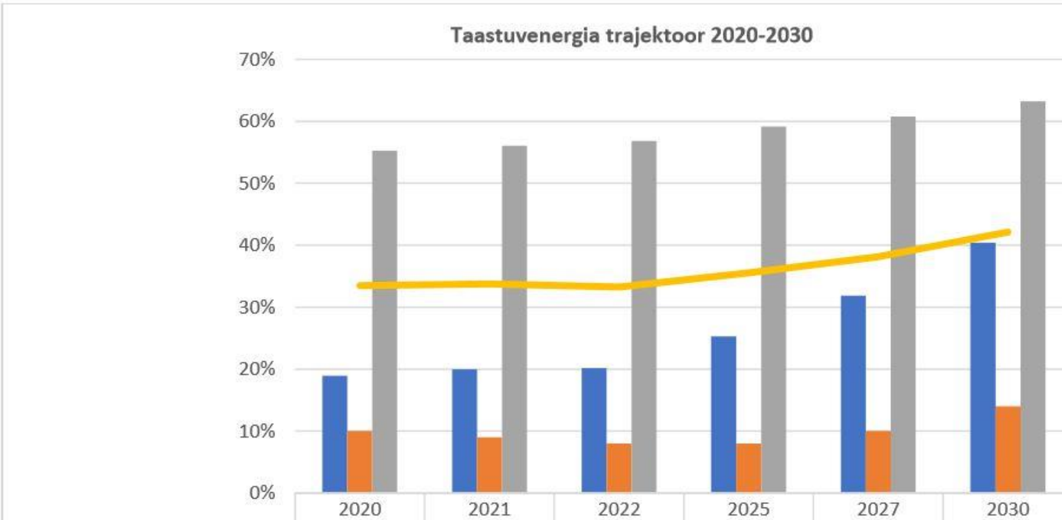
The national ENMAK 2030 for 2030, **according to which, renewable energy forms at least 50% or 16 TWh of the final energy consumption in the final energy consumption of 32 TWh by 2030, is achieved according to the projection provided**

in Table 7, where production of different renewable energy sources totals 16 TWh in 2030. The share of renewable energy in total final consumption will be at least 42% by the year 2030. The targets of the sector are as follows:

- **Electricity** - the share of renewable electrical energy in the domestic electricity consumption must be at least 30% according to NDPES 2030[33]. According to NECP 2030, the share of renewable energy must be 40% of the gross final consumption of energy.
- **Transport** - according to NDPES 2030, the renewable energy target for transport (share of final consumption) has been identified only for 2020. NECP 2030 has also indicated the target level for 2030 - 14% of the gross final consumption of energy of the transport sector[34].
- **Heat** - according to NDPES 2030, 11 TWh of the total heat demand will be met by biomass in 2030, and some 80% of district heating in Estonia will be provided using renewable sources. Given the volume of reconstruction of the building stock (this will be determined when the long-term strategy for the reconstruction of the building stock is drawn up, by March 2020) and projections of the development of renewable fuels in the district heating sector updated by the sector, the renewable fuels (11 TWh) will account for at least 63% of gross final heat consumption in 2030 (17.4 TWh in 2030).

[33] If the flexible collaboration mechanisms with other EU Member States are started successfully, it is possible to increase the share of electric energy from renewable energy sources in the final electricity consumption in Estonia to 50% according to ESDP 2030. ENMAK 2030 p. 30 https://www.mkm.ee/sites/default/files/enmak_2030.pdf

[34] Mandatory for the Member States under Directive 2018/2001/EU (the Renewable Energy Directive).



	2020	2021	2022	2025	2027	2030
Taastuvelektri osakaal	19%	20%	20%	25%	32%	40%
Taastuvenergia osakaal tanspordis	10%	9%	8%	8%	10%	14%
Taatsuvenergia osakaal soojamajanduses	55%	56%	57%	59%	61%	63%
Taastuvenergia osakaal lõpptarbimisest kokku	34%	34%	33%	36%	38%	42%

Figure 2: Share of renewable energy of final energy consumption in Estonia, overall and by sector. The 2020 figures are based on forecasts. The statistical volumes of renewable energy sold to the other Member States within the statistical transfer should be deducted from the forecasts.

Key:

Taastuvenergia trajektoor = Renewable energy trajectory

Taastuvelektri osakaal = Share of renewable electricity

Taastuvenergia osakaal transpordis = Share of renewable energy in transport

Taastuvenergia osakaal soojamajanduses = Share of renewable energy in heating

Taastuvenergia osakaal lopptarbimisest kokku = Total share of renewable energy in final consumption

ii. 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 supply

The estimated trajectory of the share of renewable energy in electrical energy consumption is shown in Figure 2 above. In the following decade, wind energy will have the highest growth potential (from both on-shore as well as off-shore wind farms), as will solar energy, please see Table 7.

Renewable energy in heating

The estimated trajectory of the share of renewable energy in heat energy consumption is shown in Figure 2 above in Chapter 2.1.2.i. Heat pumps have the highest growth potential in heating and cooling energy, please see Table 7.

Renewable energy in transport

Figure 3 below shows the estimated renewable energy trajectory in the transport sector in accordance with the new provisions of the Renewable Energy Directive. We envisage an increase in the share of second generation biofuels and electrical energy in the next decade. We are working to reduce the share of the first generation biofuels in transport to a minimum as soon as possible. We wish to meet as much as possible of the consumption demand for second generation fuels with domestically produced fuel. Production of domestic biomethane and its use in transport have the highest potential. To meet the objectives, it is necessary to produce 340 GWh of biomethane by 2030 (the actual necessary volume, without multipliers).

The role of electricity consumption in the transport sector will grow sharply after 2025. Consumption will rise significantly due to amendments to the Clean Vehicles Directive, lower prices of electric vehicles and their resulting rise in popularity, as well as the electrification of railways and the completion of Rail Baltic. The contribution of the types of the energy carriers and biofuels shown in Figure 3 has been highlighted without multipliers (i.e. as actual volumes) but the final target considers the multipliers (electromobility x 4 and electricity used in railway transport x 1.5) where the calculations include the share of renewable electricity two years ago; the biofuels from raw materials highlighted in Part A of Annex 9 of the Renewable Energy Directive are double-counted).

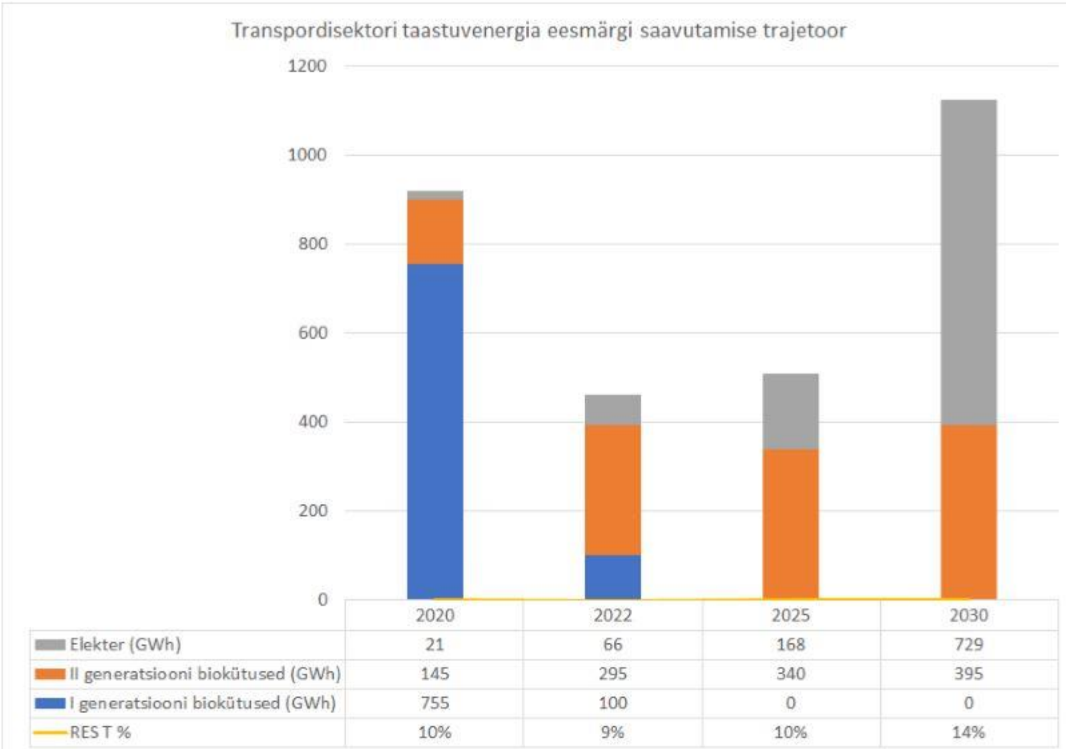


Figure 3: Contribution of different types of energy and biofuels towards meeting the renewables target in the transport sector (GWh).

Key:

Transpordisektori taastuvenergia eesmärgi saavutamise trajektoor = Trajectory for achieving the renewable energy target in the transport sector

Elekter = Electricity

II generatsiooni biokütused = 2nd generation biofuels

II generatsiooni biokütused = 1st generation biofuels

<u>Sector-by sector summary of growth in renewable energy</u>

The table below (Table 6) shows the total projected growth by sector of renewables up to a volume of 5 TWh in gigawatt-hours.

Table 6 Projected growth of renewables by sector

Growth by sector (GWh)	2017	2030	Growth
Renewable	1,763	4,325	2,562

electricity production			
Renewable electricity use in transport (without multipliers)	34	690	655
Heating and cooling energy production from renewable energy sources	9,062	11,000	1,938
Total energy from renewable energy sources	**11,034**	**16,015**	**4,981**

iii. 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

Targets for renewables agreed at EU and national level will be achieved in the most cost-efficient way, with a focus on being high efficiency and market-based. To develop renewable energy by focusing on solutions that make maximum use of the opportunities provided by Estonia's geographical and natural conditions. Biomass also plays an important role. We prefer solutions that enable a maximum increase in the efficiency of this resource. Using biomass is in line with the environmental sustainability and biodiversity conservation aspects and biomass sustainability criteria under the Renewable Energy Directive and compliance can be certified (e.g. with certificates that verify relevant sustainable forest management and production of wood fuels). We see the synergies between the sectors, (e.g. between energy efficiency, the energy performance of buildings and renewable energy solutions) as an important potential for achieving the targets.

Chapter 2.1.2.1 sets out specific renewable energy trajectories by sector and technology solution. **Given that electricity and thermal energy production generated a total of 11 TWh of renewable energy in Estonia as at 2017, a capacity of approximately 5 TWh will be added by 2030.** Table 7 shows the sector-based contribution of renewable energy technologies to the trajectory of the renewable energy targets.

Table 7. Contribution of renewable energy technologies to the trajectory of the renewable energy targets by sector.

Contribution of renewable energy technologies to the targets (GWh)	2020	2022	2025	2027	2030
Gross final energy consumption (GWh)	**38,000**	**38,160**	**38,100**	**38,060**	**38,000**
Renewable electricity production	**1,990**	**2,127**	**2,680**	**3,392**	**4,325**
Hydropower	30 (8MW)	30 (8MW)	30 (8MW)	30 (8MW)	30 (8MW)
Wind energy	670 (310 MW)	700 (318 MW)	1,150 (520 MW)	1,800 (810 MW)	2,640 (1200 MW)
Solar power	10 (100 MW)	16 (160 MW)	26 (260 MW)	32 (322 MW)	41 (415 MW)
Biomass	1,150	1,200	1,200	1,200	1,200
Other renewables	40	40	40	40	40
Renewable electricity use in transport (without multipliers)	**853**	**408**	**383**	**453**	**690**
Electric transport	21	66	168	353	729
2nd generation biofuels	100	295	340	340	395
1st generation biofuels	755	100	0	0	0
Renewable energy consumption in heating	**9,950**	**10,160**	**10,475**	**10,685**	**11,000**
District heating	5,000	4,960	4,900	4,860	4,800
Converted heat	4,000	4,160	4,400	4,560	4,800
Heat pumps	950	1,040	1,175	1,265	1,400

iv. Trajectories on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply, by feedstock and origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its source and impact on the LULUCF sink, where available.

Figure 4 shows the trajectories for bioenergy in Estonia up until 2030.

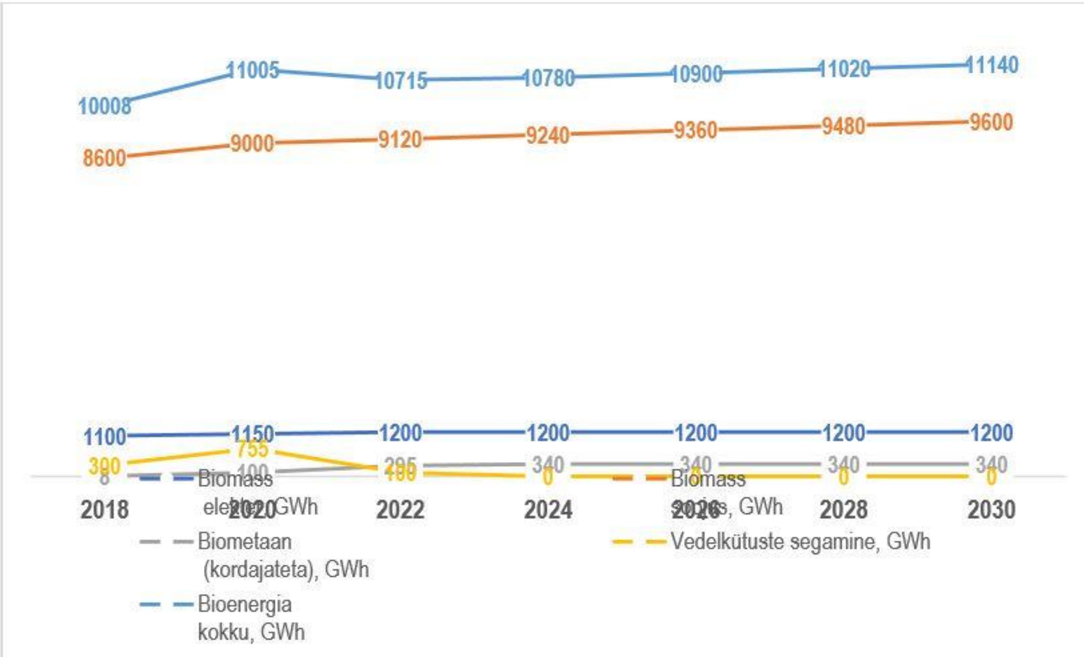


Figure 4. Bioenergy production in Estonia (GWh) up to 2030

Key:

Vedelkütuste segamine = Mixing of liquid fuel

Biometaan (kordajateta) = Biomethane (without multipliers)

Bioenergia, kokku = Bioenergy, total

The ability to meet the demand for bioenergy was limited by weather conditions, stricter climate requirements (incl. the LULUCF sector carbon capture obligation), the need to ensure the functioning of the green network formed to protect EU biodiversity, biomass sustainability criteria, the growing use of biomass as a replacement for fossil materials as well as changes in fuel prices. Wood is used for energy in Estonia to an extent in line with the sustainable allowable cut of the forestry development plan. The use of wood and wood fuels has increased and will increase more in the next few years. A total of 13.1 million solid cubic metres of wood was felled from woodland and outside woodland in 2017. Of this, 5.5 million solid cubic metres were used domestically in energy and 2.7

million solid cubic metres of wood[35] (i.e. over half) was exported as wood pellets. In 2017, 2.4 TWh of thermal energy was produced from wood-fuelled boilers, and in 2018, the power station produced an unprecedented 4.2 TWh of thermal energy and 1.1 TWh of electrical energy from wood fuels (total production of power stations was 12.3 TWh)[36].

There are 17 active biogas stations in Estonia and biomethane is produced by two undertakings (one using agricultural output, the other using biogas from the wastewater of an undertaking that produces aspen pulp[37]) The estimated biomethane production potential is 450 million m^3/year, which is greater than half of the demand for natural gas in Estonia is recent years[38].

Estonia has 2.33 million ha of woodland, of which 25.6% has economic constraints. This includes 13.1% which are strictly protected forests and 12.5% which are forests with economic constraints. The total woodland reserve area is 486 million m^3. Total woodland reserve growth was 16.1 million m^3 in 2017 and 14.1 million m^3 for managed forest. The allowed cut volumes are determined as a social agreement in the forestry development plans for a ten-year period. The current forestry development plan for the period until 2020 stipulated the possible volumes of use of the wood resources for active, moderate and declining wood supply scenarios. According to the moderate scenario, the long-term sustainable level of the forestry sector was estimated at 12-15 million m^3 per year. According to the biomass atlas[39] compiled by the Estonian University of Life Sciences, timber may be used at its current annual sustainable volume until 2033, see Figure 5.

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35 Raudsaar, M. (Environment Agency) 2019 'Puidubilanss. Ülevaade puidukasutuse mahtudest 2017' ('Timber balance: an overview of the volume of wood used, 2017'). https://www.keskkonnaagentuur.ee/sites/default/files/elfinder/article_files/puidubilanss_2017_0.pdf

36 Statistics Estonia data sheets KE033, KE035 and KE043 www.stat.ee

37 Estonian Cell Keskkonnaleht 8 August 2019 file:///C:/Users/Irje.Moldre/Downloads/Keskkonnaleht_EstonianCell2019_prew4.pdf

38 Estonian Biogas Association http://eestibiogaas.ee/tootmine-ja-kasutamine.

39 The report 'Location of the energy wood resources in the Baltic region' by Allar Padar and Ahto Kangur at the 'Wood to energy 2019' seminar https://www.eramets.ee/seminar

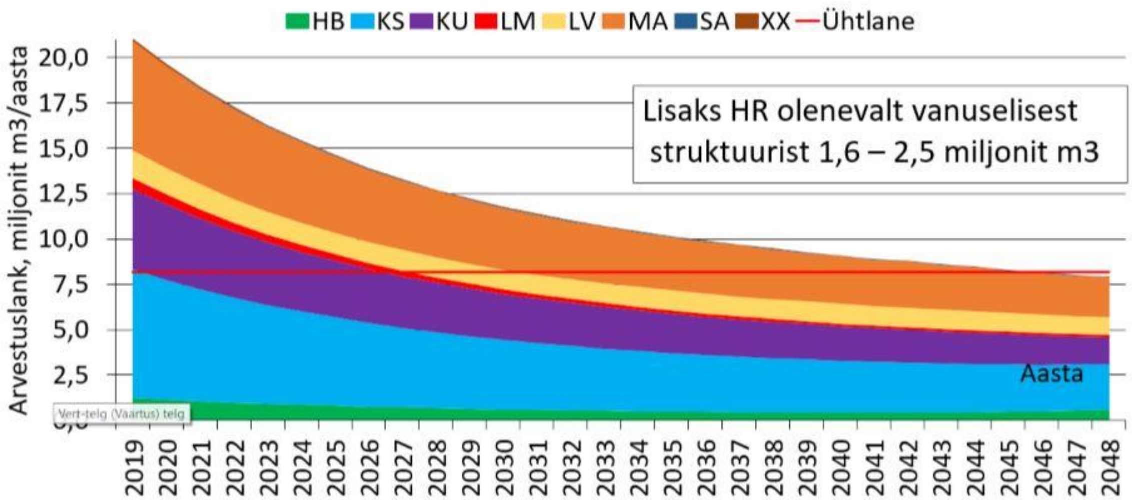

Figure 5 The use scenarios of Estonian forests (maturity cutting area by prevalence species, consistent use felling area, total), HB (aspen), KS (birch), KU (spruce), LM (alder), LV (grey alder), MA (pine), SA (ash), XX (other species), HR (thinning), Uhtlane (consistent)

Key:

Lisaks HR olenevalt vanuselisest struktuurist 1,6-2,5 miljonit m^3 = Also HR (thinning), depending on the age-class structure 1.6-2.5 million m^3

Arvestuslank, miljonit m3/aasta = Estimated felling, million m^3/year

v. Where applicable, other national trajectories and objectives, including those that are long term or sectoral (e.g. share of renewable energy in district heating, renewable energy use in buildings, renewable energy produced by cities, renewable energy communities and renewables self-consumers, energy recovered from the sludge acquired through the treatment of wastewater)

Share of renewable energy in district heating

The heating sector has been consistently switching to renewable sources in recent years and the share of renewable energy has now reached 51.64%. More and more boiler stations and cogeneration plants have switched to renewable fuels and according to figures for 2017, the share of the renewable energy was 52%, of which 93% was labelled as efficient district heating. The efficient district heating label is granted to district heating systems where at least 50% of renewable energy or 50% of waste heat, 75% of cogenerated heat or 50% of a combination of such energy and heat is used for heat generation in accordance with the Energy Efficiency Directive (Directive 2012/27/EU). This label attests the efficiency of the district heating and the share of renewable energy or cogeneration in the heating supplied by the network. It is important to note that the biomass used in the heating sector must comply with sustainability criteria and take into account the waste hierarchy in accordance with the Renewable Energy Directive.

Renewable energy consumption in buildings

Housing and energy management are very closely related. Energy demand for buildings forms an important part of the energy balance in Estonia. At the same time, both have high potential for energy savings - the energy costs of buildings account for some 40% of the EU's total energy consumption. In Estonia, the energy consumption of the households forms 42.7% of the total energy balance. The main types of energy consumed are electrical energy, gas and heating, of which the last accounts for the greatest share of consumption. State-applied policies to improve energy efficiency are increasingly focused on energy-efficient buildings and renovating buildings to make them more energy-efficient, thereby reducing energy dependency and GHG emissions from the building stock. In our view, renewable energy solutions must be applied to make the buildings more energy-efficient and, where possible, based on the cost-efficiency aspect. For example, it has been found that new and reconstructed buildings add an estimated solar electricity production capacity of up to 21 MW annually.

Renewable energy communities and renewable energy for own consumption

A more detailed explanation is provided in Chapter 3.2.v. The current legal system in Estonia enables the creation of renewable energy communities conveniently and easily and the production of renewable energy for own consumption. Under the current Commercial Code, renewable energy communities may act as a limited liability companies as well as public limited companies. The only restriction is that the renewable energy community cannot be a general partnership or a limited partnership within the meaning of the Commercial Code, since the members of these two legal entities cannot be local governments. However, local governments may form the renewable energy community under the new Renewable Energy Directive. End-consumers, primarily households, retain their rights and obligations according to the statutes of the company, articles of association, etc. The current Electricity Market Act also allows the customer to be in the role of the producer as well as the customer. It is possible to consume self-generated electricity oneself as well as supply it to others and also apply for support under certain conditions.

2.2. Dimension Energy Efficiency

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

Under Article 4(b) of Regulation (EU) No 2018/1999, the NECP 2030 document should indicate the following:

- the overall target for energy efficiency;
- the cumulative amount of end-use energy savings to be achieved over the period 2021-2030;

- the indicative milestones for the renovation of buildings, both public and private by 2030, 2040 and 2050;
- the total floor area to be renovated of public bodies' buildings over the period 2021 to 2030.

In 2017, Estonia's final energy consumption per capita among EU Member States was at an average level but we held the seventh place in consumption of primary energy per capita, see Figure 6 and Figure 7.

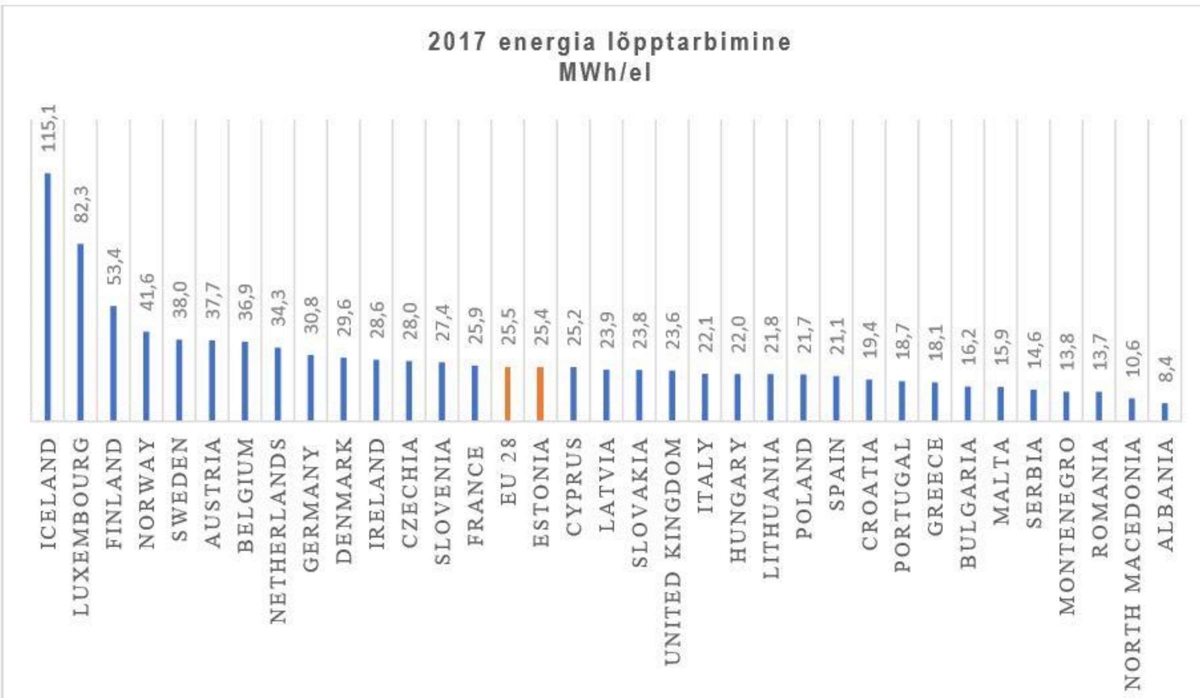

Figure 6 Final energy consumption in EU Member States per person in 2017 (according to Eurostat data).

2017 energia lõpptarbimine = 2017 final energy consumption

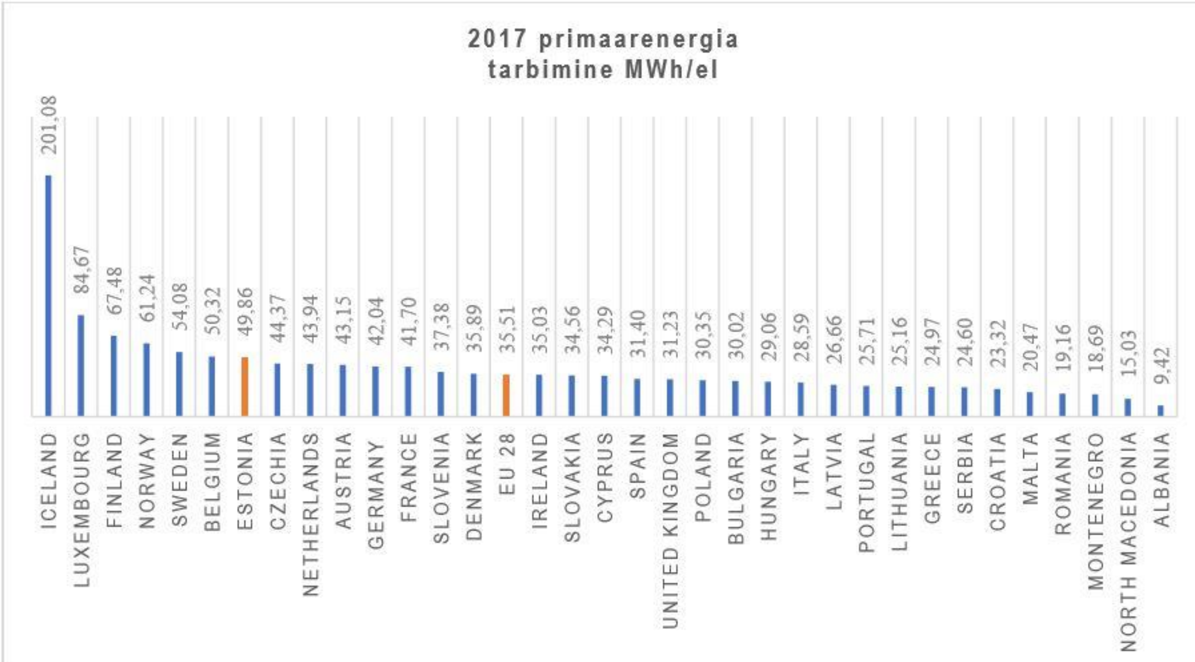

Figure 7 Primary consumption in EU Member States per person in 2017 (according to Eurostat data).

2017 primaarenergia tarbimine = 2017 primary energy consumption

Labour-intensive sectors still account for the majority of electricity consumed in Estonia. Figure 8[40], published by the World Energy Council shows that the issue does not lie in high energy consumption, but GDP which is still increasing, in other words, Estonia is still a developing economy.

[40] Härm, M (2016). Energiatarbimine Eestis: efektiivne või intensiivne, (‘Energy consumption in Estonia: efficient or intensive’) World Energy Council presentation, 1.05.2016.

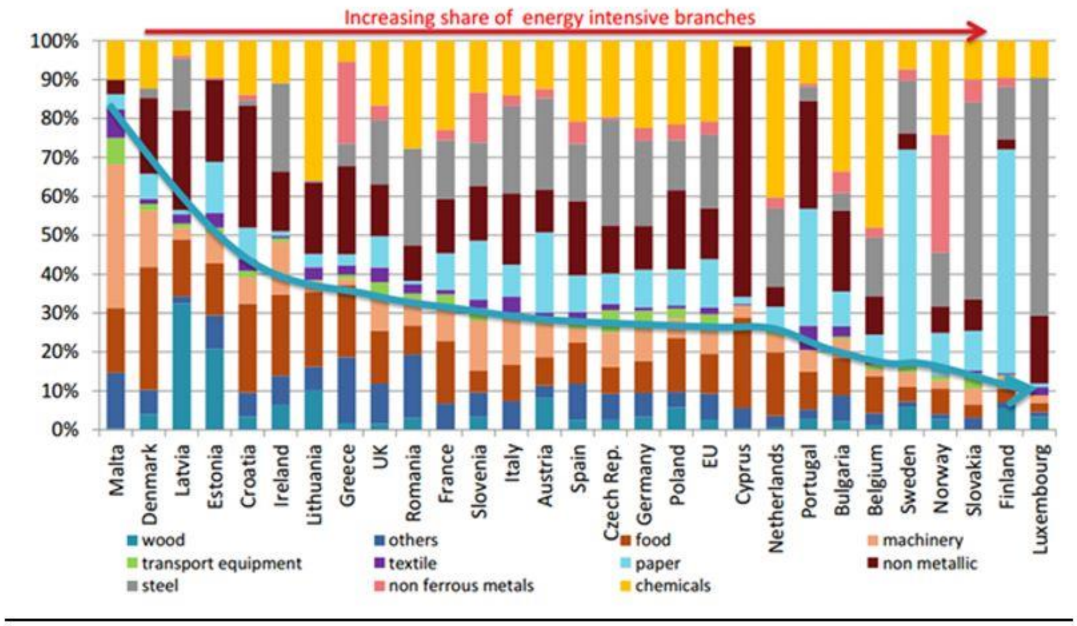

Figure 8. Share of different sectors in the energy consumption of EU states 2012[41]

Overall target for energy efficiency

Each Member State must make a fair contribution to achievement of the general energy efficiency laid down in the Energy Efficiency Directive, according to which EU consumption of primary energy should not exceed 1273 Mtoe in 2030 and/or EU final energy consumption shall not exceed 956 Mtoe. To this end, each Member State is to indicate their indicative contribution for achieving the EU energy efficiency target (hereinafter the overall energy efficiency target).

NDPES 2030 describes the consumption of primary energy, final energy consumption and energy intensity as the expected results of application of the measures in the development plan in 2030 (see NDPES 2030, Tables 1.2 and 1.3). According to NDPES 2030, the expected primary energy consumption in 2030 is 10% less than in 2012[42], while final energy consumption is 32 TWh (115 PJ) and the energy intensity of Estonian economy is 2 MWh/1000 €$_{GDP2012}$.

The conclusions of the European Council that took place in October 2014 on the EU 2030 climate and energy policy framework regarding energy efficiency[43] were based on

[41] Härm, M 2016. Energiatarbimine Eestis: efektiivne või intensiivne, (‘Energy consumption in Estonia: efficient or intensive’) Energy Council presentation, 1.05.2016.
[42] According to the data of EUROSTAT, Estonian gross domestic energy consumption was 256 PJ in 2012, i.e. according to ESDP 2030, the primary energy consumption in Estonia may be up to 230 PJ.2012.
[43] European Summit (23.-24 October 2014) - Conclusions http://data.consilium.europa.eu/doc/document/ST-169-2014-INIT/et/pdf

the European Commission Communication[44] that described different Europe 2030 primary energy consumption levels and the possible impacts of achieving these levels. Based on the background to the EU energy efficiency target, it is most relevant to focus on the consumption of primary energy as a whole and take the consumption of primary energy in 2030 as the basis for the overall energy efficiency target. Other possible bases for setting the overall energy efficiency target include final energy consumption, energy savings in primary energy consumption and final energy consumption in 2030 and energy intensity.

According to the EU Regulation on Governance of the Energy Union and Climate Action, the Member States have to consider the measures of the EU Energy Efficiency Directive and other measures for achieving the energy efficiency on the Member State and EU level in their energy efficiency overall target, and may also consider other circumstances that impact the consumption of primary energy and final energy consumption in the Member State. These other circumstances may be, for example:

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

Taking into account the circumstances listed above, Estonia has set the target of keeping final energy consumption at the same level by supporting the energy saving measures planned for 2030 and reducing consumption of primary energy by up to 14% compared to the peaks of previous years (2013 - 69.4 TWh), Figure 9.

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

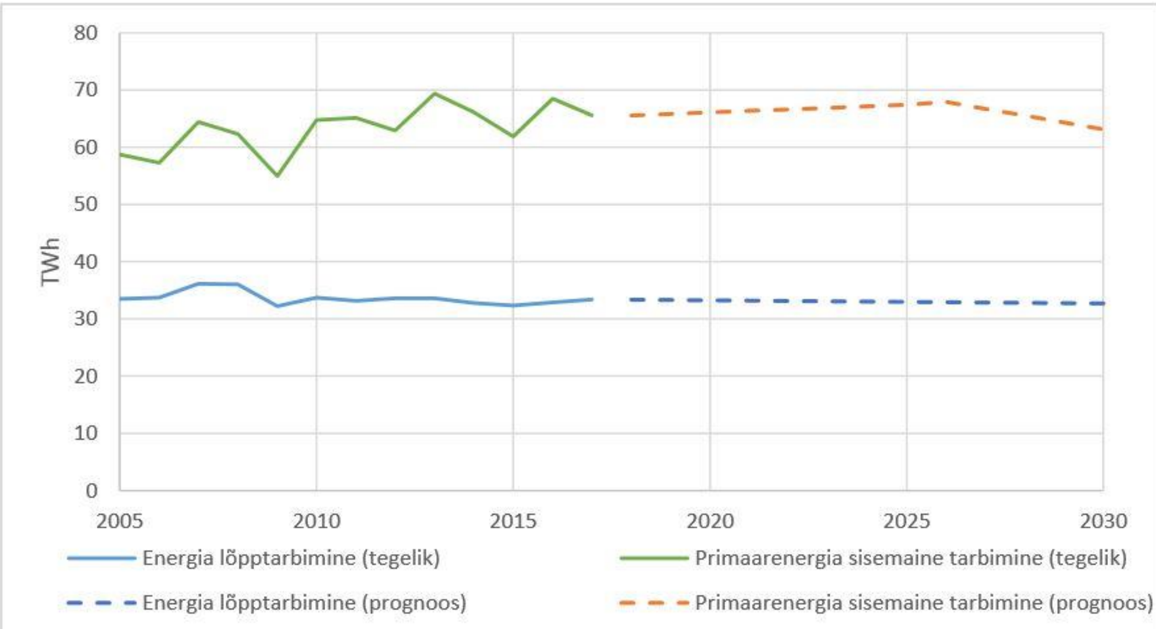

Figure 9 Estonian actual and projected final energy consumption and primary energy domestic consumption until 2030.

Key:

Energia lõpptarbimine (tegelik) = Final energy consumption (actual)

Primaarenergia sisemaine tarbimine (tegelik) = Domestic primary energy consumption (actual)

Energia lõpptarbimine (tegelik) = Final energy consumption (forecast)

Primaarenergia sisemaine tarbimine (prognoos) = Domestic primary energy consumption (forecast)

Cumulative amount of end-use energy savings to be achieved over the period 2021-2030

Article 7 of the Energy Efficiency Directive requires Member States to achieve energy savings in final consumption Average final energy consumption forms the basis for determining the savings required. The period 2021-2030 requires annual energy savings equivalent to 0.8% of the average final energy consumption in the period 2016-2018. The achieved energy saving must be cumulative, in other words the volume of the saving made in previous years must be stable throughout the period.

Table 8 shows the calculated required energy saving.

Table 8. Required energy-savings 2021-2030

Indicator	Value	Comments
Final energy consumption in 2016, TJ	118,419	Data source: Eurostat table nrg_bal_s
Final energy consumption in 2017, TJ	119,970	
Final energy consumption in 2018, TJ	N/A	
Average final energy consumption, TJ	120,000[45]	2016-2018 average final energy consumption
Required yearly energy saving, TJ	960	0.8% of average final energy consumption
Total number of cumulating milestones in the period	55	Applying the cumulative principle, the period 2021-2030 can be treated as 55 individual parts with a milestone where the energy saving target of each part equals 0.8% of the average final energy consumption
Required energy-saving between 2021-2030, TJ	52,800	55,960 = 52,800
Required energy-saving between 2021-2030, GWh	14,667	1 GWh = 3.6 TJ

Based on the Energy Efficiency Directive, different methods can be applied to calculations of the required cumulative energy saving. At the same time, application of these methods does not change the volume of the cumulative energy saving required in the period 2021-2030.

<u>The total floor area of public buildings to be renovated the period 2021-2030.</u>

According to Section 5 of the Energy Sector Organisation Act, 3% of the total useful floor area of buildings occupied by the central government where the central government uses more than 250 m^2 and that do not comply with the minimum energy efficiency requirements are to be brought into conformity with the requirements each year. As at 1 January 2018, the total useful floor area of public buildings with more than

[45] Must be recalculated after publishing the statistical data of 2017 and 2018 in EUROSTAT. Preliminary 2017 information from Statistics Estonia: final consumption increased by 2.8% in 2017 compared to 2016.

250 m^2 of useful floor area based on the ownership or contracting lease in the territory of the Republic of Estonia was 1,354,752.1 m^2 of which 572,260.5 m^2 met the requirements. Hence to comply with the Energy Sector Organisation Act, it must be ensured that the buildings that are used by public bodies that comply with the minimum energy efficiency requirements enforced in 2013 have a total useful floor area of at least 812, 000 m^2 by 2030. This means that **a total of 170,000 m^2 of building space must be renovated in the period 2021-2030[46] to achieve that target** .

Summary

Estonia's energy-efficiency targets are shown in Table 9.

Table 9. Estonia's energy-efficiency targets up to 2030.

NDPES 2030 target: 2. More efficient use of primary energy: Estonia's energy supply and consumption is more sustainable	
Objective name	**Objective**
Overall energy efficiency target primary energy consumption up to 2030	< 230 PJ[47]
Cumulative amount of end-use energy savings to be achieved over the period 2021-2030	14,422 GWh
Final energy consumption	120 PJ
The total floor area of public buildings to be renovated the period 2021-2030.	170 000 m^2

According to the projected primary energy consumption, consumption of primary energy in 2030 will probably be somewhat lower than the NDPES 2030 target, provided that we are able to achieve an cumulative final consumption energy saving of at least 14,667 GWh.

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

[46] Ministry of Finance 2019 data.
[47] ESDP 2030 objective.

The previous national reconstruction strategies for buildings[48] was submitted to the European Commission under the Energy Sector Organisation Act and NDPES 2030 in October 2017.

NDPES 2030 sets out rules on the target levels and measures for the reconstruction of buildings. These targets can be achieved by producing more renewable energy in the buildings. Table 10 below describes the expected outcomes of the measures of NDPES 2030.

Table 10. Targets and measures for reconstruction of buildings

NDPES 2030 target: 2. More efficient use of primary energy: Estonia's energy supply and consumption is more sustainable		
NDPES 2030 measure	**Dimension**	**Indicative target level**
2.4	Share of small-family housing in the total building stock for which the energy efficiency rating is at least category C or D.	> 40%
2.4	Share of apartment buildings in the total building stock for which the energy efficiency rating is at least category C	> 50%
2.4	Share of non-residential buildings in the total building stock for which the energy efficiency rating is at least category C	> 20%

The updated long-term reconstruction strategy must be submitted to the European Commission by 10 March 2020[49]. This document does not concern the indicative milestones for 2040 and 2050 of the renovation strategy of buildings to be submitted on 2020 based on Article 2a of Directive (EU) 2018/844 on the energy efficiency of buildings[50].

[48] National buildings' renovation strategy to improve energy efficiency, Ministry of Economic Affairs and Communications 2017, https://ec.europa.eu/energy/sites/ener/files/documents/ee_building_renov_2017_et.pdf. Estonian legislation means the term 'reconstruction' is more appropriate here than 'renovation'.
[49] Article 55(b) of Regulation (EU) 2018/1999.
[50] http://data.europa.eu/eli/dir/2018/844/oj

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

NDPES 2030 comprehensively addresses energy consumption in transport and district heating sector, including cogeneration. It also deals with the modernisation of street lighting and energy savings by production companies. The use of oil shale has a significant impact on the efficiency of the Estonian energy sector. One of the strategic targets of the National Development Plan for the use of Oil Shale, 2016-2030[51] ('PAK 2030'), approved by the Riigikogu on 16 March 2016 is to increase the efficiency of oil shale use and reduce negative environmental effects. Table 11 shows how the indicative targets will be achieved with measures for increasing the energy efficiency of different sectors.

Table 11. Sector targets for energy efficiency

NDPES 2030 target: 2. More efficient use of primary energy: Estonia's energy supply and consumption is more sustainable		
NDPES 2030 measure	**Dimension**	**Indicative target level**
1.1	4. Electric power from the cogeneration facilities in the additional district heating network built over the period 2020-2030, MW_{el}	25 MW_{el}
2.2	1. Transport demand in use of passenger cars compared to 2010, % 5% (2030)	Increase ≤ 5% (2030)
2.3	2. The fuel consumption of the vehicle fleet in 2030 will not exceed that of 2012	≤ 8,3 TWh
2.6	1. Reduction in heat loss of district heating by 2030 (compared to 2012), TWh	0.1 TWh
2.8	1. Energy saving of manufacturing companies, GWh/y	460 (in 2023)

[51] https://www.riigiteataja.ee/aktilisa/3180/3201/6002/RKo_16032016_Lisa.pdf#

2.8	2. Number of renovated street lights	22,000 (in 2023)
PAK 2030 strategic objective		
2	1. Energy efficiency of oil shale production, %	over 76% (to be specified in 2025)

2.3. Dimension Energy Security

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

Under Article 4(c) of Regulation (EU) No 2018/1999, the NECP 2030 document should provide information on the objective or target:

- in security of supply, i.e. in diversification of the use of energy sources and third-country imports;
- in increasing the flexibility of the energy system;
- in the case of difficulties in the supply of energy source(s).

The following gives an overview of the sectoral targets in different energy systems by parts.

Flexibility of the energy system

The adequacy and flexibility of the electrical system (and the increase thereof) is ensured by the Electrical Market Act and harmonisation with the legislation laid down pursuant to it. According to the current Electrical Market Act, the system operator (including the transmission system operator) in Estonia develops the system in their service area in a way that ensures provision of consistent network service that is based on the legislation and an operating licence to consumers, producers, transmission line owners and other system operators who are connected to the system considering their justified needs and to connect to the electrical installation of the market operator in their service area By developing the grid, the system operator will follow the need for ensuring the security of supply, efficiency and market integration considering the results of the studies carried out in these areas[66]. The targets under measure 1.1 (Developing the electrical energy production) and 1.2 (Transmission eligible for electrical energy sector needs and efficient transmission) are used to ensure the adequacy of the electricity system adequacy and development of energy system flexibility. (see Table 12 and point 2.4.3) of the sub-target of NDPES 2030 security of supply.

Table 12. Targets for ensuring electricity system adequacy and the flexibility of the energy system[65]

NDPES 2030 target: 1. Security of supply Estonia has guaranteed lasting security of supply

NDPES 2030 measure	Dimension	Indicative target level
1.1	Share of fuel-free energy sources (sun, wind, hydro energy) in final power consumption, %	>25% (2030)
1.1	Total electric power of the cogeneration stations producing to the district heating network built, MW_{el}	>600 (2030)
1.2	Average total duration of unscheduled or disruptive interruptions in the distribution system per point of consumption a year, minutes	<90 (2030)
1.2	Amount of energy not provided in the transmission system, MWh	<150 (2030)

Security of supply of the electrical system

Security of supply of the electrical system is based on sub-target measure 1.1 of the NDPES 2030 regarding security of supply (Developing the electrical energy production) and 1.2 (Transmission eligible for electrical energy sector needs and efficient transmission) (see Table 13 and point 2.4.3)

Table 13. Targets for ensuring the security of the electricity supply[65]

NDPES 2030 target: 1. Security of supply Estonia has guaranteed lasting security of supply		
NDPES 2030 measure	**Dimension**	**Indicative target level**
1.1	Existence of local power generation capacities for compliance with the N-1-1 criterion	Achieved (2030)
1.1	Share of fuel-free energy sources (sun, wind, hydroenergy) in final power consumption, %	>25% (2030)

1.1	Electric power of the cogeneration stations producing to the district heating network built, MW_{el}	>600 (2030)
1.1	Share of imported fuel in electricity production	<50%
1.2	Share of domestic electricity under open market conditions	>60 %
1.2	Average total duration of unscheduled or disruptive interruptions in the distribution system per point of consumption a year, minutes	≤90 (2030)
1.2	Amount of energy not provided in the transmission system, MWh	≤50 (2030)
1.2	Preparedness to use international connectivity, %	96% (2030)
1.2	Construction of new 330 kV lines (Sindi-Riga and Sindi-Harku)	Built (2020)
1.2	Estonia is connection to the EU's main synchronisation frequency	Connected (2030)

Investments made within the framework of the synchronisation project of the Baltic States (see point 2.4.2) that help eliminate bottlenecks and increase the readiness of external connections and flexibility of the electrical system for fast changes in the power generation also contribute to the resilience of the electrical system. When the production of electricity from oil shale is reduced (phasing out of direct combustion), new production capacities and interconnections with neighbouring countries will ensure the security of the electricity supply. Ensuring the minimum requirements for security of supply should not exclude, if needed, the application of capacity mechanisms in the future according to the EU market organisation rules in force. The system operator is responsible for ensuring the security of supply of the electrical system.

Under Regulation (EU) No 2019/943, the State undertakes to determine the security of supply standard. Although flexibility has not been aligned with the Electricity Market Act to the extent set out in the Electricity Market Directive (Directive (EU) 2019/944), the flexibility-related issues will be reflected in the Act after adopting the Directive.

<u>Gas system</u>

According to the Natural Gas Act, the system operator is responsible for ensuring the security of the natural gas supply. The system operator is obliged to ensure the security of supply and balance of the gas system at any time according to the agreements in force. The system operator develops the system on the basis of known and projected demand, including new known connectees. Therefore the N-1 criterion [52] of the infrastructure standard must be met at any time.

Sub-objective 1.3 (Ensuring the gas supply) is reflected in NDPES 2030 by ensuring the security of supply of the gas system.

Table 14. Development targets for the gas system and market and diversification of gas supply

NDPES 2030 target: 1. Security of supply Estonia has guaranteed lasting security of supply		
NDPES 2030 measure	**Dimension**	**Indicative target level**
1.3	1. Meeting the infrastructure standard (N-1)	Implemented
1.3	2. Share of the biggest supply source in the gas supply	70% (2030)
1.3	3. Share of the biggest gas seller in the market	32% (2030)
1.3	4. Meeting the standard for security of supply	Implemented (2030)
1.3	5. Concentration of gas market (HHI[53])	<2000 (2030)
1.3	6. Estonian-Finnish gas	Built (2019)

[52] The N-1 criterion means assessment of a situation where one of the biggest gas supply connections is interrupted. If, upon interruption, it is possible to reorganise the supply so that there will be no disturbances in the supply, the N-1 criterion is met.

[53] HHI - Herfindahl-Hirschman index that varies within the range of 0–10000 and for which the squares of each single gas seller's market share are added [Σ(xi)2]. The higher value characterises the higher dependency on the gas market on one gas seller. For HHI<2000, there are 7 gas sellers and the largest one's share is below 32%.

	connection Balticconnector	

To reduce the probability of the factors that impact the security of gas supply and to ensure readiness for coping with large-scale supply disruptions, the Minister of Economic Affairs and Infrastructure approves a plan for safeguarding against gas supply disruptions and a preventive action plan for reducing the risks that affect the security of gas supply every two years (based on Regulation (EU) No 2017/1938). The most recent plan was adopted in 2017[54].

ii. National objectives with regard to increasing: the diversification of energy sources and supply from third countries for the purpose of increasing the resilience of regional and national energy systems

Estonia used to have one of the lowest rates of dependency on imported energy in the EU but largely depends on imports for natural gas and motor fuels. While it is possible to use different supply channels, for motor fuels, opportunities are more limited for natural gas supplies. In response, NDPES 2030 includes targets for diversification of the gas supply, described in Table 14 of Chapter 2.3.i.

