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MINISTRY OF ENERGY OF THE REPUBLIC OF LITHUANIA

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Permanent Representation of Lithuania to the European
In the Union

07/2023

ON THE DRAFT UPDATE OF THE NATIONAL ENERGY AND CLIMATE PLAN OF THE REPUBLIC OF LITHUANIA 2021-2030

The Ministry of Energy of the Republic of Lithuania hereby submits information on the draft update of the Lithuanian National Energy and Climate Plan 2021-2030 to Ilze Juhansone, Secretary-General of the European Commission, Ditte Juul Jørgensen, Director-General for Energy and Kurt Vandenberghe, Director-General for Climate Action. You are kindly requested to forward the information contained in the Annex to this letter to the European Commission.

THE FOLLOWING IS ADDED:

1. Cover letter, 2 pages.
2. Draft updated National Energy and Climate Plan of the Republic of Lithuania 2021-2030, 269 pages.
3. Annex 1 to the draft update of the National Energy and Climate Plan of the Republic of Lithuania 2021-2030, 6 pages.
4. Annex 2 to the draft update of the National Energy and Climate Plan of the Republic of Lithuania 2021-2030, 10 pages.
5. Annex 3 to the draft update of the National Energy and Climate Plan of the Republic of Lithuania 2021-2030, 18 pages.
6. Annex 4 to the draft update of the National Energy and Climate Plan of the Republic of Lithuania 2021-2030, 41 pages.
7. Annex 5 to the draft update of the National Energy and Climate Plan of the Republic of Lithuania 2021-2030, 8 pages.

Deputy Minister

Daiva Garbaliauskaitė

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Ms Ilze Juhansone Secretary-General European Commission

24th of July 2023

MS Ditte Juul Jørgensen Director-General for Energy European Comission

MR Kurt Vandenberghe
Director-General for Climate Action European Commission

SUBMISSION OF THE DRAFT UPDATE OF THE INTEGRATED NATIONAL ENERGY AND CLIMATE PLAN OF THE REPUBLIC OF LITHUANIA

Of this letter I would like to delightfully inform You that the draft update of the latest notified Integrated Energy and Climate Plan of the Republic of Lithuania has been prepared. In accordance with the Regulation (EU) 2018/19991, the Ministry of Energy of the Republic of Lithuania is hereby submitting the draft update Plan to the European Commission.
The documents are drafted in Lithuanian and published on the official internet site of the Ministry of Energy of the Republic of Lithuania.
We look forward to continuing cooperation with the European Commission on the assessment of the Integrated National Energy and Climate Plans and receiving country-specific recommendations.

Annexes:

1. Draft Update of the Integrated National Energy and Climate Plan of the Republic of Lithuania, 269 pages.
2. Annex 1 to the draft update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 6 pages.
3. Annex 2 to the draft update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 10 pages.
4. Annex 3 to the draft update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 18 pages.
5. Annex 4 to the draft update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 41 pages.
6. Annex 5 to the draft update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 8 pages.

Yours Sincerely,

Minister Dainas Kreivy

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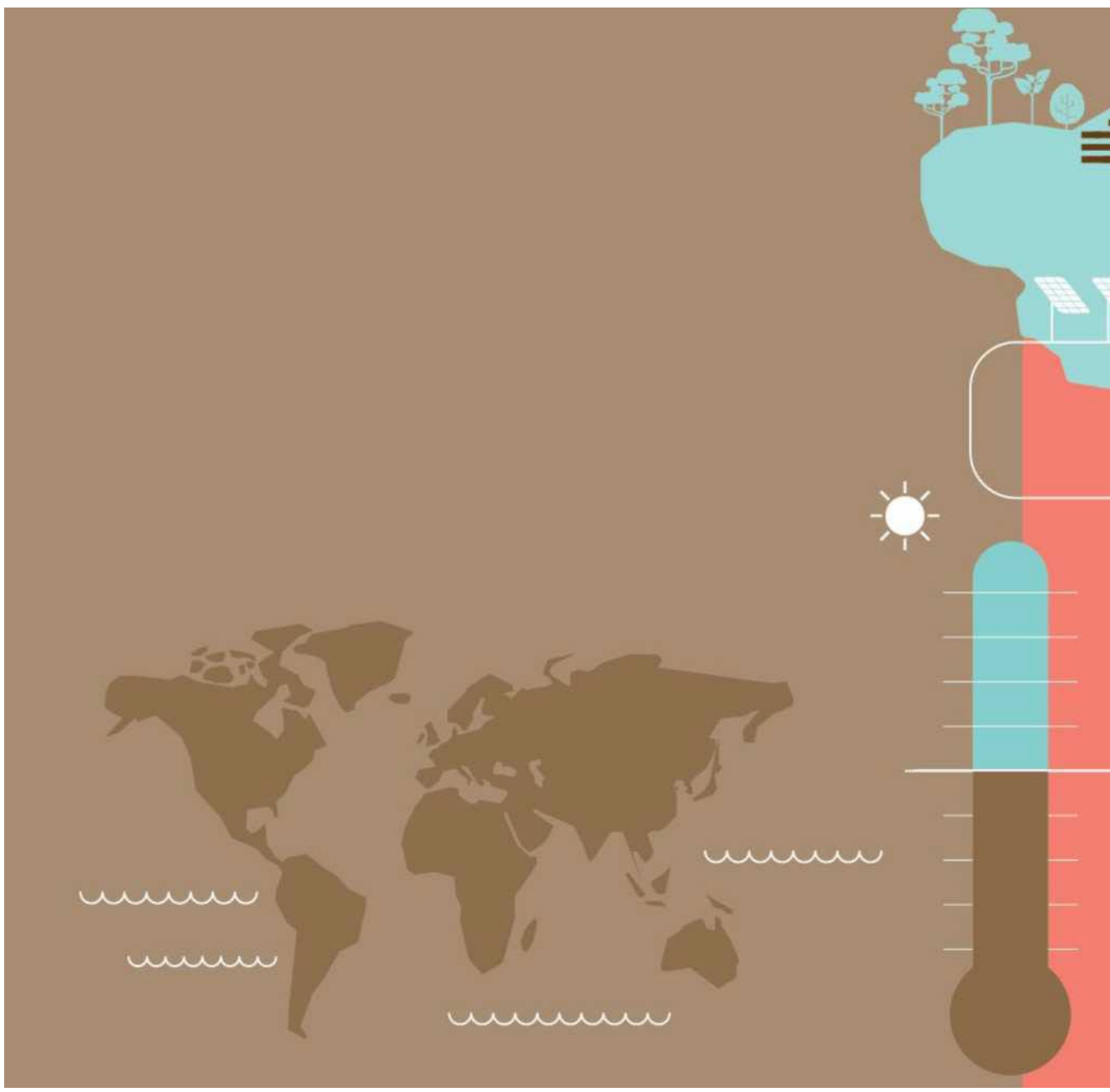
1 Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (Text with EEA relevance)

TO BE UPDATED
National Energy and CLIMATIVE ACTION PLAN of the REPUBLIC OF THE REPUBLIC 2021-2030
DRAFT



Abbreviations

ACER	Agency for the Cooperation of Energy Regulators
RES	Renewable energy resources
AEIB	Renewable Energy Communities
RES-E	RES electricity
RES-T	RES transport
AM	Ministry of the Environment
ETS	emission Trading System
BEMIP	Baltic energy market interconnection plan
BENTE	Baltic Energy Technology Scenario Study
BRI	Biopower Development Cluster
BRELL	Belarus, Russia, Estonia, Latvia and Lithuania
GDP	Gross domestic product
CAP	Common agricultural policy
CCU	Carbon Capture and Utilisation
CCUS	Carbon Capture, Utilisation and Storage
CERN	European Organisation for Nuclear Research
CO_2	Carbon dioxide
DH	District heating
DJPM	Sustainable urban mobility plans
KETS	Enabling technologies
OECD	Organisation for Economic Cooperation and Development
EE	Energy efficiency
EIB	The European Investment Bank
EIMIN	Ministry of Economy and Innovation
CEF	Connecting Europe Facility
EC	European Commission
ELLI	Project to increase the capacity of the gas interconnection between Latvia
ENMIN	Ministry of Energy
ENTSO-E	European network of transmission system operators for electricity
ESP	Existing policies and instruments
ERAA	European Resource Adequacy Assessment Study
EU	The European Union
EFSI	European Strategic Investment Fund
EC	European Council of European Leaders
FINMIN	Finance Ministry
FF55	FIT for 55 package to reduce greenhouse gas emissions by 55 % by 2030
GAEC	Standards for good agricultural and environmental condition
GIPL	Gas interconnection between Poland and Lithuania

GIS	Geographical Information Systems
GNG	Final Beneficiary
BAT	Best available technique
GWh	Gigawatt hour
GWP	Global warming potential
HAE	Pumped-storage power plant
HFCS	Hydrofluorocarbons
HHI	Herfindal-Hirschman Index
HVDC	High-voltage direct current
Ignalina NPP	Ignalina nuclear power plant
Ichokalian PDS	Ikykalis Underground Gas Storage
IPS/UPS	Electricity transmission network in part of the CIS States and the Baltic
LTRS	Long-term renovation strategy
IS	Information systems
IT	Information technology
UNFCCC	United Nations Framework Convention on Climate Change
KET	continental European Networks
KKJ	Kaunas CHP plant
CCIS	Climate Change Programme
ktoe	Tonnes of oil equivalent
LEI	Lithuanian Energy Institute
LitPol Link	Electricity interconnection between Lithuania and Poland
LOLE	*Lost* of Load Expectation
LMT	Science Council of Lithuania
LR	Lithuanian Republic
LTG	Lithuanian Railways
THE CCIC	Forestry, ecosystems, biodiversity, landscape
MTEPI	Research, experimental development and innovation
Mtoe	Million tonnes of oil equivalent
SMES	Small and medium-sized enterprise
MW	Megawatt
MWh	Megawatt-hour
N/A	Not applicable
N_2O	Nitrous oxide
NAOTMP	National air pollution reduction plan
NECPS	National Energy and Climate Action Plan of the Republic of Lithuania for
NENS	National strategy for energy independence
NCCVD	National climate change governance agenda
NCCAP	National Climate Action Plan
NCP	Products of national quality
NordBalt	Submarine power cable between Lithuania and Sweden

NOx	Nitrogen oxides
NAPS	National Progress Plan
NCCS	Independent heat producers
FIGURE	Environmental Assessment
PPPS	Planned policies and measures
WHO	Transmission system operator
BIP	The Oriential Action Plan
REMIT	Regulation on wholesale energy market integrity and transparency
RGMCG	Regional Gas Market Coordination Group
RRF	Recovery and resilience funds
SAZ	Sanitary protection zones
LNG	Liquefied natural gas
SOx	Sulphur oxides
SP 2023-2027	Strategic Plan for Agriculture and Rural Development of Lithuania 2023-
SPIS	Information system for family social assistance
ASU	Distribution system operator
SUMIN	Ministry of Communications
GHG	Greenhouse gases
NMSM	Ministry of Education, Science and Sport
t CO_2 eq.	Tonne of carbon dioxide equivalent
TEN-E	Trans-European energy networks programme
TEN-T	Trans-European Transport Network
IPCC	Intergovernmental Panel on Climate Change (IPCC)
TM	Ministry of Justice
TA	Transformer substation
TRL	Technology Readiness Level
TVG	International Value Chains
TWh	Terawatt hour
UNFCCC	United Nations framework Convention on climate change
MFA	Foreign ministry
GWP	Global warming potential
GAPTP	State waste prevention and management plan
SWU	Internal Combustion Engine
VALUE	National Energy Regulation Council
PIS	Services of public interest
GFC	Vilnius combined heat and power plant
SMR	Management requirements
MOI	Interior Ministry
AL	Region of Western and Central Lithuania
GIFCM	Land use, land use change and forestry sector

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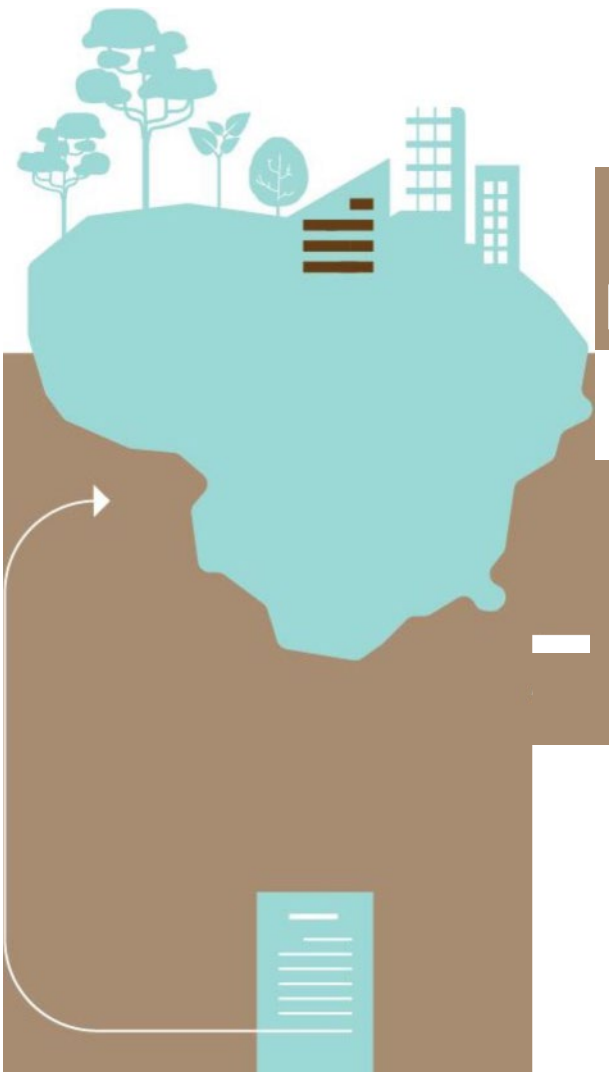
SECTIONA:

NATIONAL PLAN



FOR THE PREPARATION OF THE

1. TO BE UPDATED PLAN

OVERVIEW AND PROCESS

1.1 Summary

Political Context

In 2019, Lithuania prepared a National Energy and Climate Plan (NECP) for 2021-2030 in line with the requirements of the Energy Union[2] Governance Regulation. The NECPs are based on and integrate the provisions, objectives, targets and measures implemented and planned in Lithuania's national legislation, international commitments, strategies and other planning documents. According to the Energy Union Governance Regulation, each Member State is required to update its NECPs by 30 June 2024.

Key strategic documents integrated into the updated NECPs:

1. The National Energy Independence Strategy was adopted in June 2018[3] (hereafter: NNS);
2. The National Climate Change Governance Agenda[4] ('NACCD') was adopted in June 2021.
3. National Air Pollution Reduction Plan adopted in April 2019 and updated in August 2022[5] hereinafter referred to as 'NAOTMP';
4. the updated NECPs are linked to the National Progress Plan[6] (NRP) adopted on 9 September 2020.
5. Resolution No 789 of the Government of the Republic of Lithuania of 29 September 2021 on the territory of the Republic of Lithuania approval of the Master Plan for the territory of the Republic of Lithuania.[7]

The objective of the NAP is to identify the main changes that the country is seeking to achieve over the next decade, leading to social, economic, environmental and security progress. When planning changes, account shall be taken of the directions for the spatial development of the State territory of the Republic of Lithuania's master plan and of the functional priorities for the use of the territory and of the security contained therein, the State Progress Strategy 'Lithuania 2030''s vision and direction of development, the National Security Strategy, the United Nations 2030 Agenda for Sustainable Development and other international agreements and commitments and European Union (EU) legislation, and an assessment of the current situation, recommendations issued by international organisations (the EU, the Organisation for Economic Cooperation and Development (OECD), the International Monetary Fund and other international organisations), emerging new challenges and opportunities for progress by the State. National development programmes are drawn up to implement the changes envisaged in the NAPs. In order to achieve consistency between the two strategic planning documents, the targets of the NAP assessment indicators are directly correlated with the objectives set out in the NECPs. The relevant NCP objectives of the NECPs are as follows:

- shifting towards sustainable economic development based on scientific knowledge, advanced technologies, innovation and enhancing the country's international competitiveness;

Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December2 2018 on the Governance of the Energy Union and Climate Action.
3https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.429490/asr
4https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/7eb37fc0db3311eb866fe2e083228059?jfwid=wqwn5j7x7
5https://www.e-tar.lt/portal/lt/legalAct/410fbe3067f511e9917e8e4938a80ccb
6https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/c1259440f7dd11eab72ddb4a109da1b5/asr
7https://e-seimasx.lrs.lt/portal/legalAct/lt/TAD/ab6b8b21266f11ec99bbc1b08701c7f8

- improving transport, energy and digital internal and external connectivity;
- ensure good environmental quality and sustainability in the use of natural resources, protect biodiversity, mitigate Lithuania's climate change impact and increase resilience to its impacts;
- strengthen national security.

For each economic sector contributing to anthropogenic impacts on climate change, the NAPs set specific greenhouse gas (GHG) emission reduction targets for 2025 and 2030.

The Framework Plan for the Territory of the Republic of Lithuania lays down the guidelines for the implementation of the spatial development of the territory of the Republic of Lithuania, the spatial structure of the State territory, the mandatory provisions for the use of the State's territory and other relevant solutions with a view to achieving sustainable territorial development.8 Solutions have been developed in order to:

a) the international dimension of state integration and competitiveness, as well as the reduction of economic, social and regional imbalances, the provision of high-quality public services that are accessible to all, and the necessary systemic changes to address environmental and climate change challenges within the country;

b) responsible consumption, use of resources, protect, activate the values of nature and heritage, continuously build the identity of the site, municipality, region, country, high quality of life for itself, family, community, society, through holistic approaches, habits, behavioural patterns, perseverance to state progress, competitiveness, gradual transition to a circular economy, adaptation to climate change and resilience to global challenges.

Context in the field of energy

The full-scale military invasion of Ukraine by the Russian Federation on 24 February 2022 created an unpredictable geopolitical context and a situation on international energy markets. Given that the increase in the price of energy resources was already triggered in the second half of 2021 to a large extent by Russia's energy policy and decisions to reduce natural gas exports to European Union countries, the assumptions that Russia uses energy supplies as a tool for policy-making, economic impact and blackmail against Lithuania and the European Union as a whole have become definitive and that energy supplies from Russia are not predictable, reliable and secure.

In response to the sanctions imposed by EU Member States, the Russian Federation began to restrict the supply of natural gas and decided to unilaterally change the terms of the previously concluded contracts by requiring payment in roubles for the supply of natural gas. The latter condition led the Republic of Lithuania to refuse to import natural gas supplied by pipelines from the Russian Federation as of April 2022. Since July 2022, following the adoption of an9 amendment to the Law on Natural Gas by the Sejm, the import of Russian liquefied natural gas via the Klaipėda liquefied natural gas (LNG) terminal was banned. In this way, Lithuania completely renounced imports of natural gas from the Russian Federation in 2022.

In order to reduce Russian budget revenues from electricity imports, a decision was taken in May 2022 that all imports of electricity from the Russian Federation should be stopped. In addition,

8http://www.bendrasisplanas.lt/
9 Reference of the Law on Natural Gas of the Republic of Lithuania: https://www.e-tar.lt/portal/lt/legalAct/TAR.0C5C33AA865C/asr

in order to ensure security of electricity supply and separation from the BRELL ring contract, negotiations were initiated between the Baltic States on accelerated synchronisation in 2024. Finally, as of April 2022, Lithuania has stopped importing oil from Saudi Arabia and other western countries for its own use, which is used in the Mažeikiai oil refinery.

The NPT does not include four priority axes: reducing the impact on climate change and ambient air pollution, reliability, competitiveness and the country's business involvement in energy progress. These four axes are directly correlated with the main dimensions of the NECPs identified in the Energy Union Governance Regulation – decarbonisation, energy efficiency, energy security, the internal energy market and research, innovation and competitiveness.

In line with the NEPT, Lithuania has set ambitious targets that will significantly contribute to the achievement of the Energy Union and the EU 2030 energy and climate targets. Lithuania aims to ensure that the Baltic States' electricity system is ready to operate synchronously with continental European networks through Poland with a reliable and unified continental European electricity system already in 2024. The renewable energy (RES) ambition is currently increasing by 2030, with a target of 55 % renewables in final energy consumption (one of the highest ambitions for RES development at EU level), including 100 % of electricity and 90 % of energy in district heating from RES. At least 30 % of consumers will also generate their own electricity for their own needs. The share of local electricity production in Lithuania will increase from 35 % to 70 %, while the share of RES in transport will rise to 15 % and Lithuania will become a leader in energy innovation in the region.

The NEC vision for 2050 is an energy that generates added value for the state and the consumer and uses smart low greenhouse gas technologies and zero-emission energy sources, resilient to cyber threats and climate change, providing reliable and competitive energy. In line with the objectives set out in the United Nations 2030 Agenda for Sustainable Development, the Paris Agreement, the EU's 2030 climate and energy policy goals, Lithuania's energy sector will produce 80 % of energy from zero-emission sources (low GHG and ambient air pollutants) in 2050, provide energy to consumers safely and at a competitive price, and contribute to the country's modern economy, competitiveness and investment. The sources of energy production will consist of renewable energy sources and technologies that ensure that energy is produced in a non-polluting way. Consumers will be able to produce the energy they need to meet their needs.

Environmental context

Lithuania has achieved significant environmental achievements over the past few decades. Lithuania has more than doubled its GHG emissions compared to 1990, with 58 % of the EU-27 as a whole,10 while in terms of GHG emissions per capita, Lithuania was the fifth lowest in the EU in 2021.11 In particular, these results have been achieved despite the country's economic growth and the positive downward trend is projected to continue. This provides a good framework for the future towards a net-zero GHG emissions economy.

Lithuania is also among the leading European countries in terms of national GHG emissions

10https://ec.europa.eu/eurostat/statistics-explained/index.php/Greenhouse_gas_emission_statistics#Trends_in_greenhouse_gas_emissions
11https://ec.europa.eu/eurostat/databrowser/view/t2020_rd300/default/bar?lang=en

the country's forests are absorbed, with only Sweden, Finland and Romania landing in the Union.12 In 2021, forests absorbed 6.1 million tonnes of $CO2_{-eq.}$, i.e. 1/3 of the country's total GHG emissions.

Despite these strengths, Lithuania is lagging behind EU countries in tax policy. The European Commission (EC) estimates that in Lithuania the percentage of environmental taxes in gross domestic product (GDP) is lower (1.9 %. GDP) than the EU average (2.2 % of GDP) GDP as of 2021). Transport taxes are among the lowest in the EU and Lithuania is among the few countries without an annual pollution tax13. Motor vehicles in Lithuania are taxed on the basis of the CO_2 content only at the time of their registration. Incentives for less $CO2_{cars}$ are very limited and only in 2019 have started to provide compensation payments for the purchase of zero-emission vehicles. Lithuania has one of the lowest excise duties on petrol, diesel and other motor fuels in the EU. In 2023, the excise tax policy was revised in line with the recommendations and in order to respond to the different emission factors of fuels.

Lithuania provides fossil fuel and other environmentally harmful subsidies that could be considered for reform while ensuring food and energy security and minimising social consequences. Fossil fuel subsidies amounted to EUR 198 million in 2021, leaving low carbon alternatives without demand and support. The EC recommends revising subsidies such as energy tax relief for agricultural and forestry enterprises on gas oil, excise duty and tax relief on natural gas for industrial consumers or reduced CO_2 tax rate on agricultural diesel[12].

Social context

The social context of the NECPs can be described by the energy poverty indicator. It was 28 % in Lithuania in 2018. This means that 28 % Lithuanian people feel that their housing is not adequately heated and, despite the fact that this indicator is highly subjective, Lithuania is one of the EU countries most affected by energy poverty. Accordingly, existing and planned measures on energy efficiency, financial support for vulnerable consumers, the creation of renewable communities, an appropriate energy price and consumer education and information will be used to address this problem. There are financial incentives for deprived individuals to opt for less polluting mobility measures in order to reduce GHG emissions in the transport sector and improve air quality. The Social Climate Fund Plan will focus on the most vulnerable groups, such as households, transport consumers, micro-enterprises, who will face an additional burden due to increased energy prices as a result of the extension of the new EU Emissions Trading System to buildings and road transport and other sectors. The measures of the Social Climate Plan will also be combined with measures in the NECPs that will contribute to achieving climate change objectives. The social context of the NECPs has been further assessed taking into account the impact on macroeconomic indicators such as GDP and jobs, as detailed in section 5.2. The macroeconomic assessment showed that the package of planned policies and measures presented in the NECPs will have a positive impact on the country's GDP, contribute to job growth and increase household income across income groups.

In2022, in a context of declining natural gas exports to the EU Member States, the Russian Federation actively sought to manipulate the prices of energy resources, in particular natural gas, in the information space, while at the same time significantly increasing prices for both natural gas and electricity on the markets. All this, and

12https://ec.europa.eu/eurostat/web/products-eurostat-news/-/EDN-20180321-1
13 https://economy-finance.ec.europa.eu/system/files/2023-05/LT_SWD_2023_615_en.pdf

the rise in crude oil and oil product prices due to uncertainty in the global oil market has led to a sharp pick-up in inflation, both in Lithuania and in other EU Member States. The rise in commodity prices, especially for food products and utilities, has had a negative impact on the social conditions of the population of all EU Member States.

In September 2022, the Government of the Republic of Lithuania approved the National Energy Savings Plan drawn up by the Ministry of Energy, which set a target of 20 % energy savings over two years. In order to avoid a significant increase in the cost of heat production in the city of Vilnius, a decision was taken to allow the temporary replacement of natural gas with heavy fuel oil.

NECPs headline targets

The NECPs include Lithuania's national and EU-level targets to which Lithuania will contribute to the achievement of the agreed overall EU 2030 energy and climate change targets.

Table 1.1.1. National and EU targets for 2030

Purpose	EU		Lithuania		Implementation
	2020	2030	2020	2030	2021
GHG reduction targets under the Doha Amendment to the Kyoto Protocol and the Paris Agreement compared to 1990 levels	—20 %	> 55 %	—	≥-70 %	—58 %
GHG reduction targets for the EU Emissions Trading System sectors compared to 2005 levels	—21 %	—62 %	EU-level target	≥ 50 %	—39 %
GHG reduction targets for non-ETS sectors compared to 2005 levels	—10 %	—40 %	+ 15 %	—21 %	+ 11 %
Share of renewable energy sources in gross final consumption of energy	20 %	42.5 %	according to Directive 2018/2001.30 % (NNS)	55 %	28.1 % (2021)
Use of renewable energy sources in transport	10 %	14 %	10 %	15 %	6.69 % (2021)
Level of electricity interconnectivity	10 %	15 %	EU-level target		23.0 % (LT)
Energy efficiency objectives - Primary energy consumption in 2030 - Final energy consumption in 2030	1124 Mtoe 864 Mtoe	—11.7 % 992,5 Mtoe 763 Mtoe	PEC – 6.6 Mtoe FEC 5,7 Mtoe 0 TWh	PEC = 5.2 Mtoe; FEC – 4.2 Mtoe 39.3 TWh	PEC – 6.6 Mtoe FEC – 5.7 Mtoe

Overviewof the state of play of current policies

Energy policy area

In the context of policies and measures, Lithuania pursues the following objectives of EU energy policy:

- Delivering on theEU's climate and energy policy objectives. Promote the balanced development of RES and energy efficiency improvements in the EU. The commitments related to local and RES and energy efficiency improvements beyond 2020 will be based on the principle of burden-sharing, ensuring an adequate contribution of each EU Member State to the objectives of RES and energy efficiency improvements at EU level by 2030;
- Completion of theEU internal energy market. Having been isolated fora long time from the EU internal energy market and networks, Lithuania supports EU infrastructure, regulatory and financial instruments for further integration into the EU internal energy market, while taking advantage of its potential to increase energy security, competitiveness and sustainable development. A fully integrated and efficient EU internal energy market is a priority for Lithuania;
- ensuring energy security in the Baltic Sea region. Aim as soon as possible implement the provisions of the European Energy Security Strategy and ensure that the results of its measures are regularly reviewed at EU level;
- relevant EU long-term funding programming policy. The aim will be to ensure continuity and adequate funding for energy infrastructure and EU financial instruments in the area of closure of the Ignalina NPP, with a view to alleviating the financial burden on Lithuanian consumers;
- Strengthening theEU's external energy policy. Strengthening theEU's external energy policy, coordinated action and solidarity between EU Member States in crisis situations also strengthens Lithuania's security, which will further foster an intensified EU dialogue with major energy suppliers, in particular with the US, Canada, Norway and Australia.

Over the last ten years, Lithuania's energy sector has been fundamentally restructured in order to reduce and eventually eliminate its energy dependency on Russia, which has led to unreasonably high resource prices and the use of energy as a political influence. The implementation of NPTs, structural reforms in the energy sector and strategic projects have increased the diversity of energy supply routes and sources and reduced the cost of energy resources to consumers.

Taking into account these results and the new EU 2030 energy and climate targets and new trends in the energy sector, in June 2018 the Sejm adopted an update of the NPT, which includes the state's main energy policy objectives, orientations and targets for 2030 and a vision for 2050.

The NEPT will maintain the continuity of existing policies and policies in the areas of RES and energy efficiency, improve Lithuania's attractiveness of investments, implement new zero-emission and climate-resilient technologies, promote innovation in the energy sector and ensure progress in energy. Lithuania needs to become an energy technology developer and exporting country from an energy technology importing country.

Studies are currently being carried out at the request of the Ministry of Energy to examine Lithuania's potential to become an energy exporting country. On the basis of these studies, it is planned to update the National

a strategy for energy independence.

RES

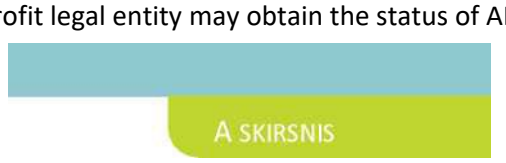
The development of RES takes place in line with EU and national strategy papers and legislation. The main policies and measures for the development of RES in each sector are set out in the NENS, the NCCD, the Law of the Republic of Lithuania on renewable energy and the Law of the Republic of Lithuania on alternative fuels.

In 2021, the share of RES in gross final energy consumption was 28.1 %. These results are mainly due to the increasing share of RES in the electricity, heat and transport sectors. RES accounted for 48.62 % for heating and ventilation, 20.92 % for electricity production and 6.69 % for transport.

Lithuania met and exceeded the EU target of14 23 % in 2020 already in 2014, when the share of RES in gross final energy consumption was 23.66 %. As a result, Lithuania transferred part of the surplus generated in 2017 and 2020 to Luxembourg and the Brussels Capital Region and allocated the resulting funds to further RES development and research.

Lithuania plans to reach 55 % by 2030. RES target in final energy consumption. This will be achieved through the widespread deployment of small-scale renewable energy installations owned by private energy consumers and communities, through the development of RES plants in onshore and offshore areas. Investments in smart energy systems, including transmission, distribution and storage infrastructure, and in increasing the required balancing capacity shall be envisaged in order to successfully integrate increased volumes of renewable energy and large numbers of prosumers ('generating customers'). In order to accelerate the development of RES in the onshore area and to kick-start the development of RES in the maritime area, the so-called 'Employment Package' was adopted on 8 July 2022. The breakthrough package simplifies administrative conditions, improves the investment environment for RES developers, while promoting a more favourable public attitude towards RES development. The package introduced the following substantive changes:

1. For prosumers:
    - surrender of allowances for the development of electricity generation capacity and allowances for the production of electricity;
    - extending the electricity storage period for prosumers from one to two years (1 April to 31 March);
    - include conditions enabling several prosumers' power plants to be allocated to a single consumption object;
    - improving prosumer pricing;
    - restrictions on the electrical power of the prosumer shall be waived.
2. For renewable energy communities (hereinafter referred to as "REC"):
    - provides that any non-profit legal entity may obtain the status of AIEB;



    - simplifying the procedures for setting up the AIEB;

Directive 2018/2001 of the14 European Parliament andof the Council https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02018L2001-20220607

- overclaims are waived;
- it is established that the majority of the AEIB decision is held by persons in the county in which the AIEB operates;
- extending the list of participants in the AEIB and the territory in which the AEIB operates;
- provision is made for information to the public (communities) on the procedures for setting up the AEIB, operational opportunities, etc. through a one-stop shop.

3. For hybrid power plants:

- regulates a completely new business model allowing for the construction and connection of several RES technologies and storage facilities at one connection point;
- the development and operation of hybrid power plants are identified as authorised activities. Accordingly, requirements for the granting of permits are laid down, time limits for the validity of permits and other necessary processes to connect a hybrid power plant to the electricity grids are laid down.

4. For wind power plants:

- for non-urbanised and non-urbanised areas, the inclusion of wind turbines in spatial planning documents is optional;
- clear criteria shall be set for environmental assessment (EIA) screening, providing that EIA screening is carried out when: (1) 3 wind turbines and more are under construction with at least one height of 50 m or more; (2) wind turbines are located less than 1 km from protected areas;
- clear criteria shall be laid down in the case of a full EIA, providing that a full EIA shall be carried out when: (1) 7 wind turbines and more are under construction; (2) wind turbines are constructed at a distance of 5 km or less from wind turbines built, under construction or planned and (3) wind turbines are to be built in the Lithuanian maritime area;
- the establishment and registration of sanitary protection zones (hereinafter referred to as “SAZ”) has been refused, but a new requirement on social distancing (wind power plants shall be installed at a distance of [4 x head height] from residential homes, kindergartens, schools, etc.) for the construction of wind turbines. Accordingly, since the distance to be introduced is similar or higher than the current maximum distance of the boundaries of the SAZ, the scheme provides for more flexibility for both wind turbine developers in terms of planned activities and landowners for possible new construction, and clearly defines the requirements for obtaining consents, informing and opposing the construction of wind turbines.

5. For solar power plants:

- shortening the period of validity of permits for the development of electricity from 36 months to 24 months;
- it is explicitly regulated that EIA selection and full EIA for solar power plants are not carried out.

6. For storage facilities:

- the development and operation of storage facilities have been identified as activities regulated by permits;
- identification of processes and requirements to be implemented by storage developers in order to achieve

connect storage facilities to the electricity grid.

7. Biogas installations:
    - the provisions necessary for the smooth connection of biogas installations to the gas system;
    - clear responsibilities and requirements for both developers and gas system operators the connection of biogas production facilities.
    - simplified conditions for the installation of medium-sized biogas production plants on land.
8. General provisions:
    - options for the construction of hybrid power plants connected to the distribution grid, solar power plants, wind power plants and biogas production facilities on agricultural land without changing their use, but ensuring land use in accordance with the identified primary land use and manner;
    - it is envisaged that the power and capacity of the electricity grids shall be reserved from the date of the conclusion of the letter of intent and the delivery of the security of obligations, which shall be increased to EUR 50/kW. These provisions apply to power plants and storage facilities;
    - for the connection of solar, wind and hybrid power plants to the electricity grid, it has been established that the power to generate power plants is assessed. This also applies to the connection of prosumer power plants.
    - there is an obligation for producers operating for commercial purposes and operating wind, solar power plants connected to the transmission grid and biogas plants to pay a production premium. The production contribution shall be determined on the basis of the amount of electricity produced and supplied to the electricity grid during the calendar year multiplied by EUR 0,0013/kWh. The production premium is intended for projects addressing the needs of communities or community-based organisations.

The changes introduced in 2022 paved the way for the development of RES in the maritime area. The Renewable Energy Act provides for two types of tendering procedures:

-) a call for tenders with the possibility of acquiring the right to encouragement. If no promotion is sought, participants may propose a development fee. Wins the tenderer offering the minimum amount of the promotion or, in the case of non-promotion, the highest development fee;
-) a tender procedure in which the tenderers compete for the possibility of using the territory for the development of renewable power plants by offering a development fee. The tenderer offering the highest development fee shall win. A minimum initial development fee of EUR 5 million and an increase of at least EUR 5 million.

In order to make it possible to connect the two wind farms to be developed in the Lithuanian maritime area to the onshore grids, a capacity of 1.4 GW has been reserved for them in the networks and the possibility to connect to the substation of work.

Energy efficiency

One of Lithuania's top priorities in the field of energy is to improve energy efficiency throughout the energy chain, from energy production to final consumers. Energy efficiency becomes particularly relevant in a context of high energy prices demanding

a rapid response by States and encouraging the development and implementation of new energy efficiency measures, energy efficiency also improves the financial situation of the public population, improves business competitiveness, reduces GHG and ambient air pollutant emissions and improves ambient air quality. The aim will be to make energy efficiency an integral part of everyday life, both at businesses and at end-users. Lithuania's energy intensity target is to reach the European Union average by 2030 and to reduce its energy

intensity by 1.5 times compared to 2017. The objective is to continue the renovation of inefficient residential and public buildings, to increase consumer education and to improve the energy efficiency performance of businesses. New measures are also envisaged to improve the technological and energy efficiency of industrial enterprises through the deployment of artificial intelligence and digital twin technologies, and to create a legal requirement for companies to implement the measures recommended in energy efficiency audits in order to achieve energy efficiency results.

On the other hand, it is important to note the improvement in Lithuania's energy productivity indicator (general energy efficiency indicator), which reflects the country's energy efficiency and distinguishes between energy consumption and decoupling. Lithuania's figure for 2021 was the best among the Baltic countries, as well as better than the neighbouring country Poland, reaching EUR 5.12/kgoe (EU average energy productivity: EUR 8.54/kgoe).

Transport

In the transport sector, fuel and energy consumption increased by 46 % between 2010 and 2021, while diesel consumption increased by 73 % since 2010 and accounted for 72 % of transport fuel consumption in 2021. Road transport accounts for 90 % of all fuel consumption in the transport sector, while diesel vehicles are still dominated by public transport fleets and freight transport.

The share of RES in transport increased from 3.63 %. Up to 6.69 % in 2016 The increase in 2021 was driven by legislative changes that introduced mandatory blending of biofuels throughout the year. In 2021, liquid biofuels accounted for the main share of RES in transport, with only a small share of electricity consumed in road and rail transport. Biofuels produced from food and/or feed crops dominate the liquid biofuels, but their use has been limited to 5.61 % as of 2022.

In order to increase the share of RES and alternative fuels in the transport sector, a law on alternative fuels was adopted in 2021, which introduced mandatory RES fuel supply obligations on fuel suppliers. The Law on Alternative Fuels provides that each fuel supplier would place an increasing proportion of RES fuel on the domestic market during a calendar year. In 2030, at least 16.8 % of RES fuel shall be supplied in the total fuel balance supplied by each fuel supplier. In order to promote the use of advanced biofuels and fuels of non-biological origin from RES, fuel suppliers are also subject to additional mandatory targets for the supply of these fuels. Investment support for the installation of advanced biofuel production facilities is planned for 2023, allowing for circular economy principles and the use of domestic waste and residues for the production of liquid biofuels, while ensuring the supply of domestic fuel suppliers.

The Alternative Fuels Act introduced binding green public procurement targets in 2021 for the acquisition of new vehicles or transport services to reorient public transport fleets and encourage public entities to opt for zero-emission vehicles. The aim is also to develop the electrification of the transport sector, and the responsible ministries have already planned support

schemes for both private and public charging infrastructure for electric vehicles. Around 54 thousand private charging points and 6000 public charging points are planned to be installed in Lithuania in 2030. In 2022, an action plan for the development of electric vehicles and recharging infrastructure for electric vehicles was adopted, with key electrification pathways for transport. According to the Action Plan, the aim will be to achieve at least 260 thousand electric vehicles on the country's roads by 2030, representing around 14 % of the total vehicle fleet registered in Lithuania.

Investment support for the production of biomethane gas started in 2020 and continues so far. Most

biomethane is expected to be used in transport and agriculture, with gaseous fuels from RES (biomethane, hydrogen, synthetic methane) expected to be at least 5.2 % in the overall final energy consumption balance of the transport sector in 2030. In addition, the aim will be to reduce the consumption of polluting fossil fuels through fiscal measures.

Competitiveness of the energy sector

One of the main challenges facing the energy sector is to improve the competitiveness of the country's economy and to ensure the supply of energy and energy resources at competitive market prices, which are among the lowest in the region. In Lithuania, energy and energy costs account for a significant share of industrial costs and household budgets, while in industry the cost of energy in terms of product cost remains high and is 20 % higher than the EU average.15 Lower energy costs and a positive balance between imports and exports of energy resources and technologies would increase the competitiveness of the country's economy. Lithuania needs to reduce energy costs and increase the competitiveness of Lithuania's business, introduce more efficient and modern technologies for energy production, supply and consumption, ensure optimal pricing of energy resources, promote liquidity in the market for the trading of energy resources, improve the conditions, reliability and accessibility of energy supply and consumption. The functioning and long-term development of the energy sector must be based on the principles of sustainable development, and climate change policy objectives shall be met by the most efficient measures selected on the basis of a cost-benefit analysis.

Climate change management policy area

The climate crisis, posing an existential threat to natural ecosystems and humanity, increasing the risk factors for national security and societal stability is a major challenge of our time. The last five years have been the warmest in the history of meteorological observations. Theyear 2020 was the warmest in Lithuania's entire history of meteorological observations, where the average annual air temperature in Lithuania was 9.2 °C, which is 2.3 °C above the average over the years 1981-2010. The increase in droughts, storms and other extreme weather events undeniably bears witness to the effects of climate change. Lithuania's climate change management policy is developed and implemented in accordance with international agreements: The United Nations Framework Convention on Climate Change (UNFCCC), adopted in New York in 1992 and implemented with country-specific commitments and emission reduction mechanisms, was signed in 1997 by the Kyoto Protocol with two commitment periods: the first Paris Agreement signed between 2008-2012 and the second 2013-2020 and 2015 16 with a committed period from 2021 to 2030, endorsed by the United Nations General Assembly in 2015 in a sustainable manner.

the 2030 Development Agenda, which sets out objective 13 'Take urgent action to combat climate change and its impacts' and targets to tackle climate change, the EU's 2030 climate and energy targets, EU Green Deal initiatives, the EU Strategy on Adaptation to Climate Change and long-term climate policy planning documents defining the EU's vision for a climate-neutral economy by 2050.17

15https://www.ena.lt/energijos-vartojimo-efektyvumas/
Law No XIII-184 of the Republic of Lithuania of 22 December16 2016 on the ratification of the Paris Agreement adopted under the United Nations Framework Convention on Climate Change.
Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank of 28 November17 2018. A Clean Planet for all. A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM(2018) 773 final.

In order to ensure the implementation of international agreements on climate change18 and the objectives set for Lithuania in EU legislation, the Lithuanian Parliament adopted the NCCD in June 2021, which sets out the objectives and targets for Lithuania's climate change management policy up to 2030, 2040 and 2050 in the areas of climate change mitigation and adaptation. Mitigation policies aim to reduce GHG emissions and increase removals. Climate change mitigation is particularly important in the energy, transport, industry, agriculture, waste and forestry sectors. Adaptation policies aim to strengthen adaptive capacity, increase resilience and reduce vulnerability to the impacts of climate change in order to contribute to sustainable development and ensure appropriate adaptation responses. Measures to achieve the objectives and targets of the NECD for 2021-2030 are included in the NECPs.

Table 1.2.1. Lithuania's legally binding short-term mitigation targets are:

The short-term objectives			
Description	**2021 e**	**Year 2025**	**2030**
Reduction of GHG emissions in non-EU ETS sectors19	16.1 Mt CO_2eq.	12.4 Mt CO_2eq.	10.3 Mt CO_2eq.*
Share of energy from renewable sources in gross final consumption of energy	23 %	24.2 %	45 %
Final energy savings	0 TWh saved	TWh (2025)	39.3 TWh

* to be revised in 2025

Since 1990, the structure of GHG emissions has changed as a result of the transformation of the country's economy (industrial contraction and development of the service sector, changes in energy resources, etc.) and the implementation of GHG reduction measures.

In 2021, 20.3 million tonnes of greenhouse gases were emitted into the atmosphere in Lithuania, an increase of about 0.5 % compared to 2020. Transport (30.3 %) and energy (30.1 %) were the largest emitters. Agriculture (21.7 %), followed by industry (13.8 %) and waste (4.0 %).

While GHG emissions decreased in many sectors of the country's economy compared to 2020, transport (-0.2 %), agriculture (- 4.5 %), industry (-3.2 %), waste (-4.2 %), Lithuania's overall increase in GHG emissions was due to a significant increase in emissions from the energy sector (+ 7.7 %). The most:

Doha Amendment to the Kyoto Protocol to the UNFCCC for the period18 2013-2020.
Commission Implementing Decision (EU) 2023/1319 of 2819 June 2023 amending Implementing Decision (EU) 2020/2126 as regards the adjustment of Member States' annual emission allocations for the period from 2023 to 2030

emissions increased in district heating and electricity production and in households, businesses due to increased use of fossil fuels.

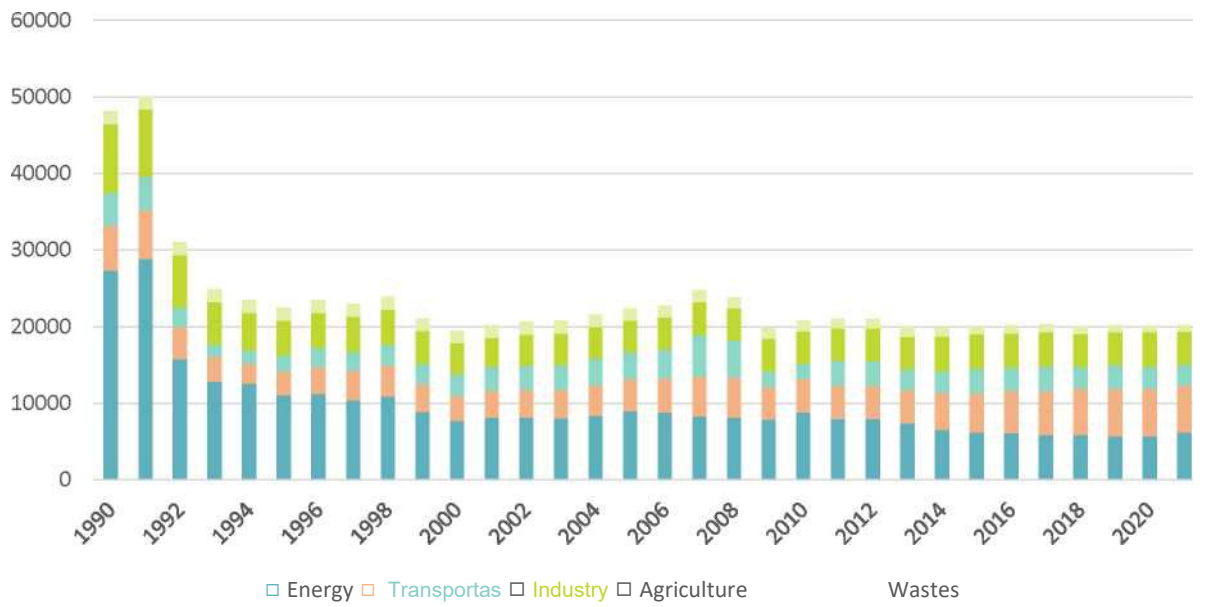


Figure 1.2.1. Lithuanian GHG emissions by sector, kt_{CO2eq}

Lithuania absorbed -6.1 million tonnes of CO2- eq. in 2021, almost 2 % more than in 2019, mainly thanks to forests (-4.5 million $TCO2_{-eq.}$), permanent grassland (-0.8 million tCO_2 eq.) and carbon stored in harvested wood products (-0.8 million TCO_2 eq.).

Administrative structure of implementing national energy and climate policies

Lithuania's energy policy is developed and its implementation coordinated by the Ministry of Energy. The development and implementation of Lithuanian climate change mitigation and adaptation policies is coordinated by the Ministry of the Environment. Both ministries actively cooperate with the Ministries of Finance, Transport, Economy and Innovation, Education, Science and Sport, Agriculture, Foreign Affairs, Defence of the Country, Culture, Social Security and Labour, Health and Interior, as well as the relevant committees of the national parliament, municipalities, the Lithuanian Scientific Council, state research institutions and universities, companies, organisations and other social partners and individuals in the development of energy and climate policies.

Table 1.2.2. Authorities coordinating the achievement of the GHG reduction targets:

Sector	Authority
Transport	Ministry of Communications
Industry (including EU ETS)	Ministry of Economy and Innovation Ministry of Environment (Construction)
Agriculture	The Ministry of Agriculture
Energy (including buildings)	Ministry of Energy Ministry of the Environment

Sector	Authority
Wastes	Ministry of the Environment
Promoting green investments	Finance Ministry
Border correction mechanism	Foreign ministry
Overall target for Lithuania	Government of the Republic of Lithuania

A National Climate Change Committee has been established to provide independent scientific advice on the design, assessment and implementation of national climate change management policies. It is composed of 11 representatives from different higher education institutions in the country. Scientists will provide advice on research or funding pathways needed to implement climate change policies to achieve GHG reduction targets, on climate-relevant research, experimental development and innovation, which could be adapted at national level, and draft national climate change management reports and reports.

The National Climate Change Committee will make proposals for the assessment of the impact of national GHG inventories, policies and measures, greenhouse gas forecasting and GHG assessment methods, the collection of activity data and the improvement of the emission indicators used. The National Climate Change Committee is independent, self-employed and acts as an advisory body to the Ministry of the Environment.

On 12 February 2020, the Prime Minister's ordinance established a working group to coordinate the implementation of the NECPs and address the Green Deal agenda. The Working Party brings together representatives from 9 Ministries – Environment, Energy, Economic and Innovation, Finance, Social Security and Labour, Transport, Education, Science and Sport, Interior and Agriculture.

The Lithuanian Parliament approves the main national energy and climate change strategies/agendas and the action plans for their implementation and the development programmes for all economic sectors, the Government. New plans are drawn up every five years and more frequently if there is a need at national level.

Each year, ministries and their system authorities draw up strategic plans which plan measures with appropriations for the 3-year period. Funds for the implementation of projects and measures are made available annually from the state and municipal budgets. EU funds – the EU Structural and Investment Funds and other dedicated funding instruments (e.g. Connecting Europe Facility), as well as the National Climate Change Programme (CCP) and the Modernisation Fund – represent a significant proportion of energy and climate investments. Investments from the Innovation, Social Climate Funds and the Next Generation Lithuania Plan (*Recovery and Resilience Facility (RRF))20 are expected to contribute significantly to the achievement of* the*energy and*climate objectives.

1.3 Consultations and involvement of national and Union entities and their outcome

The draft updated NECPs has been prepared with the involvement of ministries, authorities, in close consultation with

20 https://finmin.lrv.lt/lt/es-ir-kitos-investicijos/naujos-kartos-lietuva

socio-economic partners, associations and the public. The refurbishment process was initiated by the Ministry of Energy and the Environment in autumn 2021, with the aim of making it as inclusive as possible. To this end, 5 working groups on decarbonisation (industry, transport, waste and circular economy, energy and agriculture and forestry) and 3 energy (energy efficiency, internal market and research, innovation and competitiveness) working groups have been set up. The working groups included representatives of different ministries and institutions (designated according to their competences) and socio-economic partners. Meetings were held remotely, public and recorded on the social media of the Ministries of Environment and Energy.

Members of the Decarbonisation Working Groups were made aware of existing and planned NECPs measures, OECD Experts' Guidance on Climate Neutrality by 2050: options for reform for Lithuania', took part in the discussions and put forward proposals for additional measures to achieve the climate change mitigation targets by 2030.

Representatives of interested public groups (public authorities, science, measure, non-governmental organisations, etc.) proposed around 600 measures, from which external experts were selected as the most effective and assessed by agencies and ministries, which were selected for the updated NECPs as the most effective and in line with the strategic objectives.

Involvement of the national parliament

The National Parliament (the Sejm) is directly involved in the preparation and implementation of the NECPs, in the adoption of legislation and in the approval of the State budget that allocates funds to ensure the achievement of the Energy Union objectives. It should be noted that on 21 June 2018 the Sejm adopted the updated National Energy Independence Strategy and the National Climate Change Governance Agenda of 30 June 2021. These documents were the main documents for the preparation of the draft updated NECPs.

The Sejm also carried out regular parliamentary scrutiny during the preparation of the draft updated NECPs.

Involvement of local and regional authorities (municipalities)

The involvement of local and regional authorities is key to the preparation and implementation of the NECPs. Municipalities make an important contribution to reducing GHG emissions by developing and implementing sustainable mobility plans in cities, participating in the implementation of the Covenant of Mayors for Climate and Energy, achieving the RES targets set out in the specific plans for district heating. 17 Lithuanian municipalities have joined the Covenant of Mayors. Two Lithuanian cities – Vilnius and Tauragė – are included in the 100 cities of the European Union, which will become climate neutral by 2030. The selected cities will have to develop plans to achieve climate neutrality in the areas of energy, buildings, waste management, transport, etc. The commitments made in the contracts of a climate-friendly city will enable cities to achieve the goal together with the EU, national and regional authorities and, most importantly, with their populations.

Consultation of interested parties and the public

In the preparation of the draft updated NECPs, a public consultation of stakeholders and the public has taken place since the start of the update process. Consultations took place during meetings of the Decarbonisation and Energy Working Groups, which are open to the public. These included the presentation of existing measures, the consultants' analyses of existing measures, Lithuania's progress since the start of the plan;

new measures are proposed and the consultants' analysis of the proposed new measures is presented. In total, around 600 proposals for new measures were submitted for 1 trillion. The maximum technological potential of the measures, the potential socio-economic impact of the measures, the investments needed, etc. was assessed through external consultants. The ministries coordinating the implementation of the sectoral GHG reduction targets, based on simulations carried out by the Environmental Protection Agency and the Lithuanian Energy Agency, identified around 130 measures for almost EUR 12 billion of total investment, which became planned in this draft updated NECPs. Further, as decided by the Government, the public consultation will be carried out in parallel with the submission of the draft for comments to the European Commission between21 July and August 2024. The revised NECPs following the public consultation and the Commission's comments will be submitted to the Government for re-consultation prior to the approval of the Government.

Consultation of other Member States

The first regional consultations are scheduled for September-October 2023 (date to be revised) when the Neighbouring countries' NECPs will be invited to Lithuania. Regional consultations are part of the LIFE integrated project "Enhancing energy efficiency in Lithuania", which aims to support the implementation of the NECPs. Colleagues from Poland, Latvia and Estonia will be invited to meet in 2023, 2024, 2026, 2028 and 2029 to discuss the NECPs.

Lithuania has planned to develop two wind farm projects in the Baltic Sea22. The first call for tender for the selection of developer was launched on 30 March 2023, in which the bidders compete for the authorisation to use the part of the offshore area designated by the Government for the development and operation of wind turbines. Environmental impact assessment (EIA) procedures and other studies are carried out in preparation of the next tender, which allows developers to receive public support where necessary. These projects are among Lithuania's most important energy independence projects, which are expected to significantly increase local electricity production from renewable energy sources, thereby reducing Lithuania's dependence on electricity imports and ensuring low electricity prices for residents.

Guidance by the European Commission

The European Commission has set up two working groups with representatives from the Ministries of Environment, Energy, Environment and the Lithuanian Energy Agencies. One of the working groups was responsible for the parallel progress reporting process of the NECPs (one part of the NECPs' monitoring framework). The NECPs' progress reports were first submitted to the European Commission by 15 March 2023 and will be submitted every two years thereafter. Another working group was responsible for the process of updating the NECPs. As a result of the working group meetings, the European Commission's guidelines for updating the NECPs were prepared.23 Based on these, this update of the NECPs has been carried out.

Government Consultation, 21 June21 2022
https://lrv.lt/uploads/main/meetings/docs/24878_imp_cb4d0a2af1e4809807f11434be3225a2.elektroninio%20dokumento%20nuora %C5 %A1as
22 For more information: www.offshorewind.lt
23 https://energy.ec.europa.eu/publications/guidance-ms-updated-necps-2021-2030_en

1.4 Regional cooperation in preparing the plan

A SKIRSNIS

Lithuania is an important element of regional cooperation in achieving the EU's energy and climate change objectives and the implementation of the energy Union's dimensions, mainly energy security and the internal energy market. The main regional cooperation formats in which the content of the NECPs has been regularly aligned are two: The Baltic Energy Market Interconnection Plan (BEMIP) Working Group and the Baltic Council of Ministers.

BEMIP

Lithuania is actively involved in the implementation of the Baltic Energy Market Interconnection Plan. Its main objective is to create a well-functioning and integrated energy market and the necessary energy infrastructure, as well as to achieve a competitive, sustainable and secure energy market in the Baltic Sea region. A priority project at EU level – the interconnection of the Baltic States' electricity system with continental European networks for synchronous operation (synchronisation project) is currently being addressed in principle.

The development of the regional gas market in the Baltic States and Finland is coordinated by the Regional Gas Market Coordination Group established in 2015 under the BEMIP initiative, composed of representatives of the Ministries of Finland, Estonia, Latvia and Lithuania, national regulatory authorities, transmission system operators, LNG terminal operators, distribution system operators.

BEMIP Offshore Wind Task Force

A non-binding agreement on 2050 targets for offshore renewable energy production was signed with Latvia, Estonia, Finland, Sweden, Poland and Germany in the context of the BEMIP on 19 January 2023 with intermediate steps for 2040 and 2030 for the Baltic Energy Market Interconnection Plan (BEMIP Sea) in accordance with Article 14(1) of the TEN-E Regulation ((EU) 2022/869)24. The format of the meetings was as follows: Presentation by the BEMIP High Level Group Plenary on 26 April 2022 of the "European Interconnection Facility cross-border renewable energy project: Lithuania in cooperation with the Flemish Region', held a meeting of the BEMIP Offshore Wind Task Force on 22 September 2022, a presentation of offshore wind projects in the BEMIP Offshore Wind Task Force on 12 December 2022, a presentation of planned tenders for Lithuanian offshore wind without support and with State support at the BEMIP Offshore Wind Working Group meeting on 28 April 2023.