Estonia's natural gas consumption accounts for some 5% of the energy balance. As part of the diversification of the energy sources, Estonia has started to produce biomethane from local raw material. In 2018 Estonia produced 40 GWh of biomethane. The country has set a target of increasing biomethane production volumes to 380 GWh per year by 2030.

iii. Where applicable, national objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national energy systems

To maintain low import dependency, it is necessary to maintain a high proportion of domestic fuels in the energy balance. An overview of the targets is included in Chapter 2.3.i (see Table 13).

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[55] and energy storage

Issues related to electrical system flexibility are described in Chapter 2.3.i

[54] Preventive action plan for reducing the risks affecting the security of gas supply Plan for safeguarding the gas supply disruptions (2017) - http://www.konkurentsiamet.ee/index.php?id=18309
[55] 'Demand response' is 'tarbimiskaja' in Estonian.

2.4. Dimension Internal Energy Market

2.4.1. Electricity interconnectivity

i. The level of electricity interconnectivity that the Member State aims for in 2030.

The target level of the electrical interconnectivity of the EU Member States is at least 10% by 2020 and at least 15% by 2030[56]. **The Estonian electrical interconnectivity level is 63%, thereby exceeding the EU target level by many times.**

Cooperation between the Member States is of critical importance in increasing the electricity interconnectivity. The Member States should rely on three minimum criteria for achieving the interconnectivity level:

a) the price differential of the pool price of the electricity among the regions, Member States or bidding zones should exceed 2€/MWh;
b) nominal transmission capacity of interconnectors is below 30% of their peak load;
c) nominal transmission capacity of interconnectors is below 30% of installed renewable generation capacity;

It is important to note that planning of new cross-border interconnectors must consider the socio-economic and environmental effects.

In 2017, the electrical interconnectivity level of Estonia with other EU countries (Latvia, Finland) was 63%[56]. The interconnection capacity from Estonia to Latvia was 900-1,000 MW, and from Estonia to Finland it was 1,016 MW. It is estimated that the capacity from Estonia to Latvia will increase to 1379 MW by 2030[57], due to completion of the third Estonia-Latvia interconnection[58]. The long-term development plan (TYNDP 2018[59]) of ENTSO-E has estimated that in 2030, Estonia will fulfil all three criteria above for all analysed scenarios, as shown in Figure 10.

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[56] European Commission. Communication on strengthening Europe's energy networks. https://ec.europa.eu/energy/sites/ener/files/documents/communication_on_infrastructure_17.pdf
[57] ENTSO-E. TYNDP 2018. Input data. https://tyndp.entsoe.eu/maps-data/
[58] Elering AS: Third connection between Estonia and Latvia; https://elering.ee/eesti-lati-kolmas-uhendus
[59]ENTSO-E. TYNDP 2018. Europe's Network Development Plan to 2025, 2030 and 2040. https://tyndp.entsoe.eu/tyndp2018/

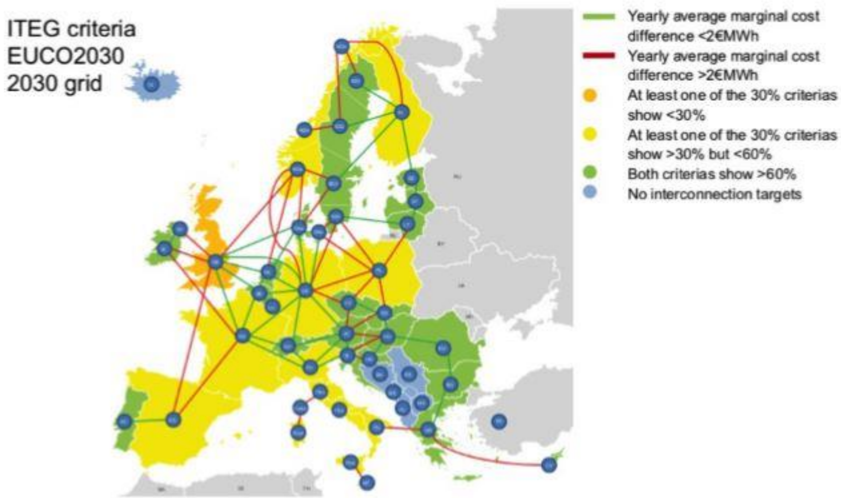

Figure 10: Fulfilment of the electricity interconnection criteria in 2030 in relation to EUCO 2030 scenario[60].

Although Estonia and other Baltic States meet the three criteria for electricity connectivity, the networks of the Baltic States have not been fully interconnected to the EU electricity grids; the Baltic States are not located in the synchronous area subject to EU law The electricity systems of Estonia, Latvia and Lithuania operate synchronously with the Russian Unified Energy System (IPS/UPS). Synchronisation of the electrical system of the Baltic States with the synchronous area subject to EU law around 2025 is one of the most important energy policy targets for Estonia and other Baltic States and will significantly affect the long-term development of the electricity network. In the roadmap[61] that was signed in the summer of 2018,the Prime Ministers of the Baltic States, the President of the European Commission and the Prime Minister of Poland confirmed the importance of the synchronisation project and recognised the wish of the Baltic States to synchronise with the Continental Europe frequency band. The interconnections between the Baltic States will also be strengthened by the synchronisation project and the project will help increase the interconnection of Poland in the electricity grid[62].

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[60] EUCO 2030 scenario = Scenario for meeting the EU-wide energy and climate objectives agreed in 2014.

[61] 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

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

2.4.2. Energy transmission infrastructure

i. Key electricity and gas transmission infrastructure projects, and, where relevant, modernisation projects, that are necessary for the achievement of objectives and targets under the five dimensions of the Energy Union Strategy

Electric system

The main target for the Estonian electricity system in the near future (until 2030) is to synchronise the electrical system with the mains frequency subject to EU law.

The Baltic States' synchronisation project has been on the list of EU Projects of Common Interest (PCI) since 2013 and relevant activities have been undertaken under it in Estonia, Latvia, Lithuania and Poland (Figure 11).

Figure 11: Synchronisation of the Baltic electricity system with the Continental European frequency band[62]. The figure shows the preliminary draft of the synchronisation plan and covers the updated lines.

Table 15 below gives an overview of actions carried out in the Estonian electricity grid under the synchronisation project. The project will be carried out as cooperation between the Baltic States and Poland A detailed overview of the status and activities of the project is available on the ENTSO-E website presenting the project[62].

Table 15. Synchronisation project activities in Estonia[62]

Name of investment	PCI number	Amount of investment, min. €	Timeframe
L386 Kilingi-Nõmme-Riga	4.2.1	120	2020
L735 Harku-Sindi	4.2.2	60	2021
L300 Balti-Tartu	4.8.2	51	2024
L301 Tartu-Valmiera	4.8.1	31	2025
L353 Viru-Tsirguliina	4.8.4	73	2025
Replacement of control systems in Estonia's electrical system	4.8.9	33	2024
Total		**368**	

The synchronisation project relates to the following dimension of the Energy Union strategy:

- Energy security, solidarity and trust
- A fully-integrated internal energy market
- Climate - low carbon economy
- Research, innovation and competitiveness.

The Estonian electricity system must also prepare for strengthening the connections between West Estonia and its islands in connection with added major capacity from the development of the off-shore and on-shore wind farms. Looking to the future, it is expedient for local governments to add the guideline to their comprehensive planning using for planning infrastructure sites (e.g. cable connections of wind farms) related to off-shore activities via public procedure on land. On this basis, Elering AS will build the West Estonia Harku-Lihula-Sindi 330/110 kV high voltage overhead line, which is one of the biggest national infrastructure projects and capable of integrating up to 1,000 MW wind farms. Cooperation has begun with Latvia to develop joint projects (e.g. a Latvian-Estonian joint wind farm in the Gulf of Riga) that would be eligible for co-financing for developing the connections via the Connecting Europe Facility (CEF).

Gas system

The greatest challenges for the Estonian gas system include interconnection of the system with the Finnish gas system via the Balticconnector by 2019 and the associated renovation of the Karksi gas-metering station in 2019. The transmission capacity of the Balticconnector in the project is 7.2 million m^3 of natural gas per day. Renovation of the metering station will ensure two-way gas flow between Estonia and Latvia. Facilities related to the construction of Balticconnector have been on the PCI list since 2013 (Balticconnector project number 8.1.1).

When completed, the Balticconnector will contribute to the physical integration of the region's gas market and market liquidity as follows:

- Improved security of natural gas supply in Estonia as well as Finland;
- Larger natural gas market that covers Finland and the Baltic States, with alternative supply channels that will increase competition in the gas market;
- Improved opportunities for using renewable energy (biomethane);
- Increase in security of natural gas supply in the Baltic States-Finland area by allowing natural gas equal opportunities for competing with other primary fuels;
- Improved integration of the single gas market covering Finland and the Baltic States with the EU single market once the Lithuanian-Poland gas interconnector GIPL is completed;
- Ends Finland's isolation from the natural gas interconnector system, thereby allowing Finland access to the underground gas storage in Latvia.

The construction of Balticconnector will expand the interconnections of the Estonian-Latvian gas systems. The project is about improving the interconnection pipeline between Estonia and Latvia, including the construction of a compressor station and a new gas metering station in Estonia.

Balticconnector relates to the following dimension of the Energy Union strategy:

- Energy security, solidarity and trust (improves security of the gas supply):
- A fully-integrated internal energy market (Finland's gas market is connected to the Baltic States and in future to the Central European gas market);
- Climate - low-carbon economy (transfer of gas produced from renewable energy sources);
- Research, innovation and competitiveness (liquid market, new market opportunities).

ii. Where applicable, main infrastructure projects envisaged other than Projects of Common Interest (PCIs)[63]

[63] 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).

Not applicable.

2.4.3. Market integration

i. National objectives with regard to other aspects of the internal energy market, including a timeframe for when the objectives are to be met.

Electric system

As Table 16 below shows, >90% of the capacity of the Estonian electrical system's interconnection lines with our neighbouring countries have been made available to the market from Estonia to abroad.

Table 16. Capacity of the external connection made available to the market in Estonia in 2016[64]

Boundary	Direction	Maximum power (MW)	Power for use on the market, MW	% share
EE-FI	EE->FI	1000	965	97%
EE-FI	FI->EE	1000	975	98%
EE-LV	EE->LV	836	779	93%
EE-LV	LV->EE	836	670	80%

Objectives and barometers relating to market integration and connection are defined in the Estonian National Energy Development Plan 2030 (NDPES 2030)[65] (see Table 17). The development plan sets an indicative target level of 96% for the external interconnection availability in 2030. Table 16 above shows that this level has been achieved for the Estonia-Finland interconnections. The barometer 'Installation of new 330 kV (Sindi-Riga and Sindi-Harku) lines' (the third Estonia-Latvia interconnection) in sub-objective of the NDPES 2030 security of supply, addresses increasing the availability of the Estonia-Latvia interconnectors, with implementation planned for 2021. Other investments in the Baltic States made within the framework of the synchronisation project also help increase the availability of external interconnectors (see Chapter 2.4.2), which helps eliminate the bottlenecks in all Baltic States and increases the resilience of the electrical systems to fast changes in production and consumption.

Table 17. Objectives and barometers relating to market integration and connection[65]

[64] ACER. Market Monitoring Report 2016. https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20Market%20Monitoring%20Report%202016%20-%20ELECTRICITY.pdf
[65] Government of the Republic, Estonia's energy development plan to 2030. https://www.mkm.ee/sites/default/files/enmak_2030.pdf.

NDPES 2030 target: 1. Security of supply Estonia has guaranteed lasting security of supply		
NDPES 2030 measure	**Dimension**	**Indicative target level**
1.2	3. Preparedness to use international connectivity, %	96% (2030)
1.2	5. Construction of new 330 kV lines (Sindi-Riga and Sindi-Harku)	Built (2020)
1.2	6. Estonia is connection to the EU's main synchronisation frequency	Connected (2030)

In addition to the development of the electricity infrastructure, the TSO (Elering AS) together with the largest distribution system operator (Elektrilevi OÜ) deal with development projects promoting the deployment of the flexibility service in the Estonian electricity system (e.g. H2020 project EU-SysFlex; Deployment of the single balancing services market in the Baltic States, starting 1 January 2018). This is helped by the fact that under the Government's Network Code Regulation, laid down pursuant to the Electricity Market Act, all Estonian electricity consumers have been supplied with remotely readable meters since 1 January 2017.

Gas system

Table 14 gives an overview of the targets relating to gas market integration.

The integration of the Estonian gas market with the gas markets of the other Baltic States and Finland has been under way since 2016, when the relevant ministries, system operators and regulators of the Baltic States and Finland acted to establish a single gas market. The parties have organised a working group for cooperation with the aim of creating a harmonised rules for the gas market and single price for access to gas in the gas system gas (Estonia, Latvia, Lithuania + Finland) by 2020. The Prime Ministers of the Baltic States approved the roadmap of necessary activities in December 2016. One of the most important tasks is to abolish the transmission fees on the borders of the countries on the regional gas market. The aim is that from 2019 onwards there will be no gas transmission fees between Lithuania, Latvia, Estonia and Finland. Only the price of the gas flow incoming to the region will remain unchanged (uniform across the region) and the gas flow output price (each country decides itself).

The establishment of a single market of the region will mean uniform market rules, a joint balancing zone across four countries, no transmission fees on the borders of the countries and system operators will have a single IT platform to meet system requirements.

For market integration, the key points of development of the physical infrastructure include completion of the Balticconnector in 2019 and supplementing the interconnection of the Estonian-Latvian gas systems with the compressor station and building a new gas metering station.

ii. Where applicable, the national objectives with regard to ensuring electricity system adequacy, 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.

The adequacy and flexibility of renewable energy production is ensured by the Electrical Market Act and harmonisation with the legislation laid down pursuant to it. According to the current Electrical Market Act, the system operator (including the transmission system operator) in Estonia develops the system in their service area in a way that ensures provision of consistent network service that is based on the legislation and an operating licence to consumers, producers, transmission line owners and other system operators who are connected to the system considering their justified needs and to connect to the electrical installation of the market operator in their service area According to the Electricity Market Act, the customers may start to produce electrical energy for their own consumption and sell excess to the grid. It is also possible to get supports for electrical energy that is generated from renewable energy sources. By developing the grid, the system operator will follow the need for ensuring the security of supply, efficiency and market integration considering the results of the studies carried out in these areas[66]. In the case of grid connections or change in the consumption or production conditions, the electricity producer has to pay all costs necessary for connecting the production capacities or changing the existing production conditions, including the costs for building new electrical installations and renovation of existing electrical installations[67].

Table 18. Ensuring electricity system adequacy and the flexibility of the energy system for producing electricity[65]

NDPES 2030 target: 1. Security of supply Estonia has guaranteed lasting security of supply		
NDPES 2030 measure	**Dimension**	**Indicative target level**
1.1	2. Share of fuel-free energy sources (sun, wind, hydroenergy) in final power consumption, %	>25% (2030)
1.1	4. Electric power of the cogeneration stations	>600 (2030)

[66] Estonian Parliament. Electricity Market Act https://www.riigiteataja.ee/akt/125012017002?leiaKehtiv
[67] Government of the Republic. Network Code https://www.riigiteataja.ee/akt/1160220160WleiaKehtiv

	producing to the district heating network built, MW_{el}	
1.2	1. Average total duration of unscheduled or disruptive interruptions in the distribution system per point of consumption a year, minutes	≤90 (2030)
1.2	2. Amount of energy not provided in the transmission system, MWh	≤150 (2030)

The barometers for meeting the objective direct the system operators to make necessary investments and develop solutions for more efficient integration of renewable energy in the Estonian electrical system. A good example of this innovation is the map application shown in Figure 12, developed by the Estonian TSO (Elering AS) that shows the available capacities in the electricity grid belonging to the company by years and enables the renewable energy producers to plan their projects more effectively.

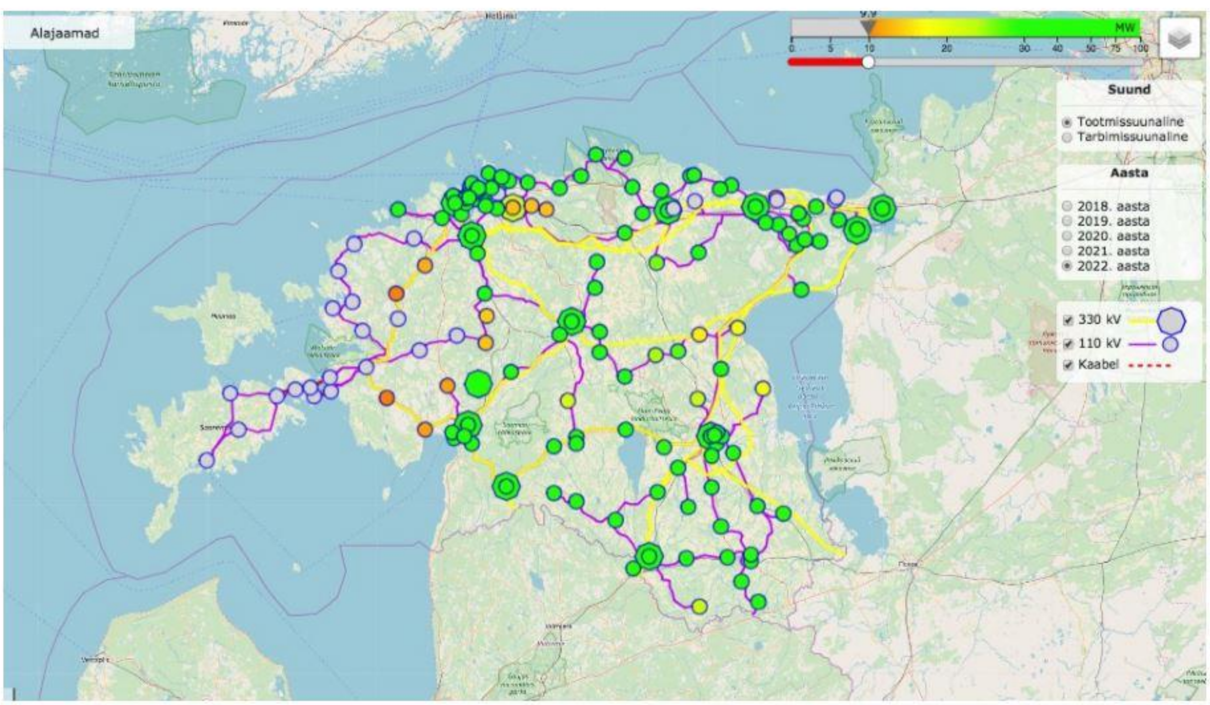

Figure 12: Elering AS's map application showing available connection capacity[68].

The synchronisation project (see chapter 2.4.2) also contributes to the renewable energy integration capacity-building by which the electrical system bottlenecks will be removed across the Baltic States.

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

Since 1 January 2017, all Estonian electricity customers have had smart readers that record and transmit at least the hourly data to the central database (data storage - e.elering.ee). Consumers have free access to their data. They may also enable data access for the freely selected service provider

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

Described in 2.4.3 ii above.

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

Not applicable.

2.4.4. Energy poverty[69]

Where applicable, national objectives with regard to energy poverty, including a timeframe for when the objectives are to be met

Current Estonian national development documents do not deal with energy poverty as an separate issue. Household subsistence is monitored fully at national as well as local government level. The 'Welfare Development Plan 2016-2023[70]' focuses on poverty reduction and aims at the reduction of the absolute poverty rate to 5.8% and reduction of the relative poverty rate to 15% by 2023.

Article 7 of the Energy Efficiency Directive EU 2018/2002 was transposed in 2019 by amendment of the Energy Sector Organisation Act, and measures for tackling energy poverty will be specified in the course of drafting the legislation. Achievement of the energy efficiency targets via different measures, renovation or other measures requires consideration whether and how the energy purchase risk groups and persons in energy poverty shall be involved in the energy efficiency measures so that

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[68] Elering AS. Available connection capacity map application https://elering.ee/vabade-liitumisvoimsuste-rakendus/

[69] The Estonian equivalent of the term is 'energiaostuvõimetus'.

[70] https://www.sm.ee/et/heaolu-arengukava-2016-2023

the measures to make housing more energy-efficient are also accessible to these groups.

Transposition of the Directive links the person in energy poverty with the subsistence allowance, which means that recipients of the subsistence allowance also includes people experiencing energy poverty. A person living alone or a family who in the last six months has received once the subsistence allowance for housing costs (incl. energy purchase) and whose previous month income (gross) is not higher than the minimum wage for equivalence scales 1,0;0,8;1,2 is deemed to be experiencing energy poverty. In 2018, 21,000 people, 1.6% of Estonian population, received the subsistence allowance to cover housing costs, including the apartment house loan. During the first half of 2019, the support for covering the housing costs amounted to 5.8 million euros of which 136,317 euros were used for the loan payment for the apartment house renovation.

Directive (EU) 2018/2002 aims to improve the situation of natural persons and households who are not able to participate in the energy saving measures without additional support. To achieve this, the policy measures, a list of which is approved by the Government of the Republic from among the measures necessary for meeting the general energy saving obligation, must be assigned to the natural persons or households in economically insecure situations or the service providers responsible for them to mitigate energy poverty.

Even now, the energy saving measures for persons experiencing energy poverty include provisions on access to energy-efficiency measures:

1) Housing benefit for families with many children. This benefit helps to improve the living conditions of low-income households with many children.
2) Support for the reconstruction of apartment buildings This grant helps to improve the energy efficiency of apartment houses and supports all members of the apartment association to carry out energy-efficiency measures. Specifications have been created for the regions where property values are lower and energy poverty is greater.
3) Case-by-case investment aid to develop local government building stock. This aid helps to improve the availability of rented accommodation for households that are not able to buy or rent it from the rental market, including socio-economically disadvantaged persons.

The statistics of the European Energy Poverty Observatory[71] suggest that Estonia does not have major problems in this area. For example, 2.9% of households had problems with ensuring heating, while the EU average is 7.9%. 6.3% of households had payment debts for energy bills, while the EU average is 7%. The amount of income Estonian families spend on energy (16.3%) is very close to the EU average of 16.3%. The only

[71] Bouzarovski, S. & Thomson, H. (2019) Transforming Energy Poverty Policies in the European Union: Second Annual Report of the European Union Energy Poverty Observatory.

issue is cooling, where keeping housing cool is more problematic than in many other countries (23.3% in Estonia compared to 19.2% in the EU). Overall it would appear that Estonia's situation regarding energy poverty is slightly better than the EU average.

2.5. Dimension research, innovation and competitiveness

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

The current national development documents in Estonia have not set independent research and development targets related to the energy sector. Research and development activities relating to the energy sector contribute to the achievement of the overall national research and development targets. The Estonian research and development and innovation strategy 2014-2020, 'Knowledge-based Estonia', focuses on reaching the following targets once funding is obtained for research and development activities:

- The level of investment in research and development must be at least 3% of GDP; and
- Private sector research and development costs must be 2% of GDP.

On 19 December 2018, scientists, politicians and business organisations concluded a social contract, the Estonian research agreement, under the auspices of the President. The signatories undertook to increase public sector funding for research and development and innovation to 1% of GDP and thereafter maintain it at least the same level[72].

Research and development and innovation for increasing competitiveness are governed by the following current sectoral development plans:

- Estonian Rural Development Plan 2014-2020
- Competitiveness Plan 'Estonia 2020'
- National Waste Plan 2014-2020
- Estonian Forestry Development Plan 2020
- Transport Development Plan 2014-2020

An agriculture and fishery sector development plan until 2030, a forestry development plan for the period 2021-2030 and an infrastructure and mobility development plan for the period 2021-2030 are being drafted.

The overall objective of the NDPES 2030 is to ensure, among other things, the growth in the competitiveness of the economy: to ensure that customers have an energy supply with market-based prices and availability that meets the European Union's long-term energy and climate policy targets and at the same time contributes to the improvement of Estonia's economic climate and environmental status and to increasing competitiveness in the long term. To facilitate performance of the NDPES 2030, a

[72] Estonian research agreement https://novaator.err.ee/886104/eesti-teadusleppe-taistekst

research and development (RD) program has been developed which among other things includes RD activities in the area of energy technologies. **In the 'State budget strategy 2019-2022' adopted in spring 2018, it was decided that from 2019 energy-related research and development would be funded in each of the four subsequent years to a total of EUR 1.6 million, i.e. EUR 400 000 a year. The NDPES RD programme lays out the barometers and timeframe for facilitating performance of the NDPES 2030 targets until 2023.** The NDPES RD program focuses on the development of the environment for the dissemination of energy-related information (www.energiatalgud.ee) and its provision to customers, participation in international cooperation in the area of energy technology and in energy-related projects, the integration of renewable energy sources into the power grid and security of supply, the introduction of biofuels and the adoption of electric vehicles, the availability of bioenergy resources in the future, the development of a long-term strategy for the renovation of buildings (this will be completed in March 2020), as well as the more efficient use of oil shale.

The Development plan for Estonian research, development, innovation and entrepreneurship 2021-2035 is currently being drafted. The implementation of the results of research and development in the interests of Estonian society and its economy has been modest to date. Cooperation between universities and companies is low, e.g. Estonia clearly lags behind EU innovation leaders in the number of publications jointly authored by businesses and research institutions. Neither current research and development policy nor enterprise policy have been able to make the economy significantly more knowledge intensive. The achievement of the targets of the climate policy will bring pressure to bear on Estonian entrepreneurs to make manufacturing models more environmentally friendly and to reduce manufacturing emissions. As a result of population decline, the number of graduates in the education system will decrease in the near future, and even if companies were to make a large-scale transition to automated manufacturing, the labour shortage will increase[73]. Hence it is not possible to take into consideration the funding and other targets (incl. in connection with the private sector) of the research and innovation of the new decade in setting the energy and climate targets until 2030. The transition to a climate-neutral economy will require the coordinated activity of various ministries and research institutions in planning research and innovation and making the related investments. In connection with the fulfilling of the targets and measures of the NECP 2030, a more detailed financing plan and schedule for the required research will be developed during the compilation and review of the sectoral development plans.

ii. Where available, national 2050 objectives related to the promotion of clean energy technologies and, where appropriate, national objectives, including long-term targets (2050) for deployment of low-carbon technologies, including for decarbonising energy and carbon-intensive industrial sectors and, where applicable, for related carbon transport and storage infrastructure.

The long-term vision for Estonian climate policy and sectoral and cross-cutting policies

[73] Drafting proposal https://www.valitsus.ee/sites/default/files/content-editors/arengukavad/taies_koostamise_ettepanek_09.09.2019.pdf

to set a clear path towards alleviating climate change were agreed upon at national level in the development document 'General Principles of Climate Policy until 2050'[74]. Estonia will have a competitive low-carbon economy by 2050. This will ensure that the country is ready and able to minimise the negative consequences of climate change and make optimal use of the positive effects. In accordance with the first policy document covering the entire economy, Estonia will be transformed into an environment that will primarily be attractive for the development of innovative technologies, products and services that reduce GHG emissions. The export of these technologies, products and services and their global implementation in solving global problems connected with climate change will also be promoted.

The introduction of low-carbon emission technologies and the efficient use of resources in industrial processes will be promoted. Legislation will be used to motivate industry to employ predominantly low-carbon fuels and production inputs. In seeking to limit the GHG emissions of energy and industry, preference will be given to directions in research, development and innovation that promote the development of efficient energy technologies, valorise domestic renewable energy resources, increase primary energy savings and reduce GHG emissions.

Estonia joined the Hydrogen Initiative[75] at the informal meeting of EU energy ministers in Linz, Austria on 17 and 18 September 2018. The public meeting of the ministers of energy in Brussels on 19 December 2018 discussed follow-up measures connected with the Hydrogen Initiative[76], and the Minister of Economic Affairs and Infrastructure delivered a speech. The use of hydrogen in different sectors of the economy offers the most efficient possibility for moving towards a low-carbon economy.

The intended aim of the measure 'Green technology investment programme' is to boost start-up and scale-up companies whose activities are directed towards developing and bringing to market new products, services and technologies for reducing or capturing greenhouse gas emissions. The aim of the investment programme is to bring additional private equity to the field of green technology via investments with state equity capital.

iii. Where applicable, national objectives with regard to competitiveness

In accordance with the overall objective of the NDPES 2030, the plan aims, among other things, to ensure that the energy sector contributes to increasing competitiveness. Its performance will be assessed using the barometers for assessing the performance of the overall target described in the following table.

Table 19. National objectives with regard to competitiveness

NDPES 2030 target: To ensure for consumers an energy supply with a market-based price and availability that meets the EU long-term energy and climate policy targets and at the same time contributes to the improvement of the Estonian economic climate and environmental status and to increasing competitiveness in the long term.	
Barometer of the NDPES 2030 overall target	**Indicative target**

[74] http://www.envir.ee/sites/default/files/362xiii_rk_o_04.2017-1.pdf
[75] The Hydrogen Initiative http://h2est.ee/wp-content/uploads/2018/09/The-Hydrogen-Initiative.pdf
[76] Follow-up measures to the Hydrogen Initiative http://h2est.ee/vesiniku-algatuse-jarelmeetmed/

	level
Energy intensity of the economy MWh/1000 $€_{GDP2012}$	2
GHG emissions of the energy sector per unit of GDP, tCO2eq/$€_{GDP2012}$	0.35
GDP change vs baseline scenario[77], %	3.6%
Change in foreign trade balance in relation to GDP, vs baseline scenario[77], %	2.8%
Change in productivity vs baseline scenario[77], %	2.7%
Change in employment vs baseline scenario[77], persons/year	15900

3. POLICIES AND MEASURES

3.1. Decarbonisation Dimension

3.1.1. GHG emissions and removals

i. Policies and measures to achieve the target set under Regulation (EU) 2018/842 as referred to 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 objective of becoming a low emission economy and achieving a balance between emissions and removals in accordance with the Paris Agreement

In April 2017, the *Riigikogu* approved the Estonian long-term climate policy development document ‘General Principles of Climate Policy until 2050’ (*hereinafter* GPCP 2050). The GPCP 2050 is a vision document that lays down a long-term target for the reduction of GHG emissions and policies for adjusting to climate change or responding to the impacts of climate change, in order to ensure preparedness and the required resilience.

The principles and guidelines set out in the document must be taken into account in updating and implementing the cross-sectoral and sectoral strategies and national development plans. The main sectoral policies and principles of the GPCP 2050 that pertain to the economy as a whole and contribute to achieving the targets indicated in point 2.1.1. are provided in an annex to the document (see Annex II, GPCP 2050 policies and principles). A detailed description of the guideline can be found in the GPCP 2050 document[78].

The compilation of the above-mentioned development document also followed the Estonian national strategy of sustainable development ‘Sustainable Estonia 21’, one of the targets of which is maintenance of ecological balance with the aim of treating nature as a value and as society’s central development resource alongside the overall development of Estonia.

The *Riigikogu* approved the strategy document ‘Sustainable Estonia 21’ in 2005. A

[77] Compared to the results of the non-intrusive scenario (minimal regulation and support) in the ESDP 2030 economic impact analysis model
[78] http://www.envir.ee/sites/default/files/362xiii_rk_o_04.2017-1.pdf

separate plan has not been compiled for the implementation of the national sustainable development strategy, and it is instead implemented via the strategies and development plans of different sectors.

On 2 March 2017 the Government of the Republic adopted the 'Estonian climate change adaptation plan until 2030' and the accompanying implementation plan, which had been completed in 2016 under the guidance of the Ministry of the Environment in cooperation with other ministries and partners and the Estonian Environmental Research Centre. The process of preparing the development plan was supported through the financial mechanism of the European Economy Association. The main objective of the development plan is to increase the preparedness and ability to adapt to climate change on the national, regional and local levels. Implementation of the development plan will improve Estonia's preparedness and ability to adapt to the impact of climate change on the national, regional and local levels and help ascertain the areas that are most vulnerable to climate change. The development plan will plan and guide the area of adaptation to the impact of climate change as a whole via a single strategy document, and the overall approach to climate change adaptation will be assembled and harmonised. This will ensure better cohesion between different sectors of climate change adaptation. The development plan sets out eight sub-objectives on the basis of the eight priority areas.

The following are the policies and measures that will contribute to meeting the objectives listed in Table 4 and Table 5 of chapter 2.1.1. In addition to already implemented and ongoing policies and measures, several additional (taken into account in the preparation of the projections of Chapter 5.1 with additional measures) and planned (the impact of the measures has not been assessed in the preparation of the projections) policies and measures are presented below. As of August 2019, the preparation of drafts for several sectoral development plans (a development plan for the agriculture and fisheries sector, a forestry development plan and a transport development plan) for the period 2021-2030 is under way in Estonia. Since the process of drafting these development plans is still in the early phases, many of the planned measures presented in this chapter originate from three relevant studies completed in 2018 and 2019: 1) the study 'Ascertaining the most cost-effective measures for achieving the objectives of climate policy and the Effort Sharing Regulation in Estonia' commissioned by with the Environmental Investment Centre and the Ministry of the Environment, the Ministry of Rural Affairs, the Ministry of Economic Affairs and Communications and the Ministry of Finance; 2) the study 'The overall national energy efficiency obligation in the period 2021-2030 and meeting renewable energy targets' commissioned by the Ministry of Economy Affairs and Communications; and 3) the study "An analysis of the opportunities for raising climate ambition in Estonia', commissioned by the Ministry of the Environment and the Government Office.

It must be noted that in order to actually examine the following planned measures actually in the development plans, additional assessments must be conducted, and a methodology for taking a GHG inventory must be developed. No decisions have been made regarding the potential application of the above planned measures.

A climate and energy committee was established on 11 July 2019 in order to agree upon suitable measures for meeting the targets, and the first meeting of the committee was held on 10 September 2019. The committee's discussions, with the aim of finding the best solutions for Estonia, have been planned to continue until the approval of the state budget strategy in spring 2020.

The connection between the measures and GHG reductions is provided in Annex III, and a more detailed description of the measures can be found in Annex V of the plan. As the result of the application of existing and additional measures, it would be possible to reduce GHG emissions by as much as a quarter in the sectors covered in the plan in the period 2020-2030.

Table 20 Reduction of GHG emissions by sector according to the scenario under the additional 2020-2030 measures.

2020, GHG emission Mt CO_{2ekv} (incl LULUCF)	Sectors	2030, GHG emission Mt	Change, %
10.9	ENERGY	6.6	40%
2.1	TRANSPORT	1.7	19%
1.4	AGRICULTURE	1.6	-14%
-1.4	LULUCF	-0.2	-600%
0.3	WASTE,	0.2	33%
0.7	INDUSTRIAL PROCESSES	0.7	0%
14	**TOTAL**	**10.5**	**25%**

Policies and measures for achieving the target under the Effort Sharing Regulation

Measures across sectors with GHG emissions reduction potential

The following describes the existing and envisaged cross-sectoral policies and measures for the reduction of GHG emissions.

The existing cross-sectoral policies and measures with GHG reduction potential in the LULUCF and agricultural sector are:

- PM3 Support for climate-friendly and environmentally sustainable agricultural practices, the 'greening support'
- PM6 Natura 2000 support for agricultural land
- PM10 Converting arable land on peat soils to permanent grassland

The existing cross-sectoral policies and measures with GHG reduction potential in the energy and agricultural sectors are:

- PM7 Investments for the diversification of economic activities in rural areas through a shift towards non-agricultural activities; and
- PM8 Investments to enhance the performance of farms.

The planned cross- sectoral policies and measures with GHG reduction potential in the energy, transport and agricultural sectors are:

- PM11 The production of bioenergy and increasing its share in agriculture

Measures in the business, public and housing sectors

Measures to be considered in the housing and business and public sectors are mainly related to energy savings achieved through the reconstruction of buildings. The following are the main existing measures that influence GHG emissions:

- HF1 The reconstruction of public sector[79] and commercial buildings;
- HF2 The reconstruction of private residences and apartment buildings; and
- HF3 The establishment of minimum requirements for nearly zero-energy buildings.

The implementation of various additional measures is still under discussion or the release of additional funding for their implementation is anticipated (these are measures planned within the meaning of ANNEX IV). Such measures include:

- HF4 Investments in the street lighting reconstruction program;
- HF5 Additional reconstruction of public sector and commercial buildings;
- HF6 Additional reconstruction of private residences and apartment buildings.

Measures in the heating sector

The main existing measure that impacts the GHG emissions of the heating sector is:

- EN3 Development of the heating sector

The implementation of various additional measures is still under discussion or the release of additional funding for their implementation is anticipated (these are measures planned within the meaning of ANNEX IV). One such measure is:

- EN4 Additional development of the heating sector

Measures in the transport sector

The main existing measures that impact the GHG emissions of the transport sector are:

- TR1 Increasing the share of biofuels in the transport sector;
- TR2 Increasing the fuel efficiency of the transport sector;
- TR3 The promotion of sustainable driving;
- TR4 Spatial and land use measures in cities to increase the fuel-efficiency of transport and enhancement of the transportation system;
- TR5 The development of convenient and modern public transport;
- TR6 Time-based road usage fees for heavy-duty vehicles.

The implementation of the following additional measures is still under discussion (these are planned measures within the meaning of ANNEX IV).

- TR7 Support for purchasing electric vehicles;
- TR8 Additional enhancement of fuel-efficient driving;
- TR9 Additional spatial and land use measures in cities to increase the fuel-efficiency of urban transport and the effectiveness of the transportation system;

[79] Central government and local government buildings

TR10 Additional activities for the development of convenient and modern public transport;
TR11 Establishment of mileage-based road usage fees for heavy-duty vehicles;
TR12 Tyres and aerodynamics of vehicles;
TR13 Development of railway infrastructure (incl construction of Rail Baltic)
TR14 Electrification of railways;
TR15 Electrification of ferries.

The studies carried out in 2018 to ascertain the most cost-effective measures for fulfilling the targets of Estonia's energy and climate policy also presented the following tax measures. The following measures are under discussion and will require additional study.

TR16 Transition to public transport powered by biomethane and electricity

Measures in the industrial processes and product use sector

The main measure for reducing GHG emissions in the industrial processes and product use sector is:

TÖ1 Prohibitions, restrictions and obligations arising from Regulation (EU) No 517/2014 on fluorinated greenhouse gases and Directive 2006/40/EC relating to emissions from air conditioning systems in motor vehicles

Regulation (EU) No 517/2014 on fluorinated greenhouse gases (which entered into force on 1 January 2015) establishes a timetable for the gradual reduction of F-gases by 2030 that will be implemented through the application of a system of credits and through prohibitions and restrictions.

In Estonia this measure is also supported through the project-based promotion of alternative natural and low GWP-content refrigerants, taking into consideration the prohibitions and restrictions arising from Regulation (EU) No 517/2014. The project-based promotion of alternative natural and low-GWP refrigerants consists of three activities:

- To ensure that Estonian refrigeration technicians are able to acquire the knowledge required to work with the new technologies and substances (CO_2, NH_3, HCs) from 2020. The Estonian educational and vocational system will be adjusted to the new requirements, and in-service training will be provided to employees already operating in the market;
- Additional measures will help prevent investments in technologies based on high GWP refrigerants that fall under strict restrictions, and the collection and recycling of these substances at the highest possible volumes will be ensured; and
- It will be ensured that target groups are aware of the restrictions and prohibitions and technological opportunities arising from Regulation (EU) No 517/2014 of the European Parliament and of the Council, which will enter into force of in 2020, and that they can, if necessary, obtain assistance with the solution of technical problems and in making decisions regarding choices between different technologies.

The above activities will serve to support and amplify the impact of Regulation (EU) No 517/2014 and other national legislation. These activities are still in the early phases, and it is therefore not possible to assess their impact separately from the impacts of Regulation (EU) 517/2014.

Under Directive 2006/40/EC, from 1 January 2017 it is forbidden to sell new EU type-approval passenger cars, pick-up trucks and vans with air-conditioning systems that contain refrigerant with a global warming potential that is greater than 150. Estonia has not established significantly more stringent requirements than those laid down in Regulation 517/2014 and Directive 2006/40/EC.

Measures in the agricultural sector

In order to achieve the desired limitation and reduction of the GHG emissions of the agricultural sector, the following existing measures of the Estonian Rural Development Plan (ERDP) for 2014-2020, which are also mentioned in the ‘Climate change mitigation and climate change adaptation action plan for 2012-2020 in the agricultural sector’ and the ‘Estonian organic farming development plan for 2014-2020’ are in effect:

- PM1 Organic farming;
- PM2 The Agri-environment-climate measure and its sub-measures;
- PM4 Knowledge transfer and notification;
- PM5 Advisory services, farm management and farm relief services; and
- PM9 Animal welfare.

The studies carried out in 2018 and 2019 to find the most cost-effective measures to fulfil the Estonian climate targets[80] and analyse the opportunities to raise climate ambition in Estonia[81] also presented the following measures. The measures listed below are under discussion and thus their impact is not taken into account in the GHG projections provided in Chapter 5.

- PM12 Improvement of the quality of feed for dairy cows;
- PM13 Increasing the share of grazing on grassland;
- PM14 Zero tillage;
- PM15 Winter plant cover;
- PM16 Precision fertilisation; and
- PM17 Replacing inorganic fertilisers with organic fertilisers;
- PM18 Investments in energy savings in greenhouses and vegetable warehouses and in introducing renewable energy therein;
- PM19 The neutralisation of acidic soils;
- PM20 The improvement of manure management;
- PM21 Audits in larger farms;
- PM22 Research and pilot projects.

[80] Report on ascertaining the most cost-effective measures for achieving the targets of the climate policy and Shared Effort Regulation in Estonia, 2018: https://www.kik.ee/sites/default/files/aruanne_kliimapoliitika_kulutohusus_final.pdf

[81] Analysis of the opportunities for raising climate ambition in Estonia, 2019: https://www.sei.org/wp-content/uploads/2019/10/eesti-kliimaambitsiooni-t%C3%B5stmise-v%C3%B5imaluste-anal%C3%BC%C3%BCs-1.pdf

The agricultural and fishery sector development plan for the next decade, 2021-2030, which is currently being prepared, aims to create a joint strategic development document for the sectors and develop the program, measures and activities required for its implementation. It is anticipated that the development plan will be submitted to the Estonian government for approval at the end of 2019.

One of the general targets of the EU common agricultural policy strategic plan 2021-2027 is to enhance environment protection and climate measures and contribute to European Union environmental and climate objectives.

Measures in the waste sector

The general waste-related requirements and rules are laid down in the Waste Act, which includes the following measure applied for limiting and reducing the GHG emissions:

JM1 Restricting the proportion of biodegradable waste being landfilled and increasing the volume of reuse and recycling of waste materials

As laid down in the Local Government Organisation Act, local governments are tasked with establishing waste management rules, as well as approving and updating a waste plan. According to the waste plans approved by the majority of local governments, incineration of waste is prohibited.

“The Estonian environmental strategy until 2030” covers the following policy:

JM2 Reducing landfilled waste (incl. biodegradable waste)

The national waste plan 2014-2020 aims to introduce sustainable waste management based on a waste hierarchy that primarily focuses on modern product design, clean and resource-efficient manufacturing and the recycling of manufactured materials. Emphasis is also placed on reducing the volume of hazardous substances in materials and products.

The national waste plan covers the following measures to limit and reduce GHG emissions:

JM3 Promoting the prevention and reduction of waste generation, incl reducing the hazardousness of waste; and

JM4 Reducing environmental risks from waste and improving monitoring and supervision.

In 2013 AS Eesti Energia finished building the modern and efficient Iru Power Plant, which produces heat and electricity from mixed municipal waste. Completion of the waste-to-energy plant has reduced the extensive amount of mixed municipal waste that was landfilled. Based on the estimation of the Action plan 2013-2030 for reducing air pollutant emissions from the Iru Plant, a total of 250 000 tons of mixed municipal waste is used to producing energy every year. The Iru cogeneration plant mainly incinerates Estonian mixed municipal waste, to which imported waste fuel is added in order to reach the annual target volume of 250 000 tonnes.

Circular economy

The objective of the circular economy is to decouple economic activity from the consumption of primary raw materials by creating a system of circular production and consumption in which losses are as low as possible. The transition to the circular economy requires changes to be made in the entire product value chain, from product design to new business models and consumption habits. In the case of new and existing products, the main focus is on designing the entire life cycle, focusing on selecting sustainable materials (avoiding or reducing hazardous substances), quality (long product life, offering the option of repair), optimisation of the supply chain (giving preference to local raw materials) and reuse and recovery (the opportunity to separate and recycle components). In addition to smart design solutions, research and development, eco-innovation, technological development and the sharing economy also play an important role.

The circular economy is a cross-sectoral principle, and hence cooperation between companies and international agreements, which create significant new opportunities for establishing new markets and partnerships, are of great importance. The role of the national government in the transition to a circular economy lines in creating favourable conditions for applying the principles of the circular economy and in removing barriers. For the circular economy to achieve its full potential, systemic thinking is required, and changes must be made in the entire socio-economic system, so that real changes in consumption, production, planning, policy, lifestyle, culture and values may take place.

The circular economy makes a direct contribution to the reduction of GHG emissions, for example via more resource-efficient production and consumption, extending the lifetime of products, innovative business models that reduce dependency on primary raw materials or the development of waste management and recycling, thereby reducing the need to produce new products and materials.

Estonia's objective is to develop a circular economy development document and action plan by the end of 2021 under the leadership of the Ministry of the Environment in order to accelerate the transition to a more circular Estonia. Preparation of the development document and the action plan is planned to take place through cooperation that would involve all parties. The preparation of the development document and action plan will be divided into the following two phases:

1. Studies: development of the indicators pertaining to the circular economy and mapping of the current situation of the Estonian circular economy (2019-2020)
2. Preparation of the development document and action plan (2021)
3. Involvement of stakeholders throughout the entire process

The Environmental Investment Centre supports the implementation of circular economy solutions via the Circular Economy Program.

The objective of the circular economy program is to support research and development in the areas of environmental management, waste, subsoil, chemicals and related topics, the more efficient use of resources, the introduction of the principles of the circular economy, means to prevent generating waste and emissions, and the reduction of the environmental impact of these activities, raising awareness in the area of the circular economy and the

development and broader application of sustainable consumption and production.

Policies and measures to achieve the target under the LULUCF regulation.

The Forest Act provides the legal framework for managing Estonian forests. The main objective of the Forest Act is to ensure the protection and sustainable management of the forest ecosystem. The Forest Act includes the reforestation measure, which aims to help forests recover after logging or a natural disaster. Under the Forest Act, forest owners are required to ensure reforestation within five years at the latest after logging or a natural disaster. Supporting prompt reforestation after logging favours consistent carbon capture in woodlands, and hence the preservation of the GHG capture level of Estonian forests.

The 'Estonian Forestry Development Plan to 2020', which was approved by the *Riigikogu* in 2011, is the official sustainable development strategy of the Estonian forestry sector. It lays down the forestry targets for 2011-2020 and describes the measures and resources required to achieve those targets. The main objective of the development plan is to ensure the productivity and viability of the forests, as well as their diverse and efficient use. One objective is to increase forest growth and the capacity for carbon capture via the appropriate forest management activities such as regeneration cutting, cleaning and thinning.

The Ministry of the Environment began to draw up the Forestry development plan 2021-2030 in December 2017 by forming the required working group for compiling the terms of reference of the development plan. The task of the working group is to determine the forestry issues that need to be solved and draw up the terms of reference. Once the terms of reference have been prepared, the Ministry of the Environment will coordinate these with stakeholders and other ministries. The guidelines for the forestry sector that are set out in GPCP 2050 are taken into consideration when a new development plan is drawn up. The forestry development plan 2021-2030 will be submitted to the Riigikogu for adoption in May 2020.

The future role of the LULUCF sector as either capturer or source of GHGs mainly depends on the management-related activities, but also on the use of peat soil and arable land and grassland management methods.

The current 'Estonian forestry development plan until 2020' highlights that the Estonian government has set the objective to increase use of timber since the age structure of Estonian forests enables more large-scale logging (12-15 million cubic meters per year), and failure to use the forest resources would be an unreasonable waste of renewable energy. The Estonian Rural Development Plan 2014-2020 supports the achievement of the objectives set out in the 'Estonian forestry development plan until 2020', through which the measures for supporting private forestry are co-financed. The objective of the Rural Development Plan 2014-2020 is to support Estonian rural life by supplementing other measures set out in the EU Common Agricultural Policy, the Cohesion Policy and the European Common Fisheries Policy. The Ministry of Rural Affairs also wishes to help increase the competitiveness of the agricultural sector, enhance the sustainable use of natural resources and advance climate measures via implementation of the development plan. The Rural Development Plan is implemented through measures that are based on the needs and objectives detected during preparation of the development plan. A total of more than 20 (sub-)measures will be implemented within the framework of the development plan.

Measures related to forest management

The ‘Estonian forestry development plan until 2020’ and RDP 2014-2020 cover the following existing measures, and their aim is to ensure the sustainable use of forests, i.e. increase the scope of the forests or ‘carbon pools’:

MM1 In order to alleviate climate change, increasing the net growth of forests and their carbon capture capability via timely reforestation

MM2 Promoting reforestation of managed private forests with habitat type compatible tree species

MM3 Improving forest health and avoiding the spread of dangerous negative factors

MM4 Reducing the environmental impacts related to the use of fossil fuels and non-renewable natural resources by increasing Estonian timber production and use

MM5 Natura 2000 support for private forested land

MM6 Investments in forest development and improvement of the viability of forests

MM7 Ensuring the protection of habitats

MM8 Conservation of biological processes and maintenance of species common in Estonia

ii. Regional cooperation in this area, where applicable.

The Baltic States (Estonia, Latvia, Lithuania) have cooperated on several climate-related projects. A network of greenhouse gas inventory and projection experts has been established between the three Baltic States, with the aim of raising the quality of various GHG reports via knowledge and experience sharing. The project ended in 2017 but the cooperation between the experts continued even after it had ended.

In recent years, close cooperation has taken place between experts in the LULUCF sector in the Baltic States to share information about relevant research in the area of forest management and the carbon capture of forests and possible new methods. A new project proposal for the improvement of datasets and methods and increasing capacity related to the implementation of the LULUCF regulation has been prepared through cooperation between the three countries. The objective of the project is to facilitate knowledge transfer between national and international experts regarding current approaches, models and databases for assessing the impacts of mitigation measures and data reporting. The project contributes to the enhancement of the Baltic States’ inventory systems and mitigation strategies in the LULUCF sector. This would also make it possible to increase the coherence and consistency of the Baltic land use policy between the LULUCF regulation, the EU Common Agricultural Policy and other relevant policies.

In connection with the preparation of the national forestry accounting plan (FRL) 2021-2025, a regular exchange of information has taken place among colleagues from Estonia, Latvia and Lithuania, and that will also continue during the preparation of the

FRL 2026-2030.

An Estonian-Latvian joint seminar on modelling the agriculture and land use sectors and reducing GHG emissions in agriculture took place in 2018. Both countries presented national measures applied in the agricultural sector as well as potential planned measures, including national cost-efficiency studies.

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

European Union support and Union funds have been used and are planned to be used in the following existing and additional measures:

EN3 Development of the heating sector
EN4 Additional development of the heating sector
EN11 Synchronisation of the Baltic electricity system with the synchronous areas of Continental Europe
TR1 Increasing the share of biofuels in the transport sector;
TR4 Spatial and land use measures in cities to increase the fuel-efficiency of transport and improve the transportation system
TR9 Additional spatial and land use measures in cities to increase the fuel-efficiency of transport and improve the transportation system
TR13 Development of railway infrastructure (incl. construction of Rail Baltic)
HF1 Reconstruction of public sector and commercial buildings
HF2 Reconstruction of private residences and apartment buildings
HF5 Additional reconstruction of public sector and commercial buildings
HF6 Additional reconstruction of private residences and apartment buildings
PM1 Organic farming
PM2 The agri-environment-climate measure and its sub-measures;
PM3 Support for climate-friendly and environmentally-sustainable agricultural practices, so-called greening support
PM4 Knowledge transfer and notification
PM5 Advisory services, farm management and farm relief services
PM6 Natura 2000 support for agricultural land
PM7 Investments in the diversification of economic activities in rural areas towards non-agricultural activities
PM8 Investments in raising the effectiveness of farms.
PM9 Animal welfare measure
MM5 Natura 2000 support for private forest estates
MM6 Investments in forest development and improvement of the viability of forests

3.1.2. Renewables

i. Policies and measures to achieve the national contribution to the binding 2030 Union target for renewable energy and trajectories as referred to in point (a)(2) Article 4, and, where applicable or available, the elements referred to in point 2.1.2 of this Annex, including sector- and technology-specific measures[82].

The NDPES 2030 document describes different measures for achieving the renewable energy targets described in the action plan. The following NDPES 2030 measures contribute most directly to the increase in the use of renewable energy:

- Measure 1.1 Development of electricity production;
- Measure 1.5 Efficient heat generation;
- Measure 2.1 Increasing the availability of alternative fuels in transport;

In order to achieve the targets described in chapter 2.1.2, the following measures will be applied, a detailed description of which is provided in Annex IV of this document:

EN1 Renewable energy support and support for efficient cogeneration of heat and power;
EN3 Development of the heating sector;
EN4 Additional development of the heating sector;
EN5 Renewable energy support via reverse auction (technology neutral);
EN6 Renewable energy support via reverse auction (technology specific);
EN7 Research and development activities program of the energy development plan;
TR7 Aid for the purchase of electric vehicles;
TR16 Transition to using biomethane and electricity for propulsion in public transport
TR13 Development of railway infrastructure (incl. construction of Rail Baltic);
TR14 Electrification of railways;
TR15 Electrification of ferries.
PM11 Production of bioenergy and increasing its share in agriculture

ii. Where relevant, specific measures for regional cooperation, as well as, as an option, 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 referred to in point 2.1.2

For the additional achievement of the targets described in Chapter 2.1.2 (raising the share of renewable electrical energy to 50% by 2030 if the collaborative mechanisms with other Member States are implemented), preparations will be made, and a measure is foreseen to support this; its description is provided in an annex to this document (see Annex IV);

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

EN2 Support for investments in wind farms

In order to implement collaborative mechanisms and map opportunities in Estonia, an expert group on renewable energy consisting of the representatives of ministries and market participants who also deal with statistical trading has been convened. The expert group mapped a list of possible cooperating countries, and an overview of the countries that are actively seeking opportunities for statistical trading to support the development of renewable energy will also be prepared. Lists of joint projects and measures, offering a clear overview of the projects that Estonia can offer to other Member States with regard to the targets for the upcoming period, will also be mapped. Coordination between ministries to find solutions to administrative problems will also be promoted.

Considering the favourable wind conditions, the availability of biomass and the volume of completed projects in Estonia, local operators that develop renewable energy have excellent opportunities for developing renewable energy production units through flexible cooperation mechanisms. More than 4 GW of wind farms on shore and in coastal waters are now in the development stage in Estonia. The completion dates for these wind farms depend largely on the mitigation of defence restrictions, which mainly involve altitude constraints on land and on the establishment of the plan for the marine area, which will presumably be carried out by the end of 2020. The figure below depicts the preliminary plan for the Estonian marine area, on which the blue hatched areas are potential areas suitable for the development of wind energy, the dark lines mark the borders of the marine area, and the earlier planning areas are marked with a red background. The potential of earlier planning areas is ca 3 GW.

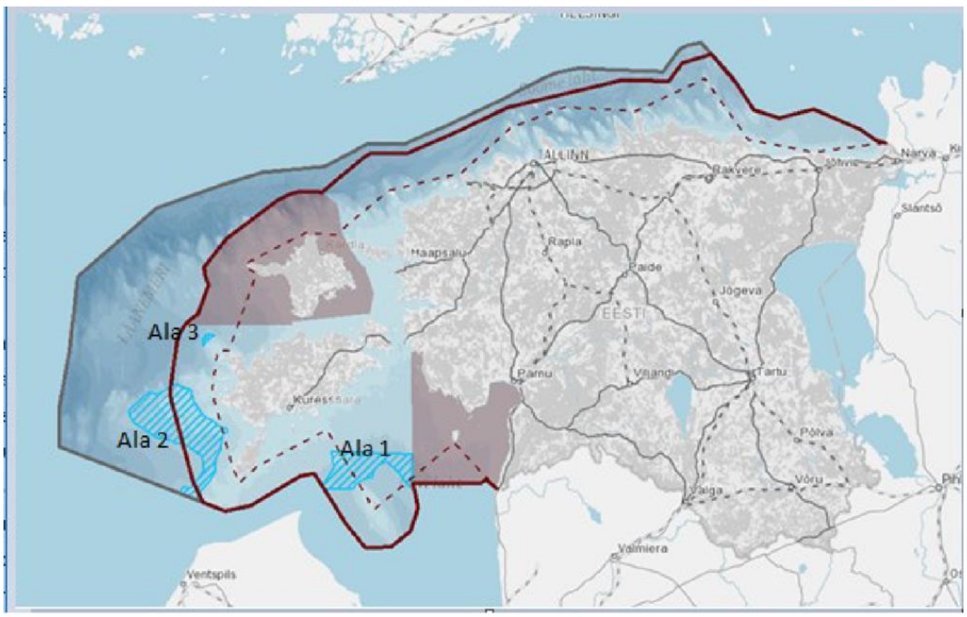


Figure 13 Preliminary plan for the Estonian marine area.

After the mitigation of the restrictions, the potential for wind energy development is 300 MW in Eastern Estonia and 850 MW in Western Estonia. The potential of the marine area as a whole is in the is roughly 7 000 MW[83]

- Area No 1: ca 3 000 MW
- Area No 2: ca 4 000 MW
- Area No 3: ca 150 MW

This is an initial indication, since much depends on the overlap between these areas, on wind shadows, on buffer areas between different developments and on the advance of technology. Regarding overlapping, it will be possible to realise 60-70% of the areas highlighted in the plan for the marine area. The potential of the given areas has been determined on the basis of current technology, a distance of ca 1 km between windmills, and the size of the areas in question. 1 GW of renewable energy capacities may be added to the wind energy area by 2030, according to projections.

Two pumped-storage hydroelectric power stations (hereinafter PHES) with a total capacity of 550 MW are under development in Estonia, and there is potential for renewable energy production from biomass. Considering that Estonia intends to build new primarily market-based electricity generation capacities through the implementation of flexible collaborative mechanisms, as well as the national government's intention to increase energy security by using electricity generation capacities that are mainly based on domestic primary energy resources or building fuel free electricity production capacities in Estonia, support will be granted for the realisation of projects that are in line with the above principles.

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 NDPES 2030 document specifies different measures for achieving the renewable energy targets described in the action plan. The following measures of NDPES 2030 contribute most directly to the increase in the use of renewable energy:

- Measure 1.1 Development of electrical energy generation;
- Measure 1.5 Efficient heat generation;
- Measure 2.1 Increasing the application of alternative fuels in transport.

The following measures will be applied to achieve the targets described in chapter 2.1.2, a detailed description of which is provided in Annex V to this document:

Existing measures

EN1 Renewable energy support and support for efficient heat and power cogeneration

Support is paid for the electricity that is generated from renewable energy sources, in cogeneration mode from biomass or in efficient cogeneration mode.

EN5 Renewable energy support via reverse auction (technology neutral)

[83] Map of the preliminary plan: http://mereala.hendrikson.ee/eskiislahendus.html

The objective of this measure is to increase the share of renewable energy through reverse auctions. The volume and schedule of the auctions is correlated with the trajectories of meeting the renewable energy targets. The following is the schedule of announcement of auctions:

Year announcement of auction	Volume of auction
2019	5 GWh
2020	5 GWh
2021	450 + 5 GWh
2023	650 GWh

EN3 Development of heating sector

This measure covers the transition from fuel oils to renewable energy, the reduction of heat losses in district heating networks and the transformation of inefficiently operating district heating networks into communal district heating systems and local heating systems.

TR1 Increasing the share of biofuels in the transport sector;

The objective of the measure is to achieve a 10% share of biofuels in the transport sector by 2020. To achieve this, a blending obligation was established for liquid fuels and the share of the biomethane use in the transport sector will be increased.

TR7 Support for purchasing electric vehicles

The objective of the purchasing support is to increase the use of electrical cars. This measure primarily supports the acquisition of vehicles with higher mileage (business vehicles, incl. vans).

Possible additional measures (envisaged)

EN6 Renewable energy support via reverse auction (technology specific)

The objective of the measure is to increase competition in the generation of electrical energy from renewable energy source via technology-specific reverse auctions.

EN4 Additional development of the heating sector

This measure covers additional reconstructions of boiler houses and heating networks and additional support for customers to transition to district and local heating systems.

TR16 Transition of public transport to biomethane and electricity

The objective of the measure is to meet the objectives of the renewable energy and clean vehicle directive by introducing electric buses in urban regions and gas-powered buses that use biomethane as fuel in rural areas and thereby also reduce GHG emissions in the transport sector.

TR13 Development of railway infrastructure (incl. construction of Rail Baltic)

The objective of the measure is to make the shift towards increasing the use of public transport and non-motorised means of transport, and also managing and reducing demand.

TR14 Electrification of railways

The electrification of railways aims to develop an environmentally friendly means of transport by increasing the competitiveness of rail transport while at the same time also directing some cargo from the roads to the railways. By making the carriage of goods by rail more attractive and by reducing carriers' operating expenditures, we will obtain a safer and more environmentally-friendly environment.

TR15 Electrification of ferries

The objective of the measure is to electrify the ferries between the mainland and the islands of Saaremaa and Hiiumaa. This is technically achievable up to 50% for the connection with Hiiumaa and 100% for Saaremaa. The carbon reduction potential of the measure from 2023 would be: on the Saaremaa line - 8072 t CO_2/yr; on the Hiiumaa line - 4120 t CO_2/yr. The total reduction would amount to 110 000 t CO_2 by 2030.

EN7 Research and development activities programme under the energy development plan

Projects and activities that contribute to the implementation of the energy sector development plan, and thereby also to the promotion of renewable energy, will be implemented under the programme.

PM8 Investments to increase the effectiveness of farms

The objective of this measure is to support the production of heat and electricity from biogas.

PM11 Bioenergy production and increasing its share in agriculture. The objective of the measure is to increase biomethane production on farms, where the objective is to produce biogas from manure, including slurry, that could replace the use of fossil fuels in energy and transport. The emphasis is on smaller investments.

PM18 Investments in energy savings in greenhouses and vegetable warehouses and in the introduction of renewable energy therein

The objective of the measure is to increase the share of renewable energy in horticulture and to increase energy savings through the introduction of modern technologies (cogeneration, solar panels, new covered areas).

EN12 The acquisition of air surveillance radars for the development of wind farms

Altitude constraints arising from national defence considerations are in force in large parts of Estonian on-shore and offshore areas (the constraints are stricter in north-eastern Estonia, south-eastern Estonia and western Estonia). One possible solution could be to invest in additional pre-warning systems and through these exempt the areas suitable for building wind farms from the altitude constraints imposed by national defence considerations. National defence air surveillance radars and radio systems are among the pre-warning systems that are necessary for ensuring early detection, and the same applies to Police and Border Guard radars. The objective of the measure is to support the development of wind energy by acquiring pre-warning radars, in order to promote the development of renewable energy in Estonia. For some regions, one possible solution would be to invest in additional compensatory measures and thereby release the areas suitable for building wind farms by exempting them from the altitude constraints dictated by national defence considerations.

EN13 Pre-development of offshore wind farms (connection, planning), joint projects

In order to build offshore wind farms, developers need to make significant expenditures even before it is clear whether it will be possible to build a wind farm in the desired area. For example, it may transpire that the area in question needs to be reserved for nature preservation. The high risks increase the price of renewable energy for society and deter potential developers. Possible solutions include national government activities for the pre-development of offshore wind farms (e.g. carrying out the necessary planning proceedings, establishing a connection to the power grid). It would primarily be feasible for the national government to consider such pre-development in joint projects with other countries (e.g. Latvia).

In addition to the measures set out in Annex IV of this document that either have a financial contribution or a regulative character, Estonia also implements other activities that may be classified as measures supporting renewable energy:

Ongoing studies and analyses or those that will be carried out in the near future

An ‘analysis of community benefit instruments (an impact assessment of tolerability)’, the aim of which is to analyse the instruments of the financial benefit (local benefit) in the local authorities and local communities in which the company operates, in order to analyse the impact of regularising agreements on the attitudes of the parties in the event of the realisation of local benefit and to find possible alternative legal solutions to problems. The objective should be to achieve equal treatment, legal certainty, transparency of agreements and the maintenance of the possibility of entering into flexible agreements appropriate for all parties.

Preparation of a manual of proceedings pertaining to renewable energy projects, with the objective of making the so-called manual of proceedings available to the project developers and persons who wish to invest in renewable energy, in order to facilitate understanding of the proceedings.

The analysis of the opportunities to increase climate ambition in Estonia, which has the aim of determining the probable measures and attendant effects that could help Estonia to get from the current greenhouse gas reduction target of 80% by 2050 to the target of a 100% reduction and achieve zero net emissions or neutrality.

Other measures/actions that support the generation of renewable energy

In addition to monetary support measures for Estonia to acquire new electricity generation capacities based on renewable energy, state support must be provided to developers, and solutions must be found for potential problems. For example, the obstacles to the development of wind energy are mainly associated with national defence and environmental constraints, the opposition of local people and the resulting development risks. In order to alleviate these bottlenecks, different ministries and authorities must cooperate.

The ministry responsible for the sector sent a letter to local governments that invited them to consider opportunities for planning areas for generating energy during preparation of the comprehensive plan. In Estonian conditions this primarily means planning areas that would be suitable mainly for the development of wind and solar energy. The importance of the role of local governments in developing renewable energy in the broader context of achieving the joint national renewable energy targets was emphasised.

Motivating local governments and the local community (see the above ‘Analysis of community benefit instruments (impact assessment of tolerability)’ through the local benefit that renewable energy production units bring that should, as it were, compensate for the possible disturbances, e.g. visual pollution, noise disturbances, and the NIMBY (Not In My Backyard) effect. In addition to the study, visits to local governments and engagement in legislative processes are also foreseen, in order to introduce the amendments, obligations and targets arising from new directives.

Relaxing national defence constraints. All countries that develop wind energy have been exposed to disturbances caused by wind farms to the operation of air surveillance radars. Altitude constraints that arise from national defence considerations are in effect on most of the territory of Estonia. These altitude constraints can be relaxed through investments in additional compensatory measures (e.g. radar and radio reconnaissance systems).

Nature conservation restrictions and the relaxation of such restrictions. The construction of any production facility in the natural environment involves some impact, but is important to bear in mind that nature conservation restrictions and established nature conservation areas should not automatically rule out renewable energy generation in that area. It is important to find so-called areas of compromise.

Planning of the Estonian marine area

Planning of the Estonian marine area is currently under way, and its aim is to reach agreement on the use of the Estonian marine area in the long term, in order to promote the marine economy and contribute to the achievement and preservation of the good environmental condition of the marine environment. The marine area plan is prepared as a thematic plan for the whole marine area of Estonia, as part of the plan for the nation's entire territory, and it will presumably be implemented by the end of 2020.

During development of the marine area plan, the synergy between the activities that are already taking place today and those that are planned for the future in the marine area are assessed, and the environmental and also economic, social and cultural impacts involved with the implementation of these activities is assessed.
The established marine area plan will serve as the basis for making different decisions on the future use of the marine area (see Figure 13, marine area plan).

Possible joint projects, e.g. a joint offshore wind farm

We see great potential in joint projects with other Member States. One of the most interesting such projects would be a joint project with Latvia that would help both countries to achieve their renewable energy targets.

Two prospective locations for developing joint projects are the Gulf of Riga and the area west of Saaremaa (see Figure 13, areas No 1 and 2). These areas are large enough to build a roughly 1 000 MW wind farm, and also hold potential for building an infrastructure network with support from the Connecting Europe Facility (CEF), which would also increase the security of supply of the Estonian electrical system, and higher interconnection capacities with the southern neighbouring. The Latvian marine area planning solution also includes potential locations for joint projects with Estonia.

The potential of offshore wind farms in the Baltic Sea is estimated to be 93.5 GW, incl. 7 GW in the Estonian marine area[84].

Future energy solutions

Of clean energy technologies, the Estonian private sector plans to build pumped-

[84] EUROPEAN COMMISSION DG ENERGY 2019 STUDY ON BALTIC OFFSHORE WIND ENERGY COOPERATION UNDER BEMIP Final Report

storage hydroelectric power stations in Paldiski (500 MW)[85] and at the Estonia mine (50 MW)[86].

In Finland, ground source heat pumps are popular for heating both private dwellings and logistics and shopping centres. A pilot project of 6.4 km and 3.3 km deep boreholes in Espoo which would aim to use geothermal energy for district heating, with a capacity of 40 MW_{th}[87], was analysed during 2019. Based on the example of the Finnish experience with geothermal energy, heating elements [88] (e.g. solid oxide fuel cell SOFC)[89], etc., will make it possible to start planning future energy solutions in the next decade.

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

According to Section 59^4(1) of the Electricity Market Act (EMA), support will be granted to electricity producers to achieve the renewable energy source electricity production target (17.6%) by 31 December 2020. By its decision, the *Riigikogu* will approve the targets for renewable energy source electricity production after 2020, and the changes to the principles for achieving those targets. The Government of the Republic will develop the relevant principles and will submit these to the Riigikogu for approval at the latest three months before the relevant decision is expected to be made by the *Riigikogu*.

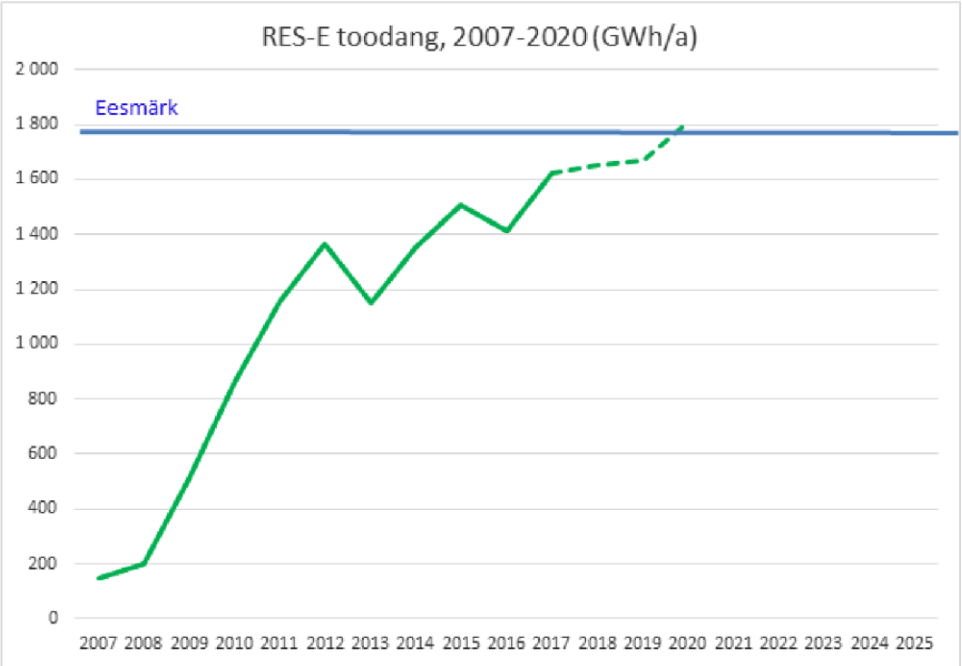
The Estonian support scheme was amended in June 2018 when the current direct support was replaced by a scheme based on reverse auction. The state has established 17.6% as the target for 2020 in the Electricity Market Act and the 'National Renewable Energy Action Plan until 2020'[90]. The domestic target for 2030 is determined in the NDPES 2030 document (30%), but based on the specified projections and renewable energy production trajectories, we would set the target at 40% (see Chapter 2.1.2.). The NDPES 2030 also establishes 50% as the target for electricity production from renewable energy sources, but this target is set provided that the statistical transfers performed with other countries become operational and that the joint projects are realised.

The existing support scheme allows the state to find in a flexible and cost-effective manner electricity producers whose production helps contribute to the target of electrical energy produced from renewable energy sources. The proposal of the Government of the Republic to the *Riigikogu* for setting the targets and mechanisms for reaching the targets enables the state to find a more expedient way to meet the targets. The Estonian government periodically organises analyses that examine the changes in the principles of the support scheme and, if necessary, it makes a proposal to the *Riigikogu*

[85] Paldiski gets different kind of power station https://majandus24.postimees.ee/6139227/paldiski-saab-teistsorti-elektrijaama
[86] https://www.err.ee/857972/estonia- kaevandusse- kavandatakse- pumphudroelektrijaama
[87] Jarmo Kallio 2019 Geothermal Energy Use, Country Update for Finland http://europeangeothermalcongress.eu/wp-content/uploads/2019/07/CUR-10-Finland.pdf
[88] Fuel Cells Hydrogen Europe
[89] Solid Oxide Cells https://elcogen.com/products/solid-oxide-fuel-cells/
[90] https://www.mkm.ee/sites/default/files/taastuvenergia_tegevuskava.pdf

for changing the mechanisms of the support scheme.

As the result of the scheme that has functioned since 2007, in 2017 the level of electricity from renewable energy reached 16.8% of total electricity consumption. The dynamics of electricity production from renewable energy sources are provided in Figure 14 below.



	Objective
	RES-E production, 2007-2020 (GWh/year)

Figure 14 Electricity production from renewable energy sources, 2007-2020, GWh/yr

As projected, the dotted lined volumes in the figure are produced with production equipment that qualified under the old support scheme. A total of 158 GWh of additional electricity from renewable energy sources will be placed on the market by 2020, fully meeting the government's objective by 2020.

Considering the NDPES 2030 target (30% RES-E), production capacities that produce electricity of 2.56 TWh/yr from renewable energy sources must be placed on the market by 2030. According to the Electricity Market Act, the Government of the Republic will organise a reverse auction if the State does not meet the target for electricity produced from the renewable energy source. The person who offers their production with the lowest support rate will win the reverse auction.

v. Specific measures to introduce one or more contact points, streamline administrative procedures, provide information and training, and facilitate the uptake of power purchase agreements[91]

Under the Electricity Market Act, connection conditions are facilitated for connecting to the grid power generation equipment using renewable energy sources and with a capacity of under 15 kW. Electricity producers also do not require an activity licence if the net capacity of the production equipment is below 200 kW.

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

The activity 'Preparing the heating development plan' of the measure 'Efficient thermal energy production and transmission' was funded in the implementation of the 'Operational Programme (OP) for Cohesion Policy Funding 2014-2020'[92], and in the course of its implementation local governments received help in analysing the efficiency of district heating systems and future needs. Based on the analysis, it may generally be claimed that it would be more profitable to reconstruct the existing district heating infrastructure than to build a new local heating system in its place. Today new residential areas are mainly connected to district heating regions.

The perspective regions for the district cooling in Estonia are downtown Tallinn and Tartu. There are two district cooling stations operating in Tartu – the downtown 13 MW district cooling station and the Aardla 5.4 MW district cooling station. The total length of the district cooling route is 2.9 km.

vii. Where applicable, specific measures on the promotion of the use of energy from biomass.

This chapter describes the availability of biomass resources, including both domestic potential and also imports from third countries. Different biomass uses by other sectors (agriculture and forest-based sectors) as well as measures for the sustainability production and use of biomass are also examined.

The NDPES 2030 document describes different measures for achieving the renewable energy targets described in the development plan. NDPES measure 2.1 'Increasing the use of alternative fuels in transport' contributes most directly to the deployment of new biomass resources. The measures listed in the table of measures in Annex III and IV of this document also help to increase the use of biomass:

EN1 Renewable energy support and support for efficient cogeneration of heat and power

TR1 Increasing the share of biofuels in the transport sector

PM8 Investments to enhance the effectiveness of farms

[91] Executive summary of the policies and measures under the support framework that the Member States are required to adapt under Sections 21(6) and 22(5) of Directive (EU) 2018/2001, with the objective of promoting and facilitating the development of the self-consumption of renewable energy and renewable energy communities (*facilitate the uptake of power purchase agreements*).

[92] https://www.struktuurifondid.ee/sites/default/files/rakenduskava.pdf

PM11 Production of bioenergy and increasing the share of bioenergy in agriculture

The generation of energy from biomass takes into account the biomass sustainability criteria, waste hierarchy, and the principles of sustainable forestry management by preserving natural diversity.

3.1.3. Other elements of the dimension

i. If applicable, national policies and measures affecting the EU ETS sector and assessment of the complementarity and impacts on the EU ETS.

In Estonia the production of electricity and oil from oil shale is the largest participant and influencer in the EU ETS. Taking into consideration existing and known future environmental requirements and climate targets, once the production facilities become depreciated, it will be possible to produce a certain amount of liquid fuel from oil shale and thereby in turn use the by-products of production and waste heat to generate electricity. The profitability of producing liquid fuels from oil shale primarily depends on the world market prices of crude oil but also on EU ETS unit prices and local environmental charges. The international quality requirements for fuel are also important influencers (e.g. restrictions on sulphur content). The quality of oil shale oil may be improved via pre-refining. The investment required for building such a pre-refining plant amounts to EUR 650 million.

In order to ensure the long-term balanced use of oil shale, a separate 'National Development Plan for the Use of Oil Shale 2016-2030' was drawn up, and this plan designates the trends in the use of oil shale as a nationally strategic domestic energy source. Planning covers the assessment of the use of shale oil and shale gas by considering the economic, social, security and environmental protection aspects. The *Riigikogu* approved the development plan in March 2016.

In addition to developments in the oil shale industry (incl. more efficient use of oil shale), excise duties and also environmental charges for electricity and fuels influence the reduction in emissions.

<u>Excise duties</u>

Fuels with imposed excise duty[93] include unleaded petrol, leaded petrol, aviation gasoline, kerosene, diesel fuel, special-purpose diesel fuel, light fuel oil, heavy fuel oil, oil shale heating oil, car gas (LPG) and (CNG), coal, lignite, coke and oil shale, liquefied gas, natural gas, fuel-like product, liquefied combustible and biofuel. Biogas, including also biomethane, is exempt from the excise duty. To ensure the competitiveness of energy-intensive users, Estonia has introduced excise duty differences. Electricity-intensive companies and those with intensive gas consumption can submit an application for exemption from energy excise duties. The company's energy management system must comply with the EVS-EN ISO 50001 standard in order to apply for the permission. For electricity-intensive companies that hold a permit for exemption from the excise duty on energy, the rate of excise duty for electrical energy is

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

EUR 0.5 / MW/h of electricity. For companies that hold a permit for exemption from the excise duty on energy, the rate of the preferential excise duty for natural gas is EUR 11.30 / 1000 m^3 of natural gas.

Environmental charges

Another fiscal measure that impacts the emissions applied in Estonia is environmental charges. The tax policy of the Government of the Republic is based on the target of reducing environmental impacts by increasing emission charges and charges for the use of natural resources. The Environmental Charges Act creates a basis for establishing the rates for charges for the use of natural resources and emission charges, establishes the procedure for their calculation and payment and prescribes the basis and specific purposes for the use of budgetary income obtained from the use of the environment. Environmental charges are established in accordance with the need for environmental protection, Estonia's economic and social situation and in cases laid down by law these are also based on the value created by the natural resources. A mineral resource extraction charge that is higher than the minimum rate established by law is applied with the aim of earning income for the State. For energy-producing minerals, the added value of the energy-producing minerals is also taken into account alongside the objective of earning income.

An emission charge for emitting carbon dioxide into the air was established in Estonia in 2000. Currently the Environmental Charges Act (which entered into force in 2006) requires the owners of combustion installations to pay emissions charges for pollutants emitted into the air. All companies that are required to possess an Ambient Air Pollution Permit are required to pay emissions charges for pollutants emitted into the air. By Regulation of the Minister of the Environment, an Ambient Air Pollution Permit is obligatory for companies that own or use combustion installations (with solid, liquefied or gaseous fuel) with net power of 1 MW or higher when burning fuel. As an exception, only companies that produce thermal energy are required to pay carbon emission charges. From 2009, the rate of the carbon emission charge has been EUR 2/t. Emission charges must also be paid for installations that emit nitrous oxide into the air. Emission charges are not imposed for methane and fluorinated greenhouse gases (HFC, PFC and SF_6). As an exception, the Environmental Charges Act establishes the opportunity to replace the emission charge (incl. the carbon dioxide emission charge) with environmental investments by companies. The emission charge is replaced by financing if the polluter applies at their own cost environmental measures that reduce the volume of emissions or waste by 15% compared to the period before the investment.

The state has used the received environmental charges to fund environmental projects (incl. the replacement of boiler equipment using fossil fuels, the reconstruction of district heating systems, etc.) for the last 20 years via the Environmental Investment Centre.

Under Section 23(3) of the Environmental Charges Act, companies in the EU ETS that generate thermal energy (installations with the installed rated thermal input over 20 MW) do not pay the emission charge at the higher rate if the quantities of carbon dioxide emitted thereby are covered by additional emission allowances purchased by the company and recorded in the annual report. In other words, if the allowed carbon volume is exceeded, the higher fee is not charged if it is covered by the additional purchased emission allowances.

Measures in the electricity production sector

The following measures, which had significant impacts, have previously been implemented in Estonia, and these will significantly influence Estonian CO_2 emissions until 2030:

1) Over the period 2004-2005, two PC-boilers were replaced with FBC-boiler blocks (2×215 MW) at the Narva Power Plants; and
2) Construction of an additional FBC boiler block (with a capacity of 300 MW), the Auvere oil-shale based power plant, began in 2011. The investment costs were ca EUR 640 million. The power plant became operational in 2015 and was fully completed in 2018. The new power plant is designed so that biomass can make up 50% of the fuel input used.

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

Adaptation to climate change

Adaptation to climate change and the corresponding measures have slowly but consistently become a horizontal subject in Estonia that will help to tie all relevant sectors and administrative levels to the adaptation measures. For example, local governments' preparations for climate change are supported by consistent development of environmental and weather monitoring information systems. Several local governments have taken climate change related risks into consideration in local development plans, and also in the reconstruction of water and sewerage and other routes and in the preparation of zoning plans and comprehensive plans. Estonia's national strategic development documents include direct and indirect measures that may help society adapt to the impact of climate change. The majority of these relate to the mitigation of climate changes and the regulation of emergency situations (based on the Emergency Act and the Water Act).

The Government of the Republic approved the 'Climate change adaptation development plan until 2030' and its accompanying implementation plan in 2017. The overall target of the development plan is to reduce the vulnerability of Estonia to climate change through a framework for action and to achieve readiness and the capability to cope with the impact of climate change on local, regional and national levels. The development plan also has eight sub-targets that are directly based on the vulnerability of sectors, describe them and are defined accordingly. Their fulfilment is supported in the implementation plan of the development plan by the measures for adaptation with the impact of climate change, which are presented together with the corresponding activities, results and costs (see Table 21).

Table 21 Sectoral overview of vulnerability from climate change and measures for adapting to climate change

Sector and target	Vulnerability	Sectoral adaptation measures

1. Health and rescue capability Improved rescue capabilities and people’s ability to protect their health and property has reduced the negative impact of climate change on health and the living environment.	The main health sector vulnerability arises from the capability and readiness of health care systems to adapt to changing climate and extreme weather phenomena (potential interruptions in medical aid), susceptibility and inequality of people, the proportion of more vulnerable people (the elderly, children, people with chronic diseases) and the presence and functioning of warning systems. Vulnerability in the case of rescue capability depends on processing massive numbers of emergency (floods, forest and landscape fires) accident notifications, on individuals’ learned helplessness and on the disruption of rescue work and public order.	1.1. Development of information, monitoring and support systems and preparation of action plans for the improvement and management of health risks arising from climate change. 1.2. Increasing rescue capabilities
2. Land use and planning Storm, flood and erosion risks have been managed, the heat island effect has been mitigated, the climate proofing of settled areas has been increased by selecting the best solutions in land use and in planning land use.	The realisation of climate risks in land use depends on the maintenance or non-maintenance of drainage systems, and also on their natural amortisation. The main risks involved in climate change are expressed and aggravated in cities exposed to weather phenomena where the people’s daily activities are planned in restricted areas with specific land use, a built environment and an urban landscape. The vulnerability of Estonian cities from climate change primarily depends on demographic processes, namely depopulation and the ageing of the population, the declining birth rate, but also the increasing spatial polarisation, compaction and suburbanisation of Harjumaa County, the decline of	2.1. Raising awareness of the impact and risks of climate change in land use, urban management and planning, the development of planning methodologies for at-risk areas and the organisation of a legal framework 2.2. Management of flooding risks and the development of green areas and urban landscapes to manage climate risks

	small towns, peripheralisation and mass emigration.	
3. Natural environment The diversity of species, habitats and landscapes and favourable conditions for and the integrity of terrestrial and aquatic ecosystems is ensured in a changing climate, and socio-economically important ecosystem services are provided at an adequate volume and quality.	The greatest vulnerability in the natural environment is the sensitivity of the favourable condition and integrity of all ecosystems (terrestrial ecosystems, freshwater ecosystems, the marine environment) and the volume and quality of ecosystem services to changes in hydrological regime (incl. ice and snow cover), and from the point of view of biodiversity, habitat specialists are most vulnerable.	3.1. Preservation of biodiversity in changing weather conditions
		3.2. Prevention of the introduction of invasive alien species in nature and combating and controlling invasive alien species in a changing climate
		3.3. Ensuring the favourable condition of ecological communities and the diversity of landscapes and organising nature conservation in a changing climate
		3.4. Ensuring the stability, favourable condition, functions, resources and diversity of terrestrial ecosystems and habitats in a changing climate
		3.5. Monitoring of the condition of surface water bodies, the structure of biota, external and internal load of substances caused by changes in temperature and hydrological regime and minimising climate risks
		3.6. Minimising the negative impact of climate change in order to achieve good conditions in the marine environment and the preservation of biodiversity
		3.7. Ensuring socio-

		economically important ecosystem services at an adequate volume and with adequate quality, taking into consideration climate risks
4. Bioeconomy The sustainability of the bioeconomy sectors that are important for Estonia is ensured through climate-conscious planning of agriculture, forestry, water management, fisheries and tourism and peat extraction.	The climate change ignorant planning of agriculture, forestry, water management, fisheries and tourism and peat extraction (not taking into account changes in hydrological regime and the increase in average temperatures) threatens the sustainability of the bioeconomy sectors that are important for Estonia.	4.1. Safeguarding the food supply in a changing climate via the development of land improvement systems, increasing the competitiveness of agriculture and knowledge generation and transfer
		4.2. Ensuring the productivity and viability of forests and their diverse and efficient use in a changing climate
		4.3. Safeguarding the welfare (income) of people whose livelihoods depend on the sustainability of fish stocks and fishing in a changing climate
		4.4. Diversification of tourism and increasing visitor satisfaction
5. Economy Economic operators use the opportunities provided by climate change in the best manner and manage the accompanying risks.	The relative slowness of climate change and the response speed and adaptability of Estonian businesses towards external changes will ensure that the economy has a low vulnerability even if adaptation entails the cessation of operations or a significant change in their character in regions that are heavily impacted by climate change. Vulnerability will increase if the economy as a whole is unable to take advantage of the new	5.1. Management of the household risks connected with climate change
		5.2. Favouring business activities that take into account the impact of climate changes

	opportunities provided by climate change.	
6. Society, awareness and cooperation Citizens understand the dangers and opportunities associated with climate change.	The level of understanding of the accompanying risks and opportunities and the level of research and education in Estonia will significantly impact the vulnerability of society and its adaptability to climate change. Individuals who are uninformed, have a low income, have poor socio-economic conditions and lower social capital are most vulnerable from climate change.	6.1. Improvement of risk management and ensuring the capability of employees of state and local government bodies to manage the risks that accompany climate change
		6.2. Supporting adaptation to the impact of climate change in pre-school education, general education and hobby schools, environmental education centres and vocational educational institutions
		6.3. Ensuring up-to-date and thorough information on climate change, incl. transition impacts of global climate change on Estonia
		6.4. Participation in cooperation in international climate change mitigation and adaptation to the impact of climate change and in the development of a strong international climate policy
7. Infrastructure and buildings The availability of vital services or the energy efficiency of buildings will not be reduced as a result of climate change.	The increasing frequency of extreme weather phenomena also tests the transport system, wherein a combination of several circumstances may lead to unpredictable risks and hazardous situations. A comparison of the various means of transport shows that road transport as a whole is most vulnerable, and also the movement of people in	7.1. Ensuring safe traffic, cargo traffic and access to vital services in changing climate conditions
		7.2. Ensuring the durability and energy efficiency of buildings and a comfortable indoor climate in changing climate conditions

	connection with infrastructure-related traffic disruptions, slipperiness risks, reduction on the load-bearing capacity of unpaved side roads and the safety of light traffic roads. The overall vulnerability of transport technologies and fuels in the second half of the century is not known. The vulnerability of buildings compared to the EU average is increased by the ageing, low-quality and hence energy-intensive building stock.	
8. Energy and security of supply Energy independence, security, security of supply and the usability of renewable resources will not decrease or the volume of final primary energy consumption will not increase as a result of climate change.	Energy independence and security of supply, which rely heavily on the oil shale industry and depend primarily on the existence and availability of domestic energy resources and the adequacy of the production capacities required for producing energy (electricity, heating and fuels) are generally forecast as not being particularly vulnerable to climate change by the end of the century. The use of renewable sources such as biomass and peat are more vulnerable than oil shale energy due to their seasonality and the need for intermediate storage.	8.1. Ensuring the usability of renewable energy resources and the supply of energy and heating for consumers in changing climate conditions

Initiative to transition to low carbon technologies

In addition to ordinary auctions in the EU greenhouse gas emission allowance trading system, aviation allowance auctions have also been held since 2014. Under Directive 2009/29/EC and the Atmospheric Air Protection Act, 100% of the income from the auction must be used for mitigation of and adaptation to climate change.

Considering the relatively low volume of income from the aviation auction and the desire to ensure that the results achieved with that income are as constructive as possible, it would be reasonable to direct it to projects with rapid growth potential, including to the promotion of smart ICT solutions and green technologies or to sustainable technology in the environmental and climate sectors. One preference is to support start-ups and research and development related to climate change mitigation and adaptation processes.

In 2018, for example, the Ministry of the Environment supported the ClimateLaunchpad green sector business idea contest, which was organised by NGO Cleantech ForEst in Estonia, the research project of the Space program of the Väätsa Basic School on measuring thermal radiation sources and the albedo effect from a stratospheric helium balloon as well as the development of the FAHM field experiment by the Chair of Ecophysiology at the University of Tartu.

These funds have also previously been used to support various innovative start-up solutions. In 2016 the development of prototypes by the companies ShipitWise, Hepta Group Energy and Themo was supported through NGO Prototron.

33 Estonian technology companies signed an agreement at the Tallinn Digital Summit in autumn 2019, promising to transfer their operations to a fully environmentally sustainable footing by 2030.

In order to analyse the opportunities for introducing low GHG emission technologies, the Ministry of the Environment has launched the following projects.

- To analyse the opportunities for minimising the GHG emissions of the Estonian oil shale industry, the project 'Climate change mitigation using CCS and CCU technologies' at Tallinn University of Technology, with the primary objective of assessing the suitability of different carbon capture technologies and developing scenarios for implementing those technologies in the Estonian oil shale industry[94];
- The hydrogen working group, which has the aim of analysing the opportunities for implementing hydrogen and fuel element technology in Estonia to achieve the country's climate targets. Eesti Vesinik[95], which brings together companies, research and educational institutions and individuals interested in the development of hydrogen technologies in Estonia, also participates in the working group.

The Ministry of Economic Affairs and Communications is also preparing for the planning of the roadmap for the decarbonisation of energy-intensive industries, incl. financial instruments for its realisation.

To introduce the low-carbon technologies, the proposals have been made during public discussion of the draft NECP 2030, to consider the development of carbon-based taxation.

Just transition

The concept of just transition developed in 1990s North America, where trade organisations saw just transition programmes as support for employees who had lost work due to environmental protection. This term has become broader over time, and under these programmes planning has taken place and investments have been made in the transition to environmentally and socially sustainable jobs, sectors and economies[96].

[94] Introduction of the project "Climate change mitigation with CCS and CCU technologies" https://www.ttu.ee/projektid/climmit/

[95] NGO Estonia Hydrogen Association http://h2est.ee/eesti-vesinikuyhing/strateegia/

[96] Just Transition Centre report to OECD 2017 http://www.oecd.org/environment/cc/g20-

Due to the absence of investment, social policy and foresight, the implementation of climate policy may, among other things, lead to the loss of jobs in regions that depend on fossil fuels. In the United States, the Just Transition Fund has been established for communities connected with coal mining, to support for transition to new energy[97]. The establishment of a similar fund for the decarbonisation of the EU ETS sector's carbon-intensive industries. The www.just-transition.info platform has been created in order to gather examples for solving the social problems that have arisen in connection with the greener management of European coal mining areas and to learn from these.

The Estonian oil shale sector employed a total of 7303 people in 2018[98]. Estonia's coal mining areas are situated in Ida-Virumaa County, and the Ida-Virumaa programme[99], the Ida-Virumaa action plan 2015-2020[100] and the Ida-Virumaa County development strategy 2019-2030+[101] have been drawn up for this area. According to the latest known information, **the oil shale energy will remain as the largest industry in Ida-Viru county during the next decade.** These documents may be supplemented, as needed, with the just transfer measures in Ida-Virumaa by, for example, engaging more people made redundant in the oil shale industry in forestry, renewable energy, etc. In planning shale oil production, the plans of ocean shipping must be taken into consideration, as well as reaching the use of the carbon-neutral fuels by 2050[102] and its impact on employment in the oil shale sector.

The Estonian economy also requires investments in the transition to cleaner energy and more sustainable jobs, and also in the transition to wind farms (incl. acquisition of air surveillance radars for national defence purposes), electrical energy storage solutions, cogeneration stations, biofuels and electricity in transport, the development of electric railways and modern rental housing stock, the reconstruction of apartment buildings, the demolition of abandoned sites, the reduction of the carbon intensity of the cement and lime industry and the recycling of the tail gases generated by industry.

iii. Policies and measures to achieve low emission mobility (including electrification of transport)

In March 2011 the Government of Estonia entered into a contract with Mitsubishi Corporation to sell an emissions allowance totalling 10 million AAUs in order to launch an electromobility programme. This programme comprised three parts:

1) The Ministry of Social Affairs adopted 507 Mitsubishi iMiev electric cars as a pilot

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climate/collapsecontents/Just-Transition-Centre-report-just-transition.pdf
[97] Just Transition Fund http://www.justtransitionfund.org/
[98] Oil shale industry yearbook 2019 https://www.energia.ee/-/doc/8457332/ettevottest/investorile/pdf/Polevkivi aastaraamat 2019 est.pdf
[99] Programme for Ida-Virumaa https://www.rahandusministeerium.ee/sites/default/files/document_files/REGO/ida-virumaa_programmi_alused.pdf
[100] Action plan for Ida-Virumaa https://www.siseministeerium.ee/sites/default/files/dokumendid/Arengukavad/ida-virumaa_tegevuskava_2015-2020_26.02.15.pdf
[101] Ida-Virumaa County development strategy 2019-2030+ https://ivol.kovtp.ee/maakonna-arengustrateegia
[102] E.g. the biggest ocean shipping company in the world, Maersk, intends to introduce carbon-free fuels by 2050 https://www.maersk.com/about/sustainability/shared-value/decarbonising-logistics

project;

2) The Ministry of Economic Affairs and Communications developed a support scheme for private individuals and legal entities for purchasing electric cars;
3) Recharging infrastructure for electric cars covering the entry country was built.

SA KredEx organised the allocation of the purchase support and management of the fast recharging network. Currently, KredEx no longer grants the support, and the infrastructure is being privatised.

The pilot plan of aid for the purchase of the electric vehicles is prepared in August 2019 (Pilot project of Measure TR7 Aid for the purchase of electric vehicles to assess the relevance of the measure) that provides for EUR 1.2 million for the aid for the purchase of the electric vehicles. The objective of the support measure is to reduce the emissions of greenhouse gases and other ambient air pollutants in the Estonian transport sector through the broader introduction of electric vehicles. To gain the greatest possible impact, the purchasing aid is directed towards the companies and natural persons with high need for transport. Support is to be provided for the purchase of 223 electric vehicles.

The forecast for the four-year period of the program as a whole is that it will reduce transport sector emissions by 3 500 t CO_2 eq[103]. At the same time, the owners of the electric vehicles purchased through the aid will also receive renewable energy certificates in the amount of the energy consumed driving the vehicles. The renewable energy certificates confirm the use of the renewable energy in the energy system balance in different sectors.

The results of **the activities of the hydrogen work group launched by the Ministry of the Environment in October 2019** will specify the opportunities for introducing hydrogen fuel and the plan to be implemented in the transport sector, as well as other sectors. The Estonian Hydrogen Association has joined the international hydrogen initiative, which has the objective of achieving the decarbonisation potential of hydrogen technology-based economic sectors, the energy system and the EU's long-term energy supply[104].

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 are summarised in chapter 4.6.iv. The most extensive of these are connected with the consumption of fossil fuels. The lower rate of excise duty is applied to diesel fuel used in agriculture, and support is also granted for generating electricity from peat or oil shale processing retort gas in efficient cogeneration mode. Estonia does not plan to amend these two measures, since the lower rate of excise duty for diesel fuels supports the competitiveness of the agricultural sector, and the Estonian government does not intend to promote the launching of additional cogeneration stations using fossil fuels.

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[103] Study on 'Determining the most cost-effective measures for achieving the targets of the climate policy and the shared effort regulation in Estonia", 2018: https://kik.ee/sites/default/files/aruanne_kliimapoliitika_kulutohusus_final.pdf

[104] The Hydrogen Initiative http://h2est.ee/wp-content/uploads/2018/09/The-Hydrogen-Initiative.pdf

3.2. Energy Efficiency Dimension

This chapter describes the planned policies, measures and programmes for achieving the indicative national energy efficiency target for 2030 as well as other objectives presented in point 2.2, including planned measures and instruments (also of a financial nature) to promote the energy performance of buildings. The NDPES 2030 document describes different measures to achieve one of the two sub-targets of the development plan – Estonian energy supply and consumption is more sustainable – and the barometers that quantify it. The following measures of the NDPES 2030 contribute most directly to energy efficiency:

- Measure 2.1 Increasing the introduction of alternative fuels in transport;
- Measure 2.2 Reducing the demand for individual motorised transport;
- Measure 2.3 An efficient transport fleet;
- Measure 2.4 Increasing the energy efficiency of the existing building stock;
- Measure 2.5 Increasing the anticipated energy efficiency of new buildings;
- Measure 2.6 Efficient thermal transmission;
- Measure 2.7 The example set by the public sector; and
- Measure 2.8 Energy savings in other sectors.