Baltic Council of Ministers

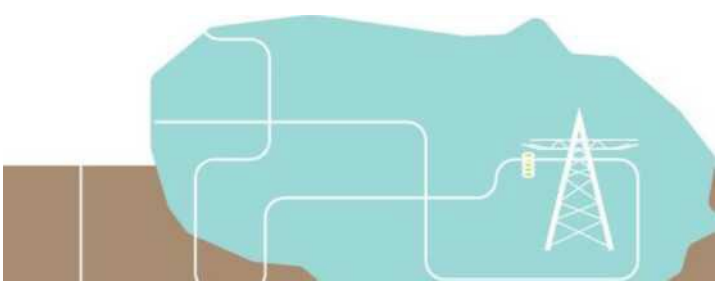
The synchronisation project, the gas interconnection project between Poland and Lithuania (GIPL), imports of electricity from third countries and other relevant issues are regularly discussed and coordinated with regional partners (Latvia, Estonia and Poland) in the Committee of Senior Energy Officers of the Baltic Council of Ministers and bilateral consultations between representatives of Lithuanian-Poland Ministries of Energy, as well as in close cooperation with the European Commission. Climate issues are discussed at the Baltic

24*Non-binding agreement on objectives for offshore renewable generation in 2050 with intermediate steps in 2040 and 2030 for priority offshore grid corridor Baltic Energy Market Interconnection Plan offshore grids (BEMIP offshore) pursuant to Article 14(1) of the TEN-E Regulation (EU) 2022/869.*

Environment Ministers' meetings.

All these elements of regional cooperation are included in the NECPs and are further mentioned in the relevant chapters 2 and 3.

SECTION A:
NATIONAL PLAN



2. NATIONAL GOALS AND OBJECTIVES

2.1 Decarbonisation dimension

2.1.1 GHG emissions and removals

Lithuania implements GHG emission reductions on the basis of the NCCD, which sets out Lithuania's 2030, 2040 and long-term objectives and targets for climate change management policy for climate change mitigation and adaptation. Mitigation policies aim to reduce GHG emissions and increase removals.

Lithuania signed and ratified the Paris Agreement in 2016. As part of this, Lithuania, together with the EU and its Member States, made a binding commitment to reduce economy-wide GHG emissions by at least 40 % by 2030, compared to the 2030 climate and energy target of at least 55 % compared to 1990, endorsed by the European Council (EC) conclusions of 10-11 December 2020.

The sectors participating in the EU Emissions Trading System (EU ETS) in which Lithuanian operators participate, together with operators from other EU Member States participating in the EU ETS, have to reduce GHG emissions by 62 % compared to 2005 levels.

Sectors not covered by the EU ETS (transport, agriculture, waste management, industry with other activities or combustion plants with a boiler plant with an installed capacity of less than 20 MW (small district heating companies), public sector buildings, households, fishing, construction, services, etc.) will have to respect Lithuania's annual GHG emission reduction limits (tCO_2 eq.) and achieve at least a 21 % reduction in greenhouse gas emissions in 2030 compared to 2005.

In order to achieve the objectives of the Paris Agreement and preserve the EU's international leadership in the fight against climate change, Lithuania is working with other EU Member States to increase ambitions for the next decade, as well as long-term climate and energy objectives. The implementation of the objectives and objectives of the NCCD shall be based on the concept of the Master Plan for the Territory of the Republic of Lithuania and shall contribute to the direction and principles of the State Progress Strategy, the objectives and objectives of the NAP, the NNS and the national security interests enshrined in the National Security Strategy in order to ensure the sustainable development of the State. The national mitigation target for 2030 is to reduce GHG emissions by 30 % compared to 2005, including land use, land use change and forestry (LULUCF); (hereinafter referred to as the 'GICM') sector removals through the transition of economic sectors towards innovative, low GHG emissions and environmentally friendly technologies and the use of RES:

1. For the sectors covered by the EU ETS (energy production and supply, industrial processes), a reduction of at least 50 % compared to 2005;
2. Sectors outside the EU ETS (transport, industry, agriculture, waste, small energy) to reduce by at least 25 % compared to 2005, including removals from the GIFF sector, and not to exceed established annual emission allocations for the period 2021-2030.

The objective of the GIFCM sector is to sustainably use agricultural land and forest land, conserve and restore organic carbon-fixing natural habitats (forests, grasslands, wetlands) and their good ecological status by 2030, increasing the use of wood in construction and long-lived product production without further negative impacts on ecosystems, increasing absorption potential and the most efficient use of wood in construction and long-lived products

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use, achieve significantly higher removals beyond the sector's emissions and amount to at least 6.5 million tonnes of $CO2_{-eq}$ over the period 2021-2030.

Table 2.1.1.1. National mitigation targets:

GHG emission reduction targets	Lithuania		
	2030	In 2040	2050
Compared to 1990 levels*	≥-70 %	—85 %	—100 %
Compared to 2005 levels*	≥-30 %	—	—
Sectors covered by the EU ETS compared to 2005 levels	≥ 50 %	—	—
Non-ETS sectors compared to 2005 levels*	≥-25 %	—	—

* Including removals of GHG from the GIFF sector. Updated EC GHG targets for Lithuania for 2030 the reduction, excluding the FISH, shall be at least 21 % compared to 2005.

Climate change mitigation will be achieved through measures in GHG emitting sectors (agriculture, energy, transport, industry, waste). These measures are described in more detail in section 3.1.1.

Table 2.1.1.2. GHG emission reduction targets for individual sectors outside the EU ETS For the period 2021-2030, in %:

Sector	Average for 2016-2018 compared to 2005 in %	2025 target in % compared to 2005	Achievement of the 2030 target in % compared to 2005
Transport	+ 36,2	+ 11,3	—14
Industry	+ 23,5	+ 2,2	—19
Agriculture	+ 3,2	—3,8	—11
Wastes	—36.6	—50,6	—65
Small energy	—3,2	—14,8	—26

Meanwhile, the GIFCM sector has been included in the EU's greenhouse gas emission reduction targets for the period 2021-2030 as a flexibilities. Lithuania will be able to offset 6.5 million t CO_2 eq. through the Flexibility Instrument for the period 2021-2030. Meeting the greenhouse gas emission reduction target for non-ETS sectors if removals from the GIFF sector are higher than the sector's emissions. If GHG emissions are generated in the GFCM sector, they will have to be covered by annual allocation units for non-ETS sectors.

Adaptation policies aim to strengthen adaptive capacity, increase resilience and reduce vulnerability to the impacts of climate change in order to contribute to sustainable development and ensure appropriate adaptation responses. Lithuania's adaptation to climate change

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the objective of a change policy is to reduce existing and anticipate potential vulnerabilities of natural ecosystems and sectors of the country's economy, to strengthen adaptive capacity, to reduce risks and damage in a cost-effective manner, and to maintain and increase resilience to climate change changes in order to ensure favourable conditions for society and sustainable economic activity, so that food production is not endangered. Adaptation to climate change will be achieved through measures in sensitive sectors (agriculture, energy, transport, industry, forestry, ecosystems and biodiversity, landscape, public health, water resources and coastal areas, urbanised areas, etc.). These measures are described in more detail in section 3.1.1.

The NCCD provides the main strands for the implementation of horizontal climate change management policies:

1. assess the impact of policy measures (new or amended legislation and investment projects) on GHG emissions and other measurable environmental indicators in decision-making;
2. establish an effective (ex-ante and ex-post) impact assessment system for climate change management policies, ensuring cooperation between stakeholders, planning of measures and monitoring the achievement of climate objectives;
3. implement the 'polluter pays' principle so that tax policies provide economic incentives to mitigate climate change;
4. integrate climate change management objectives, targets and measures into national development programmes, ensuring consistency of national policies and sending a clear signal to capital markets and investors that the transition to a climate-neutral economy is irreversible, and encouraging innovation to transform sustainable solutions into cost-effective solutions;
5. effectively plan the actions and financial resources needed to implement climate change management policies;
6. make the government climate neutral by 2024, and the public sector as a whole from 2027. Obligation public bodies to use only green electricity and heat, use zero-emission transport, purchase goods and services exclusively through green procurement, as of 2023;
7. promoting sustainable and green procurement, prioritising equipment and labelled products that meet the latest energy efficiency standards in all sectors of the economy, with a view to making green procurement the predominant type of public procurement from 2023;
9. strengthen international cooperation and the role of municipalities, develop an urban environmental index by encouraging municipalities to compete on the Green Deal and share good practices and improve public education and engagement.

The vision for climate change governance policies envisages Lithuania's economy to be circular and climate-neutral by 2050. The country's economic sectors and regions are resilient to the environmental change caused by climate change, are characterised by modern, resource-efficient, socially responsible and competitive, innovative technology and research-based development, decoupling economic growth from resource use. A reliable, sustainable, competitive, competitive, competitive and secure energy system, based on a well-functioning EU internal market, is in place. Maximum use of natural sinks using only environmentally safe carbon capture and utilisation technologies (CCU) to offset GHG emissions in sectors where no technological potential for zero GHG emissions can be found.

Protect and conserve biodiversity, strengthen natural frame structures, ensure climate-resilient ecosystem balance, maintain and enhance natural sinks through the sustainable use of forests, agricultural land and the restoration of damaged wetlands and other carbon-intensive ecosystems. Urbanised areas create a balance between nature and urban elements, making extensive use of green infrastructure and other nature-based solutions to improve the living and rest conditions of the population.

A climate-resilient society adapted to the inevitable consequences of climate change. Contain negative impacts on citizens' health and well-being, environmental factors and risks, reduce society's vulnerability to climate change and increase well-being by keeping planetary boundaries within reach.

In April 2023, the Organisation for Economic Co-operation and Development (OECD) presented the 24 policy recommendations of the study "Climate neutrality by 2050 – options for reform in Lithuania", which pathway and measures should be taken by Lithuania to meet its decarbonisation objectives, how this will affect our country and what opportunities for Lithuania are developing a climate-neutral economic model.

The study assessed Lithuania's climate change policy and its implementation. Lithuania's economic growth has been successfully decoupled from greenhouse gas (GHG) emissions. However, the GHG intensity of energy consumption in Lithuania remains above the EU average. In Lithuania, the GHG intensity index differed from the EU score by almost 14 pps in 2017 and the difference increased to 23.4 pps in 2020.

To achieve the country's GHG reduction targets, OECD experts stress the need for an ambitious cross-sectoral climate change policy, an increase in environmental taxes and the elimination of fossil fuel subsidies. According to them, the decarbonisation of the Lithuanian economy will require long-term measures. Priority must be given to increasing GHG reductions in the transport sector, while an old and inefficient car fleet, increasing road freight and urban development require urgent solutions. Ensuring the energy efficiency of buildings is another challenge, as the lack of an energy efficient building stock negatively affects the significant progress made in reducing greenhouse gas emissions from heating from biomass and waste. In the industrial sector, historically low fossil fuel prices have hampered a faster transition to renewable energy, although the current geopolitical situation and the energy price crisis are changing incentives. Finally, agriculture should regulate the increasing use of mineral fertilisers in crop production and encourage crop rotation and other sustainable agricultural practices instead of monocultures.

The study indicates that carbon pricing alone is not enough for Lithuania to become a climate-neutral country by 2050. The development of innovative technologies is needed, especially in the transport and industrial sectors. Targeted support is necessary to stimulate technology uptake and innovation.

According to OECD experts, the economic costs of achieving high climate ambitions would be minimal if environmental taxes were properly regulated. Significant emission reductions only slow down the annual growth rate and, in the event of continuous technological development, innovation would balance minimal economic costs. The current focus on subsidies may crowd out private investment. The OECD recommends bridging the existing significant funding gap for low-carbon infrastructure with private sector investments.

Small capital markets should be further expanded on a regional scale in order to give investors an interest in the environment

24https://am.lrv.lt/uploads/am/documents/files/Poveikio%20klimatui%20neutralumas%20iki%202050%20m_%20%E2%80%93%20reform%C5 %B3 %20Lithuanian%20galimyb%C4 %97s%20(LT%20translation).pdf

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financing of amicable solutions and technologies, and measures need to be tailored to the different needs of investors. Closer cooperation between self-government is recommended in order to pool knowledge, for example by creating common service centres or projects, with a view to achieving greater scale and reducing costs.

Energy from renewable sources

Lithuania's commitment to reach 23 % by 2020 in the EU RES in final energy consumption was already implemented in 2014. Lithuania is implementing RES development on the basis of the NPT, which sets long-term energy targets. The strategy sets targets for the share of RES by 2050 in gross final energy consumption, heating, transport and electricity (Table 2.1.2.1). The Ministry of Energy has now set more ambitious targets of 55 %. RES final energy consumption and 100 % RES total electricity consumption by 2030. It should be noted that the achievement of the 2030 targets requires the full implementation of planned policy measures as described in Sections 3.1.2 and 5.1.

Table 2.1.2.1. Share of RES in gross final energy consumption and in relevant sectors[25]:

	202025	202027	2022	2025	2027	2030	2050
RES share of gross final energy consumption in %	26,7728	30 (23)	34,50	40,75	46,25	55	80
RES-E share of final energy consumption in the electricity sector, %	20,17	30	34,54	54,50	72,06	100	100
Share of RES-T in final energy consumption in the transport sector29	5,50	10	7,21	9,59	11,69	15	50
Share of RES in heating and cooling30	50,23	—	53,28	57,53	61,26	67,2	—
Of which RES share of DH	74,7	70	77,45	81,28	84,65	90	100
Reference point for the overall increase in the share of energy from renewable energy sources between the Member States concerned's binding national target for 2020 and their contribution to the 2030 target, in %		—	18	43	65	—	—

The integration of renewable energy sources into the transport sector is inefficient and too slow in view of speeding up the process, with the adoption in 2021 of the Law on Alternative Fuels implementing Directive 2018/2001 as regards the decarbonisation of the transport sector. In the medium term, the share of RES

The share of25 RES in total final energy consumption in intermediate periods has been calculated on the basis of Article 4(2) of Regulation (EU) 2018/1999 of the European Parliament and of the Council in assessing the national target for 2020 and the contribution to the 2030 target. The sectoral share of RES in intermediate periods is calculated by estimating the actual percentage and contribution to the 2030 target in 2020 taking into account the percentages referred to in Article 4(2) of Regulation (EU) 2018/1999 of the European Parliament and of the Council.

26Fact:

The27 target set in the NENS.

28After evaluation of statistical transmission.

The29 RES-T targets shall be achieved by taking into account the energy content of transport fuels without applying the multipliers set out in Directive 2018/2001.

30As the overall RES target for heating and cooling is not adopted in the NPT, a projected value is provided after all planned policy measures have been implemented.

energy consumption in transport is expected to be at least equal by 2030

15 %, of which 5.2 % from RES fuels of gaseous origin.

In the future, the increase in the share of RES in gross final energy consumption will be mainly driven by the increase in RES in the electricity and transport sectors, although it will mainly consist of consumption in the heating and cooling sector (Table 2.1.2.2.).

Table 2.1.2.2. RES contribution of each sector to final energy consumption, 2021, ktoe, %:

	ktoe	%
Total final RES consumption in the heating and cooling sector	1297,9	48,62
Total final consumption of RES-E	241,3	20,92
Total final RES consumption in the transport sector	135,2	6,69
Total RES consumption	1666,0	100

The share of RES in gross final energy consumption shall be achieved by increasing the share of RES in electricity, transport and heating and cooling.

Electricity sector

According to data from the State Energy Regulatory Council for 2022, the estimated amount of electricity produced and planned to be produced in Lithuania would amount to 10.7 TWh/year after the construction of all power plants under development. The promotion quota allocation auctions to promote the development of RES-E started at the end of 2019 and therefore their outcome is likely to be visible only in 2023, when the successful bidders will build power plants and start producing electricity.

The objective will be to increase the share of RES-E in gross final electricity consumption to 100 % by 2030. Wind energy is estimated to remain the main source of electricity generation at least 60 %, solar energy 19 %, biofuels 6 %, hydropower 7 % and biogas 3 %. (Table 2.1.2.3.)

Table 2.1.2.3. Projected RES-E production trajectory with planned policies and measures, ktoe[31]:

	In 2020	FISMA	Year 2025	EBA:	2030
Final electricity consumption, ktoe	5339,5	5478,7	5653	5485	5347
Hydropower plants, ktoe	25,5	39,3	34,9	33,6	32,2
Wind turbines, ktoe	133,4	130,1	491	1034	1719
Solar power stations, ktoe	11,1	23,5	351	397	427
Biofuel power plants, ktoe	27,3	12,0	59	62	65

[31] Calculated on the basis of the objectives in Table 2.1.2.1 of Chapter 2.1.2.

Biogas plants, ktoe	12,8	11,4	12	13	14
Cogeneration plant for industrial and municipal waste	11,0	2,4	17,7	17,7	17,7
RES-E, ktoe	221,1	218,7	965,6	1557,3	2274,9

Investments in wind and solar power plants used for electricity generation are estimated to be the most attractive investments for investors in the period 2020-2030 due to their economic attractiveness and easy installation.

Part E of RES-E will be achieved by maintaining existing generation capacity, modernising it and deploying new electricity (see Table 2.1.2.4 and Table 4.2.2.5).

Lithuania has been developing RES since the first hydropower and wind power plants were built in 2002. Hydropower plants have a useful life span of between 30 and 50 years, whereas the development of these plants in Lithuania is limited by environmental laws and it is estimated that the development of these plants will not take place between 2020 and 2030.

Wind turbines have a useful lifespan of around 20 years and can therefore be retrofitted to maintain existing capacity until 2030. It is estimated that the total installed capacity of new wind turbines could increase to 6 429 MW between 2020 and 2030.

In 2003, the first biogas plants were launched, with a useful life span of between 15 and 20 years. In this context, the upgrading of these plants could take place in order to maintain the existing capacity. Given that biogas is expected to be oriented towards the transport sector, it is estimated that the development of these plants in the electricity sector will be marginal in the period 2020-2030.

In 2007, the first biomass power plants started to be built, with a potential useful life of around 15 years. In this context, in order to maintain the existing capacity, these plants could be upgraded. The increase in the capacity of new biomass plants is planned for 2023 with the entry into operation of the biomass plant currently under construction.

The development of solar power plants started in 2011 and therefore, taking into account a useful life span of around 20 years, it is estimated that there will be no need to upgrade them between 2020 and 2030. The development of new solar power plants will be mainly influenced by self-generating energy consumers (prosumers).

Table 2.1.2.4. New RES-E electricity generation capacity[32]:

	In 2020	2021/2022	2023-2025	2026-2027	2028-2030
Wind power plants, MW	—	406	1078	2165	2240
Hydropower plants, MW	—	—	—	—	—
Solar power plants, MW	—	408	3612	551	360
Biomass plants, MW	—	73	—	—	—
Biogas plants, MW	—	20	—	—	30

[32] The results of the PPP modelling scenario are presented, assuming that all planned policy measures will be implemented.

It is also envisaged to encourage prosumers and the active participation of local communities in investing in co-ownership RES facilities by encouraging active electricity consumers (see Figure 3.2 for details) to self-consumption and to receive market-conform remuneration for excess energy fed into the grid. The NEPT sets ambitious targets for the development of active electricity consumers:

- 2 % of the total number of consumers by 2020;
- 30 % by 2030 compared to the total number of consumers.

Transport sector

The transport sector aims to gradually switch to alternative fuels and electricity, therefore the EU obligations aim to achieve a share of RES in transport of at least 15 % in 2030. (Table 2.1.2.5.) However, Lithuania, like other Member States, faces difficulties in achieving the objectives set for the transport sector. In 2021, the share of RES in the transport sector was 6.69 %, below the EU average.

In order to improve the situation in the transport sector, action has been stepped up accordingly. As of 1 January 2020, higher targets for mandatory blending of biofuels into each litre of year have entered into force. In March 2021, the Law on Alternative Fuels was adopted, which:

- requirements for entities procuring in the fields of energy, transport or postal services. The requirements aim to incentivise public entities to purchase clean vehicles and/or services by providing that the share of zero-emission light-duty vehicles and buses purchased in 2030 compared to the total fleet is at least 100 % and zero-emission heavy-duty vehicles at least 16 %.
- a more ambitious mechanism of obligations for the use of biofuels and RES-fuels has been introduced by setting an increased minimum share of biofuels per litre of fuel sold in Lithuania (6.6 % in petrol and 6.2 % in diesel in terms of the total energy content of the blend). The obligations apply to all fuel suppliers operating in the country who are responsible for paying excise duties on fossil fuels. The mandatory RES fuel supply obligation for fuel suppliers is set at 16.8 % in 2030, part of which is to be achieved through the physical blending of biofuels into the fuel, while the other part can be met by purchasing units of fuel from RES from other fuel suppliers.
- from 2025 onwards, obligations will be extended to natural gas suppliers supplying natural gas to vehicles;
- fuel suppliers are also subject to mandatory obligations for the supply of advanced biofuels and fuels of non-biological origin from RES. In 2030, each supplier shall ensure that its fuel balance contains at least 3.5 % of advanced biofuels or RES fuels of non-biological origin;
- the overall share of biogas and gaseous fuels of non-biological origin from RES compared to the final energy consumption of the transport sector is envisaged to be at least 5.2 % in 2030;

- targets have been set for the use of electricity in the transport sector, with a minimum of 50 % of annual purchases of electric vehicles registered for the first time by 2030.

On 1 July 2022, an action plan for the development of electric vehicles and recharging infrastructure for

electric vehicles was adopted, which includes measures and actions to increase the uptake of electric vehicles and ensure the efficient development of recharging infrastructure for electric vehicles. The target is to have at least 262 thousand electric vehicles (around 15 % of the total vehicle fleet) in the country's fleet by 2030. The Action Plan also aims to ensure a balanced roll-out of recharging infrastructure, with a strong focus on private charging points and their integration into the national energy system.

Table 2.1.2.5. Expected trajectories for RES consumption by technology in the transport sector without applying the multipliers set out in Directive 2018/2001, ktoe[33]:

	In 2020	FISMA	Year 2025	EBA:	2030
Projected consumption in road transport, ktoe	2190,3	2214,7	2349	2200	1939
Bioethanol, ktoe	15,7	19,3	21,2	21,8	24,4
Biodiesel, ktoe	87,2	130	149	169	195
Biogas, ktoe	—	—	34	57	81
Electricity RES, ktoe	1,2	2	13,7	52	105
Water from RES, ktoe	—	—	1	3	6
RES-T, ktoe	104	151	219	303	411

Heating and cooling sector

Lithuania's primary objective in the field of heat is a coherent and balanced renovation (optimisation) of district heating systems, ensuring efficient use of heat, reliable, economically attractive (competitive) supply and production, enabling the introduction of modern and environmentally friendly technologies using local and renewable energy sources, ensuring system flexibility and a favourable investment environment. In line with good practice in EU countries, Lithuania must promote the transition to fourth generation (4G) district heating, integrating solar power plants into district heating networks and promoting the use of excess and waste heat for heating buildings.

In Lithuania, the district heating system is an integral part of the overall energy sector and is closely linked to the electricity system, fuel supply and other systems through technological and energy-flow links. There are well-developed district heating systems in all Lithuanian cities, of which approximately 57 % of all buildings are supplied in the country and around 80 % of all buildings in cities.31 32The main users of district heating services are residents living in multi-apartment buildings.

According to the Lithuanian Heat Suppliers Association, at the end of 2021, heat supply companies; and

31The results of the PPP modelling scenario are presented, assuming that all planned policy measures will be implemented.
32https://lsta.lt/wp-content/uploads/2019/10/LSTA_apzvalga_2018.pdf

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combustion plants with condensing economisers using solid fuels used by independent heat producers (hereinafter 'HPC') had a total thermal capacity of almost 1 820 MW. Of these, around 791 MW were installed in boilers and power plants. The total installed capacity of heat generation installations has decreased by around 22 % over the last 6 years, from 10 000 MW in 2015 to almost 7 800 MW in 2021, the maximum power demand for district heating (DC) systems increased in 2021 to 3 020 MW due to colder winters (compared to 2 480 MW in 2020). Over the summer period, the average load on systems is around 400 MW.

The efficiency of heat and hot water production technologies in the decentralised sector is rather low and there is considerable potential for energy savings. The sector also has the potential to convert primary energy sources, which can significantly improve the conditions for the supply of heat to the population and encourage a more efficient use of renewable energy sources, some of which could be used in other sectors.

The overall share of RES in the heating and cooling sector will reach 90 % by 2030, where heat energy from local biofuels will be the main contributor. Additional policy measures (such as the deployment of solar energy and heat pumps, low-temperature heating, waste heat recovery) are expected to reduce demand for all fuels as a result of increased energy efficiency and further centralisation in decentralised heat production. Due to the specificity of the building stock, the energy demand of the cooling sector in Lithuania is negligible. As the share of new buildings with cooling systems in the national building stock increases, energy demand in this sector is likely to increase.

Table 2.1.2.6. Estimated trajectories for RES generation by fuel type in the heating and cooling sector, ktoe[35]:

	In 2020	FISMA	Year 2025	EBA:	2030
Energy demand for decentralised heat production	1303,0	1337,1	1506,0	1535,1	1506,0
Decentralised heat production from RES	644,5	612	622	624	623
Coal for decentralised heat production	175,9	188	147	128	124
Petroleum products for decentralised heat production	150,7	154	147	144	141
Use of natural gas for decentralised heat production	554,4	551	487	413	362
Energy demand for district heating	1029,1	952	946	894	913
District heating heat from RES	723,2	734	816	815	834
Share of energy from renewable sources in total heating, %	**52,4**	**58,0**	**64,5**	**69,0**	**74,1**

[35] The results of the PPP modelling scenario are presented, assuming that all planned policy measures will be implemented.

Share of energy from renewable sources in district heating, %	**74,7**	**75,0**	**80,7**	**90,0**	**90,0**

Lithuania's targets in the heating and cooling sector are ambitious, but closely linked to energy efficiency – both decentralised and district heating will reduce energy demand by 2030. New technologies (heat pumps, modern biofuel boilers, etc.) and renovation of multi-apartment buildings will have the greatest impact. If the additional measures envisaged are implemented, a higher share of RES in heat and cooling than currently foreseen can also be achieved. It should be noted that the achievement of the 2030 targets requires full implementation of the planned policy measure as described in Sections 3.1.2 and 5.1.

The district cooling energy network is not developed in Lithuania. Residential and commercial premises are individually cooled using electricity for cooling energy generation. The annual indicative cooling energy demand in Lithuania ranges between 5 and 6 TWh. The need is based on the assumption that the cooling demand in Lithuania is ~60 kWh/m^2 per year, taking into account climatic conditions, but in order to develop the sector, it is necessary to assess that this would only be useful if only buildings already equipped with a centralised (single mechanical) ventilation system, i.e. offices, supermarkets and new high-energy multi-apartment buildings, are connected to the grid, as investments in old multi-apartment buildings in order to reap the benefits of district cooling would be unreasonably high. In this case, the annual cooling energy demand would decrease to 2-3 TWh.

Amendments to Lithuanian Law No IX-1565 on heat were adopted on 6 April 2023 to promote long-term planning of heat supply systems and motivational measures for investments related to the decarbonisation of heat supply systems, the improvement of heat efficiency, the reduction of heat demand and heat losses:

- by promoting the decarbonisation of heat supply systems, a legal framework for the purchase of waste heat and the purchase of heat from independent heat producers has been introduced.
- it strengthens the planning of the heat sector and moves to planning for a ten-year period by introducing two levels of planning documents for the heat sector: special plan for the heat sector and ten-year investment plan for the development of the heat sector by the heating supplier:

and the special plan for the heat sector is a special planning document drawn up by municipalities for a period of 10 years, identifying existing and planned new areas for heat consumers, identifying potential and alternative heating methods, heat production installations, meeting the needs of heat consumers at reasonable minimum costs and within the permitted negative environmental impacts.

the heating undertaking's ten-year investment plan for the development and modernisation of the heating system and the prospective zones for the development of the heat supply system; planned investments, timing and sources of financing for the development of a heat supply system based on a cost-benefit analysis; forecasts of energy resource demand by fuel type; demand for new heat generation installations (capacity (MW), location of connection to district heating system and planned operation

start), prioritising technologies that reduce greenhouse gas emissions; a plan to improve energy efficiency and reduce demand for heat consumption; development of the services provided by the heating undertaking and a plan to improve the quality of those services; effective measures to reduce energy poverty, improve energy efficiency, increase the reliability of heat supply and increase competition; potential sources of renewable energy sources, waste heat recovery sources and ways and means of integration in the heat supply system, their development, planned in the long term.

- heat suppliers must, in cooperation with the distribution system operator operating in the area specified in the licence, assess, at least every three years, the possibility of using the district heating system to provide flexibility services in the electricity system through demand-side management, storage of excess electricity produced from renewable sources.

Technical tasks for the implementation of the solutions:

- assessment and deployment of waste heat capture and utilisation, solar and thermal technologies, heat pumps, low-temperature heating and heat storage facilities for district heat production;
- implementation of remote heat metering system;
- rational use of high-efficiency cogeneration plants increasing local electricity production opportunities, development;
- timely modernisation (when there is no longer economic feasibility and/or changes or new ones due to environmental considerations):
  - existing biofuel combustion plants or, where economically justified, cogeneration with a view to maintaining the balance of renewable energy sources;
  - existing heat transmission installations and their systems in order to reduce heat losses and enable the optimal development of the heat transmission network;
  - building heat stations and/or heating and hot water systems, providing technical conditions where this is economically justifiable for the individual regulation of heat energy consumption for each customer.

Market for biofuels

The inevitable changes in the biofuels market are linked to the tightening of sustainability requirements for biomass fuels in the EU. In the long term, the DH sector will have to diversify the RES sources used in heat production and the RES fuel structure, as over-reliance on a single energy source is not a sustainable and long-term solution – diversification of RES and technologies used in heat production is necessary. The entry into operation of the Biofuel Unit of Vilnius CHP plant during the 2023-2024 heating season (the biofuel unit will consist of two 95 MW identical fuel steam boilers fuelled with the fuel and one steam turbine with an electricity generator of approximately 73 MW) will have a significant impact on the biofuel market due to the increasing demand for biofuels.

Various measures are in place to address the increase in demand for biofuels, including the European Union sanctions imposed by the Russian and Belarus war against Ukraine and the stagnation of timber imports from these countries:

- Scientific work carried out on behalf of the Ministry of the Environment ‘Preparation of assessments

and proposals for the development of the use of indigenous wood fuels for heat production, possible scenarios and their impact on biofuels and their raw materials, heating prices and sustainability'. This scientific work will assess the supply of wood fuel from indigenous resources and the untapped potential in Lithuania, including from sources such as electricity, maintenance and cleaning residues of gas pipeline paths, self-forested agricultural land, etc.;

- In 2022, the State Forests uridia offered 430.3 thousand KTM to the market and buyers purchased 299.1 thousand forest harvesting residues. In addition, biofuel producing companies were able to purchase the following raw material (lower quality and cheaper wood grades) from the auctions for the sale of rostwood for the production of biofuels: in 2022, it sold 552 thousand KTM paperworkers, 540 thousand KTM board wood and 611 thousand KTM fuel wood graders. Similar quantities of this wood are sold annually.
- in order to ensure a stable supply of logging residues to the market, the Ukrainian Operational Strategy for 2023-2027, approved by Order No V-3 of the Minister for the Environment of the Republic of Lithuania of 13 January 2023 approving the Operational Strategy of the State Enterprise State Forests for 2023-2027, sets out the following strategic objective: offer for sale and/or recycling a quantity of raw material for biofuel (forest harvesting residues) of 400 thousand KTM. In order to meet the objectives, targets and plans set, the raw material for biofuels (forest harvesting residues) is produced not only in the main, educational and sanitary fellings, but also through the crossing of dangerous trees in the protection zones of the power lines, the cleaning of dumps, the removal of ponds, the districts and the boundary lines and other special loggings.

As regards the increase in the placing on the market of logging residues as the worst raw material, the increase in the supply of this raw material is severely constrained by natural conditions: in wet forests, harvesting residues are used for technological purposes by pruning, while dry forests dominated by pine forests naturally have lower harvesting residues due to lower pine roots (the branches between harvesting residues account for around 90 %). In addition, harvesting residues are by-products of logging and their overall increase is only possible with increased harvesting, but there is no intention to increase harvesting. The above-mentioned scientific work is one of the actions of the Ministry of the Environment to address issues related to the supply of biofuel raw materials, which will include an assessment of Lithuania's supply potential of wood fuel, ways of increasing supply and sources (including logging residues).

A significant increase in the supply of wood for use as biofuel to the market (200 thousand KTM and more per year) is planned in the near future, following the transfer of cross-cutting forestry activities to the Urigade by Government Resolution, about 20 thousand hectares of state-owned forests in the Free State Land Fund. As the amount of wood stored in these forests in mature stands amounts to approximately CTM 1.8 million, the potential for biofuels is significant enough.

In accordance with Resolution No 972 of the Government of the Republic of Lithuania of 17 November 2017 approving the description of the procedure for trade in raw timber produced in state forests and harvesting residues, the State Forests Administration is entrusted with the production and sale of biofuels. To this end, the following wood sorts (up to 20 % of their planned production per calendar year) have been reserved for the production of biofuels: fuel wood, wood and paperwork of panels (total of approximately 380 thousand KTM)

and harvesting residues (approximately 80 thousand KTM).

The Ministry of the Environment has also drawn up a draft Resolution of the Government of the Republic of Lithuania amending Resolution No 972 of the Government of the Republic of Lithuania of 30 November 2017 approving the description of the procedure for trade in raw timber produced in state forests and harvesting

residues, proposing to lay down the principles for the application of open auctions (real-time competition for timber). Participation in the auction will not be subject to restrictions (timber will be sold to the highest bidders) and will increase the ability of buyers to compete efficiently for timber and to obtain it at a higher price in open auctions. This is likely to also have a positive impact on the supply of raw material for biofuel production by biofuel actors.

It should be noted that the increase in demand for biofuel feedstock and the measures taken and envisaged to meet this demand will not have a negative impact on forest ecosystems and biodiversity, as these measures are selected and applied only in the light of all environmental requirements. At the same time, the application of generally recognised principles of sustainable forest management in the country's forestry and regulation is excluded, while the provisions of Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources on sustainability and greenhouse gas saving criteria for biofuels provide additional protection.

Other significant developments that will have an impact on the country's biofuel market include:

- Renewable resources of the Republic of Lithuania approved on 28 April 2022
  the amendment of Article 2 of Law No XI-1375 on energy and the addition of seventh provisions33 to the Law transposing Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources as regards the sustainability and greenhouse gas saving criteria for biofuels, which are mandatory for all Member States of the European Union, as well as provisions establishing a certification procedure for compliance with sustainability requirements for biomass or feedstock for the production of biomass fuels;
- with effect from 1 May 2023, the Renewable Energy Act ('RES Law') introduced the requirement for all market participants in the Lithuanian energy resources market to use only biomass fuels that meet sustainability requirements when using biomass fuels in installations for the production of electricity, heat and/or cooling with a total rated thermal input of 20 MW or more when using solid biomass fuels (or 2 MW or more for gaseous biomass fuels).
- in order to develop the use of local, sustainable renewable energy sources in the production of biomass fuels and to simplify the process of verification of compliance with sustainability requirements in practice, the RES Law provides for the introduction of a national scheme, in addition to voluntary voluntary certification schemes for biomass fuels recognised by the European Commission, whereby compliance with sustainability requirements will be verified throughout the supply chain, making use of existing administrative structures. The voluntary national scheme has been assigned to BALTPOOL, an energy exchange operator operating an energy stock exchange.

According to the State Energy Regulatory Council (hereinafter referred to as the State Energy Regulatory Council) in Q2 2022, 45 HCOs, 28 NCOs and 79 biofuel suppliers were active on the biofuels market:

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- District heating companies and independent heat producers in Q2 2022
  transactions on the stock exchange for a quantity of 846 370 MWh of biofuels;
- In Q2 2022, 97.57 % of the total amount of biofuels supplied was purchased on the energy stock exchange, t.
  i.e. an increase of 4.37 percentage points compared to Q2 2021, the remaining amount of biofuels (2.49 %) was purchased through bilateral agreements;
- assessing the concentration of the market for biofuels on the basis of biofuel suppliers' energy exchange sales

33 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.398874/asr

biofuel volumes, Q2 2022 The value of the HHI index is 589,70 (no competition in the market for the supply of biofuels). The largest biofuel supplier accounted for 18.39 % of the market;

- For Q2 2022, the highest share of energy exchange and bilateral contracts (98.03 %) was: wood chips, 1.09 % of wood-based biofuels (sawdust, particles, blend of biofuels, etc.), 0.59 % wood pellets and 0.29 % fuel wood were purchased.

The main challenges for the biofuels market, the DH sector in 2023-2024 and in other heating seasons are to balance growing demand for biofuels and diversify heat production sources by replacing depreciated biofuel boilers with other RES technologies.

2.2 Dimension energy efficiency

Improving energy efficiency (EE) is a key priority in the field of energy up to 2050 and is enshrined in the National Energy Independence Strategy adopted in 2018. Lithuania aims to continuously and consistently increase the EE, introduce newer and less energy-using technologies, and increase consumer education and change their behaviour. Industry, buildings and transport have the greatest potential to increase EE after assessing the cost-effectiveness of efficiency measures. The headline target of the Strategy for increasing the EE is to ensure that primary and final energy intensity is 1.5 times lower by 2030 than in 2017 and by 2050 about 2.4 times lower than in 2017. The main and most end-use energy-consuming sectors are transport, services, households and industry, and their consumption projections are presented in Table 2.2.1. It should be noted that achieving the EE targets for 2030 requires full implementation of the planned policy measure, as described in sections 3.2 and 5.1.

Table 2.2.1. Projections for primary and final energy consumption by 2030, ktoe:

	FISMA	Year 2025	EBA:	2030
Primary energy consumption	6429	6087	5836	5245
Final energy consumption	5328	5045	4837	4402
Industry	1022	978	949	933
Transport	2112	1959	1832	1600
Services sector	632	587	569	540
Households	1408	1369	1342	1308

The NEC sets the EE headline targets for 2030 and 2050 as follows:

- by 2030, ensure that primary and final energy intensity in 2030 is 1.5 times lower than in 2017;

- by 2050, ensure that primary and final energy intensity is about 2.4 times lower than in 2017.

To implement the said objectives, Lithuania set priority axes, i.e.:

- promote the complex renovation of multi-apartment residential and public buildings (priority for renovation of residential areas) and energy savings of 10-11 TWh by 2030;
- promptly develop low-energy-intensive industries and industries increasing energy efficiency, deploy and acquire the most up-to-date and environmentally-friendly technologies and equipment.

Increase the EE in the transport sector by upgrading the car fleet, shifting to modern and efficient public

transport, optimising transport and alternative fuels infrastructure, electrification or using alternative fuels.

According to the requirements of Article 8 of the new EE Directive, the binding end-use energy savings target for Lithuania is 39.3 TWh (3383,9 ktoe) by 2030. According to Eurostat, final energy consumption in Lithuania was 5099 ktoe in 2016, 5344 ktoe in 2017 and 5568 ktoe in 2018. The average final energy consumption in Lithuania for these 3 years is 5337 ktoe. As the building sector accounts for a significant share of final energy consumption, Lithuania is making significant efforts to improve the energy performance of buildings. By 2030, around 5000 multi-apartment buildings are expected to be renovated, or 750 000 m² of buildings, with energy savings of around 5.5 TWh. Energy savings of 5-6 TWh are planned to be achieved by 2030 for the refurbishment of individual dwellings of natural persons (one or two). There will also be a strong focus on refurbishing public buildings. In Lithuania, according to 2021 data, central government authorities had around 5.88 million m² of building floor area, of which around 1.9 million m 2 are below energy performance classes C. The reform of the central government building sector is currently being implemented and the refurbishment of public buildings is increasing. The obligation under Article 6 of the Energy Efficiency Directive to renovate 3 % of central government and municipal buildings each year by 2030 would amount to around 510 000 m 2 and 450000 m 2 respectively.

By decision of 31 March 2021 (Protocol No 18), the Government of the Republic of Lithuania approved the long-term renovation strategy, according to which all Lithuanian public and private buildings and residential buildings will have to become fully decarbonised and have a zero carbon footprint by 2050.

By Order No D1-336 of 19 October 2022 approving the implementation plan for the long-term building renovation strategy, the Minister for the Environment approved the implementation plan for the long-term building renovation strategy, the implementation of which is currently being implemented. Integrated district renovation is an essential element of the implementation plan. By Order No V-50 of 27 April 2023 'On the establishment of a working group to prepare a model for urban regeneration', the Minister for the Environment set up a working group to make proposals and recommendations for the development of the model. The objective of the Task Force is to enable and implement pilot projects of the district complex renovation model and to revise the integrated district renovation model on their basis.

Targets for the implementation of the renovation strategy and indicative milestones for 2030, 2040 and 2050. These targets are expected to facilitate the cost-effective modernisation of 440 thousand buildings, or around 110 million square metres of surface, over the next three decades. The strategy envisages a 60 % reduction in the annual primary energy consumption of the building stock compared to 2020, a reduction in primary energy consumption from fossil fuels (replacement from renewable sources) and a 100 % reduction in CO_2 emissions.

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According to the CCI, the 2030 targets for the transport sector in relation to energy efficiency of light and commercial vehicles are:

- that by 2027 all public, taxi and ride-on transport in metropolitan cities use RES energy only;
- to achieve a minimum share of 20 % of the light-duty vehicle fleet for electric and zero-emission vehicles, the development of the necessary recharging and refuelling infrastructure;
- by increasing the number of electric vehicles, achieve:
  - by 2025, the number of electric vehicles in category M1 would be at least 10 % and N1 electric vehicles would represent at least 30 % of annual purchases;
  - by 2030, the number of electric vehicles in category M1 would be at least 50 % and N1 electric vehicles would represent 100 % of annual purchases;
  - and from 1 January 2030, vehicles of category N1 equipped with internal combustion engines,

with the exception of N1 vehicles powered by alternative fuels, are not registered.

- by 31 December 2030, road transport vehicles procured or used in the provision of services are clean and consist of:
  100 % for vehicles of categories M1, M2, M3, N1;
  16 % for N2and N3 vehicles;
- increasing energy efficiency, RES and alternative fuels, promoting sustainable mobility for clean, connected and digitalised intermodal transport, ensuring that the use of fossil fuels in road transport is reduced by 50 % by 2035;
- by 2035, limit the provision of passenger and logistics services in urban areas to zero-emission vehicles.

2.3 Energy security dimension

The strategic objective of integrating into the energy systems of the European Union and promoting the sustainable, competitive and efficient development of the energy sector aims to implement the essential provisions of the NEC, i.e. energy independence, competitiveness and sustainable development. When Lithuania became a member of the EU in 2004, it became part of the EU's single economic market, paving the way for the rapid growth of the Lithuanian economy and other areas of public interest. However, in the energy context, conditions remained largely unchanged, as Lithuania remained systematically and structurally linked to the Russian energy system. The final shutdown of Unit 2 of the Ignalina Nuclear Power Plant on 31 December 2009 further strengthened Lithuania's energy sector's dependence on a single external supplier of energy sources. Given that Lithuania did not have energy interconnections with the mainland of the EU and that all natural gas and most of the electricity were purchased from a single monopoly supplier, Lithuania started implementing infrastructure projects of regional interest to connect the Lithuanian and EU energy systems.

Over the last decade, through a coherent energy security policy, Lithuania has managed to break the pre-existing almost absolute dependence of energy supplies on Russia. In order to meet the objectives set out in the Energy Independence Strategy, the sources of energy and energy supply have been diversified, when the Klaipėda Liquefied Natural Gas Terminal (Klaipėda LNG terminal) became operational in 2014 and the electricity interconnections with Poland ('LitPol Link') and Sweden ('NordBalt') became operational in 2015 and 2016 and the construction of the Lithuanian-Poland Gas Interconnection (GIPL) in Lithuania was completed in 2021.

In addition, the Butinge oil terminal was installed and put into service already in 1999. All this infrastructure allows Lithuania to secure the supply of energy sources from alternative sources, so the complete abandonment of imports of electricity, gas and oil from Russia has no negative impact on Lithuania's energy sector and security of energy supply.

The aim is therefore to continue the activities undertaken, to make good use of the potential of projects of strategic importance which have been implemented and not yet completed, to integrate into the EU's energy systems and to promote the sustainable, competitive and efficient development of the energy sector, through the increased use of local and renewable resources, the development of competitive local energy generation capacity and the diversification of imports of energy resources that cannot be substituted locally.

The main measures provided for in EU regulations to mitigate the effects of the energy crisis caused by the Russian Federation include sufficient storage of natural gas in storage, reduction of natural gas demand, limitation of natural gas prices, reduction of demand for electricity consumption and limitation of the price of

crude oil imported from the Russian Federation.

Lithuania appreciates and supports the initiatives of the European Commission responsibly, and has therefore immediately started planning energy saving measures and developing recommendations to consumers, which were endorsed by the government in autumn 2022 and were in line with the principles of the Communication on 'Gas saved – safe in winter'. The main objective of the Energy Savings Plan is to save 20 % of energy over the next two years. In order to achieve the objective, public authorities were encouraged to save energy by changing behaviour and participating in national 'putinOut' energy-saving competitions. However, in terms of volume of gas demand, consumption was mainly influenced by the sharp increase in natural gas prices, leading to a drop in consumption of around 30 % in Lithuania and more than 50 % in the winter season.

Electricity sector

Following the collapse of the Soviet Union, the countries that applied for membership of the European Union gradually joined the Continental Europe Network (hereinafter referred to as "Continental Europe Network") by Poland, the Czech Republic, Slovakia and Hungary in 1995, Romania and Bulgaria in 2004 and Ukraine and Moldova in 2022. The operation of the electricity systems of the Baltic States in the electricity system of the Commonwealth of Independent States ('the PIC/UPS system') is exceptional in this respect. Lithuania, Latvia and Estonia are the only Member States of the European Union whose electricity systems are still operating in the IPS/UPS system, where the system frequency is managed centrally from a dispatching centre located in Moscow. However, Lithuania and the other Baltic countries are working towards becoming an autonomous part of the decentralised European electricity system and moving towards transparent European standards for the management of the electricity system. A sufficient level of energy security and full integration into the EU markets in Lithuania and the Baltic States can only be ensured if our electricity system is desynchronised from IPS/UPS and connected to continental European electricity networks for synchronous operation.

The synchronous operation of the Lithuanian electricity system would eliminate the risk of disconnection of cross-border transmission lines due to unforeseen or uncoordinated actions/failures by third parties, leading to isolated operation or blackout of the electricity systems of*the Baltic*States. Synchronisation with the KET networks would make it possible to become totally independent of the decisions taken in Russia and eliminate the possibility of technically influencing the operation of the Baltic States' electricity system.

On 24 February 2022, the Russian Federation launched an open military aggression against Ukraine and its people.

In view of this and the increased threat to Lithuania's national and energy security interests, Lithuania has intensified discussions with the other Baltic States and the European Commission on the implementation of the accelerated deynchronisation of the electricity system from the PIC/UPS system.

In August 2022, all participating countries – Poland, Lithuania, Latvia, Estonia and the European Commission – endorsed the TSOs' action plan to prepare for accelerated synchronisation of the electricity system at a meeting of the BEMIP Group. It should be noted that the above-mentioned TSO action plan provides an assessment of TSOs that critical infrastructure projects will already be implemented in the Baltic States and Poland in 2024, which will ensure secure synchronous connection and operation with KETs.

On 22 April 2023, the Lithuanian electricity transmission system operator LITGRID AB successfully tested the isolated work of the Lithuanian electricity system. During this test, the Lithuanian electricity system was for the first time disconnected from the IPS/UPS system and operated independently.

It should be noted that the electricity system's preparedness test for emergency connection to the power grid

of the Republic of Poland via the synchronous connection was already successfully completed at the end of 2021. The successful conduct of these tests confirmed the readiness of the Lithuanian electricity system to act autonomously when needed, the ability to ensure deynchronisation from the IPS/UPS system and the ability to connect to KETs for synchronous operation before 2025.

The synchronisation of the Baltic States with continental European networks will take place through the extended existing link between Lithuania and Poland, LitPol Link. In preparation for synchronisation, internal electricity transmission networks in the Baltic States and Poland are strengthened, synchronous compensators are installed and systems are prepared for disconnection from the IPS/UPS system and for self-frequency control. The new Harmony Link will serve as a market integration function through which electricity trade with the rest of the European Union will take place. Lithuania continues to be energy dependent on imported energy. Lithuania imports the vast majority of electricity. The electricity demand in Lithuania in 2022 was 12.8 TWh. In 2022, three quarters of electricity was imported and 4.2 TWh were produced to meet Lithuania's needs. Renewables accounted for 72.6 % of total electricity in 2022. The main reasons for importing more than generation are economic, i.e. there is insufficient competitive generation capacity in Lithuania.

The NEPT provides that imports of electricity will be replaced by local electricity production: electricity production in Lithuania is planned to account for 70 % by 2030. (30 % will be imported) and 100 % in 2050. However, as mentioned above, Lithuania is more ambitious and is making every effort to achieve 100 % RES in final electricity consumption in 2030.

The electricity transmission system operator AB LITGRID, which is responsible for the sound operation of the electricity transmission system in accordance with the procedure laid down by law, shall, at least every two years, draw up a ten-year network development plan (hereinafter referred to as the '10-year plan') aimed at assessing the adequacy and demand of the electricity system, ensuring security and reliability of electricity supply as well as ensuring quality, efficiency, management and environmental protection of electricity supply to consumers, improving access to the electricity system, planning the long-term development of the electricity system and effective measures to ensure the adequacy of the electricity system and the security of supply to consumers.

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Adequacy of the electricity system

At the request of the Lithuanian electricity transmission system operator Litgrid, the French consultancy and engineering company RTE International prepared an assessment of the adequacy of the Lithuanian electricity system between 2026 and 2030 ('the study'). The scope of the study included scenarios corresponding to national specificities, an assessment of the adequacy of Lithuania's electricity system for 2026-2030 and identified adequacy risks. The selected baseline scenario was subject to an assessment of the economic viability of existing generating capacities and proposals for possible State support mechanisms to ensure adequacy.

The study identified the following:

- The implementation of the Harmony Link link in 2028 poses an unacceptable level of adequacy risk in the baseline scenario. In the years 2026 and 2027, the LOLE would significantly exceed the limit of 8 hours/year (33 hours/year in 2026 and 28h/year in 2027);
- Additional needs in 2026 and 2027 to ensure the necessary level of security of supply in the system capacities. If the existing 'out-of-market' capacity of ~500 MW is maintained until the Harmony Link is brought into service, the LOLE would be reduced to an acceptable level of 8 hours/year (6.5 hours/year 2026 and 5.5 hours/year in 2027), respectively.

- the existing out-of-market capacity does not participate in the electricity market and generates electricity only during scarcity hours (on average 24 hours/year, max. 254 hours/year for production up to 6 000 MWh/year for the cold season). In view of the above, the revenues of this capacity on the electricity market would be lower than the fixed costs and therefore financial support is needed to maintain these units before the Harmony Link connector becomes operational.
- if ENTSO-E's European Resource Adequacy Assessment Study (ERAA) shows an adequacy problem after the start of operation of Harmony Link in 2028, it is recommended that Lithuania use the strategic reserve tool ~500 MW out-of-market capacity until the introduction of Harmony Link.

As the study was limited to examining the need for the implementation of the capacity mechanism in Lithuania, Litgrid carried out an additional analysis and made a proposal to implement the alternative of using the isolated work service currently used by Litgrid to maintain the out-of-market capacity.

Natural gas sector

Lithuania has no natural gas resources and therefore all natural gas consumed in Lithuania is imported. Since the launch of the Klaipėda Liquefied Natural Gas Terminal (Klaipėda Liquefied Natural Gas Terminal) since 2014, there has been a diversification of sources of supply and Lithuania has the capacity to source natural gas from LNG international markets (as mentioned above, gas has not been imported from Russia since April 2023).

At the end of 2014, the construction of a liquefied natural gas terminal in Klaipėda led to the abolition of a decades-long natural gas monopoly in Lithuania, creating competition. Lithuania has become self-sufficient in natural gas (and deliver significant quantities to the Baltic countries) through the LNG terminal alone. These fundamental changes in the natural gas sector have led to the removal of the difference of EUR 10/MWh between the Lithuanian market and the western European natural gas import price, and Lithuania has become one of the EU Member States most expensive for imported natural gas.

one of the least paying EU Member States for imported natural gas. Given the ongoing geopolitical tensions, the results achieved, the global dynamics of the liquefied natural gas market and the potential of the regional natural gas market to ensure a competitive and reliable natural gas supply, it was of strategic importance for Lithuania to ensure the long-term continuity of Klaipėda LNG terminal. In December 2018, the Seimas decided that Lithuania would ensure a long-term LNG supply after 2024 by acquiring an LNG ship-storage facility. This allows the operating costs of Klaipėda LNG terminal to be spread evenly over the 10-year lease period of the LNG ship/storage facility as is currently the case, but even over the estimated lifetime of the LNG terminal. Klaipėda nafta, the State-owned oil and liquefied natural gas terminal operator, decided on 25 February 2022 on the acquisition of the Klaipėda LNG terminal leased from Norway from 2014 onwards, at the end of 2024, at the end of 2024.

The GIPL pipeline between Lithuania and Poland entered into operation on 1 May 2022. The interconnection of Lithuania and Poland via the 508 km GIPL pipeline effectively expands the European gas market by integrating the Baltic States and Finland (it should be noted that the Balticconector gas pipeline between Finland and Estonia entered into operation on 1 January 2020). GIPL not only integrates the Baltic and Finnish gas markets into the EU's single gas market, but also provides access to alternative sources of gas supply, pathways and improves the competitiveness of the gas market, security of gas supply and security of gas supply, both through the creation of additional gas transmission capacity and the possibility of solidarity mechanisms between EU countries in the event of an emergency. GIPL allows for a more flexible and efficient

use of Polish and Lithuanian LNG terminals and transmission networks, increases the liquidity of gas trade in the bidding zones of the Baltic States and Poland and strengthens their regional role.

Following the completion of the ELLI (*Enhancement of Latvia-Lithuania interconnection) project for the strategic connection to Latvia (7 December 2022)*, Amber Grid completed its capacity by one third. This improves the region's gas availability and allows for a faster filling of the underground gas storage facility in Latvia in Inčukalnis, which is hosted by all countries in the Baltic region. The ELLI project implemented by Lithuania increased the integration of the gas market in the Baltic States and the energy security of the region.

Oil sector

In Lithuania, oil is found, but the quantities are not significant, so virtually all consumption is imported. It should be noted that Lithuania has the only refinery in the Baltic State, so crude oil imports are higher than would be sufficient for Lithuania's needs. The design capacity of the refinery of AB ORLEN Lietuva is 10 million tonnes of oil per year. Another raw material, such as gas condensate, fuel oil and medium distillates, is also processed in order to make better use of the production capacity.

In autumn 2021, AB ORLEN Lietuva signed a contract with Petrofac Ltd. for the implementation of a project for the construction of a refinery residual conversion plant. The project, which is expected to be completed by the end of 2024, is expected to increase the efficiency of refining oil products from 72 % to 84 %, which will allow the company to obtain the same quantity from a 20 % reduction in oil feedstock and its operating profits are expected to increase by around EUR 68 million per year. The company's project for the construction of a refinery residual conversion plant is important both for Lithuania and in the regional context. In these fragile times of the energy supply market, the project will increase the competitiveness of the Lithuanian economy and contribute to strengthening the security of supply of petroleum products throughout the region.

Oil was previously supplied to Lithuania via an oil pipeline, but the entry into operation of the reverse import/export terminal in Būtinge offered an alternative supply of raw material. In the event of interruption of the supply of oil through the pipeline,

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AB ORLEN Lietuva supplies its raw material through the Būtinge terminal. It has an annual design capacity of 14 million tonnes of oil per year.

The domestic market is dominated by petroleum products produced by AB ORLEN Lietuva, with only a small proportion of some types of petroleum products coming from other countries. In addition, rail or car transport may be used to supply petroleum products. Lithuania is fully in a position to diversify the supply of oil and petroleum products.

As mentioned above, Lithuania's oil sector's potential fully meets the needs of its consumers with petroleum products. Most petroleum products produced in the country are supplied to markets in other countries. Lithuania currently has the full technical capacity to export and import oil and its products from various countries and sources around the world. The country has an adequate level of public stocks of petroleum products, which makes it possible to prevent disruptions in the supply of petroleum products.

For more than two decades, the oil sector has been operating under market conditions, namely:

- there is no legal restriction on the transport of fuel from or from third countries of the European Union;
- the prices of petroleum products are not regulated by the State (except for liquefied petroleum gas supplied to group facilities);

- the State only sets rates of excise duty and value added tax on petroleum products;
- it should be noted that there are mandatory quality indicators for the petroleum products consumed and there are no import or arrival quotas.

Security of supply and stocks

Lithuania has plans to provide both crisis prevention and crisis response measures. Preventive measures aimed at ensuring security of supply of energy and energy sources shall, in particular, determine the development of the above-mentioned infrastructure aimed at ensuring reliable imports of energy sources as well as increasing local production, with a focus on electricity generation from RES. Both the appropriate diversification of imports and the strengthening of the RES balance sheet in the energy market allow not only to secure and secure energy supplies, but also to reduce the volatility of energy sources and energy prices. Emergency plans shall include and describe actions by responsible persons and competent authorities in the event of emergencies and crises. The plans are based on a risk assessment of the energy sector. The application of the actions and measures contained in the plans would, in particular, ensure the supply of energy and energy resources to vulnerable and essential customers, thus ensuring the continuity of energy companies and enabling the recovery of normal energy and energy supplies as soon as possible.

The Electricity Act34 lays down the grounds for the safe and reliable operation of the electricity system, generation, transmission, distribution and supply of electricity.

Article 23(1) of that Law provides that the transmission system operator for electricity is responsible for the stability and reliability of the operation of the electricity system, the performance of the national balancing function in the territory of the Republic of Lithuania, the provision of system services, the operation, maintenance, management and development of interconnections with the electricity systems of other countries, reducing capacity transmission.

limitations in the networks and taking into account the needs of the electricity system and the users of the electricity grids.

Article 76(1)(2) of the same law provides that VERT shall cooperate with the national energy regulatory authorities of foreign countries to ensure that the transmission system operator has one or more integrated systems at regional level for the allocation of capacity and for ensuring grid security covering one or more Member States.

The supply of electricity in an emergency situation shall be limited or suspended in accordance with the rules on the supply and use of electricity35.

Lithuania's natural gas transmission system is capable of ensuring the supply of natural gas without restrictions in the normal regime and, after the entry into operation of the SDG terminal in Klaipėda and the interconnection of Lithuania with Poland to the GIPL pipeline, it is possible to supply natural gas from diversified sources to the country. As a result, the risk of gas supply is significantly reduced, in particular due to geopolitical factors. Diversified gas supply sources also reduce the risk of gas supplies due to technical failures.