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 targets described in chapter 2.2, the taxation of energy carriers and measures in the final consumption sectors are considered.

Energy carriers are required to pay VAT and fuel and electricity excise duty; see also chapter 3.1.3.i. The following measures are applied to enhance final energy consumption (descriptions provided in annex IV to this document):

TR2 Increasing fuel efficiency in the transport sector;
TR3 Promotion of sustainable driving;
TR4 Spatial and land use measures in cities to increase the fuel-efficiency of transport and the efficiency of the transportation system;
TR5 Development of convenient and modern public transport;
TR6 Establishment of road charges for heavy-duty vehicles;
HF1 Reconstruction of public sector and commercial buildings;
HF2 Reconstruction of private residences and apartment buildings;

The following measures are also planned:

TR8 Additional promotion of fuel-efficient driving;
TR9 Additional spatial and land-use measures in cities to increase the fuel-efficiency of transport and the efficiency of the transportation system;
TR10 Additional activities for the development of convenient and modern public transport
TR13 Development of railway infrastructure (incl. construction of Rail Baltic);
HF5 Additional reconstruction of public sector and commercial buildings;

HF6 Additional reconstruction of private residences 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.

The 'National strategy for the renovation of buildings to improve energy performance'[105], which is currently in force, was submitted to the European Commission in October 2017. The updated long-term reconstruction strategy will be submitted to the European Commission by 10 March 2020[49].

iii. Description of policies and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models[106]

The development of the energy services market is regulated by Sections 31 and 32 of the Energy Sector Organisation Act. The Ministry of Economic Affairs and Communications (MEAC) in cooperation with the organisations Environmental Investments Centre (EIC), the Development Fund and SA KredEX, has analysed the potential of the energy services market and possible market barriers to developing the energy services market. There have also been several round-table discussions on the topic of energy services. The main topic in 2019 was dealing with energy efficiency agreements to provide assistance to the public sector in procuring energy services. The relevant instructional material and a model agreement were prepared. A communication event for different parties took place in February 2019 on that topic. Thus, the objectives provided for in Section 31 of the Energy Sector Organisation Act are being fulfilled in close cooperation with stakeholders.

Several instruments that help with the financing of projects addressing energy efficiency have been developed by the Estonian government (SA KredEx, EIC). For example, SA KredEx provides various forms of support to apartment associations and private individuals for home renovations. More detailed information is available on its homepage as well as the list of apartment building reconstruction specialists[107].

The Ministry of the Environment is implementing the measure 'Resource efficiency of companies', within the framework of which the energy services market is also being developed. The resource efficiency measure also supports the procurement of public sector energy services. This measure covers four activities: awareness raising, specialist training, performance of audits/resource use analysis and investments[108].

[105] https://ec.europa.eu/energy/sites/ener/files/documents/ee_building_renov_2017_et.pdf
[106] In accordance with Article 18 of Directive 2012/27/EU.
[107] http://www.kredex.ee/korteriuhistu/korteriuhistu-toetused/rekonstrueerimise-toetus/tehniline-konsultant-7/
[108] http://ressurss.envir.ee/

Several companies are active in the Estonian energy services market, such as Adven[109], Fortum[110], MTÜ Eesti Energiasäästu Assotsiatsioon[111], Soletek[112], AU Energiateenus OÜ[113], Eesti Energia[114], and others. Information on the entry into energy efficiency agreements and performed projects is available on their homepage.

iv. Other planned policies, measures and programmes to achieve the indicative national energy efficiency target for 2030 as well as other objectives presented in 2.2 (for example measures to promote the exemplary role of public buildings and energy-efficient public procurement, measures to promote energy audits and energy management systems[115], consumer information and training measures[116], and other measures to promote energy efficiency[117]).

The exemplary role of public sector buildings

In order to fulfil the exemplary role of public sector buildings, the measures are applied for the reconstruction of public sector buildings (descriptions in Annex IV of this document).

According to section 5 of the Energy Sector Organisation Act, the energy savings coordinator for immovable property owned by the central government arranges for the renovation of 3% of the total useful floor area of buildings occupied by the central government. Currently the Ministry of Finance performs the task of the coordinator for immovable property owned by the central government.

Promotion of the energy efficient public procurements

The promotion of energy efficient public procurements in Estonia is based on the Energy Sector Organisation Act. Section 6 of the Act establishes the obligation to purchase only products, services and buildings that are highly energy efficient for the central government. More specific requirements are established in the regulation 'Energy efficiency requirements for the products, services and buildings purchased by the central government'[118].

In addition, via sharing best practices, the Ministry of Economic Affairs and Communications is required to encourage public sector institutions, including regional and local-level institutions, to follow the example of the central government and purchase only products, services and buildings that are highly energy efficient. Specific project-based activities are also carried out.

[109] https://www.adven.ee/ee/energiateenus/
[110] https://www.fortum.ee/
[111] http://www.eesa.ee/esco/
[112] http://soletek.eu/energiateenused/
[113] http://energiateenus.ee/
[114] https://www.energia.ee/et/tark-tarbimine/kokkuhoid
[115] In accordance with Article 8 of Directive 2012/27/EU.
[116] In accordance with Articles 12 and 17 of Directive 2012/27/EU.
[117] In accordance with Article 19 of Directive 2012/27/EU.
[118] https://www.riigiteataja.ee/akt/110032017016

Energy audits

Section 28 of the Energy Sector Organisation Act (ESOA) deals with companies' obligation to perform regular energy audits. Under Section 28 (1) ESOA, an undertaking which is not a small or medium-sized enterprise or a distribution network operator or transmission network operator must undergo the energy audit referred to in Article 8 of the EU Energy Efficiency Directive 2012/27/EU every four years.

The energy savings coordinator draws up and publishes on their website a list of large companies. The purpose of drawing up and publishing the list of large companies is as a means to inform large companies and also to help the Technical Regulatory Authority (TRA) organise the supervision.

The minimum requirements of the energy audit are laid down in Regulation No 76 (made available on 12 June 2018) 'Minimum requirements of the energy audit'[119] of the Minister for Economic Affairs and Infrastructure, which was adopted on 22 December 2016. The first deadline for the energy audit of large companies in Estonia was 23 April 2017. Under Section 12 of Regulation No 76, companies could submit the energy audit through a simplified procedure. The next deadline for the energy audit is 5 December 2019 and thereafter every four years.

The obligation for large companies to carry out an energy audit is consistent with the ongoing energy and resource efficiency measure planned under the leadership of the Ministry of the Environment in the period of EU structural instruments. This measure targets establishing the basis for the growth of the resource efficiency of industry in the future and it is primarily aimed at small and medium-sized companies. This measure includes four activities:

- awareness-raising;
- training of specialists;
- audits, or the analysis of resource usage, and
- investment.

Replacement of pipelines

Support is available for the reduction of the diameter of district heating pipelines and the installation of pre-insulated pipes within the framework of measure EN3, Development of heating infrastructure.

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 reformulated Renewable Energy Directive (EU 2018/2001), renewable energy communities should be promoted. **A renewable energy community is a legal entity the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas**

[119] https://www.riigiteataja.ee/akt/123122016003

in which it operates, instead of financial profits (Article 2). Renewable energy communities are entitled to (a) produce, consume, store and sell renewable energy, including through renewables power purchase agreements; (b) share, within the renewable energy community, renewable energy that is produced by the production units owned by that renewable energy community, subject to the other requirements laid down in this Article and to maintaining the rights and obligations of the renewable energy community members as customers; (c) access all suitable energy markets both directly or through aggregation in a non-discriminatory manner (Article 22).

Cooperative collaboration is wide-spread in Estonia, e.g. apartment associations, consumer associations, forestry associations, agricultural associations. For example, local communities can use the supports designed with measures that are related to reconstruction of buildings and heating sector primarily via apartment associations. Projects involving consumers of energy generation that have taken place to date have shown that the **establishment of local energy communities requires the increasing of awareness in Estonia, finding leaders and providing counselling services[120].** The experience of Energy association's program that took place in the period 2014-2015 and involved ten potential energy associations (incl. the participation of 7 local authorities) showed that the prerequisite for creating an energy community in Estonia is a certain population density, experience with cooperative collaboration, the presence of fuel-free and other renewable sources and proper energy technologies, the capability to reconstruct buildings and the opportunity to sell energy to the network. This program resulted in one energy association out of 10 pilot associations that participated, i.e. **the activity, interest and readiness of local communities to create an energy community or association was low, at least some years ago[121]**.

Banks have a high risk sensitivity towards cooperative energy production since there is no trustworthy experience with it. But the high-interest capital takes big part of the, for example, income received from the solar power station installed by the apartment association and hence makes the activity not so interesting.

The solution is to ensure low interest (e.g. 2%) long-term funding or a credit guarantee for banks. It is necessary to train relevant sectoral experts to create financial, technical and legal support for the energy communities and plan measures for the founders of the energy association for using the services of these experts.

Estonia has adopted the practice of the European Renewable Energies Federation[122] as the basis for determining the role of energy communities and their designation as energy associations. Estonian legislation does not designate energy communities or energy association separately, but their activities overlap with the forms highlighted in the Commercial Code, i.e. the renewable energy communities can act within the meaning of the Commercial Code as private or public limited companies. Here an energy association means community joint activities with the purpose of generating, distributing or selling electrical energy and heat to their members through their own

[120] See more at Energy associations https://energiatalgud.ee/index.php?title=Energia%C3%BChistud
[121] Estonian Development Fund 2015 http://basrec.net/wp-content/uploads/2014/10/EDF EnerCoop BASREC report final.pdf
[122] REScoop https://www.rescoop.eu/

equipment for covering self-consumption, i.e. the electrical energy and heat is generated and distributed within the community in order to cover self-consumption. Public renewable energy generation means the generation of decentralised renewable energy which the owners (at least to the extent of 50%) are operators or citizens, local initiatives, communities, local governments, charity or non-governmental organisations, agricultural producers, associations or SMEs that create local value that may remain in the region.

The potential and socio-economic impact of Estonian energy associations [123] was assessed in 2015 within the context of the Energy Association Mentor Programme. **The greatest energy-related potential for the establishment of energy associations is in apartment buildings and public buildings that are not located in district heating regions or are located in low consumption density district heating network regions.** The potential of local cooperative electricity generation with solar panels amounts to 30 GWh/year (3% of the annual electricity demand of the buildings in case the price received with investment is lower than the price of the purchased electricity). Local electricity generation for the existing local distribution grid has a positive impact by making it possible to increase network capacity by a few percent. Wood gasification with energy cogeneration of 22 GWh/year also has potential. The production potential of wind energy does not match the locations of apartment buildings and public buildings in Estonia. The share of local energy production makes up 0.33% of the final electricity consumption of all buildings. The buildings with the potential for heating association make up 8-10% of the final heating consumption of all buildings.

The potential of communities in energy generation can primarily be implemented at the local level. More than 9,200 cities have joined the Global Covenant of Mayors for Climate and Energy,[124] and from Estonia, Tallinn, Tartu, Rakvere, Jõgeva, Kuressaare, Rõuge and Võru have joined. Under the covenant, by 2030 carbon emissions should be reduced by 40% in the territories of those towns, the towns should become carbon-neutral by 2050 and tackling of the impacts of climate change should be improved[125]. The tasks of the Tallinn Energy Agency[126] include, among other things, coordinating and organising performance of the covenant, and directing the energy savings of the communities in Tallinn. For, example, up to 100 solar electricity stations will be installed on the roofs of buildings by the end of 2020. The energy roadmap for Tallinn was prepared under the Horizon 2020 project "Energy roadmaps - R4E". The Energy Agency of the Tartu Region manages different international energy community projects[127]: the Interreg project Co2mmunity, and Horisont 2020 projects PANEL 2050 and SmartEnCity.

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[123] Estonian Development Fund 2015 Report on THE POTENTIAL AND SOCIO-ECONOMIC IMPACT OF THE ENERGY ASSOCIATIONS
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
[124] Global Covenant of Mayors for Climate and Energy https://www.globalcovenantofmayors.org/our-cities/
[125] Decision of the Tallinn City Government
file:///C:/Users/Irje.Moldre/Downloads/04.04.2019_otsus_59%20(1).pdf
[126] Tallinn Energy Agencyhttps://www.tallinn.ee/est/energiaagentuur/Tutvustus-38
[127] TREA www.trea.ee

vi. Description of measures to develop measures to utilise energy efficiency potentials of gas and electricity infrastructure[128]

Section 7 of the Energy Sector Organisation Act[129] governs the use of the gas and power infrastructure potential, requiring transmission and distribution system operators to determine the measures for improving energy efficiency in the network, the necessary investments and the agenda for the commissioning and submit an overview of these to the energy savings coordinator. Subsections 3 and 4 of the same section lay down that the cost of the energy efficiency measures is considered upon establishing the network fees of the network operators. The network fee must not hinder improvement of the overall efficiency of the gas or power system, including energy efficiency, demand-side management, and the participation of market participants in the balancing market or in the procurement of additional services.

The NDPES 2030 measures that contribute most directly to the use of the energy efficiency potential of the electricity infrastructure can be found in Table 22.

Table 22 Barometers of the measures for taking advantage of the energy efficiency potential of the electricity infrastructure[65]

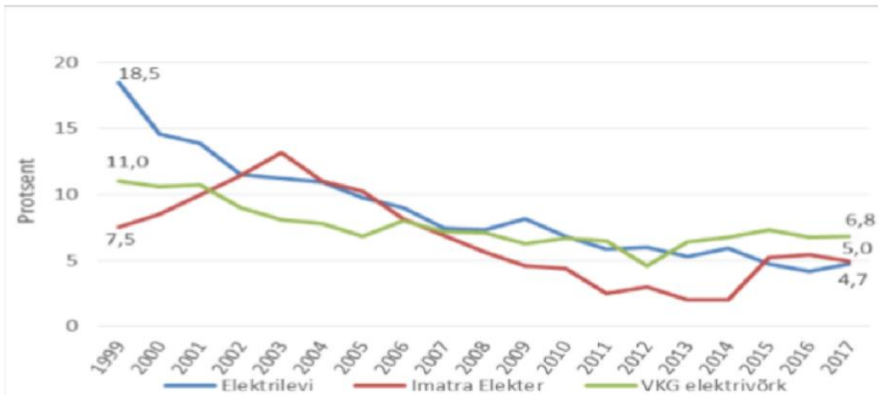
Objective: Security of supply: Continuous energy supply is guaranteed in Estonia		
Measure no.	**Barometer**	**Indicative target**
1.2	1. The average total duration of unscheduled or disruptive interruptions in the distribution system per point of consumption per year, minutes	≤90 (2030)
1.2	2. Amount of energy not provided in the transmission system, MWh	≤150 (2030)
1.2	4. Share of the weatherproof network in the distribution system	75% (2030)

In addition to the overview of the related measures in the energy sector development plan given in the table above (Table 22), the installation of remote reading devices for all consumers (completed on 1 January 2017) and optimisation of the consumers' network connections (see more detailed description below) are important measures in increasing the energy efficiency of electricity networks.

Over the period 1999–2014, the losses of the three main distribution system operators fell more than threefold (see Figure 15).

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

[129] Riigikogu. Energy Sector Organisation Act. https://www.riigiteataja.ee/akt/129062018074?leiaKehtiv



	Percentage
	Elektrilevi
	Imatra Elekter
	VKG elektrivõrk

Figure 15. Relative loss of the largest distribution system operators[130]

Whereas the losses of the biggest distribution system operator (Elektrilevi OÜ, ~90% market share) were 5.9% in 2014, in 2017 that had fallen to 4.1%. The main measure that supported this reduction in losses was an obligation to install remote reading devices for all consumers, which was completed by 01 January 2017.

Further increases in electricity grid efficiency can only take place via the reduction of under-consumption in the grid[131]. For example, the largest distribution system operator (Elektrilevi OÜ) has >1 100 km of lines and >300 substations through which not a single kWh has passed[132]. The unused line and substations increase losses and significantly reduce system efficiency.

The extent of the losses in the transmission system depends on the amount of transmitted energy, cross-border energy trading and the distribution of the capacity flows in the interconnected power system and the resulting transit flows, and weather conditions such as humidity and rainfall, among other things. In 2016, losses accounted for 3.0% of the total amount of electricity put into the main grid.

Great potential for increasing gas network energy efficiency lies in the assemblies that use energy. In essence, the Estonian gas system is a dead-end system where the only energy use takes place in the pressure-reducing metering stations where the gas is heated. There are no losses in the network and there are no compressor stations in the network. To ensure that the commercial losses of the transmission and distribution system are reduced to a minimum, all gas consumption points must have remote reading devices by 2020.

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[130] The Competition Authority. Assessment of the results of the price regulations in regulated sectors. http://www.konkurentsiamet.ee/public/Hinnaregulatsiooni_tulemuste_hindamine_reguleeritud_sektorites.pdf

[131] Development fund. Current situation of the electricity grid. 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

[132] Elektrilevi OÜ. Changes in network fees. https://www.elektrilevi.ee/hind2017

vii. Regional cooperation in this area, where applicable.

Estonia participates in the energy market interconnection working group on energy efficiency. Energy efficiency topics are also dealt with in the Committees of the Senior Officials of the Baltic Council of Ministers, as appropriate. These collaboration formats are described in chapter 1.4.ii.

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

It is planned that European Union support and Union funds should also be used in EU budget period years 2021 to 2027. Planning of the subsequent EU budget period is in the initial phases.

3.3. Energy Security Dimension [133]

i. Policies and measures related to the elements set out in point 2.3[134]

The general principles for safeguarding energy security in Estonia are established in Chapter 3.5 of the 'National Security Concept' approved by the Riigikogu[135]: Energy security can be ensured through security of supply, security of infrastructure, interconnectivity with the energy networks of the other EU Member States and the diversity of energy sources. To reduce dependency on imported energy sources, it is of primary importance for Estonia to increase energy efficiency. The EU strategy to make the best use of and develop indigenous energy resources creates a favourable environment for the security of the energy supply. For Estonia that means making use of oil shale and peat in as rational as possible a manner, and the wider deployment of renewable energy technologies. Functioning transmission connections with the Baltic States, Nordic countries and Poland ensure the security of energy supplies by reducing dependency from one supplier or a limited number of suppliers. The stability of the liquid fuel market is ensured with the EU measure of maintaining the liquid fuel stock. The trend for Estonia is to generate electricity and thermal energy from renewable energy sources. In the generation of thermal energy, a better balance is required between the used energy sources, and conditions must be created for switching the larger heat producers from natural gas to other fuels. Necessary security and safety requirements must be applied in order to ensure the business continuity of the energy systems and protection of the energy infrastructure.

Energy security is handled as a critical service for ensuring the societal continuity and cohesion. The treatment of the critical service continuity is provided in the 'Internal security development plan 2015-2020' approved by the Estonian Government, and the requirements for providers of vital services are described in the Emergency Act. To achieve energy security, it is necessary to ensure security of supply, security of

[133] Policies and measures must reflect the principle 'energy efficiency first'.
[134] Consistency must be ensured through 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.
[135] National Security Concept https://www.riigiteataja.ee/aktilisa/3060/6201/7002/395XIII_RK_o_Lisa.pdf#

infrastructure, interconnectivity with the energy networks of other EU Member States and the diversity of energy sources. The document also emphasises that to reduce dependency on imports, it is of primary importance to increase Estonia's energy efficiency.

Cybersecurity

The recommendations of the European Commission regarding cybersecurity in the energy sector provide for the implementation of cybersecurity readiness measures in real time. This primarily means that network operators, suppliers of technology and providers of vital services must meet the requirements of the relevant standards, private and public network service levels; the zoning of networks for the planning and implementation of appropriate cybersecurity measures; establishment of communication, monitoring and cooperation protocols, risk analysis and authentication mechanisms. **Member States must inform the Commission of implementation of the Commission's recommendations within 12 months or by April 2020 at the latest, and thereafter every two years via the NIS (Directive on Security of Network and Information Systems)**[136].

The E-state Academy develops a cybersecurity index on the basis of which Estonia holds second place after Czechia in cybersecurity[137]. This position shows the readiness and systemic approach of Estonia in ensuring cyber security.

The Ministry of Economic Affairs and Communications coordinates cybersecurity policymaking and implementation of the strategy, as well as cooperation between the relevant public authorities and the broader community. On a strategic level, coordination takes place via the Cyber Security Council by the Security Committee of the Government of the Republic. In addition to the Government Office and ministries, other organisations that help to ensure cybersecurity in Estonia are the Information System Authority, the Consumer Protection and Technical Regulatory Authority, the Estonian Internet Foundation, the State Infocommunication Foundation and Enterprise Estonia and Startup Estonia[138]. The vision of the Estonian cybersecurity strategy for 2019-2022 is that Estonia will be the most cyber-safe digital country. By coping efficiently with cyber risks, Estonia is able to ensure the safe and uninterrupted functioning of the digital society by relying on the joint capabilities of the national authorities, a knowledgeable and participatory private sector and outstanding research competence. Estonia is an internationally recognised trendsetter in the area of cybersecurity that supports state security and contributes to the growth of the competitiveness of companies operating in the area. Society as a whole perceives cybersecurity as a shared responsibility in which everyone has a role to play. Various economic sectors in Estonia need 1.5 times more ICT specialists than now each year. The professional cyber skills of specialists working in companies in sectors that deal with the provision of essential services are of crucial importance for society. The objective is to ensure the necessary labour force for both the state and the public sector by developing talented

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[136] European Commission recommendation on cybersecurity in the energy sector https://ec.europa.eu/energy/sites/ener/files/commission_recommendation_on_cybersecurity_in_the_energy_sector_c2019_2400_final.pdf

[137] Cyber security index https://ncsi.ega.ee/

[138] Cyber Security https://www.mkm.ee/et/tegevused-eesmargid/infouhiskond/kuberjulgeolek

young people in formal education as well as through extra-curricular activities and training cybersecurity specialists in conformity with the demands of the labour market[139]. **Companies that provide essential services in the energy sector have a risk analysis and plan for the business continuity of essential services [140] that contains, among other things, the managing of the risks of cyberattack**[141].

The electricity system

The following NDPES 2030 measures contribute most directly to ensuring security of supply and the achievement of related targets (see Table 13):

- Measure 1.1 Development of electricity production; and
- Measure 1.2 Efficient transmission suitable to meet the needs of the electricity sector

Under Section 4(4^1) of the Electricity Market Act, the regulator (the Competition Authority) may require the system operator to invite tenders for the creation of new production capacities, energy storage devices or energy efficiency/demand-side management measures if the capacity reserve of the system's generating installations falls below the capacity reserve established in the grid code.

The following measures are applied for achieving the targets described in Chapter 2.3 (see Annex):

EN1 Renewable energy support and support for efficient cogeneration of heat and power
EN9 Increasing the share of the weatherproof grid
EN11 Synchronisation of the Baltic electricity system with the synchronous areas of Continental Europe

Investments in the Baltic States made within the framework of the project for the synchronisation of the Baltic States (see point 2.4.2), which help eliminate bottlenecks in Estonia and also in the other Baltic States and increase the preparedness of external connections and the flexibility of the electrical system to respond to rapid changes in power generation also contribute to the resilience of the electrical system. The Estonian government is planning to pay support for the use of biofuels to power stations that enable co-incineration but are not competitive due to the increasing price of the permitted carbon emission credit. This makes it possible to increase national energy security and improve domestic production capacity. Estonia also plans to start organising technology-specific reverse auctions for bringing electricity from renewable energy sources to market. This would make it possible to organise reverse auctions for bringing controllable production equipment to market, and that would in turn contribute

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[139] Cybersecurity Strategy of the Republic of Estonia https://www.mkm.ee/sites/default/files/kyberturvalisuse_strateegia_2022_eng.pdf
[140] Vital services https://www.siseministeerium.ee/et/eesmark-tegevused/kriisireguleerimine/elutahtsad-teenused
[141] Manual for the preparation of risk analysis and business continuity plan for providers of vital services https://www.siseministeerium.ee/sites/default/files/dokumendid/Kriisireguleerimine/toimepidevuse_riskianaluusi_koostamise_juhend_nov_2017.pdf

to the stability of the electricity system.

Gas transmission system

The following NDPES 2030 measure contributes to ensuring the security of gas supply and achieving the related targets (see Table 14)

- Measure 1.3 Safeguarding the gas supply.

The main instrument for achieving the objectives described in chapter 2.3 is building the Balticconnector gas connection between Estonia and Finland. No additional national measures for increasing energy security are planned for the period 2021-2030. At the same time, the private sector is considering implementing projects that would contribute to the security of the gas supply (e.g. AS Tallinna Sadam and AS Alexela Invest are considering building an LNG terminal in Paldiski together).

District heating systems

To ensure the security of supply in district heating systems, the District Heating Act [142] provides for additional commitments for the power companies. The power company is the provider of the lifeline services for the district heating systems where more than 50 GWh/year of thermal energy is transmitted to the customer and that are located in the local government unit with a population of at least 10 000.

In very large systems, where the consumption of thermal energy is at least 500 GWh/year, it is compulsory to provide the possibility of using the amount of reserve fuel that would ensure the heat supply over three twenty-four hour periods.

Liquid fuels

To ensure the continuous availability of liquid fuels, the provisions of Directive EU 2009/11 and the Liquid Fuel Stocks Act are observed[143], and from 19 November 2013 the requirements of maintaining the stock provided for in the energy program of the International Energy Agency and one of the NDPES 2030 measures are also implemented:

- Measure 1.4 Maintenance of gas reserve.

In addition to general reserve quantity, the Liquid Fuel Stocks Act establishes that the quantity that is equivalent to at least 30 day average quantity of the corresponding domestic energy product in the previous calendar year must be maintained in Estonia. 53% of the reserves were on Estonian territory in 2018.

Oil shale

The possibilities for using oil shale and the demand for oil shale products are associated

[142] https://www.riigiteataja.ee/akt/103032017012?leiaKehtiv
[143] https://www.riigiteataja.ee/akt/101072017019?leiaKehtiv

with the increasing stringency of the international energy and climate policy targets.

Under the 'National Development Plan for the Use of Oil Shale 2016-2030', oil shale will also remain an important fuel in the period 2021-2030, and the following measures (NDP for the use of oil shale 2030)[51] will be applied for ensuring the security of the oil shale supply:

- Measure 1.1. Promoting of the sustainable mining of oil shale;
- Measure 1.2. Reducing the negative impact of oil shale mining on the natural environment and water supply;
- Measure 2.1. Increasing the efficiency of oil shale utilisation; and
- Measure 2.2. Reducing the negative environmental impact of the use of oil shale.

To replace the production capacity involved in closing ageing oil shale incineration blocks (619 MW by the end of 2019 and 658 MW in subsequent years[144]) during the period 2021-2030, this plan will apply measures for the construction of new renewable energy production capacities (measures EN1 and EN2 in Annexes III and IV of this draft).

ii. Regional cooperation in this area

The electricity system

In addition to the regional groups in the PCI, the electricity TSO (Elering AS) cooperates in the security of supply area in the following formats:

1. Balti regional security coordinator (hereinafter *Balti RSC*)
2. Cooperation organisation BRELL of the system operators of Belarus, Russia, Estonia, Latvia and Lithuania.

On 1 January 2018, the Baltics RSC commenced activities as the region's security coordinator by guaranteeing its support in increasing the region's security to the Baltic system operators through the provision of necessary services. The Baltic RSC is one of the five regional security coordinators in Europe that cover all system operators in Europe. The objective of the services provided by RSCs is to enhance preparations for real-time management of electrical systems.

The main functions that the regional security coordinator performs are:

1. Coordination of the interruptions of electrical system equipment with cross-border effect;
2. Preparation of Europe-wide reports on interruptions, coordination of interruptions and detecting inconsistencies;
3. Quality assurance of the common grid models used by the system operators and assembly of the regional and Europe-wide common grid model, including merging the system operators' models into a single model on the basis of the

[144] Competition Authority 2019 Report on electricity and gas market in Estonia in 2018 https://www.konkurentsiamet.ee/index.php?id=23346

uniform standard, assessment of the quality of the model and giving feedback to the system operators;

4. Assessment of the adequacy of regional production and transmission capacities for a short and medium period in the future, including an assessment of the adequacy of the pan-European production and transmission capacities and an assessment of whether production is adequate.
5. Coordinated calculation of cross-border transmission capacities, including the calculation of regional transmission capacities on the basis of a single methodology and the coordination of capacities among system operators.
6. A coordinated analysis of the operational security of electrical systems, during which bottlenecks in operational security are identified using the single grid model, and possible solutions are coordinated with system operators.

The Baltic RSC continuously collaborates with the RSCs of the Nordic countries as well as those of Central Europe, in order to ensure better collaboration on the borders between the regions. The RSC's role is to supervise and support; all final management decisions in the system are made by the system operators who actually manage the system.[145]

The Estonian electricity system belongs to the same synchronous area with the electricity systems of Belarus, Russia, Latvia and Lithuania (UCTE). In standard situations, the system operator for Russia ensures the automatic regulation of the frequency of the Estonian electricity system (except when the Estonian electricity system operates in isolation from other electricity systems). The BRELL cooperation organisation of the TSOs of Belarus, Russia, Estonia, Latvia and Lithuania was established in order to organise synchronous operation in the UCTE, incl. maintaining frequency within required limits,.

Estonia, Latvia and Lithuania have implemented a coordinated balance control in their electricity systems as of 01.01.2018. Estonia, Latvia and Lithuania are seen as a joint balance area and one of the Baltic system operators is responsible for balancing the overall balance in the Baltic States. To minimise the deviation from the summarised alternating current of the Baltics, back-up capacities are started up within required amounts from the joint list of operators that can provide supply for balancing the system.[146]

Gas transmission system

As the gas system operator, Elering AS is involved in the Regional Gas Market Coordination Group (RGMCG) of the Baltic States and Finland. In addition to the system operators of the relevant States, the controllers and the ministries responsible for the area also belong to the working group.

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[145] Elering AS. Security of supply report 2018. https://elering.ee/sites/default/files/public/Infokeskus/elering_vka_2018_web.pdf

[146] Elering AS. Balancing rules https://elering.ee/sites/default/files/attachments/Bilansi%20tagamise%20ehk%20tasakaalustamise%20eeskirjad%2001.2018.pdf

In addition, a working group was established between the 3B+FI countries (North Eastern gas supply risk group) under Article 3(7) of the Security of Supply Regulation (EU 2017/1938) to jointly prepare a risk analysis of the security of supply of natural gas and the plans for preventing and resolving emergencies. Representatives of the ministries, regulators and gas transmission system managers participate in the working group.

Solid fossil fuels

Estonia does not have any regional or international agreements that deal with the supply of solid fossil fuels. Nevertheless, Estonia has joined one international agreement that could theoretically affect the supply with solid fossil fuels. An act on accession to the treaty on Spitzbergen that was adopted by the *Riigikogu* on 4 February 1930[147], which ratified the "Treaty on Spitzbergen"[148], enables Estonia to mine minerals in Sptizbergen, among other economic activities. Estonia does not plan to commence mining-related economic activities in Spitzbergen.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds.

The Estonian TSO (Elering), in cooperation with the Latvian, Lithuanian and Polish TSOs, is organising financing for the implementation of the measure 'Synchronisation of the Baltic electricity system with the synchronous areas of Continental Europe'.

The TSO finances activities related to the development of the electricity grid from the network fee collected from consumers. The resources from the so-called 'bottleneck fee' are also used for building cross-border interconnectors. The intention is to use EU co-financing to fund the measure. The Baltic States synchronisation project has been on the list of EU Projects of Common Interest (PCI) since 2013. Construction of the third Estonia-Latvia interconnection, for example, has received co-financing for implementation of the measure. Project financing has been applied for within the framework of this financing period, and the financing of these projects will also be necessary in the next EU financing period. An accurate review of the status and activities of the project is available on the ENTSO-E web page[62], which describes the project.

[147] https://dea.digar.ee/article/AKriigiteataja/1930/02/18/4

[148] https://dea.digar.ee/article/AKriigiteataja/1930/02/18/5

3.4. Internal Energy Market Dimension[149]

3.4.1. Electricity infrastructure

i. Policies and dimensions to achieve the targeted level of interconnectivity as set out in point (d) of Article 4

The target level of the electrical interconnectivity of the EU Member States is at least 10% for 2020 and at least 15% for 2030[56].

Electricity transmission measures (for more information, see chapter 2.4.2) primarily address the synchronisation of the electrical systems of the Baltic States with the frequency area subject to EU law and increasing the availability of external interconnections. Activities undertaken within the Baltic States synchronisation project take place in Estonia, Latvia, Lithuania and also Poland. Investments made in connection with synchronisation strengthen cross-border connections as well as the domestic electricity transmission system. In that way, the bottlenecks in the electricity system are removed, and the interconnectivity of the energy grids of the Baltic States and Poland is increased. In 2017, the interconnectivity of the Estonian electricity grids with neighbouring countries (Latvia, Finland) was 63%[56]. The interconnection capacity from EE to LV was 900 MW, and 1016 from EE to FI. It is estimated that the capacity from EE to LV will increase to 1379 MW by 2030[150] based on completion of the third Estonia-Latvia interconnection[151].

The following measures of the NDPES 2030[4] mostly contribute directly to ensuring interconnectivity between electricity networks.

- Measure 1.2 Transmission that meets the requirements of eligible for electricity management and efficient transmission

The following measures will be applied in order to achieve the targets described in Chapter 2.2:

EN8 Improving the quality of network services;
EN9 Increasing the share of the weatherproof grid;
EN10 Transition to the remote reading system;
EN11 Synchronisation of the Baltic electricity system with the synchronous areas of Continental Europe.

ii. Regional cooperation in this area[152]

The Baltic States synchronisation project will be implemented in collaboration between the Baltic States and Poland. An accurate review of the status and activities of the project is available on the ENTSO-E web page[62] and Chapter 2.4.2., which describe the project.

[149] Policies and measures shall reflect the first principle of energy efficiency.
[150] ENTSO-E. TYNDP 2018. Input data. https://tyndp.entsoe.eu/maps-data/
[151] Elering AS: The third interconnection between Estonia and Latvia. https://elering.ee/eesti-lati-kolmas-uhendus
[152] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds.

The Estonian TSO (Elering), in cooperation with Latvian, Lithuanian and Polish TSOs, is organising financing for implementation of the measure ‘Synchronisation of the Baltic electricity system with the synchronous areas of Continental Europe’. The TSO finances activities related to development of the electricity grid using the network fee collected from consumers. The resources from the so-called “bottleneck fee” are also used to construct cross-border interconnectors. The intention is to use EU co-financing to fund the measure. The Baltic States synchronisation project has been on the list of EU Projects of Common Interest (PCI) since 2013. Construction of the third interconnection between Estonia and Latvia has, for example, received the co-financing for implementation of the measure. Project financing has been applied for within the framework of this financing period, and financing of these projects will also be required in the next EU financing period. More detailed information on the status of the project and activities can be found on the ENTSO-E web page,[62] which describes the project.

3.4.2. Energy transmission infrastructure

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

Electricity system

Measures for implementing PCIs and other major infrastructure projects are described in point 3.3.1.

Gas transmission system

Input for the gas system is indicated in point 2.4.2.

ii. Regional cooperation in this area[153]

Electricity system

All relevant information regarding the electricity transmission infrastructure is described in point 3.3.1.

Gas transmission system

Inputs to the gas system are indicated in point 2.4.2.

iii. Where applicable, financing measures in this area at national level, including EU support and the use of EU funds.

Electricity system

All relevant information regarding the electricity transmission infrastructure is described

[153] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013.

in point 3.3.1.

Gas transmission system

Inputs to the gas system is indicated in point 2.4.2.

3.4.3. Market integration

i. Policies and measures related to the elements set out in point 2.4.3

Electricity system

The following NDPES 2030 measures contribute most directly to the market integration and coupling of the targets (see Table 17) indicated in Chapter 2.4.3.i:

- Measure 1.2 Efficient transmission suitable for meeting the needs of the electricity sector

The following measures (for more information about the measure see Annex) are implemented for achieving the targets described in Chapter 2.4:

EN8	Increasing the quality of network services
EN9	Increasing the share of the weatherproof grid
EN10	Transition to a remote reading system
EN11	Synchronisation of the Baltic electricity system with the synchronous areas of Continental Europe

Investments in the Baltic States made within the framework of the synchronisation project contribute significantly to market integration (see Chapter 2.4.2), which helps eliminate the bottlenecks in all of the Baltic States and increase the resilience of the electrical system to rapid changes in electricity production and consumption.

Gas transmission system

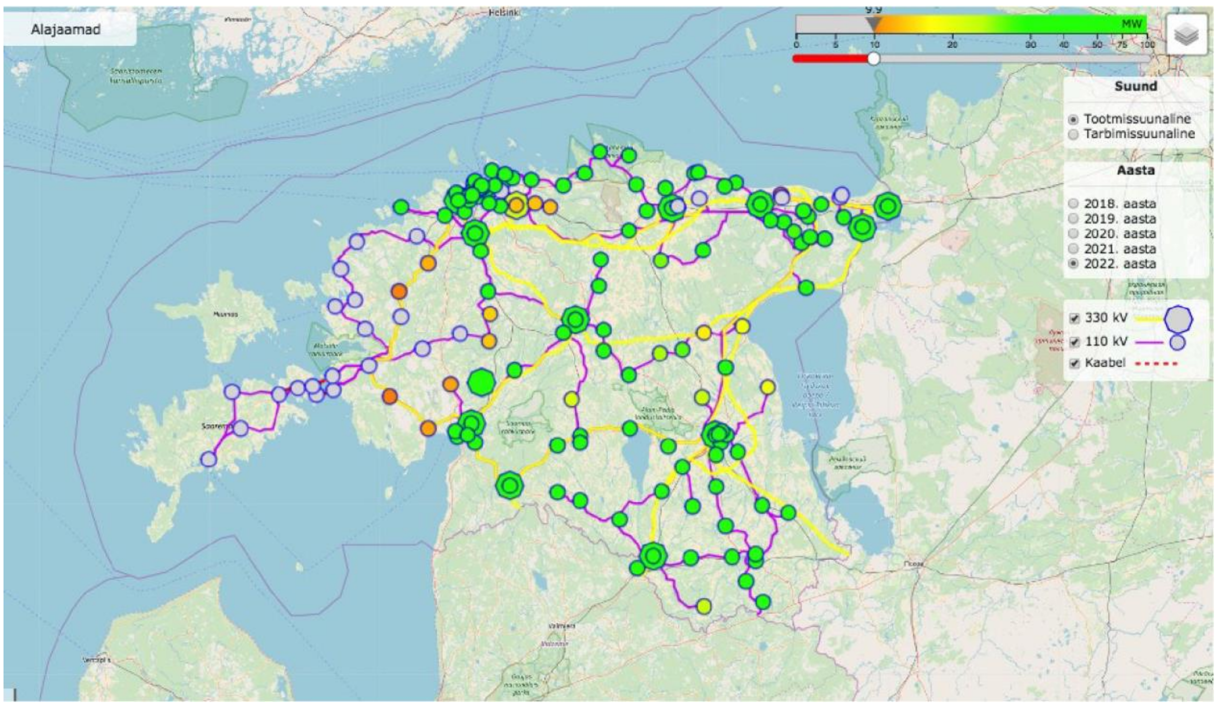
The most important investment in physical infrastructure in the area of gas market integration is the construction of the Balticconnector by 2019, and related additional work on the Estonia-Latvia gas system interconnector. The supplemental works include building of a compressor station in Estonia and the enabling of bi-directional gas flow.

ii. Measures that increase energy system flexibility for generating renewable energy.

This chapter describes measures to increase the flexibility of the energy system with regard to renewable energy production, such as smart grids, aggregation, demand response, storage, distributed generation, dispatching mechanisms, re-dispatching and curtailment, real-time price signals, including the roll-out of intra-day market coupling and cross-border balancing markets. These measures are implemented in order to achieve the targets (see Table 18) indicated in chapter 2.4.3.ii .

Electricity system

The sufficiency and flexibility of the electricity system will be safeguarded through measures 1.1 (Developing the electrical energy production;) and 1.2 (Transmission eligible for electrical energy sector needs and efficient transmission) of the NDPES 2030 security of supply sub-target (Table 18). The barometers of these measures direct network operators to make necessary investments and develop solutions for more efficient integration of renewable energy into the Estonian electrical system. A good example of this innovation is the map application developed by the Estonian TSO (Elering AS), which shows the available capacities in the electricity grid belonging to the company on a year-by-year basis and enables renewable energy producers to plan their projects more effectively.



	Substations
	MW
	Orientation
	Production-oriented Consumption-oriented
	Year
	2018 2019 2020 2021 2022
	330 kV 110 kV Cable

Figure 16. Available connection capacity map application of Elering AS[154]

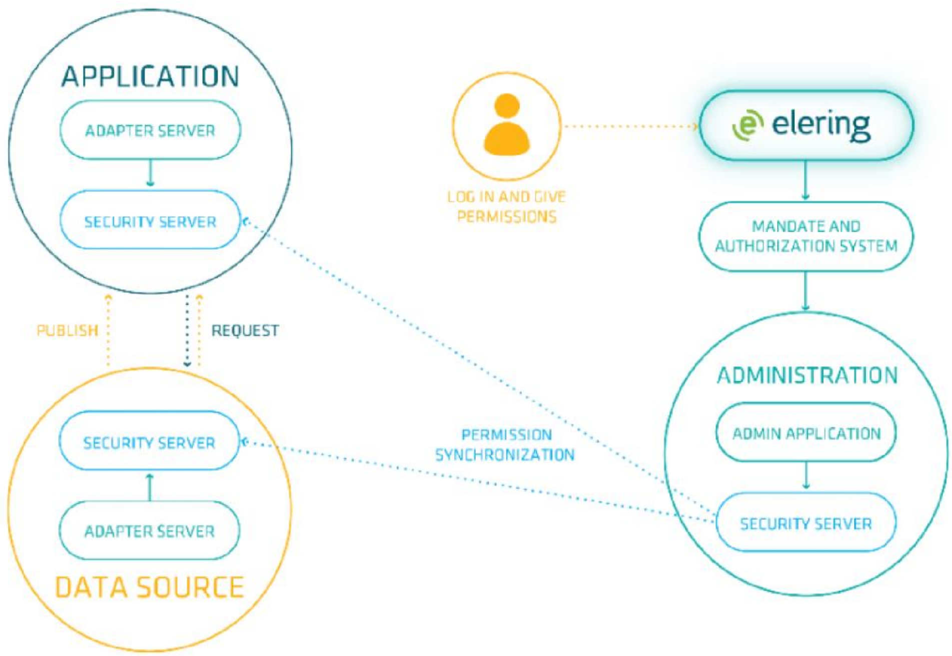
The synchronisation project (see Chapter 2.4.2) also contributes to capacity building for

[154] Elering AS. Available connection capacity map application. https://elering.ee/vabade-liitumisvoimsuste-rakendus/

the integration of renewable energy, and in that context bottlenecks in the electricity system will be removed throughout the Baltic States.

The system operator (Elering AS) has created a data exchange platform called Estfeed for the development of the flexibility services market. Estfeed enables the secure exchange of messages in the energy sector (Figure 17) – different data sources and applications (Figure 18) that wish to use these data can be connected to the platform. Estfeed consists of a legal, software and hardware solution to manage the exchange of energy metering data among market participants, support the process of consumers changing electricity supplier on the open market and enable access to software applications authorised by consumers for metering data (i.e. for monitoring and controlling consumption).[155]

PEER TO PEER DATA TRANSMISSION ARCHITECTURE



	APPLICATION
	ADAPTER SERVER
	SECURITY SERVER
	LOG IN AND GIVE PERMISSIONS
	MANDATE AND AUTHORIZATION SYSTEM
	PUBLISH
	REQUEST
	ADMINISTRATION
	SECURITY SERVER
	PERMISSION SYNCHRONIZATION
	ADMIN APPLICATION

[155] Elering AS. Estfeed. https://elering.ee/elektrituru-kasiraamat/6-kauplemine-avatud-elektriturul/64-tarkvork-ja-andmevahetus-avatud-0

	ADAPTER SERVER
	SECURITY SERVER
	DATA SOURCE

Figure 17. Simplified architecture of Estfeed[155]

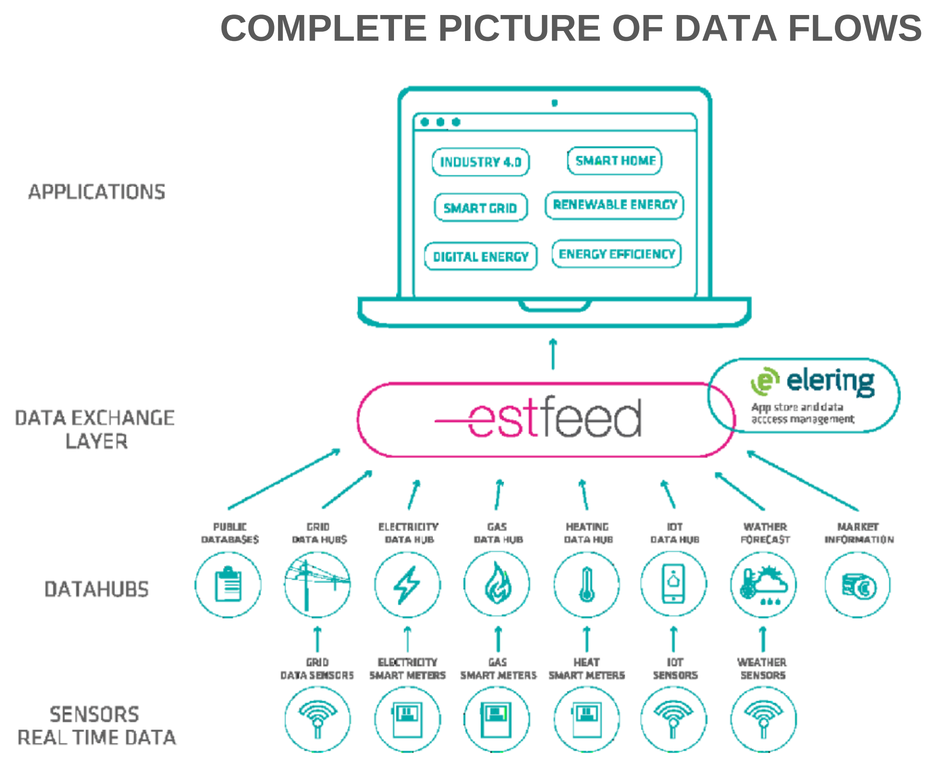


Figure 18. Flow of data and management of access rights[155]

The Estfeed platform can integrate various data sources (e.g. in future also district heating data and data from other remote readers and sensors) and provide appropriate services for converting the data into valuable information to control consumption, manage flexibility, perform audits and make comparisons. For example, gas and electricity data warehouses, the Commercial Register, the Population Register, Foreca weather information and the ENTSO-E Transparency platform are interfaced with Estfeed to obtain the electricity price.

Both the TSO (Elering AS) and the biggest distribution system operator (Elektrilevi OÜ) are involved in development projects to provide a more favourable flexibility service within the Estonian electricity system (e.g. the H2020 project EU-SysFlex, and the deployment of a single balancing services market in the Baltic States as of 1 January 2018). This flexibility has also created the need for a project like INTERRFACE (in progress), the main objective of which is closer coordination between TSOs and distribution system operators to encourage acquisition of the services for both transmission and distribution to render management of the network more efficient and effective and increase the level of demand response and generation of renewable energy, thus also enabling the end customer to become an active market participant.

These activities are also facilitated by the fact that, according to Government of the

Republic Regulation establishing a Network Code, established pursuant to the Electricity Market Act, all Estonian electricity consumers have been supplied with remotely readable meters as of 1 January 2017.

As regards the Baltic States, it should also be taken into account that as the electricity system of the Baltic States is not synchronised with the synchronous areas subject to EU law, liberalisation of the balancing market is more complicated than for other EU Member States (e.g. the price of the balancing service is considerably influenced by balancing deliveries from Russia).

The system operators of the Baltic States are working actively on consumption control to provide the market with greater flexibility (see, for example, the recent public consultation and the analysis that preceded it – *Baltic Electricity Transmission System Operators' Public Consultation on „Demand Response through Aggregation – a Harmonized Approach in the Baltic Region* [156]). System operators in the Nordic countries are making plans for a joint Scandinavian mFRR trading platform and a standard product. It will be beneficial for the Baltic States' trading platform and standard products to be harmonised or integrated with the Scandinavian platform and its product.

The Estfeed platform also shows gas system measurement data (e.elering.ee). Consumers themselves can see (and enable gas sellers to see) gas consumption data. Data is sent to the platform from remote reading devices once a day and from domestic meters once a month. Since all gas metering points need to be equipped with meters that can be read remotely as of 2020, all consumers will be able to see their gas consumption in real-time as of 2021.

iii. Where applicable, measures to ensure the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets.

The Electricity Market Act prohibits discrimination of market participants. The network operator, in response to a request from a consumer, producer, line operator or any other network operator, is obliged to connect any electrical installation which conforms to requirements and is located in its service area to the network and to amend the conditions of consumption or generation[66] . As from 20 February 2018, aggregators are able to enter into a contract with the TSO (Elering AS) to provide a balancing service[157], which means that the aggregators are able to participate in the electricity market on the same principles as the other market participants. The regulation will be updated to cover independent aggregators and energy storage in accordance with Directive (EU) 2019/944 on the internal market for electricity.

Pursuant to the Natural Gas Act, the system operator is obliged to ensure access to the transmission network to third parties in accordance with Regulation (EC) No 715/2009.

[156] https://elering.ee/en/electricity-market#tab0 Baltic Electricity Transmission System Operators' Public Consultation on "Demand Response through Aggregation - a Harmonized Approach in the Baltic Region".

[157] Elering AS. Reguleerimisturg. https://elering.ee/reguleerimisturg

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.

In Estonia, consumers' rights are protected by the Consumer Protection Act[158 158], Electricity Market Act[66], District Heating Act and Natural Gas Act. Responsibility for oversight of the electricity and natural gas markets and the settlement of disputes relating to it is shared among several agencies. The Consumer Protection Board deals with issues concerning the terms of contracts and oversees the advertising and sales activities of electricity and gas companies. The Competition Board oversees the functioning of the market and the activities of market participants pursuant to the Electricity Market Act, District Heating Act and Natural Gas Act. The Technical Regulatory Authority deals with issues relating to electrical safety and meters.

The Consumer Protection Act provides that the consumer has the right to:

(a) demand and obtain goods and services which meet the requirements, are harmless to the life, health and property of the consumers, and are not prohibited from being owned or used;
(b) obtain necessary and truthful information on the goods and services offered in order to make an informed choice, and timely information on any risks relating to the goods or services;
(c) obtain information on consumer law and other issues relating to consumption;
(d) obtain advice and assistance if their rights are violated;
(e) demand compensation for any patrimonial or non-patrimonial damage caused to them;
(f) request that their interests be taken into account and that they be represented through consumers' associations and federations in the decision-making process on consumer policy issues.

Hence the Consumer Protection Act provides general requirements that are set out in greater detail in special acts (the Electricity Market Act, the District Heating Act and the Natural Gas Act).

Section 90 of the Electricity Market Act provides that, during the period from 1 October to 30 April, a customer's network connection in a building or part of a building which constitutes a dwelling and which is used as a permanent residence and heated exclusively or primarily by electricity, or in which the use of electricity is unavoidable for the functioning of the heating system that exclusively or primarily uses another fuel source, cannot be interrupted earlier than within 90 days.

Section 17 of the District Heating Act provides that if a customer has failed to pay the amount due under a contract entered into with a network operator, the supply of heat required for heating the dwelling may be interrupted during the period from 1 October to 30 April only when 90 days have passed since receipt of the relevant notice and the customer has failed, during that period, to remedy the defect which constitutes the basis for interruption of the supply of heat. Otherwise the network operator has to give at least

[158] Riigikogu. Consumer Protection Act. https://www.riigiteataja.ee/akt/TKS

seven days' notice of interruption caused by indebtedness.

Section 26 of the Natural Gas Act provides that if a household customer has failed to pay the amount payable under the contract entered into with the seller and the household customer uses gas to heat a dwelling used as a permanent residence, the supply of gas may be interrupted during the period from 1 October to 1 May only if ninety days have passed since receipt of the relevant notice.

The competitiveness of the retail market for electricity and gas is also strengthened by regulatory and information technology developments (the Network Code applied as of April 2019, developments in Open Government Partnerships, etc.).

iii. Description of measures to enable and develop demand response, including those addressing tariffs to support dynamic pricing[159]

This area is still being development and thus is regulated in legislation in a general manner. More specific regulations will be drawn up as needed, based on the results of the pilot projects in progress.

One aggregator is operating in Estonia as part of one of the pilot projects. It has been able to enter into the contractual relations necessary for providing the service with both consumers and the system operator. A more specific description as regards the electricity market can be found under point (ii) of section 3.4.3.

3.4.4. Energy poverty

i. Where applicable, policies and measures to achieve the objectives set out in point 2.4.4.

National policy related to energy poverty is governed by the Social Welfare Act[160], according to which the State supports people in need with financial aid. Local authorities pay a subsistence allowance to people in need, and the application, calculation, granting and payment of this allowance is governed by Section 8 of the Act. Section 133(5) 'Bases for calculating the subsistence benefit' of the Act provides that housing expenses that are taken into consideration when calculating the subsistence benefit, including (points 5-8):

- the cost of the thermal energy or fuel consumed by the hot water supply;
- the cost of the thermal energy or fuel consumed for heating;
- the costs related to electricity consumption;
- the cost of household gas;

SA Kredex[161] provides the following grants to private individuals and apartment associations to improve living conditions:

- Small residential home reconstruction grant;
- Small residential home's heating system renovation grant;

[159] In accordance with Article 15(8) of Directive 2012/27/EU.
[160] https://www.riigiteataja.ee/akt/130122015005?leiaKehtiv
[161] http://www.kredex.ee/toetus/

- Reconstruction grant for apartment associations;
- Housing grant for families with many children:
- Electrical installation renovation grant for private persons and associations of apartment owners.

In January 2019, the Estonian National Social Insurance Board established an advisory unit for local authorities with the aim to ensuring that those local authorities can provide uniform and high quality nationwide social welfare support measures to adults once the public administration reform is completed.

The aim of the advisory unit operating under the Estonian National Social Insurance Board since 2019 is to increase the support provided by the State to local authorities in the performance of social welfare tasks, to harmonise and improve the quality of aid measures and contribute towards the development of a strong frontline adult social welfare system. The advisory unit provides local authorities with advice on strategy, implementation and specific cases.

To alleviate the energy poverty that might be experienced during the heating period, the District Heating Act, Electricity Market Act and the Natural Gas Act contain provisions significantly limiting common interruptions of energy supply. Under the District Heating Act [162] and the Electricity Market Act, the electricity supply may be interrupted from 1 October to 30 April only if 90 days have passed since receipt of the relevant notice.

The same rule is applied under the Natural Gas Act for the period from 1 October to 1 May[163].

3.5. Dimension research, innovation and competitiveness

i. Policies and measures related to the elements set out in point 2.5

Energy-area research and development

The NDPES's 2030 research and development programme (hereinafter NDPES 2030 RD programme), approved by the Minister for Economic Affairs and Infrastructure in June 2019, envisages activities that contribute towards the successful implementation of NDPES 2030 measures. NDPES RD program activities are aggregated into the following seven areas:

- Electricity supply (generation, transmission and distribution of electricity). This area covers activities relating to NDPES 2030 measure 1.1 'Developing electricity production' and 1.2 'Efficient transmission meeting the needs of the electricity sector';
- Biomass and biofuel in the energy sector and transport. This area covers activities relating to NDPES 2030 measure 1.1 'Developing electricity production'; 1.5 'Efficient production of heat' and 2.1 'Increasing the availability of alternative fuels in transport';
- Use of oil shale and other domestic non-renewable fuels. This area covers activities relating to NDPES 2030 measure 1.1 'Developing electricity production'

[162] Section 17(4^1) of the District Heating Act
[163] Section 26(3^1) of the Natural Gas Act

and the Oil Shale Development Plan;

- Transport and mobility links with the energy sector. This area covers activities relating to NDPES 2030 measure 2.2 'Reducing the demand for motorised individual transport' and 2.3 'An efficient transport fleet';
- Energy efficiency of buildings (i.e. buildings scheduled for renovation and new buildings, and distributed generation solutions associated with the buildings). This area covers activities relating to NDPES 2030 measure 2.4 'Increasing the energy efficiency of the existing building stock' and 2.5 'Increasing the prospective energy efficiency of new buildings';
- Heat supply (efficient heat generation and transmission, heat storage). This area covers activities relating to NDPES 2030 measure 1.5 'Efficient thermal energy generation' and 2.6 'Efficient thermal energy transmission'.
- Energy saving in consumption (street lighting, industry). This area covers activities relating to NDPES 2030 measure 2.8 'Energy saving in other sectors'.

The NDPES RD program also envisages activities cutting across the boundaries of these areas, involving participation in international research and development activities, improvement of the collection and dissemination of information about the areas of the energy programme, improvement of cooperation with local authorities and ensuring that state authorities are informed about the processes of energy policy design and implementation.

Among the key entities commissioning energy-related research and development activities in Estonia are large energy sector enterprises.

Economic competitiveness

Implementation of this programme as a whole must contribute towards promoting economic competitiveness; no separate measures for increasing economic competitiveness are envisaged. According to the Estonia 2020 competitiveness plan, important factors for ensuring the competitiveness of the economy include the existence of a qualified labour force (including top researchers and specialists); research and development in cooperation with the private sector; achievement of companies' growth ambitions and a business and investment environment conductive to promoting efficiency and productivity; sectoral integration; an international-level living environment and infrastructure; energy security, energy and resource efficiency; a smart grid; a circular economy; keeping the government deficit below 0.5% of GDP; a budget policy that supports competitiveness and a flexible governance structure.

The measures for achieving the targets described in the NDPES 2030 document create the economic preconditions for avoiding having to pay the resource- and pollution-related charges associated with the introduction of energy efficiency and renewables, for deriving the benefits obtainable through cooperation and joint projects (including export opportunities), for new business and operating models to arise (renewable energy communities, energy generation and storage by customers, smart infrastructures and cities, etc.), for changes in consumption habits and behaviour to develop which stimulate a reduction in GHG emissions, and for a knowledge-based future to take shape.

The measure ‘Green technology investment programme’ is planned to boost start-up and emerging companies whose activity is directed towards developing and launching new products, services and technologies that reduce greenhouse gas emissions. The aim of the investment programme is to attract additional private equity to green technology through State equity capital investment.

ii. Where applicable, cooperation with other Member States in this area, including, where appropriate, information on how the SET Plan objectives and policies are being translated to a national context.

Estonia participates in a cooperation programme between the Baltic States and Nordic Energy Research which aims to promote research into the energy sector. The founding document of this collaboration programme was approved in October 2018 and under it, joint research is to be financed, grants are to be given to students for degree courses and exchanges of scientists are to be funded. The research programme will focus on the following topics, the funding for which has been agreed until 2021:

- reduction of the carbon intensity of the transport sector;
- energy saving in buildings and industry;
- analyses of the energy system;
- challenges and opportunities in regional energy networks.

At the end of 2018, at Norway’s initiative, a collaborative group of Nordic countries was formed to work on the topics of Carbon Capture, Use and Storage (CCUS) and reducing GHG emissions (NGCCUS).

The aim of the cooperation platform is to:

- enhance information exchange and cooperation to develop CCUS-related policies and with regard to decarbonisation;
- discuss policies and strategies related to CCUS; and
- monitor developments in decarbonisation and CCUS in the Nordic countries and within the context of cooperation between the Nordic and Baltic countries and the EU’s Strategy for the Baltic Sea Region, focusing on technologies and various systemic solutions.

iii. Where applicable, financing measures in this area at national level, including EU support and the use of EU funds.

Energy sector research and development activities will be financed from various different sources during this EU financing period. Applied research to achieve socio-economic goals corresponding to Estonia’s needs (the so-called RITA programme) will be financed under the Operational programme for cohesion policy funds 2014-2020[92] . Two projects directly related to the energy sector have been granted financing under this programme:

- ‘Development of innovative and more sustainable technology for the processing of oil shale or its products’, as part of the development of more efficient, environment-friendly and sustainable options for the use of natural resources;
- research into the situation and prospects of the Estonian bioeconomy and its sectors. Development of business models in selected areas of the bioeconomy.

Estonia has also applied for funding for energy-related research and development activities under the EU's Horizon 2020 programme. In 2019, Estonian partners took part in several dozen energy-related projects funded under the Horizon 2020 programme[164]. Energy-related priorities under the Horizon 2020 programme are a reduction in energy consumption and carbon footprints through smart and sustainable use; supplying customers with electricity which is affordable and produces low carbon emissions; alternative fuels and mobile energy sources; a single, smart European electricity grid; new knowledge and next generation technology; robust decision-making and public engagement; market uptake of energy innovations; energy security and security of supply; recovery, recycling and waste recycling. Estonian partners have been very successful in sectoral projects – within the first six years, €19.87 million have been attracted towards development of the sector by means of 42 agreements concluded with the European Commission (the total budget of the projects is €22.34 million). By way of comparison, the amount attracted by means of 11 agreements under the previous framework programme was almost 10 times, or €1,962.192, less. Whereas EU countries registered a success rate of 13%, the Estonian partners' success rate was 15%. Innovation projects predominated (accounting for 68.8% of the funded applications). By participating in the Horizon programme, the Estonian partners also contribute towards achieving the national climate and energy targets, as all open topics are directly linked to reducing the environmental impact of the energy sector.
Baltic and Nordic scientists can apply for funding for research projects under the Baltic-Nordic countries research cooperation programme, launched in 2018[165]. This programme is funded by Nordic Energy Research and the Baltic States.

[164] For successful projects, see https://edukad.etag.ee
[165] For the joint Baltic-Nordic Research Programme, see https://www.nordicenergy.org/programme/the-joint-baltic-nordic-energy-research-programme/

SECTION B: ANALYTICAL BASIS[166]

4. CURRENT SITUATION AND PROJECTIONS WITH EXISTING POLICIES AND MEASURES[167, 168]

4.1. Projected evolution of main exogenous factors influencing energy system and GHG emission developments

i. Macroeconomic forecasts (GDP and population growth)

Estonia's GDP increased by 3.9% in 2018 in comparison to 2017. The table below (see Table 23) indicates the population data used for GHG projections and the actual rate of GDP growth over the period from 2020 to 2040.

Table 23. Estonia's population and GDP projections

Parameter	2020	2025	2030	2035	2040
Population (in millions of people)	1.31794 0	1.312061	1.306181	1.294957	1.283732
GDP growth (real growth rate in %)[169]	3.0	2.6	1.9	1.4	1.4

ii. Sectoral changes expected to impact the energy system and GHG emissions

The most important changes set to impact greenhouse gas emissions over the period 2021-2030 are as follows:

- changes in the oil shale power industry. The operational resources of the old oil shale power plants are expiring or environmental restrictions are being applied to these with the intention of closing the oil shale blocks. The major users of the oil shale will presumably be shale oil producers. The transition to oil production will

[166] See Part 2 for a detailed list of parameters and variables to be reported in Section B of the Plan.
[167] The current situation is that on the date of submission of the national plan (or the latest available date). 'Existing policies and measures' cover policies and measures which have been implemented and adopted. 'Adopted policies and measures' are those on which an official government decision has been taken by the date of submission of the national plan and for which a clear commitment to proceed with implementation exists. 'Implemented policies and measures' mean policies and measures for which one or more of the following applies on the date of submission of the national plan or progress report: directly applicable European legislation or national legislation is in force, one or more voluntary agreements have been established, financial resources have been allocated, human resources have been mobilised.
[168] 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. When developing national projections on the basis of existing policies and measures and impact assessments, Member-State-specific results from the EU Reference Scenario 2016 and the results of subsequent policy scenarios may also be a useful source of information.
[169] Actual GDP growth rate (29.01.2019): Ministry of Finance,
https://www.rahandusministeerium.ee/et/riigieelarve-ja-majandus/majandusprognoosid

reduce carbon emissions in the oil shale sector;

- use of means and modes of transport which generate less emissions will have an impact on GHG emissions in the transport sector, which is an important source of GHG emissions.

iii. Global energy trends, international fossil fuel prices, EU ETS carbon price.

Global energy trends

A comparison of future scenarios generated by different organisations, compiled and analysed in 2019 by the World Energy Council, shows that an increase in electricity demand is unavoidable. Energy sources will diversify, but the share of fossil fuels do not drop globally below 70% (currently 80%) by 2040 in most of the scenarios. Renewable energy sources are used more to the detriment of coal, but the extent of use of solar and wind energy is still an open question. Some scenarios show an increase in the use of natural gas compensating for the drop in the use of crude oil. It is presumed that there will be an increased need to use nuclear energy. All energy scenarios demonstrate the need for coordinated activity and policies to manage global climate change. To diversify energy sources, increased attention is being paid towards artificial/synthetic energy carriers and fuels, especially towards the role of liquid hydrogen generated using electricity rather than thermal energy or obtained chemically. Important for achieving a low carbon economy are the avoidance of political mistrust, protectionism and conflicts, consumer behaviour and choices, and distributed/dispersed electricity generation. Digitalisation may either reduce or increase energy consumption; the bases for these scenarios are rather unclear[170].

The European Commission has embarked on the path towards achieving climate neutrality by publishing at the end of 2018 a strategic long-term vision for attaining a prosperous, modern, competitive and climate neutral economy by 2050 – 'A Clean Planet for all;[171]. To achieve this target, the new president of the Commission, Ursula von der Leyen, promised to submit a proposal for a European Green Deal within the first 100 days of taking office.

International price of fossil fuels

In the energy models devised to assemble the greenhouse gas projections presented in this document, Estonia has used the fossil fuel price projections recommended by the European Commission (see Table 24).

Table 24 Fossil fuel prices at the time of drawing up the plan.

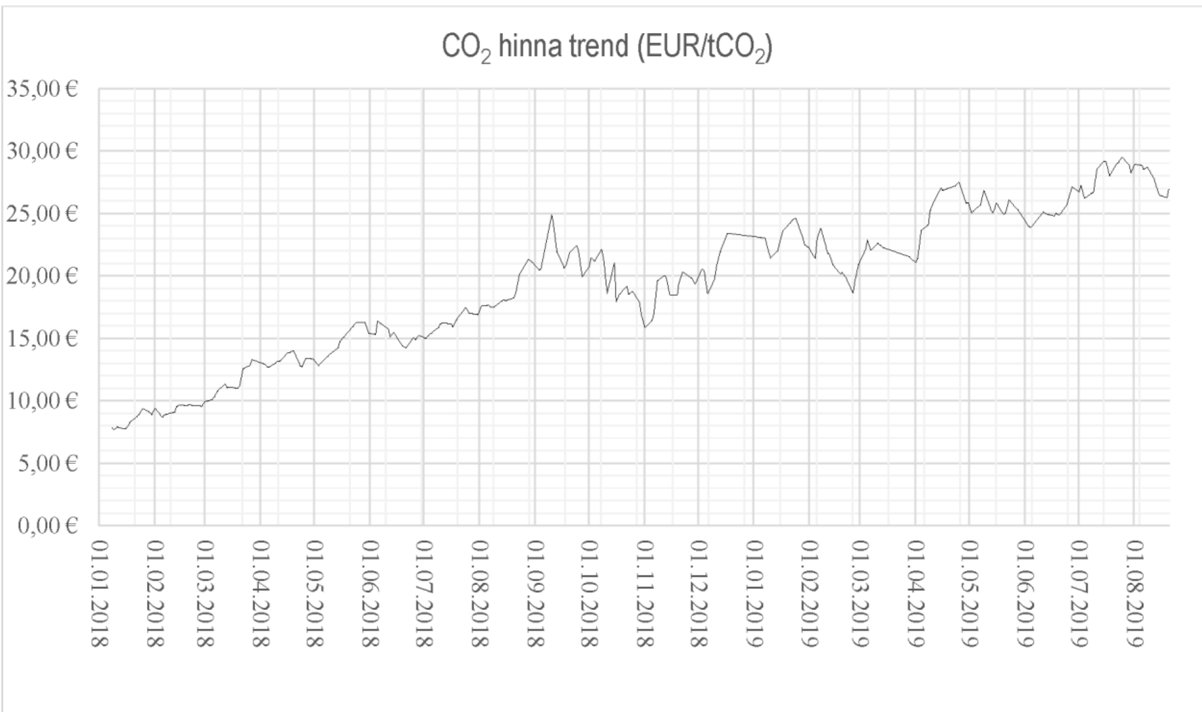
[170] World Energy Council (2019), Global Energy Scenarios Comparison Review https://www.worldenergy.org/assets/downloads/WEInsights-Brief-Global-Energy-Scenarios-_Comparison-Review-R02.pdf

[171] European Commission (2018), 'A Clean Planet for all European log-term strategic vision to reach the prosperous, modern, competitive and climate neutral economy', https://eur-lex.europa.eu/legal-content/ET/TXT/PDF/?uri=CELEX:52018DC0773&from=ET.

International fuel prices, EUR/GJ	2015	2020	2025	2030
Oil	**8.90**	**13.86**	**15.73**	**17.33**
Gas (NCV)	**7.17**	**8.91**	**9.64**	**10.49**
Coal	**2.12**	**2.64**	**3.16**	**3.79**

EU ETS carbon price

In the second half of 2018, the EU ETS CO_2 price rose to a record level, reaching over €20 per t/CO_2 at the end of the year. The price increase is projected to continue also in coming years. Figure 19 shows the EU ETS carbon price diagram for the period from January 2018 to August 2019.



	Carbon price trend (EUR/tCO_2)

Figure 19. EU ETS carbon price diagram, January 2018 to August 2019. (Source: EEX)

An increase in the share of production capacity based on renewable energy sources like wind and biomass can be projected as a general trend in electricity production, depending on the reduction in the price of the relevant technologies and the increase in the price of the carbon dioxide quota[172]. On the basis of different sources, the price of

[172] https://www.mkm.ee/sites/default/files/enmak_2030_koos_elamumajanduse_lisaga.pdf

carbon dioxide is projected to be €40 by 2030[173]

In the energy models used to make projections for the energy sector on the basis of the measures set out in this document and on planned measures, Estonia uses a combination of the EU ETS carbon price projections recommended by Thomson Reuters (2020 and 2025) and the European Commission (communicated to the Member States on 15 June 2018[174]) (see Table 25).

The expected market demand and possible amendments to legislation are taken as the basis for making a carbon price projection. According to the projection, the price will remain high until 2021 for three reasons: (1) the beginning of a new trading period concurrent with the amendments to legislation; (2) applications to allocate allowances for free will be made for the period of 2021 to 2025; and (3) a market stability reserve will be applied from 2019, which will take allowances off the market.

The projection assumes that, on the basis of current data on price movement, demand will drop, as the system has stabilised and free allowances have been calculated for the companies, so the companies will be able to plan their future activities. The model also takes into account the changes made to achieve renewable energy targets and energy efficiency targets and, for example, also the 'coal phase-out' in Europe, which should also result in a drop in demand for allowances, because companies' total emissions will decline.

According to the model, the price will start increasing again from 2027. The grounds for this are expected legislative amendments – the EU ETS framework for the fifth period will have been established. Also, it is not known whether allocation of free allowances will be continued and how many sectors will be concerned after 2030.

Table 25 EU ETS carbon price projection for the period 2020-2040, (€/tCO_2)

Parameter	2020	2025	2030	2035	2040
EL HKS CO_2 price	26	23	34.7	43.5	51.7

4.2. Dimension Decarbonisation

4.2.1. GHG emissions and removals

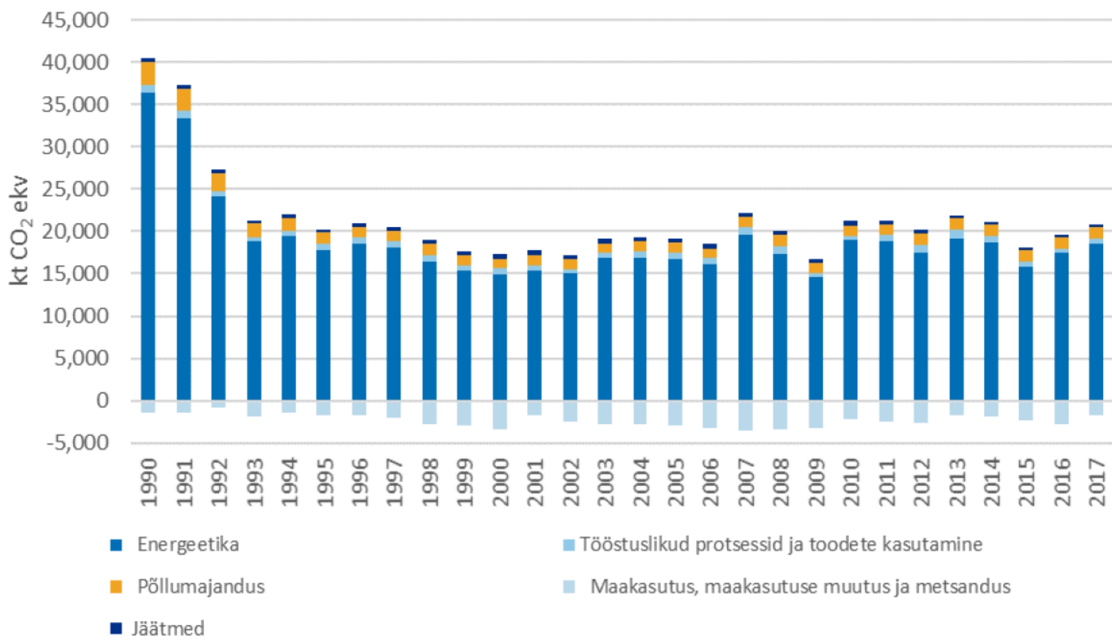
i. Trends in current GHG emissions and removals in the EU ETS, effort sharing and LULUCF sectors and different energy sectors

In 2017, Estonia's total GHG emissions were 20.9 Mt CO_2 eq, excluding net emissions from land use, land use change and forestry (LULUCF). Between 1990 and 2017, GHG emissions decreased by 48.4% (see Figure 20). The main reasons for the decline were the transition from a centrally planned economy to a market economy and successful

[173] https://www.redshawadvisors.com/european-commission-sees-e40-eu-ets-price-by-2030/

[174] EC_recommendations parameters projections 2019 (15.06.2018)

implementation of the associated reforms.

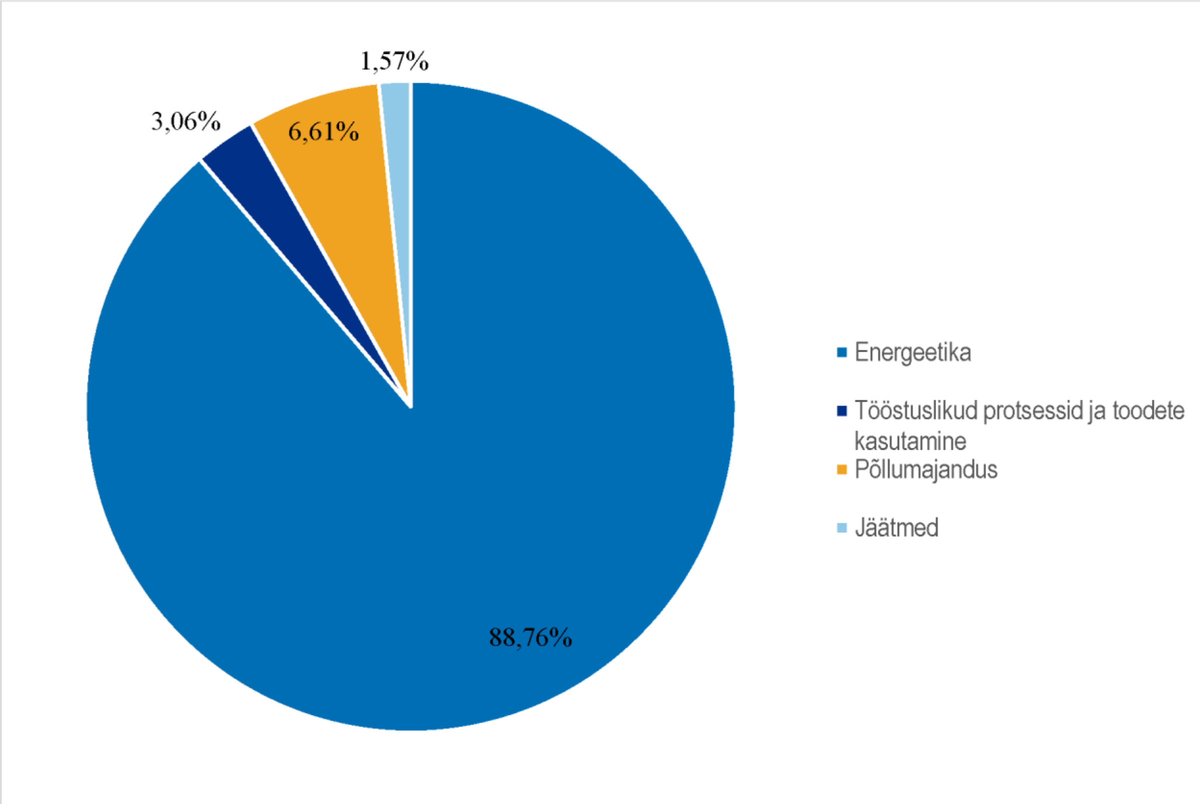


	kt CO_2 eq
	Energy
	Industrial processes and product use
	Agriculture
	Land use, land use change and forestry
	Waste

Figure 20. Estonia's GHG emissions and their removal by sector between 1990 and 2017, in kt CO_2 eq (Source: GHG emissions inventory 1990-2017, 2019[175])

The energy sector is indisputably the largest source of GHG emissions in Estonia. It accounted for 88.76% of Estonia's total GHG emissions in 2017 (see Figure 21). The second biggest source of emissions is the agricultural sector, which accounted for 6.61% of total emissions in 2017. Emissions from industrial processes and product use and waste accounted for 3.06% and 1.57% of total emissions respectively.

[175] Estonia's GHG emissions inventory 1990-2017: https://www.envir.ee/sites/default/files/content-editors/Kliima/Inventuur/nir_est_1990-2017_150319.pdf



	Energy
	Industrial processes and product use
	Agriculture
	Waste

Figure 21. GHG emissions by sector in 2017, % (Source: GHG emissions inventory 1990-2017, 2019[176])

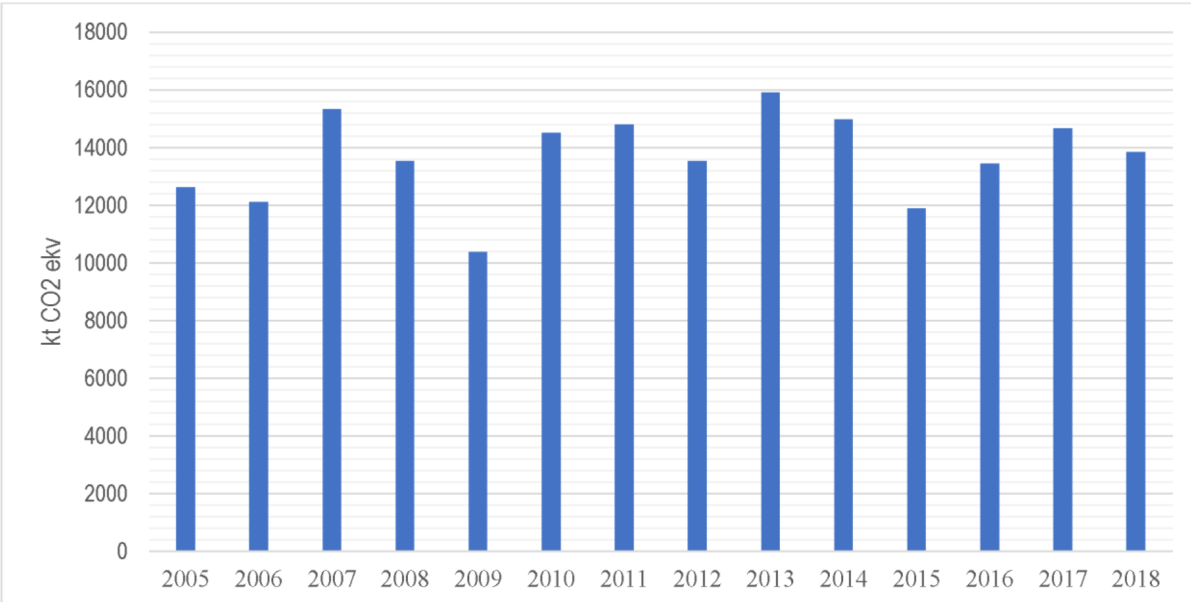
Greenhouse gas trends in the EU ETS

The share of emissions of total emissions from the energy sector accounted for by emissions from heat and electricity production covered by the EU ETS was 70.26% in 2017 (see Figure 22).

Carbon dioxide emissions from the energy sector have varied over time mainly due to economic trends, the structure of energy supply, and climatic conditions. GHG emissions declined from 1990 to 1993 owing to big changes in the structure of the economy which took place after the fall of the Soviet Union and the restoration of Estonia's independence. Energy sector emissions have subsequently remained quite stable. In 2003, emissions increased mainly due to the export of electricity produced from oil shale. The significant growth in emissions from 2006 to 2007 is associated with generalised economic growth and the reduction in emissions from 2007 to 2009 is associated with a generalised economic recession. Since 2009, GHG emissions have been closely linked to the volume of exported electricity, which is mainly produced from

[176] Estonia's GHG emissions inventory 1990-2017: https://www.envir.ee/sites/default/files/content-editors/Kliima/Inventuur/nir_est_1990-2017_150319.pdf

oil shale.



	kt CO_2 eq

Figure 22. Estonia's EU ETS emissions from 2005 to 2018, tCO_2 eq. (Source: Ministry of the Environment, 2019)

<u>Trends in greenhouse gases in sectors covered by the Shared Effort Regulation</u>

The sector with the biggest greenhouse gas emissions outside the EU ETS in 2017 was the transport sector. In 2017, the transport sector accounted for 13.2% of the energy sector and 11.7% of total greenhouse gas emissions. Compared to 1990, emissions from the transport sector have decreased by 1.4%.

In comparison to 1990, emissions from the manufacturing and building sector falling within the energy sector have decreased by 74.8%.

In 2017, the agricultural sector's total GHG emissions were 1379.30 kt CO_2 eq, 48.93% lower than in 1990.

Total emissions from the waste sector have been declining in recent years. In comparison to the reference year (1990), GHG emissions were 11.15% lower in 2017.

<u>Trends in GHG in the LULUCF sector</u>

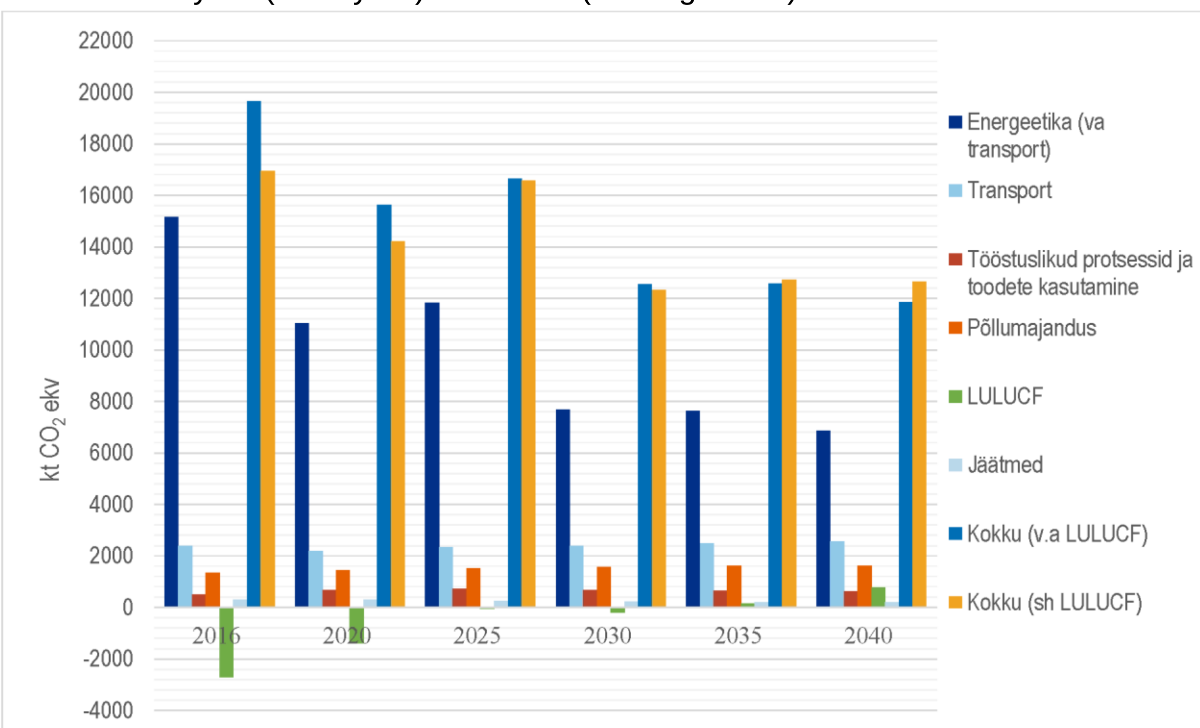
Being the only potential GHG emissions sink in Estonia, the LULUCF sector plays an important role in the national carbon cycle. In 2017, the LULUCF sector removed a total of 1792.74 kt CO_2 eq. Carbon removal in 2017 was 20.36% greater than in the reference year (1990). The main factors influencing removal in the LULUCF sector were primarily logging volumes, the expansion of populated areas, timber products and emissions from peat soils. Over the last decade, LULUCF sector emissions have varied considerably due to fluctuating logging intensity and deforestation caused by changes in the socio-economic situation in Estonia. The LULUCF sector's main carbon sink is woodland, with a total surface area of 2.44 million ha. In 2017, the carbon stock of

Estonian forests increased by 1,934.3 kt CO_2 eq. or the increase in wooden biomass exceeded GHG emissions from logging, the decay of dead wood, soil respiration, drainage of peatland soils, and fires.

ii. Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

Projections for GHG emissions under a scenario with existing measures (i.e. projections take account, directly or indirectly, of the impact of applied and/or accepted measures) are given below. The projections for industrial processes and use of products, for agriculture, for waste and for the LULUCF sector are the same as submitted to the European Commission in March 2019. By virtue of the changes in the energy sector, projections for the energy sector were updated in the middle of 2019, resulting in changes to all GHG emissions.

Projections for GHG emissions have been calculated for the period from 2016 to 2040; the reference year (base year) was 2016 (see Figure 23).



	Energy (except transport)
	Transport
	Industrial processes and product use
	Agriculture
	kt CO_2 eq
	LULUCF
	Waste
	Total (excl. LULUCF)
	Total (incl. LULUCF)

Figure 23 Projected GHG emissions and their removal by sector under a scenario with existing measures, in kt CO_2-eq

More detailed projections are given below, broken down by sector.

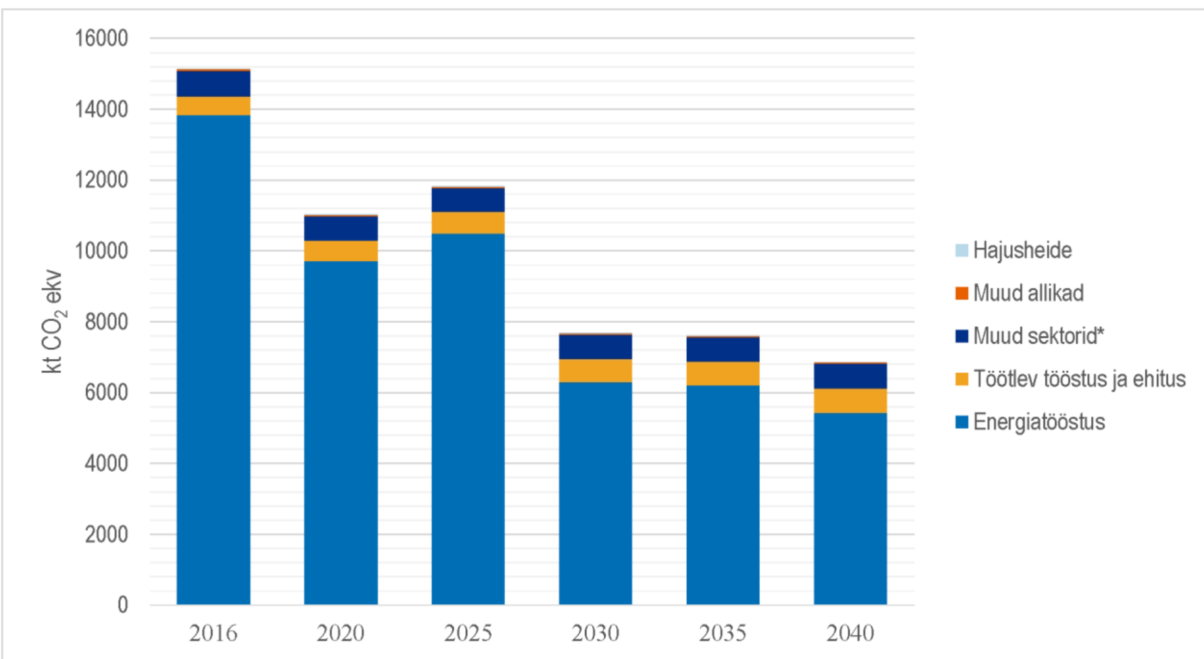
Projections for GHGs in the energy sector

The energy sector covers GHG emissions from the consumption and production of fuels and energy (electricity and heat). The main components of this sector are the energy industry, manufacturing and construction, transport, other sectors (incl. the commercial and public, housing, agricultural, forestry, fishery and fish farming sub-sectors) and diffuse emissions from the natural gas distribution system.

Figure 24 shows projected GHG emissions from the energy sector in the case of a scenario with existing measures, broken down by sub-sector. According to the projections, by 2040, emissions will be 54.7% less than in 2016. The biggest reduction will take place in the energy industry.

According to the projections, by 2040, GHG emissions from the energy industry will be 60.7% less than in 2016 after gradual cessation of the direct combustion of oil shale, construction of the more efficient Auvere power plant and the commissioning of new oil shale production plants.

It is projected that by 2040, GHG emissions from manufacturing and construction will be 30.3% greater than in 2016.



	kt CO_2 eq
	Diffuse emissions
	Other sources
	Other sectors*
	Manufacturing industries and construction
	Energy industries

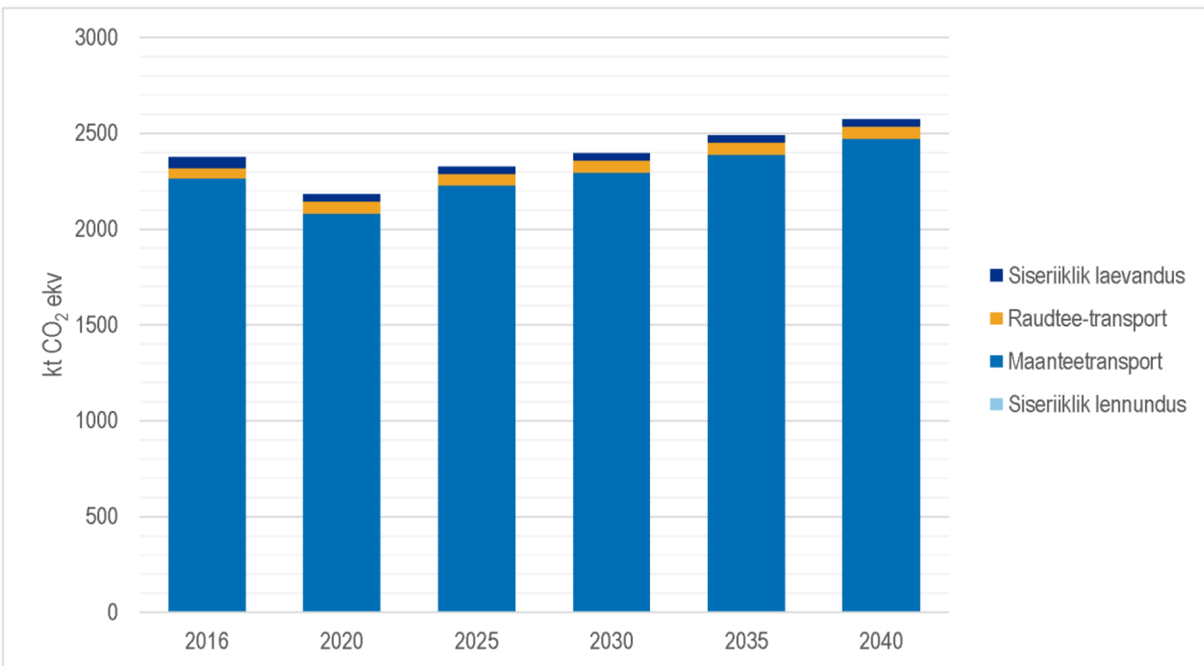
Figure 24 Projected GHG emissions from the energy sector, broken down by sub-sector (excluding transport), in kt CO_2 eq

** Other sectors – fuels consumed in the commercial/public sector, households and agriculture/forestry/fisheries*

Projections for GHGs in the transport sector

The majority of GHG emissions from the transport sector come from road transport. Historically, the share of GHG emissions represented by road transport has been over 95% of total GHG emissions from transport.

By 2040, it is assumed that total GHG emissions from the transport sector will have increased under a scenario with existing measures by approximately 8.2% in comparison to 2016. An increase in road transport is projected. According to estimates, emissions from domestic aviation and railway transport will remain stable from 2016 to 2040. Emissions from domestic shipping are projected to decline because of lower fuel consumption. Figure 25 shows projected GHG emissions from the transport sector under a scenario with existing measures, broken down by sub-sector.



	kt CO_2 eq
	Domestic shipping
	Railway transport
	Road transport
	Domestic aviation

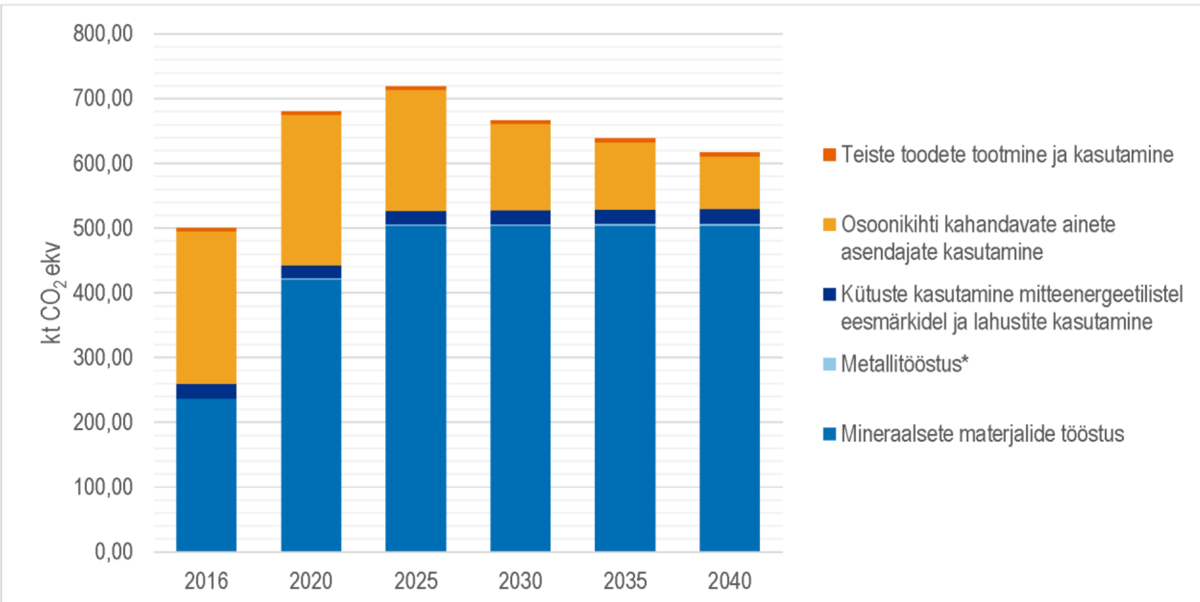
Figure 25 Projected GHG emissions from the transport sector, broken down by sub-sector, in kt CO_2 eq

Projections for GHGs from the industrial processes and product use sector

According to projections, emissions of fluorinated greenhouse gases (substitutes for ODS) will decrease significantly after 2025, leading to a decline of 43% by 2030 and of over 56% by 2035. The reason for this is Regulation (EU) No 517/2014 and Directive No 2006/40/EC. Figure 26 shows projected GHG emissions from industrial processes and product use, broken down by sub-category.

Some of the smaller producers in the mineral materials industry who sell their products to the European Union plan to increase their production capacity, but this will not significantly impact projections of total emissions from the industrial processes and product use sector. All plants already use the best available techniques (BAT) in accordance with BAT reference documents, hence reduction of GHG emissions owing to the deployment of newer technologies is not envisaged.

According to the projections, emissions from the use of fuels and solvents for non-energy purposes will increase by 17% from 2021 to 2040. Consumption of these products depends a lot on the economic situation of small manufacturers and the use of solvents depends considerably on the size of the population.