On 25 October 2017, the European Parliament and the Council adopted Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 ('the

34 Reference of the Law of the Republic of Lithuania on Electricity: https://www.e-tar.lt/portal/lt/legalAct/TAR.F57794B7899F/asr
35Approved by Order No 1-38 of the Minister for Energy of the Republic of Lithuania of 11 February 2010 approving the Rules on the supply and use of electricity.

Regulation concerning measures to safeguard the security of gas supply'), the objective of which is to guarantee the security of gas supply by ensuring the proper and continuous functioning of the internal market in natural gas by allowing exceptional measures to be implemented when the market is no longer able to deliver the required volume of gas, and by clearly defining and dividing the responsibilities of natural gas undertakings, Member States and the Union for preventive action and response to specific disruptions of supply. This Regulation also establishes mechanisms based on the principle of solidarity to coordinate preparedness and response in the event of a Member State, regional and European Union emergency. The Ministry of Energy has been designated and notified as the competent authority for the implementation of the measures laid down in this Regulation.

When assessing the transmission system's capacity to provide gas supply to customers in the event of a disruption of supply, the N-1 criterion established in accordance with the Regulation concerning measures to safeguard security of gas supply provides that this indicator of gas security of supply is met in Lithuania.

The supply ofpetroleum products in an energy emergency shall be carried out in accordance with the Petroleum Product Restrictions Plan36. It lays down measures to stabilise the supply and/or reduce consumption of petroleum products when an energy emergency is declared in the event of a reduction in the supply of petroleum products to the extent that the safety, health or economic activity of the country is threatened.

According to EU and Lithuanian legislation, oil products and oil stocks must be maintained in the country in sufficient quantities to cover most of the following needs: 90 days of average daily net imports or 61 days of average daily domestic consumption. Part of the stocks are dedicated stocks held and managed by the State-owned Lithuanian Energy Agency (hereinafter 'LEA'), which the LEA is required to build up for at least 30 days, calculated on the basis of the average daily internal consumption in the previous calendar year. The rest of the stocks shall be pooled by obligated undertakings.

2.4 Dimension internal energy market

36Approved by Order No 1-107 of the Minister for Energy of the Republic of Lithuania of 24 May 2013 approving the plan for the application of restrictions on the supply and consumption of petroleum products.

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2.4.1 Extent of electricity interconnectivity

In 2014, the European Council set the target that the level of interconnectivity between EU Member States should be at least 10 % of the total electricity generation capacity installed in a Member State by 2020 and 15 % by 2030. Projects of common interest should contribute to achieving this target. The nominal capacity of interconnectors should reach 30 % of the load at peak times and the nominal interconnection capacity should reach at least 30 % of the installed renewable energy generation capacity. It should be noted that all these indicators are met in Lithuania, with the level of electricity interconnection being above 60 % and the nominal capacity of interconnectors at peak load and the nominal capacity of interconnectors in relation to the installed renewable generation capacity of more than 60 %.37

It should be noted that Lithuania's high-voltage electricity transmission networks were directly connected only to the high-voltage grids in the Kaliningrad region of Latvia, Belarus and Russia before the connections with Sweden and Poland were established. These connections allow for excessive energy exchanges with these neighbouring systems. The main challenge for electricity in Lithuania and all Baltic States is to integrate their energy systems into the single European electricity market and to start synchronous operation with the European continental electricity grid by 2025. New interconnectors with Sweden (NordBalt 700 MW) and Poland (LitPol Link – 500 MW) were installed and launched at the end of 2015/early 2016. Together with Estlink I (350 MW) and Estlink II (650 MW), the total Baltic transmission capacity between Finland and Estonia with other Member States is 2 200 MW, which represents ~23 % of the interconnection level.

It is important for the competitiveness of the Lithuanian economy and for attracting foreign investment that the average final price of electricity for business and industrial consumers is lower than in other Scandinavian and Central and Eastern European Member States. According to Eurostat data for the first half of 202238, Lithuania ranked 8th in terms of the lowest average final electricity price (including taxes on domestic consumers in the EU Member States). It is important for Lithuania to improve this indicator and move to 1-3.

2.4.2 Energy transmission structure

In order to fulfil the Energy Union dimensions of energy security, integration into the internal energy market, the following major electricity and gas transmission infrastructure projects, which are also included in the NNS, are currently being implemented, and most of them have the highest possible status for the project in Lithuania – the government has been recognised as important economic projects for the State:

Power area

Synchronisation project

The Synchronisation project is currently the most important in Lithuania in the field of electricity. As mentioned above, Lithuania, Latvia and Estonia are the only EU Member States whose electricity systems are still operating in synchronous mode with the Russian-controlled IPS/UPS (Integrated Power System/Unified

37TYNDP 2018 Regional Insight Report North-South Interconnections East, link: https://tyndp.entsoe.eu/Documents/TYNDP%20documents/TYNDP2018/consultation/PCI%20Region/ENTSO_TYNDP_2018_NSI_EAST.pdf

38 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_price_statistics

Power System) system, which includes Russia;

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Belarusian, former USSR and Baltic power grids. According to an agreement between the BRELL countries (Belarus, Russia, Estonia, Latvia and Lithuania), the day-to-day management and frequency control of the IPS/UPS system (and thus of the Baltic electricity grids) is ensured by a central control centre operated by the Russian electricity system operator. However, as members of the EU, the Baltic States have to link their energy objectives and targets to the strategic objectives of the EU's common energy policy, one of which is to create a fully integrated electricity market at the economic and technological (interconnection) level. The aim is therefore to disconnect from the IPS/UPS system and synchronise with the continental European electricity grid (KET). The importance of synchronisation is recognised as one of the main objectives of the EU's energy policy. This project is included in the European Energy Security Strategy and the EU Energy Union as a project of common interest and is crucial for the EU's energy security. The objective of synchronising the Baltic States with the continental European networks by 2025 is also on the agenda of the Senior Officials Meetings of the High Level Group*of the Baltic Energy Market Interconnection Plan (BEMIP*). On 13 June 2019, the Lithuanian Parliament adopted the Law on the interconnection of the Lithuanian electricity system with the continental European networks for synchronous work and related legislation. They shall set out the basic conditions for the organisation and implementation of the synchronisation process. The law provides that the synchronisation project and related infrastructure projects will be granted the status of a project of critical national importance. This makes it possible to speed up spatial planning procedures in synchronisation-related projects, to establish easements and to carry out expeditious environmental impact assessment procedures. The project measures are described in more detail in Section 3.4.2.

Natural gas domain

Gas interconnection between Poland and Lithuania (GIPL)

In the field of natural gas, one of the most important projects implemented is the interconnection between Poland and Lithuania (GIPL), which will connect the Baltic States and Finland with the EU's single gas market, increase security of supply and diversification of supply routes in the region, promote more liquidity in the regional market and competition between suppliers, and enable a more efficient use of the LNG terminal in Klaipėda. The project was completed in early 2022. The length of the pipeline is ~508 km, including 165 km in Lithuania, with an estimated maximum capacity of 2.4 billion m³/year[from Poland and 1.9 billionm³/yearfrom]Lithuania. The project was implemented by the Lithuanian natural gas transmission system operator AB Amber Grid and the Polish natural gas transmission system operator GAZ-SYSTEM. The project is included in the list of projects of common interest and its implementation is supported by the Connecting Europe Facility (CEF). The GIPL interconnection plays a crucial role in diversifying natural gas supplies both to Lithuania and to other Baltic frosts. It also enabled the capacity of the Klaipėda LNG terminal to be used to the maximum and to the extent to which it was available on the Polish market.

Project to increase the capacity of the gas interconnection between Latvia and Lithuania (ELLI)

The project to increase the capacity of the gas pipeline interconnection between Latvia and Lithuania (ELLI) is also underway. This project extends the Kiemenian gas metering station in Lithuania and will also modernise the pipelines on Latvia's territory in order to increase the pressure to 50 bar (now 40 bar) and complete the works on the Lithuanian side in November 2022, while in Latvia, the project will continue in 2023. Once fully completed, the capacity of the gas interconnection between Latvia and Lithuania will be increased approximately twice in both directions. The aim of this project is to ensure sufficient capacity between the

Baltic and other European countries, to make use of alternative sources of gas supply and to use road transport for the countries of the region;

improve security of gas supply, contribute to the creation of an internal energy market, increase market integration and competition, and strengthen energy solidarity between EU countries. Access to the underground gas storage facility in Latvia in Inčukalnis will also be facilitated. By integrating the Baltic gas markets into the EU's single gas market, this interconnection will become an important part of the route connecting the European and Eastern Baltic markets. This project is carried out by AS 'Conexus Baltic Grid', the Latvian natural gas transmission system and underground natural gas storage system operator, and AB 'Amber Grid', the Lithuanian natural gas transmission system operator. The project is included in the list of projects of common interest and has received support from the CEF.

Projects of local significance to improve the reliability of Lithuania's electricity and natural gas transmission systems are set out in the National Plan for the Implementation of Electricity and Natural Gas Transmission Infrastructure Projects39. These projects receive investment from the European Union (the activities financed are described in more detail in section 3.3). Among the strategy papers are the 10-year development plans for operators (both transmission and distribution), which include the main projects, development and investments of operators.

2.4.3 Market integration

On 14 March 2023, the Commission proposed a reform of the EU electricity market design to accelerate the development of renewable energy and the phasing out of gas, less dependent on volatile fossil fuel prices for consumers' bills, more empowerment and protection against future price shocks and possible market manipulation, and make EU industry clean and more competitive. The reform includes two legislative proposals: a regulation amending the relevant electricity market legislation and another regulation focusing on improving the protection of the Union against market manipulation through better monitoring and transparency.

The proposals aim to address some of the shortcomings identified by the Commission during the recent energy crisis, in particular as regards the impact of high and volatile fossil fuel prices on short-term electricity trading markets, which have led to large price hikes for households and businesses and massive electricity bills. The proposed measures plan to address the impact of fossil fuel prices, bring lower-cost benefits from renewable energy for consumers and address affordability, decarbonisation and security of supply objectives.

In order to make energy bills for European consumers and businesses less dependent on short-term price fluctuations, while ensuring a stable income for those investing in renewable energy and nuclear energy, the proposal aims to improve the functioning of the long-term market by:

- promoting the market for power purchase contracts by ensuring that products to cover default risk are available and leveraged through renewable energy tenders;
- stabilising electricity prices by providing stable investment incentives and limiting the excess income of energy producers by requiring reciprocal contracts for difference for new investments in renewable energy and nuclear energy, where public funding in the form of operating support is needed; and

39The National Implementation Plan for electricity and natural gas transmission infrastructure projects approved by Resolution No 476 of the Government of the Republic of Lithuania of 22 July 2014 approving the National Implementation Plan for electricity and natural gas transmission infrastructure projects.

- improving forward electricity markets to make them more liquid and integrated.

To accelerate the deployment of renewable energy and phase out gas, the Commission proposal includes measures to:

- ensure market access for offshore renewable energy production;
- increase the efficiency of short-term markets;
- facilitate and provide incentives for the development of flexible solutions such as demand response and storage through network tariff measures, specific products and market cultivation based on flexibility, including the possibility of specific support schemes.

The Commission's proposal also aims to improve consumer protection and empower consumers by:

- identifying the suppliers whose services are used as a last resort when the supplier is unable to fulfil their obligations and additional protection against disconnection for vulnerable customers;
- allowing Member States to intervene in price setting in retail markets in times of crisis to ensure that households and small and medium-sized enterprises (SMEs) have access to a minimum amount of electricity at affordable prices;
- hedging requirements for suppliers under certain conditions;
- providing consumers with a wide choice of contracts, including fixed-priced supply contracts;
- giving consumers direct access to renewable energy production through energy sharing and self-consumption.

Finally, the reform intends to increase market monitoring and transparency by amending the Regulation on wholesale energy market integrity and transparency (REMIT) and provide better protection against market manipulation and market abuse through:

- enhanced role of the Agency for the Cooperation of Energy Regulators (ACER) investigating significant cross-border cases in relation to REMIT;
- harmonisation of fines set by regulatory authorities at national level for REMIT infringements; and
- improved data collection and market monitoring by ACER and regulators.

2.4.4 Energy poverty

A cornerstone of a sustainable internal market is access to energy services for all, in order to ensure that consumers' basic needs and health are met. However, Lithuania is facing energy poverty (sometimes referred to as energy poverty) when it is difficult or impossible for the population to provide adequate heating of the dwelling or to have access to essential energy services such as lighting or transport40.

Energy poverty is due to four main challenges: inefficient energy use, high energy prices and low household incomes, and a lack of consumer awareness. Energy poverty

the problems are also reflected in the energy poverty indicators (see Table 2.4.4.1.):

40European Economic and Social Committee, 2011/C 44/09.

- according to the EU Survey on Income and Living41Conditions, in 2018, more than a quarter (27.9 %42) were unable to afford sufficient heating due to lack of funds. This is the second highest among the EU countries, with a significant gap from the EU average of 7.4 %;
- In a survey carried out by Vilmorus, more than 23 % of the population mentioned that it was unable to heat enough, and 22.5 % in 202143;
- In Lithuania, 17.1 % of households spent a large share of their income on energy costs in 2016. This indicator shows the share of households in total households whose share of energy expenditure (electricity, gas, other fuels, thermal energy) in disposable income was more than 2 times the median of that share.

Table 2.4.4.1. Energy poverty dynamics in Lithuania, %:

	In 2015	In 2016	In 2017	In 2018	In 2019	In 2020	2021 e	FISMA
The share of persons living in households who cannot afford sufficient heating due to lack of money (LT)	31,1	29,3	28,9	27,9	26,8	23,1	22,5	17,5
The share of persons living in households who cannot afford sufficient heating due to lack of money (EU)	9.4	8.7	7.8	8.1	6,9	8	7	—

EU data also point to hidden energy poverty when households spend too little and do not provide services. Energy poverty particularly affects socially vulnerable groups in society: elderly, children, chronic diseases, single parents, unemployed. Tackling this pressing social challenge requires a comprehensive policy approach combining social and environmental policies.

To tackle energy poverty, the National Progress Programme for 2021-2030 sets the target 'Reduce energy poverty in the population' and identifies three national targets with targets for 2025 and 2030 (see Table 2.4.4.2).

Table 2.4.4.2. Energy poverty targets for 2030 under the National Progress Programme 2021-2030:

Impact indicator	Baseline (year)	Interim value in 2025	Target value for 2030	Data source	Institution responsible for providing data
Share of population unable to keep their home adequately warm due to lack of funds	28 % (2018)	23 %	17 %	Statistics Lithuania	SADM

41https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_lithuania.pdf
42Eurostat, Inability to keep home adequately warm – EU-SILC, 2019. (In Lithuania, some 1.560 million households are billed on a monthly basis.)
43https://osp.stat.gov.lt/lt/statistiniu-rodikliu-analize?hash=7f3cc1da-a1c7-44c6-b573-73efcc3b3189#/

Share of households that spend a significant share of their income on energy expenditure	17.1 % (2016)	15 %	10 %	Statistics Lithuania	EM

To achieve these objectives, Lithuania is taking cross-cutting measures, as described in more detail (section3.3.4.), covering the areas of energy efficiency, household income, energy prices and consumer information. In Lithuania, as in 8 other EU countries, the EU-funded Horizon 2020 project "STEP – Solutions to Tackle Energy Poverty" was launched in 2019.44 The main objective of STEP is to alleviate energy poverty by encouraging changes in consumer behaviour. This project and national measures to tackle energy poverty take into account financial support (reimbursement of a share of heating and water costs for the poor, public support for the renovation/modernisation of multi-apartment buildings through credit and interest payments), improve the energy efficiency of buildings and installations and raise consumer awareness.

2.5 The research, innovation and competitiveness dimension

In order for Lithuania to become a country developing and exporting energy technologies from an energy technology importing country, it is necessary to promote experimental and industrial development and innovation incubators, research and pilot deployment of the results of the most promising energy technologies. Lithuania is carrying out energy research and experimental development and the products developed must be incorporated into industrial production and become part of Lithuania's exports, thus contributing to the country's economic growth. Lithuania needs to identify priority axes for energy research and innovation at national level and create a competitive advantage by focusing on them. There are currently two strategic documents that provide guidance for national policies to promote research and innovation in the context of the Energy Union – the National Energy Independence Strategy and the Smart Specialisation Concept.

Objectives set out in the National Energy Independence Strategy

One of the four strategic orientations of the strategy adopted in 2018 (in addition to competitiveness, reliability, mitigation of climate change and environmental air pollution (energy saving and green energy)) enshrines the involvement of a Party's business in achieving energy progress (innovation). In this context, the objective of Lithuania has been set to:

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the country importing energy technologies must become a country that develops and exports energy technologies. The aim is for Lithuania to become a centre of information technology and cyber security solutions for energy, biomass and biofuel technology, solar and wind energy technology, geothermal technology, energy market development, improvement of electricity system operation, development of new electricity system management methods and implementation of energy projects.

Taking into account the specificities and needs of the Lithuanian energy sector, the strategic objectives, existing and desired competences, the following priority axes for energy research and experimental development have been identified:

44 For more information: https://www.stepenergy.eu/

- the planning of the future development of the energy sector, energy economics;
- modernisation of existing energy production technologies, taking into account new challenges; and requirements;
- development and integration into the grid of new low greenhouse gas and ambient air pollutant emissions, climate-resilient technologies for energy production and storage; and integration into EU strategic value chains;
- technologies using local energy generation and renewable energy sources;
- analysis of the operation of the electricity system and improvement of the management of the electrical system;
- technologies for distributed energy generation, smart grids, production and use of new promising forms of energy;
- ensuring reliability and quality of electricity supply, vulnerability of electricity systems and optimisation of operating modes;
- the functioning of electricity markets, power mechanisms and active involvement of consumers in the functioning of the electricity system and markets;
- energy and cybersecurity security, reliability of energy installations and systems, resilience to cyber-attacks.

The NEPT also provides that in order to promote the development of energy innovation and the exploitation of energy competences, R & D results in other areas of the economy, the increase in exports and the creation of new business in the country, it will:

- increasing synergies among science and research institutions, energy companies and engineering companies by promoting various forms of cooperation using investments from the EU research and innovation programme Horizon 2020, national and other programmes, developing digital energy innovations and improving technologies in Lithuanian energy sector, thus strengthening the ecosystem of scientific research and innovation in Lithuania;
- to achieve closer cooperation between energy companies and educational institutions, partnership-support programmes for energy companies and engineering companies are drawn up to encourage cooperation by developing and deploying digital energy innovations and improving technologies;
- tax measures promote investments in solar, wind, biomass, biofuels and others

  the technological development of renewable energy production, the improvement of production, the acquisition of technology and the development of a centre of excellence, the development of liquefied natural gas technologies and the development of a competence centre;
- promote the involvement of engineering industries in the development of new liquefied natural gas technologies, technological installations and means of transport and their integration into the market;
- encouraging the development of new energy production technologies, including RES, distributed energy generation and smart grids, and their integration into the network;
- promote the production of electricity storage technologies by attracting investment in the production of these technologies in Lithuania;
- assessing the potential for offshore wind energy technology production, attracting investment in

these technologies

technology production in Klaipėda port;

- the production and use of indigenous energy resources is developed, produced and exported; technology;
- information technology solutions for the energy sector are promoted and tested in Lithuania optimise, encourage the export of such products;
- strengthen energy facilities and infrastructure construction companies in order to increase their added value, boost the export of services and boost their innovativeness;
- promote the production of solar energy technologies by enshrining Lithuania as the biggest competence centre and solar technology exporter in the Baltic and Nordic region**.**

An additional promising area for the development of energy innovation and energy competences, the exploitation of R & D results in other areas of the economy, the growth of exports and the development of new business in the country is the use of hydrogen in energy, industry and transport.

It is also necessary to further develop carbon capture and storage technologies and to analyse their applicability in Lithuania. It is also necessary to set up an open-access $CO2_{transport}$ infrastructure that creates the preconditions for the transfer of carbon captured from emission sources to geological storage sites (in December 2022, interested Enterprises in Poland, Lithuania and Latvia submitted two applications for PCI status for CO_2 transport infrastructure projects). Another crucial course for the development of carbon technologies is the$_{capture}$ and use of CO2 for other applications, which would contribute to the decarbonisation of certain industrial sectors by 2030. The European Union Innovation Fund will provide more than EUR 38 billion to support five strategic areas between 2020 and 2030, two of which are directly related to$_{CO2}$ storage and use.

Objectives set out in the concept of smart specialisation

The Lithuanian R & I (Smart Specialisation) concept for 2021-2027 aims to promote innovation-driven and sustainable economic growth through science-business cooperation and concentration of resources on areas with the greatest potential for research and experimental development and innovation (R & D & I).

In total, around EUR 600 million has been allocated for the implementation of the objectives and activities of the Lithuanian concept of smart specialisation for 2021-2027.

Lithuania adopted an updated concept of smart specialisation on 17 August 2022 to focus resources on areas with the highest potential.

Based on the analysis of Lithuania's environment, the Smart Specialist identified three main challenges that will be addressed in the context of the development of the R & I (smart specialisation):

- low innovation capacity of SMEs;
- low value-added enterprises and low ratio of business investment in R & D & I relative to GDP;
- low level of internationalisation of business and science (participation in international projects, networks).

In order to address the identified challenges, the development of R & D & I (smart specialisation) aims to promote innovation-driven and sustainable economic growth through science-business cooperation and

concentration of resources on areas with the greatest potential for R & I.

RTEPI (smart specialisation) development pathways:

- strengthen research and innovation capacities by: creating an enabling environment and conditions, developing the skills and competences needed;
- developing and applying high-level scientific knowledge, cutting-edge technologies and innovation to market new and sustainable technologies, products, processes, methods;
- promote active international cooperation and involvement in, creation and development of international value chains among actors in the R & I priority ecosystem.

In implementing the concept of research and experimental development and innovation (smart specialisation), the Ministry of Economy and Innovation of the Republic of Lithuania together with the Public Agency for Innovation shall provide for the monitoring and evaluation of this concept, as described in Order No 4-33 of the Minister for Economic Innovation of the Republic of Lithuania of 25 January 2023 approving the description of the procedure for monitoring the concept of research and experimental development and innovation (smart specialisation) and impact assessment.45

Smart specialisation 1 of the 3 R & I priorities relevant to the National Energy and Climate Plan – New Production Processes, Materials and Technologies. It aims to ensure efficient and sustainable business development and the deployment of digital solutions and new technologies, as well as industrial cooperation between business and science, thereby increasing productivity, added value and energy efficiency. Priority includes the development of technologies for energy storage and use, the development of energy markets, changes in the functioning of the electricity system, new methods of electricity system management, power mechanisms and the active involvement of consumers in the functioning of the electricity system and markets. It will contribute to improving energy efficiency in the sectors with the highest potential – industry and buildings and transport.

The implementation of all measures under the Smart Specialisation concept in all priorities is expected to achieve in 2030:

SECTIONa)

- R & I investment in Lithuania will increase to 2.2 % of GDP (from 1 % of GDP) GDP in 2019);
- The Global Innovation Index will rise to 30th place in Lithuania (39th in 2021);
- the number of enterprises active in innovation will increase to 57 %. (46.9 % 2018);
- the share of Lithuanian high-tech (medium and high) goods exports in the overall goods export structure will increase to 44 %. (40.3 % in 2020);
- the number of innovative small and medium-sized enterprises will increase significantly, up to 51.4 %. (38 % in 2020).

National targets for the promotion of clean energy technologies

The current situation, national targets and measures to promote investment in innovative technologies to ensure the development and efficient use of clean, renewables and energy efficiency are also provided for in the following strategic documents:

- *State Progress Strategy 'Lithuania 2030' and its National Progress Plan 2021-2030* – Increasing incentives for industry to invest in climate-neutral technologies (NPP Target 1.4);
- The*sustainable development strategy* includes the introduction of cleaner production methods, the

45 https://www.e-tar.lt/portal/lt/legalAct/fdada7609cc511ed8df094f359a60216

promotion of recycling of secondary raw materials and the creation of recycling capacities as one of the major challenges for industrial development.

- *The* NCCPD enshrines ambitious national climate change mitigation targets for the industrial sector.

The objectives set out in the documents in question are described in more detail in section 3.1. Decarbonisation dimension of this plan, section 3.1.1 on GHG emissions and removals, in the industrial and industrial process sector. This paragraph also sets out already achieved and projected GHG emission reduction targets.

Study streams for processes related to climate change

The NCCD provides for the promotion of R & D & I by prioritising innovation geared towards the implementation of the EU Green Deal and enabling sustainable solutions to be turned into cost-effective solutions:

1. ensure the development of RTEPI contributing to the low GHG emissions transformation of all sectors of the economy in the following areas: cross-cutting studies on economic integration, forward-looking developments and climate change, renewable energy, smart energy systems, electrification, zero emission solutions for all modes of transport, exploring alternatives to fossil fuels (green hydrogen, etc.), energy storage and storage, transforming energy-intensive industries into carbon-free technologies, circular economy, bioeconomy, sustainable food systems and climate-smart agriculture and forestry, digitalisation of all sectors of the economy, environmentally-friendly carbon capture and utilisation technologies (CCU), etc.;
2. provide incentives for the development of low-emission technologies in all sectors of the economy, strengthening cooperation between state and municipal institutions, academic institutions, business and financial institutions, promoting joint research and increasing the uptake of R & D & I in practice;
3. ensure efficient use of state and EU funds through additional support to international and EU

projects and programmes funded by the funds, including Horizon Europe, to foster interdisciplinary Green Deal research;

4. ensure that the state innovation system promotes the technological renewal of Lithuanian companies in line with the objectives of the Green Deal and the reorientation towards the production and export of innovative, environmentally friendly goods and services;
5. step up the mobilisation of public and private investment for R & D & I activities, reaching 2 % by 2030. Public and private investment of GDP, 4 % in 2040 GDP;
6. develop and implement a programme to enhance the excellence of professionals required for research related to the Green Deal (implementing activities);
7. carry out an assessment of the national (farm level) benchmarks on a sector-specific basis.

Lithuania is currently carrying out a wide range of research on climate change, but there is no uniform framework for publishing research results. There is a need for cooperation between science and business to increase the practical application of the RTEPI.

National objectives with regard to competitiveness

In order to ensure that Lithuania is actively involved in the processes of the Fourth Industrial Revolution and

to ensure industrial competitiveness while achieving ambitious climate objectives, the Lithuanian Ministry of Economy and Innovation shall pursue the following objectives:

- promote the active digitalisation of industry, thereby enhancing international competitiveness;
- promoting an efficient industrial transformation towards a climate-neutral economy;
- promote the integration of industry in European strategic value chains. The strategic value chains relevant to the NECPs and relevant for Lithuania are:
  - batteries;
  - connected, clean environment and autonomous vehicles;
  - low-carbon industry;
  - hydrogen technologies and systems.

Diversification of the supply of imported components for clean energy technologies is important to integrate the concepts of recyclability and circularity and reduce dependence on imported raw materials. The draft guidelines for Lithuania's transition to a circular economy by 2035 were approved by a protocol decision of the Government of the Republic of Lithuania of 21 June 2023. Among these strands of the guidelines are industry-relevant axes: accelerating circularity, economic fairness, transformation through research, innovation and digitalisation; a direction for circular industry – ensuring a sustainable industrial transformation towards a circular economy – and for ensuring compliance with the waste prevention and management hierarchy (circular use of waste).

Challenges in a global market:

1. Market barriers: trade barriers, inconsistent policies and complex regulations that may hamper the competitiveness of clean energy technologies.

2. Fossil fuel subsidies that can distort the market and reduce the competitiveness of clean energy technologies. Phasing out fossil fuel subsidies or redirecting towards clean energy would level the playing field.
3. Underdeveloped infrastructure – transmission and distribution networks limiting clean the deployment of energy technologies, especially in remote or developing regions.
4. Intellectual property rights restricting access for smaller market players to patents technology and its use.
5. Technology transfer – ensuring an efficient transfer of clean energy technologies is challenging due to high technology costs and lack of local capacity.

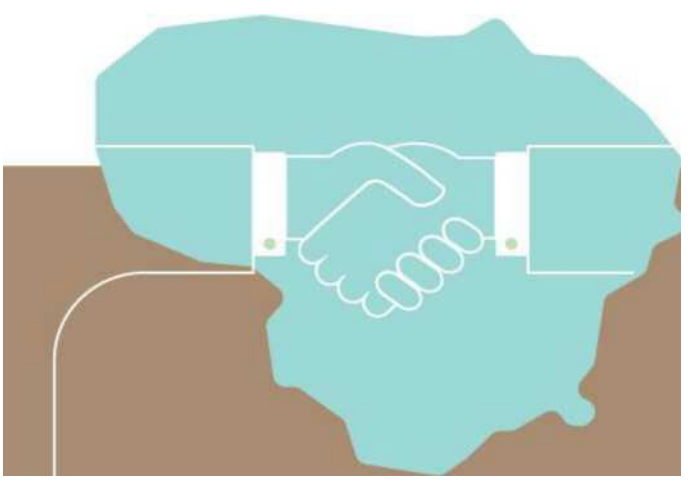
Challenges in the internal markets:

1. Policy and regulatory uncertainty: frequent policy changes and regulatory uncertainty in the country discourage investment in clean energy technologies.
2. Limited access to finance: limited access to affordable financing opportunities for clean energy projects hampering their competitiveness in the internal market.
3. Network integration. The volatility of renewable energy sources requires efficient grid integration and energy storage solutions, which may be difficult in some regions.
4. Infrastructure requiring refurbishment. Existing infrastructure and interests in conventional energy

sources potentially pose challenges for the deployment of clean energy technologies.

Addressing these challenges requires a comprehensive approach involving cooperation between government, industry, financial institutions and organisations. With a strong focus on cost reduction, support policies, R & D, international cooperation and the removal of market barriers, the competitiveness of clean energy technologies can be significantly improved.

SECTION A: NATIONAL PLAN



3. POLICIES AND MEASURES

This chapter describes the policies and measures that will be used to achievethe national objectives and targets set out in Chapter 2. The policy measures presented are divided into three groups:

- **The existing policy instruments** (hereinafter 'ESMs') presented **in the green** tables have already been adopted in the legislation and have clear implementation mechanisms and secured funding. The impact of the EPP package and external factors on the achievement of national targets is described as the ESP scenario in Chapter 4.
- **The planned policy measures** (hereinafter referred to as "PPM"), presented in the **blue** tables, are proposed as complementary measures to the ESP package in order to achieve the 2030 targets, but are currently not embedded in legislation or strategic planning documents and/or their implementation depends on the availability of different sources of funding. The impact of PPPs on achieving national targets has been assessed through the PPP scenario modelling, which is described in detail_HYPERLINK "file:///C:/Users/g.krusniene/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/R4VAGQCL/3 skyriaus preambule.docx#_PLANUOJAMOS_POLITIKOS_IR_2"in Chapter 5.
- The measures for which information is provided next to another sector, as there is also a GHG effect in another sector, are presented in **orange** tables. For each sector, only the impact of the measure on that sector is indicated in terms of GHG savings and/or total fuel and energy savings.

The planned policy measures will be adopted in 2023 and beyond in the form of sectoral development programmes or other strategic planning documents and/or other legislation. Planned policy measures, prior to their inclusion in sectoral development programmes or other strategic planning documents and/or other legislation, will be assessed in terms of financial, economic, social and environmental benefits, choosing the most effective set of measures and the way they are implemented, which will ensure that the objectives and indicators of the energy and climate change governance policy for 2021-2030 are reached.

The results of the policy measures adopted and implemented will be regularly monitored and compared with projections. In the event of insufficient results and threat of non-achievement of climate targets, consideration will be given to replacing inefficient measures with more efficient and/or scaling-up measures, to strengthening and/or early economic and legal signals to encourage the desired behaviour of market players and consumers, and to consulting the public on changes in policies and measures. The NECPs agreed with the institutions and approved by the Government's protocol decision of 30 December 2019 were submitted to the European Commission on 31 December 2019. At the same time, by a protocol decision of the Government's consultation, it was decided to set up a working group to coordinate the implementation of the NECPs and to address the Green Deal agenda, which was established by Prime Minister's Decree of 12 February 2020. The working group brings together nine ministries – the Ministries of Environment, Energy, Economy and Innovation, Finance, Social Security and Labour, Transport, Education, Science and Sport, Interior and Agriculture. It is responsible for coordinating the transfer of NECPs measures into the related sectoral development programmes, other strategic planning documents and/or implementing legislation and the 2021-2027 operational programme of EU funds and the Common Agricultural Policy Strategic Plan 2021-2027; consider priorities for the use of climate change funds; address other relevant issues related to the implementation of the NECPs and, where appropriate, submit proposals to the Prime Minister for the modification of the Plan or the improvement of its implementation mechanisms, and for initiatives to implement the Green Deal agenda in Lithuania.

3.1 Decarbonisation dimension

3.1.1 GHG emissions and removals

Climate change mitigation objectives are closely linked to the energy efficiency targets defined in the National Energy Independence Strategy (NENS), the National Renewable Energy Development Programme, the Long-term Renovation Strategy, the Renewable Energy Law, the Alternative Fuels Act and the existing NECPs.

Lithuania's 2030 Progress Strategy49 highlights the need for joint work on sustainable development, the environment, energy, transport, the economy and the strengthening of democracy, but does not elaborate on more detailed directions. There is a strong focus on social responsibility and green growth.

The NAP states that Lithuania aims to properly implement Lithuania's sustainable development and climate change mitigation commitments and to decouple economic growth from GHG emissions. Strategic objective 6 focuses on ensuring good environmental quality and sustainability in the use of natural resources, protecting biodiversity, mitigating Lithuania's impact on climate change and increasing resilience to its impacts.

In this section, policies and measures are grouped and presented by sector. Detailed measures and the policies needed to achieve this are discussed for each emitting sector and sectors where removals are to be improved, taking into account the long-term vision and the objective of a low-carbon economy, and to balance emissions and removals in line with the Paris Agreement.

The following are the policies and measures for non-EU ETS and GIFF sectors that will be implemented or planned to be implemented in order to achieve the 2030 greenhouse gas emission reduction targets.

Transport sector

The obligations for the transport sector in relation to the transition to climate neutrality are set out in the strategic documents of the Republic of Lithuania:

1. For the transport sector, the IPCC sets the following mitigation targets for 2030:

1.1 increasing energy efficiency, RES, alternative fuels and promoting sustainable mobility for clean, connected and digitalised transport modes;

1.2 a 15 % share of RES in transport, of which 5 % — gaseous fuels from RES;

1.3 establish Low Emission Zones for municipal councils by 2023;

1.4 that by 2027 all public, taxi and ride-on transport in metropolitan cities use RES energy only;

1.5 at least 60 % of urban travel by public transport, cycling and walking:

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1.5.1 increasing the attractiveness of public transport through the deployment of intelligent transport systems, technological and other solutions for the prioritisation of public transport, the compatibility of urban and suburban public transport routes and the interconnection between different modes of public and private transport;

1.5.2 ensure the development of infrastructure for bicycles and pedestrians by creating an attractive, safe network of bicycles and walkways integrated into the common transport system, building or reconstructing at least 600 km of new or existing bicycles and pedestrian paths;

49 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.425517

1.6 promote the production of advanced biofuels and reach at least 3.5 % of the final energy consumption of the transport sector;

1.7 electrified at least 35 %. Railway network in Lithuania (8 % electrified in 2021);

1.8 achieve a 20 % reduction in the use of fossil fuels in inland waterway transport;

1.9 to achieve a minimum share of 20 % of the light-duty vehicle fleet for electric and zero-emission vehicles, the development of the necessary recharging and refuelling infrastructure;

1.10 by increasing the number of electric vehicles, achieve:

1.10.1 by 2025, the number of electric vehicles in category M1 would be at least 10 % and N1 electric vehicles would represent at least 30 % of annual purchases;

1.10.2 the number of electric vehicles in category M1 would be at least 50 % by 2030 and 100 % of annual purchases for N1 electric vehicles;

1.10.3 from 1 January 2030, vehicles of category N1 equipped with internal combustion engines, with the exception of N1 vehicles powered by alternative fuels, shall not be registered;

1.11 by 31 December 2030, road transport vehicles procured or used in the provision of services are clean and consist of:

1.11.1 100 % for vehicles of categories M1, M2, M3, N1;

1.11.2 16 % for N2 and N3 vehicles;

1.12 at least 60000 recharging points for electric vehicles, of which 6000 recharging points for publicly accessible and semi-public electric vehicles;

1.13 ensure that from 2023 at least one publicly accessible recharging point for high or very high power electric vehicles is to be installed in all refuelling stations, bus and railway stations, airports and seaports under construction or reconstruction.

Table 3.1.1.1: GHG emission reduction targets in the transport sector for the period 2021-2030, %:

Sector	Average for 2016-2018 compared to 2005 in %	2025 target in % compared to 2005	Achievement of the 2030 target in % compared to 2005
Transport	+ 36,2	+ 11,3	—14

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2. The above-mentioned obligations for the transport sector are enshrined in Goal 6 of the **NAP** 'Ensure good environmental quality and sustainable use of natural resources, protect biodiversity, mitigate Lithuania's impact on climate change and increase resilience to its impacts'6.1 'Increase the share of energy from renewable energy sources and use of alternative fuels in transport, promote sustainable intermodal mobility and reduce environmental pollution caused by transport'. As part of the implementation of the objectives set out in the NAP for the transport sector, the **Transport Development Programme 2022-2030** ('the Connectivity Development Programme') has been established.

3. The aim of the**Connectivity Development Programme** is to formulate public policy in the fields of the functioning of the transport system and the development of infrastructure for all modes of transport, electronic communications and postal services, as well as to formulate State policies in the fields of road safety, transit, logistics and combined transport, passenger and freight transport by rail, road, sea, inland waterway and air transport for all modes of transport, and to organise, coordinate and monitor the achievement of these operational objectives. The objectives set out in the NAPs will be pursued through the implementation of

objectives, the cross-cutting outcome of which will ensure the implementation of the horizontal principles of sustainable development, innovation (creativity) and equal opportunities for all in the field of mobility, and the resolution of the problems identified and the elimination of the causes of the problems.

In particular, target 6.1 'Increasing the share of energy from renewable sources and the use of alternative fuels in transport, promoting sustainable intermodal mobility and reducing environmental pollution from transport' contributes to the reduction of greenhouse gas emissions and nitrogen oxide (NO_x) emissions from transport; increasing the share of renewable energy sources in gross energy consumption in transport and energy savings in transport; the share of cycling and other non-motorised journeys in the overall travel structure and the increase in the share of train journeys in the overall travel structure; Increasing the share of rail and inland waterway transport in total freight transport.

This challenge will address the following issues:

- missing recharging/refuelling infrastructure for alternative fuels and public incentives to use zero-emission vehicles;
- increasing the popularity of public transport, adapting public transport and its infrastructure to people with individual needs, improving the accessibility of public transport services between different modes of transport;
- increasing the development of missing solutions for sustainable mobility in cities and non-motorised transport infrastructure;
- increasing the share of goods and passengers transported by road and increasing the lack of alternative zero-emission vehicles for the transport of passengers and goods.

4. The**Law of the Republic of Lithuania on Alternative Fuels** establishes the development of the use of alternative fuels in the transport sector in the Republic of Lithuania. The aim of this law is to reduce the impact of the transport sector on climate change and ambient air pollution by reducing the share of renewable energy sources in the transport sector in gross final energy consumption by at least 15 % in 2030. This is precisely the objective of a consistent increase in the diversity of energy sources in the transport sector, the introduction of obligations on fuel suppliers for the supply of renewable fuels, an increase in the use of advanced biofuels, the promotion of electricity in transport, the development of alternative fuels infrastructure, an increase of zero-emission vehicles registered in Lithuania.

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In the Republic of Lithuania, the number and requirements for procurement in the transport sector. It is foreseen that by 2030, 60000 recharging points for electric vehicles are to be installed in the Republic of Lithuania, of which 6000 are public and semi-public.

5. **The National Air Pollution Reduction Plan** aims to limit national anthropogenic emissions of SO_2, NO_x, NH_3, $PM_{2.5}$ and NMVOCs into ambient air in order to comply with the 2020 and 2030 targets set in the Environmental Strategy for Lithuania. Road transport has the greatest influence on NO_x emissions. While NO_x emissions from trucks and buses decreased by 14 % in 2019 compared to 2005, their share in the overall NO_x emissions structure represented as much as 39 % of total NO_x emissions in 2019. Also important is the passenger car sector, which accounted for more than 18 % of total NO_x emissions in 2019. Reducing vehicle pollution by reducing the use of internal combustion engine vehicles and increasing the use of electric vehicles is one of the priorities of the Ambient Air Protection Law.

6. **The Action Plan on the use of electric vehicles and the development of recharging infrastructure** for electric vehicles aims at providing measures and actions to increase the use of electric vehicles and ensure the efficient development of electric vehicle charging infrastructure in Lithuania for the period 2022-2030. The number of

electric vehicles is projected to be at least 262248 by 2030.

7. **The Guidelines for the development of hydrogen refuelling infrastructure and the promotion of hydrogen-powered road vehicles in Lithuania** aim to set targets and measures to ensure the development of hydrogen refuelling infrastructure and promote the use of hydrogen-powered vehicles in Lithuania for the period 2023-2030. The objective is to have at least 10 hydrogen refuelling points (public and private) in Lithuania by 2030 and at least 5 % of all new vehicles purchased in the country to be run on hydrogen.

Current situation. In the transport sector, which includes road, rail, air and inland waterways, road transport accounts for as much as 95 % of total emissions. Passenger cars account for almost 60 % of emissions. There is a need to change the old car fleet (currently the average age of passenger cars in Lithuania is 15 years, one of the oldest in the EU), to newer and more efficient vehicles, to use alternative fuel vehicles, to promote innovative transport technologies, clean vehicles and electric mobility in all modes of transport.

Demand for electric vehicles on the Lithuanian market and purchase rates are growing at an increasing rate every year, but as of 1 April 2023, according to VĮ Regitra, 8320 pure M1 and N1 electric vehicles were registered in Lithuania. However, with the increase in the total number of passenger cars in Lithuania (especially old and polluting cars), the change in the share of electric cars is not marked. Measures are needed to discourage the use of polluting cars and to opt for zero-emission cars and other sustainable mobility measures. Promoting the electrification of the transport sector and the use of other alternative fuels, particularly in road transport, is one of the key measures to reduce pollution in the transport sector.

There is a need to change the behaviour, behaviour and habits of society, business and the public sector, encouraging the shift away from the use of polluting vehicles. The communication plan for the development of electromobility sets out the main communication objectives: encourage the public, business and the public sector to switch to electric vehicles, and to raise awareness of existing support for their acquisition and other incentives; raise awareness of the possibilities and support provided for the development of recharging infrastructure; changing the way society, business and public travel habits

more cohesive.

The charging infrastructure for electric vehicles is developed in Lithuania on the core trans-European road network, i.e. in the vicinity of international motorways (highways of national importance) E85 and E67 and along with other roads belonging to the trans-European transport network (TEN-T) for approximately every 50 kilometres for urban electric vehicles. In 2022, 28 public high-power charging stations for electric vehicles (56 recharging points) were installed on the Vilnius-Klaipėda motorway, the Vilnius-Panevėžys motorway and next to other roads of national importance at national initiative. The planned charging infrastructure is presented in a map of the charging infrastructure for electric vehicles. 17 municipalities in Lithuania took advantage of the EU's investment opportunity to install recharging points for electric vehicles (a total of 56 recharging stations for electric vehicles – 33 high power and 23 normal power) have been installed on the municipal initiative. A further 100 charging stations for electric vehicles were installed by the Transport Competency Agency together with 39 municipalities in the country.

The development of publicly accessible charging infrastructure for electric vehicles along national roads is planned in line with national targets, but also with a particular focus on new EU requirements, ensuring the circulation of electric vehicles not only at national level but also across the EU. The planned roll-out of recharging infrastructure on roads of national significance on sections where very high capacity charging pools (above 150 kW charging points) are to be developed. The development of charging infrastructure in municipalities is also very important. In 2022, all Lithuanian municipalities prepared plans for public recharging points to be installed by 2030 (recharging infrastructure close to dense accommodation, shopping, recreation and leisure

centres, health, educational establishments, etc.). This public charging infrastructure for electric vehicles (along national roads and in municipalities) is being created and developed in line with approved European Union standards, but also permits other types of electric vehicles to be charged (combined stations with three types of connectors – AC, DC (Combo 2) and DC (CHAdeMO)).

Table 3.1.1.2: Existing and planned policy measures in the transport sector until 2030

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	Total savings of CURO AND ENERGY, GWh
EXISTING POLICY INSTRUMENTS (EPP)			
T1-E	Promoting the purchase of electric vehicles	373,42	1197,96
T2-E	Promoting the development of alternative fuels infrastructure and transport	333,14	685
T3-E	Electrification of railways	271,31	105
T4-E	Promotion of intermodal transport	179,9	673
T5-E	Promotion of less polluting vehicles	52,80	224,09
T6-E	The registration fee	152,70	127,25
T7-E	Abolition of the reduction in the pollution tax	36,78	153,14
T8-E	Electronic tolls in the field of freight transport	545,01	1851,06
T9-E	Reducing traffic congestion	412,72	1607,58
T10-E	Public awareness	29,26	125,39

T11-E	Green procurement	322,11	691,68
T12-E	Low-emission zones (LEZ)	274,12	84
T13-E	Charging infrastructure for electric vehicles	286,84	947,23
T14-E	Eco-driving	164,96	663,55
T15-E	Implementation of sustainable mobility plans	487,31	2458
T16-E	Sustainable Mobility Fund	*	**
T17-E	Promotion of the production of electric buses	*	**
T18-E	Construction and reconstruction of cycle paths	100	90
A13-E	Reducing the use of fossil fuels in agriculture	73,10	295,04
A14-E		210,43	849,3
A15-E		537,08	2167,69
A7-E		352,98	876
L4-E		197,04	319
A3-E		6,96	28
A5-E		344,94	7446
RES8-E	Use of alternative fuels	1321,99	**
RES9-E		*	**
RES6-E		831,18	**
AMOUNT		**7898,08**	**22057,38**
PLANNED POLICY MEASURES (PPM)			
T1-P	Promoting the purchase of electric vehicles	187,94	214,45
T2-P	Promoting the development of alternative fuels infrastructure and transport	520,16	1328,31
T3-P	Electrification of railways	103,57	173,00
T4-P	Promotion of intermodal transport	150,20	562
T5-P	Promotion of less polluting vehicles	34,56	544,02
T19-P	Transport measures discarded pollutants	10	38,16
T20-P	Restrictions on polluting vehicles	*	**
T21-P	Upgrading of trains	5	9
T22-P	Rail development and infrastructure improvement projects	*	**
T23-P	Promoting sustainable mobility	144,26	576,23
T24-P	Promoting sustainable inland navigation	118,5	437,54
T25-P	Development of electricity supply at seaport	*	45
T26-P	Development of sustainable airport infrastructure	1,95	5
T27-P	Law on excise duties	733,87	5484,21

T28-P	Implementation of the FF55 package	671,58	2366
A3-P	Reducing the use of fossil fuels on land farm	4,64	28
A22-P		45,24	**
RES36-P	Use of alternative fuels	59,99	**
AMOUNT		**2791,46**	**11901,25**

*The impact of the measure is not assessed as it does not directly reduce GHG emissions, but this measure is essential for the successful implementation of the other envisaged measures.

** The impact of the measure is not assessed as it does not directly contribute to fuel and energy savings, but this measure is essential for the successful implementation of the other measures envisaged.

T1-E: Promotion of the purchase of electric vehicles. The aim is to encourage the purchase of electric vehicles, thereby reducing pollution in the transport sector. Activities of the measure: (1) financing the acquisition of pure M1 new electric vehicles and the acquisition of pure M1 used electric vehicles (up to 4 years) for natural persons, and financing of M1 and N1 pure electric vehicles for mechanical movement to legal persons *(2022-2027)*; 2) Promoting the purchase of zero-emission passenger cars (BEV and H2) through financial instruments (and legal regulation). Target of 10 % by 2025 Electric cars for M1 annual purchases (registered and re-registered) and at least 30 % for N1 electric cars; M1-50 % in 2030; Class N1 electric cars – 100 % of annual purchases *(2022-2026)*.

T1-P: Promotion of the purchase of electric vehicles. Financial support measures for the purchase of electric vehicles and/or for the installation or renewal of the infrastructure necessary for charging them shall apply until M1 and N1 electric vehicles account for at least 10 % of the total number of passenger cars. For funded activities for natural persons: purchase of pure M1 new electric vehicles and purchase of pure M1 used electric vehicles (up to 4 years). For legal persons in respect of the activities financed: Purchase of classes M1 and N1, pure electric vehicles, where energy is supplied exclusively from an electric storage device for mechanical movement *(in2026-2030)*.

T2-E: Promoting the development of alternative fuels infrastructure and transport. The measure includes: Financial incentives for municipalities for the deployment of infrastructure for public transport vehicles powered by alternative fuels and/or renewable energy sources (electricity, hydrogen, biomethane) *(in2023-2029);* Promoting the replacement of polluting buses in municipalities with new zero-emission buses (electricity, hydrogen, biomethane) with financial incentives and setting up the recharging/refuelling infrastructure needed for them *(in2024-2030)*; (3) Establishment/development of recharging/refuelling infrastructure for alternative fuels (electricity, biogas and hydrogen): 1. Development of publicly accessible refuelling points for compressed biogas (implemented by the start of biogas production); 2. Establishment of publicly accessible hydrogen refuelling points; 3. Recharging infrastructure for heavy-duty *electrictransport (24-2030)*; (4) Promotion of zero- and zero-emission vehicles powered by electric, hydrogen or biogas produced from RED II compliant feedstocks (for minibuses and buses (M2 and M3) and heavy goods (N2 and N3) vehicles *(2024-2030)*.

T2-P: Fostering the development of alternative fuels infrastructure and transport. The measure includes: (1) the renewal of the urban and suburban public transport fleet by promoting the use of alternative fuels; and

electric vehicles. As well as the deployment of alternative fuels in the areas of bus fleets (*2027-2030) as liquefied natural gas (LNG)*and electricity infrastructure, such as fixed stops; 2 charging infrastructure for heavy-duty electric transport (290 recharging points) and hydrogen (6 recharging points) *(2026-2030);* (3) Promotion of the acquisition of vehicles of categories N2,M2,N3 and M3 adapted to use RES *(2025-2030)*; 4) Deployment of

modern transport management systems that directly contribute to the reduction of empty mileage, i.e. a GPS tracking system, together with a transport order management system and access to transport exchanges *(2024-2030)*.

T3-E Rail electrification. The measure covers the renewal, upgrading and expansion of the railway infrastructure (including the construction and electrification of second roads) on the IX B corridor with a track gauge of 731 kilometres, with a gauge of 1 520 mm. About 8 % of railway lines are currently electrified in Lithuania: Lithuanian/Belarusian border – Kaunas and Lentvario Trakai railway line (149 km). By 2023, Lietuvos geležinkeliai intends to electrify the Vilnius node and the sections of Kaišiador-Radviliškis and Radviliškis-Klaipėda. In total, ~ 420 kilometres of road will be electrified (21.97 %). By 2026, it is planned to build an electrified Rail Baltica railway line with a length of 394 km in Lithuania. Following the construction of the Rail Baltica railway line, the intermodal terminals in Vilnius and Kaunas will be connected to the intermodal terminals of Riga (Salaspils) and Tallinn. *(2016-2027)*.

T3-P Rail electrification. The measure includes: (1) purchase of electric locomotives to be used on an electrified railway section to transport freight instead of diesel traction *(2022-2027);* The replacement of non-compliant diesel trains with modern, environmentally friendly electric and battery trains for passenger transport *(2022-2027);* (3) routing of battery train charging stations for non-electrified sections *(2023-2025)*.

T4-E: Promotion of intermodal transport: The measure includes an increase in intermodal transport volumes and revenues through diversification of the service portfolio through: The promotion of intermodal transport on a 1 435 mm network (Italian direction) (*23-2024);* The promotion of intermodal transport on a 1 520 mm network (*2022-2023).*

T4-P: Promotion of Intermodal Transportation. The measure includes: The promotion of intermodal transport on a 1 435 mm network (*2022-2030);* 2) technical development of intermodal terminals in Vilnius and Kaunas to adapt terminals for semi-trailer loads and larger *container flows (2022-2025)*; Adjusting the tax base in order to make the most advantageous choice of the least polluting mode of transport (e.g. increased road charges for trucks, reimbursement of the railway infrastructure charge, etc.*) (from2025 to 2030)*; (4) Feasibility study for the transfer of goods transported by heavy duty vehicles (HDV) through Lithuania to *rail(24-2030)*.

T5-E: Promotion of low-emission vehicles. Financial incentives are being implemented for natural persons who have placed an polluting passenger car in service in Lithuania for a specified period as an end-of-life vehicle: (1) a compensation payment for the purchase of a low-emission passenger car; (2) compensation payment for the purchase of alternative means of transport – bicycles, e-scooters, e-bikes, public transport tickets or sharing services; 3) Compensation allowances for the purchase of a less polluting car for deprived persons *(from 2020 to 2023)*.

T5-P: Promotion of low-emission vehicles. The measure includes the implementation of financial incentives to opt for less polluting mobility measures for natural persons who have placed an polluting passenger car in service in Lithuania for a specified period as an end-of-life vehicle: (1) purchase a low-emission passenger car; (2) to purchase alternative means of transport – bicycles, e.g.

scooter, e-bikes/tricycles/quadricycles – or public transport tickets (buses, trolleybuses, railways), E-money replenishment for public transport or sharing services; 3) compensatory allowances for the purchase of a less polluting car by deprived natural persons *(between 2024 and 2026).*

T6-E. Registration fee. From 1 July 2020, the registration of light goods vehicles and light commercial vehicles (categories M1 and N1) shall be subject to a registration tax depending on the type of fuel and their combinations and where CO_2 emissions exceed 130 g/km. *(2020-2030).*

T7-E: Removal of pollution tax relief. Abolish the tax relief on environmental pollution from mobile sources granted to natural persons engaged in an individual activity within the meaning of the Personal Income Tax Act and using private vehicles in their *activities(2021)*.

T8-E Electronic tolls in the field of freight transport. The measure includes: (1) the introduction of a new road charging system e-tolling, where the charge is not time-based, but per distance travelled. Encourage vehicle managers and users to move away from "empty" mileage, consolidate shipments, optimise routes, use environmentally friendly vehicles for the purchase of less polluting (higher EURO) vehicles; (2) linking tariff ranges to the EURO class of vehicles. The highest Euro class will include zero-emission (AD-using) measures and are planned to benefit from the lowest *rate (from2024 to 2030)*.

T9-E. Reducing traffic congestion. The measure includes: (1) changes in traffic organisation through traffic planning measures (flow distribution, traffic limitation during peak hours) and/or the introduction of smart traffic regulation technological tools (smart traffic lights, crossings, *etc.) (2021-2030)*; (2) developing recommendations to municipalities covering spatial planning solutions that will contribute to the efficient organisation of traffic (optimal layout of public transport stations, development of commercial areas according to traffic volume, etc.) *(2022-2030)*; 3) education and information for employers and workers on the use of flexible working time options (remote working, start and end of flexible working hours, additional days available, etc.), which would reduce the number of commuting between work and work *(between 2020 and 2030)*.

T10-E: Public information: The objective of the measure is to inform and educate the public in order to encourage the collection of zero-emission vehicles and other alternative means of travelling for their own cars. This will be achieved by: (1) training, publicity, presentations, advertising, etc. in kindergartens, schools, universities, residents, public, municipal and private enterprises and organisations, *etc. (2017-2030)*; 2) the organisation of hackathons and the funding of winning initiatives that influence the behaviour of groups in society *(2022-2030)*.

T11-E Green Procurement: The measure provides for a change of the legal framework to increase the uptake of zero-emission TA and to reduce the number of conventionally fuelled TA by implementing the minimum procurement targets *(2021-2030).*

T12-E Low emission zones. According to the Alternative Fuels Act, low-emission zones are to be established in cities by 1 January 2025. The Ministry of Transport and Communications drew up a draft Low Emission Zones Guidelines in 2023 and is planned to be adopted this autumn. Municipal authorities must foresee low-emission zones in cities with resort or resort status or more than 50 thousand inhabitants and projects are ready to install them (*2022-2030*).

T13-E – Infrastructure for electric charging. The measure includes: (1) public and semi-public electric vehicles

financial incentive for the purchase/installation of recharging points *(in2023-2027),* already *installed 160 (2021-2022)*; *(2) the installation of 1 publicly accessible charging stations for electric vehicles (in2023-2027) in all bus and railway stations, airports and seaport under construction or reconstruction*; *(4) provision of shore-side electricity supply in inland ports – TEN-T main inland ports and TEN-T additional inland ports2025-2030; (5) the installation of recharging points for electric vehicles in parking areas in inland and maritime ports (23-2027);* 6) financial promotion of the purchase/installation of recharging points for private electric vehicles *(2022-2027);* 7) the replacement of polluting public transport by electric vehicles in rural district areas, as far as *demand is concerned (2022-2030).*

T14-E: Eco-driving. Driving schools have already included eco-driving training in their driver training programmes since 2010, and VĮ Regitra has successfully tested economic and eco-driving knowledge and skills during the tests since 2014. However, as those who have previously been trained to drive may not have the knowledge of eco-

driving, this measure will provide targeted training for existing drivers and envisage the organisation of social advertising through the most intensive advertising measures for the target group *(2022-2030)*.

T15-E. Implementation of Sustainable Mobility Plans: The measure is addressed to municipalities and includes: (1) the financing of sustainable urban mobility plans (SUMPs) measures – deployment and development of intelligent transport systems in urban areas, adaptation of urban streets and other transport infrastructure to public transport needs, deployment of cable transport, adaptation of urban transport infrastructure for people with special needs, deployment and development of public-private transport interoperability systems, cycling infrastructure and its systems, adaptation of public (urban and suburban) vehicles for bicycles and people with special needs, deployment and development of public transport security equipment *(2018-2022)*; (2) the preparation of *DJPM in municipalities (2016-2023)*; 3) the implementation of the measures foreseen in the GPM to promote walking, cycling, public transport and the use of alternative fuels *(2021-2027)*.

T16-E Sustainable Mobility Fund. The establishment of the Fund is defined in Article 30 of the Law of the Republic of Lithuania on Alternative Fuels. It will be used to finance measures in urban sustainable mobility plans, to promote the uptake of alternatively fuelled vehicles, to develop and develop alternative fuels and transport infrastructure, to limit the installation of internal combustion engine vehicles in urban areas, to convert vehicles powered by internal combustion engines (combustion engines) to alternatively fuelled vehicles, to finance the implementation of measures to reduce ambient air pollution *(in2023-2030)*.