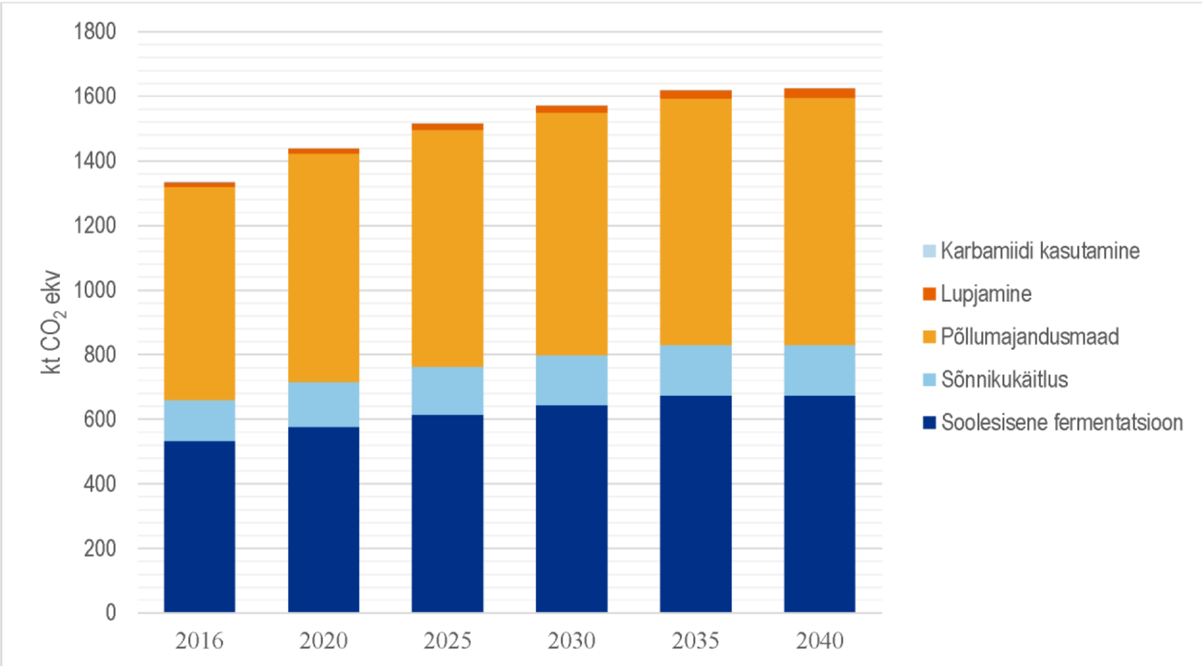
	Manufacture and use of other products
	kt CO_2 eq
	Use of substitutes for ozone-depleting substances
	Use of fuels for non-energy purposes and use of solvents
	Metalworking sector*
	Mineral materials industry

Figure 26 Projected GHG emissions from the industrial processes and product use sector, broken down by sub-sector, kt CO_2 eq

* As of 2019, the emissions referred to in the greenhouse gas inventory and in projections come under the metalworking sub-sector *Lead production (CRF 2.C.5)* of the sector *Other process uses of carbonates (CRF 2.A.4.b)*.

Projections for GHGs from the agricultural sector

According to projections, total GHG emissions from the agricultural sector will grow steadily and reach 1625 kt CO_2 eq by 2040, an increase of 22% above the 2016 level (see Figure 27). The trend of growth in GHG emissions from the agricultural sector stems from an increase in the number of animals and increasing dairy production from dairy cattle in the enteric fermentation, manure management and arable land sub-sectors. The reason for an increase in emissions from agricultural land is a projected increase in use of the synthetic and lime fertilisers.

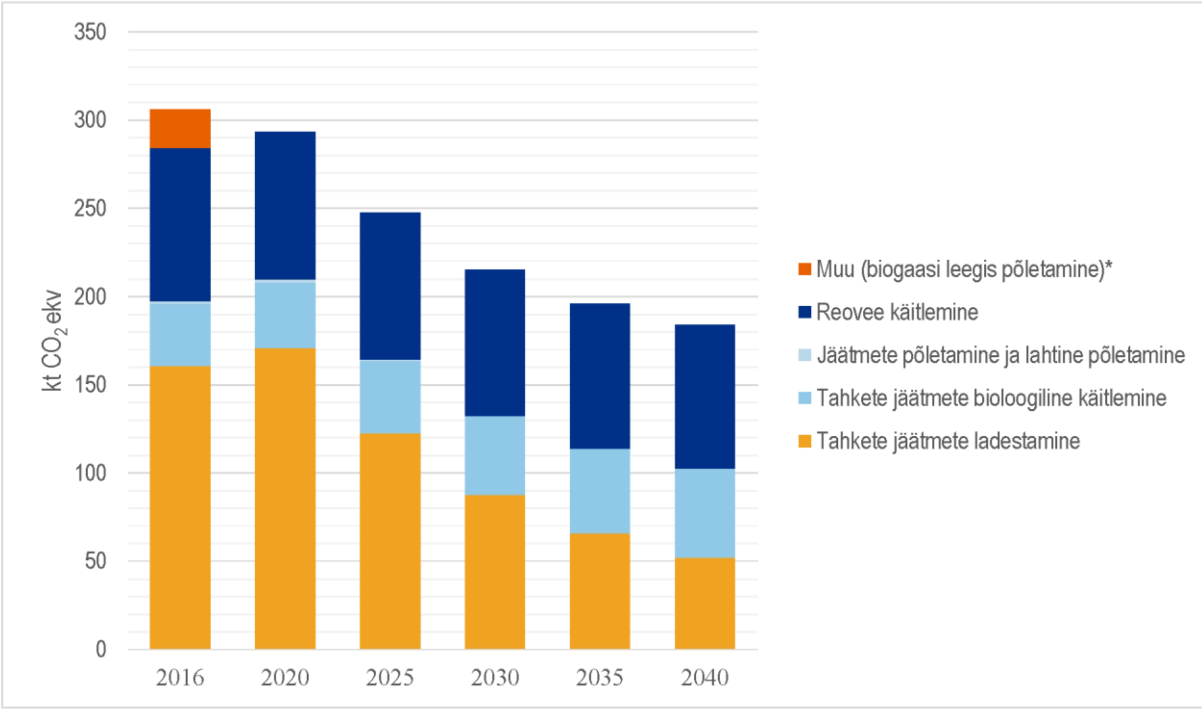


	kt CO_2 eq
	Application of urea
	Liming
	Agricultural areas
	Manure management
	Enteric fermentation

Figure 27. Projected GHG emissions from the agricultural sector, broken down by sub-sector, kt CO_2 eq

GHG projections in the waste sector

According to projections, by 2040, emissions in CO_2 equivalents will be 40% lower than in 2016 (see Figure 28). The reduction in emissions is mainly related to an increase in the reuse and recycling of waste, a decrease in the volume of landfilled biodegradable waste and waste incineration at the Iru cogeneration station, as emissions mainly stem from landfilling solid waste. The increase in GHG emissions from the biological treatment of solid waste is related to a decrease in the total volume of landfilled biodegradable waste. The reduction of emissions from wastewater treatment is linked to expansion of the sewerage network.



	kt CO_2 eq
	Other (incineration of biogas in flame)*
	Waste water treatment
	Incineration and open burning of waste*
	Biological treatment of solid waste
	Solid waste disposal

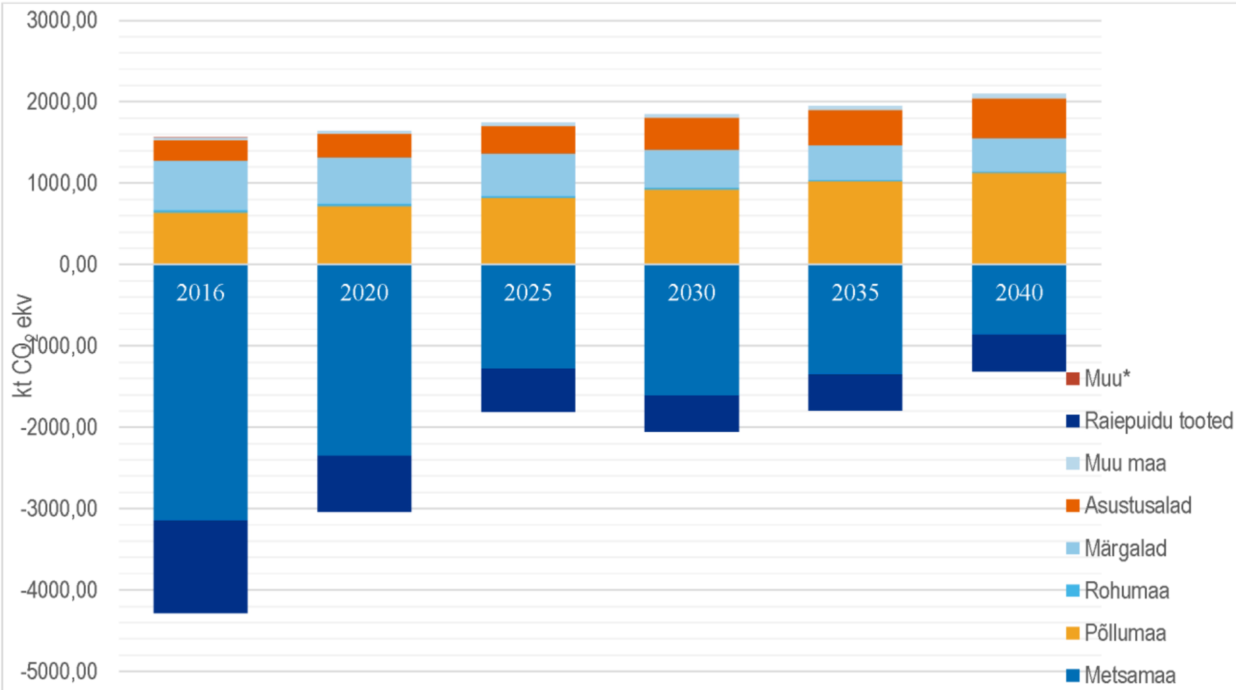
Figure 28 Projected GHG emissions from the waste sector, broken down by sub-sector, in kt CO_2 eq.

** Amounts of burnt biogas have not been added either to the 2019 greenhouse gas inventory or to greenhouse gas projections stemming from the comments made during the 2018 shared effort obligation decision audit (so-called ESD audit) as regards this sector*

Projections of GHGs in the LULUCF sector

The forested surface area is currently expanding, but for these greenhouse gas projections the Forest Reference Level (FRL) is derived from calculation rules, according to which the forested surface area remains constant. The area of arable land decreased from 1990 until 2004, the year Estonia joined the EU and agricultural support began to be provided. No further growth in the area of arable land area is forecast. Grassland area should still decrease in the near future, mainly due to natural afforestation. The surface area covered by infrastructure and buildings is constantly expanding to the detriment of other land use classes. The National Forestry Development Plan forecasts further growth of regeneration felling, cleaning and thinning. The management method described will bring about a temporary decline in carbon removal. According to projections, the LULUCF sector will remain a carbon sink until 2030, after which the sector is expected to produce emissions. The main reason for this is emissions from arable land and a reduction in the amount of carbon stored in forests, as replacement of older forests with newer ones will lead to a reduction in forest stock.

In the near future, the forest stock will reach its peak and then start to decline, hence a reduction in carbon removal is expected.



	kt CO_2 eq
	Other*
	Harvested wood products
	Other land
	Built-up areas
	Wetlands
	Grassland
	Arable land
	Wooded area

Figure 29. Projected GHG emissions from the LULUCF sector, broken down by sub-sector, kt CO_2 eq

**Indirect N_2O emissions from areas under cultivation (leaching) has been reported in the GHG inventory as indirect emissions and therefore these emissions are not forecast.*

4.2.2. Renewables

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.

State of play

According to the Eurostat SHARES model, the share of gross energy consumption accounted for by renewables was 29.29% in 2017, including 17.33% of gross electricity consumption, 51.64% of gross heat consumption and 0.40% of gross consumption by the transport sector.

According to current projections, the estimated share of renewable energy in gross final consumption will total 32.3% by the end of 2019, including 17.76% of gross final consumption of electricity, 53.92% of gross final consumption of heat and 8.2% of gross final consumption by the transport sector.

Overview of the transport sector by technology:

The biggest hike in the share of renewable energy can be seen in the transport sector. First generation biofuels account for the largest share – a total of 6.4%, which results from the obligation, imposed on suppliers of liquid fuels, to add a biocomponent. The share accounted for by second generation fuels or domestic biomethane is 1.4% (including multipliers) and electromobility accounts for 0.4% (including multipliers).

Overview of renewable electrical energy by technology:

According to current (unofficial) projections, the share represented by renewable electrical energy will be around 18% by the end of 2019; hydraulic power will contribute around 30 GWh, wind energy 670 GWh, solar energy 100 MWh, biomass 1,150 GWh and other renewables 47 GWh.

Heating and cooling energy from renewable energy sources:

According to current projections, the share of renewables in heating will account for around 53.9% of final energy consumption by the end of 2019, to which wood as local heating will contribute 5,000 GWh, consumption of transformed heat 3,800 GWh and heat pumps 905 GWh.

Projections for the future

Estonia has made a detailed assessment of whether the overall target can be achieved by 2020. According to this, the share of renewables in gross energy consumption will be at least 30% in 2020[177]. According to current unofficial projections, renewables are projected to account for the following sectoral shares by 2020:

- 18.95% of electricity consumption;
- 55.28% of heat and cooling energy consumption;
- 10% of energy used in transport.

By 2030, Estonia’s gross energy consumption will increase by 10 to 16%, i.e. by 0.85 to 0.88% a year. Hence gross final energy consumption will increase to between 41 and 43 TWh by 2030.

Taking into consideration the NDPES 2030 renewable energy targets (achieve a share of 80% of gross heat consumption and 50% of gross electricity consumption accounted for by renewables, on condition that the statistical transfers of renewable energy are used), the new Renewable Energy Directive, which determines the share of renewables in transport fuels, and also potential interest in statistical transfers of renewable energy, the share of renewable energy may account for over 50% of final gross energy consumption. The domestic renewable energy target reflects the ambitions of the NDPES 2030, but also takes into account a reasonable contribution by Estonia towards meeting the EU’s overall renewable energy target.

[177] Calculations of this share consider take into account agreed statistical transfers of renewable energy.

ii. Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

Chapter 2.1.2. describes the development of the renewable energy sector to 2030 and trajectories, taking into account current trends in renewable energy generation and consumption. The formulation of trajectories for renewable energy in 2040 takes into account general climate policy targets established both by the European Union and domestically. On the basis of the general principles of climate policy with a view to 2050, Estonia is aiming to reduce GHG emissions by approximately 72% of 1990 levels by 2040.

In future we will be able to see more and more cooperation and synergies between sectors, which will bring about the more widespread introduction of renewable energy and energy savings in both primary electricity generation and in the use of secondary energy in all sectors, as we move towards a carbon neutral economy.

The trends which the renewable energy sector will follow in the lead-up to 2040 will depend substantially on the megatrends we can perceive in Europe and globally, where the main keywords are carbon neutral energy generation, energy saving and storage, and smart consumption.

It is clear that fossil fuels are being replaced more and more by renewable energy. Renewable energy is produced in locations with the best geographical and climatic conditions for doing so at both the micro- (production of renewable energy for own consumption) and the macro level. As a result, we can see big wind and solar farms on-shore, offshore and in water bodies, because as the technology develops and prices drop, factors such as the depth of the sea, for instance, are no longer significant (anchored floating foundations will be used). To maximise benefits and meet national targets, countries will cooperate actively in the area of renewable energy in joint projects, support schemes and by engaging in statistical transfers. Thanks to technology leapfrogging, pumped-storage hydroelectric power stations, hydrogen being used as an energy carrier and batteries, it will be possible to harmonise consumption in the network in view of 2040 because peak hours will be covered using stored energy.

To ensure the security of supply of electricity in Estonia, it will be possible in future to use a combination of renewable energy generation equipment and storage solutions (including seasonal storage), capture, storage and sequestration and new generation modular nuclear reactors. Use of new technologies and combinations thereof requires extensive preliminary work to be carried out in the form of research, preparatory work and construction.

For nuclear energy to be one potential option for meeting Estonia’s electricity demand after 2030 presupposes the making of thorough political preparations at the State level, the recruitment of people with relevant training and the creation of a legal basis. The commissioning of nuclear energy requires legislation to be drawn up which would establish the terms, conditions and process of building a nuclear power plant in Estonia and, if necessary, the creation of the necessary structures. Currently Estonia does not have the necessary legal framework, competent authorities or thematic experts to build nuclear stations. According to the Radiation Act, permission for such an activity can be applied for only after the Riigikogu has adopted a decision on commissioning of a nuclear facility. It is also worth mentioning that smaller modular reactors that are not yet operating anywhere in the world could be suitable for Estonian conditions.

To find the best solution for ensuring security of Estonia's electricity supply, an analysis is to be carried out in 2020-2021 to identify roadmaps towards climate neutral electricity generation in Estonia and the socio-economic impacts of different roadmaps.

There is increasing movement towards more energy-efficient and environmentally sustainable solutions also in terms of consumption. We see that the building stock is becoming more and more energy efficient and 'smarter' over time. The housing sector is applying effective solutions for generating, consuming and monitoring automated household energy (as well as for selling surplus energy). Households use means to generate heat which leave a low carbon footprint (biomethane, heat pumps, hybrid solar panels). Unfortunately the automated systems and, for instance, the charging of so-called light duty vehicles at home result in an increase in electricity consumption in buildings.

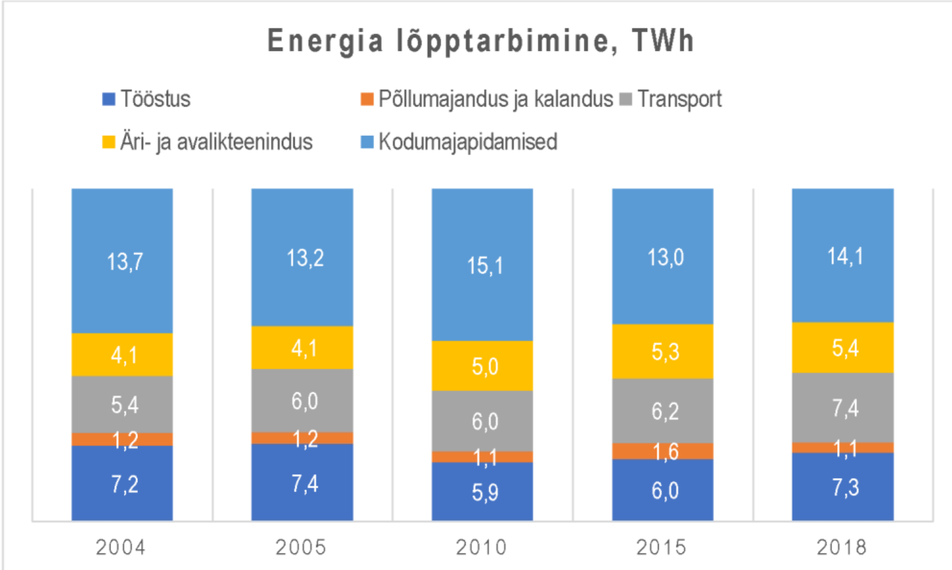
Rapid electrification can also be seen in the transport sector, both in road and rail transport. Alternative fuels are replacing fossil fuels. Thanks to convenient public transport and light traffic roads, cities are becoming practically car-free, giving rise to a pleasant urban environment with clean air.

4.3. **Dimension Energy efficiency**

i. Current primary and final energy consumption in the economy and per sector (including industry, residential, service and transport)

According to Eurostat data, 257 PJ (71.3 TWh) of primary energy and 118 PJ (32.8 TWh) of final energy were consumed in Estonia in 2016. The figure below describes the structure of final consumption (see Figure 30). In comparison to 2004, when Estonia joined the European Union, energy consumption in the services and transport sectors and transport has grown by a quarter. Household energy consumption has not significantly changed in comparison to 2004, whereas industrial energy consumption has reached the same level. At the same time, the added value of the manufacturing industry has increased more than twofold but its share of total added value has declined by 1.6%[178]. To create added value (in current prices), manufacturing used less than half the energy in 2018 than it did in 2004.

[178] Data sheet RAA0042 of Statistics Estonia



	Industry
	Final energy consumption, TWh/a
	Agriculture and fisheries
	Transport
	Commercial and public services
	Households

Figure 30. Structure of final energy consumption in Estonia in 2004-2018 (Data sheet KE024 of Statistics Estonia)

ii. Current potential[179] for the application of high-efficiency cogeneration and efficient district heating and cooling.

According to sub-measure 4 of NDPES 2030 measure 1.1, Estonia's target is to supply 75 MW more heat to the district heating network through high-efficiency cogeneration than in 2014. Tallinn Power Plant's second production facility commenced operation in 2017 with a thermal output of 76 MW. A cogeneration plant in Mustamäe in Tallinn with a thermal output of up to 47 MW will be added in 2019.

A district cooling sector has not yet been established in Estonia. A district cooling pilot project has been launched in Tartu.

iii. Projections considering existing energy efficiency policies, measures and programmes as described in point 1.2.(ii)[180] for primary and final energy consumption for each sector at least until 2040 (including for the year 2030)

Domestic consumption of primary energy (fuels used in Estonia + import - export) will fall markedly by 2030 (to around 60–61 TWh/a, or -11% of 2016 levels). However, according to projections, final energy consumption will remain stable at the same level as in previous years (32–33 TW/h). No significant changes in cross-sectoral distribution are forecast in respect of final energy consumption (see Figure 30).

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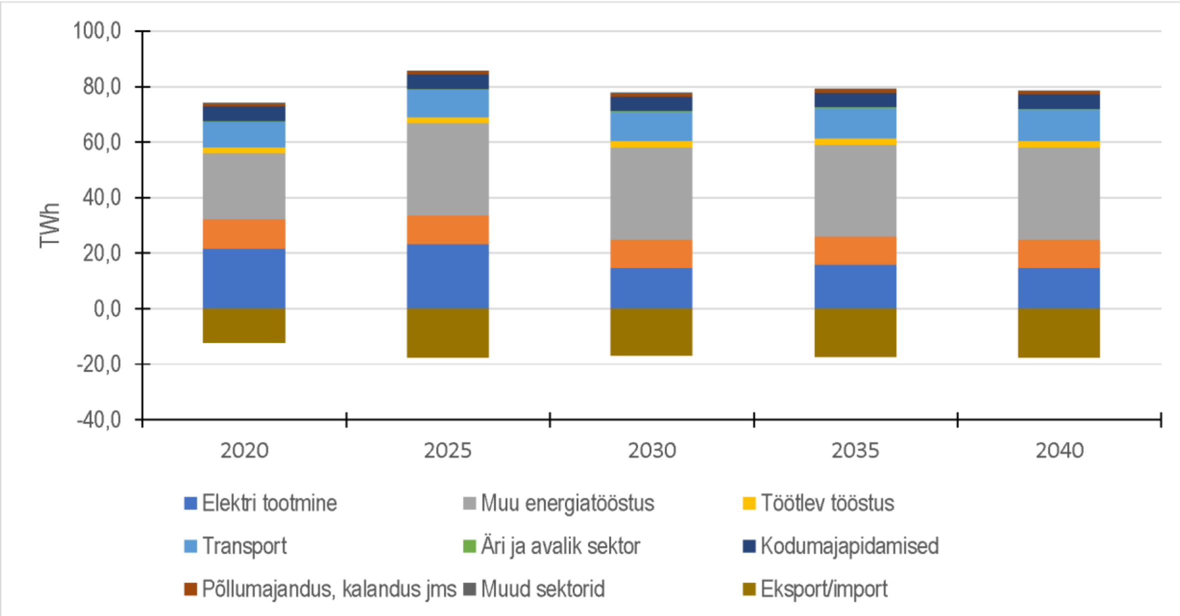
[179] In accordance with Article 14(1) of Directive 2012/27/EU.

[180] This reference 'business as usual' projection is the basis for the 2030 final and primary energy consumption target described under point 2.3, and for the conversion factors.



	TWh
	Electricity production
	Other energy industry
	Manufacturing industries
	Transport
	Commercial and public sector
	Households
	Agriculture, fisheries and others
	Other sectors
	Export/import

Figure 31. Domestic primary energy consumption until 2040[181]

iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, according to Article 5 of Directive 2010/31/EU.

Cost-optimal levels of minimum energy performance requirements were ascertained in the study 'Analysis of the cost-optimal energy efficiency minimum requirements for buildings' commissioned by the Ministry of Economic Affairs and Communications and completed in 2017[182]. The results are summarised in the following table (see Table 26). When analysing the table, consideration should also be given to the weighing factors of the energy carriers, the most important of which are the weighing factor 0.75 for fuels obtained from renewable raw materials; 0.9 for district heating, 1.0 for natural gas and 2.0 for electricity.

Table 26. Energy use requirements for new and existing buildings, weighted for cost-optimal and actual energy efficiency; unit: kWh/(m^2·year)

[181] Projection of the Estonian Environmental Research Centre; author's calculations

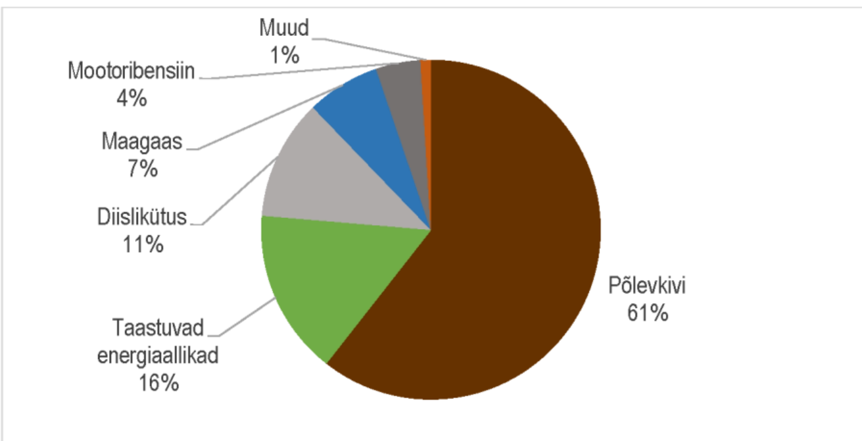
[182] https://www.mkm.ee/sites/default/files/kuluoptimaalsuse_aruanne_20171128_uus.pdf

Building type	New building		Existing building	
	Cost-optimal level	Requirement, 2017	Cost-optimal level	Requirement, 2017
Small residential buildings	87	160	250	210
Apartment blocks	103	150	130	180
Office buildings	93	160	160	210

4.4. Dimension energy security

i. Current energy mix, domestic energy resources, import dependency, including relevant risks

The structure of Estonian primary energy consumption in 2016 by fuel is characterised by the following figure (see Figure 32).



	Motor gasoline %
	Other 1%
	Natural gas 7%
	Diesel fuel 11%
	Renewable energy sources 16%
	Oil shale 61%

Figure 32. Primary energy sources used in Estonia in 2016 [Eurostat nrg_110a]

The vast majority of Estonia's primary energy needs are satisfied by domestic sources of energy. Thanks to oil shale, renewable energy sources and peat, Estonia is the least dependent country in the EU on imports via energy carriers; these accounted for 6.8% in 2016[183]. This share will probably decrease in the coming years as generating

[183] Eurostat t2020_rd320,

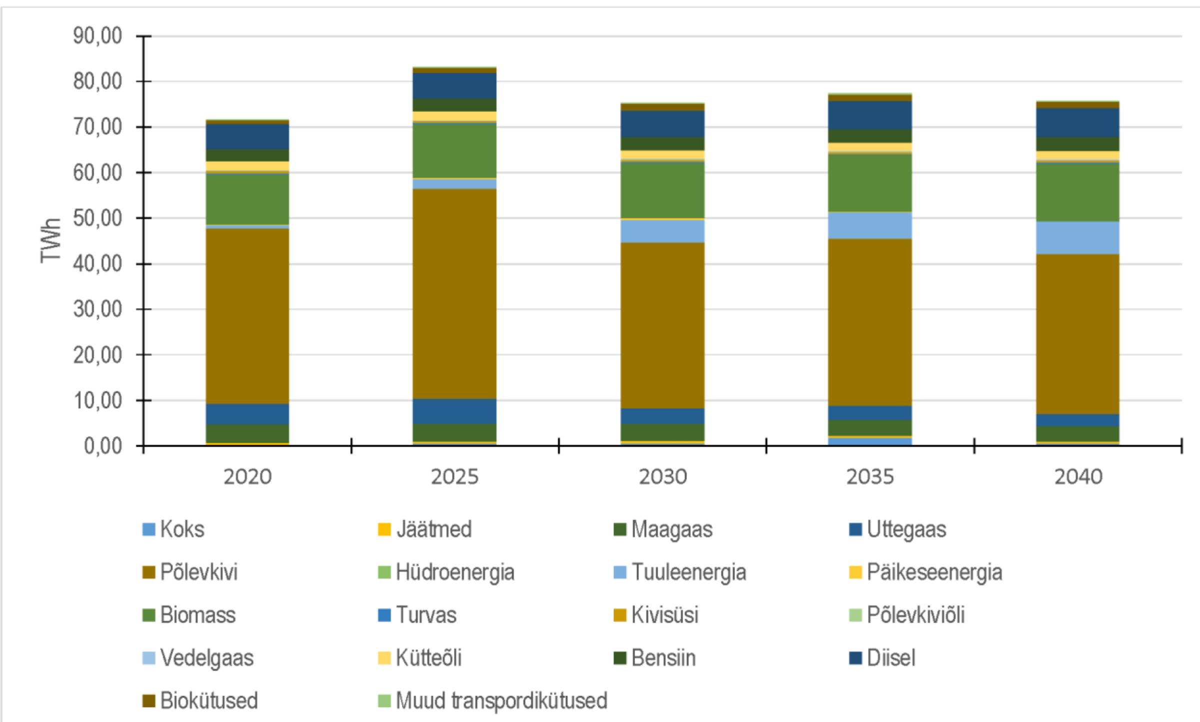
electricity from oil shale becomes less competitive.

Despite the good overall picture, all liquid motor fuels and natural gas consumed in Estonia is imported. For fuel deliveries, natural gas represents a higher risk, as most of the gas consumed in the entire region is imported from Russia.

However, the situation will improve in the near future owing to the completion of the GIPL gas pipeline connecting Poland and the Baltic States in 2023. Options for liquid fuel imports are more diverse.

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 generation (fuels consumed in Estonia + imports) will change significantly over the next decade – the importance of domestic renewable fuels will increase.



	TWh
	Coke
	Waste
	Natural gas
	Retort gas
	Oil shale
	Hydropower
	Wind energy

---

https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_rd320

	Solar energy
	Biomass
	Peat
	Coal
	Shale oil
	Liquefied gas
	Fuel oil
	Petrol
	Diesel
	Biofuels
	Other transport fuels

Figure 33. Projections for primary energy generation to 2040[184]

4.5. Dimension Internal Energy Market

4.5.1. Electricity interconnectivity

i. Current interconnection level and main interconnectors[185].

In 2017, the level of interconnection of Estonia's electricity grids with neighbouring countries (Latvia, Finland) was **63%**[56]. The interconnection capacity between EE and LV was 900-1,000 MW, and 1016 MW from EE to FI. Two 330 kV lines connect Estonia with Latvia's electricity system (one connects Tartu to Valmiera, and the other between Tsirguliina and Valmiera). Two DC cable lines connect Finland and Estonia (EstLink 1 and EstLink 2). According to data from 2017, the peak capacity of the interconnection in the direction of Latvia was 816 MVA and 1048 MVA in the direction of Finland. The transmission capacity between Estonia and Latvia may vary depending on repair works taking place in the electricity network, and on the external air temperature.

The existing electricity transmission infrastructure is described in the following annual analyses:

1. Elering AS. Report on the security of supply of Estonia's electricity system. https://elering.ee/toimetised#tab0
2. Estonian Competition Authority. Report on the electricity and gas market in Estonia. https://www.konkurentsiamet.ee/sites/default/files/elektri-ja gaasituru aruanne 2018.pdf

ii. Projections of interconnector expansion requirements (including for the year 2030)[186]

It is estimated that capacity in the direction from EE to LV will increase to 1379 MW by 2030[187], as a result of the completion of the third Estonia-Latvia interconnection[188]. The

[184] Projection made by the Estonian Environmental Research Centre, author's calculations
[185] Cf. overviews of existing transmission infrastructure, broken down by TSO.
[186] Cf. the national network development plans and regional investment plans of TSOs.
[187] ENTSO-E. TYNDP 2018. Input data. https://tyndp.entsoe.eu/maps-data/
[188] Elering AS: The third Estonia-Latvia interconnection. https://elering.ee/eesti-lati-kolmas-uhendus

ENTSO-E long-term development plan (TYNDP 2018[189]) estimates that in 2030, Estonia will fulfil all three abovementioned criteria under all the scenarios analysed (see Figure 34).

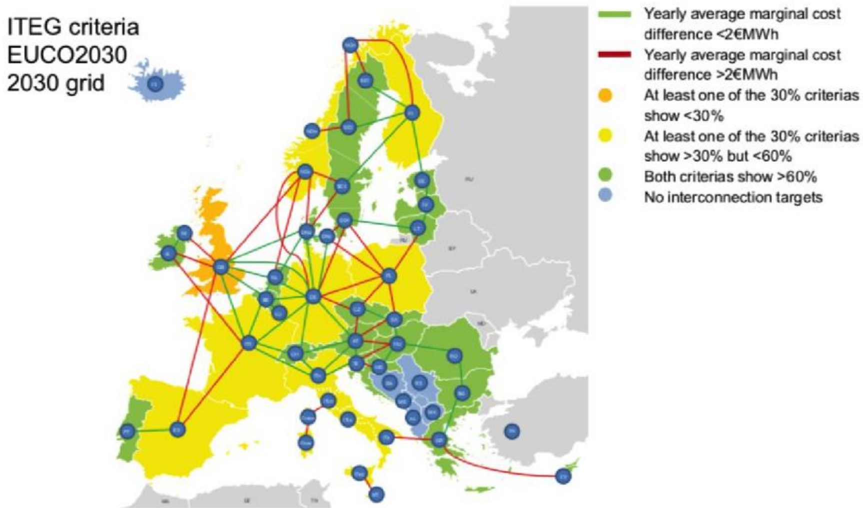


Figure 34. Fulfilment of electricity interconnection criteria in 2030 under the EUCO 2030 scenario[59, 190]

Although Estonia and other Baltic States fulfil three electricity interconnection criteria, the networks of the Baltic States have not yet been fully interconnected to the EU electricity grids. In other words, the Baltic States are not located in the synchronous area subject to EU law. Estonian, Latvian and Lithuanian electricity systems operate synchronously with the Russian Unified Energy System (IPS/UPS). Synchronisation of the electricity system of the Baltic States with the synchronous area subject to EU law around 2025 is one of the most important energy policy targets for Estonia and the other Baltic States and will significantly affect the long-term development of the electricity network.

The Prime Ministers of the Baltic States, the President of the European Commission and the Prime Minister of Poland affirmed in the roadmap[191] signed in the summer of 2018 the importance of the synchronisation project and recognised the wish of the Baltic States to synchronise with the mains frequency of continental Europe. The interconnections between the Baltic States will also be strengthened under the synchronisation project and the project will contribute towards the increased electricity interconnection of Poland[192].

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[189] ENTSO-E. TYNDP 2018. Europe's Network Development Plan to 2025, 2030 and 2040. https://tyndp.entsoe.eu/tyndp2018/

[190] The EUCO 2030 scenario is the scenario for meeting the EU-wide energy and climate objectives agreed in 2014.

[191] 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

[192] ENTSO-E. Project 170 - Baltics synchro with CE. Interconnection targets.

4.5.2. Energy transmission infrastructure

i. Key characteristics of the existing transmission infrastructure for electricity and gas[193]

In Estonia there is one company providing transmission system services (Elering AS); it is also the system operator. There are 5,202 km of transmission lines (110 kV–330 kV) belonging to the TSO.[194]

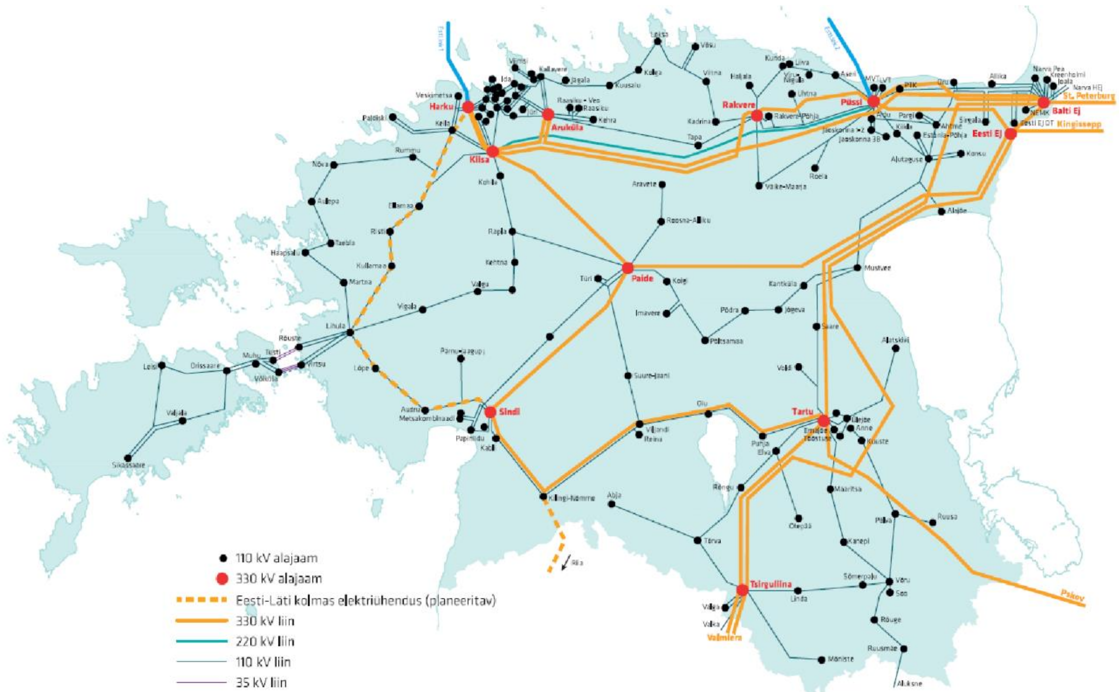
Estonia's electricity system belongs to the large synchronously operating BRELL Union for the Co-ordination of Transmission of Electricity (Figure 35) which comprises Estonia's neighbours, Latvia and Russia (which are interconnected to it by AC lines), and their neighbours – Lithuania and Belarus. Estonia is interconnected to Russia by three 330 kV lines (two lines from Narva to St. Petersburg and Kingisepp and one line from Tartu to Pskov), two 330 kV lines interconnect Estonia with the Latvian electricity system (one lies between Tartu and Valmiera, the other between Tsirguliina and Valmiera). Two DC cable lines interconnect Finland and Estonia (EstLink 1 and EstLink 2) (Figure 36).[194]

Figure 35. Map of the electricity system of the Baltic States and north-west Russia[194]

https://tyndp.entsoe.eu/tyndp2018/projects/projects/170

[193] Cf. overviews of existing transmission infrastructure, broken down by TSO.

[194] Estonian Competition Authority. Report on the electricity and gas market in Estonia, 2017. http://www.konkurentsiamet.ee/index.php?id=23346



	110 kV substation
	330 kV substation
	Third Estonia-Latvia electricity interconnection (planned)
	330 kV line

Figure 36. Estonian electricity system map[195]

According to data from 2017, the peak capacity of the interconnection in the direction from Narva to Russia was 613 MVA (subject to no electricity being traded between Estonia and Latvia), 391 MVA in the direction from southern Estonia to Russia, 816 MVA in the direction of Latvia and 1048 MVA in the direction of Finland.

The transmission capacity between Estonia and Latvia may vary depending on the repair works taking place in the electricity network, and on the external air temperature.

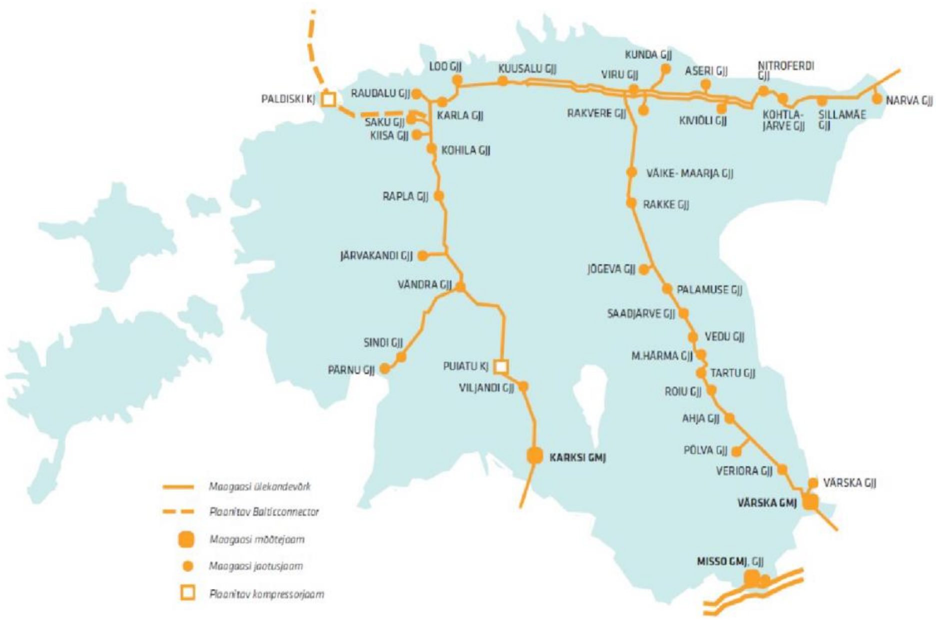
The existing electricity transmission infrastructure is described in the following annual analyses:

1. Elering AS. Report on the security of supply of Estonia's electricity system. https://elering.ee/toimetised#tab0
2. Estonian Competition Authority. Report on the electricity and gas market in Estonia. https://www.konkurentsiamet.ee/sites/default/files/elektri-_ja_gaasituru aruanne 2018.pdf

According to the Natural Gas Act, Estonia's gas transmission system has one transmission operator, which is also the system operator. The gas transmission system

[195] Elering AS. Estonian transmission system map https://elering.ee/elektri-pohivorgu-kaart

and the electricity system have the same system operator - Elering AS. Estonia's gas transmission system is a dead-end system – the gas enters the country via three inlets, but two-way gas flows cannot be enacted from Estonia.



	Natural gas transmission network
	Planned Balticconnector
	Natural gas metering station
	Natural gas distribution station
	Planned compressor station

Figure 37. Map of Estonia's gas transmission system[196]

Estonian gas transmission system is interconnected with Latvia and Russia. The interconnection with Latvia passes via Karksi (7 million m^3 a day) and with Russia via Narva (3 million m^3 a day) and Värska (4 million ^{3} a day). The aggregate interconnection capacity is hence 14 million m^3 a day. Estonia's gas transmission system does not have any gas storages, liquefied gas terminals or compressor stations. The largest amount of natural gas consumed within the last 20 years was 6.7 million m^3 (19 January 2006). Hence the gas transmission system's N-1 criterion is 104.5%, i.e. security of supply in the system is technically ensured. Estonia's gas transmission network comprises 885 km of gas pipeline, three gas metering stations and 36 gas distribution stations. A list of gas transmission system pipelines is provided in the table below (see Table 27).

The minimum transmission capacity of the gas transmission system at the indicated points is 7 million m^3 a day.

Table 27. Estonia's gas system pipeline network. The table shows the length of the pipelines. [197]

[196] Elering web - https://elering.ee/gaasisusteem
[197] Estonian gas transmission network development plan 2018-2027,

Pipelines	Length, km	Nominal-diameter (DN), mm	Maximum operating pressure (MOP), barg	Age, years
Vireši - Tallinn	202.4	700	49.6	26
Vändra - Pärnu	50.2	250	54	12
Tallinn - Kohtla-Järve I	97.5	200	≤ 30	65
Tallinn - Kohtla-Järve II	149.1	500	≤ 30	50
Kohtla-Järve - Narva	45.1	350 / 400	≤ 30	58
Izborsk - Värska GMS	10.1	500	53.7	43
Värska GMS - Tartu	75.6	500	45.9	43
Tartu - Rakvere	133.2	500	45.2	39
Izborsk - Inčukalns	21.3	700	49.2	34
Pskov - Riga	21.3	700	51.4	46
Branch lines	79.2	-	-	-
Total	**885.0**	-	-	--

Estonia's gas transmission system is also interconnected with Lithuania's gas transmission system via Latvia (see Figure 38).

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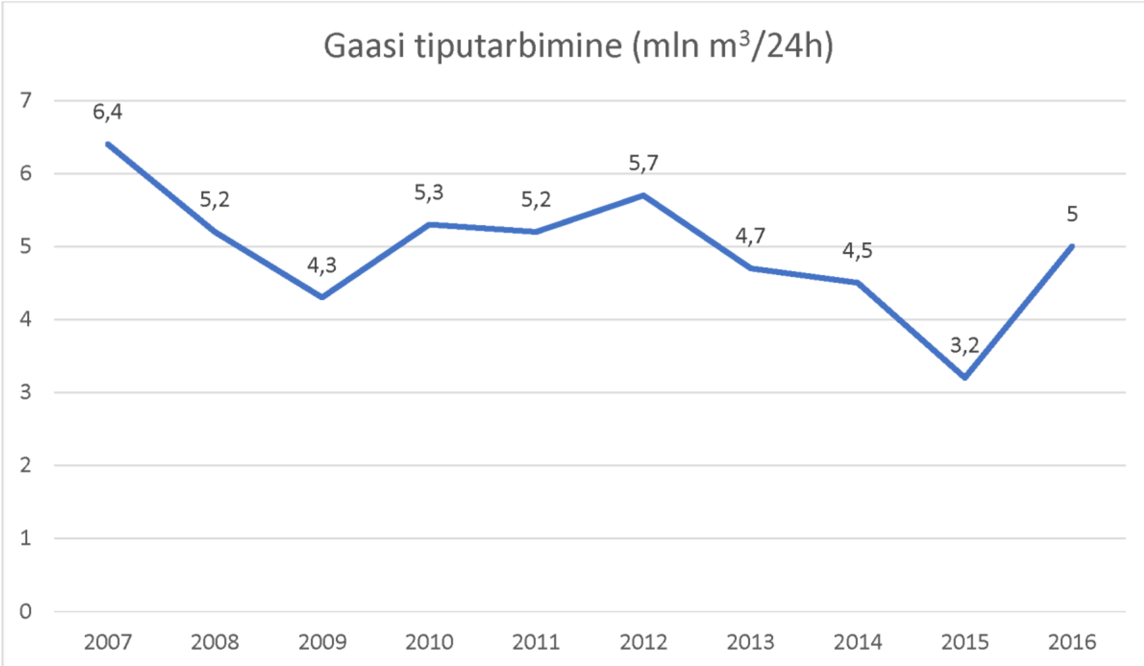
https://elering.ee/sites/default/files/attachments/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202018-2027_t%C3%A4iendatud_16_05_2018.pdf

	Gas transmission network
	Planned transmission network
	Connection point
	LNG terminal
	Natural gas storage

Figure 38. Estonian gas transmission system map[197]

The peak loads of the gas transmission system are indicated in the figure below (see Figure 39).



	Gas peak consumption (million m3/24h)

Figure 39. Peak consumption of the gas transmission system 2007-2016[198]

Estonia's gas transmission system development plan, prepared by the system operator, is available at

https://elering.ee/sites/default/files/attachments/Eesti%20gaasi%C3%BClekandev%C3%B5rgu%20arengukava%202018-2027_t%C3%A4iendatud_16_05_2018.pdf

The Estonian Competition Authority prepares an overview of the functioning of the gas market for the European Commission every year. The report can be found at http://www.konkurentsiamet.ee/file.php?29091.

ii. Projections of network expansion requirements at least until 2040 (including for the year 2030)[199].

Electrical system

The actions of Estonia's electricity TSO (Elering AS) to keep the Estonian electrical system operational and make the necessary investments to ensure security of supply derive directly from the Electricity Market Act, Network Code and the electricity and energy sector development plans.

Elering's investments are targeted at the following:

1) supporting the security of supply;

[198] Source - Elering AS
[199] Cf. the national network development plans and regional investment plans of TSOs.

2) supporting electricity market development (external interconnections);
3) supporting transmission capacities to enable new interconnections and the growth of loads;
4) stopping the deterioration of the network;
5) improving reliability (voltage quality and preventing interruptions);
6) enhancing the operator’s efficiency, reducing losses;
7) connecting new customers (consumers, producers).

Investments are generally approved up to five years in advance (except for the projects of common interest). 33% of the volume of investment for 2018-2022 is going towards renovation of the amortised network and 67% towards development of the domestic network. Around 22% of investments are being made in sub-stations and around 78% in power lines. Investments related to synchronisation of the electricity system of the Baltic States are scheduled until 2025 (Figure 40).[145]

ANNEX 6. TRANSMISSION SYSTEM INVESTMENTS

Substations	
Tap changers of 110 kV transformers	2023
Change of 110-330 kV power transformers	2022
Bushings of 110-330 kV transformers	2023
330 kV substation 0T diesel generator installations	2020
Accumulator batteries and charging equipment	2022
Partial renovation of substations	2022
Purchase of reserve equipment of substations	2021
Purchasing the service plot for substations	2018
Changing RTUs in substations	2018
Renovation of Aidu 110 kV substation	2020
Renovation of Alutaguse 110 kV substation	2019
Renovation of Audru 110 kV substation	2022
Renovation of Ellamaa (Riisipere) 110 kV substation	2020
Renovation of Elva 110 kV substation	2023
Renovation of Haapsalu 110 kV substation	2022
Reconstruction of Haljala substation into compact substation	2023
Renovation of eastern 110 kV substation	2018
Renovation of Järvakandi 110 kV substation	2021
Renovation of Kanepi 110 kV substation	2020
Renovation of Kantküla 110kV substation into compact substation	2021
Renovation of Kehtna 110kV substation into compact substation	2022
Renovation of Koigi 110 kV substation	2019
Renovation of Konsu 110 kV substation	2022
Renovation of Kopli 110 kV substation	2018
Renovation of Kuusalu 110 kV substation	2018
Renovation of Kuuste 110 kV substation	2023
Renovation of Laagri (Pääsküla) 110 kV substation	2023
Renovation of Lihula 110 kV substation	2020
Renovation of Linda 110 kV substation	2021
Renovation of Maaritsa 110 kV substation into compact substation	2022
Renovation of Martna 110 kV substation into compact substation	2020
Renovation of Muhu 110 kV substation into compact substation	2021
Renovation of Mustvee 110 kV substation	2023
Renovation of Orissaare 110 kV substation	2018
Paide substation reactors	2018
Reconstruction of Põdra substation into compact substation	2022
Renovation of Pärnu-Jaagupi 110 kV substation into compact substation	2021
Rakvere-Põhja C1T 110 kV switchboard compact solution	2023
Renovation of Ranna 110 kV substation	2019
Renovation of Risti 110 kV substation	2019
Renovation of Roela 110kV substation into compact substation	2020
Renovation of Rõngu 110 kV substation	2019
Renovation of Sikassaare 110 kV substation	2020
Renovation of Sindi 110 kV distribution unit	2018
Renovation of Sirgala	2021
Renovation of Soo 110 kV substation into compact substation	2021
Renovation of Suure-Jaani 110 kV substation	2024
Renovation of Tabasalu 110 kV substation	2018
Renovation of Tsirguliina 330 kV substation	2019

Renovation of Vigala 110 kV substation into compact station	2021
Renovation of Väike-Maarja 110 kV substation	2019
Renovation of Vändra 110 kV substation	2018
Electricity power lines	
Changes of the 110 kV lines insulation, cable and bird barrier	2022
L104C Alajõe branch preliminary study for changing the wire and wire changing	2021
L156 Kanepi-Vöru ferroconcrete tower change	2020
L346 Paide-Sindi ferroconcrete tower change, insulation change	2020
L066 Rakvere - Rakvere-Põhja overhead line reconstruction	2026
L078 Püssi-Kiviõli overhead line reconstruction and Kiviõli inlet building	2026
L079 Uhtna-Kiviõli overhead line reconstruction and Kiviõli inlet building	2026
L104A Illuka-Alutaguse overhead line reconstruction	2023
L104B Mustvee-Alutaguse overhead line reconstruction	2023
L136 Ahtme-Illuka overhead line reconstruction	2023
L138 Alutaguse-Jaoskonna 3B overhead line	2020
L194 Raasiku-Kehra overhead line reconstruction	2025
L195 Aruküla-Raasiku overhead line reconstruction	2025
Tapa-Aegviidu-Kehra 110 kV overhead line	2025
L011 Harku-Veskimetsa cable and overhead line	2020
L012 Harku-Kadaka cable and overhead line	2020
L8023 Veskimetsa-Kadaka cable line	2019
L011 Harku-Veskimetsa partial cable and overhead line	2023
L002 Harku-Veskimetsa partial cable and overhead line	2023
L009 Kopli - Paljassaare partial change of the overhead line with the cable line	2021
L010 Paljassaare - Volta partial change of the overhead line with the cable line	2021
L8017 Veskimetsa-Kopli cable line	2020
L8025 Veskimetsa-Volta cable line	2020
L8052 Tartu-Tööstuse cable line	2023
L8053 Tööstuse-Anne cable line	2026
Purchase of reserve equipment of lines	2020
Domestic network development	
L030 Sindi - Papiniidu clearance arrangements	2018
L030 Sindi - Metsakombinaat clearance arrangements	2018
L030 Papiniidu - Metsakombinaat clearance arrangements	2018
L08 Aidu-Jaoskonna 3B clearance arrangements	2019
L100A Aruküla-Jüri raising of clearance	2020
L103 Püssi-Rakvere raising of clearance	2026
L138A Püssi-Kiikla overhead line, raising of clearance	2019
L173 Võiküla - Orissaare building into single line	2021
L173 Võiküla-Orissaare 110 kV cable line section in the Small Strait	2020
Installation of Tsirguliina 330 kV transformer	2019
Selection of Leisi-Kärdla mixed line route	2021
Second 110 kV marine cable of Big Strait	2020

The third Estonia-Latvia interconnection (CEF co-financing)	
Construction of Harku-Sindi line (L503)	2020
Construction of Kilingi-Nõmme-Riga line (L502)	2020
Harku 110 kV cells	2018
Harku 330 kV cell	2019
Kilingi-Nõmme 330 kV substation	2019
Renovation of Kullamaa 110 kV substation	2018
Riisipere 110 kV cells	2020
Sindi 110 kV cell	2018
Sindi 330 kV cell	2020
Synchronisation (CEF co-financing)	
L300 Balti-Tartu reconstruction	2023
L301 Tartu-Valmiera reconstruction	2024
L353 Estonia-Tsirguliina overhead line reconstruction	2025
Modernisation of the Estonian control systems of the electrical system	2025
Other investments with cross-border impact	
Improvements to emergency reserve power plant	2019
EstLink1 improvements	2019
EstLink2 improvements	2019
Sindi A2T and reactors	2019

Figure 40. Elering AS’s plans for investment in Estonia’s transmission system[145]

Gas transmission system

Estonia’s gas transmission system operator Elering AS periodically draws up a gas transmission network development plan for the next 10 years. When budgeting for the investment plans reflected in the development plan, various investment projects are validated and a justified choice of investment projects is made. The choice is based on the principle that under conditions of resource scarcity, priority should be given to projects from which society derives the greatest socio-economic benefit.

This benefit may be expressed as:

- security of energy supply;
- better functioning energy markets;
- the increased efficiency of Elering's operations;
- better customer service. The following inputs, analyses and studies are taken into account when investing in regulated assets: (a) for developing the network:
- network development plans, ENTSO-G 10-year development plans, development plans resulting from Estonia's energy policy, Elering's and customers' development plans, and other studies.

Investment qualifies if a new network element is built with the investment (e.g. a pipeline, a gas distribution station, gas metering stations, and so on) owing to insufficient transmission capacity or the need to ensure reliability in accordance with the quality requirement regulation.

Among the more important investments to be made over the next 10 years are construction of the Balticconnector gas pipeline between Estonia and Finland and its spin-off projects, such as construction of a metering point and a compressor station on the Estonia-Latvia border.

4.5.3. Electricity and gas markets, energy prices

i. Current situation of electricity and gas markets, including energy prices

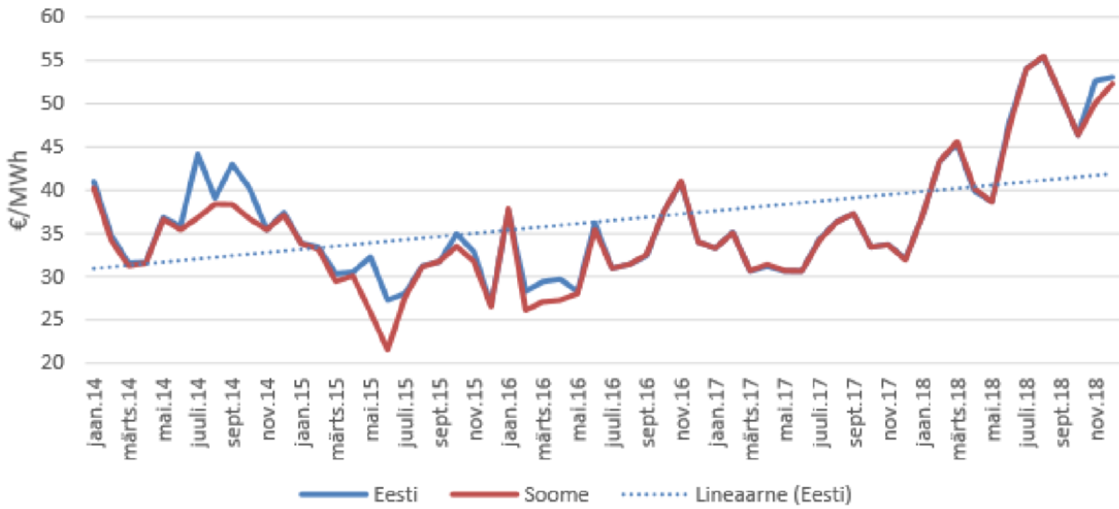
The power exchange Nord Pool AS (NP) started its activities in Estonia in April 2010. The electricity market was opened to the extent of 28.4% in 2010. Since 1 January 2013, the electricity market has been open to everyone, and all electricity consumers with a valid network contract can choose the electricity provider and price package most suitable for them.[194]

Thanks to the *EstLink 1* and *EstLink 2* interconnections between Estonia and Finland and *NordBalt* between Lithuania and Sweden, the electrical system of the Baltic States is closely integrated with the electrical system of the Nordic countries (Norway, Sweden, Finland, Denmark), where the Nord Pool power exchange also operates.[194]

Estonia produced electricity in the amount of 10.58 TWh (net production) in 2018, a decrease of 5.8% compared to 2017 (Table 28). In 2018, 3.48 TWh of electricity was imported to Estonia, an increase of 65% compared to 2017. Electricity consumption in 2018 was 7.98 TWh, which was 1.5% higher than in 2017. Estonia exported 5.35 TWh of electricity in 2018, 12.3% more than in 2017. Network losses in the Estonian transmission system in 2017 and 2018 were substantially the same (0.7 TWh).[194]

Table 28. Electricity balance[194]

Electricity balance, GWh	2017	2018	Change, %
Production (net)	11,234	10,583	-5.8
Import	2,109	3,484	65.2
Consumption	7,865	7,980	1.5
Loss	713	737	3.4
Export	4,765	5,350	123



	€/MWh
	Jan 2014 March 2014 May 2014 July 2014 Sept 2014 Nov 2014 Jan 2015 March 2015 May 2015 July 2015 Sept 2015 Nov 2015 Jan 2016 March 2016 May 2016 July 2016 Sept 2016 Nov 2016 Jan 2017 March 2017 May 2017 July 2017 Sept 2017 Nov 2017 Jan 2018

	March 2018 May 2018 July 18 Sept.18 Nov 2018
	Estonia
	Finland
	Linear (Estonia)

Figure 41. Comparison of prices in the NP Estonia and NP Finland price areas[227]

The figure above (Figure 41) shows that Estonian and Finnish electricity prices were quite similar following the launch of *EstLink 2* in December 2013. Differences in prices between Estonia and Finland were caused mainly by interruptions to *EstLink 1* and *EstLink 2*, when the transmission capacity between Estonia and Finland decreased. In 2017 there were no significant interruptions in the operation of *EstLink 1* and *EstLink 2*. 194

Table 29. Price comparison in NP power exchange[227]

Price area	Average price 2017, €/MWh	Average price 2018, €/MWh	Change, %	Maximum price 2018, €/MWh	Minimum price 2018, €/MWh
NP System	29.41	43.99	**33.1**	198.29	2.17
NP Finland	33.19	46.80	**29.1**	255.02	159
NP Estonia	33.20	47.07	**29.5**	255.02	159
NP Latvia	34.68	49.90	**30.5**	255.03	1.59
NP Lithuania	35.13	50.00	**29.7**	255.03	1.59

The table above (Table 29) shows that the average price in the NP Estonia price area was 47.07 €/MWh in 2018, which was 29.5% higher than the price in 2017. Average prices increased similarly in the NP System and NP Finland price areas. Meanwhile, average prices dropped in the NP Latvia and NP Lithuania price areas, which was mainly caused by the new Lithuania-Poland (*LitPol Link*) and Lithuania-Sweden (*NordBalt*) interconnectors. In 2018, the highest hourly price in NP Estonia was 255.02 €/MWh and the lowest was 1.59 €/MWh.[194].

Table 30. Quantities traded in the day-ahead market in the NP Estonia price area[194, 200]

Traded quantities in the NP Estonia price area	Unit	2017	2018	Change, %
Quantity of electricity sold in the day-ahead (Elspot) market in the NP Estonia price area	TWh	10.15	9.55	**-5.9**
Quantity of electricity purchased in the day-	TWh	7.38	7.58	**2.6**

[200] Nord Pool AS. Market data. https://www.nordpoolgroup.com/Market-data1/#/nordic/table

ahead (Elspot) market in the NP Estonia price area				

The quantity of electricity sold in the day-ahead (Elspot) market totalled 10.15 TWh in 2018 (Table 30), 5.9% higher than in 2017, and the quantity purchased totalled 7.58 TWh.

Table 31. Quantities traded in the intra-day market in the NP Estonia price area[194,200]

Traded quantities in the NP Estonia price area	Unit	2017	2018	Change, %
Quantity of electricity sold in the intra-day (Elbas) market in the NP Estonia price area	GWh	90	106	**17.8**
Quantity of electricity purchased in the intra-day (Elbas) market in the NP Estonia price area	GWh	204	161	**-21.1**

The quantity of electricity sold in the intra-day (Elba) market totalled 0.11 TWh in 2018 (Table 31), 17.8% higher than in 2017, and the quantity purchased totalled 0.16 TWh.

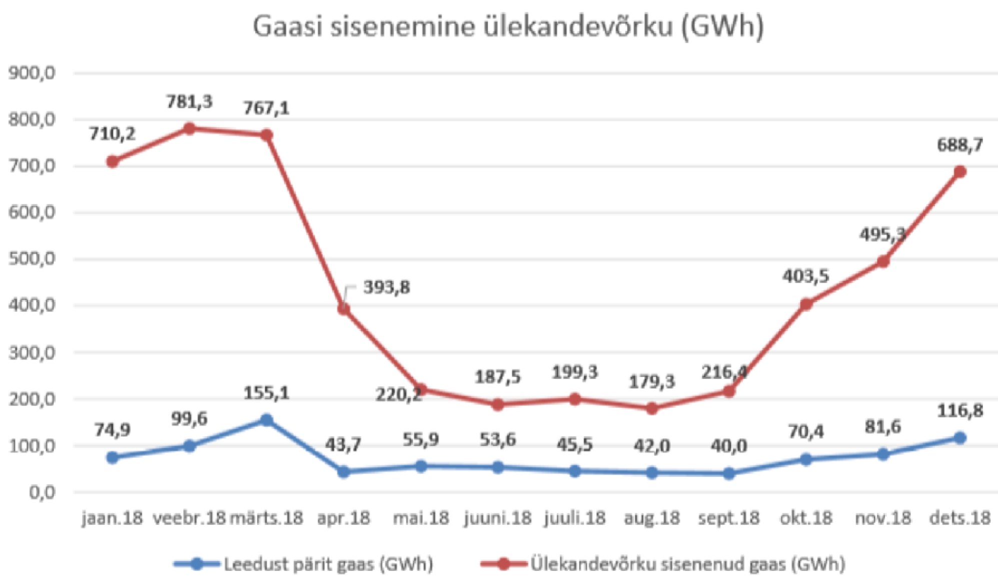
All consumers with a valid network contract can select the most suitable electricity seller for them. Eesti Energia AS (Table 32) has the biggest market share in the retail market.

Table 32. General data on the electricity retail market[194]

Year	Total consumption (w/o losses) GWh	Number of undertakings whose market share exceeds 5%	Number of independent electricity sellers	Market share of three biggest sellers		
				Large and very large industrial undertakings	Medium-size and small industrial undertakings	Small undertakings and household consumers
2010	7,431	1	4	100	94	94
2011	6,845	1	5	100	93	93
2012	7,407	1	5	100	93	93
2013	7,332	2	15	100	90	85
2014	7,417	2	16	100	90	85
2015	7,440	5	16	100	90	85
2016	7,664	4	17	100	90	85
2017	7,865	5	16	100	90	85

There were 16 independent electricity traders in Estonia in 2017, of which 10 undertakings were operating actively in the market. The rate of switching electricity trader by consumers was 3% in 2017. 84% of consumers had electricity contracts and 16% of consumers used a general service (consumers who did not have a valid electricity contract). The average balancing portfolio share of the biggest wholesale electricity trader (Eesti Energia AS) in 2017 was 59.5%, followed by Elektrum Eesti OÜ with 10.6% and Scener OÜ with 9.6%. The average balancing portfolio share of Eesti Energia in 2013 was 71.9%, meaning that in 2017 the market share of the biggest Estonian electricity trader (Eesti Energia AS) had decreased. Hence it can be concluded that competition in the electricity market among electricity traders had increased.[194]

The Estonian gas market has been open since 2007. Since 2015, the independent system manager of the Estonian gas system has been Elering AS. In essence, the Estonian gas system is a closed system, receiving natural gas from Russia and Lithuania (regasified LNG). Figure 42 gives an overview of the origin of imported natural gas. The share of natural gas imported from Russia in 2018 was 93%.



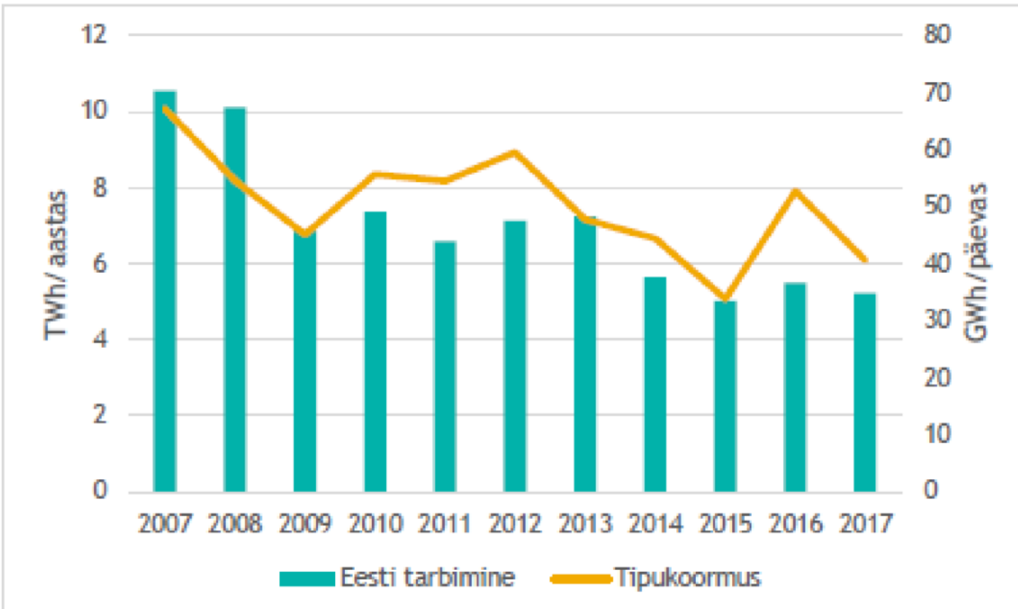
	Entry of gas to the transmission network (GWh)
	Jan 2018
	Feb 2018
	March 2018
	April 2018
	May 2018
	June 2018
	July 2018
	Aug 2018
	Sept 2018
	Oct 2018
	Nov 2018
	Dec 2018
	Gas from Lithuania (GWh)
	Gas entered in the transmission network (GWh)

Figure 42. Origin of imported gas in 2018

At the start of July 2017 the Estonian gas exchange came into operation, and it became possible to trade in natural gas between the Baltic States independently of the country in which the selling or purchasing undertaking is located. UAB GET Baltic manages the gas market covering the Baltic States. The establishing of the single gas market was made possible by an agreement between the system operators of the three countries to apply the implicit auction method to distribution of cross-border transmission capacities, where the gas price in cross-border transactions also covers transmission capacity. For example, an Estonian market participant can buy gas from Lithuania without organising the transport of gas from Lithuania to Latvia and from there to Estonia. While 1.36 GWh of gas was purchased via the gas exchange in 2017, its use is increasing.

The sales volume and daily peak load of the Estonian gas market has been continuously decreasing over the last 10 years (see Figure 43).

Figure 43. Gas consumption quantities and peak load, TWh/yr, GWh/day (2007-2017)



	TWh/year
	GWh/day
	Estonian consumption
	Peak load

Depending on the sales volume, the final gas price for household consumers in 2017 was within the range of 25.79 €/MWh - 35.26 €/MWh (see Table 34), while for business consumers it was 8.22 €/MWh - 11.69 €/MWh (see Table 33).

Table 33. Final gas price for business consumers in 2017

2017, €/MWh	Consumption < 0.28 GWh	Consumption 0.28-2.8 GWh	Consumption 2.8-27.8 GWh	Consumption 27.8-277.8 GWh	Consumption 277.8 - 1111.1 GWh
1 January – 30 June 2017	35.26	31.45	27.63	27.63	26.68
1 July - 31 December 2017	29.61	28.65	27.70	25.79	26.74

Table 34. Final gas price for household consumers in 2017

2017, €/MWh	Consumption < 5.56 MWh	Consumption 5.56-55.6 MWh	Consumption < 55.6 MWh
1 January – 30 June 2017	42.08	34.84	33.89

1 July - 31 December 2017	42.03	34.38	29.60

The number of gas purchasers in the retail market was ca 49.3 thousand customers, including 47.2 thousand household consumers. The rate of changing electricity trader by consumers averaged 12%.

Five operators had a gas import licence, of which two actually imported gas in 2017. There were a total of 24 distribution system operators (the total length of the network was 2,131 km), and the market share of the biggest system operator was 82% (for 1,483 km of the distribution system). A total of 41 operators acted as gas sellers. The majority sold gas in their own network area. Seven persons operated actively as sellers, and the market share of the largest was 92%. In Estonia, six undertakings acted as balance responsible parties.

ii. Projections of development with existing policies and measures until at least 2040 (including for the year 2030).

The prices of electricity and gas as electricity carriers are formed on the respective markets (e.g. the Nord Pool power exchange for electricity). Measures applied in Estonia do not impact the prices of electricity and gas as energy carriers.

4.6. The research, innovation and competitiveness dimension

i. The current situation of the low-carbon-technologies sector and, to the extent possible, its position on the global market (that analysis is to be carried out at Union or global level)

Europe has taken a leading role in global climate action to achieve an economy emitting near-zero GHG emissions. This relies on a safe and sustainable energy supply that is supported by a market-based and trans-European approach. The energy system of the future involves electricity, gas, heating/cooling and mobile systems as well as markets. Citizens are at the centre of the system with the support of smart networks. The transition requires the introduction of further technological innovations in the energy, construction, transport, industrial and agricultural sectors. This can be accelerated with revolutionary solutions in digital, information and communication technologies, artificial intelligence and biotechnology. It will also be necessary to expand the systems and processes that cover cross-sectoral cooperation (e.g. circular economy). Technologies in which Europe sees potential include the production of synthetic gases and liquids with the help of renewable electricity, decentralisation of the energy system based on renewable energy sources, digital technology and smart grids, industrial processes, the capture and transformation of carbon into new products when burning fuels, expanding the use of biomass, carbon sequestration from this biomass, and circular bioeconomy[201].

The coming years will see a breakthrough in the energy and carbon storage sectors.

Regarding energy storage, Estonia is already on the global map as the home of Europe's leading producer of ultracapacitors Skeleton Technologies[202], with

[201] Communication of the European Commission "A Clean Planet for all" https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0773&from=EN
[202] Skeleton Technologies https://www.skeletontech.com/ultracapacitor-technology

production units in Germany and development in Tallinn. While energy storage in batteries takes place as a chemical reaction, in ultracapacitors it takes place electrostatically. Ultracapacitors have been under development for more than a decade, but a major breakthrough came with the introduction of graphene use. Ultracapacitors as energy storage have a long lifetime (one million charging cycles, where batteries have several thousand charging cycles) and are 30% more energy efficient than batteries. They are used in motor sport (Formula 1 cars), the space industry, shipping, heavy industry, renewable energy, the automotive industry and the transport sector.

While ultracapacitors are mainly used in industry, the **energy router and storage device** developed as a prototype by the Tallinn University of Technology in 2018 is suitable for managing energy flow in households[203].

Comparing various electricity storage technologies, today **lithium-ion batteries are the best batteries in regard of price, lifetime and technological indicators**. The capacity of lithium-ion batteries was 1,629 MW in 2018, with a projected increase of 1,200 GW by 2050. Lithium-ion batteries are used in industry, such as the 100 MW Tesla, but also in electricity networks, e.g. in Australia and Texas. Lead-acid batteries have a short lifetime. Zinc-hybrid cathode technology is under development. The innovation of sodium metal halide and sodium-sulphur batteries is unclear and they are not expected before 2025. However, Japan has made use of sodium-sulphur batteries to stabilise wind energy. A total of 450 MW of sodium-sulphur batteries have been installed all over the world, mainly produced by the Japanese company NGK Insulators. These batteries have a high operating temperature and hence are suitable only as non-mobile solutions.

Pumped-storage plants, compressed-air storage, flywheel energy storage and ultracapacitors are more mature technologies, but a major change in their prices is not predicted for the coming years. Pumped-storage plants have been installed mainly by rivers to store solar and wind electrical energy to balance electricity supply when sunshine or wind is lacking and to cover peak demand. **Pumped-storage stations comprise 97%[204] of the total installed energy storage capacity worldwide**. 270 pumped-storage stations have been installed or are being built around the world. For example, the oldest station in the USA was built in 1929 and the station with the highest capacity is at over 3000 MW[205]. By 2017, pumped-storage stations had been installed with a total capacity of 153 GW and stationary batteries with a capacity of 5 GW. These stations are mainly located in Europe, China, Japan and the US. A total of 26 GW of pumped-storage stations will be added in the next five years (including 18 GW in China, with the network operators mainly belonging to the state). New stations in Europe will be built in Switzerland, Portugal, Austria, the UK and Germany. A total of 650 MW of

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[203] TalTech power electronics of the Electrical Power Engineering and Mechatronics Institute have developed innovative solutions for use and storage of renewable energy in households. https://www.ttu.ee/taltechi-energeetikud-naitavad-uudseid-lahendusi-taastuvenergia-kasutamiseks

[204] Hydrowires 2019 Energy Storage Technology and Cost Characterization Report https://www.sandia.gov/ess-ssl/wp-content/uploads/2019/07/PNNL_mjp_Storage-Cost-and-Performance-Characterization-Report_Final.pdf

[205] PSH - The Nation's Largest Energy Storage Resource https://www.hydro.org/wp-content/uploads/2018/04/2018-NHA-Pumped-Storage-Report.pdf

capacity will be added in Morocco and Israel. A total of 146 TWh of electricity will be produced at pumped-storage stations in 2023[206]. Two pumped-storage plants planned in Estonia will be unlike those elsewhere, which are built mainly on rivers.

Another option in energy storage is hydrogen and hydrogen fuels. Today, hydrogen is mainly produced from natural gas and coal and used mainly in petroleum refining and the production of fertilisers. The current use of hydrogen on the basis of fossil fuels contributes to carbon emissions equivalent to the total emissions of Indonesia and the UK. To switch to clean energy, it is necessary to both store the carbon that accompanies hydrogen from fossil fuels and increase the hydrogen stock obtained from renewable electricity. Based on its analysis, the IEA has estimated that by 2030 the cost of producing hydrogen from renewable electricity will be reduced by 30%. **Hydrogen could be one of the main options for storing renewable energy and one of the most affordable ways to store energy for days, weeks or even months.** Hydrogen and hydrogen fuels can be transported thousands of kilometres from regions with favourable sun and wind conditions to energy-hungry cities. The transition to clean energy also requires the use of hydrogen from renewable energy in transport, buildings and electricity generation, including making hydrogen available also to users. The main obstacle to the development of a clean hydrogen industry is the current lack of regulation. Industrial ports should be the main development centres for clean hydrogen, in order to provide it to ships and other vehicles. The existing gas transmission network is suitable for the delivery of hydrogen[207].

Carbon capture, utilisation and storage (CCUS) technology today enables carbon capture in industry and the burning of fuels, its transport by ship or pipeline, its use in products and services and its storage deep underground. Today, 30 million tCO_2/year is captured, but according to projections, this volume could be 2.3 billion tCO_2 in 2040, representing 7% of the required reduction in cumulative emissions[208].

According to current knowledge, Estonia does not have suitable geological conditions for storing CO_2 [209]. The country is carrying out a study entitled ‘Opportunities for climate change mitigation in carbon capture and use in industry’. Its main objective is to assess the suitability of different carbon capture technologies and develop scenarios for implementing these technologies in the Estonian oil shale industry. It also analyses the environmental impact of the most effective solutions and the technological and economic capacity of the industrial sector to use the captured CO_2. The economic analysis focuses on the difference in unit costs of the most appropriate capture technologies, sensitivity to carbon quotas and electricity prices, and the need to subsidise investments, as well as the export potential of the captured CO_2. The result

[206] Analysis from Renewables 2018 https://www.iea.org/newsroom/news/2019/march/will-pumped-storage-hydropower-capacity-expand-more-quickly-than-stationary-b.html
[207] IEA 2019 The Future of Hydrogen https://webstore.iea.org/download/summary/2803?fileName=English-Future-Hydrogen-ES.pdf
[208] CCUS https://www.iea.org/topics/carbon-capture-and-storage/
[209] A.Shogenova et al. 2009 Possibilities for geological storage and mineral trapping of industrial CO2 emissions in the Baltic region https://www.sciencedirect.com/science/article/pii/S1876610209006894?via%3Dihub#aep-abstract-id15

will be a comprehensive study of the feasibility of investing in carbon capture infrastructure to help minimise GHG emissions in the Estonian oil shale industry.

ii. Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers

In late 2018, the Estonian Research Council approved the study 'Climate change mitigation opportunities for carbon capture and use in industry' within the framework of strategic research and development support under the RITA programme. TalTech conducted the study with a budget of around € 950,000. The research was financed by the European Regional Development Fund and the Estonian state.

This study looked at what pre-requisites allow the cost-efficient creation and operation of carbon capture technologies and whether and under what conditions it would be possible to use CO_2 as an input in Estonian industry or whether it is economically viable to export this secondary raw material for use in the industrial sectors of other countries. The results of the study provide input to companies in the Estonian industrial sector, universities and research institutions for further research work and also to the national authorities and institutions for planning processes.

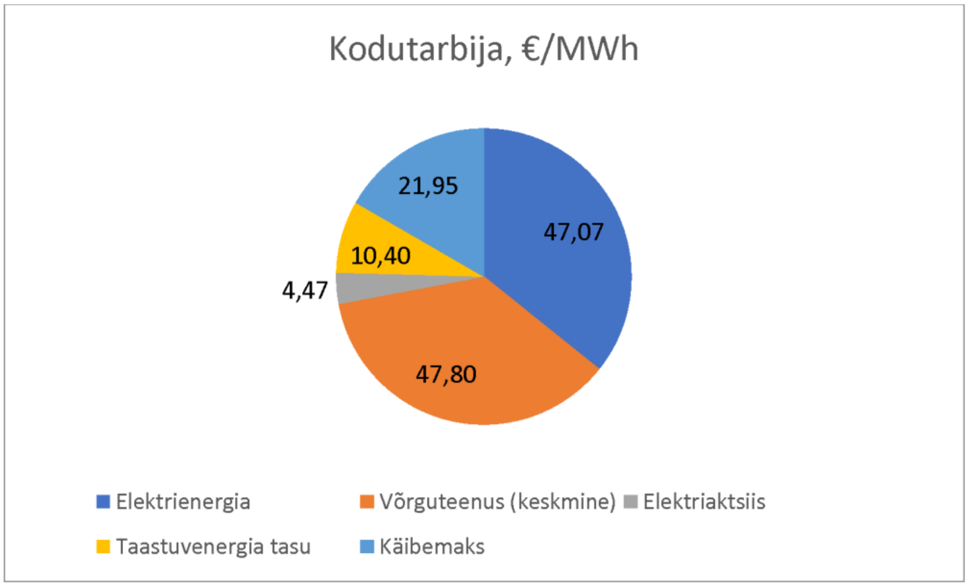
iii. Breakdown of current price elements that make up the main three price components (energy, network, taxes/levies)

a) Electrical energy

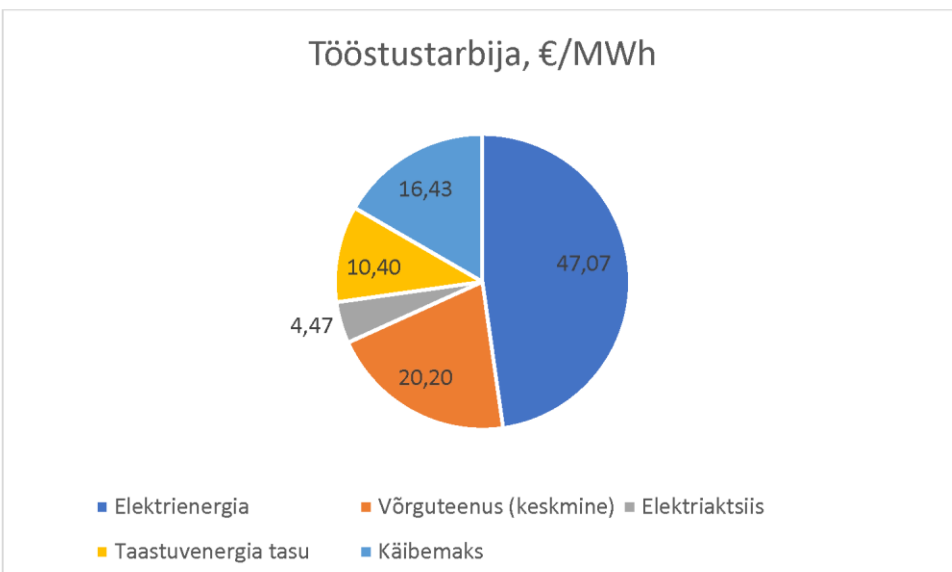
Final electricity prices largely depend on the voltage level of connection points. Network prices depend of the voltage level of the connection point – a higher voltage at the connection point means a lower investment cost for the network operator. Hence the price of a higher voltage level network service is lower than the network price of a lower voltage level. On that basis, Estonian consumers can be divided into three categories in relation to the final electricity price: household consumers (low voltage connection points), industrial consumers (connected at a voltage of 110 kV), and large-scale consumers (connected at 330 kV).

The components of the final electricity price in 2018 by the consumer groups indicated above are shown in Figure 44.

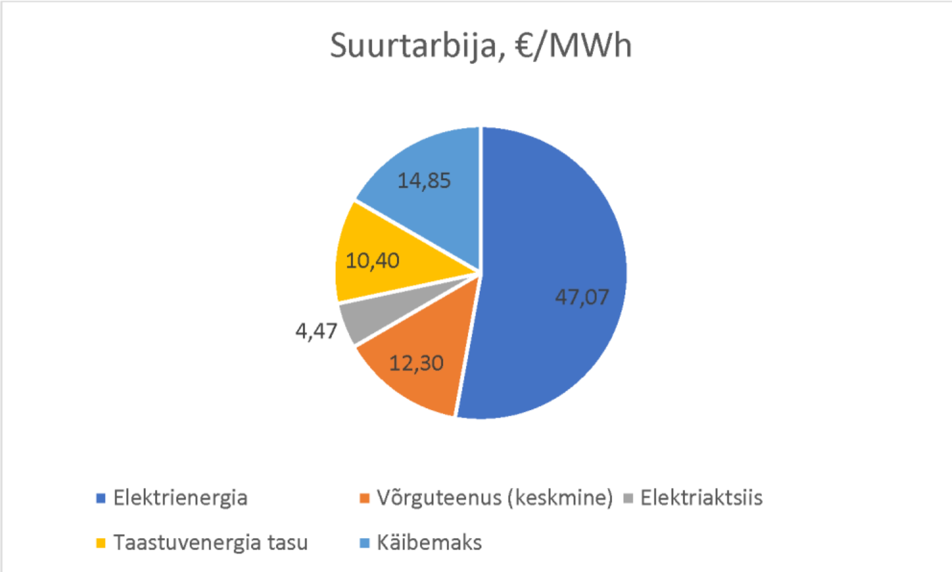
Figure 44 Price components by consumer group in 2018



	Household customers, €/MWh
	Electrical energy
	Renewable energy fee
	Network service (average)
	Electricity excise duty
	VAT



	Industrial customers, €/MWh
	Electrical energy
	Network service (average)
	Electricity excise duty
	Renewable energy fee
	VAT



	Large-scale customers, €/MWh
	Electrical energy
	Network service (average)
	Electricity excise duty
	Renewable energy fee
	VAT

Electricity excise duty in Estonia is largely the same for all customers - 4.47 €/MWh. However, the state has established a lower rate of excise duty for electro-intensive consumers, or consumers whose electro-intensity exceeds 20% and whose energy management system complies with ISO 50001. A lower excise duty rate of 1.0 €/MWh is applied to these consumers.

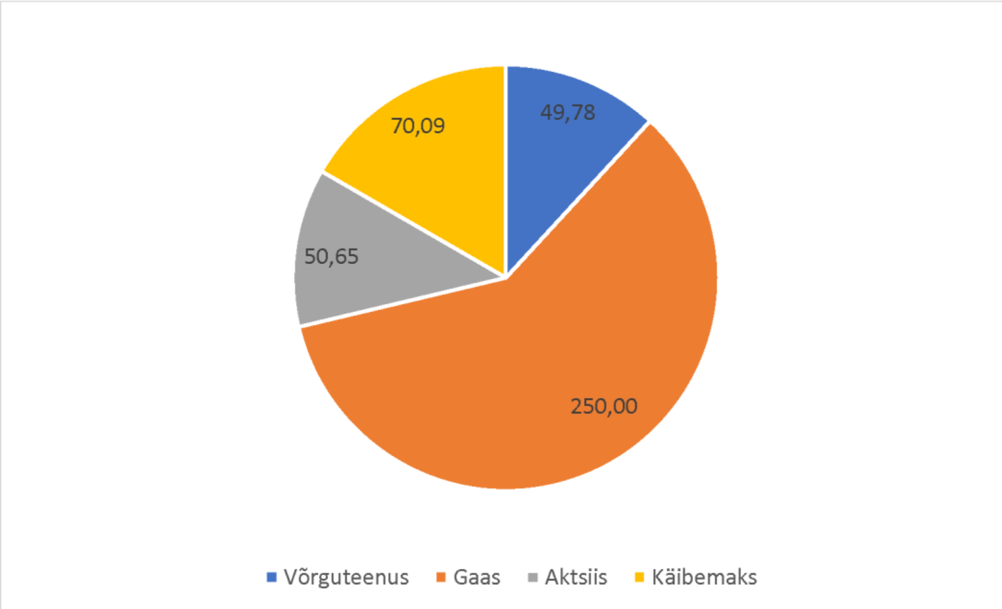
Another important component of the final electricity price is the renewable energy fee, which is used to finance a national support scheme for electricity generated from renewable energy sources. Considering that the largest producers of electrical energy from renewable energy sources will start to leave the support scheme from 2021, a significant reduction in the renewable energy fee can be expected in the near future. The state has also made the support scheme for electricity from renewable energy sources reverse auction-based, which in turn reduces the pressure on the renewable energy fee.

b) Natural gas

Gas consumption has halved in Estonia in recent years. The main reason is the reduction of gaseous fuels in the generation of electrical energy and heat due to the relatively high and at times unstable final price of natural gas. The bulk of the final gas price consists of the price of gas as a product, followed by state fees and the network service fee.

The components of the final gas price 2018 are shown in Figure 45.

Figure 45 Price components (€/thousand m³) of natural gas in 2018



	Network service
	Gas
	Excise duty
	VAT

The price of natural gas forms the largest component of the final price. VAT is uniform in Estonia, at 20%. Gas excise duty is largely the same for all consumers, but a lower excise duty rate is applied for gas-intensive consumers. The general level of excise duty in 2018 was 50.56 €/thousand m^3, and in 2019 it was 63.31 €/thousand m^3. A lower excise duty rate can be applied for persons whose gas consumption intensity is at least 13% and whose energy management system complies with ISO 50001. In that case, the gas excise duty rate is 11.30 €/thousand m^3.

iv. Description of energy subsidies, including for fossil fuels

None of the measures under this plan (see Annex IV) offer financial support for the deployment of fossil fuels. Regulation (EU) 2018/1999 does not define the concept of energy subsidies, but according to recital 20 of the Regulation, Member States may base themselves on definitions of energy subsidies used by international organisations. According to the OECD, energy subsidies are measures which, because of their existence, result in cheaper or higher energy consumption in a certain market segment compared to an energy market that operates without interventions.

On 1 January 2019, the fee rate levels for the right to extract energy from mineral resources and the corresponding heavy fuel oil price levels changed in Estonia. The widening of the price range between the fee rates and heavy fuel oil prices stemmed from the objective of maximising state revenue at very high heavy fuel oil prices. The fees for the right to extract energy from mineral resources were linked to the evolution of oil prices on the world market in order to align the price of competing fossil fuels to ensure the availability of energy supplies to the consumers. The fee rates will increase exponentially under the new system from a heavy fuel oil price of € 361 per tonne. This is due to the fact that if companies recoup variable costs as well as capital costs, then each subsequent euro is essentially net income and it is also possible for the state to collect more state revenue from its assets.

Restrictions on the use of peat for energy purposes include requirements on combustion plants. The burning of peat is required in a certain volume, for example in co-combustion with wood, for ensuring the technical condition of the boiler.

Energy consumption subsidies for consumers are minimal in Estonia. Energy subsidies are available for natural and legal persons.

Energy subsidies for natural persons

People with subsistence difficulties have access to subsistence support, which takes into account the household's housing costs, including the cost of heat or fuel consumed for heating purposes. Local authorities lay down the conditions for calculating these housing costs. The authority may establish limits on costs by regulation, such as a maximum amount of energy costs. Issues relating to energy poverty are more thoroughly described in chapters 2.4.4 and 3.3.4.i.

Estonia does not impose excise duty on solid fuel (coal, peat briquettes, firewood etc.) used as fuel by households.

The main fuel used by households in Estonia is wood and wood-based fuels, the consumption of which accounted for 86% of the fuel used for heating by households in 2017, according to Statistics Estonia. As wood and wood-based fuels are not taxed in any sector in Estonia, the exemption from excise duty of wood and wood-based fuels does not qualify as an energy subsidy.

Despite the excise duty exemption on fossil fuels used by households, the quantities of fossil solid fuels used by natural persons are modest. According to Statistics Estonia, fossil fuels accounted for 0.6% of household heating fuels in 2017.

Energy subsidies for legal persons

Estonia has gradually reduced energy subsidies for legal persons. An overview of energy subsidies for legal persons in 2016 is shown in the following table (see Table 35).

Table 35. Energy subsidies for legal persons in 2016[210]

Energy subsidy	Estimated volume of energy subsidies, M€
Excise duty exemption on specially marked diesel used in inland fishing vessels	1,255,000
Lower excise duty rate on specially marked diesel and light fuel oil used in agriculture	32,000,000
Excise duty exemption on natural gas used for keeping	110,000

[210] OECD, see https://doi.org/10.1787/505a4fca-en

the natural gas system operable	
Support for electricity production from high-efficiency cogeneration using peat or pyrolysis gas from oil-shale processing on the basis of the Electricity Market Act	4,400,000
Excise duty exemption on diesel used in mineralogical processes	250,000
Excise duty exemption on natural gas used in mineralogical processes	250,000
Excise duty exemption on fuel used for air navigation in civil aircraft used for commercial purposes or in state aircraft, including fuel used for maintenance and repair on board such aircraft	0
Excise duty exemption on fuel produced by a fuel manufacturer and used on its own territory as heating fuel or in a stationary engine in the fuel production process	0

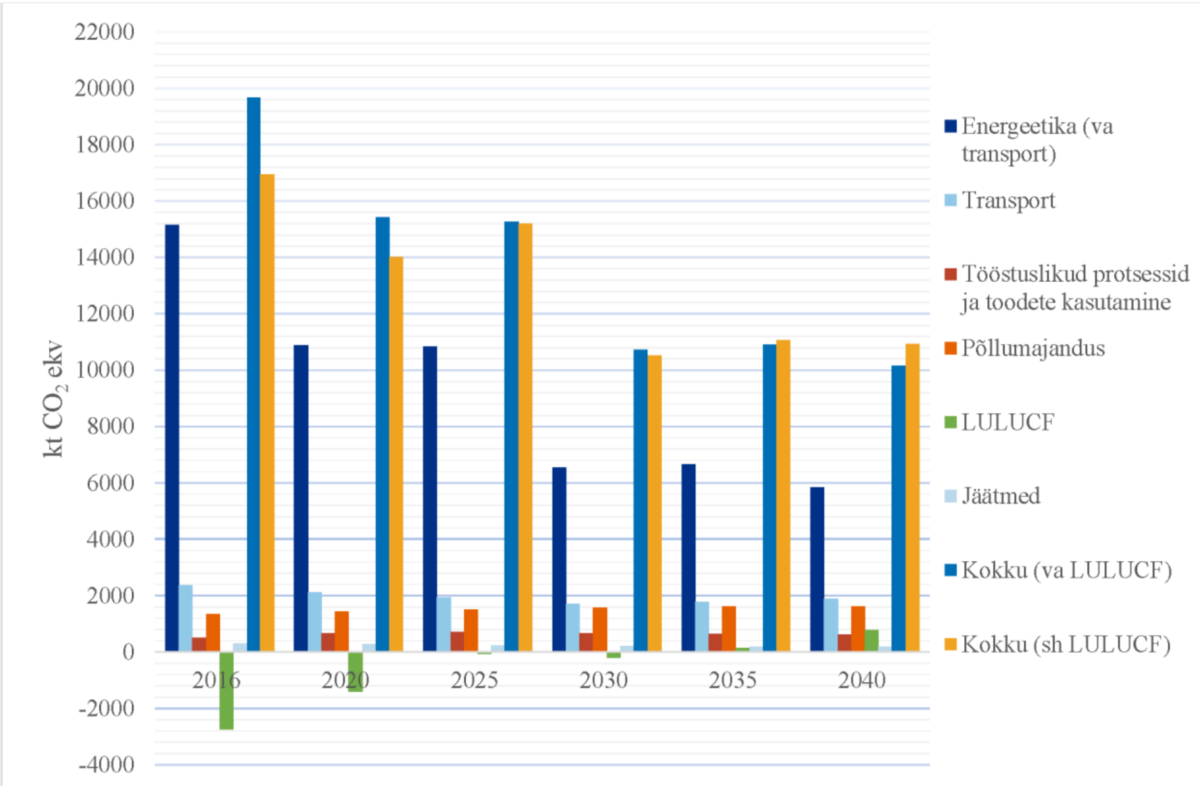
5. IMPACT ASSESSMENT OF THE PLANNED POLICIES AND MEASURES[211]

5.1. Impact of the planned policies and measures described in section 3 on the energy system and greenhouse gas emissions and removals, including comparison with projections of existing policies and measures (as described in section 4).

i. Projections of the development of the energy system and GHG emissions and removals, and where applicable, of emissions of air pollutants in accordance with Directive (EU) 2016/2284, in the light of the planned policies and measures, covering at least ten years after the end of the period covered by the plan (including for the last year of the period covered by the plan), including relevant Union policies and measures.

GHG emissions projections for the additional measures scenario have been calculated for 2016-2040, with 2016 used as the reference year (baseline year) (see Figure 46). Years with additional measures (see Figure 46) [sic]. In the additional measures scenario, the projected GHG emission trends take into account the planned additional measures in Annex III of this plan and their impact.

[211] The proposed policies and measures are options under discussion which have 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 will therefore cover not only implemented and adopted policies and measures (projections for existing policies and measures), but also planned policies and measures.



	kt CO_2 eq.
	Energy (except transport)
	Transport
	Industrial processes and product use
	Agriculture
	LULUCF
	Waste
	Total (excl. LULUCF)
	Total (incl. LULUCF)

Figure 46 Projected GHG emissions and removal by sector in the additional measures scenario, kt CO_2-eq

Projections of the emissions of air pollutants in accordance with Directive (EU) 2016/2284

The national programme for the reduction of air pollutant emissions ('the ÕVP programme') for 2020-2030 was submitted to the European Commission in early 2019, giving an overview of the opportunities and potential for the further reduction of pollutants emitted to ambient air from Estonian stationary and mobile emission sources.

Table 36 below shows the ambient air pollutant projections in the ÕVP programme by sector. Due to changes in the country's energy sector, this was updated in the middle of 2019, resulting in changes to all estimates of ambient air pollutant emissions.