T17-E: Promotion of the production of electric buses. The measure aims to provide financial incentives for the production of local electric vehicles (buses) and infrastructure. This would contribute to promoting the renewal of the entire public transport fleet by RES or alternatively fuelled *vehicles (between 2024 and 2030)*.

T18-E. Construction and reconstruction of bicycle tracks. The measure aims to plan and build infrastructure suitable for cycling in urban, suburban and rural areas. The measure is expected to reduce car traffic in urban and peri- *urban areas (2022-2030)*.

Reducing the use of fossil fuels in agriculture:

A13-E. Removal of tax credits for transport used in agricultural activities. *(More on the measurein the agricultural sector)*

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A14-E: Reducing the use of fossil fuels. *(More on the measurein the agricultural sector)*

A15-E. Review of Technology Cards. *(More on the measurein the agricultural sector)*

A7-E. Development of non-arable technologies, in particular direct sowing. *(More on the measure inthe agriculturalsector)*

L4-E. Promotion of catch crops. *(More on the measure in the land use, land use change and forestry sector)*

A3-E: Development of precision fertilisation technologies. *(More on the measurein the agricultural sector)*

A5-E: Promoting short supply chains and agriculture in urbanised areas. *(More on the measurein the agricultural sector)*

Use of alternative fuels:

RES8-E – Mandatory blending of biofuels into mineral fuels. *(More on the measure in the renewable energy sector)*

RES9-E Investment support for second-generation biofuel production facilities. *(More on the measure in the renewable energy sector)*

RES6-E: Investment support for the installation of biomethane production and biogas treatment plants. *(More*

on the measure in the renewable energy sector)

T19-P Vehicle emissions monitoring system. The measure aims to strengthen the control of TA on the road by means of remote sensing of TA benchmarks and other relevant indicators ("reading") and to take decisions on the basis of the data received to temporarily restrict or prohibit the participation of polluting TAs in traffic *(in the period2023-2030)*.

T20-P. restrictions on polluting vehicles. Introduction of legal regulation restricting the registration of polluting road vehicles *(2027-2029).*

T21-P. Modernisation of trains: Upgrading to electric-battery trains of the existing three dual-wagon power plants 'Skoda EJ575'. The electric trains of Škoda EJ575 no longer operate the Vilnius – Minsk route and due to the limited electrified railway network in Lithuania. Transforming trains into battery-electrics would allow them to run on a non-electrified road and replace part of diesel *trains on routes (24-2030)*

T22-P. Rail development and infrastructure improvement projects. Adaptation of maintenance activities and infrastructure for new electric passenger trains: (1) upgrade and establish a passenger train maintenance and repair base for existing, newly procured electric and battery passenger rolling stock; (2) the deployment of renewable and green solutions for maintenance and repair of passenger rolling stock; Improved safety and health conditions for maintenance and repair of passenger rolling *stock(24-2026).*

T23-P: promoting sustainable mobility: The measure includes: A cycle of lectures on sustainable mobility to encourage society to change travelling patterns and make the most environmentally friendly way *oftravelling (24-2030); (2) increasing the attractiveness of public transport by lowering/making ticket prices free of charge, allowing faster mobility, convenient connections and opportunities for sharing electric cars, renting bicycles (in2023-2030);* 3) Passenger train and public road passenger timetables

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harmonisation, identifying locations for electric car sharing, bicycle rental *services (in2023-2030);* 4) Favourable modal shift in inland waterway and maritime passenger ports to public road transport, if compatible, rail, sharing of electric cars, rental of bicycles *(in2023-2030);* (5) enhancing the attractiveness of public transport by enabling its faster movement on defined *routes (in2023-2030);* 6) layout of bus stops, review of routes and traffic schedules, compatible between urban/suburban/interurban and long-distance*routes (in2023-2030); (*7) The introduction of LGT's smart ticketing system with new ticketing channels, the loyalty system based on the CO_2 history and adapted for persons with disabilities. The framework would extend the LTG to the possibility of being a first *option for travellers (between 2024 and 2030)*. 8) financial incentives for the development and deployment of integrated public transport ticketing systems to facilitate the planning and settlement of journeys by different modes of public transport for passengers *(24-2026);* (9)The creation of a mobile application for sustainable mobility aimed at changing the internal attitudes of TA users through the possibility of receiving feedback on travel distance, time, CO2 footprint and energy consumption, and more sustainable alternatives *(2024-2030);* (10) Continually track and improve the pricing of *MT (2024-2030).*

T24-P: Promotion of sustainable inland navigation. The measure includes: (1) the purchase of new cargo ships and barges, which would allow for the transfer of part of the cargo from polluting cars to less polluting inland waterway transport; 2) upgrading the ferries infrastructure (adapting electricity driven ferries to the needs of electric ferries) to replace the fuel used by Klaipėda-Curonian Neria with a lower emission profile; (3) the replacement of power plants installed on board inland waterway vessels with less polluting ones; (4) increasing the flow of passengers by water and, consequently, reducing passenger traffic by road, and aiming at the use of LNG or RES for new vessels; 5) the construction and/or modernisation of inland waterway infrastructure, including ports and berths *(2024-2030)*.

T25-P: Development of electricity supply in the seaport. The measure includes: (1) installation of a power supply

system for ships at berth, including ship and quay installations, directly supplying the ship's main switchboard and used for hotel, service work or secondary battery charging in the port of Klaipėda; (2) ensuring a minimum electricity supply infrastructure for seagoing containers and passenger ships *(2024-2030).*

T26-P: Development of sustainable airport infrastructure. The measure includes: (1) deployment of sustainable aviation fuel supply infrastructure; (2) the electrification of aircraft parking areas at Vilnius, Kaunas and Palanga airports; 3) upgrading of airport infrastructure by installing new or adapting existing parking areas in accordance with the criteria required to service hydrogen and/or electric aircraft *(2024-2030)*.

T27-P. Amendment to the Excise Duty Act. From 2024, fossil fuel concessions and subsidies for gas oils, coal, coke, lignite, diesel, liquefied petroleum gas in cylinders will be phased out. Excise duty rates for these fuels will be gradually increased over the period 2024-2026. A new type of fuel – peat for heating purposes (to prevent this polluting fuel*from becoming an alternative to coal) will be subject to excise duty (as of 2024*).

The amendments to the Excise Duty Act will, as of 2025, include a CO_2 component in the excise duty rates for petrol, kerosene, diesel, heating gas, oil and gas hydrocarbons, coal, coke, lignite, proportional to the CO_2 emissions of the fuel type, taking into account the calorific value, and will increase on a pro rata basis*from 2025 to 2030 (from 2025*).

Implementation of the T28-P FF55 package. The impact of the implementation of the FF55 package as a whole through various pieces of legislation:

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The development of the EU Emissions Trading System into the sectors of road transport, buildings, etc. (ETS2). The ETS is taxed on fuel suppliers who place fossil fuels or fuels on the market. The amount of fuel supplied is converted into tonnes of CO_2 and fuel suppliers will be obliged to surrender allowances purchased on the market for each tonne of CO_2. The aim is to accelerate the phase-out of fossil fuels and the increased use of renewable energy sources *(from 2024).*

Reducing the use of fossil fuels in agriculture:

A3-P. Development of precision fertilisation technologies. *(More on the measurein the agricultural sector)*

A22-P: Promotion of second generation biofuels and electric agricultural machinery. *(More on the measurein the agricultural sector)*

Use of alternative fuels:

RES36-P: Investment support for the installation of biomethane production and biogas treatment plants. *(More on the measure in the renewable energy sector)*

Table 3.1.1.3: Indicative financing needs for existing and planned measures in the transport sector:

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Transport	Total funds	Public money	Climate Change Programme,	Total funds	Public money	Climate Change Programme,

	3270,80	1460,26	Modernisation Fund, EU funds investments (20142020) and (2021--2027), Recovery and Resilience Facility, other sources	3009,57	747,61	Modernisation Fund, EU funds investments (2021-2027) including the Sustainability Fund, Social Climate Fund, Allowances II funds, Recovery and Resilience Facility, European Investment Bank and other loans

Industrial and industrial processes sector

The transition of industry to climate neutrality is a multifaceted process that requires active engagement and management of this transformation from relevant interest groups, both in the private and public sectors. The transformation towards a climate-neutral industry has multiple impacts and is itself influenced by a multitude of interlinked social, economic, legal, political, geographical, technological and other dimensions. Both in Lithuania and in any other country, a climate-neutral industry would have an undeniable positive environmental impact in terms of reducing GHG emissions and air pollution. This can also be a significant competitive strength for local industry, creating new jobs, markets, efficient use of raw materials and reducing dependence on external suppliers of raw materials, etc. Consequently, the benefits of a climate-neutral industry are both global and local. Nevertheless, the potential for such a transformation is negative

impacts and costs are almost exclusively localised. A green industrial transformation strategy must be based on technological progress and related economic analysis.

The obligations for industry related to the transition to climate neutrality are set out in the strategic documents of the Republic of Lithuania:

1. Article 4(4)([1]) of the**Law of the Republic of Lithuania on the improvement of energy efficiency**1 provides that the Ministry of Economy and Innovation of the Republic of Lithuania is responsible for the implementation of energy efficiency improvement measures in the industrial sector from 1 January 2021 to 31 December 2030 with a view to achieving the required energy savings of at least 5 456 GWh.

2. The National Climate Change Mitigation Targets for the**industry** of the IPCC are the following GHG emission reduction targets for 2030:

2.1 **For industrial sectors participating in the EU ETS:**

2.1.1 improving energy efficiency in the industrial sector by promoting the substitution of polluting technologies with less polluting technologies, applying the principles of the circular economy that will save resources and pursue waste prevention, adopting a wide range of smart solutions and introducing new business models;

2.1.2 promote the transformation of polluting industrial processes and raw materials in key industries in the country by supporting upskilling and reorientation programmes for workers to ensure a just transition to climate-friendly technologies;

2.1.3 encourage industry to become prosumers through RES;

2.1.4 promote the use of hydrogen in industrial processes in the production of fertilisers and/or other

products;

2.1.5 promote pilot projects for green hydrogen production that contribute to reducing the impact of industrial processes on climate change and environmental pollution, diversifying the conventional types of fuels and raw materials used in the industrial sector;

2.1.6 promoting waste and low-waste production, circular economy models, re-use/recycling of waste and industrial symbiosis in industrial plants;

2.1.7 promote the rational use of resources, secondary and climate-friendly raw materials, so that by 2025 the secondary raw materials (circularity) index has a value no lower than the EU average (11.9 in 2019);

2.1.8 promote innovation in industrial processes that reduces energy consumption, industrial reorientation and digitalisation projects.

2.2 **Sectoral mitigation targets and targets for industrial sectors outside the EU ETS by 2030 with a view to reducing GHG emissions by at least 19 % compared to 2005:**

2.2.1 the deployment of innovative, more energy-efficient technologies through the development of a competitive circular economy and a bioeconomy based on biomass raw materials;

2.2.2 A 79 % reduction in the use of fluorinated greenhouse gases in the internal market, replacing them with substitutes, tightening controls on imports and uses;

2.2.3 the rapid development of RES and industries that produce alternatives to fossil fuels;

2.2.4 improving energy efficiency by achieving energy savings of 5.45 TWh and the use of RES and alternative fuels in industry;

2.2.5 promote waste and low-waste production, circular economy models, re-use/recycling of waste and industrial symbiosis in industrial plants through eco-innovation

index (1225: 122; 133 in 2030);

2.2.6 reduce the use of natural resources by promoting secondary use of materials, products and waste, implement circular economy targets across all sectors of the economy, with the aim of keeping the secondary raw materials (circularity) index at or above the EU average by 2025 (11.9 in 2019), ensuring the recovery of recovered materials (8.1 in 2025; 10,6 in 2030;

2.2.7 encourage energy-intensive businesses to introduce energy efficiency measures;

2.2.8 achieve at least 50 % of organic and wood building materials in all public buildings by 2024, increasing the use of secondary raw materials and reducing the generation of building waste.

Table 3.1.1.4: GHG emission reduction targets for industry for the period 2021-2030, %:

Sector	Average for 2016-2018 compared to 2005 in %	2025 target in % compared to 2005	Achievement of the 2030 target in % compared to 2005
Industry	+ 23,5	+ 2,2	—19

The above mentioned obligations for the Lithuanian industry are enshrined in the **NAP. Objective**1 'Transforming the sustainable development of a science-based, high-tech, innovation-based economy and enhancing the country's international competitiveness' has set target 1.4 'to reorient industry towards a climate-neutral economy'. The Ministry of Economy and Innovation is responsible for the impact indicators of this challenge, such as the change in industrial greenhouse gas (GHG) emissions compared to 2005 emissions, energy savings in industry and the achievement of others.

Current situation. Lithuanian industry directly generated more than 20.8 % of the country's GDP in 2021 (13.4

in 1995). In terms of the number of full-time employees, the Lithuanian industry is the largest employer in the country. Of the country's economy, industry is the sector with the largest spill-over effects on other sectors. For example, business services and logistics, wholesale and retail trade, science and innovation, energy and agriculture benefit from industry by providing services or products to industry. Depending on the method used to calculate indirect impacts, the overall share of industrial impacts in the economy ranges from 35 % to 45 % in expert judgement.

The historically inherited manufacturing structure in Lithuania is dominated by labour-intensive, resource- and energy-intensive technologies compared to the EU average. The share of manufacturing enterprises classified as high- and medium-tech enterprises has slightly decreased over the last decade and the majority of the value added is generated by low- and medium-tech enterprises. The industrial structure is not susceptible to global technology and innovation, which presupposes the dominant outsourcing of low GDP and the weak involvement of the Lithuanian manufacturing industry in high added value, EU strategic value chains and sectoral alliances.

As a result, business, especially industry, is not efficient in using materials to create value compared to the EU average, while resource productivity is close to half of the EU average, but GHG emission intensity is above the EU average. In addition, a large part of the industrial sector is dependent on non-energy natural gas.

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Accelerating the transition of industry to investment in clean technology manufacturing capacity is essential to strengthen the competitiveness and security of industry. Lithuania has the potential to reform its production sector and contribute to the clean technology supply chain. According to the latest OECD data, about 4 % of Lithuanian start-ups are 'green' (OECD average 3 %). Total venture capital investment accounts for 0.73 % of GDP, of which 5.3 % is for climate technology start-ups.

The decarbonisation of industry shall include the following objectives and objectives:

- reduce the demand for carbon-intensive products through measures promoting the transition to a climate-neutral industry, including the circular economy and industrial symbiosis;
- the deployment of innovative decarbonisation technologies and solutions, including electrification processes using renewable electricity, renewable sources (solar, geothermal or bioheat) and the use and storage of green hydrogen and carbon capture (CCUS);
- increasing energy efficiency in all industrial sectors through the deployment of innovative tools and technologies;
- apply a holistic approach that includes not only the use of standard industrial energy efficiency, but also the decarbonisation of the costs of energy sources and other industrial processes.

The main focus on the implementation of the transformation should focus on a holistic approach to industrial transformation and the combination of sustainability elements through cooperation with other institutions, analysis of foreign good practices and impact assessment of specific measures.

To this end, the Collective Leadership Platform Industry 4.0, which was established in 2017, aims to increase and strengthen the competitiveness and productivity of the Lithuanian industry and to promote the integration of digital solutions and new green technologies. Through a bottom-up approach, the Platform consists of a High Level Industrial Competitiveness Commission chaired by the Minister of Economy and Innovation, a Coordination Group and seven thematic working groups addressing current challenges and future related issues in the following areas: digital production, as well as services promoting digitalisation, standardisation, energy efficiency and the circular economy. In the context of the dialogue between business associations, industry and academia, stakeholders shall set up a discussion forum to discuss the integration of digital solutions, new technologies and skills and then submit relevant proposals to the Government of the Republic of Lithuania.

In 2023, the European Commission presented new initiatives to promote a more sustainable use of resources, the strengthening of the circular economy and the wider uptake of climate-neutral technologies, thereby strengthening the EU's global competitiveness. Member States are invited to take into account the provisions of these initiatives, in particular the Net-Zero*Industry Act,*when drawing up the NECPs. While stressing that the technologies listed in the last legislative proposal should build on the existing strengths of the EU and each Member State should be given the opportunity to take advantage of the technology, we are in favour of extending this list, including the production of components and technologies such as biosolutions, offshore wind infrastructure technologies, solar energy integration solutions, CCUS (carbon capture and utilisation).

In 2023, an analysis of the decarbonisation of Lithuania's manufacturing industry by 2050 identified three scenarios that could lead to the decarbonisation of the industrial sectors under investigation. For this purpose, a three-scenario model has been developed for each of the investigated industries, which would then be adapted to:

merging industries into a general picture:

The first scenario includes changes in absolute GHG emissions from fuel combustion and industrial processes, taking into account the average evolution of greenhouse gas emissions from industrial processes and combustion of fuels in the investigated industries over the last 20 years, i.e. if the respective GHG reductions follow a historical trend.

The second scenario refers to the maximum achievable reduction of GHG emissions from the Lithuanian industries under investigation, based on the consistent introduction of the best technologies currently available and already proven on the market, as well as the innovations already launched by Lithuanian companies that go beyond the solutions that are currently on the market. It is also assumed that the lack of development or competitiveness of today's technologies leads to breakthrough innovations needed to achieve climate-neutral production. GHG savings would be supported, as a basis, by retrofitting energy efficiency through a wider use of biomass, less polluting fuels and electricity produced from RES, replacing fossil fuels currently burned for thermal processes. This is a likely scenario until 2030.

The third scenario is aligned with the assumed trends in the development of the required technologies and the effective adaptation of the required changes, and is based on assumptions with a view to accelerating its implementation. A more significant decline in demand for related products (in particular refined petroleum products, ammonia, high footprint cement) is assumed, which will act as an additional factor for the need to move towards breakthrough innovations that go hand in hand with decarbonisation. The development of CCUS, thermal electrification, efficient use of biomass resources, green hydrogen gas and synthetic fuels technologies and related infrastructure is necessary. The successful decarbonisation of production also goes hand in hand with the coherent development of circular economy cooperation between relevant stakeholders. This scenario underlines that, despite the fact that the significant results of these breakthrough innovations are expected already in the next decade, the regulatory, infrastructural and financial framework for their empowerment needs to be developed without delay. This is a likely scenario after 2030.

Climate neutrality scenarios are not projections but reflect the desirable development of the industries analysed, which would allow for a transition to climate-neutral production by 2050.

Table 3.1.1.5: Existing and planned policy measures in the industrial and industrial processes sector until 2030

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	Total savings of CURO AND ENERGY, GWh
EXISTING POLICY INSTRUMENTS (EPP)			
P1-E	Reducing F-gases	198,57	**
P2-E	Improving energy efficiency	313,44	4227,7
P3-E	Incentives for investment and innovation	*	**
P4-E	Industrial use of RES	22,10	**
P5-E	Changing polluting technologies	826,10	**
P6-E	Promoting technological eco-innovation	*	**
P7-E	Introduction of state-of-the-art technologies	45,21	**

P8-E	Promoting non-technological eco-innovation		**
P9-E	Design decisions		**
P10-E	Fostering traditional industrial transformation		**
P11-E	Boosting the digitalisation of industry		**
P12-E	Improving energy efficiency in enterprises	76,83	**
P13-E	Production and use of hydrogen	651,05	6211,0
P14-E	Feasibility study on Co_2 Catch and Storage	*	**
P15-E	Innovative green products and services	89,51	149,19
P16-E	Instrument management system	37,50	0,16
P17-E	Deployment of alternative fuels	230,37	**
RES6-E	Production and cleaning of biomethane	315,48	**
EE4-E	Consumer education and advice	57,13	**
A5-E	Short supply chains	147,83	**
AMOUNT		**3011,29**	**6360,35**
PLANNED POLICY MEASURES (PPM)			
P18-P	Reducing the use of F-gases	28,49	**
P5-P	Changing polluting technologies	440,58	**
P19-P	Long-term hedgical contracts	204,11	5115,09
P20-P	Reimbursement of electricity prices	298,92	**
P21-P	Methodology for life-cycle modelling of construction	*	**
P22-P	Information system for tracking construction	*	**
P23-P	Action Plan for the transition to circular construction	*	**
P24-P	Building Databank	*	**
T27-P	Amendment of the Law on Excise Duties	19,69	**
EE12-P	Improve the technological and energy efficiency of industrial plants for the implementation of artificial intellectual and	3,49	**
EE13-P	Create a legal requirement for companies to implement energy consumer efficiency audits	16,69	**
RES36-P	Investment support for the installation of biomethane production and treatment plants.	106,30	**
EE14-P	Promoting the introduction of internal monitoring systems for energy efficiency in businesses and	10,09	**
AMOUNT		**1130,09**	**5115,09**

*The impact of the measure is not assessed as it does not directly reduce GHG emissions, but this measure is essential for the successful implementation of the other envisaged measures.

** The impact of the measure is not assessed as it does not directly contribute to fuel and energy savings, but this measure is essential for the successful implementation of the other measures envisaged.

P1-E. Fluorinated gas reduction: The measure includes: (1) Regulation (EU) No 517/2014 of the European

Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases, which reduces greenhouse gas (GHG) emissions by two thirds in 2030 compared to 2014 levels *(2015-2030);* 2) Implementation of the Kigali Amendment to reduce the use and production of hydrofluorocarbons (HFCs) *(2019-2032).*

P2-E: Enhancing energy efficiency. The measure includes: (1) the preferential payment for services of public interest *('PIS') to industry participating in the EU ETS, i.e. companies will receive compensation for the implementation of energy efficiency improvement measures, in line with measure -EE5 (2021-2028);* (2) the deployment of energy-efficient manufacturing technologies in large and medium-sized manufacturing companies participating in the EU ETS: digitalisation, modernisation, optimisation and automation of production processes (*2022-2026*).

P3-E: Privileges for investment and innovation. There are currently corporate tax incentives for investment and innovation: for the promotion of entrepreneurship, from 1 January 2018 the one-year income tax for small start-ups, exempting them from corporate tax in the first year of operation; incentives for innovation – incentives focused on enterprises that develop the latest technologies in their operations and then use them in their activities to generate income: (1) triple deduction of research and experimental activities ('R & D') costs, allowing three deductions from revenue of costs incurred by undertakings in carrying out R & D work; 2. Accelerating depreciation of R & D assets by allowing the purchase price of fixed assets used in R & D activities to be written off into costs within two years; 3.The reduced tax rate on the commercialisation of R & D, which introduced an additional relief for companies investing in R & D as of 2018, is subject to a reduced corporate tax rate of 5 % on the commercialisation of inventions generated by R & D activities (profits from the use or disposal of assets generated by R & D activities). The incentives are targeted at companies that develop the latest technologies in their operations and then use them in their operations to generate income (*2018-2030).*

P4-E. Industrial use of RES. Measures for activities in companies not participating in the EU ETS: (1) Installation of energy generation capacity using RES, development and deployment of new technologies for the more efficient use of RES in industrial plants with a view to using energy for their own internal needs and enabling excess energy to be delivered to other industries or to centralised energy networks (Renewable energy sources for industry LT+ (No 04.2.1-LVPA-K-836) (*2014 to 2020)*; (2) carrying out energy audits in industrial enterprises (Audit for Industry LT (No 04.2.1-LVPA-K- *804) (2014-20);* On the basis of energy efficiency audit reports, investments will be made for the installation of energy generation capacity using RES, the development and deployment of new technologies for the more efficient use of RES in industrial plants, with a view to using energy to meet their own internal needs, enabling excess energy to be delivered to other industries or transferred to centralised energy networks. The activities are implemented in the Western and Central Lithuania region (hereinafter referred to as the VMP region) *(2022-2027).*

P5-E. substitution of polluting technologies. Activities for companies participating in the EU ETS: (1) part-financing projects replacing polluting production technologies with less polluting technologies, implementing best available techniques (BAT), etc. *(2022-2030); (2*) Incentivising investments in the production and use of RES electricity in manufacturing plants, including investments in tangible assets (installations, technologies) that reduce GHG emissions and ensure a continuous environmental impact (*2022-2026).*

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P6-E: Enhancing technological eco-innovation. Activities targeted at small, small and medium-sized enterprises: (1) encourage micro-enterprises and SMEs to adopt technological eco-innovations. Funded technological eco-innovation investments in cleaner production innovations (introduction) using rational resource use and pollution prevention techniques (e.g. process modernisation/optimisation to reduce negative environmental impacts and/or saving natural resources, waste production, re-use/recycling of waste, recovery of heat (recovery, regeneration), flow separation, etc.) (Eco-innovation LT+ (No 03.3.2-LVPA-K-837) (*2014-20)*; (2) promote the development, demonstration and deployment of environmentally friendly innovative technologies

in SMEs active in fields. Investments in eco-innovation, the development and production of sustainable "circular" products. Creating incentives for companies to showcase their digital and environmentally friendly technologies for SMEs that are potentially able to adopt them, allows SMEs to become aware of the benefits of these technologies (for*2021-2027*); (3) encourage micro-enterprises and SMEs to adopt non-technological eco-innovations, i.e. environmental management/management, manufacturing technological and/or environmental audits and ecodesign principles in product design. Projects intended to improve the environmental performance of products throughout their life cycle (selection and use of raw materials, production, packaging, transport, use), systematically including environmental aspects at the earliest stage of product design (Eco-Innovation LT (No 03.3.2-LVPA-K-832) *(2014-2021)) are*envisaged; (4) provide micro-enterprises and SMEs with the necessary information, advisory methodological and other support on resource efficiency, conservation of natural resources, deployment of eco-innovations, etc. to stimulate investments by SMEs in eco-innovation and other resource-efficient technologies (Eco-Consultant (Ref. 03.3.2-IVG-T- 829)*2021-2027)*.

P7-E Deployment of modern technologies: The activities of the measure are targeted at small and medium-sized enterprises: 1) Transforming traditional industry by deploying key technologies for industrial innovation and growth in the economy as a whole – Promotion/introduction of Key Enabling Technologies (KETs) in the production processes of micro and SMEs (DPT for industry LT+ (No 03.3.1-LVPA-K-841) (*2014-2021)*; Promoting micro-enterprises and SMEs to invest in the start-up and development of innovative manufacturing and/or innovative services (Regio Invest LT+ (No 03.3.1-LVPA-K-803) (*2014-2021)*; 3) Encouraging micro-enterprises and SMEs to invest in the deployment of modern technologies, enabling the adaptation and creation of new production capacities to produce new and existing products (Regio potential LT (No 03.3.1-LVPA-K-850) (*2014-2022*).

Promoting non-technological eco-innovations Encourage companies to invest in product/service design solutions to increase the attractiveness of the company's products or services and thus the demand and productivity of the company (Designation LT (No 03.3.1-LVPA-K-838) (*2014-* 20).

P9-E Design Decisions. These activities will stimulate investment in brand, enterprise process (excluding digital deployment), design and organisational innovation, in particular sustainable and increasing integration into the development of business models of the SCPs (*2022-2027).*

P10-E: Encouraging the Transformation of Traditional Industries. Joint Science and Innovation Missions in Smart Specialisation: Create an Industry 4.0 Lab platform for the exchange of know-how and solutions for the circular economy. The development of the platform will be linked to the European Digital Innovation Hubs (i.e. the platform will be set up on the basis of organisations with the status of European Digital Innovation Hubs) *(2022-2025).*

P11-E: Fostering the digitalisation of industry. The measure includes: (1) carrying out technological audits of industrial SMEs to assess the possibilities and prospects of digitisation of industrial SMEs' production processes; and

technological supervision of the implementation of technological audit provisions (technological advisory services) and installation of industrial SMEs' production process equipment with integrated digitalisation technologies, based on the recommendations of the technological audit carried out (Digitising Industry LT (No 03.3.1-LVPA-K-854) (*2014-20*); (2) the installation of industrial process equipment with integrated digitalisation technologies, including the execution of technological audits of industrial enterprises and/or the implementation of technological audit provisions (technological consulting services) *(2024-2027);* (3) Incentivise investment in the deployment of industrial process equipment with integrated digitalisation technologies to accelerate and efficient companies' involvement in international value chains*(24-2028).*

P12-E: Enhancing energy efficiency in enterprises. Energy audits in industry are encouraged. According to the results of the audits, investments are expected to be made in improving energy efficiency and reducing its intensity, enabling industry to invest in the adoption of state-of-the-art and environmentally friendly equipment and technological solutions in production processes, ensuring the continuity of these production processes, i.e. upgrading the necessary technological equipment and the existing infrastructure for technological processes (*2022-2027).*

P13-E: Hydrogen production and use. AB Achema, located in the Kaunas region, envisages step-by-step steps towards zero emissions generated by the company by 2050. In the first phase, the company plans to refurbish one ammonia unit in such a way that 30 % of green hydrogen is supplied to this ammonia unit and CO_2 emissions will be significantly reduced by up to 27 %, leading to a 12 % reduction in CO_2 emissions at company level. As a second step, the company envisages continuing the investment in ammonia aggregates and aiming to replace all the hydrogen needed to produce its production with green hydrogen. In parallel, the company envisages further exploring the feasibility of CO_2 capture, use and storage technologies (in*2023-2027)*.

Feasibility study on capture and storage of P14-E. CO_2. The study should assess the feasibility of developing and utilising CO_2 capture and storage technologies in Lithuania, taking into account direct GHG reductions/entity, industry. The analysis should include the existing national legislative framework in this regard, the ongoing legislative processes at EU level (for hydrogen, the updated RES Directive, the pending EU border correction mechanism for CO2, etc.), assess what changes would be needed to the legislative framework, assess the necessary upgrade of the infrastructure, and prepare for potential development. The analysis recommendations should be consistent with Lithuania's strategic energy and climate change objectives (*2023-2025)*.

P15-E – Innovative green products and services. A financial instrument and a specialised knowledge-sharing platform will be set up to promote the development of environmentally friendly products and technologies. The objective of the measure is to: create Hubs for Circularity. These hubs would foster the green and digital transformation. Possible hub activities: (a) investments in infrastructure; (b) investments in ecosystem faculty and international networking; (C) green innovation advisory services; (D) Investments in high Technology Readiness Level (TRL) (6-9) R & D activities (*2022-2026*).

P16-E: Facility Management System. It is envisaged to establish an efficient governance system for monitoring the implementation, coordination and progress of energy efficiency measures in the Lithuanian industrial sector (*2022-2024*).

P17-E Deployment of alternative fuels. For the successful transformation of industrial plants and decarbonisation of industrial processes, investments towards the deployment of alternative fuels, such as replacing fossil fuel boilers with renewable energy sources, are envisaged

heat pumps (air-to-water, ground-to-water, water-to-water, air-to-air), replacement of fossil fuels used in the production process by RES/electricity etc. in industrial plants outside the EU ETS in Kaunas, Šiauliai and Telšiai regions*(23-2026*).

RES6-E: Biomethane production and cleaning. *(More on the measurein the renewable energy sector)*

EE4-E Consumer education and counselling. *(More on the measure in the energy efficiency sector)*

A5-E Short supply chains: *(More on the measure in the agricultural sector)*

P5-P. Replacement of polluting technologies. For companies participating in the EU ETS. Supporting investments in tangible assets (installations, technologies) that reduce the negative environmental impact of economic activities and ensure a continuous environmental impact, i.e. investments in GHGs that reduce innovation in cleaner production (*2022-2026).*

P18-P: Reducing Fluorinated Gas Use. The aim is to encourage companies to purchase new equipment or replace old equipment with technological alternatives other than F-gases or low global warming potential (GWP) gases. When providing financial support for the purchase and deployment of cooling equipment, give priority to those applicants that envisage the purchase of equipment using refrigerants with lower GWP. The measure covers the small-scale industry and transport sectors (*2022-2030*).

P19-P. Long-term hedgical contracts. The measure aims to advance the GHG reduction result from companies not participating in the EU ETS (heidgy principle). Planning long-term contracts with companies to initiate and ensure long-term GHG reductions. Such contracts would provide companies with fixed public support for each tonne of GHG that could be saved on the basis of the best-performing technological measures available at that date, while the cost of CO_2e t saved is determined on the basis of a forecast of a possible longer-term price. A technological audit shall be carried out to assess CO_2 emissions at appropriate intervals by the company (monitoring). At the end of the period, an audit of how much the company has saved/reduced its greenhouse gas emissions again and whether it has met its commitments is to be reimbursed in case of non-*compliance (in 2024-2030*).

P20-P. Electricity price compensation. Compensation of the greenhouse gas costs of the European Union included in electricity prices to industrial sectors and sub-sectors in the period from 2021 to 2030 by way of State aid i compensation payment obliged to invest at least 30 % of their electricity consumption from non-CO_2 sources or a significant part of the aid amount, at least 50 %, in projects that reduce the emissions of the installation and which are below the benchmarks for free allocation in the EU ETS*2024-2030.*

P21-P: Building life cycle modelling methodology. The implementation of the measure would include the development and approval of a building life-cycle modelling methodology (in*2023-2029*).

P22-P. Building Material Tracking Information System. The implementation of the measure would include the following activities: (1) assess the feasibility of establishing and operating such an IS system, taking into account EU regulation and policy-making and foreign good practices; (2) create a regulatory environment for the operation of such a system; (3) establish a technical basis for the functioning of the IS; (4) prepare market participants for the application of IS. The measure is shaped by the planned implementation abroad of "material passports" and similar initiatives in the construction sector*(24-2029).*

P23-P – Action Plan for the transition to circular construction. The measure aims to prepare the transition to circular

an agenda for action on the construction economy for a period of 5 years, which could consist of the following clusters: (1) Market development; (2) Development of measurement tools and system; 3) Policies and their formulation, legislation; (4) awareness-raising and awareness-raising; (5) Establishment or designation of a permanent organisational structure or entity coordinating the implementation of the agenda (*in 2024*).

P24-P Building Databank. The collection, compilation and processing of data on the building stock to be upgraded (to be upgraded) has been developed and implemented, ensuring a building databank solution (*2023-2025*)

T27-P. Act on Excise Duties. *(More about the measure in the transport sector)*

EE12-P: Enhancing the technological and energy efficiency of industrial companies through the deployment of artificial intelligence and digital twin technologies. *(More on the measure in the energy efficiency sector)*

EE13-P: ***Create a legal requirement for companies to implement the measures recommended in energy efficiency audits.*** *(More on the measure in the energy efficiency sector)*

RES36-P: Investment support for the installation of biomethane production and treatment plants. *(More on the*

measure in the renewable energy sector)

PEE14-P. Promoting the introduction of internal monitoring systems for energy efficiency in businesses and industry. *(More on the measure in the energy efficiency sector)*

Table 3.1.1.6: Indicative financing needs for existing and planned measures in the industrial and industrial processes sector:

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total funds	Public money		Total funds	Public money	
Industry	1717,50	913,97	Climate Change Programme, Modernisation Fund, EU funds investments (20142020) and (2021-2027), Recovery and Resilience Facility, Just Transition Fund, other sources	386,90	169,04	Climate Change Programme, Modernisation Fund, EU funds investments (20212027), Recovery and Resilience Facility, other sources

Agricultural sector

The obligations for the agricultural sector in relation to the transition to climate neutrality are set out in the strategic documents of the Republic of Lithuania:

1. **For** the agricultural sector, the IPCC sets the following mitigation targets for 2030:

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1.1 the deployment of innovative technologies, the development of sustainable farming and the increase of added value in all agricultural sectors;
1.2 ensure the efficient, cost-effective and environmentally sound use of fertilisers and reduce the use of nitrogen mineral fertilisers in agriculture by at least 15 % compared to 2020;
1.3 promoting innovative, anti-pollution, animal husbandry technologies and practices, digitalisation of livestock farms, performance research;
1.4 achieve at least 70 % of manure and slurry production in a sustainable way to reduce methane, nitrous oxide and ammonia emissions in livestock farming, improve the sustainability of manure and slurry management;
1.5 implement measures to reduce direct and indirect emissions of nitrogen compounds into the environment from agricultural activities;
1.6 doubling the area of organic farming compared to 2020;
1.7 50 % of pig and cattle manure is used for biogas production;
1.8 promote the use of science-based safe alternatives to protect yields from pests and diseases, reducing chemical pesticides and expanding the integrated pest management system;
1.9 bringing the food supply chain closer to consumers, promoting agriculture in urbanised areas in order to

reduce transport needs and distances;

1.10 develop and apply a GHG accounting system at farm level by 2025 at the latest.

Table 3.1.1.7: GHG emission reduction targets for the agricultural sector for the period 2021-2030, %:

Sector	Average for 2016-2018 compared to 2005 in %	2025 target in % compared to 2005	Achievement of the 2030 target in % compared to 2005
Agriculture	+ 3,2	—3,8	—11

2. Strategic objective 6 of the **NAP** 'Ensure good environmental quality and sustainability in the use of natural resources, protect biodiversity and mitigate Lithuania's climate change impact and increase resilience to its impacts' envisages the development of sustainable and bioeconomy-based activities in the agriculture, forestry and fisheries sectors (progress challenge 6.2). This objective provides for the development of nature friendly farming and the promotion of low GHG technologies, a sustainable farming policy based on the sustainable use of mineral fertilisers and pesticides, reducing water pollution from nitrogen and phosphorous compounds and air pollution by ammonia, enhancing operators' knowledge of the consequences of climate change, air pollution and biodiversity loss, linking investment support to the introduction of sustainable production methods and technologies, sustainable use of soil, water and other productive resources, and promoting afforestation of forests and other permanent crops, conservation and restoration of wetlands, enhancing the removals of land and forestry, and implementing climate change adaptation measures in agriculture and forestry.

3. The Development**Programme for Agriculture and Food, Rural Development and Fisheries 2022-2030** identifies sectoral challenges, including those related to both climate change mitigation and resilience, and the causes of the challenges to be addressed.

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4. One of the specific objectives of the**Lithuanian Strategic Plan for Agriculture and Rural Development 2023** -2027 (the 'SP 2023-2027') is to contribute to climate change mitigation and adaptation, including by reducing GHG emissions and increasing carbon sequestration, and to develop sustainable energy (specific objective 4, SO4). This objective is to be achieved through the Good Agricultural and Environmental Conditions (GAEC) and Management Requirements (MMR) standards and 24 different interventions. GAEC and SMR standards and interventions will reduce the use of mineral fertilisers and GHG emissions associated with fertilisation, reduce GHG emissions from the livestock sector, increase the introduction of plant residues into the soil and reduce the mineralisation of soil organic carbon, thereby increasing the sequestration of organic carbon in soil, ensuring an increase in forest biomass and the growth of GHG absorption in forest biomass, and increasing the resilience of farms to climate challenges. Investment support will encourage farmers to introduce on-farm technologies that reduce GHG emissions, ammonia emissions and improve air quality, as well as to transfer manure and waste generated on farm to energy (supporting the installation of biogas plants for farm use) and to invest in technological solutions that improve animal welfare. The IfS 2023-2027 will be complemented by funds from other sources: public budget, EU funds investment programme 2021-2027, European Recovery and Resilience Facility, Modernisation Fund.

The following GAEC and SMR standards contribute to the SO4 objective: GAEC1, which requires the maintenance of permanent grassland, GAEC2 laying down protection requirements for peatlands and wetlands, GAEC3 prohibiting the burning of stubble, GAEC6 providing for soil protection during the most sensitive period, GAEC7 laying down minimum requirements for plant renewal, GAEC8 laying down a requirement on a minimum agricultural area allocated to non-productive areas or features, GAEC9, which aims to protect biodiversity-rich

permanent grassland, SR2, which ensures the protection of water against pollution caused by nitrates from agricultural sources, VR3 and VR4, which include prohibitions on the proximity and drainage of grassland in designated areas of importance for birds and areas for the protection of natural habitats and of wild fauna and flora.

In order to further contribute to climate change mitigation and adaptation, including by reducing GHG emissions and increasing carbon sequestration, payments are envisaged for participating in schemes beneficial for the climate, the environment and animal welfare (eco-schemes), as well as rural development interventions and committing to a higher level of environmental protection above minimum GAEC and SMR standards and relevant minimum requirements for fertiliser and plant protection products use, animal welfare, as well as other relevant mandatory requirements established in national and EU law.

For the period 2023-2027, 404 thousand ha (13.59 %) of UAA are planned to be subject to commitments to improve adaptation to climate change, 839 thousand ha (28.21 %) of UAA will be subject to commitments to reduce GHG emissions or maintain/increase carbon storage in soil and biomass. It is also planned that 382.1 thousand ha (12.84 %) of the utilised agricultural area will be subject to conversion and maintenance commitments. By 2030, the aim is to increase the share of organic land used by agricultural producers to 16.2 % of the utilised agricultural area. In the period 2023-2027, the IfS will also support investments in renewable energy generation capacities, including bio-based ones. The target value of the indicator is set at 1 MW.

For interventions related to climate change mitigation, adaptation and enhancement of the absorption potential, the IfS foresees support for the period 2023-2027 at around 1.67 million ha or 56 % of the utilised agricultural area and 122268 livestock (LU) or 17.02 % of the total LU.

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5. The National Water Plan 2022-2027, the National Air Pollution Reduction Plan, the Soil Sustainable Use Action Plan 2030 contain measures to reduce air, water and soil pollution from agriculture and food, fisheries activities and ensure a more sustainable use of these resources, while also contributing to climate change mitigation and adaptation.

Current situation. The inefficient deployment of low GHG technologies, the lack of investment, partly led to an increase in the share of agricultural GHG emissions in the country's overall GHG composition from 18 % to 21 % between 2005 and 2021, while greenhouse gas emissions from the crop sector increased by 28.1 %. Due to the lack of innovative approach to land and energy from land, Lithuania's share of agriculture in total renewable energy production (10.3 %) is below the EU average (12.1 %). The results of the national GHG inventory show a significant increase in crop-related emissions since 2005. Between 2005 and 2021, N_2O emissions from soils increased by 42 %. The main drivers of the increase in GHG emissions from agriculture are the increasing use of mineral fertilisers, the growing area and yields of cereals and the increasing cultivation of organic soils.

Unlike other sectors, agriculture can contribute to the fight against climate change, not only by reducing GHG emissions directly, but also by increasing the accumulation of CO_2 in soils or plant biomass. As soil is the largest storage of carbon on land, the use of sustainable practices that reduce direct soil emissions and increase absorption is essential. It should be noted that part of the NECPs' existing and planned measures fall into both the agriculture and the GIFF sectors and contribute to the reduction of GHG emissions from both sectors and to the accumulation of CO_2 (included in the FISH sector). These include crop change, catch crops, peatlands used in agriculture, as well as extensive grassland maintenance and non-simultaneous agriculture.

Table 3.1.1.8. Existing and planned policy measures in the agricultural sector until 2030

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	Total savings of CURO AND ENERGY, GWh
EXISTING POLICY INSTRUMENTS (EPP)			
A1-E	Climate-friendly livestock farming	498,97	**
A2-E	Promotion of organic products	1,36	**
A3-E	Development of precision fertilisation	48,15	**
A4-E	Extensive grassland management	—113,39***	**
A5-E	Promoting short supply chains	128,50	**
A6-E	Development of protein crops	810,04	**
A7-E	Development of non-army technologies	581,14	95,00
A8-E	Reformulation of feed	94,17	**
A9-E	Organic farming	129,94	**
A10-E	Promoting bioeconomy businesses	271,38	**
A11-E	Nature-friendly orchard and berry management	0,00	**
A12-E	Sustainable horticulture and horticulture	10,06	**
A13-E	Renunciation of tax relief	*	1229,00

A14-E	Reducing the use of fossil fuels	*	1419,00
A15-E	Review of technology cards	*	3591,00
A16-E	Promotion of research	78,00	**
A17-E	Information and counselling	1,07	**
L5-E	Promotion of plant change	379,20	**
L4-E	Promotion of catch crops	145,87	**
L1-E	Restoration of peatlands (restoration of hydrological regime on agricultural land)	359,8	**
L3-E	Conservation of wetlands		**
L6-E	Restoration of peatlands (translation with grassland)		**
AMOUNT		**3424,26**	**6334**
PLANNED POLICY MEASURES (PPM)			
A1-P	Climate-friendly livestock farming	777,54	**
A2-P	Promotion of organic products	5,65	**
A3-P	Development of precision fertilisation	24,90	**
A18-P	Environmentally friendly diets	89,85	**
A19-P	Sustainable use of public land	98,30	**
A20-P	On-farm GHG inventories	37,18	**
A21-P	Balanced fertilisation system	487,27	**
A22-P	Ad-propelled techniques	*	**
AMOUNT		**1520,69**	**0**

*The impact of the measure is not assessed as it does not directly reduce GHG emissions in this sector, but this measure is essential for the successful implementation of the other measures envisaged.

** The impact of the measure is not assessed as it does not directly contribute to fuel and energy savings, but this measure is essential for the successful implementation of the other measures envisaged.

*** The measure saves GHG in another sector, the GIFCM, which offsets the GHG emissions generated in this sector.

A1-E. Climat-friendly livestock farming. Investments will be directed towards efficient equipment and technologies to reduce GHG emissions from livestock farms, especially as regards manure management. The aim is to apply the acidification of slurry, the incorporation of slurry into the soil and the use of manure for biogas production. In addition to reducing GHG emissions, this will also increase the more efficient application of organic fertilisers to crops (based on actual crop needs and ensuring all qualitative soil parameters) (KP31tvi Sustainable investments in50agricultural *holdings) (2023-2027)*.

A1-P. Climat-friendly livestock farming. The envisaged extension of the scope of measure A1-E (*2023-2027)*.

A2-E: Promoting the consumption of organic products. The objective of the measure is to promote the consumption of organically and environmentally friendly production methods and to reduce the consumption of environmentally friendly, unsustainable products. The measure provides for a price difference between organic, NGA and conventional products

50The related measures of the IfS 2023-2027 (measure codes from IfS 2023-2027) are further highlighted here.

compensation for the consumption of largely environmentally friendly food in pre-school establishments. Promoting green procurement (*2021-2026)*should also contribute to this.

A2-P: Promotion of the consumption of organic products. The envisaged extension of the scope and time period of measure A2 *-E (from 2025 to 2030)*.

A3-E. Expansion of precision fertilisation. The measure is intended to support the acquisition of precision technologies that will lead to fuel savings, reduced use of plant protection products and fertilisation, and will improve *soil condition (2022-2023).*

A3-P. Expansion of precision fertilisation. The measure provides for the adaptation of the national legislative framework to the wider use of precision technologies (including drones), the transfer of knowledge to end-users of the technology and the promotion of the use of these technologies. Enabling technologies will lead to fuel savings, reduced use of plant protection products and fertilisation, and improved soil *condition(24-2030)*.

Extensive grassland maintenance of A4-E. The measure is intended to encourage farmers to graze extensively on grasslands. The measure aims to have a positive impact on the various grassland habitats by maintaining and maintaining grasslands and improving their condition. This will reduce soil loss due to erosion, increase soil organic carbon stocks, reduce the need for mineral fertilisers or use mineral fertilisers, reduce nutrient leaching to water bodies and avoid GHG emissions from the conversion of grassland to arable land. The measure will also contribute to animal welfare objectives. The measure provides for compensation to farmers who are eligible (TI05eko6 1 – Extensive management of permanent grassland by grazing livestock; TI05eko9.1 – Upper standards for the keeping of bovine animals: access of dairy cattle to pasture, including grazing on fields during the warm season; TI05eko9.2 – Upper standards for the keeping of bovine animals: free access of cattle to open areas, pastures *(in2023-2027)*.

A5-E: Promoting short supply chains: Short supply chains reduce the number of potential intermediaries between the producer and the final consumer and reduce the costs of transporting products. This has a significant impact on ensuring the viability of small and medium-sized farms and greater integration of producers in the food supply chain. The measure contributes to the objectives of protecting the environment and improving public health by promoting the consumption of local production, with a particular focus on organic and quality-based production, reducing the carbon footprint by optimising transport costs. Short supply chain schemes aim to reduce the distances that products are transported to the final consumer. And bringing the food supply chain closer to urban consumers by promoting urban agriculture/urban farming (KP14gra Trumpa supply chains) *(23-2027)*.

A6-E: development of protein crops. The cultivation of grasses requires large quantities of fertilisers to produce yields, which releases N_2O gases into the atmosphere. The release of 1 kg N_2O into the atmosphere is equivalent to approximately 265 kg CO2e (100 GWP). Legumes that have symbiotic links with nitrogen-fixing bacteria with sufficient soil air permeability and mineral content do not require additional nitrogenous fertilisers, unlike grasses. At the same time, leguminous grasslands have a high nutritional value, particularly protein content, which ensures sustainable further use of protein material throughout the food chain (TI03sus01.1 Coupled income support for protein crop growers) *2023-2027.*

A7-E – Non-army technology development. The aim of the measure is to encourage non-simultaneous tillage, with a particular focus on the promotion of direct sowing. Non-arable farming, and in particular direct sowing, improves the soil

characteristics, yields and carbon storage (TI05eko1.8 Operations on arable land – non-simultaneous conservation farming technologies*)(23-2027)*.

A8-E. Amendment of the composition of feed. Inform farmers about the impact of certain changes in feed composition on GHG emissions while maintaining productivity: replacement of the feeding of pigs, limited changes in the composition of the feed for cattle, reduction of methane released by cattle, information to cattle farmers on the possibilities of diversifying feed composition by improving the quality of the feed and thus the productivity of the cattle (e.g. conversion of common wheat, barley straw to maize, milling, etc.), reduction of carbohydrates and substitution of unsaturated fat in feed, incorporation of nitrogen additives with slowly digestible nitrogen compounds in feed, reduction of protein content in feed for dairy cows and avoidance of excessive feeding *(2022-2023)*.

A9-E: Organic farming. The measure aims to promote organic farming. This measure will address the challenges of providing the population with quality food, reducing negative environmental impacts, preserving biodiversity and maintaining the stability of ecosystems (TI05eko8 Transition to organic farming; TI05eko10 Organic farming (fruit, berries, vegetables, herbs and herbs); KP01ekū Organic farming: Organic farming Continuing Commitments*) (2023-2027)*

A10-E: Boosting Bioeconomy Businesses. The measure aims to encourage the production of innovative high added-value products based on agricultural production produced in Lithuania. To this end, subsidies are provided for productive investments in innovative bioeconomy businesses (KP14prd Investments in Bioeconomy *Businesses) (2023-2027)*.

A11-E: Nature-friendly orchard and berry management. The intervention is aimed at encouraging agricultural operators to manage orchards in a nature-friendly manner with the aim of reducing the use of plant protection products, reducing nutrient leaching from the soil and contributing to the conservation of biodiversity (TI05eko2 Nature-friendly management of gardens and berry *trees)(23-2027)*.

A12-E: Sustainable horticulture. The measure aims to encourage fruit, fruit and vegetable growers to introduce more environmentally friendly production technologies, thereby contributing to the protection and improvement of soil quality and the reduction of pollution of surface waters and groundwater (TI05eko3 Sustainable Fruit, Fruit and Vegetables Programme (NCP)*) 2023-2027*.

A13-E – Renunciation of tax relief. The measure aims to reduce the use of gas oils for use in agricultural activities by restricting the use of fuel at reduced excise duty rates to agricultural machinery (e.g. tractors, harvesters*) (in2023-2030)*.

A14-E: Reducing the use of fossil fuels. The measure aims to promote a reduction in the use of fossil fuels in agriculture, forestry and fisheries through: (1) regulatory action (e.g. limiting the consumption of gas oil for agricultural use) *(2021-2030);* (2) the planning of new investment measures to boost the transition from fossil fuels to renewable energy sources and energy efficiency *(2022-2026)*. And, by means of advice and the setting up of a platform, to encourage the sharing of technical equipment between farmers in order to exploit the overall potential of the resources of Lithuanian agricultural machinery. A potential land manager can farm with all the necessary services and without capital and by using already existing capacities (often underutilised by other farmers) (in*2023-2027)*.

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A15-E. Review of Technology Cards. The objective is to reduce the use of gas oils for use in agriculture. A lower amount of excise fuel would save 20 % of the fuel *consumption (in2023-2030)*.

A16-E: Encouraging research. The measure would look at a wide range of farming practices, measuring their GHG emissions, output and carbon capture. The aim is to identify the most energy efficient and climate-friendly

farming practices (KP22eip European Innovation Partnership for Agricultural Productivity and Sustainability) *2023-2027.*

A17-E. Information and consultation. The objective of the measure is to promote good sustainable and sustainable farming practices in order to reduce negative impacts on soil, water, air and climate. The aim is to familiarise farmers with the implementation of eco-schemes under CAP Strategic Plan 20232027 direct support measures and other policy instruments. Outdoor days, information campaigns on soil-friendly technologies, practices promoting more efficient use of fertilisers and plant protection products and other activities in climate friendly agriculture are planned. The measure also aims to improve the knowledge of farmers and fish businesses on how to apply these advanced technologies and operational solutions to reduce GHG emissions through advisory services. Encourage farmers to farming more sustainably, using state-of-the-art technologies and implementing good practices *(in2023-2027)*.

A18-P. Environmentally friendly diet. The measure envisages a series of communication and education campaigns to inform people about the negative impact of unsustainable agricultural production (plant and livestock farming) on the environment and *humanhealth (24-2027).*

A19-P: Sustainable use of public land. The measure provides that new contracts for the lease of State-owned land (in accordance with the Resolution of the Government of the Republic of Lithuania on the sale and lease of State-owned agricultural land plots) should be treated organically or with very low pollution (e.g. using limited quantities of mineral fertilisers and plant protection products, specifying that non-susceptive agriculture, etc.) may be carried out. Ensure the sustainability of activities on publicly owned land leased with limited negative environmental and climate *impacts (in2023-2030)*.

A20-P – Inventory of GHGs on farms. The measure is intended to enable the collection of data on farms (GHG emissions, soil condition) and, through this data, the provision of advice to farmers in relation to energy efficiency improvements, livestock farming or crop technologies, in order to identify and advise on how to reduce GHG emissions in production, on a farm-specific basis. Enable on-farm application of data-driven GHG reduction solutions *(2022-2025)*.

A21-P. Balanced fertilisation system. Establish a system of balanced fertilisation whereby mineral fertilisers are used efficiently and less (calculated per crop unit or per hectare of crop): introduce a requirement for the farm to provide data on the use of mineral fertilisers (by active substance) on the farm; develop a methodology for fertilisation plans to calculate optimal fertiliser content by crop and introduce a requirement for farms to prepare mineral and organic fertiliser fertilisation plans. The measure also provides for the creation of a dedicated digital accounting base for fertilisers and chemical plant protection products, which would serve as a basis for national accounting and controls, and for the deployment of other digital solutions. Mineral N fertiliser consumption on cropland is expected to decrease by 10 %. *(2021-2024)*

A22-P. AD-powered technique. The measure aims at replacing fossil-fuel-powered agricultural machinery and vehicles with second-generation biofuels and electric techniques (e.g. tractors;

trucks, harvesters), prioritising the adaptation of existing technology to second generation fuels. The measure shall only apply to entities using at least 50 % of second-generation biofuels in *the commitment period2023-2030*.

L5-E: Promoting plant change: *(More on the measure in the land use, land use change and forestry sector)*

L4-E: Promotion of catch crops. *(More on the measure in the land use, land use change and forestry sector)*

L1-E. restoration of peatlands (restoration of hydrological regime on agricultural land). *(More on the measure in the land use, land use change and forestry sector)*

L3-E. Conservation of wetlands. *(More on the measure in the land use, land use change and forestry sector)*

L6-E. peatland restoration (translation with grassland). *(More on the measure in the land use, land use change and forestry sector)*

Table 3.1.1.9: Indicative financing needs for existing and planned measures in the agricultural sector:

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total funds	Public money		Total funds	Public money	
Agriculture	961,70	908,02	Modernisation Fund, Strategic Plan for Agriculture and Rural Development of Lithuania 2023-2027, Lithuanian Rural Development Programme 2014-2020, Programme for the Lithuanian Fisheries Sector 2021-2027	222,20	126,34	Climate Change Programme, Modernisation Fund, Investments from EU funds (2021-2027), other sources

Waste management sector

The obligations on the waste sector in relation to the transition to climate neutrality are laid down in the strategic documents of the Republic of Lithuania:

1. The IPCC targets for the waste sector for climate change mitigation by 2030 are as follows:

1.1 to reduce per capita food waste by 50 % to tackle food waste (41 kg in 2019);

1.2 a maximum of 5 % by weight of municipal waste generated as a proportion of municipal waste going to landfills;

1.3 recycling at least 70 % by weight of all packaging waste;

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1.4 reuse and recycling of at least 60 % by weight of municipal waste;

1.5 by 2025, achieve a secondary raw material utilisation (circularity) index no lower than the EU average (11.9 in 2019).

Table 3.1.1.10: GHG emission reduction targets for the waste sector for the period 2021-2030, %:

Sector	Average for 2016-2018 compared to 2005 in %	2025 target in % compared to 2005	Achievement of the 2030 target in % compared to 2005
Waste	—36.6	—50,6	—65

2. The**Sustainable Development Strategy** stresses that the inefficient application of the polluter pays principle to waste management will not lead to an effective waste management system and that failure to ensure universal, good quality and accessible public municipal waste management services can lead to increased

pollution of the environment. The vision points out that a regional waste management system will be established and that initial sorting will significantly reduce waste flows to landfills and increase recycling. Currently, a regional waste management system is in place and primary waste sorting is promoted through both regulatory and financial instruments.

3. The**UTP** mentions that, in order to rationalise the use of natural resources, ensuring the quality of utilities in the environmental sector contributes to the improvement of the quality of life. A separate target in the programme is reserved exclusively for the waste sector. This target focuses not only on the prevention of the generation of municipal waste but also on the production of waste from economic activities, so that waste from production and other economic activities does not increase or at least grows at a much slower rate (at least twice as much as production growth). The aim is to maximise recycling or reuse, promote technologies and production methods that reduce the use of natural resources and/or prevent the generation of waste. The Industrial Development Programme stresses the aim of encouraging companies to jointly adopt the principles of industrial symbiosis in the region, which can save raw materials and reduce the waste generated.

4. The National Waste Prevention and Management Plan for 2021-2027 (hereinafter referred to as the 'WMP'), approved by Resolution No 579 of the Government of the Republic of Lithuania of 1 June 2022, identifies the opportunities and risks associated with waste management in Lithuania, stressing that the implementation of waste prevention measures at national level will reduce the generation and non-use of waste, rational use of natural resources and materials, and reduce the risk of negative impacts of waste on public health and the environment. Reducing GHG emissions in the area of waste is one of the targets of the GAP. To this end, it is planned to increase the preparing for re-use and recycling of municipal waste to at least 60 % by weight of municipal waste generated by 2030. By contrast, the amount of waste going to landfills is to be significantly reduced to 5 % by weight of all municipal waste generated by 2030, in line with the target set in the National Progress Plan.

To achieve these objectives, the GMP foresees that the management of municipal waste must be organised in such a way as to encourage the proper preparation for re-use and recycling of waste. And the amount of bio-waste treated at source and separately collected municipal waste shall be at least 60 % in 2023, 65 % in 2024, 70 % in 2025, 75 % in 2026 and 80 % in 2027. Provision of bio-waste to households by 2024

the means of collection or their composting on site.

It is envisaged to promote the development of recycling infrastructure for textiles, plastics, green and food waste by 2030 with a target of 88,5 thousand tonnes of waste in secondary raw materials, as well as to promote the deployment and development of technologies that enable the use of more secondary raw materials in production. This will encourage recycling and recovery in the form of raw materials and reduce resource use, waste and GHG emissions.

Waste prevention is equally important in reducing GHG emissions in the waste sector. The plan sets a target of per capita municipal waste below the European Union average. The GAPCP provides for the promotion of the re-use of objects and a stronger focus on food waste prevention.

5. The**Lithuanian Roadmap for the transition to a circular economy by 2035,**endorsed by the Government on 21 June 2023, aims to establish a focused framework for the implementation of circular economy policies by creating the conditions for a more sustainable use of resources covering the whole life cycle of products and materials, ensuring cooperation between stakeholders. The aim is not only to create an environmentally friendly economic framework, but also to take advantage of the country's growth and competitiveness opportunities through new technologies, business models and forms of cooperation. The guidelines aim to address the consequences of the depletion of natural resources and the consequences of a traditional linear economy

characterised by waste, which have a significant impact on climate change, loss of biodiversity and degradation of the quality of the environment, which are increasingly threatening the well-being of the population.

Current situation. It should be noted that the waste sector is currently undergoing a number of changes that are intended to reduce its negative environmental impact. One of these is an already significant reduction in the amount of waste going to landfills. In 2022, 15.36 % of municipal waste was landfilled.

According to recent surveys, domestic energy consumption is reduced by 24 %, water consumption by 20 %, waste generation by 22 %,[51], partly or fully household waste is sorted by as much as 91-95 % of the population. [52] According to a survey commissioned by the Ministry of the Environment in 2020, all waste generated in the household was sorted by 60 %. Lithuania's population is the best score since 2015 (55 %)[53].

Table 3.1.1.11: Existing and planned policies in the waste management sector by 2030:

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	COMMON Fuel & ENERGY savings, GWh
EXISTING POLICY INSTRUMENTS (EPP)			
K1-E	Waste management	122,70	**
K2-E	Development of waste collection measures	172,64	**
K3-E	Wastewater handling	290,10	**

[51] https://am.lrv.lt/lt/naujienos/gyventoju-apklausa-rodo-aplinkosauga-yra-svarbi-devyniems-is-desimties-salies-zmoniu
[52] https://vkj.lt/en/news/survey-shows-that-lithuanians-willingly-sort-waste.-simple-tips-for-those-who-dont-do-it-yet/164
https://ekodiena.com/survey-asks-why-people-in-lithuania-sort-their-waste-and-recycle/
[53] https://am.lrv.lt/lt/naujienos/visas-atliekas-rusiuoja-60-proc-lietuvos-gyventoju

K4-E	Sorting of waste	268,41	**
K5-E	Food waste prevention	21,30	**
RES20-E	Implement local and RES CHP projects, giving priority to Vilnius and Kaunas	201,57	**
P15-E	Innovative green products and services	1,43	**
AMOUNT		**1078.15**	**0**
PLANNED POLICY MEASURES (PPM)			
K6-P	Circularity in public procurement	28,67	**
K7-P	Scientific research	*	**
K8-P	Domestic composting	8,15	**
AMOUNT		**36,82**	**0**

*The impact of the measure is not assessed as it does not directly reduce GHG emissions, but this measure is essential for the successful implementation of the other envisaged measures.

** The impact of the measure is not assessed as it does not directly contribute to fuel and energy savings, but this measure is essential for the successful implementation of the other measures envisaged.

K1-E – Waste management. The measure includes: 1) subsidies and grants for the acquisition and management

of bio-waste collection facilities (05.2.1-APVA-R-008) and grants for the acquisition and management of bio-waste collection facilities *(2021-2023)*; (2) development of bio-waste treatment infrastructure through support for projects for the production of biomethane gas and/or for the installation of biogas treatment plants *(2020-2030)*; 3) unification of the environmental pollution tax, including an increase in the landfill tax *(2021-2023)*.

K2-E: Development of waste collection facilities. The measure includes: (1) raising citizens' awareness of the possibilities, benefits, disposal sites, sorted waste through various channels and tools for waste sorting. The information shall include both theoretical information on the benefits and environmental impacts of recycling and practical information on where and how they can sort waste (from*2016 to 2030)*; (2) development of infrastructure for separate collection of municipal waste: modernisation, refurbishment or construction of bio-waste collection containers and/or composting tools for individual holdings; the installation/reconstruction of container yards and the purchase of containers for container yards; construction/upgrading of bulky waste collection sites and/or adaptation/upgrading and/or re-use of waste preparation for re-use *(2014-2023)*; 3) subsidies and grants for the purchase of individual secondary raw materials (glass, paper/board/plastics/metal) and textile waste containers and means for the collection of bio-waste *(2021-2023)*.

K3-E – Wastewater management. The measure includes: 1 projects for the refurbishment of new waste water treatment plants (05.3.2-APVA-V-013) *(2018-2023) (m.)*; 2) projects that will:
the rehabilitation and/or construction of drinking water supply and/or waste water collection networks and the reconstruction and/or construction of water improvement and/or waste water treatment plants (05.3.2-APVA-R-014) *(2014-2023)*; 3) the construction of sewage sludge treatment plants to treat sewage sludge from waste water treatment plants in the Telšiai and Utena regions *(2015-2023)*; (4) the development of waste water management systems, including the installation of separate and aggregated waste water management systems, which ensure equivalent environmental protection to a centralised collecting system; urban waste water

refurbishment of treatment plants that discharge untreated waste water into the natural environment before requirements and/or where the pollution load exceeds or is close to the design capacity of the treatment plants and the construction of which has not been financed by EU funds *(2024-2030)*.

K4-E – Waste sorting. The measure is intended to finance: (1) the development of separate collection of municipal waste, prioritising the collection of household food (kitchen), green, textile, hazardous waste, the installation of bulky waste collection sites, infrastructure for the collection of waste ready for re-use (regional measure 02-001-06-10-01 (RE) "Promote separate collection") *(2023-2030)*; (2) modernisation and development of waste preparation and recycling infrastructure, deployment of new facilities for textiles, furniture, plastics, composite packaging, bio-waste, electrical and electronic waste and other waste (Progress Measure 02-001-06-10-02 "Promoting recycling and recovery of secondary raw materials") *(2023-2030)*; 3) publicity campaigns by municipalities to promote separate collection of waste (in particular food, textiles, construction, furniture, packaging, tyres, hazardous waste) (regional measure 02-001-06-10-01 (RE) "Promote separate collection of waste") *(2023-2027)*.

K5-E Food waste prevention. The aim of the measure is to finance national publicity campaigns on food waste reduction and food waste prevention, re-use of objects (Progress Measure 02-001-06-10-03 "Promoting waste prevention*") (23-2027)*.

RES20-E: Implement local and RES CHP projects, giving priority to Vilnius and Kaunas. *(More on the measure in the renewable energy sector)*

P15-E – Innovative green products and services. *(More on the measure in the industrial sector)*

K6-P: Circularity in public procurement. Complement the description of the procedure for applying environmental criteria in green procurement with circularity criteria and/or *principles(24-2025)*.

K7-P: Research. The measure is intended to finance research and applied research on circular economy, with key investment pathways in re-use, substitution of fossil raw materials with bio-based and secondary raw materials, production of long-lived products, development of new curricula, change of consumer habits *(24-2027)*.

K8-P: Domestic composting. The measure plans to amend the legislation to provide for a lower fee for waste management (in *2023-2023) for residents composting household bio-* waste.

Table 3.1.1.12: Indicative need for financing of existing and planned measures in the waste sector:

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Wastes	Total funds	Public money	Investments from EU funds (2014-2020) and (2021-2027), Waste prevention and management programme	Total funds	Public money	Waste prevention; and management programme
	721,12	549,24		3,00	3,00	

SECTION a)

Land use, land use change and forestry sector

The obligations for the GIFCM sector in relation to the transition to climate neutrality are set out in the strategic documents of the Republic of Lithuania:

1. **The** NCPD sets the following mitigation targets for the GIFCM sector by 2030:

   1.1 to achieve a steady reduction in GHG emissions from cultivated land in the GFCM sector through soil-friendly farming practices and improvements;

   1.2 increase the stock of organic carbon in forests and wood products, enhance the annual removal of organic carbon through sustainable forestry, and increase the use of indigenous raw materials in wood products;

   1.3 increase the country's woodland to at least 35 % by 2024, giving priority to areas that are self-covered with trees and shrubs, in line with ecological principles;

   1.4 an increase of at least 8 000 ha of permanent grassland;

   1.5 1.5 times by 2024 and 3 times by 2030 on areas covered by non-simile technologies;

   1.6 use at least 4 % of the utilised agricultural area for biodiversity-rich landscape features by 2024 and 10 % by 2030;

   1.7 restore at least 8 000 ha of carbon-rich ecosystems, ensure their sustainable use, halt the exploitation of new natural wetlands by 2024;

   1.8 encourage changes in consumption patterns by increasing the use of renewable wood-based products and energy, and reduce the use of more polluting non-renewable resources;

   1.9 ensure and continuously monitor sustainability requirements for the production of renewable timber products in order to avoid additional negative impacts on ecosystems;

   1.10 promote the cultivation of industrially suitable crops (fibrous, etc.), their use and the use of wood in industries by increasing the stock of stored organic carbon in long-lived products, ensuring that this does not have additional negative impacts on ecosystems;

   1.11 develop a high value-added and circular bioeconomy and increase its contribution to the country's

GDP.

The NFCM sets the following National Climate Change Mitigation Targets and targets for 2030 through the sustainable use of agricultural land and forest land, the conservation and restoration of natural habitats (forests, grasslands, wetlands) storing organic carbon and their good ecological status, increasing the use of wood in construction and the production of long-lived products without further negative impacts on ecosystems, increasing the absorption potential, maximising its absorption potential, achieving significantly higher GHG removals than the sector's emissions and achieving at least **6.5 million tCO_2 eq over the period 2021-2030**.

2. Lithuania's Progress Strategy "Lithuania 2030" mentions Lithuania's reputation for nature, the importance for Lithuanians of preserving and developing the natural heritage and the wise use of resources. Among the fundamental changes in the smart economy initiatives are to ensure the stability of ecosystems and to protect biodiversity through sustainable forestry development.

SECTION a)

3. The National Sustainable Development Strategy examines the potential of the GIFCM sector for afforestation and afforestation of more fertile soils, points to the need for economic and administrative measures to rebuild exploited quarries, peatlands, remediation of abandoned old farm buildings, and envisages the development of a landscape management plan at national level. The Vision provides that the protection of the landscape and biodiversity will be ensured, as Lithuania's forest and perennial cropland increases, the expansion of protected areas and the natural frame and integration into international ecological networks will ensure the protection of the landscape and biodiversity, slow down soil erosion and increase the ecological stability of the areas. According to the mission, the increase in forestry in Lithuania will not only lead to a more rational use of lying, low-productivity and unsuitable land for agricultural production, but will also strengthen the country's natural frame by adding forest elements and facilitate the integration of the Lithuanian system of protected areas into the European ecological networks by creating the necessary links.

4. The National Environmental Protection Strategy, approved by Resolution No XII-1626 of the Seimas of the Republic of Lithuania of 16 April 2015 approving the National Environmental Protection Strategy, and the **general plan for the territory of the Republic**of Lithuania, approved by Resolution No 789 of the Government of the Republic of Lithuania of 29 September 2021 approving the general plan for the territory of the Republic of Lithuania, provide that the country's forestry capacity should increase to 35 % by 2030.

5. The National Landscape Management Plan, approved by Order No D1-703 of the Minister for the Environment of 2 October 2015 approving the National Landscape Management Plan, provides for the strengthening of the natural frame and ecological balance and the improvement of land use processes by addressing the issue of forestry development strategies and forestry enhancements in a holistic manner (in terms of landscape and biodiversity, ecological, social and economic aspects), combining the spatial layout of forests and the formation of natural frames, with priority being given to afforestation of ecologically degraded nature frame areas.

6. The National Progress Plan envisages the development of sustainable and bioeconomy-based activities in the agriculture, forestry and fisheries sectors. The main strands of environmental protection and climate change management are set out in the Environmental Protection and Climate Change Management Development Programme of the Ministry of the Environment of the Republic of Lithuania for the period 2022-2030, approved by Resolution No 318 of the Government of the Republic of Lithuania of 30 March 2022 approving the development programme for environmental protection and climate change management of the Ministry of the Environment of the Republic of Lithuania as manager of the 2022-2030 Development Programme.

7. Measures No 02-001-06-08-04 'Promotion of forest development**and sustainable development of the forest sector', approved by Order No D1-305 of the Minister for the Environment of the Republic of Lithuania of 19**

September 2022 on the implementation of the Progress Measure No 02-001-06-08-04 'Promoting forest development and sustainable development of the forest sector' of the Environmental Protection and Climate Management Development Programme of the Ministry of the Environment of the Republic of Lithuania, as approved by Order No D1-305 of the Minister for the Environment of the Republic of Lithuania of 19 September 2022 on the implementation of the Progress Measure No 02-001-06-08-04 'Promote forest development and sustainable development of the forest sector' of the Development Programme for Environmental Protection and Climate Change Management of the Ministry of the Environment of the Republic of Lithuania, as approved by Order No D1-305 of the Minister for the Environment of the Republic of Lithuania of 19 September 2022 on the implementation of the Progress Measure No 02-001-06-08-04 'Promoting forest development and sustainable development of the forest sector' of the Development Programme for Environmental Protection and Climate Change Management of the Ministry of the Environment of the Republic of Lithuania, as approved by Order No D1-305 of the Minister for the Environment of the Republic of Lithuania of 19 September 2022 on the implementation of the Progress Measure No 02-001-06-08-04 'Promoting forest development and sustainable development of the forest sector' of the development programme for environmental protection and climate change management of the Lithuanian Ministry of the Environment, as approved by Order No D1-305 of the Minister for the Environment of 19 September 2022 on implementing Measure No 02-001-06-08-04 'Promoting forest development and sustainable development of the forest sector' of the development programme for environmental protection and climate change management of the Lithuanian Ministry of the Environment, as approved by Order No D1-305 of the Minister for the Environment of the Republic of Lithuania of 19 September 2022 on the implementation of Measure No 02-001-06-08-04 'Promoting forest development and sustainable development of the forest sector', approved by Order No D1-3 State budget funds are earmarked for activities that will help to address the problems raised by the Lithuanian Ministry of the Environment in its development programme for environmental protection and climate change management and their causes.

8. The objective of the land holding programme is to improve land holding structures and reduce abandoned land. In order to achieve this objective, the following measures have been put in place: restoration of productive abandoned land to good

agricultural condition, including drainage work (the assessment criterion is 90 ha of the utilised agricultural area restored in 2020); it provides for the preparation of areas unsuitable for low productivity agriculture for afforestation, including the formation of natural frames and the creation of ecologically stable landscapes.

Current situation. In order to achieve these objectives, over the last decade (2013-2022), State-owned land has afforested 7 thousand ha and private land 10.5 thousand hectares of new forests under the Lithuanian Rural Development Programme 2014-2020. Support for the development, maintenance, protection and development of forests and the restoration of forests caused by natural disasters was also provided for in Lithuania's Strategic Plan for Agriculture and Rural Development 2023-2027. The country's forestry capacity is also increased by the inclusion of around 3-4 thousand hectares of self-forested areas each year in the accounts of forest land.

Given their significant role in climate change mitigation, organic soils (peat soils) are increasingly being taken into account. The restoration of drained peatlands through hydrological restoration, which ensures permanent flooding of the area and allows for the recovery of wetlands, is a priority of national climate change policies as set out in the strategy papers. According to the national GHG inventory, emissions from organic soils (peatlands) in 2020 were 495 thousand tCO2eq, representing more than 10 % of total agricultural emissions in Lithuania in 2020. As GHG emissions from organic soils were the fourth largest source of emissions from the agricultural sector, after mineral nitrogen fertilisers and intestinal fermentation of dairy cows and beef cattle, restoration of organic soils on agricultural land could be one of the most effective ways to reduce emissions from both the

agriculture and the GFCM sectors and contribute to climate change mitigation objectives.

Table 3.1.1.13: Existing and planned policy measures in the land use, land use change and forestry sector by 2030:

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	COMMON Fuel & ENERGY savings, GWh
EXISTING POLICY INSTRUMENTS (EPP)			
L1-E	Restoration of peatlands (restoration of hydrological regime on agricultural land)	—812,24	1,00
L2-E	Conservation of grasslands and habitats of species	—184,39	**
L3-E	Conservation of wetlands	—159,15	**
L4-E	Promotion of catch crops	—3357,20	**
L5-E	Promotion of plant change	—4423,50	**
L6-E	Restoration of peatlands (translation with grassland)	—967,46	**
L7-E	Promoting a green litter	—190,10	**
L8-E	Conservation of landscape features	—146,00	**
L9-E	Afforestation	—143,00	**
L10-E	Young people's education	—72,10	**
L11-E	Development of agroforestry and agro-horticulture	*	**
A4-E	Extensive grassland management	—318,00	**
A7-E	Development of non-army technologies	—3000,00	**
			SECTIONa)
AMOUNT		**—13773,1**	**1**
PLANNED POLICY MEASURES (PPM)			
L12-P	Conservation of grassland area	—62,16	**
L13-P	Promotion of carbon farming (on agricultural land)	*	**
L14-P	Preservation of tree self-growth	—748,17	**
L15-P	Improving the quality of forests	125,94	**
L16-P	Determination of GHG indicators	*	**
L17-P	Promotion of carbon farming (in woodlands)	*	**
L18-P	Afforestation	—72,01	**
L19-P	Promotion of organic construction	—1051,82	**
L20-P	Restoration of peatlands (restoration of hydrological regime in forests)	—39,89	**
AMOUNT		**—1848,11**	**0**

*The impact of the measure is not assessed as it does not directly reduce GHG emissions, but this measure is essential for the successful implementation of the other envisaged measures.

** The impact of the measure is not assessed as it does not directly contribute to fuel and energy savings, but this measure is essential for the successful implementation of the other measures envisaged.

L1-E. restoration of peatlands (restoration of hydrological regime on agricultural land). Identify areas of former peat wetlands where it is appropriate to restore wetlands, identifying the effectiveness of such wetlands in absorbing GHG. Promote the restoration of drained wetlands (peat wetlands) by restoring adequate water levels and maintaining ecosystems through sustainable economic activities, with a particular focus on wetland, the development of which would contribute to the development of a circular economy and the conservation of natural habitats *(2022-2026)*.

L2-E: Conservation of grasslands and habitats of species. The measure is intended to encourage farmers to conserve grasslands and natural habitats. The measure provides for compensation to farmers who are eligible (TI05eko6 2.1 – Management of natural grasslands of EC interest; KP070Protection of wild birds outside the Natura 2000 site; KP07ntž Support for Natura 2000 agricultural land *(2023-2027)*.

L3-E. Conservation of wetlands. The measure is intended to encourage farmers to maintain wetlands. Provides for compensation to farmers who meet the requirements laid down (TI05eko6 2.2 – Management of wetlands of EC importance; TI05eko7 Extensive wetland management *(2023-2027)*.

L4-E: Promotion of catch crops. The measure will encourage agricultural operators to grow catch crops, while increasing catch crops will not only improve the agrochemical composition and physical characteristics of arable land, but also contribute significantly to reducing environmental pollution and adverse climate change (TI05eko1.2 Arable land – catch crops*)(23-2027)*.

L5-E: Promoting plant change: The change of at least 4 plants applied annually under this measure will have a positive impact on the maintenance of soil fertility. Moving away from a monoculture and applying crop rotation will increase the organic carbon content of the soil. By contributing to increasing carbon sequestration in soils and reducing GHG emissions, the measure will have a direct impact on the achievement of climate change mitigation and adaptation objectives. The measure provides for compensation to farmers,

meeting the requirements foreseen (TI05eko1.1.1 Arable Land – Plant Change*)(23-2027)*.

L6-E. peatland restoration (translation with grassland). The replacement of arable peatland with grassland will have a positive impact on the reduction of GHG emissions from peatlands, the preservation of soil fertility, the reduction of erosion that is strongly influenced by intensive agriculture and the increase in organic matter. The measure aims to contribute to reducing the degree of ploughing of peat soils (organic soils) by promoting restoration, conservation and regular maintenance of herbaceous vegetation cover of organic soils. (TI05eko4 Replacement of scalable peatlands with grassland*) (2023-2027)*.

L7-E. Promotion of the Green litter. The measure aims to reduce soil erosion and GHG emissions, to increase the organic matter content in soil and biomass through the establishment of grass strips, the installation and maintenance of grasslands on the plots of land shown. Converting arable land into grassland contributes to halting soil erosion and reducing GHG emissions (TI05eko5 Exchange of demonstrated land with grassland; TI05eko1.6 Short-lived melliferous plant strips; TI05eko1.7 Permanent grass strips *(2023-2027)*.

L8-E: Retention of landscape features. The measure aims to preserve and restore the traditional mosaic landscape. Areas with high mosaic density allow a wide range of plant and animal species to live and reproduce, thus contributing to the conservation of biodiversity. Landscape features protect soils against erosion and the measure can therefore have a direct positive impact on the national soil fertility conservation, organic matter increase, erosion reduction targets, as well as, depending on the type of landscape feature, GHG emission reductions and absorption enhancements (TI05eko1.5 Maintenance of landscape *elements)(23-2027)*.

L9-E. afforestation. The measure aims to increase the country's forest coverage by providing support to private landowners for afforestation and maintenance and protection (7 years after *afforestation) (23-2027)*.

Education of L10-E. young people. The measure aims to strengthen the resilience of forest ecosystems to adverse environmental pressures, to form targeted stands, and to increase the productivity and absorption potential *of stands (in2023-2027)*.

L11-E. development of agroforestry and agro-horticulture. Define the concept of agro-forestry and agro-horticulture economic activities applicable in Lithuania based on best practices in other countries. Assess the potential of perennial crops (agro-forestry and agro-horticulture) on agricultural land (in terms of land use specificities) and the economic, social and environmental (including carbon stock) potential of the products or raw materials produced, as well as the development of mixed perennial crop-pasture systems *(in2023-2025)*.

Extensive grassland maintenance of A4-E. *(More on the measurein the agricultural sector)*

A7-E – Non-army technology development. *(More on the measurein the agricultural sector)*

L12-P: Conservation of grassland area. The measure provides for an obligation for farmers whose farm contains permanent grassland to maintain them. If a farmer has destroyed such grassland in the past, he would be obliged to *restore it (in2023-2030)*.

L13-P: Promotion of carbon stock farming (on agricultural land). The measure aims to promote the development of carbon farming practices and, where necessary, the development of regulatory measures to encourage the long-term storage of organic carbon in soil, dead organic matter and biomass, ensuring complementarity and durability and respecting biodiversity and overall

ecological principles for natural assets *(2022-2030)*.

L14-P. Retention of tree self-growth. The measure is intended to support the conservation of self-growing trees (by compensating part of the agricultural income lost and the costs of accounting for forest land) with a view to increasing the area of newly afforested forests by 2030 *(in the period2023-2030)*.

L15-P: Improving forest quality. The measure aims to support reforestation with valuable tree species and the conversion of depleted and low-value stands, with the aim of increasing by 2030 forests that are more resilient and more CO_2 absorbing (in*2023-2030)*.

L16-P. Establishment of GHG indicators. Establish national GHG emission targets and carbon stock changes in order to adjust the existing accounting for GHG emissions/absorption and to provide for the most appropriate measures to reduce and enhance greenhouse gas emissions in the *GIFF sector (2019-2023)*.

L17-P: Promotion of carbon storage farming (in woodlands). Where a private forest owner finds it necessary to carry out (intermediate) cuttings for the development or thinning of young people or other carbon farming measures in the forest he manages, appropriate action shall be taken to support the costs incurred during harvesting or other carbon storage measures. The level of compensation would depend on the type of harvesting or the application of a specific measure (in*2023-2030)*.

L18-P. afforestation. Around 300 ha of new forests would be afforested annually on state-owned land in order to increase the country's *forestcoverage (in 2023-2030)*.

L19-P: Promotion of Organic Construction. The measure includes: (1) implementation of pilot building refurbishment/modernisation projects using standardised modular structures from organic materials and the development of guidance on the mass application of these solutions, leading to an average reduction of at least 30 % of primary energy consumption. *2023-2025;* (2) support the deployment of standardised modular structures from organic materials in Lithuania *(in2023-2024) to meet the objectives of the Long-Term Renovation*Strategy.

L20-P peatland restoration (restoration of hydrological regime in forests). The status of Natura 2000 habitats

9080 and 91D0 is currently assessed as unfavourable (U1). This is due to climate change and the renewal of old drainage systems in these habitats. In order to avoid emissions from these bog forests, it is envisaged to maintain or restore the *hydrological regime(24-2030)*.

Table 3.1.1.14: Preliminary funding needs for existing and planned measures in the HRFCM sector:

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total funds	Public money		Total funds	Public money	
GIFCM	383,52	383,52	Recovery and Resilience Facility, Strategic Plan for Agriculture and Rural Development of Lithuania 2023-2027, State Budget	386,90	169,04	Recovery and Resilience Facility, Financing the Common Needs of Forestry

Small energy sector

The obligations for the small energy sector in relation to the transition to climate neutrality are set out in the strategic documents of the Republic of Lithuania:

1. **For** the small energy sector, the IPCC sets the following mitigation targets for 2030:
   1.1 reducing GHG emissions by at least 26 % by 2030 compared to 2005:
   1.2 increasing energy efficiency and shifting to low-emission heating and cooling technologies with priority to RES deployment;
   1.3 transform the current building sub-sector into an energy-efficient (nearly zero-energy) and decarbonised building sector by 2050 compared to 2020, reducing annual primary energy consumption by 60 %, primary energy consumption from fossil fuels and GHG emissions by 100 %, with a share of 74 % of renovated buildings;
   1.4 energy savings of at least 6 TWh in individual homes and public buildings by promoting the complex renovation of multi-apartment buildings, individual homes and public buildings (priority for renovation of residential areas);
   1.5 30 % of households to be active, prosumers, promoting decentralised generation and energy storage;
   1.6 advise end-users on energy-saving measures and solutions that change consumer behaviour and habits in improving energy efficiency;
   1.7 increase the number of connected district heating customers by promoting the efficient use of heat.

Table 3.1.1.15: GHG emission reduction targets for the small energy sector for the period 2021-2030, %:

Sector	Average for 2016-2018 compared to 2005 in %	2025 target in % compared to 2005	Achievement of the 2030 target in % compared to 2005
Small energy	—3,2	—14,8	—26

Small energy means energy-generating installations (small combustion plants with a capacity of up to 20 MW) and the sectors using it (households, public, service, construction, fisheries, forestry, etc.) which are not covered by the EU ETS.

Table 3.1.1.16: Existing and planned policy measures in the small energy sector by 2030:

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	COMMON Fuel & ENERGY savings, GWh
EXISTING POLICY INSTRUMENTS (EPP)			
EE7-E	Transforming boilers into more efficient technologies	244,94	7622,81
EE4-E	Consumer agreements with energy suppliers	189,11	2773,21

	education and counselling		
RES6-E	Investment support for the installation of biomethane production and biogas treatment plants	77,63	0,29
RES3- E	Use of RES in public and residential buildings (EU support)	12,71	0,07
EE10-E	Renovation/modernisation of one or two apartments for natural persons	11,04	429,48
EN3-E	Encourage the purchase of solar power plants and/or the replacement of fossil fuel heat installations by deprived persons	0,26	0
AMOUNT		**535,43**	**10825,86**
PLANNED POLICY MEASURES (PPM)			
RES36-P	Investment support for the installation of biomethane production and treatment plants	145,33	0
EE10-P	Renovation/modernisation of one or two apartments for natural persons	212,35	5513,17
AMOUNT		**357,94**	**5513,17**

All small measures in the energy sector are RES or EE measures that contribute to the achievement of the targets for these sectors and are described in those paragraphs. The financing of these measures is included under RES and EE measures, but investments in the small energy sector in Table 3.1.1.17 are needed to achieve the target for non-ETS sectors.

Table 3.1.1.17: Indicative financing needs for existing and planned measures in the small energy sector:

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total funds	Public money		Total funds	Public money	
Small energy	527,63	309,75	Climate Change Programme, EU funds investments (2014-2020) and (2021--2027), Recovery and Resilience Facility	2670,10	808,99	Climate Change Programme, Modernisation Fund, Social Climate Fund, Allowances II

Horizontal climate change management policies

It should be noted that the need for public interventions to achieve the national targets, as well as the cost of implementing the National Plan, can be significantly reduced by strengthening horizontal climate change management policies that would increase the coordinated functioning of public bodies, municipalities and the private sector, as well as public awareness and engagement.

Table 3.1.1.18: Horizontal climate change management measures:

NO.	INSTRUMENT	RESPONSIBLE ENTITY
H1	Integration of the impact assessment on GHG emissions into the legislative process	AM, TM
H2	Extending the scope of green procurement and increasing obligations for the public sector	AM, MOI
H3	Mandatory adaptation criteria for new infrastructure projects	AM, EIMIN, SUMIN, ENMIN
H4	Enhancing municipal inclusion in climate change management	MOI, AM
H5	Mainstreaming climate change in all education systems	NMSM, AM
H6	Raising public awareness and inclusion in climate change management policies	AM
H7	Implementation of development cooperation projects (climate change) in developing countries	AM, FINMIN, MFA
H8	Promoting research on climate change mitigation and adaptation	NMSM, EIMIN, LMT, AM

H1. Integration of the impact assessment on GHG emissions into the legislative process. Make legislative changes to ensure that new and amended legislation is assessed for environmental impacts, including GHG emissions, depending on their subject matter (*2022-2030*).

H2. Extending the scope of green procurement and increasing obligations for the public sector. Extending the scope of green procurement to, but not limited to: green electricity and heat (under guarantees of origin), purchase of low-emission transport services, purchase or rent of buildings for public use (highest energy efficiency classes), waste management (mandatory sorting infrastructure), etc. Provide legislative changes to ensure that the highest possible share of purchases in municipalities and public bodies is carried out in accordance with green procurement criteria (*2022-2030*).

H3. Mandatory application of climate change adaptation criteria to new infrastructure projects. Introduce legislative changes to ensure that climate change adaptation requirements are introduced for all new infrastructure projects (*23-2030*).

H4. Enhancing the inclusion of municipalities in climate change management policies. Develop attractive mechanisms for the implementation of climate change management policies to encourage regional development councils and individual municipalities to contribute effectively to the achievement of the national targets (*2022-2030*).

H5. Mainstreaming climate change in all education systems. To achieve behavioural change in society, ensure that climate change education is included in all levels of education and higher education programmes*2023-2030*.

H6. Raising public awareness and inclusion in climate change management policies. Raise public awareness on climate change, pollution, public health, through research

based on innovative and intensive communication (*2021-2030*).

H7. Implementation of development cooperation projects (climate change) in developing countries. Implementing adaptation and mitigation measures in third countries (*2022-2030) under European Union legislation, the Convention on Climate Change, the Kyoto Protocol and other international*agreements.

H8. Promoting research on climate change mitigation and adaptation. Expanding research on climate change, ensuring R & D and innovation in the field of climate change; attracting business funds for R & D and innovation in the field of climate change (*2022-2030*).

Strategies, plans and measures on adaptation to climate change

In accordance with the Law of the Republic of Lithuania on financial instruments for climate change management and in51 implementation of the Regulation of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action, the52National Climate Change Governance Agenda was updated with the National Climate Change Governance Agenda for 2030, 2040 and the long-term 2050 objectives.

The strategic objective of Lithuania's climate change adaptation policy is to reduce and anticipate the potential vulnerability of natural ecosystems and sectors of the country's economy, to strengthen the capacity to adapt, to reduce risks and damage in a cost-effective manner, and to maintain and increase resilience to climate change, in order to ensure favourable conditions for society and sustainable economic activity so as not to endanger food production.

The Strategic Goal on Adaptation to Climate Change will aim to:

- all residents in flood-prone areas are covered by flood protection measures;
- the share of climate-related economic losses per year would not exceed 0.08 % of the country's GDP;
- the proportion of expected adverse, natural and catastrophic weather events would be at least 90 % of the actual events.

In addition, the strategic objective will be pursued along the following main lines:

- more systematic adaptation: coherence and synergies between mitigation and adaptation measures;
- data-based decisions: enhancing knowledge and research on climate change impacts, vulnerability and adaptability to climate change, and promoting R & D & I;
- open data: collect and disseminate information on ongoing climate change and the resulting damage

and the magnitude of losses, providing information to stakeholders and the public, and sharing good practices and examples.

The strategic objective will be implemented through adaptation measures in climate-sensitive sectors and areas:

- in the public health sector, mitigating the adverse effects of climate change on human health;
- in agriculture, increasing the resilience of the agricultural sector to climate change;
- in forestry, ecosystems, biodiversity, landscape protection, preserving and enhancing ecosystem

Law of the Republic of Lithuania of 7 July51 2009 on financial instruments for climate change management,No XI-329: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.349514?jfwid=-pd71fh244

Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December52 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council: https://eur-lex.europa.eu/eli/reg/2018/1999/oj

resilience, the scale and value of ecosystem services, with a stronger focus on nature-based solutions;

- for the protection of water resources and coastal areas, to reduce the fall in groundwater levels, the negative effects of rising ocean levels and natural and catastrophic hydrometeorological events;
- in the energy, transport, industrial sectors, increasing the resilience of engineering infrastructure to climate change threats;
- in the cultural sector, increasing the resilience of cultural heritage sites to natural and catastrophic weather events.

Short-term cross-sectoral adaptation objectives and targets:

- in urbanised areas, planning of settlements, urban areas and spaces in accordance with the principles of sustainable development and green infrastructure, an approach based on the assessment of ecosystem services, nature conservation and resilience;
- ensure coordination between state and municipal authorities responsible for planning disaster risk, climate change emergencies, alert systems, response measures in the management of emergencies that may result from the effects of climate change;
- in the area of financial management, adapting internal processes, policies, products and services to meet the challenges of climate change;
- gathering and disseminating data and information – continuously monitor and assess risks, sensitivities and adaptation opportunities in individual economic sectors at international, national, regional and municipal level.

The main long-term pathways for adaptation to climate change by 2050 are:

- continuous monitoring of the effects and impacts of climate change and the introduction of cost-effective measures to mitigate the effects of climate change;
- ensure the resilience of engineering infrastructure to climate change changes and the sustainable use of natural resources such as water, biodiversity and soil, promote the development of green infrastructure (e.g. sustainable alternatives to grey infrastructure and measures to increase the resilience of the living environment), other nature-based solutions;
- increase public and public authorities' awareness, resilience, preparedness for risks and emergencies related to climate change;

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- ensure planning of disaster risk and emergency management measures for natural events;
- improve meteorological and hydrological monitoring, forecasting and warning system.

The objectives and objectives of the NACD are also implemented in cross-sectoral policies, such as the National Progress Plan 2021-203053, the National Sustainable Development Strategy54 and the economic sector-specific development programmes or short-term planning documents. Municipalities, together with the relevant ministries at national level, are responsible for implementing national adaptation objectives, targets and targets, as well as certain measures in the NECPs. Flood risk focuses on the sub-national level and EU-funded adaptation projects focus on coastal management and flood risk.

Adaptation to climate change is included in the environmental impact assessment procedures. The legislation on

Resolution No 998 of the Government of the Republic of Lithuania of 9 September53 2020 approving the National Progress Plan 2021-2030: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/c1259440f7dd11eab72ddb4a109da1b5/asr
Resolution No 1160 of the Government of the Republic of Lithuania of 11 September54 2003 approving and implementing the National Sustainable Development Strategy: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.217644/asr

EIA is: The Environmental Impact Assessment Act of a planned economic activity55, which sets out the general principles and requirements of the EIA, as well as a number of Government Regulations and Orders of the Minister for the Environment which contain more detailed and more detailed provisions. The basic act is the description of the procedure for assessing the environmental impact of planned economic activities56.

Successful adaptation to climate change requires not only the contribution of the state, but also the initiative of municipalities and residents and cooperation with scientists. There is a need to raise awareness among citizens, farmers, entrepreneurs of emerging threats and to promote preventive protection against damage caused by climate change.

Adaptation to climate change will be implemented through adaptation measures in climate-sensitive areas: agriculture, energy, transport, industry, forestry, ecosystems and biodiversity, landscape, public health, water resources and coastal areas, urbanised areas, etc., in line with key short-term pathways up to 2030. These measures are described in more detail in Annex 5.

Law of the Republic of Lithuania on the environmental impact assessment of planned economic activities of 15 August55 1996, No I-1495: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.30545/asr

Order No D1-885 of the Minister for the Environment of 31 October56 2017 approving the description of the procedure for assessing the environmental impact of planned economic activities: https://www.e-tar.lt/portal/lt/legalAct/81ad5250be4511e79122ea2db7aeb5f0/asr

Table 3.1.1.19: Adaptation measures:

NO.	SECTOR	INSTRUMENT	The aspect of the NECPs to which it relates*
EXISTING POLICY INSTRUMENTS (EPP)			
PR1-E	Forestry, ecosystems, biodiversity, landscape (hereinafter referred to as "SACC")	Strengthening the natural frame and creating green infrastructure in degraded agro-areas	1
PR2-E	Transport	Reduce the impact of extreme weather events on transport infrastructure elements and on road surfaces	—
PR3-E	Transport	Ensure continuous improvement of the Multi-Country Information System	—
PR4-E	Transport	Development of means of identification of problematic road sections	—
PR5-E	Transport	Adaptation of several technical normative documents to climate change	—
PR6-E	Infrastructure	Enhancing the resilience of electricity distribution infrastructure to climate and environmental impacts, including the replacement of airlines by underground cable	1,2,3,4
PR7-E	Agriculture	Promoting the development of farm animal insurance	—
PR8-E	Agriculture	Promoting the development of crop and plant insurance	1
PR9-E	Agriculture	Promoting the development of new tools to manage agricultural production risks	1
PR10-E	Agriculture	Development of Intelligent Melioracic Systems	1
PR11-E	Agriculture	Analysis and assessment of opportunities for multicultural/multi-species farming	1
PR12-E	Agriculture	Agricultural Adaptation Adaptation Advisory (L39)	1
PR13-E	Agriculture	Ensure continuous improvement of the agro-meteorological observation network and	1
PR14-E	Agriculture	Promoting the development of organic farms and the production of products produced under the national agricultural and food quality scheme (hereinafter referred to as NGA) by increasing demand for organic and NGA	1
PR15-E	Agriculture/Aquaculture	Development of organic farming (including aquaculture)	1

PR16-E	Public health	Setting up and running an inter-institutional working group to combat the impact of climate change on public health	—
PR17-E	Public health	Raising awareness among health professionals about the impact of climate change on human health	—
PR18-E	Emergency management	Improvement and development of alert and information infrastructure	1,2,3,4
PR19-E	Emergency management	Strengthening the fire rescue force	1,2,3,4
PR20-E	Emergency management	Development of the Early Warning System for Nuclear Hazards in Lithuania	3
PR21-E	Urbanised areas	Preparation of adaptation plans in municipalities	—
PR22-E	Urbanised areas	Assess the sensitivity of Lithuanian territories to climate change by municipalities	—
PR23-E	Cross-sectoral objective	Provision of climate projections and scenarios and planning of necessary adaptation measures	1,2,3,4
PR24-E	Cross-sectoral objective	Business advice on adaptation to climate change	1,2,3,4
PLANNED POLICY MEASURES (PPM)			
PR25-P	Water resources	Ensure the functioning of the flood risk management system	1,2
PR26-P	Water resources	Implement flood risk management projects	1,2
PR27-P	Water resources	Implement water management and protection projects	—
PR28-P	Water resources	Implement rainwater management projects	—
PR29-P	Water resources	Reduce the negative impact of rising water levels and extreme weather events on surface and groundwater quality	—
PR30-P	Water resources	Increase the resilience of waste water management infrastructure to rainfall and	—
PR31-P	THE CCIC	Protect protected species and habitats	1
PR32-P	THE CCIC	Conservation and sustainable use of biodiversity and ecosystems through ecosystem services assessment mechanism	1
PR33-P	THE CCIC	Development of a coastal lane management programme	—
PR34-P	THE CCIC	Implementation of coastal management measures in the coastal zone	—

PR35-P	THE CCIC	Restoration and protection of wetlands, ensuring their resilience and the provision of services relevant to adaptation	1
PR36-P	THE CCIC	Increasing forest resilience	1
PR37-P	THE CCIC	Implementation of measures to prevent fires and natural disasters in forests	1
PR38-P	THE CCIC	Promoting sustainable forestry in the context of climate change in private forests	1
PR39-P	THE CCIC	Preparation or updating of planning documents for protected areas and their implementation	—
PR40-P	THE CCIC	Forest science research	5
PR41-P	Transport	Reduce the impact of extreme weather events on airport infrastructure	—
PR42-P	Infrastructure	Reducing the vulnerability of the energy sector	1,2,3,4
PR43-P	Infrastructure	Amendment of normative documents	1,2
PR44-P	Infrastructure	Refurbishment of waste infrastructure	1
PR45-P	Agriculture	Selection and breeding of varieties of agricultural plant species resistant to climate	1
PR46-P	Agriculture	Promoting multicultural (multi-species) farming	1
PR47-P	Agriculture	Efficient use of water for irrigation in agriculture	1
PR48-P	Public health	Development of green infrastructure in urbanised environments	1
PR49-P	Public health	Installation of water columns	—
PR50-P	Public health	Improvement of phenological observations, air pollen observations and forecasting systems	—
PR51-P	Public health	Promoting the prevention of tick-related diseases	—
PR52-P	Public health	Raising public awareness of climate change and its threats to human health	—
PR50-P	Public health	Development of legislation on reducing the impact of climate change threats on public health	—
PR50-P	Public health	Development of updates to hygiene standards, adapting them to changing climatic conditions and protecting human health	2

PR50-P	Emergency management	Modernise the meteorological alert system for dangerous events	—
PR50-P	Emergency management	Strengthening public warning, information and self-protection	1,2,3,4
PR50-P	Cross-sectoral objective	Ensure continuous improvement of the hydrometeorological observation network and	1,2,3,4
PR50-P	Cross-sectoral objective	Participation in international cooperation	—
PR50-P	Cross-sectoral objective	Promoting research to identify the impacts of climate change	5

* Aspect of the NECPs: 1 – Decarbonisation, 2 – Energy Efficiency, 3 – Energy Security, 4 – Internal Energy Market, 5 – Research, Innovation and Competitiveness

Most adaptation measures contribute to decarbonisation. However, a more detailed assessment of the measures and the preparation of the Adaptation Plan is foreseen by June 2024 when the NECPs will be adopted. At that time, the funds available and needed for adaptation measures will also be assessed in detail.

Regional cooperation on climate change. The implementation of theParis Agreement and the EU's 2030 climate and energy targets are discussed periodically in different Baltic assemblies involving members of the Parliaments of Lithuania, Latvia and Estonia, committees, summits of Prime Ministers, the Baltic Council of Ministers and meetings of senior official groups, as well as fora for the implementation of the European Union Strategy for the Baltic Sea Region and meetings of ministers for the Baltic environment.

Energy from renewable sources

In Lithuania, RES development is promoted in the electricity, transport and heat sectors through financial (State budget allocations, Climate Change Programme funds, EU support funds, revenues from statistical energy transfer agreements or joint projects, tax relief) and non-financial measures (obligations, information, regulatory measures).

Electricity sector

RES development in the electricity sector, reaching 55 % The 2030 target for the RES part shall be implemented in accordance with the following principles:

- the gradual market integration of renewable energy sources by developing the most cost-effective technologies, taking into account the maturity of the technologies and assessing trends in their near future progress;
- affordability and transparency – the design of the scheme for the promotion of renewable energy sources must be market-based, least distortive and ensure a minimum financial burden on energy consumers, clarity and a non-discriminatory competitive environment;

- active participation of energy consumers – the increasing share of renewable energy sources in the overall energy mix must encourage decentralised production of electricity, enable consumers to self-consumption of renewable energy and receive market-conform remuneration for excess energy fed into the grid, as well as solutions for consumer behaviour and demand and supply management.

In order to achieve the RES targets, measures are in place to increase the RES share in the electricity sector (Table 3.1.2.1).

3.1.2.1. table. Existing and planned policy measures in the renewable electricity sector until 2030

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	IMPACT ON RES SHARE IN GROSS FINAL ENERGY CONSUMPTION, %
EXISTING POLICY INSTRUMENTS (EPP)			
RES1-E	Financial support for prosumers	0,0	0,667
RES2-E	Development of RES in the Baltic Sea	0,0	7,873
RES3-E	Use of RES in public and residential buildings	12,71	0,070
RES4-E	Installation of RES power plants and storage facilities for legal persons and RES communities	0,0	0,504
RES5-E	Promoting the deployment of energy storage facilities in households	0,0	0,000
AMOUNT		**12,71**	**9,114**
PLANNED POLICY MEASURES (PPM)			
RES27-P	Solar and wind power plants in the business sector	0,0	0,845
RES28-P	Solar and wind power plants in the public sector	0,0	0,181
RES29-P	Create renewable energy communities in municipalities, using the capacity of renewable energy power plants they manage free of charge for deprived (energy-poor) residents	0,0	0,473
RES30-P	Encouraging electricity consumers to choose energy produced from RES	0,0	0,000
RES31-P	Recommendations on the development of renewable energy communities (AIEB) and citizen energy communities (PEBs) in Lithuania	0,0	0,000
RES32-P	Targeted and equitable education of pupils and students on the possibility and benefits of energy recovery from	0,0	0,000
RES33-P	Reduce CO2 emissions from the LNG terminal	85,18	0,000
AMOUNT		**85,18**	**1,499**

RES1-E Financial support for prosumers. A prosumer scheme was set up in 2015 to promote the active participation of electricity consumers in the market. By 2030, we aim to have 30 % of prosumers compared to the total number of electricity consumers.

In order to ensure that the prosumer scheme is accessible to all electricity consumers, the purchase of the power plant is supported by the European Union Structural Funds and the national Climate Change Programme. As of 2019, prosumers receive a payment of EUR 323 per kW installed capacity of solar power or purchased from remote power parks. By increasing installed power without inverter) a premium of EUR 243 per 1 kW shall be granted up to 10 kW. In total, more than EUR 160 million of EU funds are planned for grants to prosumers to install RES plants or buy remote RES parks by 2029. (*Years 2023-2029*)

RES2-E: RES development in the Baltic Sea. In November 2018, assessments were launched to assess the development and operation of RES power plants in the Baltic Sea and to determine the installed capacity of these plants. Following the assessments and taking into account the adequacy of the power of Lithuania's electricity system, the synchronisation of the Lithuanian electricity system with the European electricity system, decisions were taken in 2020 and 2023 on the parts of the Baltic Sea where it is appropriate to organise tenders for the development and operation of RES and the power installed by these power plants. In 2022, amendments were made to the laws on renewable energy and electricity, in implementation of which the State Energy Regulatory Council approved the Procedure for the organisation of competitive tendering for the use of the marine area for the development and operation of power plants using renewable energy sources and for the granting of permits for the development and operation of offshore parts of the marine area for the development and operation of power plants using renewable energy sources, which regulates the procedure and procedures for tendering. The construction of power stations in the Baltic Sea is subject to the award of a tender for the development and operation of offshore renewable power plants. On 30 March 2023, one tender for development and exploitation57 in the area covered by the Government Resolution was launched and the other one is planned to be published by the end of 2023. The successful tenderer shall have three years from the date of receipt of the development and exploitation permit to obtain a building permit and to obtain a permit for the production of electricity within 6 years of the date of receipt of the development and operation permit. After assessing the duration of tendering procedures and the construction of power plants, it is planned that electricity production will start after 2028. In order to connect wind farms planned to be installed in the Baltic Sea to the transmission grid, offshore substations should be built and new cable lines should be built up to the substation of the Works. On 22 June 2020 and revised on 15 March 2023, the Lithuanian Government Resolution on the area and power of the development of offshore power plants was adopted.58 The tender for development and exploitation permits for the area covered by this Government Resolution is planned to be published by the end of 2023. Private investment in this project is expected to reach EUR 3 billion. *(From 2020 to 2030)*

RES3-E: Use of RES in public and residential buildings. Climate change programmes

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the grant promotes the use of renewable energy sources (solar, wind, geothermal energy, biofuels, etc.) in public and residential buildings (for persons from different social groups). *(2021-2030)*

RES4-E: Deployment of RES plants and storage facilities for legal persons and RES communities. The measure

Resolution No 171 of the Government of the57 Republic of Lithuania of 15 March 2023 on the determination of the parts of the territorial sea of the Republic of Lithuania and/or the exclusive economic zone of the Republic of Lithuania in the Baltic Sea in which it is appropriate to organise a tendering procedure (tenders) without incentive measures for the development and operation of plants using renewable energy sources and setting the maximum capacity and minimum installed capacity of those power plants

58Resolution No 697 of the Government of the Republic of Lithuania of 22 June 2020 on the determination of the parts of the territorial sea of the Republic of Lithuania and/or the exclusive economic zone of the Republic of Lithuania in the Baltic Sea in which it is appropriate to organise a tendering procedure (tenders) for the development and operation of plants using renewable energy sources and the setting of the maximum capacity and minimum installed capacity of those plants (current version as of 21 March 2023)

aims to encourage legal entities and renewable energy communities to invest in installations for the production and individual storage of electricity from renewable energy sources. Support is envisaged for investments by legal persons, farmers and renewable energy communities in onshore solar and wind power plants, giving priority to self-consumption, farm or economic activity needs. *(From 2020 to 2026)*

RES5-E: Encouraging the deployment of energy storage facilities in households. The measure aims to promote the deployment of electricity storage facilities in households. For the period from 2023 to 2029, the operational programme of EU funds 2021-2027 provides households with EUR 3.291 million in grants for which households will deploy 20 MWh of electricity storage solutions. *(Between 2023 and 2029)*

RES27-P. solar and wind power plants in the business sector. For the REPowerEU loan, the estimated need is EUR 401 million, excluding VAT, for generating 357 MW of RES for electricity generation. Funding intensity up to 80 %, business own contribution EUR 105 million excluding VAT. The modification of the RRF plan, supplemented by the need for this activity, has been submitted to the Ministry of Finance and has been agreed and sent to the European Commission. *(Years 2024-2029)*

RES28-P. solar and wind power plants in the public sector. The financing needs for the REPowerEU loan are estimated at EUR 107.4 million, excluding VAT, for which 95 MW of RES for electricity generation is planned to be created. In addition, the State budget is requested to pay the ineligible REPowerEU VAT amounting to EUR 22.6 million. The funding intensity is up to 100 %. The modification of the RRF plan, supplemented by the need for this activity, has been submitted to the Ministry of Finance and has been agreed and sent to the European Commission. An amendment is beingmade to the Progress Measure 03001-06-03-02 "Increase the share of renewable energy sources in the electricity grid" in addition to this activity. *(Years 2024-2029)*

RES29-P. Create renewable energy communities in municipalities, using revenues to compensate the poor (energy poor). The planned operating grants amount to EUR 78.5 million. Loans from REPowerEU have an estimated need of EUR 95.9 million, excluding VAT, for which it is planned to create 155 MW of RES for electricity generation. In addition, the State budget is requested to pay the ineligible REPowerEU VAT amounting to EUR 36.6 million. The financing scheme: a grant of up to 45 % and a loan of up to 55 % of the value of the investment. The modification of the RRF plan, supplemented by the need for this activity, has been submitted to the Ministry of Finance and has been agreed and sent to the European Commission. Legal advice on options for granting State aid to communities has been initiated. An amendment is being made to the Progress Measure 03-001-06-03-02 "Increasing the share of renewable energy sources by ensuring the integration of renewables into the electricity grid" in addition to this activity. *(Years 2024-2029)*

RES30-P: Incentivising electricity consumers to choose energy from RES. The measure aims to increase the share of final consumption of electricity produced from RES in Lithuania. The education campaign will inform citizens about the principles of the functioning of green energy plans and encourage green electricity choices. *(24-2026)*

RES31-P. Recommendations on the development of renewable energy communities (AIEB) and citizen energy communities (PEBs) in Lithuania. The measure aims at carrying out an assessment of existing barriers and opportunities for community development, identifying unjustified regulatory and administrative barriers, facilitating transfers

intra-community energy, opportunities for cross-border participation in Community activities. *(24-2025)*

RES32-P: Targeted and equitable education of pupils and students on the possibility and benefits of energy recovery from RES. Education in society is essential at school age in order to promote the popularity of RES in society. A programme and a communication plan for the promotion of RES and their energy consumption are planned, involving companies in the energy sector, schools and higher education institutions. Examples of plan

activities include: creating an energy ambassador initiative for students/students, visits to schools, pupil visits to energy companies. Synergies will be sought with other energy promotion initiatives such as Energy Smart Start. *(From 2025 to 2030)*

RES33-P: Reduce CO2 emissions from the LNG terminal. There is currently no appropriate fund/programme for this project. The new investment facility would be implemented in the same way as other existing instruments of this type. The measure aims to reduce GHG emissions by installing an electricity connection from the LNG terminal to 30 % by reducing CO2 emissions (23 thousand tonnes CO2 reduction per year). *(2023-2025)*

Additional measures contributing to the development of RES-E:

- Exemption from excise duty for RES-E. Electricity generated using RES is exempt from the obligation to pay excise duty. This provision applies to both electricity produced and imported in Lithuania;
- guarantees of origin RES-E: Guarantees of origin shall be issued to RES-E producers. Guarantees of origin issue also to RES-E producers who win an auction and receive a supplement to the electricity price;
- RES sales contracts. RES producers shall be entitled to sell electricity to final customers under renewable electricity purchase/sale contracts without an independent electricity supplier licence. Such generators will still have to meet the requirements of an independent electricity supplier.

Financing of planned RES electricity measures[59]**.** Most of the investments related to the use of renewables in the electricity sector are intended for individuals who consume electricity for their own use or for the needs of the farm and install solar and wind power plants. Support is planned for natural and legal persons, the public sector, and for the creation of renewable energy communities in municipalities, with income allocated to compensation for people experiencing energy poverty. The co-financing of RES measures is shown in Table 3.1.2.4.

Transport sector

The development ofRES in the transport sector is in line with the objectives set out in national legislation to achieve a 15 % share of renewable fuels and energy in the transport sector. One of the key principles for the decarbonisation of the transport sector is the effective integration of alternative fuels, ensuring technological neutrality of energy mixes. The aim is to use a wide range of fuels in the transport sector, such as biofuels, advanced biofuels, biomethane, electricity from RES and RES fuels of non-biological origin. The measures already adopted aim to ensure that the total share of biogas and renewable gaseous fuels of non-biological origin in final energy consumption in transport is at least 5.2 % in 2030 and electricity

59Indicative funding needs.

the number of vehicles powered by the country would reach 260 thousand. The NCCD will aim to achieve a 50 % reduction in the use of fossil fuels in road transport by 2035. The development of biomethane and advanced biofuels production capacity and the adaptation of the regulatory environment are a strong focus on unlocking the potential of bio-based waste and residues generated in the country.

Since 2022, Lithuania has been operating a system for energy credits in the transport sector (DAEI unit of account) where fuel suppliers record the quantities of fuel placed on the domestic market and the units of account allocated to them for the supply of RES fuels are used to fulfil their mandatory obligations. The system combines different RES fuels, thus promoting technological neutrality.

In order to achieve the RES targets, measures (Table 3.2.2.2) are in place to increase the share of RES in the transport sector.