Table 36 Projections of ambient air pollutants 2020-2040, kt

Sector	Air pollutant	2020	2025	2030	2035	2040
Energy	NO_x	13.905	13.071	9.686	9.259	7.809
	SO_2	18.311	17.580	11.185	11.762	10.322

	Non-methane VOCs	7.830	7.433	6.945	6.837	6.175
	PM 2.5	4.084	3.668	3.156	2.951	2.731
	NH_3	0.644	0.636	0.633	0.632	0.630
Transport	NO_x	13.577	12.879	11.772	11.923	11.857
	SO_2	0.052	0.053	0.053	0.046	0.046
	Non-methane VOCs	2.802	2.540	2.263	2.254	2.117
	PM 2.5	0.733	0.678	0.566	0.449	0.418
	NH_3	0.13560	0.11059	0.08591	0.08904	0.08022
Agriculture	PM 2.5	0.109	0.112	0.115	0.115	0.115
	NH_3	9.38	9.30	9.43	9.70	9.70
Industry	NO_x	0.082	0.094	0.107	0.078	0.084
	SO_2	0.011	0.01247	0.014	0.015	0.016
	Non-methane VOCs	0.909	0.962	1.007	1.052	1.098
	PM 2.5	0.279	0.307	0.334	0.355	0.375
	NH_3	0.091	0.099	0.108	0.113	0.121
Solvents	NO_x	0.0038	0.0041	0.0043	0.0044	0.0047
	SO_2	0.001	0.00144	0.001600	0.001734	0.001859
	Non-methane VOCs	6.203	6.158	6.284	6.414	6.517
	PM 2.5	0.076456	0.079307	0.081516	0.082550	0.083188
	NH_3	0.012160	0.013305	0.014369	0.015491	0.016947
Waste	NO_x	0.02995	0.03216	0.03406	0.03556	0.03696
	SO_2	0.0539	0.061	0.0673	0.0723	0.0770
	Non-methane VOCs	0.1989	0.2045	0.2098	0.2146	0.2192
	PM 2.5	0.098	0.099	0.099	0.068	0.068
	NH_3	0.063	0.068	0.072	0.075	0.078
Total	NO_x	27.60	26.08	21.60	21.30	19.79
	SO_2	18.43	17.71	11.32	11.90	10.46
	Non-methane VOCs	17.943	17.298	16.709	16.772	16.126
	PM 2.5	5.38	4.94	4.35	4.02	3.79
	NH_3	10.32	10.23	10.34	10.62	10.63

The impact of the planned policies and measures outlined in Chapter 3.1.1 on air pollution in the agricultural sector is detailed in Tables 37, 38 and 39. The impact of the policies and measures provided in the tables has been identified in a 2018 study entitled 'Finding the most cost-effective measures for achieving climate policy and shared commitment objectives in Estonia'[212].

Table 37 Impact of planned policies and measures on pollution in the agricultural sector

[212] https://www.kik.ee/sites/default/files/aruanne kliimapoliitika kulutohusus final.pdf

Measure	Impact on air pollutants
PM11 Production of bioenergy and increasing its share in agriculture	There are no precise figures on the additional impact on ambient air, but the impact of the production process can generally be assessed as negative - emissions increase from the biomethane production process, where relatively large quantities of electricity and thermal energy are used. Lifecycle emissions to ambient air from production depend on the fuels used to produce electrical and thermal energy. Emissions also occur from the additional transport of manure to the biogas station and the transport of digestate to the fields. At present, in all Estonian biogas stations where the wet anaerobic digestion of livestock manure technology is used, i.e., when solid manure is used as additional substrate (quite common), the digested material (digestate) is liquid. So in the Estonian context, it is not possible to speak of the impact of separate digestion on NH_3 and H_2S emissions from solid manure. Compared to unfermented liquid manure, the impact of fermentation on NH_3 emissions is negative, i.e. fermentation results in increased NH_4-N content in digestate, so the risk of ammonia emission is higher (various sources point to a 10-20% increase). The impact on H_2S emissions is positive, i.e. a large amount of sulphur in the substrate volatilises (or may volatilise) as H_2S during the fermentation process. H_2S in the composition of biogas or potentially occurring in biogas is removed from the biogas or substrate (depending on the technology used). In the first case, bound with active carbon, in the second case with $FeCl_3$, and an insoluble sulphur compound is created. Thus the sulphur content in the digestate that may potentially volatilise is significantly lower.
PM10 Converting arable land on peat soils to permanent grassland	From the point of view of ambient air, the reduction of CO_2 and other emissions from the combustion of machine fuels (SO_2, PM2,5, NO_x, VOC) in agricultural machinery is positive. The impact on H_2S and NH_3 emissions can reportedly be assessed as neutral.
PM12 Improving the quality of feed for dairy cows	There are no data about additional impacts on ambient air. The volume of machine work was not expected to increase. The impact on SO_2, incl. H_2S, NO_x, VOC, NH_3 and PM2.5 emissions can reportedly be assessed as neutral. There is no impact on NH_3 and H_2S emissions since vegetable fats are used as a source of energy available in the small intestine. Vegetable fats and higher-quality roughage have no direct relationship with nitrogen metabolism.
PM13 Increase in the share of grazing land	Among the impacts on ambient air, the increasing ammonia (NH_3) emissions can be assessed as negative. However, H_2S emissions are decreasing since a prerequisite for their emission is an anaerobic environment, which is primarily associated with stall buildings (manure channels) and liquid manure storage facilities. The impact on SO_2, NOx, VOC and PM2.5 emissions can reportedly be assessed as neutral.

PM14 Zero tillage	Related effects can be assessed as positive: nitrogen leakage into the soil is reduced, and from the point of view of ambient air impact, emissions from combustion of machine fuels (SO_2, PM2,5, NO_x, VOC) are reduced. The impact on H_2S and NH_3 emissions can reportedly be assessed as neutral.
PM15 Winter plant cover	A negative spillover effect from the measure impacts ambient air in connection with increased emissions (SO_2, PM2,5, NO_x, VOC) from agricultural transport (transport of fertilisers and seeds, sowing).
PM16 Precision fertilisation	The impact on ambient air is positive: H_2S emissions are reduced as the cumulative quantity of plant nutrients is decreasing, since fertiliser is delivered exactly where needed and in the optimum amount. The impact on SO_2 excl. H_2S, NO_x, VOC, NH_3 and PM2.5 emissions can reportedly be assessed as neutral.
PM17 Replacement of inorganic fertilisers with organic fertilisers	There are no data about additional impacts on ambient air, thus the impact is neutral. The impact on SO_2, incl. H_2S, NO_x, VOC, NH_3 and PM2.5 emissions can reportedly be assessed as neutral. In the case of fertilisers, the overall impact on emissions (particularly on NH_3) depends on the technology (equipment) and work organisation. Conditions are favourable for the absorption of NH_3 ions into soils when (i) fertiliser is applied to soil, (ii) soil has good uptake properties, (iii) soil is suitably moist, (iv) the acidity of soil is low, and (v) the temperature is low.

Table 38 Impact of planned policies and measures to the pollutants in the transport sector

Measure	Impact on air pollutants
TR7 Aid for the purchase of electric vehicles	Related effects on air pollutants can be assessed as positive: in terms of ambient air, the measure contributes to the reduction of air pollutant emissions (SO_2, PM2,5, NOx, VOC). The impact on H_2S and NH_3 emissions can reportedly be assessed neutral.
TR8 Additional enhancement of fuel-efficient driving	
TR9 Additional spatial and land use measures in cities to increase the fuel-efficiency of transport and enhance the transportation system	
TR10 Additional activities for the development of convenient and modern public transport	
TR11 Establishment of mileage-based road charges for heavy goods vehicles	
TR12 Tyres and aerodynamics of vehicles	
TR13 Development of railway infrastructure (incl. construction of Rail Baltica)	

Table 39 Impact of planned policies and measures on pollutants in the energy sector

Measure	Impact on air pollutants
EN4 Additional	The impact of replacing district heating with local heating can be assessed as

development of heating sector management	negative, i.e. emissions to ambient air may increase since the better controllable and high boilers of district heating boiler stations are replaced with numerous local boilers. The impact on H_2S and NH_3 emissions can reportedly be assessed as neutral.
	The impact on ambient air of renovating heat pipelines can be assessed as positive. Since the need for heat production decreases, emissions to ambient air also decrease (SO_2, NO_2, NO_x, solid particles, VOC). The impact on H_2S and NH_3 emissions can reportedly be assessed as neutral.
	The impact on ambient air of reconstructing boiler houses can be assessed as positive. Since the efficiency of heat production increases, emissions to ambient air also decrease (SO_2, NO_2, NO_x, solid particles, VOC). The impact on H_2S and NH_3 emissions can reportedly be assessed as neutral. The exact scope of the impact depends on which fuel is replaced with the biofuels (chips).
HF5 Additional renovation of public sector and business buildings	The impact on ambient air of renovating office buildings can be assessed as positive. Since the need for heat production decreases, emissions to ambient air also decrease (SO_2, NO_2, NO_x, solid particles, VOC). The impact on H_2S and NH_3 emissions can reportedly be assessed as neutral.
HF6 Additional renovation of private homes and apartment buildings	The impact of the measure can be assessed as positive. Since the need for heat production decreases, emissions to ambient air also decrease (SO_2, NO_2, NO_x, solid particles, VOC). The impact on H_2S and NH_3 emissions can reportedly be assessed as neutral. The policy of decreasing energy poverty also contributes to the measure as this helps to increase the capability of lower-income households to invest in the energy efficiency of the buildings. At the same time, as the State only provides partial support for the renovation of buildings, the involvement of private investments is also required for a positive effect. Supporting the renovation of apartment buildings is budget neutral - the equivalent of 33% of the aid is received back into the economy as tax income already during performance of the works.

ii. Assessment of policy interactions (between existing policies and measures and planned policies and measures within a policy dimension and between existing policies and measures and planned policies and measures of different dimensions).

In this section, it is necessary to establish a robust understanding of the impact of energy efficiency/energy savings policies on the sizing of the energy system and to reduce the risk of stranded investments in energy supply.

Decarbonisation

To meet the targets established by the effort sharing regulation, when planning the activities it is important to focus on the most efficient use of measures, e.g. increase support to already functioning measures or also consider the possibilities for intergrouping the measures during planning.

The main objectives of measures implemented or planned in the transport sector are to increase vehicle efficiency and reduce the national transport demand. One target of the current 'National transport development plan 2014-2020' is to reduce the share of urban car use by improving conditions for walking, cycling and use of public transport, and the use of smart solutions for various new services, in particular the provision of short-term bicycle and car rental services. For a number of measures, the scenario of projections with additional measures provides an estimate of the mitigating effect on GHG emissions for several measures if additional funding is released for implementation of the measures.

According to the scenario with existing measures, emissions from the transport sector will increase by around 1% by 2030 in comparison with 2016. Additional measures in the transport sector would reduce the sector's emissions by 28.4% compared to the projections with measures, reducing emissions 27.9% by 2040 in comparison with 2016.

The opportunities for reducing GHG emissions in the agricultural sector are primarily related to limiting GHGs related to the cultivation of arable land. The 2018 study 'Finding the most cost-effective measures for achieving climate policy and shared commitment objectives in Estonia' identifies which measures to group and plan together to make their implementation more effective. According to the study, it would be effective to group measures PM10, PM14 and PM15 relating to the use of arable land use and PM16, PM17 and partly also measure PM15 relating to fertilisation.

On 11 July 2019, the Climate and Energy Committee of the Government of the Republic was formed to discuss measures suitable for fulfilling the objectives and to formulate the government's position in relation to them.

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.

In domestic (environmental, climate and energy) activities, Estonia follows the EU's environmental, climate and energy policy and the related legal framework. National sectoral targets and national measures for achieving these are determined during preparation of the sectoral development plans.

5.2. Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills and social impacts of the planned policies and measures described in section 3

The NECP 2030 measures are predominantly laid out in current development plans, where the environmental impact assumed to be associated with implementation has been assessed on the basis of an environmental impact assessment and the Environmental Management System Act[213]. The development plans for forestry, agriculture, transport and waste management for the new planning period starting in 2021 are being prepared, and the environmental impact of the development plans will be reassessed during this process. The NECP 2030 measures are expected to have a positive environmental impact compared to the situation if these measures were not implemented. The negative impacts that may accompany the measures can be mitigated through implementation of NECP 2030. The environmental impacts expected from the NECP 2030 measures are described in the following tables.

Table 40 Estimated environmental impact of energy measures.

[213] https://www.riigiteataja.ee/akt/112122018045

No	ENERGY MEASURES	IMPACT
EN1	**Renewable energy support and support for efficient cogeneration of heat and power**	Environmental impact must be assessed when planning activities with significant environmental impact. The installation of wind electricity stations on a water body and other activities with significant environmental impact are listed in Section 6 of the Environmental Impact Assessment and Environmental Management System Act. **The majority of NECP 2030 energy measures were assessed during preparation of the NDPES 2030 SEA programme and report:** A significant impact on endangering biodiversity is associated with an increase in logging due to increased use of wood fuels. Additionally, the burning of wood fuels in spot and local heating causes health effects from $PM_{2.5}$, and this decreases as a result of the measure. A significant impact on energy security is associated with the growth of the share of imported fuels and energy, primarily due to the significant decrease in electricity generation from oil shale. The closure of old oil shale combustion plants significantly reduces the need to pump cooling water and groundwater from mines, and reduces GHG and pollutant emissions and waste generation. Wind farms and solar stations will not lead to significant negative impacts, but they have local effects, mainly in the form of visual disturbance due to landscape changes, and changes in the habitats, feeding and migration of birds and animals due to noise and shade from wind turbines. Negative impact on Natura 2000 areas can be avoided. No significant land use change is planned. No significant negative cross-border impact is expected.
EN2	**Support for investments in wind farms**	
EN3	**Development of the heating sector**	
EN4	**Additional development of the heating sector**	
EN5	**Renewable energy support via reverse auction (technology neutral)**	
EN6	**Renewable energy support via reverse auction (technology specific)**	
EN7	**Research and development activities programme of the energy development plan**	
EN8	**Increasing the quality of network services**	
EN9	**Increasing the share of the weatherproof network**	
EN10	**Transition to a remote reading system**	
EN11	**Synchronisation of the Baltic electricity system with the Continental Europe synchronous area**	
EN12	**Acquisition of air surveillance radars (also radio systems, as appropriate) for development of wind farms**	
EN13	**Pre-development of offshore wind farms (connection, planning), joint project**	

Table 41 Estimated environmental impact of the transport measures.

No	TRANSPORT MEASURES	IMPACT
TR1	**Increasing the share of biofuels in the transport sector**	**The majority of NECP 2030 transport measures were assessed during the preparation of the NDPES 2030 SEA programme and report**[214]:
TR2	**Increasing the fuel efficiency of the transport sector**	
TR3	**Promotion of sustainable driving**	The significant impact on the endangering of biodiversity is two or three times smaller compared to the electricity and heating sectors, and the planned measures will reduce GHG and pollutant emissions. Increasing use of biofuels and electrical vehicles will reduce the negative environmental impact of transport. The production of biofuels does not have a significant global environmental impact, as in Estonia biomethane is mainly produced on the basis of wastewater and agricultural waste and is directed to existing gas network for use in gas-powered vehicles. The growing number of vehicles increases the fuel demand of vehicles and infrastructure developments, and therefore the importance of developing public transport grows; **During preparation of the strategic environmental assessment report**[215] **for the Transport Development Plan 2014-2020**: The assessment of the compliance of the plans in Chapter 4.2 of the Development Plan with the environmental targets showed that the Development Plan promotes the use of energy from renewable sources and the achievement of environmentally friendly modes of transport, reduces transport noise, reduces the need for transport by directing the settlement and production structure, and reduces the number of victims of traffic accidents. At the same time, the following risks exist: the measures contained in the Development Plan are not sufficient to break the link between
TR4	**Spatial and land use measures in cities to increase the fuel-efficiency of transport and enhance the transportation system**	
TR5	**Development of convenient and modern public transport**	
TR6	**Time-based road charge for heavy goods vehicles**	
TR7	**Aid for the purchase of electric vehicles**	
TR8	**Additional enhancement of fuel-efficient driving**	
TR9	**Additional spatial and land use measures in cities to increase the fuel-efficiency of transport and enhance the transportation system**	
TR10	**Additional activities for the development of convenient and modern public transport**	
TR11	**Establishment of mileage-based road charges for heavy goods vehicles**	
TR12	**Tyres and aerodynamics of vehicles**	
TR13	**Development of railway infrastructure (incl. construction of Rail Baltica)**	
TR14	**Electrification of railways**	
TR15	**Electrification of ferries**	
TR16	**Transfer of public transport to biomethane and electricity**	

[214] https://energiatalgud.ee/index.php/ENMAK:Dokumentatsioon
[215] https://www.mkm.ee/sites/default/files/transpordi_arengukava_2014-2020_ksh_aruanne.pdf

		economic growth and transport demand; with the improvement of public transport conditions, car use and energy consumption in the transport sector continue to increase; greenhouse gas emissions will not be reduced but the aim is to limit them; all measures included in the Development Plan aimed at reducing transport demand and introducing alternative fuels and encouraging their use contribute in part to limiting the spread of pollutant emissions, but the Development Plan still envisages an increase in the number of movements (incl. an increase in vehicle traffic), meaning that the reduction of pollutant emissions might not be guaranteed.

Table 42 Estimated environmental impact of building stock measures.

No	BUILDING STOCK MEASURES	IMPACT
HF1	**Renovation of public sector and business buildings**	**The majority of NECP 2030 building stock measures were assessed during preparation of the NDPES 2030 SEA programme and report:** Renovation of a building reduces the building's energy demand by up to half, hence reducing both fuel needs and emissions. At the same time, the electricity demand of the building increases with installation of forced ventilation, heat pumps, smart home solutions etc. To cover the growing power demand, there are energy measures for renewable energy, efficient cogeneration and security of supply. As a result of the building stock measures, the energy efficiency of Estonian building stock will increase, the indoor climate of buildings will improve, and so will the people's health (people are indoors 80-90% of the time); the lifetime and usability of buildings will be extended, and the value of property will increase.
HF2	**Renovation of private homes and apartment buildings**	
HF3	**Establishment of minimum requirements for nearly zero-energy buildings**	
HF4	**Investments in street lighting reconstruction programme**	
HF5	**Additional renovation of public sector and business buildings**	
HF6	**Additional reconstruction of private homes and apartment buildings**	

Table 43 Estimated environmental impact of agricultural measures.

<table>
<tr><th>No</th><th>AGRICULTURAL MEASURES</th><th>IMPACT</th></tr>
<tr><td>PM1</td><td>Organic farming</td><td rowspan="5">The majority of the NECP 2030 agricultural measures were assessed during preparation of the Estonian Rural Development Plan 2014-2020 SEA programme and report[216]: According to Chapter 5.3.1, the measures of the rural development plan focus particularly on strengthening agriculture, improving the related social situation in the country and maintaining good environmental status.</td></tr>
<tr><td>PM2</td><td>Agri-environment-climate measure and its sub-measures</td></tr>
<tr><td>PM3</td><td>Support for climate-friendly and environmentally sustainable agricultural practices, so-called greening support</td></tr>
<tr><td>PM4</td><td>Knowledge transfer and information</td></tr>
<tr><td>PM5</td><td>Advisory services, farm management and farm relief services</td></tr>
<tr><td>PM6</td><td>Natura 2000 support for agricultural land</td><td rowspan="13">The application of the planned measures will result in better environmental status in rural areas compared with not applying the RDP measures in comparable conditions. The implementation of the measures as planned is not expected to lead to a deterioration of the state of the environment, but it is nevertheless important that the planned measures consistently ensure the protection of the environment and its improvement. According to table 5-2, the introduction of renewable energy and energy saving solutions, bringing buildings and equipment into line with current standards, land improvement, conservation of traditional landscapes, and protection of biodiversity, water and soil will have a direct positive impact.</td></tr>
<tr><td>PM7</td><td>Investments in diversification of economic activities in rural areas towards non-agricultural activities</td></tr>
<tr><td>PM8</td><td>Investments in enhancing effectiveness of farms</td></tr>
<tr><td>PM9</td><td>Animal welfare measure</td></tr>
<tr><td>PM10</td><td>Converting arable land on peat soils to permanent grassland</td></tr>
<tr><td>PM11</td><td>Production of bioenergy and increasing its share in agriculture</td></tr>
<tr><td>PM12</td><td>Improving the quality of feed for dairy cows</td></tr>
<tr><td>PM13</td><td>Increase in the share of grazing</td></tr>
<tr><td>PM14</td><td>Zero tillage</td></tr>
<tr><td>PM15</td><td>Winter plant cover</td></tr>
<tr><td>PM16</td><td>Precision fertilisation</td></tr>
<tr><td>PM17</td><td>Replacement of inorganic fertilisers with organic fertilisers</td></tr>
<tr><td>PM18</td><td>Investments in energy savings and renewable energy</td></tr>
</table>

[216] Estonian Rural Development Plan 2014-2020 https://www.agri.ee/et/eesmargid-tegevused/eesti-maaelu-arengukava-mak-2014-2020/seire-ja-hindamine/keskkonnamoju

	deployment in greenhouses and vegetable warehouses	
PM19	**Neutralisation of acid soils**	
PM20	**Improvement of manure management**	
PM21	**Audits of larger farms**	
PM22	**Research and pilot projects**	

Table 44 Estimated environmental impact of waste management measures.

No	WASTE MANAGEMENT MEASURES	IMPACT
JM1	**Percentage restriction of biodegradable waste going to landfills and increasing the volume of waste taken for recycling**	The measures are included in the National Waste Plan 2014-2020, where Chapter 7.2 of the conclusions of the SEA[217] indicate that implementation of the waste plan measures will not lead to a significant negative environmental impact, incl. environmental pollution or the deterioration of Natura 2000 sites. In the case of new installations, this is precluded by compliance with current environmental law. Estonia's circular economy strategy and action plan will be completed by the end of 2021[218].
JM2	**Reduction of landfilled waste (incl. biodegradable waste)**	
JM3	**Promoting the prevention and reduction of waste generation, incl. reducing the hazardousness of waste**	
JM4	**Reduction and monitoring of environmental risks from waste and improvement of supervision.**	

Table 45 Estimated environmental impact of forestry measures.

No	FORESTRY MEASURES	IMPACT
MM1	**Increasing the net growth of forests and carbon capture capacity for mitigating climate change through timely reforestation**	According to table 5-2 of the Estonian Rural Development Plan 2014-2020 SEA report, maintenance improves the carbon capture capacity of a forest stand, storm damage is prevented, and carbon is stored in long-lived products when the accumulated wood is taken for use in the timber industry.
MM2	**Promoting the regeneration of managed private forests with tree species compatible with the habitat type**	

[217] https://www.envir.ee/sites/default/files/jaatmekava_keskkonnamoju_strateegiline_hindamine.pdf
[218] Circular economy https://ringmajandus.envir.ee/

MM3	**Improving forest health and preventing the spread of hazardous negative factors**	**The SEA report of the Forestry Development Plan to 2020** highlights the destruction of resources as a significant negative economic impact if less is grown than is felled during the longer term. Rural municipal roads are damaged by higher volumes of logging, and uninventoried and valuable old forests can be destroyed by active use of timber. The NECP 2030 forestry measures are all expected to have a positive environmental impact; a negative impact on biodiversity may be associated with fragmentation of forests in connection with an uncontrolled increase in timber production (measure MM4). Such a development is likely to be ruled out, since **the majority of managed forest land in Estonia has a certificate of sustainable forest management (1.75 million ha of forest land without economic restrictions)**, incl. 1.5 million ha with an FSC[219] and 1.2 million with a PEFC[220] certificate. 100% of state forest land has both certificates.
MM4	**Reduction of environmental impacts related to the use of fossil fuels and non-renewable natural resources by increasing the production and use of Estonian timber**	
MM5	**Natura 2000 support for private forest land**	
MM6	**Investments in forest area development and improvement of forest viability**	
MM7	**Ensuring the protection of habitats**	
MM8	**Preservation of biological processes and maintenance of populations of species common in Estonia**	

Table 46 Estimated environmental impact of industrial process measures.

No	INDUSTRIAL PROCESS MEASURES	IMPACT
TÖ1	**Prohibitions, restrictions and obligations arising from Regulation (EU) No 517/2014 on fluorinated GHGs and Directive 2006/40/EC relating to emissions from air-conditioning systems in motor vehicles**	As a result of the measure, GHG emissions will be reduced, i.e. the measure will have a positive environmental impact.

Table 47 Estimated environmental impact of cross-sectoral measures.

[219] Monthly Figures https://fsc.org/en/page/facts-figures
[220] PEFC Annual Review 2018 pefc.org

No	INDUSTRIAL PROCESS MEASURES	IMPACT
IP1	**Green technology investment programme**	As a result of the measure, GHG emissions will be reduced and the measure will have a positive impact. The measure also contributes to the promotion of entrepreneurship related to mitigating and combatting climate change.

Tables 48, 49 and 50 present the macroeconomic impact of the planned policies and measures in the agricultural, transport and energy sectors under point 3 of the Plan up to 2030. The impact assessments are from the 2018 study 'Finding the most cost-effective measures for achieving climate policy and shared commitment objectives in Estonia'[221].

Table 48 Macroeconomic impact of planned measures in the agricultural sector.

Marginal cost €/tCO_{2e}	GDP change, M€ 2030	Macroeconomic impact	Impact on health, environment, employment and education, skills and social impact
PM11 Production of bioenergy and increasing its share in agriculture			
428	2.0	Although this is a measure with high production demand, the impact on GDP is positive as a result of import replacement and the promotion of local manufacturing. The foreign trade balance is also improved. The GDP change takes place via the biomethane production process plus indirect and induced effects. 20% of the effects occur via the agricultural sector.	The measure has the positive spillover effect of reducing nitrogen leaching and the higher value of digestates as fertiliser compared to unprocessed manure. The impact is also positive in terms of energy security and reducing the use of fossil fuel.
PM10 Converting arable lands on peat soils to permanent grassland			
14	-0.7	The decreasing profitability in agriculture weakens competitiveness. As a result of the drop in purchasing power, GDP will decrease and the balance of foreign trade will improve again. The GDP change takes place through the reduction of farmers' profitability, in addition to indirect and induced effects. 69% of the effects occur via the agricultural sector.	Reduced air pollution (particulates) also marginally reduces heart and lung disease, which in turn prolongs healthy life expectancy (incl. working time) and slightly reduces the pressure on health care spending. The impact on biodiversity is also positive. The need for liming is also reduced. Reducing soil leaching also leads to an increase in soil carbon stocks and soil fertility. Eutrophication of surface water bodies and groundwater pollution are reduced. The latter, in turn, reduces the resources needed to implement the

[221] https://www.kik.ee/sites/default/files/aruanne_kliimapoliitika_kulutohusus_final.pdf

			state's obligation to achieve the good status of water bodies. The reduced pressure on water bodies from diffuse pollution also brings a positive impact for fisheries.
PM12 Improvement of the quality of feed for dairy cows			
113	-2.1	Implementation of the measure means that additional expenditure will be incurred in agriculture and as a result the added value (profitability) will decrease. Overall, however, the macroeconomic impact is still marginal. The GDP change takes place via a fall in farmers' profitability plus indirect and induced impacts. It is estimated that 69% of the cumulative GDP impact occurs via the agricultural sector. However, reduced purchasing power improves the foreign trade balance.	Since the market of the agricultural produce is open to international competition, the additional costs mean a negative impact on the competitiveness of Estonian dairy farmers and the risk of carbon leakage. Appropriate support for dairy farmers should therefore be considered when implementing the measure.
PM13 Increase in the share of grazing			
1213	-8.0	Profitability in agriculture improves and competitiveness is strengthened. As the result of the strengthened purchasing power (through increased profitability), imports increase and the impact on the foreign trade balance is negative. The GDP change takes place through a rise in farmers' profitability plus indirect and induced impacts. 69% of the impacts occur via the agricultural sector.	If the pasture lands are established through the restoration of semi-natural biotic communities, the impact on biodiversity will be more positive (especially on coastal grasslands) - lower plants receive more light and trampling promotes seed germination). Reduction of soil leaching also leads to an increase in soil carbon stocks soil fertility. Eutrophication of surface water bodies and groundwater pollution are reduced. The latter, in turn, reduces the resources needed to implement the state's obligation to achieve the good status of water bodies. The reduced pressure on water bodies from diffuse pollution also brings a positive impact for fisheries. There is positive impact on animal welfare and health - grazing is considered to be the most healthy to keep animals. The risk of the spread of infectious diseases is negative.
PM14 Zero tillage			
-400	7.0	The increasing operating surplus (profit) in agriculture has a positive effect on GDP growth and, through indirect effects, also on employment. However, imports increase through the improvement	Reduced air pollution (particulates) marginally reduces heart and lung disease, which in turn prolongs healthy life expectancy (incl. working time) and slightly reduces the pressure on health care spending. Zero tilling reduces soil

		of purchasing power. The competitiveness of farm holdings is improved. The GDP change takes place via a rise in farmers' profitability, plus indirect and induced impacts. 69% of the impacts occur via the agricultural sector.	degradation, which also slows the decrease in the area of arable land, which has become a global problem. Reducing soil leaching also leads to an increase in soil carbon stocks soil fertility. Eutrophication of surface water bodies and groundwater pollution is reduced. The latter, in turn, reduces the resources needed for implementing the state's obligation to achieve the good status of water bodies. The reduced pressure on water bodies from diffuse pollution also has a positive impact on fisheries. The negative effect of the spread of pests and plant diseases is possible, so there is a need for greater use of chemicals (pesticides).
PM15 Winter plant cover			
43	-2.4	The decreasing operating surplus (profit) in agriculture has a negative effect on GDP growth and, through indirect impacts, also on employment. The competitiveness of farm holdings is weakened. The GDP change takes place via decreased profitability of farmers, plus indirect and induced impacts. 69% of impacts occur via the agricultural sector.	Air pollution (particulates) marginally contributes to heart and lung disease, which in turn reduces healthy life expectancy (incl. working time) and slightly increases the pressure on health care spending. However, a positive impact arises from the reduction of nitrogen leakage into the soil.
PM16 Precision fertilisation			
-166	5.0	The increasing operating surplus (profit) in agriculture has a positive effect on GDP growth and employment. Reducing fertiliser imports has a positive effect on foreign trade. The GDP change takes place via rise in farmers' profitability, plus indirect and induced impacts. 75% of impacts occur via the agricultural sector.	The measure has a positive spillover effect through the reduction of nitrogen leakage (i.e. leaching into water bodies). This also has a favourable effect on soil biota, increasing soil fertility. Eutrophication of surface water bodies and groundwater pollution is reduced. The reduced pressure on water bodies from diffuse pollution also has a positive impact on fisheries.
PM17 Replacement of inorganic fertilisers with organic fertilisers			
-143	2.1	The increasing operating surplus (profit) in agriculture positively effects the growth of GDP and also employment. The reduction fertiliser imports has a positive effect on foreign trade. The GDP change takes place via the improvement in farmers' profitability plus indirect and induced impacts. 74% of impacts occur via the agricultural	The measure has a positive spillover effect from the reduction of nitrogen leakage into the soil, which decreases eutrophication of surface waters and groundwater pollution, and has a positive impact on the fisheries sector.

		sector.	

Table 49 Macroeconomic impact of planned measures in the transport sector.

Marginal cost €/tCO2e	GDP change, M€ 2030	Macroeconomic impact	Impact on health, environment, employment and education, skills and social impact
TR7 Aid for the purchase of electric vehicles			
-397	-11.2	The measure increases costs in the public sector and savings in the private sector. Taken together, the divergent effects will have a negative impact on GDP and employment.	Reduced air pollution (particulates) marginally reduces the risk of heart and lung disease, which in turn prolongs healthy life expectancy (incl. working time) and slightly reduces the pressure health care spending. Energy security increases as dependency on petroleum-based imported car fuel is reduced.
TR8 Additional promotion of fuel-efficient driving			
-251	3.7	The measure results in a certain positive impact on the economy through additional purchasing power. Reducing the use of imported fuels leads to an additional positive impact on foreign trade, but the effect of the shift in purchasing power (from fuels and other car costs) on the increase in imports will be more pronounced and, and the balance will deteriorate overall. All direct impacts occur via the transport sector.	Reduced air pollution (particulates) marginally reduces the risk of heart and lung disease, which in turn prolongs healthy life expectancy (incl. working time) and reduces the pressure on health care spending. The number of accidents also decreases.
TR10 Additional activities for the development of convenient and modern public transport;			
-335	-18.9	This measure has the greatest impact on the road transport sector (public transport). Negative effects arise from fuel consumption and activities related to passenger cars (maintenance, sale, insurance). Overall, the negative impacts outweigh the positive ones (in terms of GDP and employment). The impact of the transport sector on GDP is positive, through the development and growth of public transport. All positive direct and indirect effects come from the transport sector. However, the overall effect is still negative due to public expenditure.	Reduced air pollution (particulates) marginally reduces the risk of heart and lung disease, which in turn prolongs healthy life expectancy (incl. working time) and slightly reduces the pressure on health care spending. In addition, the number of accidents is reduced, as is expenditure on vehicle repair. People will lower incomes will benefit more from the measure, so there will be some income redistribution effect.
TR9 Additional spatial and land use measures in cities to increase the fuel-efficiency of transport and enhance the transportation system			
-264	-17.9	This measure will generate cost savings and increase purchasing power in the private sector, with	Reduced air pollution (particulates) marginally reduces heart and lung disease, which in turn prolongs

		public sector costs exceeding revenues. Overall, the negative effects on the economy outweigh the positive ones. However, the measure will have a negative impact on the added value of the transport sector through reducing car sales and repair services.	healthy life expectancy (incl. working time) and reduces the pressure on health care spending. The number of accidents also decreases, as does expenditure on vehicle repair.
TR11 Establishment of mileage-based road charges for heavy goods vehicles;			
147	15.0	The measure leads to increased costs in the private sector and additional revenue in the public sector (road charges received exceed costs and tax revenue reduction). Overall, the positive effects on the economy outweigh the negative ones.	Reduced air pollution (particulates) reduces the risk of heart and lung disease, which in turn extends the time of living healthy life expectancy (incl. working time) and marginally reduces the pressure health care spending. The number of accidents also decreases, as does expenditure on vehicle repair.
TR12 Tyres and aerodynamics of vehicles			
222	-5.8	The measure increases costs in the public sector and savings in the private sector. Taken together, there will be a negative impact on GDP, but employment will even increase, albeit minimally, in particular through motor vehicle repair services	Reduced air pollution (particulates) reduces the risk of heart and lung disease, which in turn prolongs healthy life expectancy (incl. working time) and marginally reduces the pressure on health care spending. The number of accidents also decreases, as does expenditure on vehicle repair.
TR15 Development of railway infrastructure (incl. construction of Rail Baltica)			

74	8.5	This measure will lead to an increase in public sector costs due to the great need for subsidies, and savings in the private sector. A significant rise in employment is naturally expected during the construction period.	One negative spillover effect is that an estimated of 560 ha of forest land needs to be deforested during the construction of the railway route (taking into consideration the need for deforestation of a railway corridor of up to 50 m). The maturity of the forests in the way of the railway has not been separately assessed. Emissions from deforestation of 560 ha of forest amount to approx. 282 tonnes of CO2e, i.e. 0.28 million tonnes of CO2e. Considering the areas deforested in previous years (ca 200-600 ha per year), deforestation due to Rail Baltica may amount to 560 ha over several years, which may hinder Estonia’s compliance with climate agreements, especially if deforestation takes place after 2020. During the construction period of Rail Baltica, Estonia must take into account additional emissions when fulfilling land use and forestry sector obligations. As a mitigation measure, the timber harvested during construction of Rail Baltica must be transformed to the maximum possible extent in Estonia.

Table 50 Macroeconomic impact of planned measures in the energy sector.

Marginal cost €/tCO2e	GDP change, M€ 2030	Macroeconomic impact	Impact on health, environment, employment and education, skills and social impact
EN4 Additional development of the heating sector			
45	-1.5	The replacement of district heating with block heating increases costs in the private sector (building owners). In summary, there will be some negative impacts on both GDP and employment.	The impact of the measure can be assessed as negative: emissions to ambient air may increase as better controllable and high boilers in district heating stations are replaced with many local boilers. The measure may create fertile ground for the development of new ideas or innovation.
32	0.0	The reconstruction of heating pipelines is expected to create additional costs for district heating. Overall, however, the macroeconomic impact is still marginal.	The measure has slight positive health effects (reduced risk of heart and lung disease) that will prolong healthy life expectancy (incl. working time) and marginally reduce the pressure on health care spending (reduces the need for heat production, which in turn

			reduces ambient air emissions). The reduced use of imported fossil fuels will have a positive impact on energy security.
-12	-0.3	The renovation of boiler houses is expected to lead to cost savings in district heating. Overall, however, the macroeconomic impact is marginal.	The measure has slight positive health effects (reduced risk of heart and lung disease) that will prolong healthy life expectancy (incl. working time) and marginally reduce the pressure on health care spending (reduces the need for heat production, which in turn reduces ambient air emissions). The reduced use of imported fossil fuels will have a positive impact on energy security.
HF5 Additional renovation of public sector and business buildings			
9	-1.8	The measure will lead to increased costs in the public sector due to the need for subsidies, and savings in the private sector. In summary, there will be some negative effects on GDP, but positive effects on employment. A significant rise in employment can be expected during the renovation period.	The measure has slight positive health effects (reduced risk of heart and lung disease) that will prolong healthy life expectancy (incl. working time) and marginally reduce the pressure on health care spending (reduces the need for heat production, which in turn reduces ambient air emissions). The reduced use of imported fossil fuels will have a positive impact on energy security.
HF6 Additional renovation of private homes and apartment buildings			
Renovation of private homes			
-138	-15.9	The measure will lead to increased costs in the public sector due to the high need for subsidies, and savings in the private sector. Overall, there will be some negative effects on GDP, but positive effects on employment. A significant rise in employment can be expected during the renovation period.	The measure has slight positive health effects (reduced risk of heart and lung disease) that will prolong healthy life expectancy (incl. working time) and marginally reduce the pressure on health care spending (reduces the need for heat production, which in turn reduces ambient air emissions). A positive accompanying effect is the improvement of living conditions and an increase in property value as a result of the renovation of building stock. The reduced use of imported fossil fuels will have a positive impact on energy security.
Renovation of apartment buildings			
8	-9.0	The measure will lead to increased costs in the public sector due to the high need for subsidies, and savings in the private sector. Overall, there will be some negative effects on GDP, but positive effects on employment. A significant rise in employment can be expected during	The measure has slight positive health effects (reduced risk of heart and lung disease) that will prolong healthy life expectancy (incl. working time) and marginally reduce the pressure on health care spending (reduces the need for heat production, which in turn reduces ambient air emissions). The

		the renovation period.	reduced use of imported fossil fuels will have a positive impact on energy security.

5.3. Overview of investment needs

i. Existing investment flows and forward investment assumptions with regard to the planned policies and measures

In order to achieve the country's targets and implement the measures of the national energy and climate plan needed for this purpose, the contribution of the private, public and non-profit sectors must be combined.

Given the large investment needs of public sector activities, all available resources must be used to implement the activities, including national tax revenues, co-financing from relevant EU funds, income from trading GHG emission allowances and financial instruments with reasonable terms.

The European Commission's proposal for the EU long-term budget framework 2021-2027 (submitted in 2018, still under negotiation as at October 2019) provides, inter alia, for EU funding for activities contributing to climate and energy goals. According to the Commission's proposal, at least 25% of the EU's budgetary framework should contribute horizontally to achieving climate goals. The contribution of various EU funds to climate goals is planned differently depending on their specifics, including at least 40% of CAP funds (direct agricultural payments and the rural development fund), 37% of Cohesion Fund resources, 30% of ERDF resources, 30% of EMFF resources, 35% of funds under Horizon Europe – the Framework Programme for Research and Innovation, and 60% of the funds under the Connecting Europe Facility (investment in transport, energy and digital infrastructure). As of the end of October 2019, the establishment of the Just Transition Fund is also likely to assist the regions most impacted by the GHG reduction target in carrying out the activities necessary for achieving a just transition. The sources for this new fund have not yet been agreed. It is important that the creation of the fund does not harm those parts of the EU budgetary framework (cohesion policy, common agricultural policy and the Connecting Europe Facility) that contribute to climate targets above the expected average of 25% of the MFF.

To achieve climate and energy policy targets, it is important that the conditions for the next (2021- 2027) and subsequent EU budgetary frameworks are negotiated, prepared and implemented in the same way as other horizontal objectives and duly taken into account when designing criteria and conditions for different EU budget programmes, to enable synergies to be achieved by contributing to other key objectives. In doing so, it is necessary to avoid undue constraints on the ability of countries and project implementers to combine resources from different sources (incl. various EU programmes and other options, and increasingly financial instruments alongside grants) to contribute to climate policy goals in order to achieve rapid movement towards targets and facilitate the finding and implementation of optimum solutions. It is also important that in addition to activities that directly contribute to climate policy targets, activities that contribute to these indirectly should also be financed, as without them the achievement of GHG emission reduction targets is not realistic. The feasibility of implementing the actions of the climate and energy plan also depends, inter alia, on the fact that the updating of the rules and regulations on EU state aid will take account of market failures that occur in achieving the just transition of the regions most dependent on use of (solid) fossil fuels and the need to encourage the overcoming of these, specifically adjusting public sector contributions where necessary and justified.

In 2019 and in coming years, the state's tax revenue, EU 2014-2020 budgetary framework funds (primarily the European Regional Development Fund, Cohesion Fund, Connecting Europe Facility, and to a lesser extent also the Rural Development Fund, LIFE and Horizon 2020), as well as auctioning revenue from the EU ETS system (in line with the objectives set out in Article 10(3) of Directive 2003/87/EC117, Section 161(4) of the Atmospheric Air Protection Act and the state budget strategy) will be used to implement the NECP 2030 measures. The state budget strategy (which is prepared for at least four years in accordance with the State Budget Act) defines the financing volumes to be used during the strategy period, incl. the planned distribution of EU structural and investment funds (Structural Funds, Rural Development Fund, Maritime and Fisheries Fund) and GHG allowance auctioning proceeds. In order to implement measures contributing to the goals of climate and energy policy Estonia directed structural and investment fund support in the amount of approx. € 796.1 million during the EU budget period 2014-2020, incl. the promotion of energy efficiency, sustainable transport and energy and resource efficiency of enterprises[222]. According to the state budget strategy (2020-2023), measures will be funded from GHG allowance auctioning revenue in the total amount of € 269.8 million during the period 2013-2020.

The development of renewable energy is facilitated on the basis of the Electricity Market Act by directing the fee for renewable energy collected from energy consumers to energy producers, using other measures related to taxes and fees (which are reviewed in Section 3.2) and organising consumer awareness and information activities (incl. e.g. in cooperation with the Kredex and Environmental Investment Centre foundations). The private sector – residents, associations, enterprises – invest in the development of energy efficiency and renewable energy with their own resources (this is encouraged with various public support measures, including support for energy audits).

To achieve the targets of the NECP 2030, it is planned to continue combining various investment sources in the next EU budget period 2021-2027, gradually increasing the share of financial instruments to encourage the choice of activities for implementation, inter alia, on the basis of their economic viability and to increase leverage in the use of public funds.

According to preliminary estimates as of autumn 2019, the public sector expenditure needs in 2021-2030 for the implementation of NECP 2030 measures in the energy sector amount to € 347 million, of which € 589 million in transport, € 1.046 billion for the renovation of building stock and € 278.5 million in

[222] https://www.struktuurifondid.ee/et/toetatavad-valdkonnad

agriculture, totalling an average of approx. € 226 million per year for all these sectors. In addition, investments are expected from the private and non-profit sectors. The more specific distribution and schedule of measures and the state budget funds planned for their implementation will be decided upon the preparation of the medium-term state budget strategy (the strategy is updated annually in the spring).

ii. Sector or market risk factors or barriers in the national or regional context

The main risk factors for energy management, incl. the market, are continuous variables related to balancing unmanaged and/or weather-dependent energy sources (solar, wind, hydropower, biomass) and managed capacities during peak demand, fluctuations in fuel and CO_2 prices, regulatory tightening, technology development, the geopolitical situation and the technical security of supply. The obstacles include competencies at different levels (incl. avoiding investments that run counter to national targets; gaps in climate, environment and technology knowledge and insufficient dissemination of this knowledge) to cope with these variables continuously, incl. keeping up with digital technology and other innovations. The implementation of most of the above measures, incl. related investments, requires the following conditions to be met:

- Monitoring global and local energy markets;
- A stable regulatory space (incl. strategic planning);
- The existence of competencies, continuous increase of these and dissemination of awareness;
- The availability of technology and technical capability;
- Cross-sectoral cooperation:
- Systematic monitoring of the implementation of measures.

iii. Analysis of additional public finance support or resources to fill identified gaps identified under point ii.

To implement the measures, incl. determining the resources necessary for investments, the following is necessary:

- The creation of indicators and a platform for monitoring changes in the energy market, and participation in international cooperation
- The timely engagement of the sector in the application of EU legal requirements (to take into account the time available for the transposition of legal requirements and public consultation on the timetable for the implementation of measures)
- The organisation of training sessions and internships to increase competencies related to the implementation of measures, investments, the application of new requirements (analysis of knowledge related to the application of measures and training needs), information campaigns, continuous updating of training programmes (regular analysis of training needs).
- The presence of affordable technologies and a workforce (regular analysis of technologies and the workforce)
- Diversification of cooperation methods
- Yearly assessment of the implementation of the measures and, if needed, proposals for increasing their beneficial impact based on that assessment.

5.4. Impacts of planned policies and measures on other Member States and regional cooperation

This chapter should cover the impact of the policies and measures proposed under Chapter 3 on other Member States and regional cooperation, up to at least the last year of the period covered by the plan, including a comparison with forecasts of existing policies and measures.

i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible.

Electricity infrastructure measures (see Chapter 2.4.2 for more details) primarily address the synchronisation of the electricity systems of the Baltic States with the frequency band subject to EU law. Within the framework of the Baltic synchronisation project, activities will take place in Estonia, Latvia, Lithuania and Poland. Investments in synchronisation will strengthen both cross-border connections and the national electricity transmission network. This will remove bottlenecks in the electricity system and increase the interconnectivity of the Baltic and Polish energy grids. In 2017, the connectivity level of the Baltic States electricity system was >60% in 2017. In the same year, the connectivity level of Poland was 4%[56]. Investments in the context of the synchronisation of the Baltic States will increase it by 2.4 percentage points[62]. Hence the activities planned under the synchronisation project will have a significant positive impact on the electricity systems of Member States in the neighbouring region and in other regions.

Meeting the targets of the national energy and climate plans is not expected to have significant negative impacts on the other Baltic States. On the contrary, aspects such as the development of offshore wind farms will have a positive impact on the region's energy supply. According to monitoring programmes for existing wind farms, e.g. in the North Sea, offshore wind farms can be built without significant damage to the environment through appropriate planning and mitigation measures. When planning, it must be taken into account that in addition to being technologically suitable solutions, offshore wind farms can also provide various seabed habitats[223].

At the end of 2018, the total capacity of the EU's offshore wind farms was 20 GW; as a result of current policies, this will multiply many times over the coming decades. The efficiency of new offshore wind farm capacities is 40-50% as a result of larger turbines and other technological upgrades, being comparable to those of gas and coal stations in some areas, and exceeding those of on-shore wind farms and solar plants[224].

The interconnectivity level in the Baltic States is over 60%, which will increase with synchronisation of the electricity system with the European network. The connection capacity between Estonia and Latvia will be 700 MW until 2025, after which it will double.

The Baltic States have coordinated the exchange of national energy and climate plan measures and have assessed the possible impacts of the measures on neighbouring

[223] WWF 2014 Environmental Impacts of Offshore Wind Power Production in the North Sea https://www.wwf.no/assets/attachments/84-wwf_a4_report___havvindrapport.pdf
[224] IEA 2019 Offshore Wind Outlook 2019 https://www.iea.org/offshorewind2019/

countries. Most measures do not have a negative effect on other countries. Direct cross-border impact are expected to occur with electricity and gas network development projects. This impact is generally positive, especially in terms of energy prices and energy market integration.

Estonia and Latvia are also the biggest manufacturers of wood pellets[225], supplying the European countries who lack the renewable energy sources. The cooperation of the sector has become stronger in the wood supply (incl. wood chips and wood pellets) to the wood industry and energy sector, e.g. Baltpool initiated by the Lithuanian operator[226]. Cooperation opportunities of the Nordic countries and Baltic States are also sought for the development of future technologies (energy storage, CCUS, hydrogen, etc.).

ii. Impacts on energy prices, utilities and energy market integration.

One result of the Baltic States electricity system is the convergence of the electricity exchange price in the three countries. In 2017, the electricity exchange price was 5.8% higher in Lithuania and 4.5% higher in Latvia than in Estonia. At the same time, the electricity exchange price in Estonia was essentially the same as in Finland (33.2 €/MWh)[227]. Thus, the planned electricity infrastructure measures will have a positive impact on both the energy exchange price and electricity market integration.

iii. Where relevant, impacts on regional cooperation

The Baltic States electricity system synchronisation project has a major impact on the Baltic States and Poland, and this has created a need for very intensive regional cooperation. In the most important formats, such as the Energy Committee of the Baltic Council of Ministers and the BEMIP high-level and technical working groups, cooperation has intensified in recent years. Both cooperation forms regularly monitor the implementation of the project and resolve issues and problems raised.

[225] Graanul Invest https://www.graanulinvest.com/eng/frontpage
[226] Baltpool https://www.baltpool.eu/lv/
[227] Nord Pool Spot. Day ahead prices. https://www.nordpoolgroup.com/Market-data1/Dayahead/Area-Prices/ALL1/Yearly/?view=table

EXECUTIVE SUMMARY of NECP 2030

ANNEX IA LIST OF PARAMETERS AND VARIABLES TO BE REPORTED IN SECTION B OF THE NATIONAL PLAN

Table in Excel

ANNEX IB GREENHOUSE GAS EMISSIONS AS REQUESTED IN SECTION B OF THE NATIONAL PLAN BY IPCC SECTOR AND GAS

Table in Excel

ANNEX II KPP 2050 POLICIES AND PRINCIPLES

ANNEX III RELATIONSHIP BETWEEN NECP 2030 MEASURES AND THE OBJECTIVES OF THE PLAN

ANNEX IV DESCRIPTIONS OF THE MEASURES

Table in Excel

ANNEX V REPLIES TO THE COMMENTS RECEIVED ON THE DRAFT NECP 2030