3.1.2.2. table. Existing and planned policy measures in the renewable energy sector in the transport sector until 2030

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	IMPACT ON RES SHARE IN GROSS FINAL ENERGY CONSUMPTION, %
EXISTING POLICY INSTRUMENTS (EPP)			
RES6-E	Investment support for the installation of biomethane production and biogas treatment plants	77,63	0,290
RES7-E	Obligation to refill natural gas for the use of RES of the items operators, supplying natural gas for the transport sector	0,0	0,000
RES8-E	Mandatory blending of biofuels into mineral fuels	0,0	1,000
RES9-E	Investment support for second-generation biofuel production facilities	0,0	0,050
RES10-E	Building green hydrogen production capacity in the transport sector	0,0	0,000
RES11-E	Integration of publicly accessible operators of recharging points for electric vehicles into the DAEI	0,0	0,000
T13.4-E	Development of private charging infrastructure for electric vehicles.	0,0	0,000
AMOUNT		**77,63**	**1,340**
PLANNED POLICY MEASURES (PPM)			
RES34-P	Information around at service stations traded	0,0	0,000
RES35-P	Regulatory changes for the establishment of a system of public biomethane gas access points	0,0	0,000
RES36-P	Investment support for the installation of biomethane production and treatment plants.	145,33	0,182
AMOUNT		**145,33**	**0,182**

RES6-E: Investment support for the installation of biomethane production and biogas treatment plants. The financing of biomethane production facilities, including biogas treatment plants. The aim is to reach production capacity capable of producing 1.4 TWh of biomethane by 2030. The construction of the gas pipeline up to the overall gas network and the connection of the production facilities to the gas networks shall not be financed. *(From 2020 to 2030)*

RES7-E Obligation for operators of natural gas refuelling points for the use of RES for natural gas supply to the transport sector. In order to ensure the parallelism between demand and supply of produced biomethane gas, and taking into account the projected increase in natural gas consumption in the transport sector, entities supplying natural gas for direct consumption in the transport sector shall be obliged to supply a specified and gradually increasing amount of gas from renewable energy sources. *(From 2025 to 2030)*

RES8-E – Mandatory blending of biofuels into mineral fuels. Petrol complying with Lithuanian or European standards must be marketed at the point of sale of petrol containing at least 6.6 % biofuel calculated on the total energy content of the fuel/biofuel blend (optional blending into A98 petrol) and diesel containing at least 6.2 % biofuel calculated on the total energy content of the fuel/biofuel blend. *(2022-2030)*

RES9-E Investment support for second-generation biofuel production facilities. The investment aid granted to biofuel producers is expected to produce at least 12.4 ktoe of second-generation biofuels produced from waste and/or residues in Lithuania. The investment aid would be granted to new production facilities to be installed in the vicinity of existing biofuel production facilities or to set up production facilities from the outset. The intensity of investment support shall not exceed 50 % depending on the size of the undertaking. *(Between 2023 and 2026)*

RES10-E – Creating green hydrogen production capacity in the transport sector. New capacity for the production of green hydrogen (hydrogen produced by electrolysis from RES electricity) will be developed, which will be used in transport to replace conventional fossil fuels and reduce GHG emissions. *(2023-2030)*

RES11-E: Integration of operators of publicly accessible recharging points for electric vehicles into the DAEI unit of account system. Operators of publicly accessible recharging points for electric vehicles would be able to obtain from RES units of account for electricity supplied to electric vehicles, which could be traded with oil fuel suppliers. A clear monitoring system based on meter reading shall be established to ensure the accounting of electricity from RES. *(2023-2024)*

T13.4-E Development of private charging infrastructure for electric vehicles. *(More about the measure in the transportsector)*

RES34-P: Dissemination of information on biofuels traded at service stations. For consumer information, it is proposed to introduce an obligation for service station operators to publish information on the raw materials used for the production of biofuels in the fuel structure sold at the service stations and their country of origin. As the measure is of a regulatory nature, the implementation of the measure would require legislative changes. *(From 2025 to 2030)*

RES35-P. regulatory changes for the establishment of a system of public biomethane gas access points. The aim of this measure is to enable producers distant from gas networks to feed biomethane into the gas networks without a direct connection of the production facility. The measure is needed because the introduction of biomethane into the gas networks is a complex and costly process to build a gas pipeline to a biomethane plant distant from the production of biomethane

in the case of production, this is not an efficient and cost-effective process. Public entry points would enable part of the biomethane producers to feed gas into the gas network without direct connection to the gas network and transport the produced biomethane to the entry point by transporters. This measure would create a regulatory environment enabling gas injections and determining the authorities responsible for control and surveillance. *(2024-2030)*

RES36-P: Investment support for the installation of biomethane production and treatment plants. The measure aims to develop additional biomethane production capacity. The EU-Lithuania regulatory environment and planned requirements for the management of agricultural waste and food waste are becoming more and more stringent, leading to an increasing amount of bio-based raw materials that can be used for energy production. Demand for biomethane arises not only in transport but also in other sectors such as industry, heating, agriculture. The Repower EU initiative foresees that EU biomethane production needs to increase to 35 billion cubic metres by 2030, and therefore biomethane production capacity and utilisation infrastructure must be actively increased in this context. The aim of this measure is to provide an additional production capacity of at least 600 GWh of biomethane resulting from the combined implementation of measure RES6-E of 2 TWh of biomethane produced in *2030 (in2026-2030).*

Financingof planned measures in the RES transport sector[60]. The sector's investments focus on supporting the installation of biomethane production and treatment plants. There is no need for regulatory and public funds for another instrument. The co-financing of RES measures is shown in Table 3.1.2.4.

Heating and cooling sector

Individual households mainly use the cheapest heating fuel in the market, biomass. RES development in the heating and cooling sector, reaching 90 % The RES part target for district heating and production of heat in households shall be implemented in accordance with the following principles by 2030:

- transparency – to ensure that heat supply activities are managed in an efficient, transparent and non-discriminatory manner between operators in the heat market and its users, including the purchase of energy resources in the most transparent and competitive manner, ensuring the least cost to the final customer;
- 'competitiveness' means a rational use of the investments needed to secure the reliable supply of environmentally friendly heat at affordable prices to consumers, ensuring the capacity of district heating to compete with alternative heat supply options;
- 'efficiency' means the establishment of regulatory principles that promote the introduction of technical and managerial solutions in district heating company systems, ensuring reliable and least cost-effective supply of heat to the final consumer;
- smart – Adaptation of the system to different, environmentally friendly and cost-competitive innovative technologies in the heat generation, supply and consumption chain.
- decarbonisation – gradually increasing the use of RES in heating and cooling production and implementing energy efficiency measures.

Existing policy/enabling measures in the heating and cooling sector:

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- establishing a regulatory environment that encourages the attraction of investments and provides a non-discriminatory environment for all actors in the district heating market;
- increasing transparency in the biofuels market;

60Indicative funding needs.

- promotion of the supply of heat from district heating, in buildings and priority in urbanised areas in order to reduce air pollution;
- reduce the amount of heat prices checked and individually determined by the national regulator (by transferring part of the responsibility from VERT to municipal councils);
- increase the number of new heat customers connected to district heating (CHP).

In order to achieve the RES targets, measures are in place to increase the RES share in the heating and cooling sector (Table 3.1.2.3.).

3.1.2.3. table. Existing and planned policy measures in the renewable heating and cooling sector until 2030

NO.	INSTRUMENT	Total GHG CO2 emission effect, thousand t CO2-eq. 2021-2030	IMPACT ON RES SHARE IN GROSS FINAL ENERGY CONSUMPTION, %
EXISTING POLICY INSTRUMENTS (EPP)			
RES12-E	Increase the use of RES for heating and cooling production in the DH sector	1,26	0,300
RES13-E	Promote the use of RES for heat generation by assessing the potential of solar technologies, heat pumps and heat storage in DH systems	74,54	0,194
RES14-E	Deployment of low-power biofuel cogeneration plants adapted for burning harvesting residues	335,55	0,190
RES15-E	Promotion of low-power biofuel cogeneration	263,74	0,253
RES16-E	Update and/or upgrade the heat transmission network and its installations/elements	0,0	0,000
RES17-E	Promote RES in district heating (using solar technologies, heat pumps and/or heat storage)	0,0	0,000
RES18-E	Promote the use of waste heat from industry, waste or cooling energy in the district heating sector	0,0	0,000
RES19-E	Modernisation of the heat metering system	1,20	0,040
RES20-E	Implement local and RES CHP projects, giving priority to Vilnius and Kaunas	867,66	2,646
RES21-E	Use of residual heat in DH systems	17,53	0,080
RES22-E	Installation of heat storage tanks for boilers	80,34	0,113

SECTIONa)

	optimising work and increasing efficiency		
RES23-E	Installation of heat pumps to optimise the performance of heat production systems by increasing the operational efficiency of heat production	81,88	0,113

RES24-E	Construction of solar collector systems for district heating activities with related engineering equipment (heat tanks, piping, automation, etc.)	74,06	0,063
RES25-E	Switchover of DH networks to Generation IV heat supply systems, lower temperatures of the scales	0,46	0,007
RES26-E	Construction of biofuel boilers based on logging residues, reducing fossil fuel consumption in heat production	248,00	0,063
AMOUNT		**2046,22**	**4,062**
PLANNED POLICY MEASURES (PPM)			
RES37-P	Restriction of the use of fossil solid fuels by area	0,0	0,000
RES38-P	Modernisation or replacement of deteriorated biofuel boilers other RES using technology	0,0	0,000
AMOUNT		**0,00**	**0,000**

RES12-E: Increase the use of RES for heating and cooling production in the DH sector. Improving incentive regulation to enable heat supply companies to store for modernisation. *(2018-2030)*

RES13-E: Promote the use of RES to generate heat energy from DH by assessing the potential of solar technologies, heat pumps and heat storage in DH systems. Funding is envisaged for new low-power RES technologies (e.g.: biofuel boilers, biofuel cogeneration plants) and retrofitting of existing ones, replacing depreciated biofuel boilers with other RES-using technologies, giving priority to promoting the use of RES-combusted CHP plants and high-efficiency biofuel boilers with heat pumps or containers adapted to burn logging residues (SM3 quality biofuels) and waste heat. *(2021-2030)*

RES14-E Deployment of low-capacity biofuel cogeneration plants adapted to burn harvesting residues. The measure provides funding for CHP plants under construction of up to 20 MWth and 5 MW e-power (total rated thermal input from 1 MW to 20 MW). Covering the 2014-2020 investment period, two projects are currently underway. *(2018-2023)*

RES15-E Promotion of low-power biofuel cogeneration. The measure provides funding for CHP plants under construction of up to 20 MWth and 5 MW e-power (total rated thermal input from 1 MW to 20 MW). *(Years 2023-2029)*

RES16-E: Upgrade and/or upgrade the heat transmission network and its installations/elements. Upgrading the pipelines in the heat transmission network by replacing old (channel) pipelines with a new, non-channel type, reducing technological losses in heat transmission and increasing the reliability of heat supply.

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Refurbished and modernised depreciated heat transmission networks, 1 000 km. *(2015-2023)*

RES17-E: Promote the use of RES in district heating (using solar technologies, heat pumps and/or heat storage). In Lithuania, biofuels are already used in most municipalities. In 2017, the RES share in district heating was already 68.7 % and in the total heating and cooling sector the RES share was above 46 %. Coal and gas oil are still used in part of municipalities. The measure is designed to convert their heating farms into RES. *(2021-2030)*

RES18-E: Promote the use of waste heat from industry, waste or cooling in the district heating sector. This heat is generated in any case by chemical processes in the production plants, so if in theory its potential of about 3 TWh per year in Lithuania is estimated, it is planned to use part of it in the district heating sector. Full utilisation is not possible because part of the industrial sites are located in areas which are too remote from heat consumers. The priority axis in the heat sector is the collection, storage and efficient use of environmental energy and waste energy emitted into the air by power plants, industrial sites and buildings. Waste heat emitted by thermal power plants can be consumed for heating buildings. *(2021-2030)*

RES19-E Modernisation of the heat accounting system. The EU Internal Market Directive (2009/72/EC) and its amendment (2016/0380(COD)) indicate that, in the case of a positive assessment of cost-benefit analysis, all heat meters must be replaced by remote reading by 2027.

- establishing a regulatory environment that encourages the attraction of investments and provides a non-discriminatory environment for all actors in the district heating market;
- promoting transparency and competition in the biofuel market, ensuring a low level of market concentration;
- an optimal balance between domestic production of biofuels and imports of biofuels from third countries is sustainable, allowing a high level of competition and low market concentration to be maintained in the long term;
- promotion of the use of organically and sustainably produced and supplied biofuels (use of certificates certifying best forest management practices for guarantees of origin of biofuels, guaranteeing the quality and sustainability of products throughout the biofuel production and supply chain);
- promotion of the supply of heat from district heating, in buildings and priority in urbanised areas in order to reduce air pollution;
- an assessment of the current situation and forward-looking evolution of the decentralised sector's heat supply, with a view to providing rational development pathways, assessing changes in heat production technologies that increase the efficiency of heat production and consumption;
- an assessment of the current situation in the cooling energy sector, a forward-looking analysis and the establishment of guidelines for the most rational solutions for cooling energy supply;
- assessment and deployment of waste heat capture and utilisation, solar and thermal technologies, heat pumps, low-temperature heating and heat storage facilities for district heat production;

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- the rational development of high-efficiency cogeneration plants that increase the potential for local electricity generation;
- the timely modernisation (or construction) of existing biofuel combustion plants or cogeneration installations, existing heat transmission installations and their systems, building heat stations, heating and hot water systems;
- Other specific measures facilitating RES development processes, reducing administrative burdens and encouraging active energy consumers shall be used to ensure the development of RES. *(For 2021-2027)*

RES20-E: Implement local and RES CHP projects, giving priority to Vilnius and Kaunas. Vilnius CHP plant received a EUR 190 million loan from the European Investment Bank (EIB) in December 2016, backed by the European Fund for Strategic Investments (EFSI), a key element of the Investment Plan for Europe. Vilnius combined heat and power plant will generate about 0.3 TWh of electricity. The plant will have a total plant capacity of around 92 MW. The boiler will only use municipal waste that remains after sorting and is not suitable for recycling. The other two biofuel boilers, with a capacity approximately 3 times that of a waste boiler, will use biofuels.

The Kaunas CHP plant was not supported. A high-efficiency waste-fired CHP plant with an electrical capacity of around 26 MW will be installed. Municipal waste remaining after sorting and not suitable for recycling, non-hazardous industrial waste and sludge from water treatment plants will be used. Such capacity will allow the production of around 175 GWh of electricity each year. *(2014-2023)*

RES21-E: Use of residual heat in DH systems. Installations for recovering and adapting thermal energy to the environment for the benefit of DH users. Heat can be recovered from water treatment emissions, from digital information data centres, from industry, *etc. (in 2023-2029)*

RES22-E – Installation of heat storage tanks for optimisation and efficiency of boilers. The measure would introduce facilities allowing the storage of thermal energy produced in biofuel boilers. The accumulated 'green' heat energy would be used to meet the peak needs of the heat system, avoiding the production of heat in installations using fossil fuels. 'GNG' means heat suppliers, independent heat producers operating heat production systems using biofuels. *(Years 2023-2029)*

RES23-E – Installation of heat pumps to optimise the performance of heat production systems by increasing the operational efficiency of heat production. The adaptation of heat pumps to DH systems is linked to optimising the performance of biofuels-based systems and reducing the share of fossil fuels in the balance in natural gas systems through the full or partial replacement of fossil fuel using compressor heat pumps. The measure is implemented by heat suppliers and independent heat producers operating heat production systems using biofuels and/or natural gas. *(Years 2023-2029)*

RES24-E. Construction of solar commuting systems for district heating activities with related engineering equipment (heat tanks, pipelines, automation, etc.). The measure is implemented by heat suppliers and independent heat producers operating heat production systems using biofuels and/or natural gas. *(Years 2023-2029)*

RES25-E. DH networks switch to generation IV heat supply systems, lower temperature limits; and

deployment of technology. This measure promotes the switch-over of DH networks to generation IV heat supply systems by adapting heat transmission networks to low-temperature work, thus reducing the technological losses in heat transmission. *(Years 2023-2029)*

RES26-E. Construction of biofuel boilers based on logging residues, reducing the use of fossil fuels in heat production. The measure is implemented by heat suppliers and independent heat producers operating heat production systems using biofuels and/or natural gas. *(Years 2023-2029)*

RES37-P Restriction of the use of fossil solid fuels by location. Prohibition (restriction) of the use of fossil solid fuels for space heating in densely populated areas, i.e. where the damage caused by particulate matter is greatest. *(Years 2024-2030)*

RES38-P: Modernisation or replacement of depreciated biofuel boilers with other RES-using technologies. The measure proposes to modernise and/or replace worn-out biofuel boilers with other RES technologies. The measure is implemented by heat supply companies and independent heat producers. *(Years 2023-2029)*

In the DH sector, the planned measures concern the implementation of the NAP's objective 'Ensure the adequacy of the Lithuanian electricity market and the electricity system and increase the share of RES in domestic energy production and gross final energy consumption and implement emission reduction measures in the energy sector'. Two planned activities entitled '*Increase the use of RES for heating and cooling production in the HWTP sector*' and *'Increase energy efficiency and expansion of district heating, hot water and cooling systems'*, which provide:

- deploy new and/or modernise existing low-power RES technologies (e.g.: biofuel boilers, biofuel cogeneration plants);
- replace worn-out biofuel boilers with other RES technologies, giving priority to the deployment of RES combustion CHP plants and high-efficiency biofuel boilers with heat pumps or containers;
- use environmental energy in DH systems with solar technologies;
- use ambient energy in DH systems by installing heat pumps and short- and long-term storage heat tanks;
- promote residual energy (waste heating and cooling, for example: industrial, water or waste sector, cooling systems or power plants) use in the DH sector;
- in order to reduce primary and final energy consumption and GHG emissions in the DH sector, promote the switch of DH networks to the 4th generation heat supply system by developing integrated DH systems, efficient use of residual and environmental energy;
- to reduce energy consumption in DH networks by around 12-13 % and reduce CO2 emissions by more than 2000 tonnes per year, invest in the modernisation and development of district energy pipeline systems through lower temperatures (e.g.: circulating pumps, heat conversion points, heat exchangers, piping for low-temperature mode, measuring instruments, etc.);
- retrofitting of building induction heat and hot water metering devices and data

remote reading systems. At least 100 thousand heat metering and hot water appliances are planned to be upgraded.

Financing of planned RES measures in the heating and cooling sector[61]. Investments by the sector are foreseen for the modernisation and development of heat generation and transmission infrastructure. Most of the investments will be devoted to the expansion of generation capacity from RES, and only a relatively small part will be for the modernisation of the heat transmission infrastructure. The co-financing of RES measures is shown in Table 3.1.2.4.

Financing of planned measures in the RES sector

With a view to achieving RES targets such as 70 % in 2030. RES gross final energy consumption and 100 % In the case of RES electricity consumption, the largest investments will be made in the RES electricity sector to stimulate the development of solar and wind farms. Investments from the Next Generation Lithuania (Recovery and Resilience Facility, RRF) plan (Table 3.1.2.4) will contribute significantly to this.

3.1.2.4. table. Indicative financing needs for existing and planned measures in the energy efficiency sector.

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Renewable	Total funds	Public money	Climate Change	Total funds	Public money	Climate Change

61 Indicative funding needs.

energy resources	1077,25	910,92	Programme, EU funds investments (2014-2020) and (2021-2027), Recovery and Resilience Facility, other funds.	864,10	726,2	Programme, Modernisation Fund, Recovery and Resilience Facility.

General/specific measures to promote RES development:

Contact Centre

There are several contact points in Lithuania to advise applicants throughout the administrative application process for permits for renewable energy projects and are the only ones to apply for permits.

Article 15 of the Law on renewable energy provides that the LEA shall provide advice and methodological assistance on activities in the electricity sector as well as on possible promotion measures for renewable energy installations. Advice and methodological support on activities in the electricity sector also include permit granting processes resulting in permit granting decisions by the responsible authorities.

It should be noted that authorisations to operate in the electricity sector are issued by the State Energy Regulation

the Council, which also provides advice on administrative applications for activities in the electricity sector, and accepts requests for authorisation.

The State Territorial Planning and Construction Inspectorate shall provide advice and methodological assistance on the application of the provisions of the legislation on State supervision of spatial planning and construction and related thereto and shall accept applications for building permits.

Simplify administrative procedures:

The Energy Act sets a general deadline for the issue of licences, permits and certificates for energy activities – 30 calendar days from the date of the application for a licence, permit or certificate and for the registration of all duly executed documents with the authority issuing the licences, permits or certificates in accordance with the procedure laid down by law.

In Lithuania, the three main permits for the development of plants using renewable energy sources are issued – a permit for the development of electricity generation capacity, a building permit and a permit for the production of electricity. The process of granting all these permits shall not take more than 1 year for all power plants, regardless of their capacity.

A permit for the development of electricity generation capacity (hereinafter referred to as “development permit”) is required for the development of a renewable power plant/installation. The construction/installation of a power plant is subject to a permit to produce electricity (hereinafter referred to as “the production permit”).

Electricity-generating customers operating installations for the production of electricity from renewable energy sources of whatever capacity and persons intending to construct or construct electricity from renewable energy sources with an installed capacity of less than 100 kW are subject to simplified permit-granting procedures without having to apply to the National Energy Regulatory Council for a permit to develop electricity generation capacity and for a permit to generate electricity, i.e. it is sufficient to inform the electricity network operator

about their activities when applying for the conditions for connection to the power plant.

Organisation of information and training

State and municipal institutions, organisations, and enterprises are obliged, within their competence, to prepare, submit and make public information on the procedure for issuing permits, licenses or certificates, the procedure for examining certification applications, the assistance provided to applicants and support schemes. The ministries are obliged, within their remit, to develop and implement appropriate public information and awareness-raising measures, to provide advice and to develop educational programmes on the practical possibilities and benefits of the development and use of RES.

Exchanges of experience on the use of RES between public authorities, bodies, enterprises, organisations and private entities are organised and examples of good practice are made public.

General programmes in formal education shall include knowledge and skills in the field of RES applications, benefits and technological solutions. Promote research and innovation, public education, civil servants and vocational training in RES. The use of pilot projects is encouraged.

Information on support measures, legal information, organisations, statistics and other relevant information

with regard to the development and use of RES, published on the following websites:

- https://www.ena.lt/atsinaujinantys-energijos-istekliai/;
- https://www.ena.lt/kvietimai-teikti-paraiskas/.

Information on the issue of certificates for the operation of energy installations and the holders of certificates: https://www.regula.lt/Puslapiai/bendra/technine-prieziura/energetikos-irenginiu-eksploatavimo- – activity-status.aspx.

Curricula on the benefits and practical possibilities of RES are included in the curricula of Lithuanian schools of general education and in the curricula of Lithuanian university and non-university higher education institutions.

Contracts for the sale and sale of electricity from RES

The legislation lays down general principles which provide that a producer may sell electricity to final customers under contracts for the purchase and sale of electricity from renewable sources. These generators do not require a licence from an independent electricity supplier, but in order to protect the consumer's interests, this producer must meet the requirements of an independent supplier.

Prosumers (RES self-consumption)

Prosumers may be natural and legal persons planning to produce electricity in power plants using renewable energy sources with no installed capacity limitation.

The prosumer has been given the opportunity to 'store' electricity in the electricity networks for a period of two years from 1 April to 31 March, which is not consumed by him for his own use and which is not consumed for the purposes of the farm. The producer pays a charge on the use of the electricity grids for the quantity of electricity 'stored' and recovered from the grid62. The amount of electricity supplied to the electricity grid in

62 https://www.vert.lt/atsinaujinantys-istekliai/Puslapiai/elektros-energija-gaminanciu-vartotoju-naudojimosi-elektros-tinklais-services-price.aspx

excess of the electricity consumed by the prosumer during the storage period shall not be carried over to the next storage period.

Prosumers can install power plants themselves or acquire power plants on the basis of bilateral contracts from third parties, thus creating the possibility for people living in multi-apartment buildings to become a prosumer. Similarly, the power plant of a prosumer may be distant from the place of consumption of the electricity. In that case, the power plant must be owned by the producer customer, or by another right of control.

Renewable Energy Communities (RES self-consumption)

The Renewable Energy Act regulates the operating conditions for renewable energy communities. A renewable energy community is defined as a legal status granted to a non-profit-making legal entity which fulfils the criteria and which owns and develops facilities for the production of energy from renewable sources within a defined territory and has the right to produce, consume, store and sell energy.

A non-profit-making legal person seeking and obtaining the status of a renewable energy community shall comply with the following requirements:

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1. the participants are natural persons and/or medium-sized, small and micro-enterprises and/or other non-profit-making legal persons, and/or municipalities and/or municipal bodies;
2. at least 51 % of the votes in the meeting of participants shall be held by the participants referred to in point 1 of this paragraph who reside or operate in the county where the renewable energy community owns or otherwise lawfully owns an energy generating installation/installations;
3. the principal objective set out in the instruments of incorporation of a non-profit-making legal person is to provide environmental, economic or social societal benefits to its participants or to provide those benefits in the places where it operates, and its primary purpose is not to make a profit.

Renewable energy communities shall be entitled to participate in the auctions without the obligation to produce and deliver to the grid the full amount of electricity won in the auction. They may also carry out any activity in the energy sector on the basis of an appropriate permit. Members of the renewable energy community shall not lose their existing electricity consumer rights and obligations, except for the consumer's right to choose an independent electricity supplier, which may be limited by voting on the right to choose an independent electricity supplier in accordance with the procedure laid down in the statutes of the renewable energy community.

In order to facilitate the establishment of renewable energy communities, municipalities are obliged to assess and make public the sites where renewable energy community energy production facilities may be built or installed. The LEA has also developed guidance on the establishment of renewable energy communities[63].

A financial model of renewable energy communities is currently being developed to ensure that participation in renewable energy communities is accessible to consumers on low incomes or in vulnerable households.

Guarantee of origin scheme for renewable energy sources

Lithuania has a system of guarantees of origin for renewable energy sources. Guarantees of origin shall be issued for gas and electricity produced using RES. The guarantee of origin shall be issued at the request of the producer per unit of energy (1 MWh). The guarantee of origin shall be used within 12 months of the date of manufacture of the unit concerned and shall lapse if it is not used. The Guarantee of Origin scheme allows for the

63 https://www.ena.lt/aieb/

identification, registration and monitoring of the origin of the energy produced and gives consumers the opportunity to know whether their energy consumption is produced using RES. Guarantees of origin are administered by two designated entities and the registers of guarantees of origin are for electricity and gas. Guarantees of origin of gas are linked to other schemes: sustainability compliance assessment and RES fuel scheme.

Regional cooperation:

In the area of RES, regional cooperation mainly takes place in the field of electricity on issues such as opening up support; joint projects and a joint support scheme. Lithuania is also open to statistical

the transmission of energy to other Member States or, where appropriate, the statistical acceptance of energy from another Member State.

Statistical transfers. The above measures areassessed to be sufficient to achieve the target set for 2030 and therefore there is currently no estimated excess energy that Lithuania could pass on to other Member States.

Lithuania has already experienced bilateral cooperation in transferring surpluses to other Member States, as in October 2017 it became the first Member State to sign a cooperation agreement with Luxembourg on the transmission of statistical data on renewable energy sources.

In a situation where Lithuania's RES share will reach and exceed the target set by 2030, Lithuania is ready to conclude agreements with other Member States on the statistical transfer of a specified amount of RES from the Republic of Lithuania to another country. Similarly, if the measures adopted are not sufficient to achieve the target by 2030, the Lithuanian Parliament may decide to adopt a statistical quantity of RES from another Member State. This transfer or acceptance may take place in the framework of the European Union Renewable Energy Development Platform.

Opening upsupport: Lithuania has opened its support scheme to other Member States. Another Member State may participate in the auctions organised in Lithuania to allocate the annual amount of electricity production and the price premium for electricity produced from renewable energy sources. A Member State with direct electricity interconnections with the Republic of Lithuania may participate in the auctions organised in Lithuania, having concluded an agreement with the Republic of Lithuania and undertaking to grant natural and/or legal persons of the Republic of Lithuania and/or other organisations or units thereof intending to build or install power plants in the Republic of Lithuania the right to participate in the distribution of support organised in that Member State. Where there is an agreement with another Member State, the volume to be allocated in the auction shall be calculated taking into account: the volume of electricity imported from the Member State seeking to participate in the auction in the previous calendar year; the RES share of RES in the preceding calendar year in the Member State seeking to participate in the auction; gross final electricity consumption in the Republic of Lithuania, in the previous calendar year; the annual amount of electricity production to be auctioned, as specified in the schedule.

Joint projects and a joint support scheme. Lithuania is open to other Member States through an agreement to carry out joint projects or to organise joint support schemes.

3.1.3 Other elements of this aspect

Policies and measures affecting the EU ETS sector

Obligations for the ETS sector related to the transition to climate neutrality are set out in the IPCC in the energy production and supply sectors by 2030:

1. achieve a 45 % RES share in the country's gross final energy consumption balance;
2. 30 % of domestic electricity consumption by 2025 and 50 % by 2030;
3. achieve a share of energy from RES of at least 90 % in district heating systems;

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4. 27 TWh of final energy savings in 2030, of which 5.45 TWh for industry, 10.36 TWh for services and homes, 10.9 TWh for transport and 0.54 TWh for agriculture;
5. identify, through pilot projects for green hydrogen production, technological solutions that contribute to the balancing of excess electricity from RES;
6. adapt the existing natural gas grid infrastructure to transport hydrogen and biogas by 2024, prioritising gas from RES.

For industrial sectors covered by the EU ETS, the objectives are set for the industrial sector.

Table 3.1.3.1: Existing and planned policy measures in the EU ETS sector until 2030

NO.	INSTRUMENT
EXISTING POLICY INSTRUMENTS (EPP)	
P2-E	Improving energy efficiency
P3-E	Incentives for investment and innovation
P5-E	Changing polluting technologies
P6-E	Promoting technological eco-innovation
P13-E	Production and use of hydrogen
P16-E	Instrument management system
RES1-E	Financial support for prosumers
RES2-E	Development of RES in the Baltic Sea
RES4-E	Installation of RES power plants and storage facilities for legal persons and RES communities
RES6-E	Investment support for the installation of biomethane plants
RES12-E	Increase the use of RES for heating and cooling production in the DH sector
RES13-E	Promote the use of RES for heat generation by assessing the potential of solar technologies, heat pumps and heat storage in DH systems
RES14-E	Deployment of low-power biofuel cogeneration plants adapted for burning harvesting residues
RES15-E	Promotion of low-power biofuel cogeneration
RES19-E	Modernisation of the heat metering system

RES20-E	Implement local and RES CHP projects, giving priority to Vilnius and Kaunas
RES21-E	Use of residual heat in DH systems
RES22-E	Installation of heat storage tanks for optimisation and efficiency of boilers
RES23-E	Installation of heat pumps to optimise the performance of heat production systems by increasing the operational efficiency of heat production

RES24-E	Construction of solar collector systems for district heating activities with related engineering equipment (heat tanks, piping, automation, etc.)
RES25-E	Roll-out of DH networks to Generation IV heat supply systems, lower temperature limits and technologies
RES26-E	Construction of biofuel boilers based on logging residues, reducing fossil fuel consumption in heat production
EE2-E	Renovation/modernisation of multi-apartment buildings
EE3-E	Renovation of public buildings
EE4-E	Agreements with energy suppliers on consumer education and consulting
EE6-E	Energy-saving agreements with state-owned and municipal undertakings
EE8-E	Modernisation of indoor heating and hot water systems in buildings
EE9-E	Implementation of energy efficiency measures by private legal entities according to energy audit reports
EE11-E	Upgrading street lighting systems
PLANNED POLICY MEASURES (PPM)	
P5-P	Changing polluting technologies
P20-P	Reimbursement of electricity prices
RES33-P	Reduce CO2 emissions from the LNG terminal
RES36-P	Promoting the introduction of internal monitoring systems for energy efficiency in businesses and industry
EE2-P	Renovation/modernisation of multi-apartment buildings
EE3-P	Renovation of public buildings
EE8-P	Modernisation of indoor heating and hot water systems in buildings
EE9-P	Implementation of energy efficiency measures by private legal entities according to energy audit reports
EE11-P	Upgrading street lighting systems
EE12-P	Increase the technological and energy efficiency of industry through the deployment of artificial intelligence and digital twin technologies
EE13-P	Create a legal requirement for companies to implement the measures recommended in energy efficiency audits
EE14-P	Promoting the introduction of internal monitoring systems for energy efficiency in businesses and industry

In 2021, 79 stationary installations and 2 aircraft operators in Lithuania carried out activities falling within the scope of the EU ETS. Most of these installations are small district heating installations. By contrast, emissions from the EU ETS sector in Lithuania amounted to 5 992 kt CO2eq. EU-level mechanisms in the ETS sector, such as the Market Stability Reserve, and funds for innovation and modernisation will affect operators in the EU and Lithuanian ETS sector, encouraging them to invest in modernising production through the introduction of new energy efficiency technologies or the transition to RES.

The main measures implemented by the EU ETS sector are RES20-E “Implement local and RES

using CHP projects, with priority being given to Vilnius and Kaunas, and P2-E to 'modification of polluting technologies: The implementation of existing policies and measures in the EU ETS will reduce GHG emissions by 41 % in 2030 compared to 2005 levels. In order to further reduce GHG emissions in the EU ETS sector, further investments are planned to replace polluting technologies with less polluting technologies (measure P5-P), refurbishment of multi-apartment buildings (EE2-P), etc. The implementation of the planned policies and measures will result in a 45 % reduction in GHG emissions in 2030 compared to 2005.

Policies and measures to achieve low-emission mobility

All the policies and measures listed in section3.1.1. in the transport sector have to some extent an impact on the promotion of low-emission mobility. The following existing policies contribute most to this: T1-E, T5-E, T11-E, T12-E, T13-E and planned policies: Measures T1-P, T5-P and fiscal measures T6-E and T28-P.

Energy subsidies

Lithuania will aim to gradually reduce polluting and wasteful energy consumption by 2030, as well as market distortions in favour of fossil fuels. In 2022, the Law on Excise Duties, which increases excise duties, was amended to implement the gradual reduction or phasing out of tax benefits, as well as the introduction of the carbon component of the excise duty rate from 2025 onwards. In total, thirteen energy subsidies were identified in Lithuania to be phased out by 2026:

1. reduced rate of excise duty on heating gas oil (rejected from 2025);
2. reduced rate of excise duty on coal, coke and lignite used for business purposes (refused from 2024);
3. reduced rate of excise duty on natural gas used as heating fuel by business for use (refused from 2026);
4. a lower rate of excise duty on labelled diesel used in agricultural activities (temporary suspension);
5. exemption from excise duty for petroleum gas and gaseous hydrocarbons for domestic purposes (withdrawal from 2025);
6. reduced excise duty rate on electricity used for business purposes (temporary suspension until the adoption of a new Energy Taxation Directive);
7. excise duty exemption for natural gas used for combined heat and power production (temporary suspension pending the adoption of the Energy Taxation Directive);
8. excise duty exemption for electricity supplied to household customers and beneficiaries (temporary suspension pending the adoption of the Energy Taxation Directive);
9. excise duty exemption for natural gas supplied to household customers and beneficiaries (temporary suspension pending the adoption of the Energy Taxation Directive);
10. excise duty exemption for electricity produced from renewable energy sources (temporary suspension pending the adoption of the Energy Taxation Directive);
11. exemption from excise duty of natural gas intended for use as motor fuel (suspended until 2030);
12. biofuels concessions (temporarily suspended until the adoption of the Energy Taxation Directive);

13. preferential 9 % VAT rate on heat supplied for residential heating, hot water supplied to residential premises or cold water hot water (To date).

Some of them decided to phase out or reduce support (see Table 3.1.3.1). Some subsidies, such as exemptions for natural gas supplied to household customers and beneficiaries, are necessary to ensure the well-being of the population. More detailed information on subsidies is provided in section 4.6.

3.2 Energy efficiency dimension

Lithuania has the highest final energy consumption in buildings, road transport and industry, and energy efficiency measures are therefore primarily targeted (directed) towards these sectors.

Energy efficiency improvements in Lithuania by 2030 will be implemented in accordance with the following principles:

- feasibility – priority should be given to the most cost-effective energy efficiency improvement measures in achieving the energy efficiency targets;
- active training and education for energy consumers – since energy consumers can contribute to energy efficiency objectives by changing their behaviour and habits, the training and education of energy consumers must be strengthened;
- competition – enabling investors in energy efficiency to compete with each other for the implementation of the most economically advantageous projects, for energy efficiency improvement obligations or for state incentives;
- energy efficiency improvements shall give priority to alternative cost-effective energy efficiency measures that make energy demand and energy supply more efficient, in particular measures to reduce the energy consumption of end-users in a cost-effective manner, demand-side management initiatives and more efficient conversion, transmission and distribution of energy, while ensuring that the objectives of those solutions are met.

Article 3(4) of the Law of the Republic of Lithuania on Energy Efficiency sets out as one of the main principles of energy efficiency improvement the principle of priority for energy efficiency improvement: when taking decisions on the planning and financing of energy transmission or distribution networks or systems, priority shall be given to energy efficiency improvement measures that reduce energy demand if they are more cost-effective than the corresponding energy supply solutions. The principle is detailed in individual laws in the energy sector.

Article 33 of the Law of the Republic of Lithuania on Electricity lays down the obligation of the transmission system operator to prepare and at least every 2 years by 1 July of the State Energy.

SECTION a)

submit to the Regulatory Council a 10-year network development plan containing an assessment of existing and expected electricity supply and demand, the conclusions of a credible assessment of the adequacy of the electricity system. Under Article 33(2)(4) of that law, that plan must identify possible alternatives to demand reduction by introducing or encouraging the deployment of energy efficiency improvement measures in transmission networks in investment projects, with a view to implementing the energy efficiency improvement principle laid down in the Law on energy efficiency improvement. Article[36] (1) of the Law on electricity provides that a distribution system operator serving more than 100000 customers is to draw up every two years a 10-year plan for the development, renewal, modernisation and investment of distribution systems, based, inter alia, on network optimisation opportunities based on energy efficiency improvements, with a view to implementing the

energy efficiency improvement principle laid down in the Law on energy efficiency improvement.

Essentially analogous provisions on the principle of priority for energy efficiency improvements are laid down in the Law on natural gas[8]. The obligation of the natural gas transmission system operator to take account of the energy efficiency first principle when drawing up the ten-year network development plan is laid down in Articles 31(1) and 31(2)(4) of the Law on natural gas. Articles 37(1) and 37(2)(4) of the Law on natural gas provide that the distribution system operator must take account of that principle when drawing up a 10-year network development, renewal, modernisation and investment plan (investment plan).

The application of the principle is also governed by the provisions of the Law of the Republic of Lithuania on the heat sector. Article 8(1) of the Law on the heat sector provides that municipalities are to manage the heat sector in accordance with the special plans for the heat sector approved by the municipal councils. Article 8(3) of the Law on the heat sector provides that, when drawing up special plans for the heat sector, the principle of priority for improving energy efficiency referred to in the Law on the improvement of energy efficiency is to be applied in particular.

As part of the implementation of the new Energy Efficiency Directive, it is envisaged to amend the Energy Efficiency Improvement Act and other relevant legislation in order to extend the energy efficiency first principle to sectors other than energy sectors that have an impact on energy consumption and energy efficiency, as well as to enshrine in legislation how the monitoring of this principle will be ensured.

Article 5 of the new Energy Efficiency Directive stipulates that public entities must implement measures and save 1.9 % of energy each year. Public entities (public bodies) are currently managers of public buildings listed in the list of public buildings managed by central government bodies, approved by Order No 1-7 of the Minister for Energy of 23 January 2014 approving the list of State-owned heated and/or cooled buildings used by State institutions and bodies – public administration entities with a total surface area of 250 square metres or more. Following the entry into force of the new Energy Efficiency Directive and its transposition, the list of public entities will be revised.

In order to meet the target of Article 8 of the new Energy Efficiency Directive, which cumulatively amounts to 39.3 TWh, Lithuania plans to implement existing energy efficiency improvement measures and plans new energy efficiency measures to ensure the achievement of the energy efficiency target by 2030. As shown in the information below (Table 3.2.1), this cumulative energy savings target for 2030 will be achieved with 34.5 TWh from existing energy efficiency measures and a further 11.9 TWh from planned energy savings.

efficiency measures. A total of 46.4 TWh will be saved by 2030.

Table 3.2.1. Existing and planned policy measures in the energy efficiency sector until 2030

NO.	INSTRUMENT	Energy savings in TWh. 2021-2030
EXISTING POLICY INSTRUMENTS (EPP)		
EE1-E	Impact of higher excise duties and taxes on fuel consumption	8.66 TWh
EE2-E	Renovation/modernisation of multi-apartment buildings	TWh
EE3-E	Renovation of public buildings	0.44 TWh
EE4-E	Agreements with energy suppliers on consumer education and consulting	2.77 TWh
EE5-E	PIS allowance for industry	4.23 TWh
EE6-E	Energy-saving agreements with state-owned and municipal undertakings	3.75 TWh
EE7-E	Transforming boilers into more efficient technologies	7.62 TWh
EE8-E	Modernisation of indoor heating and hot water systems in buildings (“smart renovation”)	0.03 TWh
EE9-E	Implementation of energy efficiency measures by private legal entities according to energy audit reports	0.105 TWh
EE10-E	Renovation/modernisation of one or two apartments for natural persons	0.43 TWh
EE11-E	Upgrading street lighting systems	TWh
T2-E	Renewal of urban and suburban public transport fleet by promoting the use of renewable fuels and electric vehicles	*
T3-E	Electrification of railways	*
T11-E	Renewal of the transport fleet, using green procurement and ensuring minimum procurement targets for transport	*
T13-E	Promotion of electric vehicles and development of charging infrastructure	*
T15-E (T3.1, T3.2, T 3.3)	Implementation of Sustainable Urban Mobility Plans (SUMPs)	*
P16.1	Increase energy efficiency in industrial plants	*
Cumulative effect of measures		**TWh**
PLANNED POLICY MEASURES		

EE2-P	Renovation/modernisation of multi-apartment buildings	5.27 TWh
EE3-P	Renovation of public buildings	0.138 TWh
EE8-P	Modernisation of indoor heating and hot water systems in buildings ("smart renovation")	0.2 TWh
EE9-P	Implementation of energy efficiency measures by private legal entities according to energy audit reports	0.035 TWh
EE10-P	Renovation/modernisation of one or two apartments for natural persons	5.5 TWh
EE11-P	Upgrading street lighting systems	0.1 TWh
EE12-P	Increase the technological and energy efficiency of industry through the deployment of artificial intelligence and digital twin technologies	0.04 TWh
EE13-P	Create a legal requirement for companies to implement the measures recommended in energy efficiency audits	TWh
EE14-P	Promoting the introduction of internal monitoring systems for energy efficiency in businesses and industry	0.215 TWh
Cumulative effect of measures		**11.9 TWh**

* Although the measures in the transport and industry sectors contribute to the EE targets, no evaluation of the measure (total energy savings until 2030) was carried out in the LEA modelling exercise.

EE1-E: The impact of higher excise duties and taxes on fuel consumption. Higher excise duties on fuels reduce fuel consumption, which improves energy efficiency in the transport sector. Lithuania has introduced higher excise duties and VAT taxes on fuel, i.e. petrol, liquefied natural gas and diesel, to improve energy efficiency in the transport sector. In Lithuania, fuel is subject to VAT of 21 %, i.e. 6 percentage points above the EU minimum of 15 %. At present, motor petrol is subject to the following duties only on a fixed basis: a rate of excise duty of EUR 466 per 1000 litres for unleaded petrol and a rate of excise duty of EUR 579,24 per 1000 litres for lead-containing petrol. Diesel is subject to a rate of excise duty of EUR 372 per 1000 litres of product. The rate of excise duty on LPG is EUR 304,10 per tonne. Higher taxes and excise duties on fuels are projected to result in energy savings of 8.66 TWh in 2030 (the current NECPs planned energy savings of 6 TWh by 2030). *(2021-2030)*

EE2-E Renovation/modernisation of multi-apartment buildings Lithuania will continue to prioritise the renovation of multi-apartment buildings, reduce consumer heating costs and improve living conditions in multi-apartment buildings. The programme for the renovation of multi-apartment buildings will continue. This existing measure is being implemented between 2021 and 2026. After the refurbishment of the building, either B or C should be achieved and 40 % of the building's energy consumption should be saved annually. The measure is expected to renovate around 3267 multi-apartment buildings and save 6.6 TWh by the end of 2026. *(2021-2026)*

EE2-P Renovation/modernisation of multi-apartment buildings The measure will be a continuation of EE2-E and will be implemented between 2024 and 2030. The measure will require renovation of the multi-apartment building to class B and energy savings of 40 %. 7534 multi-apartment units should be renovated by the end of 2030, of which 860 multi-apartment units are planned to be upgraded/modernised using a plant from renewable organic origin

standardised modular construction products (liquids) produced by natural resources. By 2030, the measure is expected to deliver overall energy savings of 5.27 TWh. *(2024-2030)*

EE3-E Renovation of public buildings The programme to improve the energy efficiency of public buildings sets targets for 2030 for the renovation of buildings owned by the State and municipalities. For central government buildings, the measure is implemented between 2021 and 2028 and for municipal buildings in 20212024. By 2030, around 367000 floor area of 2^{central} government public buildings and around 86 220 m of 2 municipal^{public} buildings are planned to be renewed. Under the current legal framework, public buildings must reach a minimum class B or C after refurbishment. Annual energy savings of around 8 GWh will be achieved and overall this measure will save around 0.44 TWh. *(For 2021-2028: Central Government; 2021-2024 – Municipalities)*

EE3-P Renovation of public buildings The measure will be a continuation of the EE3-E measure, implemented between 2024 and 2030. The measure will require the renovation of public buildings up to class B, and by 2030 around 143 thousand m of^{2} central government public buildings and 363 780 m of 2^{municipal} public buildings. This measure is expected to result in total energy savings of 0.138 TWh by 2030. *(2024-2030)*

EE4-E: Agreements with energy suppliers on consumer education and consultation. The purpose of these agreements is to educate and advise consumers on energy-saving measures and decisions that change consumer behaviour and habits and increase energy efficiency. Energy suppliers will ensure the implementation of the scope of consumer education and advice and the measures provided for in agreements concluded between them or through other persons.

The implementation of this measure and changes in consumer habits are expected to result in energy savings of 2.77 TWh by 2030. *(2021-2030)*

EE5-E PIS allowance for industrial enterprises. A support mechanism to finance the implementation of energy efficiency improvement measures in all major Lithuanian industrial plants that consume more than 1 GWh of electricity per year. Companies will receive compensation for the implementation of energy efficiency improvement measures by recovering 85 % of the public interest service price paid for the consumption of electricity in excess of 1 GWh in the previous calendar year, provided that the recovered funds are earmarked for investments in energy saving measures. Energy efficiency measures are planned to be implemented annually, leading to annual energy savings of around 77 GWh and energy savings of 4.23 TWh by 2030. *(2021-2028)*

EE6-E: Energy-saving agreements with state-owned and municipal-owned enterprises. Energy companies will save energy according to the energy levels indicated in the energy savings agreements (either by themselves or through others) by applying cost-effective energy efficiency improvement measures in final energy users' installations (installations, equipment, transport).This measure is expected to deliver savings of around 68 GWh annually and around 3.75 TWh by 2030. *(2021-2030)*

EE7-E: Transforming products into more efficient technologies. The implementation of the measures in the plan will achieve the headline target of 50000 boilers in households by 2030, other heat-consuming energy efficiency measures leading to savings of at least 139 GWh per year, or 7.62 TWh by 2030. 5000 boilers are planned to be upgraded annually.

The measure will compensate up to 50 % of the costs incurred by households not connected to the district heating system when replacing inefficient individual boilers;

using more efficient technologies. *(2021-2030)*

EE8-E Modernisation of indoor heating and hot water systems in buildings ("smart renovation"). A financial instrument that will encourage building owners to renovate old elevator-type heat points into a more recent, individual contour heat point. This existing measure was implemented in 2021-2022. It is planned to compensate up to 60-80 % of the investment costs and refurbish 158 heat points. This would lead to energy savings of around 0.03 TWh by 2030 *(2021-2022)*.

EE8-P: Modernisation of indoor heating and hot water systems in buildings ("smart renovation"). The measure will be a continuation of the EE8-E measure and will be implemented between 2023 and 2030. The measure is planned to update 290 heat points per year. By 2030, the measure is expected to result in total energy savings of 0.2 TWh. It should be noted that in multi-apartment buildings, where heat stations and other indoor heating and hot water systems are not modernised, a large proportion of the population living in low-income and energy poverty is home to the current overcompensation for heating costs. Therefore, the implementation of this measure will contribute not only to higher energy savings, but also to the costs and thus compensation of the population in need, as well as to the reduction of the price of heat. *(2023-2030)*

EE9-E: Implementation of energy efficiency measures by private legal entities according to energy audit reports. In order to improve the energy efficiency of businesses, Lithuania has planned a financial instrument to encourage companies to implement the energy efficiency improvement measures identified in the energy audit. This existing measure is being implemented between 2021 and 2024. Subsidies are planned for 44 projects, leading to energy savings of almost 0.105 TWh by 2030. *(2021-2024)*

EE9-P: Implementation of energy efficiency measures by private legal entities according to energy audit reports. The measure will be a continuation of EE9-E, implemented between 2025 and 2030. A subsidy is planned for 25 projects, leading to energy savings of 0.035 TWh by 2030. *(2025-2030)*

EE10-E: Renovation/modernisation of one or two apartments for natural persons. Financial incentive for owner-occupied houses to renovate individual homes. This existing measure was implemented in 2021-2022. A minimum energy performance class B for house B and a reduction in the calculated thermal energy consumption (kWh/m² of useful floor area of the building (part of it)) of at least 40 % compared to the calculated thermal energy before refurbishment (modernisation) is required. 1600 individual homes are planned to be renovated. Up to 30 % of investment costs are reimbursed. Cumulative energy savings by 2030 are 0.43 TWh. *(2021-2022)*

PEE10. Refurbishment (modernisation) of one or two apartments for natural persons. The measure will be a continuation of EE10-E, implemented between 2023 and 2030. This is a financial incentive for the owners of individual houses to renovate their individual homes. A minimum energy performance class B for house B and a reduction in the calculated thermal energy consumption (kWh/m² of the useful floor area of the building (part of it) per year) of at least 40 % compared to the calculated thermal energy consumption before refurbishment (modernisation). In total, the measure plans to renovate 65895 individual homes, leading to energy savings of 5.5 TWh by 2030. *(2023-2030)*

EE11-E Modernisation of street lighting systems. Financial support to boost streets

modernisation of lighting systems and incentives for municipalities to save electricity. This existing measure is being implemented between 2021 and 2023. The aim is to replace and upgrade around 69353 luminaires. Electricity savings are expected to be around 0.16 TWh by 2030 or about 3 GWh per year. *(2021-2023)*

EE11-P: Modernisation of street lighting systems. The measure will be a continuation of EE11-E, implemented between 2024 and 2030. This measure is planned to replace around 100 thousand luminaires in total, leading to energy savings of 0.1 TWh by 2030. *(2024-2030)*

EE12-P: Enhancing the technological and energy efficiency of industrial companies through the deployment of artificial intelligence and digital twin technologies. This is a completely new planned measure that was not part of the NECPs currently in force. It is an investment instrument to be implemented between 2026 and 2030 to increase the level and efficiency of automation of industrial enterprises. Within the scope of the measure, subsidies will be awarded to deploy digital twin or artificial intelligence solutions for the digitisation of a company's process or part of it. The tool combines fully real-time data-driven company-based decisions in its own right, leading to energy and cost savings; the enabled automatic optimisation of the production line by IoT

technology by comparing existing data (parameters) with historical and regularly informed energy efficiency deviations, and by using smart video surveillance solutions to report line mistakes, thereby reducing human labour demand and increasing efficiency; an AI-enabled machine learning algorithm allows for anticipating, containing and preventing potential increases in costs and energy consumption, as well as early identification and prevention of potential energy quality problems, as well as analysing different energy consumption scenarios and implementing Energy 4.0 solutions. The subsidy intensity will be up to 50 %. The measure is expected to save 0.04 TWh of energy or about 0.8 GWh annually by 2030. *(2026-2030)*

EE13-P: Create a legal requirement for companies to implement the measures recommended in energy efficiency audits. This is a completely new planned regulatory measure that was not in the current NECPs, which is planned to start in 2027. In the scope of the measure, the Energy Efficiency Improvement Act and/or the description of the procedure for energy audits will be complemented by an obligation for companies to implement the measures recommended by the energy efficiency audit with an expected payback period of up to 5 years. The measure plans to save 0.26 TWh by 2030. *(2027-2030)*

EE14-P: Promotion of the implementation of internal monitoring systems for energy efficiency in businesses and industry. It is a financial instrument designed to reduce companies' energy costs. The measure is intended to encourage businesses to start measuring and monitoring their energy waste. This makes it possible to monitor the evolution of their energy consumption more efficiently than using bills or meters. The measure will be implemented between 2025 and 2030 with an aid intensity of up to 40 %. The measure plans to save 0.215 TWh by 2030. *(2025-2030)*

The savings of the following existing and planned energy efficiency measures described above can be summarised in the following graph:

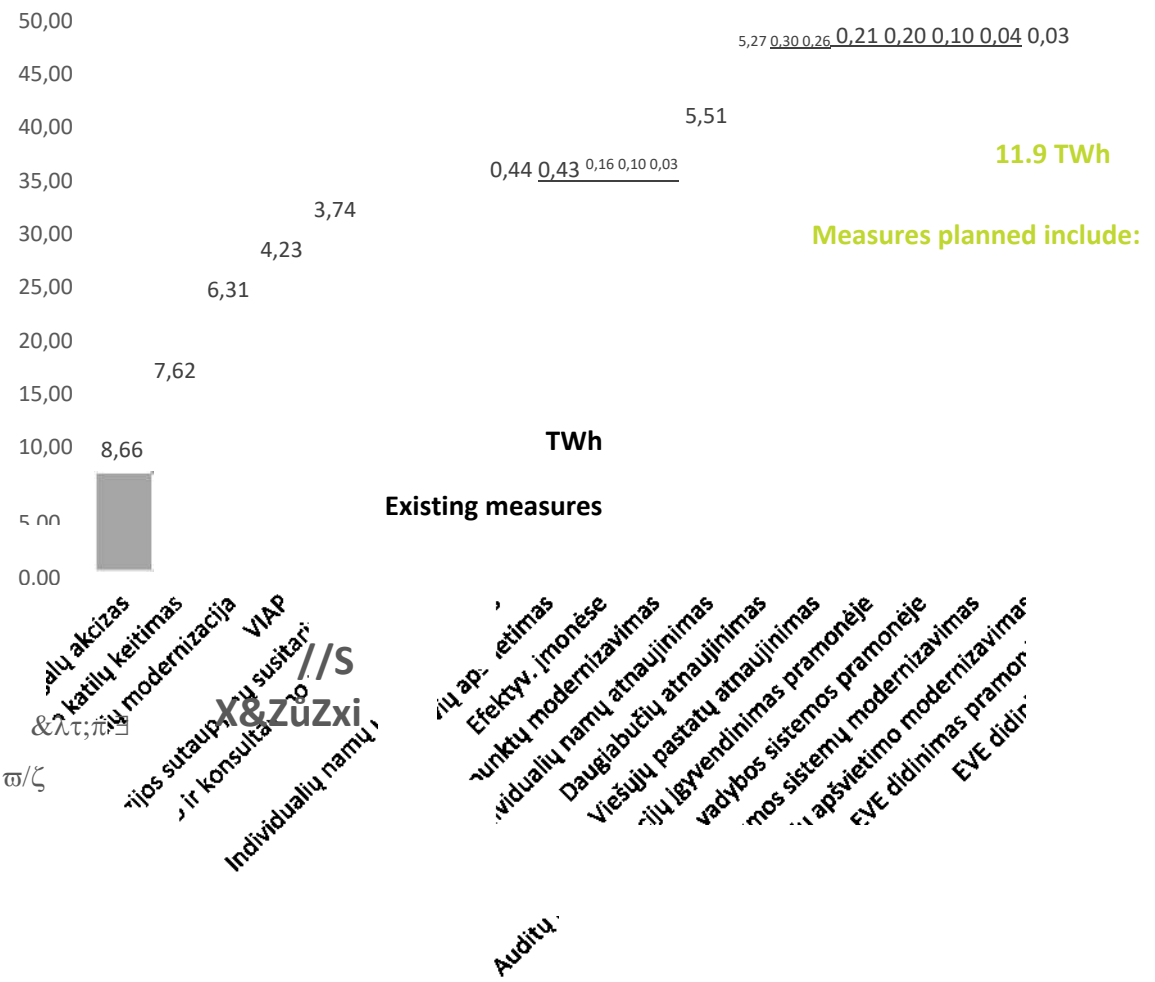


Figure 3.2.1: Cumulative energy savings excluding individual transport and industry sectoral measures, 2030, TWh.

Energy efficiency improvement measures in the transport sector

Measures T2-E, T3-E, T11-E, T13-E and T15-E in the transport sector will contribute to the energy efficiency targets. *(More information on measures in the transport sector*).

Long-term building strategy

By decision of 31 March 2021 (Protocol No 18), the Government of the Republic of Lithuania approved the long-term renovation strategy, according to which all Lithuanian public and private buildings and residential buildings will have to become fully decarbonised and have a zero carbon footprint by 2050. By order of 19 October 2022, the Ministry of the Environment approved the implementation plan for the long-term building renovation strategy. The plan will renovate cities and towns through the European New Bauhaus initiative, creating a financial and regulatory incentive for public buildings, district renovation, heritage management and restoration. This initiates the development of a catalogue of best architectural solutions and environmental management practices, ensures effective advice on the development of investment plans, implementation, and the responsibility of project promoters to provide guarantees. In 2030, at least 15 % of all contracted works will be related to building reconstruction.

Publicity of energy efficiency measures

In order to increase the scope of energy efficiency improvements, the Energy Efficiency Improvement Act establishes the principle of publicity, according to which the responsible authorities administering energy efficiency improvement measures shall publicly disseminate information to all market participants, including financial institutions. For example, the Public Investment Development Agency publicly disseminates and coordinates with financial institutions information on refurbishment and financing of multi-apartment buildings and public buildings, street lighting (more detailed information www.vipa.lt) and, for example, the Public Investment Development Agency has coordinated it with financial institutions before approving a financial instrument for street lighting. Currently, the Ministry of Economy and Innovation publicly disseminates information to all relevant market actors, including financial institutions, on possible energy efficiency improvement measures in the industry sector, it64 is planned that these measures will continue until 2030.

Assessment of heating and cooling

Results of the assessment of options for efficient heating

By assessing the long-term targets for the energy sector and the results of a comprehensive assessment of the national heating and cooling potential, targets and targets are set for the heating sector (Table 3.2.2).

Table 3.2.2: Targets for the heat sector in Lithuania for 2050

Sector	Purpose	Targets (2030)	Targets (2050)
Heating sector	T1. Final energy consumption (GES)	26.3 TWh	TWh
	T2. Primary energy consumption (PES)	28.4 TWh	20.6 TWh
	T3. GHG emissions	1567 ktCO2	0 ktCO2
	T4. Share of RES in DH	87 %	100 %
	T5. Share of RES in decentralised sector	76 %	90 %

In the field of thermal energy efficiency, there are three main expectations:

1. Rational consumption: a key measure to reduce the intensity of ODR;
2. Efficient infrastructure: a key measure to reduce the intensity of PES;
3. Sustainable fuel structure: a key measure to reduce GHG emissions.

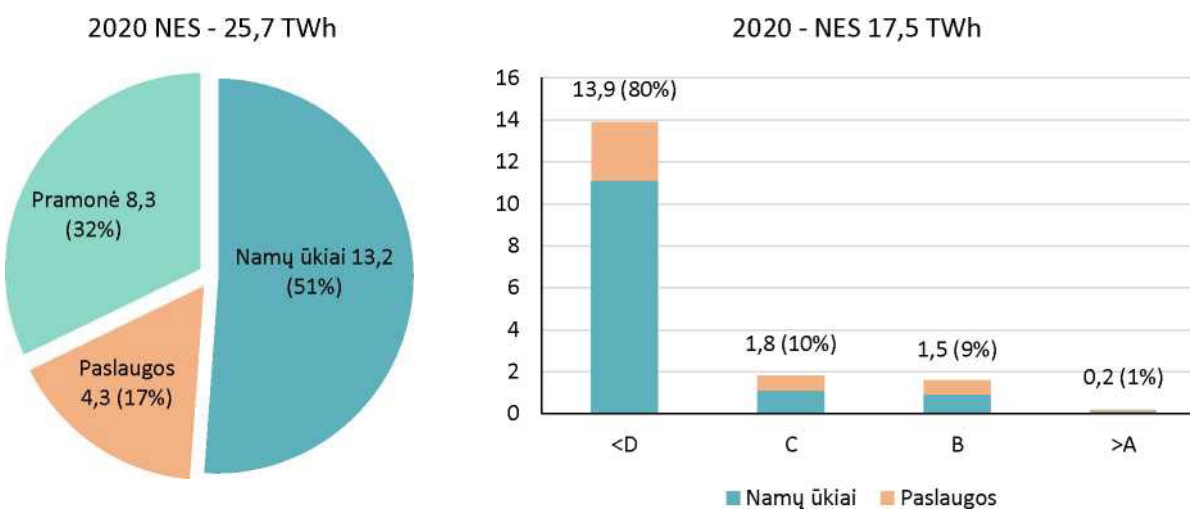
With regard to the energy supply chain, these expectations are grouped into two groups: improving the efficiency of the demand for heating and the efficiency of the supply of heating (Figure 3.2.2).

64 More detailed information: http://eimin.lrv.lt/lt/veiklos-sritys/es-parama-1/2014-2020-m/energijos-efektyvumo-priemones

3.2.2. figure. A model for efficient heating options

1.1. Potential for increasing efficiency in heating demand

A detailed assessment of the national heating and cooling potential showed that the majority of heat demand (~68 %) is for heating of buildings (households and services), while the vast majority of buildings (~80 %) are energy-efficient.

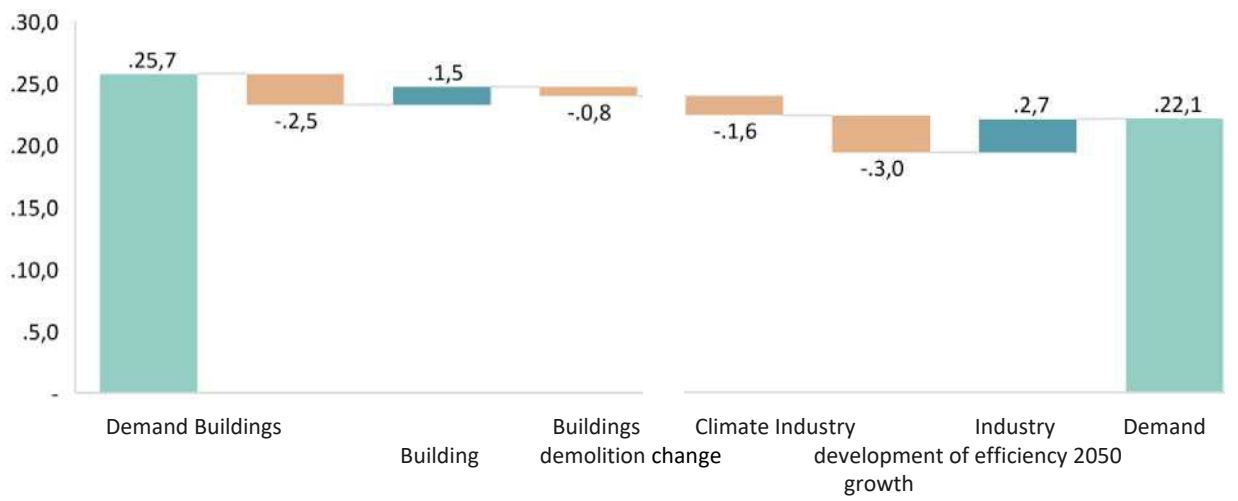


3.2.3. figure. 2020 Lithuanian heating NES, GWh

Accordingly, the main potential for improving the efficiency of heating demand can be found in improving the energy efficiency of buildings (modernisation of buildings).

In the comprehensive assessment of the national heating and cooling potential, the baseline scenario for the forecast of heating demand, taking into account all factors influencing heating demand (in 2020, demand characteristics, building modernisation, construction of new buildings, demolition of buildings, changes in climate change;

industrial development and efficiency gains) is projected to reduce the demand for heating by 14 %. (from 25.7 TWh in 2020 to 22.1 TWh in 2050).



3.2.4. figure. Forecast of change in heating demand, 2020-2050 (baseline scenario), NES, TWh

1.2. Potential for increasing the efficiency of the heating supply

The long-term strategic objectives for the energy sector and the recommendations for a comprehensive assessment of the national heating and cooling potential form two main strands for improving the efficiency of heating supply:

- efficient infrastructure is a key tool for reducing the intensity of PES;
- a sustainable fuel structure is a key tool for increasing the share of RES and reducing GHG emissions.

In the comprehensive assessment of the national heating and cooling potential, the analysis of the structure of the heating supply showed that when assessing the sustainability of the fuel (RES share of the fuel structure in 2020):

- the best indicators are in the district heating (DCH) segment, where the RES share is 79 %;
- minimum RES share in industry where the RES share is 26 %.

In assessing the efficiency of the production infrastructure:

- the best ratio of NES to GES is also found in the district heating segment (100 %);
- lowest efficiency in the household segment (estimated at ~50 % of biomass boilers as inefficient[68]).

Based on a comprehensive assessment of the national heating and cooling potential, the targets set for the heating sector, the most likely scenarios for the development of the sectors concerned and the analysis of the current situation, priority directions for improving supply efficiency are being developed (Table 3.2.2).

1.1. Table 3. Heating supply efficiency pathways (summary).

Sector	Efficiency indicators (2020)	Efficiency Pathways (2050)

[68] Benefit Action Factor (NCF) less than 77 per cent

	Infrastructure efficiency	Sustainability of fuels	Heating sector	Sectors concerned
District heating	high	high	• Rational development • Optimisation of the production structure • Reduction of supply losses (transformation to 4G network) • Integration of waste heat	• Share of RES in the electricity generation structure (100 %) • Share of RES in the gas network (80 %)
Decentralised heating – Households	Low.	Moderate	• Elimination of fossil solid and liquid fuel consumption • Elimination of natural gas consumption • Elimination of inefficient sources of biofuel production • Limiting the use of biofuels	
Decentralised heating – Services	Moderate	Moderate	• Elimination of fossil solid and liquid fuel consumption • Elimination of natural gas consumption • Limiting the use of biofuels	
Decentralised heating – Industry	Moderate	Low.	• Elimination of fossil solid and liquid fuel consumption • Reducing natural gas consumption • Introduction of CCUS technology	

1.3. Baseline results

Results of a comprehensive national heating and cooling potential baseline in 2050:

- elimination of fossil solid and liquid fuel consumption (2.5 TWh in 2020);
- significant reductions in natural gas consumption (from 6.7 TWh to 0.4 TWh) due to both the reduction of gas consumption and the transformation of the gas sector;
- eliminating inefficient sources of biofuel production (2.3 TWh in 2020);
- the expansion of heat pumps and the integration of waste heat increase the share of ambient energy almost 7 times (from 0.8 TWh to 5.9 TWh).

The detailed change in the production structure by sector in 2050 in the baseline scenario is disclosed in Table 3.2.4.

Table 3.2.4. Change in production structure in 2050 (summary)

Fuels	Because 2020 (not-looking at-normalisation)	Variation	BECAUSE 2050				
			Total	Households	Services	Industry	DRS
Coal	1.221	—	—	—	—	—	—
Solid fuels	347	—	—	—	—	—	—
Petroleum	904	—	—	—	—	—	—
From natural gas	6.743	—	415	—	—	415	—
Total IK	**9.214**	**—**	**415**	**—**	**—**	**415**	**—**
RES gas	96	+ 1.60	1.697	—	38	1.659	—
Biofuels	9.933	—	9.762	2.164	335	2.318	4.945
Biofuels (n.p.)	2.232	—	—	—	—	—	—
Wastes	597	+ 1.47	2.070	—	—	825	1.245
Waste heat	89	+ 350	441	—	—	—	441
Solar collectors	—	+ 251	251				251
Electricity (ES)	419	+ 2.12	2.541	1.439	367	133	602
Environment	712	+ 4.15	4.869	2.446	624	227	1.572
Total RES	**14.079**	**+ 7.55**	**21.631**	**6.049**	**1.364**	**5.162**	**9.056**
TOTAL	**23.292**	**—**	**22.046**	**6.049**	**1.364**	**5.577**	**9.056**

A change in production structure would make it possible to achieve the 2050 heating supply ratios (Figure 3.2.5).

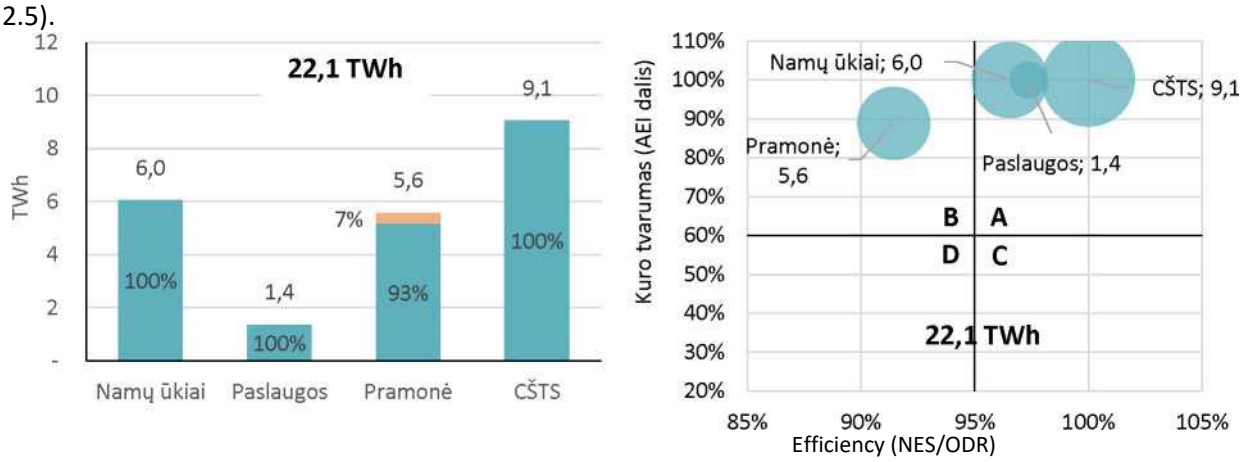


Figure 3.2.5: Efficiency indicators for heating supply (2050)

A baseline scenario for a comprehensive national assessment of heating and cooling potential in 2050:

- the fuel structure of sectors using heating for space heating (Households, Services and DHS) is dominated by RES fuel sources and the supply is in a relatively high-efficiency and sustainable fuel zone (Division A);
- the industrial sector's supply, due to the relatively lower use of heat pump technology, is located in a lower-efficiency zone (Division B);
- whereas the vast majority of the industrial sector's heating energy is not used for space heating, but rather for space heating;

  for industrial processes69, it is estimated that ~11 % of the sector's fuel structure will be fossil fuel, while CCUS will be used to manage the remaining GHG emissions.

This transformation of the heat production structure would lead to more than 4 fold reduction of CO_2 emissions (Figure 3.2.6).

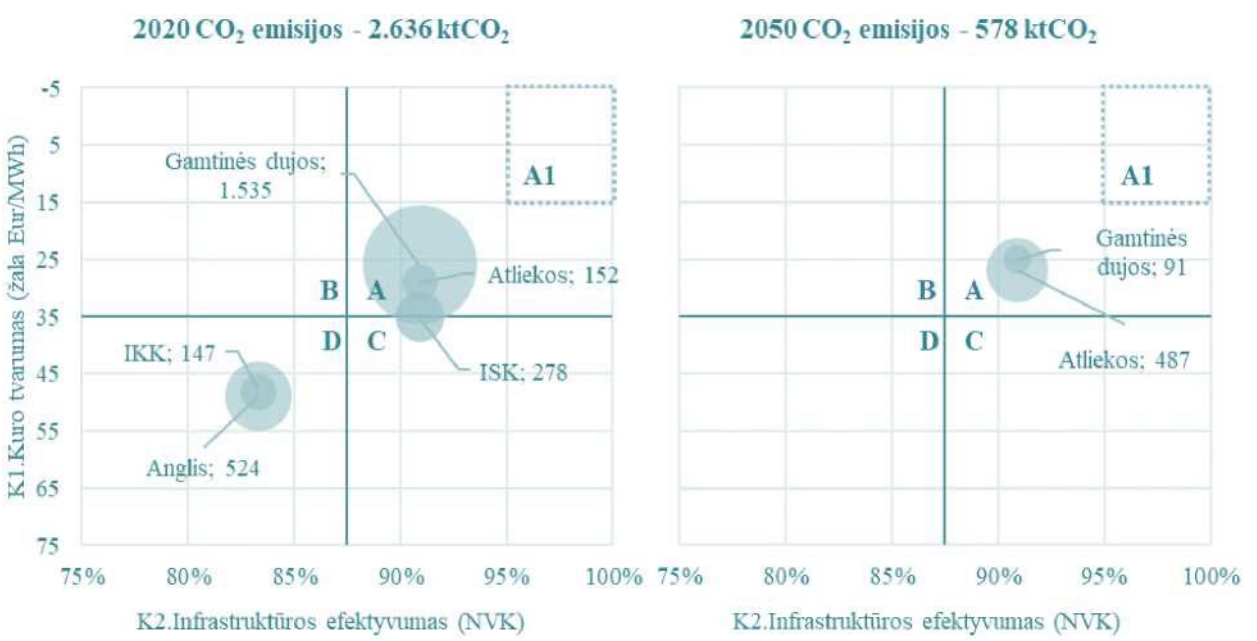


Figure 3.2.6. Change in CO_2 emissions (2020-2050)

The baseline scenario would achieve the indicators in Table 3.2.5 by fully realising the heating efficiency improvement potential identified in the assessment of the heating and cooling potential.

3.2.5. table. Projections for the heating sector in 2050

Sector	Goal 2050	Targets	Baseline indicators
Heating sector	T1. Reduction in ODR intensity	TWh	22.8 TWh
	T2. Reduction in PES intensity	20.6 TWh	TWh
	T3. GHG emissions	0 $ktCO_2$	578 $ktCO_2$

69A specific fuel type may be relevant for the production process, e.g. when the process requires a specific heat temperature or a specific chemical element generated by combustion.

T4. Share of RES in DH	100 %	100 %
T5. Share of RES in decentralised sector	90 %	97 %

As can be seen, the targets for the T1 and T2 targets (GES 18.8 TWh and PES 20.6 TWh) are not fully met in the baseline scenario. This indicator is mainly influenced by measures to improve the efficiency of heating demand. In order to reach the target, the demand efficiency measures planned in the Long-Term Renovation Strategy (LTRS) should be fully implemented.

It is also important to note that although the targets for the T1 and T2 targets are not fully met, their 2050 framework significantly increases the share of environmental energy.

Target T3 (0 ktCO2 emissions) is not fully achieved. The remaining emissions consist of:

- Emissions from waste incineration plants (488 ktCO2/year). The source of emissions is three installations with high capacity and economic capacity participating in the ETS. Accordingly, it is assessed that, with appropriate financial incentives (high allowance price), the remaining damage to emissions can be managed by CCUS technology. As the share of RES in the waste structure increases, the need for CCUS technology would decrease proportionally.
- Emissions from natural gas (91 ktCO2/year). The source of emissions is the industrial sector, which in the baseline scenario predicts a consumption of ~2 TWh of a low CO2-footprint, of which natural gas will account for 20 %. As in the case of waste incineration plants, it is estimated that, with appropriate financial incentives (high emission allowance price), most of the damage caused by the remaining emissions can be managed by CCUS technology.

In the baseline scenario, the remaining targets (T4 and T5) are projected to be fully achievable.

Results of the assessment of options for efficient cooling

Taking into account the long-term strategic objectives for the energy sector and the results of a comprehensive assessment of the national heating and cooling potential, the targets and targets set out in Table 3.2.6. shall be set for the cooling sector.

3.2.6. table. Targets for the cooling sector for 2050

Sector	Purpose	Targets (2050)
Cooling sector	T1. Reduction in ODR intensity	—
	T2. Reduction in PES intensity	—
	T3. GHG emissions	0 $ktCO_2$
	T4. Share of RES in DH	100 %
	T5. Share of RES in decentralised sector	100 %

The cooling sector is emerging and represents a minor part of the energy sector. Respectively:

there are no targets to reduce ODR and PES compared to 2017 levels.

As for the heating sector, there are three main expectations for cooling energy efficiency:

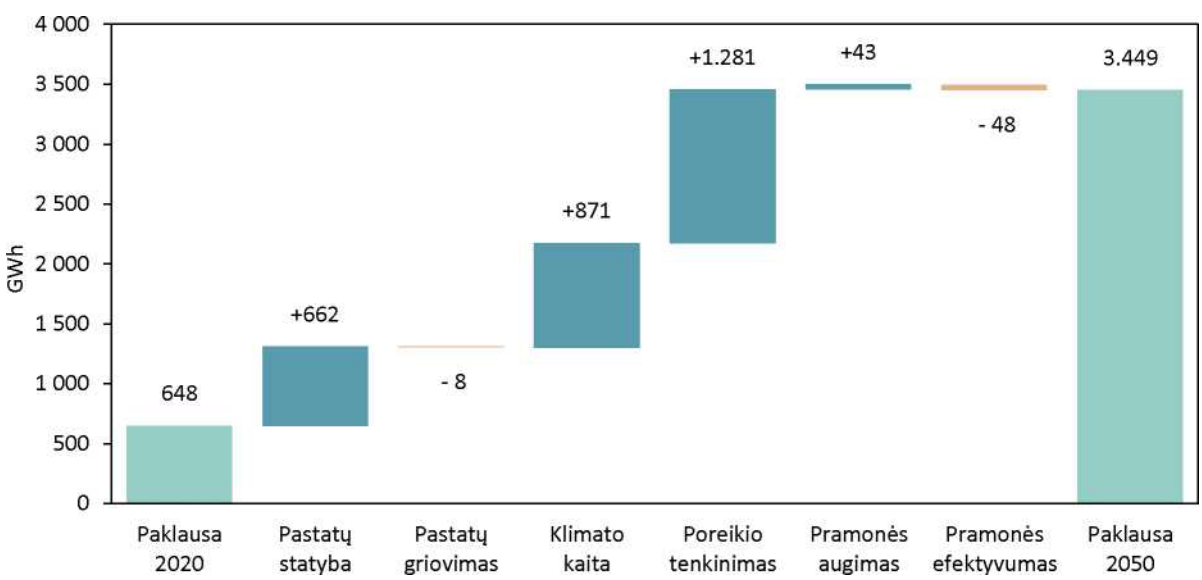
- Rational consumption: key instrument for managing ODR intensity.
- Efficient infrastructure: key tool for managing the PES intensity:
- Sustainable fuel structure: a key tool for managing GHG emissions.

As in the case of heating, from the point of view of the energy supply chain, these expectations are grouped into two groups: improving the efficiency of the cooling demand and the efficiency of the cooling supply.

2.1. Potential to increase efficiency in cooling demand

The comprehensive assessment of the national heating and cooling potential found that the demand for cooling (NES) amounted to 0.6 TWh in 2020. Unlike the heating sector, where heat in the cold season is a necessary service to meet basic human needs, cooling in the existing climatic area is still not a necessary service. This is also supported by the assessment that a significant part of the cooling demand is not met. In the services sector, actual cooling consumption is estimated to be 10 %, while domestic consumption is estimated to account for only 1 % of cooling demand.

It is the change in the level of cooling demand that accounts for the most significant part of the change in the projected cooling demand. The baseline scenario for the forecast of cooling demand estimates that the demand for cooling will increase ~5 times in 2050 (from 0.6 TWh in 2020 to 3.4 TWh in 2050).



2.1.7. figure. Forecast of change in cooling demand for 2020-2050 (baseline scenario), NES, TWh

2.2. Potential for improving the efficiency of cooling supply

The long-term strategic objectives for the energy sector and the results of the comprehensive assessment of the national heating and cooling potential form two main strands for improving the efficiency of heating supply:

- Efficient infrastructure: key tool for managing the PES intensity:
- Sustainable fuel structure: a key tool for managing GHG emissions.

A detailed national assessment of the heating and cooling potential showed that:

- Cooling is produced in a decentralised manner using high-efficiency technology (heat pumps).

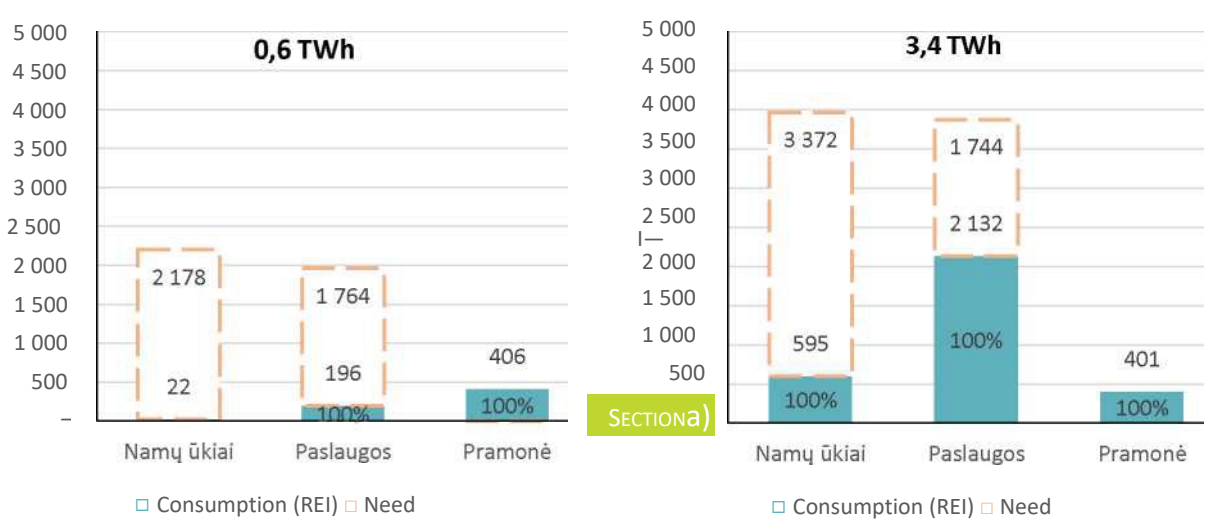
2050 technologies will not generate GHG emissions and will account for 100 % of greenhouse gas emissions. The share of RES in the production structure (the most likely scenario for the evolution of the electricity sector).

Taking into account the objectives set for the cooling sector, the most likely scenarios for the development of the sectors concerned and the analysis of the current situation, the following priority directions for increasing the efficiency of supply shall be developed.

3.2.7. table. Summary of supply efficiency challenges.

Sector	Efficiency indicators 2020		Efficiency Pathways (2050)	
	Infrastructure efficiency	Sustainability of fuels	Cooling sector	Sectors concerned
District cooling	—	—	• Rational development by increasing the efficiency of production	• RES share in the electricity generation structure (100 %)
Decentralised cooling	High	High[70]	• Keeping RES part of the production structure	

After the achievement of the planned efficiency targets, the indicators for the cooling sector in Figure 3.2.8 can be predicted in 2050.



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70The most likely scenario for electricity

3.2.8. figure. Cooling demand and supply, NES 2050

2.3. Baseline results 2050 baseline:

- increasing cooling energy demand (from 5.1 to 9.1 TWh);
- there is a significant increase in the demand response rate (from 13 % to 38 %) and the corresponding increase in demand for cooling (between 0.6 and 3.4 TWh);
- 100 % retained in the production structure. RES part:

In addition, an assessment of the potential of district cooling was carried out, which identified a preliminary potential for district cooling of up to 1 TWh in Vilnius and Kaunas cities. The projected baseline for the cooling sector in 2050 is given below.

Table 3.2.8. Projections for the cooling sector in 2050

Sector	Goal 2050	Targets	Baseline indicators
Cooling sector	T1. Reduction in ODR intensity	Not appropriate	TWh
	T2. Reduction in PES intensity	Not appropriate	TWh
	T3. GHG emissions	0 kt CO_2	0 kt CO_2
	T4. Share of RES in DH	100 %	100 %
	T5. Share of RES in decentralised sector	100 %	100 %

In the baseline scenario analysed in the comprehensive assessment of the national heating and cooling potential, all set targets for cooling (T3-T5) are fully met.

Improving energy efficiency in electricity and gas infrastructure

In 2019, the 10-year investment plan of AB Energija Distributor, covering the period 2019-2028, was approved. It focuses on the modernisation of the electricity and natural gas network. One part of the plan concerns the adaptation of smart technologies. The main measures identified in the plan are:

Implementation of smart meters. The Electricity Act provides that the implementation of smart metering is a long-term and global process that will be carried out without the individual consumer's consent or request. The roll-out of smart metering in Lithuania is carried out in two stages:

- Deployment phase I until 2026. In this phase, smart metering devices will be deployed to consumers with the highest electricity consumption (1 000 kWh/year) or the metrology check of existing metering devices has been completed. In addition, smart electricity metering devices can be installed at this stage for consumers who are disabled in order to meet public social policy objectives.
- Deployment Phase II from 2026. In this phase, smart metering devices will be installed for the remaining consumers once the metrological verification of existing meters has been completed. At this stage, the

the possibility to request AB Energija Distributor to install a smart electricity metering device before the expiry of the legal metrological approval of the customer's existing metering device. In order to benefit from this option, consumers will have to bear a share of the costs associated with the roll-

out of smart metering, which may not be lower than 50 %. The exact share of these costs will be determined by the VERT. In cases where a request for the installation of a smart electricity metering device is made by a socially vulnerable customer or a disabled person (the latter may also apply in the first stage), the smart metering device will be installed free of charge.

Implementation of smart metering system for metering management, reliable data collection, storage and analysis. In order to optimise the amount of information systems (IS) required by the ESOs, their operation and maintenance costs, the systems are planned to be upgraded and functionalities extended.

Implementing grid management decision-making in IS based on Big Data. By increasing the number of remotely monitored and controlled equipment, ESOs will collect more network performance. On the basis of the information collected, it will be possible to analyse data, improve network maintenance processes and extend the useful life of the assets.

The main benefits of the programme are to enable customers to make decisions on energy efficiency and energy savings with accurate data on their consumption.

Financing of planned measures in the energy efficiency sector

The sector requiring the highest additional investment. Additional funds are to a large extent planned for the modernisation of buildings. Significant investments are required by efficiency improvements in companies and public infrastructure (upgrading street lighting) (Table 3.2.9).

Table 3.2.9. Indicative financing needs for existing and planned measures in the energy efficiency sector.

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total funds	Public money		Total funds	Public money	
Energy efficiency	2814,96	1094,68	Climate Change Programme, Modernisation Fund, EU Funds investments (20142020) and (2021-2027), Recovery and Resilience Facility, EU Municipal Development Fund, State Budget.	7064,94	2179,17[71]	Climate change programme, Modernisation Fund, loans returned to energy efficiency or municipal development funds, State budget, other sources.

[71] It is estimated that the planned financing needs for EE2-P have been reduced by EUR 403,75 million of public funds, taking into account that the planned funding sources do not cover all the necessary financing needs of the NECPs and the volume of the existing measure can be achieved in an incomplete manner.

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3.3 Energy security dimension

In order to properly prepare for changes in the electricity system by decarbonising the country's energy sector, integrating markets and increasing energy production from RES, the EPSO-G group is organising a

study on the transformation of the Lithuanian energy system, on the basis of which proposals will be made on alternatives to the development and development of the energy system in Lithuania's green energy transition and becoming the energy exporting country.

Table 3.3.1. Existing and planned policy measures in the energy security sector until 2030

NO.	INSTRUMENT
EXISTING POLICY INSTRUMENTS (EPP)	
ES1-E	Lithuanian electricity system synchronisation project
ES2-E	Risk-preparedness plan in the electricity sector
ES3-E	Implementation of the construction project for Unit 5 of the Kruoni pumped storage plant
ES4-E	Project to increase the capacity of the gas interconnection between Latvia and Lithuania
ES5-E	Modernisation of electricity distribution networks through the deployment of smart
PLANNED POLICY MEASURES (PPM)	
ES6-P	Build up gas stocks in underground storage in the context of the implementation of EU Regulation 2017/1938 on the filling of gas storage facilities
ES7-P	Implement cross-border gas agreements on solidarity measures ensuring continuity of gas supply for protected household customers

ES1-E. Lithuanian electricity system synchronisation project. Synchronisation with continental European electricity grids is the last step towards Lithuania's energy independence. The Baltic States' electricity systems are ready to operate in a single synchronous area with those of other European countries. Historically, Lithuania's electricity system continues to operate synchronously with the electricity system of the Commonwealth of Independent States (IPS/UPS) linking the systems of Belarus, Russia, Estonia, Latvia, Lithuania and other countries. The frequency of the Baltic States' electricity system is managed and coordinated centrally by the dispatching site in Moscow, making Lithuania, Latvia and Estonia an isolated energy island in the European Community in the context of system management.

The energy isolation of the Baltic States in the European Union will only be completely eliminated when the electricity system becomes a fully-fledged player in Europe's electricity infrastructure, market and system, i.e. by operating at a single frequency in the synchronous area of continental Europe. The synchronisation project will allow Lithuania to achieve full energy independence from non-friendly third countries. *(2018-2025)*

ES2-E – Risk-preparedness plan in the electricity sector. A risk-preparedness plan in the electricity sector is to be drawn up as part of the implementation of Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector. *(2022-2023)*

Implementation of the construction project of Unit 5 of the ES3-E. Kruoni pumped storage power plant (KHAE) Kruonis HAE 5 will contribute significantly to the region's energy independence, contribute to energy security

the development of the system from renewable energy sources and the smooth operation of the energy system. *(From 2020 to 2026)*

ES4-E: Increasing capacity of the gas interconnection between Latvia and Lithuania (ELLI). The project aims at increasing the capacity of the gas transmission link between Latvia and Lithuania, ensuring security and security of gas supply, more efficient use of infrastructure and better integration of the Baltic gas markets. The project will facilitate access to the underground gas storage facility in Inčukalnis in Latvia. *(2017-2024)*

ES5-E – Modernisation of electricity distribution networks through the deployment of advanced technologies. Deployment of smart energy systems digital management systems, adapting electricity distribution grids for RES development. *(2021-2030)*

ES6-P. Kaupti gas stocks in underground storages in the context of the implementation of EU Regulation 2017/1938 on gas storage. In accordance with Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of gas supply, EU Member States that do not have gas storage facilities have to conclude agreements with market participants in Member States where underground gas storage facilities are located. The agreements shall provide for the utilisation of storage volumes of at least 15 % of the average annual gas consumption of a Member State without underground gas storage facilities over the previous five years by 1 November 2022 at the latest. In order to comply with this requirement, Lithuania's gas reserves are stored in the underground natural gas storage facility of Inčukalnis in Latvia and can be used, if necessary, for commercial, isolated work, vulnerable customers. In this context, the measure will act as an additional commitment to continue cooperation with Latvia in the storage of gas stocks in Inčukalnis and in line with the storage trajectories specified in the Regulation. *(2022-2025)*

ES7-P: Implement cross-border gas agreements on solidarity measures ensuring continuity of gas supply for protected household customers. In accordance with Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard security of gas supply, EU Member States, connected gas transmission infrastructure, have to agree on the necessary technical, legal and financial arrangements to ensure the supply of gas to solidarity-protected household customers. As part of this requirement, the agreement with Latvia was signed on 10 March 2022 and the agreement with Poland is planned to be signed by the end of 2022. In this context, the measure will act as an additional commitment to finalising the agreements with Latvia and Poland and to implementing the regulatory and technical changes resulting from the agreements. (*until 2030* (rolling measure))

Kruonio HAE

When the energy system load is low and there is a lot of cheap excess energy (e.g. night time), the Cruonis pumped-storage power plant (HAE) units, which are switched on in pump mode, generate water from the Kaunas Lagoon to the artificial upper 303 ha catchment area 100 m above Kaunas Lagoon water level. On the day when energy demand increases, Kruoni HAE can operate as a conventional hydropower plant. For the prevention and response of systemic accidents, it is important that the Kruoni HAE units can provide a fast reserve power, with the capacity to enter the network at full capacity less than 2 minutes. KHAE units are ready to automatically desist from anti-warrant automation and to compensate for the power deficit. Other equally important functions of KHAE are the comparison of load variances in the system, voltage and frequency control, and the ability to launch in the event of a systemic accident (black start).

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Four hydro-installations are currently installed in Cruonio HAE, but the original design of the power plant envisages the construction of four more plants. In order to maintain a reliable local generation, it is envisaged to extend the fifth asynchronous hydro-state with a capacity of 225 MW. According to the technical characteristics, the hydro-installation could operate between 110 and 225 MW in pump mode and 55-225 MW in generator mode. The project is implemented in the context of the development of renewable energy sources (RES) in the region. The new assembly of Kruonis HAE would provide an opportunity to address one of the main challenges posed by the expansion of RES worldwide, namely the flexible and real-time adjustment of wind turbine production imbalances. As countries in the region increase their share of RES in electricity generation, demand for this service will increase. With the emergence of new production capacity, higher base production and reserve needs are forecast. Most of the secondary reserve of active power will

be provided by the flexible installations of the Kruonis HAE. Although, in today's market conditions, the existing capacity of 900 MW is sufficient for the operation of the power plant, its further development is important to ensure the country's energy independence and competitiveness by maintaining sufficient and reliable local generation capacity. A new more efficient unit would make it possible to compensate for electricity shortages or surpluses on the market in a much more flexible way in real time. The project is included in the list of projects of common interest and is supported by CEF for socio-economic and technical studies.

Balancing services market

The common Baltic balancing energy market has been operational since 1 January 2018. AB Litgrid, AS 'Augstsprieguma tīkls' and AS 'Elering' ('Baltic TSO') co-organise trading of balancing energy in the Baltic States in accordance with the common Baltic balancing rules.

The transmission system operators of the three Baltic States, Litgrid, Augstsprieguma tīkls and Elering ('Operators'), have developed and apply common rules for the Baltic balancing market in implementing Article 20 of the Regulation of the European Commission (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (the 'Guidelines') on a European platform for the exchange of mFRR balancing energy. Operators have harmonised the Balance Accounting Rules of the Baltic CoBa (Baltic CoBa) as of 1 January 2018 and apply the single imbalance pricing and single imbalance portfolio model in accordance with the European Commission (EU) 2017/2195 Regulation establishing a guideline on electricity balancing ('EBGL').

The Baltic electricity transmission system operators Litgrid, AST and Elering are developing a single market for balancing capacity, which will become operational from 2025 onwards. Operators estimate that it will reserve up to 1 512 MW of balancing capacity. A new market is being created by preparing for synchronisation with continental European electricity grids, followed by the Baltic States acting as a common frequency control block and contracting balancing capacity services jointly.

The Baltic States' planning to operate synchronously with the continental European networks creates a high demand for balancing solutions, which will require technical capabilities both to increase and reduce electricity production or consumption.

In addition to existing capacity, balancing services may be provided efficiently by:

- battery systems that can use both energy and feed it into the grid on demand;
- existing and newly developed renewable power plants with control systems adapted for balancing by reducing production;

- demand aggregators able to adjust electricity consumption.

Balancing capacity services in the common market of the Baltic States will be procured on a daily basis through an auction, 15 minutes for tomorrow's day.

From 2025, automatic and manual Frequency Retention Reserve (aFRR and mFRR) services will be purchased on the market, and Frequency Retention Reserve (FCR) following synchronisation with continental European networks. These reserves vary in the speed and duration of their response, with a frequency containment reserve to be activated within 30 seconds, an automatic frequency restoration reserve within 5 minutes and a manual reserve within 15 minutes.

Litgrid, AST and Elering have calculated the need for these services. The total required amount of balancing

capacity will be up to 1 512 MW in 2025, of which part will be provided by operators' available capacity, such as energy storage, but most of this demand will be procured on the market. After synchronisation, the need for a 25 MW frequency retention reserve will also contribute to this amount. The breakthrough of renewable energy means that this demand will continue to grow rapidly by 2030.

Insulated operation of the electricity system

The Lithuanian electricity transmission system operator shall, in accordance with the provisions of the Law of the Republic of Lithuania on electricity system integration with the European electricity systems, identify additional services, including non-frequency ancillary services, in order to ensure the preparation of the isolated work of the electricity system, including the availability of electricity generation facilities and necessary for the synchronisation of the electricity system.

European regulation on crisis prevention and management

On 5 June 2019, Regulation (EU) 2019/941 of the European Parliament and of the Council on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC ('Regulation (EU) 2019/941') was adopted. Regulation (EU) 2019/941 establishes a common framework of rules for preventing, preparing for and managing an electricity crisis, providing more transparency in the preparedness phase and during an electricity crisis and ensuring that measures are taken in a coordinated and efficient manner. Member States are obliged to develop risk-preparedness plans and Regulation (EU) 2019/941 provides for common principles for electricity crisis management. The adoption of this Regulation and its assimilation to that in the natural gas sector will have a positive impact on the security of the Lithuanian electricity system and crisis prevention. In accordance with the provisions of Regulation (EU) 2019/941, risk-preparedness plans should be approved and published by 5 January 2022, but due to various adverse circumstances they will be adopted at the end of 2023.

Measures envisaged to ensure security of natural gas supply

As part of the provisions of the Regulation concerning measures to safeguard security of gas supply, a solidarity agreement on solidarity measures to ensure security of gas supply was signed between the Lithuanian and Latvian Governments on 10 March 2022. The main objective of the agreement is to ensure mutual assistance to vulnerable gas customers in Lithuania and Latvia in cases where either party is no longer able to guarantee the gas supply of its vulnerable customers. In order to achieve this goal, both sides have committed themselves to defining gas

the terms of exchange and agreeing on the necessary technical, legal and financial arrangements. On 5 May 2022, the merging of Lithuania and Poland with the GIPL pipeline gave rise to an obligation to sign a similar IGA. The last technical details of the agreement are currently being negotiated and it is planned to sign the agreement already in summer 2023.

Following the adoption by the European Council on 1 July 2022 of amendments to the Regulation concerning measures to safeguard security of gas supply, one of the main objectives was to ensure that gas storage in the EU is filled before the winter season and that stocks can be shared between Member States in a spirit of solidarity. In the absence of its own gas storage, Lithuania has taken solidarity measures and has built up the necessary gas reserves in the Inčukalnis gas storage facility in Latvia, and plans to build up an appropriate volume in 2023. These stocks are designed to meet vulnerable customers and corresponding electricity generation needs in the case of isolated electricity system work.

In Lithuania, a risk assessment is carried out in accordance with the Regulation concerning measures to safeguard the security of gas supply and, on the basis of the results of this assessment, preventive action and emergency plans are established and approved by order of the Minister for Energy of the Republic of Lithuania. A summary of the risk assessment and the preventive action and emergency plans shall be made publicly available on the website of the Ministry of Energy of the Republic of Lithuania 71and in the Register of Legal Acts72. These plans shall also include a regional dimension where Member States assist each other in the event of a natural gas emergency by channelling gas flows to protected customers in a neighbouring country suffering from an emergency.

The Regulation on measures to safeguard security of gas supply provides for an infrastructure standard (N-1) describing the technical capacity of the gas infrastructure to meet total gas demand in a defined (N-1) formula area when the single largest gas infrastructure is disrupted on a day of exceptionally high gas demand occurring with a statistical probability of once in 20 years. Based on the established calculation of the N-1 criterion, the risk assessment found that this gas reliability indicator is currently met in Lithuania at 117 %. Following the construction of the pipeline to Poland, the N-1 criterion will rise to 214 % and the N-1 criterion will rise to 272 % when the interconnection capacity between Lithuania and Latvia is increased. It should be noted that Lithuania did not meet this standard prior to the start of operations of the LNG terminal, reaching 37.1 %.73

It should be noted that the National Action Plan74 for Preventing Security of Natural Gas Supply lays down obligations for natural gas transmission and distribution system operators for emergency preparedness plans. All natural gas undertakings have such plans.

The procedure for supplying consumers with energy and/or energy resources in the event of an energy emergency75 shall govern the supply of energy and energy resources to consumers in the event of an emergency, as well as the preparation and management of emergencies. These arrangements stipulate that preparedness

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the energy emergency plans shall include the following measures:

- ensuring that businesses operate in emergency situations;
- the best possible supply of energy and energy to consumers;
- the use of alternative energy sources;
- reducing the consumption of energy resources and energy in the company;
- limiting the supply of energy sources and energy to consumers.

The storage of natural gas shall be such that it is sufficient in the following cases: During a period of 30 days of exceptionally high gas demand (cold season); or during extreme temperatures during a seven-day peak period occurring with a statistical probability of once every 20 years; or for a period of at least 30 days in

71http://enmin.lrv.lt/lt/veiklos-sritys-3/gamtines-dujos/teises-aktai-lietuvos-gamtiniu-duju-sektorius
72https://www.e-tar.lt/portal/lt/legalAct/TAR.6A808030EFF4/asr
73Drawn up on the basis of a 2018 study commissioned by the Ministry of Energy and carried out by UAB Ecotermija entitled 'Assessment of the risks of natural gas supply disruptions in Lithuania and modelling of possible scenarios'.
74The National Action Plan to ensure the security of natural gas supply was approved by Order No 1-241 of the Minister for Energy of the Republic of Lithuania of 28 November 2012 approving the preventive action plans to safeguard the national security of natural gas supply and the national emergency plans for natural gas supply.
75Approved by Resolution No 12 of the Government of the Republic of Lithuania of 13 January 2003 approving the procedure for supplying consumers with energy and/or energy resources in the event of an energy emergency.

average winter conditions in case of disruption of one of the largest gas infrastructures.

Oil stocks

The storage, storage and refurbishment of reserve reserves of energy resources is provided for in Article 29 of the Energy Law. According to that provision, energy undertakings with more than 5 MW heat and/or electricity generating installations and producing heat or electricity for sale must have reserve reserves of energy resources. They shall be pooled, stored and updated with funds from energy companies and other funds. They must not be less than the quantity consumed within 10 days. Stockpiling is the most common: biofuels, fuel oil, shale oil and diesel fuels. Natural gas is not foreseen as reserve fuel in any of the storage facilities. Reserve fuel reserves must be built up in the cold season. During the warm season (1 April to 31 October), the need and amount of reserve reserves of energy resources are determined by the energy companies themselves.

According to the requirements of Council Directive 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain stocks of crude oil and/or petroleum products, their total oil stocks in an EU Member State must be maintained at all times at least 90 days of average daily net imports or 61 days of average daily inland consumption, whichever is higher. In Lithuania, special stocks of petroleum products are built up and managed with public funds. These stocks must be built up for a period of at least 30 days, calculated on the basis of the average daily internal consumption in the previous calendar year. The rest of the stocks shall be pooled by obligated undertakings.

This stockpiling is ensured by the LEA, which also ensures that the quality of the stored oil products meets the minimum quality requirements for petroleum products. Stocks of petroleum products are held at the Subaćs oil terminal, which was built in 1964. Following Lithuania's restoration of independence in 1964, the terminal has been continually modernised and operated by AB Klaipėdos nafta since 2012.

Cybersecurity policy

Cybersecurity policy in Lithuania is developed by the Ministry of National Defence and implemented through the National Cyber Security Centre. The Ministry of Energy is involved in the implementation of legal cybersecurity requirements and coordinates cybersecurity issues of energy companies. In particular, the Ministry is involved in the identification of critical information infrastructure in the energy sector and monitors compliance with the requirements for such infrastructure. 2023 and 2024; and

The Ministry of Defence and other ministries will focus on the implementation of Directive (EU) 2022/2555 of the European Parliament and of the Council on measures for a high common level of cybersecurity across the Union, adopted in 2022, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive). The first task is to identify the entities in the energy sector that would be subject to the requirements of the Directive. The NIS2 Directive provides for a wider range of such entities and imposes stricter requirements on them. The full implementation of the NIS2 Directive should significantly improve the cybersecurity situation of companies in the energy sector, especially those previously exempted from such requirements.

Regional cooperation:

In the Regulation concerning measures to safeguard security of gas supply, Member States are grouped according to the main sources of natural gas supply. Lithuania is part of 2 groups – Belarus and North-East.

States within a group are obliged to draw up a joint risk assessment and common regional chapters in the preventive action and emergency plans. These chapters cover the main aspects of cooperation between Member States connected by natural gas pipelines in the event of an emergency.

Another key aspect of regional cooperation is ongoing security of supply exercises involving regional public authorities (ministries), energy companies (transmission systems, terminal operators) and other interested organisations. Such exercises are regularly organised at the request of state authorities by the Joint Research Centre of the European Commission in cooperation with the NATO Energy Security Competence Centre in Lithuania. The natural gas solidarity mechanism test exercise took place in 2019 and the Baltic synchronisation exercise with continental European electricity grids in 2021. In 2023, exercises are foreseen to jointly address maritime (including underwater) infrastructure protection among the countries of the region.

Other cooperation formats are described in section 1.4.

Financing of planned measures in the energy security sector

Strategic projects involving Lithuania are described in more detail in section 2.3. Table3.3.2 shows the financing of the measures. The most costly project is the synchronisation of the Baltic energy system with the continental European networks, funded by EU funds.

Table 3.3.2. Indicative financing of existing and planned measures in the energy security sector need:

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Energy security	Total funds	Public money	Investments from EU funds (2014-2020), European	Total funds	Public money	—
	1056,11	569,35		0,00	0,00[77]	

[77] The accompanying measures are regulatory and the need for public funds is not foreseen.

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			connecting Europe Facility (CEF)			

3.4 Internal Energy Market dimension

3.4.1 Electricity infrastructure

It should be noted that the aspect of connectivity in Lithuania is satisfactory (see section2.4.1.) and therefore no specific measures are foreseen to improve it, but Lithuania is still not in the synchronous area with the continental European networks, so that one of the most important strategic objectives for the Lithuanian electricity sector is the interconnection of the Lithuanian electricity system with the continental European networks for work in synchronous mode and full integration into the European electricity market. The main network development volumes and parameters are therefore proposed in such a way as to ensure that existing strategic objectives and guidelines are met and to avoid unnecessary investments. Further details on the synchronisation project are given in Sections 3.4.2 and2.3.

For regional cooperation see section 1.3.and for financing in section 3.3.

3.4.2 Energy transmission infrastructure

Electricity sector

The medium-term76adequacy outlook carried out by the European Association of Transmission System Operators for Electricity (ENTSO-E) predicts that in Lithuania in 2025 the *Lost of Load Expectation* (LOLE) will increase to 29.5 hours per year for a PPP scenario. Lithuania aims to establish a probability of load loss (LOLE) of no more than 8 hours per year. To achieve this objective, a capacity mechanism is being developed in Lithuania, a system that will ensure a reliable functioning of the Lithuanian electricity system and a sufficient level of security of electricity supply beyond 2025.

In Lithuania, cross-border connections, reliability and availability of cross-border connections have the greatest impact on the adequacy of power, and particular attention is therefore paid to the operation of cross-border lines and the development and deployment of regional market mechanisms.77 A capacity mechanism covering demand response, storage facilities78and other measures will contribute to the sound functioning of the system. New, reliably available local generation capacity could also contribute to ensuring competitive local electricity generation.

Litgrid is currently carrying out a pilot battery project to test the usability of battery storage systems under realistic conditions of operation of the Lithuanian electricity system. Test

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the results will help to assess the areas of use of such batteries and to identify the technical parameters best suited to the system's needs. The aim of the project is to increase the ability to manage frequency and to ensure the stability and security of the system. Battery storage systems can contribute to maintaining the required level of inertia (synthetic inertia) and to ensuring very fast regulatory power reserves, which would contribute to improving system adequacy by preparing for synchronous work with continental European networks. In total, 11 areas have been identified where such a battery system could benefit: most of them concern frequency management, as well as rapid compensation for power variations, congestion management, improving energy quality and dynamic stability and emergency reserve.

In the context of the implementation of the Synchronisation project described in more detail in Section2.3, the Government of the Republic of Lithuania approved the following specific electricity projects, which form an integral part of this project:

- Extension of the LitPol Link connection, covering actions from the power transmission line and the 330 kV Alytus transformer substation ordering equipment to complete reconstruction/extension works;
- Reconstruction of the 330 kV electricity transmission line in Lithuania-Vilnius;
- optimisation and preparation of the North-East Lithuania's electricity transmission network for synchronous work with the continental European energy system, including the dismantling of the part of the off-line 750 kV inter-system transmission line LN705 (connection with the Republic of Belarus) on the territory of the Republic of Lithuania, the reconstruction of the 330 kV Utena

76https://www.entsoe.eu/outlooks/midterm/

77 https://enmin.lrv.lt/uploads/enmin/documents/files/LEES_adekvatumo_vertinimo_santrauka.pdf

78Storage facilities are those in which electricity can be stored and fed into the electricity grid, or in which electricity can be converted into other forms of energy and returned to electricity grids (including electric batteries, Cruoni pumped storage power plant, capacitors, compressed air or hydrogen storage facilities).

transformer substation, the reconstruction of the 330 kV Ignalina NPP transformer substation and the transfer of 330 kV Ignalina NPP transformer substation to the Lithuanian power station;

- Construction of the 110 kV power line Pagėgiai – Bitėnai;
- Extension of 330 kV Bitėnai transformer substation;
- Construction of 330 kV power line Vilnius-Neris and newly built electricity transmission the entry into service of the line is scheduled for 2025;
- Construction of the 330 kV power line at Kruoni HAE-Bitėnai with spatial planning and environmental impact assessment processes will be launched by the end of this year and the entry into operation of the newly built power line is scheduled for 2025;
- Construction of 330 kV power line at work-Bytein with spatial planning and impact environmental assessment processes will be launched by the end of this year and the entry into operation of the newly built power line is scheduled for 2025;
- Construction of 330 kV 'Mšaša' distribution facility with spatial planning and environmental impact assessment processes will start before the end of this year and the start of operation of the newly built switchgear is scheduled for 2025;
- Construction of Harmony Link connection (marine cable) with the Republic of Poland. Synchronisation until 2025 will take place through the existing connection between Lithuania and Poland (LitPol Link) and the construction of a new submarine cable between these countries, Harmony Link. The construction of a DC (HVDC) offshore connection up to 700 megawatts (MW), a DC land cable, as well as the construction of a 330 kV converter station with a switchgear in Works, Kretinga district, are envisaged. In Lithuania, the project will cover the territorial waters of the country in the Baltic Sea, the municipalities of the city of Palanga and the district of Kretinga. Cable

The Harmony Link project will be implemented by the Polish electricity transmission system operator PSE and the Lithuanian electricity transmission system operator AB LITGRID. This project is expected to receive support from the CEF (the project is also included in the list of projects of common interest after the Synchronisation project). The project is planned to be implemented in several stages, including studies on the implementation of the construction project for the interconnection, spatial planning on the Republic of Lithuania side, as well as the design of the connection, the production of equipment, the construction of the construction contract until the planned entry into operation of the connection (offshore cable) in 2025;

- Construction of the 330 kV Distribution Facility "Workers" with a spatial planning and environmental impact assessment the processes were completed in 2022 and the start of operation of the newly built switchgear is planned for 2025.

The project is included in the list of projects of common interest and is supported by CEF.

Gas sector

The following national strategic initiatives shall be deployed in the gas transmission infrastructure section 2019-2024:

- own an LNG storage facility with a discharge facility (FSRU);

- Construction and operation of the gas interconnection between Poland and Lithuania in 2022 (GIPL project);
- modernising and developing the natural gas transmission system by deploying smart remote control system equipment and optimising system capacity;
- implement EU gas network codes;
- increase the capacity of the connection between Latvia and Lithuania (ELLI project). Works and extended capacity on the Lithuanian side were completed in 2022, completion in the Latvian side by the end of 2023;
- modernising and developing the natural gas transmission system by deploying smart remote control system equipment and optimising system capacity;
- the deployment of smart metering devices for natural gas consumers only when the results of the cost-benefit analysis are positive.

For regional cooperation, see section 1.4. For funding see also sections 3.3 and 2.3 on CEF projects.

3.4.3 Market integration

Lithuania's energy sector will undergo major changes by 2030. In particular, in the electricity sector, where the growing share of decentralised generation will require major structural changes. The ongoing auctions for technology-neutral generation increase the share of local electricity generation each year, but also create additional challenges, such as system balancing. The introduction of smart metering (smart metering) creates a legal framework for a market aggregators mechanism with a growing number of prosumers, which, with three different types of customers, would create the conditions for demand side response and avoid some peak electricity demand in the market. By analysing the potential for interconnection/integration of the electricity and gas markets, any envisaged measures will increase the liquidity of the market, the share of local generation, security of supply, national competitiveness and citizens; and

reduce the impact of creating a new energy transition for businesses.

Table 3.4.1. shows the sectoral policy measures for existing policies and planned policies for the internal market (market integration).

Table 3.4.1. Existing and planned policy measures in the internal energy market until 2030

NO.	INSTRUMENT
EXISTING MEASURES	
VR1-E	Ensure that decisions and recommendations on nuclear safety and environmental protection by EU and international organisations in the Republic of Belarus, in the Ostrovets district, are in the interest of Lithuania, in the construction of a nuclear power plant in the Republic of
VR2-E	Refurbishing and/or upgrading heat stations and/or heating systems in multi-apartment buildings, individual and/or public buildings
VR3-E	Update and/or upgrade the heat transmission network and its installations/elements
VR4-E	Eliminate retail electricity prices for domestic consumers
VR5-E	Promote the development of smart grids
VR6-E	Promote the use of environmentally and sustainably produced and supplied biofuels
VR7-E	Balancing capacity market
VR8-E	Construction of the Harmony Link connection
MEASURES PLANNED INCLUDE:	
VR9-P	Owning a floating LNG ship/storage facility with a discharge facility (FSRU) "Independence"
VR10-P	Create a legal framework for trade between electricity consumers and electricity sharing.
VR11-P	Establish a centralised data exchange platform – an information technology system for central and standardised storage, exchange and storage of energy data and other information related to energy activities
VR12-P	Create a legal framework for an open-access energy market production, supply and consumption database "Data HUB"
VR13-P	Enshrine provisions related to hydrogen market and infrastructure development in the Lithuanian legal framework
VR14-P	Implement pilot projects for flexibility services

V R1-E. Ensure that decisions and recommendations on nuclear safety and environmental protection by EU and international organisations in the Republic of Belarus, in the Ostrovets district, are in the interest of Lithuania. Decisions and recommendations on nuclear safety and environmental protection in the Republic of Belarus, in the Ostrovets district, have been adopted in the interest of the EU and international organisations in Lithuania. *(2009-2030)*

V R2-E: Renovate and/or upgrade heat stations and/or heating systems in multi-apartment buildings, individual and/or public buildings. Number of heat points and/or heating systems retrofitted – *2000 (2019-2022)*

V ***R3-E: Upgrade and/or upgrade the heat transmission network and its installations/elements.*** Upgrading of heat transmission network pipelines by replacing old (channel) pipelines with new, non-channel, heat transmission networks for low-temperature operation (generation IV DH networks). Upgraded district heating networks – 1 000 km; 42 km of newly built district heating networks. *(2018-2030)*

V ***R4-E Remote retail electricity prices for household customers.*** Phase out electricity price cap regulation and public electricity supply gradually (in III steps from 2020 to 2026). *(2019-2026)*

V ***R5-E. Promote the development of smart grids.*** Digitalisation and automation of the network, deployment of smart metering and smart devices. Refurbishment of distribution points (SP), transformer substations (TP) and/or distribution facilities in electricity distribution grids with the implementation of smart grid elements. Modernising the network by creating the right conditions for prosumers connected to the network. *(2022-2030)*

V ***R6-E: Promoting the use of environmentally and sustainably produced and supplied biofuels.*** A National Biofuel Sustainability Scheme for fuels used in the DH sector (a scheme confirming best forest management practices ensuring product quality and sustainability throughout the biofuel production and supply chain) has been established. *(2021-2023)*

V ***R7-E: Balancing capacity market.*** Balancing capacity is needed by system operators to ensure that electricity production is consistent with consumption. The Baltic States' planning to operate synchronously with the continental European networks creates a high demand for balancing solutions, which will require technical capabilities both to increase and reduce electricity production or consumption. Creating a new market gives businesses time to prepare for change and seize opportunities: within two years, invest and build facilities that will subsequently be procured to ensure the stability of the three countries' electricity systems. The Baltic electricity transmission system operators Litgrid, AST and Elering are developing a single market for balancing capacity, which will become operational from 2025 onwards. Operators estimate that it will reserve up to 1 512 MW of balancing capacity. A new market is being created by preparing for synchronisation with continental European electricity grids, followed by the Baltic States acting as a common frequency control block and contracting balancing capacity services jointly. ***(****2018-2025)*

V ***Construction of the Harmony Link connection between R8-E.*** The Harmony Link will connect the Žarnoviece substation in the Pomeranian Region of Poland with a 700 MW underwater and land high-voltage direct current connection of approximately 330 km in Poland with the Kretinga district of Kretinga in Lithuania. The project will be equipped with maritime cables and converters on the Lithuanian and Polish sides of approximately 290 km and about 40 km of land. *(2019-2030)*

V ***R9-P: Acquisition of a floating LNG ship/storage facility with a discharge facility (FSRU) "Independence".*** Project to ensure the long-term operation of the LNG import terminal, takeover of ownership of the LNG ship-storage Independence. On 11 May 2022, the Government of the Republic of Lithuania supported AB Klaipėdos Nafta's proposal that, as of 2025, when it was taken over, the LNG ship-Independence storage facility had been registered in the Lithuanian Register of Seagoing Ships. (*2018-2024)*

V ***R10-P: Establish a legal framework for trade between electricity consumers and electricity sharing.*** The measure aims to create a legal framework for the exchange/trading of electricity through*P2P (peer-to-peer*) platforms by including the necessary provisions in the Lithuanian Energy Law. 2024 in the context of the upgraded Electricity

the Directive will regulate in more detail the provisions on energy sharing and trade between them. *(2023-2025)*

V R11-P: Establish a centralised data exchange platform – an information technology system for central and standardised storage, exchange and storage of energy data and other information related to energy activities. The measure aims to implement a customer-oriented energy market design. Within the scope of the measure, a platform for the exchange of energy market data, Data HUB, will be established on the basis of an existing database. The date HUB will provide market participants with user-friendly and secure access to customer data, simplify the switching procedure and provide one-stop-shop services and include other functionalities. An open-access database of production, supply and consumption of the energy market will be established. *(2020-2025)*

V R12-P: Establish a legal basis for an open-access energy market generation, supply and consumption database "Data HUB". The aim of the measure is to create the legal framework necessary for the functioning of Data HUB. Within the scope of the measure, the amendments to the Lithuanian Energy Law and the Law on Electricity of the Republic of Lithuania will be implemented. The laws will include definitions of key concepts, competences of the Lithuanian Ministry of Energy, purpose, management and service of Data HUB, and provisions on access, security and exchange of data used by Data HUB. *(2022-2023)*

V R13-P: Establish provisions related to the development of the hydrogen market and infrastructure in the Lithuanian legal framework. The scope of the measure will include provisions related to the development of the hydrogen market and infrastructure in the Lithuanian legal framework. The amendments will cover areas such as the tasks of hydrogen network, storage and terminal operators and provisions on existing hydrogen networks, geographically limited hydrogen networks, interconnections with third parties and confidentiality of operators. At the same time, the provisions of the Directive on common rules for the internal market in renewable gases, natural gas and hydrogen (COM(2021) 803) will be transposed into the Lithuanian legal framework. *(2023-2025)*

V R14-P: Implement pilot projects for flexibility services. The measure aims to assess the feasibility of implementing the flexibility service model in Lithuania. Within the scope of the instrument, the distribution system operator will implement pilot projects of the flexibility service model to implement pilot purchases of flexibility services from market participants providing such services, in accordance with the Trade Arrangement for Flexibility Services, selecting energy efficiency improvement measures as a matter of priority. Pilot projects will allow the distribution system operator to determine the supply of flexibility services and the appropriateness of the conditions offered to suppliers and to provide for appropriate adjustments. *(2023-2025)*

Financing of planned market sector measures[79]. Additional investments are needed mainly in the field of heat: development of RES production capacity, installation of equipment, transfer of studio sectors to zero-emission production. The total demand for the sector, which includes gas, heat and electricity, amounts to around EUR 51 million, of which public funds are some EUR 31 million and private funds around EUR 20 million. EU Structural Funds 2021-2027, Heat Tariff, Norwegian Financial Mechanism, Life programme. The co-financing of measures in the internal market sector is shown in Table 3.4.3.

Internal market sectoral policy

The electricity system in Lithuania is fundamentally changing. The growing share of electricity from renewable energy sources in the electricity generation basket forces system operators to integrate both renewable and conventional power plants responsibly. Consumer behaviour and consumer formation are becoming increasingly important

conditions to participate in the market, motivating consumers to adapt their electricity consumption to real

79 Indicative funding needs.

market prices and the situation in the system.

The expected rapid development of electric vehicles and renewable energy technologies will have a major impact on the performance of electricity systems. As a result, customers who will be able to adapt to changing conditions will play an increasingly important role in ensuring sound management of electricity systems and rational investment in distribution systems. Incentives will be provided to customers who are able to adapt their consumption schedules in a flexible manner and contribute to more stable systems.

The Lithuanian DSO is implementing a plan to promote the development of prosumers, which removes bureaucratic barriers to the connection of prosumers to the electricity grid. Consumers installing solar power plants generate electricity for their own use and actively participate in the exchange process with DSOs.

A traditional customer is not only consuming but also producing energy. Renewables and self-generation are a future in energy, a path that is emerging in all advanced countries, where decentralisation of infrastructure is gaining momentum.

At the proposal of the DSOs, pre-conditions, development and production permits were abandoned, in some cases the project was abandoned, the cost of connecting prosumers to the grid was reduced, companies were allowed to become prosumers, the requirements for power limitation were revised, financial promotion of solar power plants was changed, control accounts were abandoned, the investments needed for the sustainable integration of prosumers were to be covered by the DSO investment plan. The aim is to create a sustainable prosumer ecosystem and ensure its sustainable development. The development of small energy targeting consumers who produce electricity themselves is one of the priority activities of the Lithuanian Ministry of Energy.

Virtual*power plants and '*demand*side management'*technologies are another important tool. AI and other innovations are changing this area and consumers are no longer passive and can become active players in the market. The use of technologies such as virtual power plants or electricity demand-side devices provides, in certain cases, monetary benefits. A virtual power plant is considered to be composed of a large number of different types of customers, be they home consumers, electric vehicles and businesses, who, depending on their needs, can change their consumption and production behaviour.

A study carried out by the international consultancy E4tech in Lithuania showed that a household consumer can potentially generate up to EUR 300-400 in additional revenue per year in Lithuania by providing virtual power plant services. The British market model was used for the calculations.[80]

The largest state-owned holding company of energy companies, Ignitis Group, invested Moixa, a British company that develops battery and virtual power plant technologies. Another investment was also made in the Estonian start-up Fusebox, which is creating a platform to change business's electricity consumption behaviour.

The plan of measures for the implementation of the Lithuanian national strategy for the development of renewable energy sources[81] provided for the design and implementation of support schemes that would create favourable conditions for the use of renewable energy sources, giving priority to projects with the highest cost and enabling each potential investor.

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participate in renewable energy activities through transparent, simple, non-discriminatory and public selection procedures.

80https://nlea.lt/data/public/uploads/2019/05/elektros-energijos-ir-gamtiniu-duju-rinku-apzvalga_2019-geguze.pdf
81https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.377162/asr

The Law on Electricity of the Republic of Lithuania82 states that a vulnerable electricity customer is a household electricity consumer who receives and/or is entitled to receive monetary social assistance in accordance with the Lithuanian Law on monetary social assistance for deprived residents and who, in accordance with the procedure laid down in this Law and its implementing legislation, is entitled to the additional guarantees provided for vulnerable customers. Additional measures to protect the rights and legitimate interests of vulnerable consumers are:

1. vulnerable customers may not be restricted and/or interrupted the supply and/or transmission of electricity where they fail to pay for the electricity, electricity transfer service or other related services supplied within the prescribed time limit, provided that the indebtedness of these vulnerable customers to the guaranteed electricity supplier or supplier does not exceed 3 basic social benefits, except in the cases provided for in Article 71 and Article 72(1) and (3) of this Law;
2. the supply and/or transmission of electricity may not be interrupted on Fridays, Saturdays, Sundays, public holidays and public holidays or when the average daily air temperature is lower than 15 °C or above + 30 °C, except in the cases provided for in Article 71 and Article 72(1) and (3) of this Law. In such cases, the supply to the customer may be interrupted on the day following the end of the circumstances set out in this point if the affected customer has been warned accordingly in accordance with the procedure laid down in the Rules on the supply and use of electricity and other legislation implementing this Law;
3. vulnerable customers shall have the right to pay to the guaranteed electricity supplier or supplier until the last day of the month following the calendar month in which the transmission and/or supply of electricity or other related services to the customer takes place, unless longer settlement deadlines have been agreed upon at the request of the vulnerable customer;
4. for vulnerable customers when connecting electricity equipment to the electricity networks operated by the distribution system operator, if the connection payment is higher than EUR 600, 60 per cent of the connection fee shall be paid within 10 calendar days of the consumer's signing of the contract for the connection service and the other part of the payment shall be paid within 10 calendar days of the end of the works. The connection service shall start when the affected customer pays the first instalment of the connection service. The distribution system operator shall notify the vulnerable customer of the end of the works specified in the works contract and provide him with the necessary documents for payment in accordance with the procedure laid down in the connection service contract;
5. if vulnerable customers fail to pay for the electricity, electricity transmission service or other related services supplied within the deadline, no interest shall be charged for 3 months from the date on which the deadline is exceeded.

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Liberalisation of the electricity market

Liberalisation of the electricity market takes place in compliance with the requirements of European Union legislation. Since 1 January 2010, after the entry into force of the Lithuanian Electricity Market Plan, consumers in Lithuania can buy electricity from independent electricity suppliers. Commercial consumers are obliged to purchase electricity from independent suppliers from 2013 onwards. As of 2021, household customers were gradually obliged to phase out monopolistic public supply services:

- As a first step, as of 1 January 2021, the regulation of the final electricity price was abolished for those

Law of the Republic of82 Lithuania on Electricity: https://www.e-tar.lt/portal/lt/legalAct/TAR.F57794B7899F/mouDoNqiIt

household customers with an actual electricity consumption above 5 000 kWh, as well as for all household customers connected to medium-voltage electricity grids, and for relevant communities and community organisations and associations. This did not apply to vulnerable consumers (residents receiving social assistance). As of 01/01/2021,public supply is discontinued for household customers who consume at least 5 000 kWh/year in the facility (in the period from 01/06/2019 to 31/05/2020), as well as for consumers connected to medium-voltage grids (excluding communities and socially vulnerable consumers).

- As asecond step, as of 1 July 2022, final electricity price regulation for all household customers with actual electricity consumption above 1 000 kWh between 1 June 2020 and 31 May 2021, with the exception of vulnerable customers, has been abandoned. As of 1 July 2022, public supply is discontinued for household customers who consume at least 1 000 kWh/year (except for communities and socially vulnerable customers) in the facility (1 June 2020 to 31 May 2021).
- As a third step, as of 1 January 2026,83 final electricity prices are no longer regulated for all household customers and will have to choose an independent electricity supplier by the end of 2025. From 1 January 2026, all consumers, including communities and socially vulnerable consumers, are excluded from public supply.84

Common Baltic and Nordic Balancing Market – Baltic-Nordic Coordinated Balancing Area 2018. The transmission system operators of the Baltic States, in order to create a single market for the balancing of the frequency restoration reserve with manual activation of the Baltic States and to harmonise the principles of electricity balancing in the Baltic States based on the principles of market participants in the Baltic States, developed a common Baltic country market for the balancing of the frequency restoration reserve with manual activation and the Baltic States' electricity imbalance accounting model (the 'Model') in 2016-2017. The common Baltic balancing market has been operational since January 2018. The barriers to access to the Baltic balancing market have been reduced by reducing minimum bids to 1 MW.

Agreement on the development of a regional gas market model in the Baltic States and a common entry/exit tariff treatment. Established in 2015 under the BEMIP initiative, the Regional Gas Market Coordination Group (RGMCG) is composed of representatives of the Ministries of Finland, Estonia, Latvia and Lithuania, national regulatory authorities, transmission system operators, LNG terminal operators and distribution system operators. RGMCG's participation in the development of the regional gas market plays an important role in achieving the objectives of the BEMIP. Between January 2015 and now, RGMCG has achieved many milestones for short- and medium-term measures to improve

the Eastern Baltic Regional Gas Market.

A study on the creation of a regional gas market in Finland and the Baltic States was carried out. The results of this study have been taken into account in the follow-up of RGMCG. These actions were included in the Action Plan for the creation of the Regional Gas Market, which set out the necessary measures to ensure the functioning of the Eastern Baltic regional gas market, i.e.:

- the creation of a common tariff zone between Finland, Estonia and Latvia (FINESLAT) (from 2020);

83This deadline was postponed from 1 January 2023 to 1 January 2026 due to the energy crisis and high electricity prices in 2022.
84 For more information: https://www.vert.lt/Puslapiai/bendra/Elektros-energijos-tiekimas.aspx

- Estonia-Latvia Common Balancing Zone (from 2020);
- Lithuania's accession to the common zone is planned until 2023. However, due to the energy price crisis, Lithuania's planned accession has been postponed to 2026 or later until an updated action plan is submitted by RGMCG.

3.4.4 Energy poverty

To address energy poverty in a holistic way, existing and planned measures (Table 3.4.2) aim to reduce the share of households who spend a significant share of their income on energy costs to 10 % in 2030. In order to achieve this, public efforts need to focus on four dimensions: improving energy efficiency, affordability of energy resources, increasing incomes for small households and informing consumers. It is important to note that the RES29-P measure financed by the RRF, which will create RES communities in municipalities, should make a significant contribution to the objectives of reducing energy poverty and increasing RES, using revenues to compensate the poor (energy poor). More information on the measure in section 3.1.3.

3.4.2. table. Existing and planned policy measures in the internal energy market (energy poverty) sector by 2030

NO.	INSTRUMENT
EXISTING MEASURES	
EN1-E	Compensation for heating costs of the dwelling
EN2-E	Payment of credit taken for the renovation/modernisation of a multi-apartment building and interest on persons entitled to reimbursement of heating costs of the dwelling
EN3-E	Encourage the purchase of solar power plants and/or the replacement of fossil fuel heat installations by deprived persons
MEASURES PLANNED INCLUDE:	
EN4-P	Information for hard-to-reach consumers (not using IT tools) on compensation and energy savings
EN5-P	Create an information hub containing information on energy savings, compensations and energy communities

EN1-E. Compensation for heating costs of the dwelling. For poor residents for heating their dwellings

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reimbursement of the part of the expenditure in excess of 10 % of the difference between the income and the income levels supported by the State 2 (in 2023: EUR 314) per family member or 3 state-supported income rates (3 MRP in 2023: EUR 471) per resident. *(since 1995 (continuous, follow-up)).*

EN2-E: Credit taken out for the renovation (upgrading) of a multi-apartment building and payment of interest for persons entitled to reimbursement of heating costs of the dwelling. Payment of credit and interest to the owner of a multi-apartment building who has carried out or is implementing a State- or municipal-sponsored project for the renovation/modernisation of a multi-apartment building and is entitled to reimbursement of the heating costs of the dwelling. *(since 2009 (continuous, follow-up)).*

EN3-E: Incentivising deprived persons to purchase solar power plants and/or to replace heat installations using fossil fuels. The measure will finance the purchase of solar power plants and the replacement of fossil

fuel heat installations for deprived persons. 'Potential beneficiaries' shall mean natural persons and/or persons living with them who were granted cash social assistance until 20 April 2022 in accordance with the procedure laid down in the Law of the Republic of Lithuania on monetary social assistance to deprived residents. 85 % financed A fixed cost of 1 kW for equipment. *(2023-2030)*

EN4-P. Information for hard-to-reach consumers (not using IT tools) on compensation and energy savings. The measure aims to inform hard-to-reach consumers about possible compensations and ways of saving electricity. When visiting consumers, social workers will inform consumers about the possibility to apply for compensation, mergers with the AEIB, energy efficiency, renovation of buildings and energy savings. *(2023-2030)*

EN5-P: Create an information hub containing information on energy savings, compensations and energy communities.

Within the scope of the measure, an information hub will be handed over to the municipal service units. The information hub will provide information on compensations, mergers into renewable energy communities (hereinafter referred to as 'AEIB'), energy efficiency, building renovation and energy savings. According to this information, municipal employees will be able to advise residents applying for compensation and energy savings. *(Between 2023 and 2030)*

Energy efficiency

Over the last couple of decades, Lithuania has seen a significant distinction between energy-efficient new construction and the majority of households living in old building housing. For old multi-apartment buildings, heat is distributed inefficiently and unevenly, for technical reasons it is not possible to regulate heat in apartments, and some of the buildings' floors (upper or lower) do not meet minimum hygiene standards, even during the heating season. Energy efficiency can help alleviate energy poverty. The measures concerned shall be grouped into the following groups: improving the energy efficiency of buildings and installations and changing consumer behaviour.

Measures in the area of efficiency of buildings and installations include the renovation of buildings (EE2-E and EE10-E) and the conversion of boilers into more efficient technologies (EE7-E). In the future, financial instruments will promote the modernisation of indoor heating and hot water systems in multi-apartment buildings ("mini-renovation") (EE8-E) for further progress in the future. These and related measures are described in more detail in section 3.2 on energy efficiency.

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Energy prices

High energy prices are another possible cause of energy poverty. In Lithuania, the potential of technological progress and the promotion of a competitive market are taken into account in order to achieve energy prices in line with the needs of consumers (more broadly in sections 2.4.3. and3.4.3.).

As a small open economy, Lithuania purchases all imported energy resources at global market prices, but wages are lower than in Western European countries, leading to a significantly higher share of the population in various forms of energy poverty. The NPT sets the objective of phasing out retail electricity sales price regulation.

In the area of energy poverty, the VERT calculator related to market liberalisation is also relevant, allowing consumers to compare offers from different suppliers and to choose the best offer. The aspect of a

competitive market is described in more detail in Section 3.4.

Consumer awareness

Consumer awareness, awareness and related behavioural changes are an important part of alleviating energy poverty. Accordingly, it is easier for a well-informed consumer to obtain financial support, take measures to improve energy efficiency or choose the most appropriate independent energy supplier in the context of market liberalisation.

In order to obtain compensation for vulnerable groups, it shall also be ensured that information on benefits is available to consumers. Currently, information on compensation for heating and water costs, including an interactive calculator, can be found in the Social Support Information System (SPIS) http://www.spis.lt/,85 together with information on existing social assistance (social benefits and compensation, student social assistance, social services, etc.).

An additional measure to raise consumer awareness of energy efficiency is agreements with energy suppliers to inform consumers about the services they provide (EE6-E). For the period 2017-2030, energy suppliers will ensure the implementation of the scope of consumer education and advice and the measures provided for in agreements concluded between them or through other persons.

Policy coherence

It is important to note that energy poverty policies and measures seek policy coherence and promote a cross-sectoral approach, which is most evident when combining energy efficiency and financial support measures.

For example, persons who are reimbursed for heating have a duty to keep their costs as low as possible and to contribute to improving energy efficiency. The Lithuanian Law on monetary social assistance for deprived residents86 states that owners of apartments in a multi-apartment building who apply for compensation for heating costs of the dwelling must participate in the discussion and adoption of the decision at the meeting.

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on the implementation of a project for the renovation of a multi-apartment building, if such a decision is considered and taken, and participate in the implementation of the project. For those who do not comply with these obligations, if, as a result of their actions (inaction), the project for the renovation (modernisation) of a multi-apartment building has not been initiated, the right to reimbursement of the heating costs of the dwelling shall be restricted.

An identical process is also visible when choosing which buildings should be renovated. In the selection of buildings to be renovated and renovated, where the other selection criteria score the same, priority shall be given to buildings occupied by socially vulnerable persons. Such processes improve the compatibility of measures and bring mutual benefits in terms of energy efficiency and protection of vulnerable groups.

3.4.5 Financing of planned internal energy market measures

3.4.3. the financing of the measures is shown in the table below. The most costly project is the takeover of the ownership of the Klaipėda LNG vessel Independence, financed by AB Klaipėdos nafta.

85http://www.spis.lt/SkaiciuOkles/BustoSildymoIslaiduKompensacijos
86https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.215633/asr

3.4.3. table. Existing and planned internal energy market (including energy poverty) sector the indicative financing needs of the measures.

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total funds	Public money		Total funds	Public money	
Internal Market	1024,42	777,58	Climate Change Programme, EU Funds Investment (2021-2027), Connecting Europe Facility Facility, CEF)	165,00	0,00[89]	Other funds

Research, innovation and competitiveness dimension

Section2.5 'National objectives and objectives' of this plan describes the strategy papers, objectives and actions defining national policy orientations to promote research and innovation in the field of energy: NENS, concept of smart specialisation, actions implemented by the Ministry of Economy and Innovation. When assessing existing and/or planned policies and measures (Table 3.5.1.) to promote energy and climate innovation, this section describes the opportunities for the funds planned and relevant in the strategy papers.

3.5.1. table. Existing and planned policy measures in the research, innovation and competitiveness sector by 2030

NO.	INSTRUMENT

[89] The accompanying measures are either regulatory, so there is no need for public funds, or the measures will be implemented by energy companies.

EXISTING MEASURES	
MT1-E	Attracting investors in the manufacture of batteries for electric vehicles
MT2-E	Empowering the energy innovation pilot environment
MT3-E	Joint Nordic-Baltic Energy Research Programme
MT4-E	Ignitis Group Smart Energy Venture Capital Fund
MT5-E	Carrying out research to activate funds received from RES statistical surplus sold to Luxembourg in Lithuania
MT6-E	"Sumani specialisation"
MT7-E	"Experiment"
MT8-E	"Intellite"
MT9-E	"Pre-commercial purchases in LT"
P6-E	Promoting technological eco-innovation: Eco-innovation LT
P6-E	Promoting technological eco-innovation: Eco-innovation LT+
MEASURES PLANNED INCLUDE:	
MT10-P	Implement research on catalytic materials to assess the potential use of these substances for CO_2 reduction and/or hydrogen production
MT11-P	Implement research in the field of nuclear energy to assess the future use of nuclear energy and monitoring methodologies
MT12-P	Implement research into the use of hydrogen in fuels, gas and sector integration
MT13-P	Assess the feasibility of adapting the gas transport system to the transport of green hydrogen-methane blends and implement pilot projects for the development and adaptation of the system
MT14-P	Implement energy research in the field of digitalisation, to promote digitalisation of the sector

MT1-E: attracting investors in the manufacture of electric batteries. The measure envisaged in the measures plan for the implementation of the NPT (TSP) plans investment attraction actions to build capacity for the production of batteries or their components in Lithuania. *(2022-2025)*

MT2-E Enabling a pilot environment for energy innovation. The adoption of the pilot environmental provisions provided for in the NNS FSC by drafting and adopting amendments to the Lithuanian Law on Energy, the Law on Energy from Renewable Sources, the Law on Electricity and other legal acts, while at the same time granting VERT the right to grant exemptions to both state-regulated undertakings operating in this environment and other economic operators that do not have the necessary permits or licences, thus encouraging energy innovation. *(2019-2030)*

MT3-E Joint Nordic-Baltic Energy Research Programme. Intra-Baltic and Baltic Nordic energy research projects are funded. Research topics are currently identified: (a) decarbonisation of transport; (b) energy efficiency in buildings and industry; (C) energy system analysis; (D) challenges and opportunities for regional electricity interconnections/markets. *(2018-2024)*

MT4-E – Ignitis Group Smart Energy Venture Capital Fund. The Smart Energy Risk Capital Fund managed by Contrarian Ventures invests in start-ups that develop new technologies in energy. *(2017-2030)*

MT5-E: carrying out research by activating the proceeds of the RES statistical surplus sold to Luxembourg in Lithuania. The Facility will co-finance research and pilot projects in line with the themes of the European Horizon Programme Clean Energy Transition Partnership. *(Years 2023-2028)*

MT6-E. 'Smart Specialisation'. For 2021-2027, 3 R & I priorities have been identified, covering the most effective themes of the priorities of the Smart Specialisation Programme 2014-2020. The new list of priorities for smart specialisation was agreed with the social partners in Lithuania and with the European Commission. The smart specialisation for 2021-2027 will include health technologies and biotechnology; new production processes, materials and technologies; information communication and technology priorities. Among these, the most relevant NECPs are 'New production processes, materials and technologies'. *(2014-2023)*

Table 3.5.2. RTEPI priorities for smart specialisation

RTEPI priority	Priority Theme
New production processes, materials and technologies	1. Photonics and laser technologies. 2. Advanced materials and structures. 3. Flexible technologies for product development, manufacturing and process management, design. 4. Energy efficiency, smartness. 5. Renewable energy sources:

In the Smart Specialisation, activities are planned in line with the Lithuanian smart specialisation approach:

- In the first strand, the following activities are planned:
  - Enhancing the capacity of researchers, making researchers' careers more attractive;
  - Enhancing the capacity to innovate, equipping SMEs with the skills needed to adapt to technological changes in the economy and industrial transformation.
- In the second strand, the following activities are planned:
  - promote applied R & D and strengthen scientific management and knowledge commercialisation skills in higher education institutions;
  - promote the operation of the RTEPI infrastructure and the system of knowledge transfer and commercialisation;
  - promote development, acceleration and expansion of start-ups;
  - promote the supply of innovation;
  - promote industrial transformation;
  - promote innovation in the public sector.
- In the third strand, the following activities are planned:
  - increase the level of internationalisation of science;
  - promote the participation of SMEs in international R & I initiatives;
  - encourage the attraction of foreign direct investment.

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MT7-E. "Experiment". The measure will encourage enterprises to invest in research and/or experimental

development for the development of innovative products, services or processes, as well as to stimulate the development of enterprises by investing in the creation and development of R & D and innovation infrastructure. *(2018-2023)*

MT8-E "Inteleta". The measure will encourage enterprises to invest in research and/or experimental development for the development of innovative products, services or processes, as well as to stimulate the development of enterprises by investing in the creation and development of R & D and innovation infrastructure. *(2018-2023)*

MT9-E. Pre-commercial purchases LT. The Facility will stimulate demand for innovation in all areas of public governance. The share of public investment in innovative procurement is expected to increase steadily until at least 20 % of each ministry's planned public procurement in 2027. *(2018-2023)*

P6-E: Enhancing technological eco-innovation.

Eco-innovation LT (No 03.3.2-LVPA-K-832) → The objective of the measure is to encourage micro-enterprises and SMEs to adopt non-technological eco-innovations, i.e. environmental management/management systems (EMS), manufacturing technological and/or environmental audits and ecodesign principles in product design. *(2018-2023)*

Eco-innovation LT+ (No 03.3.2-LVPA-K-837) → the objective of the measure is to encourage micro-enterprises and SMEs to adopt technological eco-innovations to mitigate the negative effects of climate change and greenhouse effects. *(2018-2023)*

MT10-P: Implement research on catalytic substances to assess the potential use of these substances for CO_2 reduction and/or hydrogen production. Within the scope of the measure, research on catalytic materials will be implemented to assess the potential use of these substances to reduce $CO2_{emissions}$ and/or green hydrogen. The scope of the measure will also aim at creating a prototype of an appliance that could act as a catalyst for CO_2 reduction and/or hydrogen production. The ongoing studies will be carried out by a single scientific team throughout the lifetime of the measure. The Research Coordinating Authority is the Scientific Council of Lithuania. *(Years 2023-2029)*

MT11-P: Implement nuclear research to assess the future use of nuclear energy and monitoring methodologies. The instrument will implement a research programme in the field of nuclear energy. Researchers and research teams will be invited to carry out research on the following topics:

- the energy generation of small modular nuclear reactors and the safety of higher actinides; and use of thorium to generate energy;
- ion fibre retrofitting of new materials for batteries and radiation sources and testing by nuclear spectrometry techniques;
- development of spectrometric and isotopic methodologies for the monitoring and verification of greenhouse gas emissions and development of instruments.

The coordinating authority of the programme shall be the Scientific Council of Lithuania. *(24-2026)*

MT12-P: Implement research on the use of hydrogen in fuels, gas without i

sector integration. Within the scope of the measure, research will be carried out exploring the use of hydrogen for synthetic fuels, gas and the potential for sector integration. *(2023-2030)*

MT13-P: Assess the feasibility of adapting the gas transport system to the transport of green hydrogen/methane blends and implement pilot projects for the development and adaptation of the system. The measure aims to identify how the existing gas system can be adapted for the transport of green hydrogen.

Within the scope of the measure, a pilot project will be carried out to connect hydrogen electrolysis units to renewable electricity generation and the gas transmission and distribution system. Hydrogen gas produced by electrolysis in the *P2G (Power-to-Gas)* plant will be blended with natural gas in various proportions and transported to consumers. As a result of the pilot project, a study will be carried out on the basis of the hydrogen transport study programme developed by the Lithuanian Energy Institute. *(2023-2025)*

MT14-P: Implement research in the field of energy digitalisation to boost the digitalisation of the sector. The scope of the measure will include research on the digitalisation of the energy sector related to the use of open data by large energy companies, the creation of digital *twinning,etc. (23-2029).*

Measures to promote industrial competitiveness

Section 2.5of this plan describes the objectives formulated by the Ministry of Economy and Innovation to foster industrial transformation and competitiveness. The objectives are pursued by the activities approved by the Progress Measure 05-001-01-04-02 "Encouraging enterprises to make the transition towards a climate-neutral economy". The measures on industrial and industrial processes listed in section 3.1.1contribute most to the promotion of industrial competitiveness: P2-E, P4-E, P5-E, P6-E, P10-E, P11-E, P12-E, P13-E, P14-E, P15-E, P17-E.

The draft guidelines for Lithuania's transition to a circular economy by 2035 integrated measures to promote industrial competitiveness, aimed at:

- promote applied research and experimental development on the circular economy by providing for key investments in re-use, substitution of fossil raw materials with bio-based and secondary raw materials, production of long-lived products, development of new curricula, changing consumer habits;
- include circular economy issues in general education and vocational training programmes;
- analysis of potential investors that can contribute to the development of the circular and green economy in value chains of relevance for Lithuania and the EU;
- introducing requirements for the use of secondary raw materials and alternative materials, replacing fossil and non-metallic resources, minerals;
- promote the acquisition of digital-circular technologies and/or systems (e.g. digital-circular twins) supporting the development of the circular economy;
- promote the uptake of environmentally friendly innovative technologies, i.e. those promoting the production of sustainable products, in companies active in the fields of S4;
- promote the development and/or deployment of environmentally friendly products or technologies;
- promote the transition of businesses towards a circular economy.

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In order to improve the competitiveness of clean energy technologies in the country, it is important to:

1. increasing cost competitiveness as a key factor, focusing on reducing the costs of clean energy technologies through economies of scale, technological progress, increasing the efficiency of production processes and installations through R & D, simplified supply chains and cost-saving incentives;
2. implement policy and regulatory support measures to increase the uptake of clean energy technologies, including feed-in tariffs, tax incentives, grants, renewable portfolio standards, to ensure

clear and stable policy frameworks ensuring a predictable business environment and attracting investments;

3. increase investment in R & D to stimulate technological progress and innovation in clean energy technologies that increase efficiency, productivity and reliability, technology competitiveness, promote public-private partnerships, cooperation with research institutions, accelerate R & D;
4. promote international cooperation and the sharing of knowledge, best practices and technologies;
5. promote consumer and business awareness of the benefits of clean energy technologies, stimulate market demand through incentives, public procurement programmes and green finance opportunities;
6. development of a skilled workforce – Investment in curricula and upskilling to prepare skilled workers for the clean energy industry, development of education and training programmes aligned with industry needs to meet the needs of specialised knowledge and competences;
7. financing and investment support: improve access to clean energy project finance and investment by developing mechanisms for green bonds, venture capital funds and public-private partnerships to raise capital, reduce investment risk through policy guarantees, improve credit and risk-sharing mechanisms.

SET-Plan

The SET-Plan (Strategic Energy Technology Plan) is the technological pillar of the EU's energy and climate policy. The Ministry of Energy of the Republic of Lithuania and the Ministry of Education, Science and Sport of the Republic of Lithuania are members of the SET-Plan management group. Lithuanian representatives participate in the following SET-Plan Implementation Working Groups:

- batteries;
- nuclear safety;
- high Voltage Direct Current (HVDC) technologies.

The information generated in the SET-Plan format shall be used to draw up or update national energy strategy papers, identifying the country's promising energy technologies and research needs for their development.

Horizon Europe's Clean Energy Transition co-funded partnership

The Ministry of Energy of the Republic of Lithuania is part of the European Horizon Partnership for Clean Energy Transition (which is also planned to be joined by the Lithuanian Science Council as of 2024). In 2022, the Ministry of Energy had earmarked EUR 1.4 million for the following Partnership thematic invitations:

- An "optimised integrated European energy system without greenhouse gas emissions";
- "Ensuring climate neutrality through energy storage technologies, renewable fuels and carbon capture without utilisation/storage".

Funding of planned research, innovation and competitiveness measures

Table 3.5.3. shows the financing of the measures. The planned measures will focus public investment on research on the use of hydrogen, on nuclear energy and/or on the digitalisation of the energy sector.

Table3.5. *Indicative need for funding of existing and planned measures in the research, innovation and competitiveness sector.*

Sector	Existing instruments in EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Research, innovation and-competitiveness	Total funds	Public money	Investments from EU funds (2014-2020), Municipal funds, State budget.	Total funds	Public money	Modernisation Fund, European Horizon Programme, Euratom, other sources.
	775,52*	633,66*		8,7	8,7	

* “smart specialisation”, “experiment”, “intellectual”, “pre-commercial procurement LT”, “promoting technological eco-innovation”: Eco-innovation LT and promotion of technological eco-innovation: The Eco-Innovation LT+ part consists of horizontal funds and only part of it will be used for energy and climate-related projects (selected through joint calls)”.

SECTION B: ANALYTICAL BASIS

STATE OF PLAY AND FORECASTS APPLYING EXISTING POLICIES; AND MEASURES[90,91]

[90] Current situation is the situation described in the latest data available at the time of drafting the NECPs. Existing policies and measures encompass implemented and adopted policies and measures. 'Adopted policies and measures' means policies and measures decided upon and clearly committed to implement them. 'Implemented policies and measures' means policies and measures which, at the date of submission of the national plan or progress report, meet one or more of the following conditions: directly applicable European Union legislation or national legislation, one or more voluntary contracts, financial resources and human resources are in force.

[91] The choice of external factors can be based on assumptions made in the EU Reference Scenario 2020 or other subsequent policy scenarios for the same variables. In addition, Member State-specific results presented in the 2020 EU Reference Scenario and subsequent policy scenarios can be a useful source of information for national projections using existing policies and impact assessments.

4.1 Projected evolution of the main external factors influencing changes in the energy system and GHG emissions

This chapter describes a scenario for the implementation of existing policies and measures (PPMs): the impact of policies and measures on achieving GHG emission reduction targets, increasing the use of RES and energy efficiency. It also describes aspects of energy security, the internal energy market and research, innovation and competitiveness.

Macro-economic factors are assessed by checking:

In the modelling of energy and GHG indicators, two main indicators were used: GDP (gross domestic product, constant prices (circuit-linking) and Lithuanian population change until 2040.

Between 2005 and 2007, Lithuanian GDP grew steadily, reaching its peak in 2007 (EUR 34.9 billion), but in 2008-2009 the country experienced a recession as a result of the impact of the global financial crisis. As a recovery from the crisis, GDP started to grow again since 2010, reaching a significant level of EUR 43.4 billion in 2019. The global COVID-19 pandemic and related economic restrictions led to a fall in Lithuania's GDP in 2020. Lithuania achieved rapid growth and a reduction in GHG emissions in its economy. Between 1990 and 2020, GDP grew by 76 % and GHG emissions decreased by 59 %.

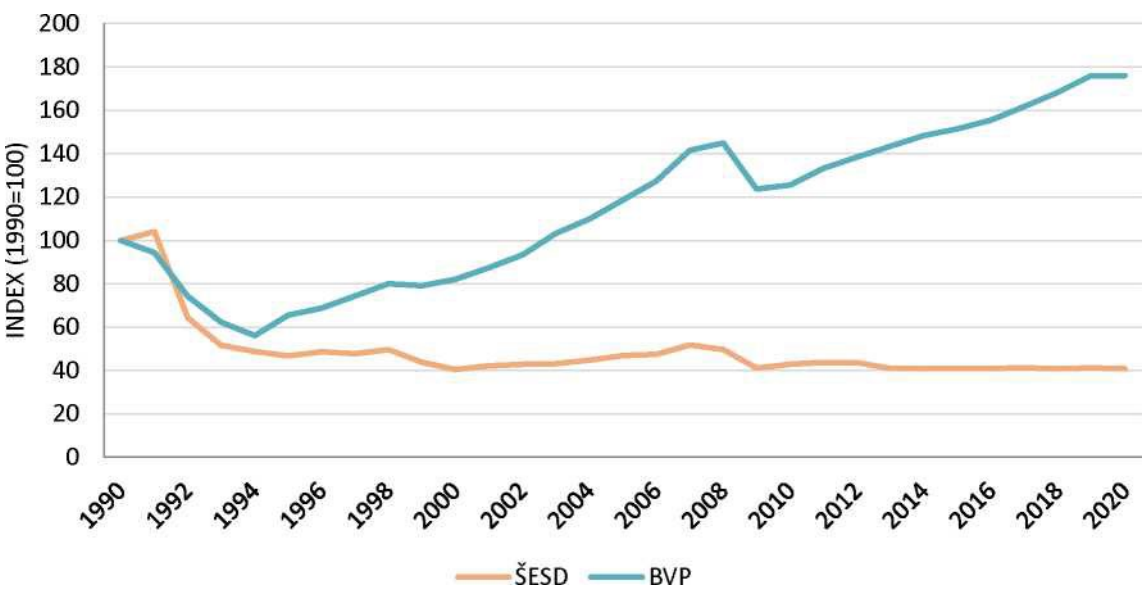


Figure 4.1.1. Lithuanian GDP and GHG emissions 1990-2020

While Lithuania's economy managed relatively successfully to cope with the challenges posed by Russia's war in Ukraine last year, with an annual change in GDP of 1.9 %, at the end of the year there were signs of advantage over a more complex period: In the fourth quarter, value added in manufacturing economic activities fell by 2 % and in wholesale and retail trade, transport, accommodation and food services by 2.2 %, while foreign demand slowed down the change in exports of goods and services from 15.2 % in the first three quarters of 2022 to 1.3 %. In the fourth quarter, household expenditure on goods and services decreased by 2.8 % in the fourth quarter. This year's economic activity will be hampered by the persistence of geopolitical tensions due to Russia's aggression in Ukraine, an unstable external environment, and the growing impact of monetary policies on domestic and foreign demand, which started last year. We expect that the change in GDP will slow down to 0.5 % in 2023, with an average annual rate of around

3 % between 2024 and 2026.

Table 4.1.1. Forecast of key macroeconomic indicators (LR Ministry of Finance)

Name of the indicator	2022	2023	2024	2025	2026
1. Percentage change in gross domestic product at constant prices	1,9	0,5	3,0	3,0	3,0
2. GDP at constant prices in EUR million	46897,7	47132,6	48547,3	50002,1	51501,5
3. Change in GDP at current prices, percentage	19,1	10,3	5,3	5,1	5,1
4. GDP at current prices, EUR million	66918,2	73829,7	77779,6	81743,8	85884,5
5. Percentage change in labour productivity (GDP at constant prices per employed person)	—1,9	1,2	3,0	3,1	3,2

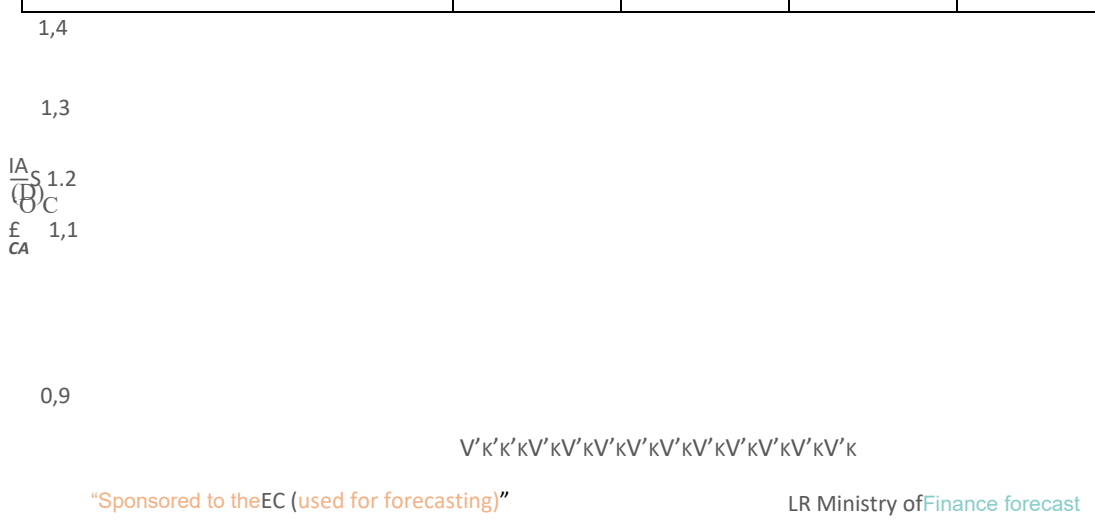


Figure 4.1.2: GDP forecast for 2020-2040

Considering that the Ministry of Finance’s forecast for the current year is slightly different from the one recommended by the Commission to be used in the forecasting process and the data required for forecasts up to 2040 were used by the EC for calculations.

Between 1992, when the population in Lithuania reached its maximum of 3706 thousand, it decreased by 23 % in 2017. (an average of 1.28 % each year) and 1 January 2017 stood at 2848 thousand. According to the State Data Agency, 2830 thousand inhabitants were living on 1 July 2022. A number of factors contributed to the depopulation of the population: negative birth rates, mortality, emigration. This leads to a shrinking population, a decline in the share of children and working-age people in the overall age structure and an increase in the share of dependent older people.

Based on projections made in 2021, Lithuania will continue to follow the trend of depopulation and ageing for the

period 2021-2040. Lithuania is expected to have 2 million 576 thousand inhabitants in 2030 and 2 million 340 thousand inhabitants in 2040. The population change resulting from Russia's war against Ukraine was not assessed at the time of drafting of the NECPs, but this did not have a significant impact on the calculations.

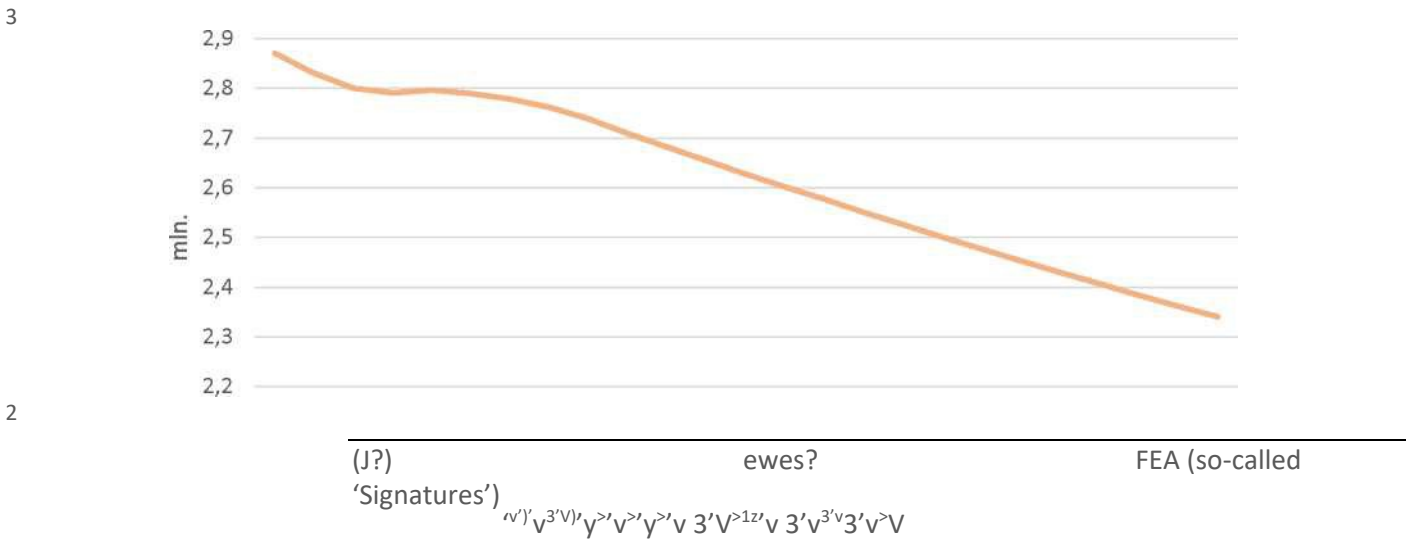


Figure 4.1.3. Population evolution 2016-2020 (average annual) and forecast 2021-2040

Sectoral and technological developments

Technology will play a key role in achieving Lithuania's energy and climate policy objectives. Lithuania's main objectives in developing new energy technologies are to promote and increase the use of RES and to facilitate energy efficiency so that the Lithuanian industry remains innovative and competitive. In order to achieve them, the development of RES needs to be accelerated, such as: biofuel production technologies, wind and solar energy, as well as hydrogen production using RES. All this should be achieved through a more efficient use of energy resources in energy production processes, buildings, industry and transport. Taking into account the impact of existing policy measures on the energy sector by 2040, the planned measures to improve energy efficiency (EE) and the promotion of RES, the main changes are expected to occur in the energy production and transport sectors.

Energy sector

The implementation of existing policy measures will lead to a particularly rapid development of RES technologies in the energy sector. In addition to the faster development of conventional RES technologies through support schemes for energy generation, RES enabled energy consumers to become prosumers in 2015. There are currently just over 55000 prosumers in Lithuania with a total installed capacity of almost 661 MW.

Transport sector

As a continuation of existing policies and measures in the transport sector, the target for the share of biofuels blended with mineral fuels will continue to reach 16.8 % in 2030. (The 2022 target is 6.8 %) and the uptake of electric, biogas and hydrogen vehicles will also be promoted. Without additional policy measures, the renewal of Lithuania's old and polluting passenger car fleet will take time. In the heavy transport subsector, biomethane and hydrogen are visible as an alternative to fuels. The replacement of road vehicles is closely linked to the development of the fuel infrastructure and measures will be taken to ensure the infrastructure requirements foreseen in the alternative fuels infrastructure regulation. Rail and bus sub-sectors are making smart solutions and electrification is foreseen.

Agricultural sector

While technological progress in Lithuanian farms is increasing, the sector is still lagging behind the EU average. However, there is scope for using technologies developed and proven in other countries, such as organic or other environmentally friendly production; reducing the use of mineral nitrogen fertilisers in crop farms, replacing fertilisers with other preparations developed with new technologies and safer for the environment; changes in the feeding ration of animals; using more advanced techniques, equipment and advanced technologies for manure storage and management, etc.

Industry sector

In the industrial sector, existing policy measures are designed to incentivise the shift from fossil fuels to RES use and energy efficiency improvements. This is an opportunity for electricity-intensive undertakings to benefit from the relief by paying for services of public interest related to the production of electricity from renewable energy sources in the electricity sector, by committing to carrying out an energy audit and implementing part of the recommendations contained therein, as well as a programme to promote energy audits in industry. In order to successfully expand and compete not only on the domestic market but also on the international market, industry is introducing, without further incentives, measures to scale up EE with a payback period of up to 3 years. The promotion of technological progress in the industrial sector is part of measures to promote the digitalisation and automation of production processes, such as robotics technologies, artificial intelligence solutions, deployment of Internet of Things systems, etc. The use of F-gas in the industrial sector in EU countries is already covered by a wide range of efficient GHG abatement technologies in commercial refrigeration and air conditioning equipment. These technologies are expected to be used to further reduce the negative environmental impact of the subsector.

Waste management sector

In the waste management sector, existing policy measures are aimed at reducing landfilling of municipal waste and recycling. New landfills complying with EU environmental requirements have been set up for solid waste disposal, as well as mechanical-biological treatment of biodegradable waste, projects for waste water treatment and the development of waste incineration capacity. Landfill gas is used for energy production or other purposes.

Household sector

Existing policy measures focus on three main factors affecting energy efficiency in households: the modernisation of buildings, the replacement of inefficient equipment and consumer behaviour. Under the multi-apartment building renovation (modernisation) programme, 2682 multi-apartment buildings were renovated between 2014 and 2020 and energy savings achieved during this period are 2 982 GWh, while 741 multi-apartment buildings were renovated in 2021-2022 and savings of 73.2 GWh were achieved during this period. As a continuation of the existing measure for the modernisation of multi-apartment buildings, over 3200 multi-apartment buildings are planned to be modernised over the period 2021-2030. Energy efficiency in households is strongly influenced by the replacement of boilers for more efficient biofuel boilers or heat pumps. As a result of this measure, 50000 boilers are planned to be replaced by 2030.

Services sector

In the services sector, there are two existing policy instruments: agreements with energy suppliers on consumer education and consultation, and agreements with energy companies on energy savings. The first measure is targeted at changing consumer behaviour. It requires energy suppliers and energy companies to educate and advise energy consumers on ways and means to reduce energy consumption. This measure is expected to generate savings of around 280 GWh annually. The second measure requires energy companies to install EE measures with final customers, thereby reducing energy consumption. The measures put in place are expected to save 60 GWh each year. These measures have been in place since 2017. The most popular educational and advisory tools used by energy suppliers are online and press advice and the provision of information together with bills. Energy companies tend to use a retrofitting measure for lighting and the replacement of fuel-powered vehicles with electric vehicles.

Trends in the global energy market

Global climate and energy trends reflect clear developments in energy production and consumption. The implementation of the Paris Agreement's long-term goals obliges States to contribute to the reduction of GHG emissions by providing a vision for the development of net-zero energy production in the country's national strategies. Lithuania attaches great importance to energy security, the integration and digitalisation of energy markets, the diversification of energy sources and energy production, the development of smart grids, the enhancement of EE and the promotion of RES consumption.

The price of EU ETS allowances is influenced by the overall EU ETS quota. The continuously decreasing number of allowances, together with the entry into force of the Market Stability Reserve, the assessment of different sources92, will increase the price of allowances to EUR 85/ATL by 2025 and EUR 99/ATL by 2030 in the short and medium term. This will mainly be influenced by the Market Stability Reserve93, which has been operational since January 2019. It is designed to address in the long term the historical surplus of allowances accumulated during the first stages of the EU Emissions Trading System, as well as making the EU Emissions Trading System more resilient to new sources of supply-demand imbalances.

The EU ETS is a cornerstone of the EU's climate policy and a key instrument to reduce GHG emissions in a cost-effective manner. In the period since 2005, the ETS has demonstrated the effectiveness of carbon pricing and emissions trading. Emissions in the system are on track, slightly above 8 % compared to the start of phase 3 (2013-2020). The price of allowances currently fluctuates around EUR 85 per tonne of carbon dioxide equivalent (tCO_2e). This forces companies in ETS sectors to take additional action to reduce GHG emissions.

As of 2024, fuel suppliers and fuel suppliers in the sectors participating in the EU ETS II (road transport, buildings and additional sectors such as small energy, construction and manufacturing and all other sectors excluded from the scope of the ETS) will start monitoring of the carbon emissions of the fuels supplied. As of 2027, reporting fuel and fuel suppliers will have to report allowances purchased on the market. As there will be no free allocation of allowances to participants in the scheme, the scheme will have an impact on fuel and fuel price increases.

Taking into account the European Commission's assessment that the ETS II price should range from EUR 30 to EUR 80 between 2026 and 2030. This price signal, together with the adoption of an amendment to the Law on Excise Duty, will promote a shift towards less polluting or zero-emission fuels and fuels (by replacing zero-emission alternatives – biofuels, hydrogen, biomethane, biogas, promote the development of the electric vehicle grid), decarbonisation, the

92https://www.statista.com/statistics/1334906/average-carbon-price-projections-worldwide-by-region/
93https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.264.01.0001.01.ENG

development of innovative technologies, and mitigate the impact on the environment and climate change. A Social Climate Fund will be set up to mitigate the negative consequences of the partial auctioning of allowances.

Against this background, and taking into account the targets for increasing the EE and RES in Lithuania, as well as the existing and planned measures to achieve them, it can be concluded that Lithuania will be on track to meet its 2030 targets. No additional factor analysis was carried out and the assumptions made were based on the current situation and estimates of past trends.

Technology cost developments

In many parts of the world, RES technologies are the cheapest option for the introduction of a new energy generation technology. This option will become even more attractive as the cost of solar and wind technologies decreases. Energy prices for biofuels, hydropower, geothermal, solar and offshore wind are now at the level of fossil fuel prices in the period 2010-2018. In 2021, the global weighted average price of solar electricity was around EUR 48/MWh and onshore wind was EUR 33/MWh94.

RES competitiveness continued to improve in 2021. The global weighted average electricity price for newly launched solar energy (PV) and onshore and offshore wind projects decreased in 2021. This is despite rising prices for raw materials and RES equipment in 2021[95]. The Global Weighted Average Benchmark Electricity Price ('LCOE') launched in 2021 decreased by 13 % per year, from EUR 0.05/kWh to EUR 0.048/kWh, for new large-scale solar power projects.

The LCOE of new onshore wind farms decreased by 15 % in 2021, from EUR 0.039 per kilowatt hour in 2020 to EUR 0.033 per kWh in 2021. The offshore wind market witnessed an unprecedented expansion in 2021 (with 21 GW) and the LCOE price decreased by 13 % from EUR 0.086/kWh to EUR 0.075/kWh per year since 2020.

Between 2010 and 2021, the balance between RES and the competitiveness of current fossil fuels and nuclear energy has changed significantly. Between 2010 and 2021, LCOE for new large-scale solar PV projects decreased by 88 %, for onshore wind by 68 % and for offshore wind by 60 %.

In 2021, new large-scale solar PV and hydro power LCOE was 11 % lower than the cheapest new fossil fuel-fired electricity generation, while onshore wind power was 39 % lower. Geothermal energy and energy from biomass combustion remain on average more expensive globally than the cheapest fossil fuel-fired option, but they provide a secure energy supply and in some cases can be highly competitive.

Rising raw material prices, in particular for materials such as steel, copper, poly-silicon and aluminium, solar photovoltaic modules and wind turbines, have been increasing since around Q4 2020.

In setting the targets for Lithuania's EE and RES, technological price developments were taken into account and optimal measures were chosen from an economic and technological point of view. Modelling and forecasting for the period 2020-2040 did not further analyse the impact of technology prices. This shall only be taken into account when assessing the availability of individual technologies, the estimated budget and average market prices of policy measures to boost EE or RES.

94IRENA (2023), Low-cost finance for the energy transition

Decarbonisation dimension

4.2.1 GHG emissions and removals

Lithuania's GHG emissions (excluding GIFCM) in 2020 amounted to 20 173 kt CO_{2eq}. GHG emissions decreased by 65 % in 2020 compared to 1990 and by 19 % compared to 2005, excluding the GIFF. Table 4.2.1.1 shows the evolution of GHG emissions over the period 1990-2020.

Table 4.2.1.1. Greenhouse gas emissions from 1990 to 2020

Greenhouse gas emissions by individual gas	Base Year	In 1995	In 2000	2005	In 2010	In 2015	In 2019	In 2020
	kt CO_2eq.							
CO_2 emissions excluding CO_2 from the	35 768	15 092	11 876	14 117	13 947	13 320	13 920	13 649
CO_2 emissions including CO_2 from the	30 106	10 422	2 313	9 611	3 369	5 322	8 021	7 376
CH_4 emissions excluding CH_4 from FISH	7 779	4 929	4 304	4 352	4 038	3 776	3 311	3 207
CH_4 emissions including CH_4 from FISH	7 782	4 934	4 308	4 353	4 039	3 777	33 12	3 208

[95] IRENA, Renewable Power Generation Costs in 2021

N_2O emissions excluding N_2O from FIFCM	4 578	2 432	3 290	4 109	2 611	2 705	2 616	2 799
N_2O emissions including N_2O from FISH	4 691	2 550	3 403	4 222	2 747	2 840	2 738	2 914
HFCS	N/A	6	21	86	247	551	511	481
PFC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uncorrected mixture of HFCs and PFCs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SF_6	N/A	0	1	2	6	5	5	10
NF_3	N/A	N/A	N/A	N/A	N/A	0.24	N/A	N/A
Common GHG quantity(excluding (GIFCM)	**47 861**	**22 233**	**19 441**	**22 714**	**20 750**	**20 304**	**20 387**	**20 174**
Total GHG emissions (including FISH)	**42 330**	**17 701**	**10 009**	**18 336**	**10 327**	**12 459**	**14 612**	**14 013**
Greenhouse gas emissions by sector	**Base Year**	**In 1995**	**In 2000**	**2005**	**In 2010**	**In 2015**	**In 2019**	**In 2020**
	kt CO_2eq.							
1. Energy (excluding indirect CO_2)	33 148	14 189	10 947	13 175	13 135	11 293	11 927	11 847
2. Industrial processes and product use	4 351	2 134	2 891	3 770	2 164	3 463	3 355	3 076
3. Agriculture	8 936	4 436	3 966	4 146	4 147	4 482	4 183	4 347
4. Land use, land-use change and forestry	—5 545	—4 547	—9 446	—4 392	—10 440	—7 861	—5 775	—6 161
5. Wastes	1 689	1 701	16 88	1 492	1 402	1 118	922	903
Greenhouse gas emissions EU ETS and EU ETS non-participating sectors	**1990 m.**	**1995 m.**	**2000 m.**	**2005 m.**	**2010 m.**	**2015 m.**	**2019 m.**	**2020 m.**
	kt CO_2eq.							
EU ETS (from stationary installations)	NA	NA	NA	9 690	7 921	6 817	6 047	6 121
EU ETS (from domestic aviation)	NA	NA	NA	2	2	2	2	2
EU ETS (total GHG emissions)	NA	NA	NA	9 692	7 923	6 819	6 049	6 123
No-ETS	NA	NA	NA	13062	12851	13 371	14 237	14 081
Greenhouse gas emissions separately for the energy sector sub-categories	**1990 m.**	**1995 m.**	**2000 m.**	**2005 m.**	**2010 m.**	**2015 m.**	**2019 m.**	**2020 m.**
	kt CO_2eq.							
1. Energy	33 148	14 189	10 947	13 175	13 135	11 293	11 930	11 851
A. Fuel combustion	32 827	13 876	10 620	12 767	12 609	10 743	11 368	11 388
1. Energy production	13 552	6 373	5 056	5 655	5 329	3 154	2 278	2 646
2. Industry and construction	6 160	1 757	1 090	1 491	1 290	1 187	1 299	1 186
3. Transport	5 811	3 178	3 216	4 195	4 382	5 085	6 285	6 138
4. Other sectors	7 304	2 567	1 255	1 413	1 592	1 281	1 476	1 390
5. Military	0	1	3	13	16	36	29	28
B. Futy fuel emissions	321	313	327	408	526	549	562	463
1. Solid fuels	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

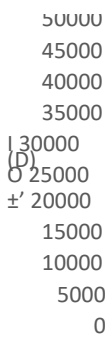
2. Oil and natural gas and other emissions GHG quantity energy in the manufacture of	321	313	327	408	526	549	562	463

Following a significant recession in 1992 caused by the collapse of the Soviet economy, the transition from a centralised planned economy to a market economy, transforming manufacturing, energy industries and agriculture. After 50 years of annexation of the Soviet Union in 1990, Lithuania inherited an energy-intensive economy. The resource blockade of the USSR 1991-1993 led to a sharp decline in economic activity, as evidenced by the fall in GDP at the beginning of 1990. The economic situation improved in the mid-1990s and GDP grew until 1999 (from 1999 to 2000 GDP fell due to Russia's economic crisis) and continued to increase between 2001 and 2008.

At the beginning of 1990, combustion of fossil fuels was dominated by manufacturing, energy and agriculture. The comparison of the annual total fuel balances for the period 1990-2020 shows a significant decrease in final consumption of heavy fuel oil (e.g. from around 57 800 TJ in 1990-1991 to 19 307 TJ in 1 992.13126 TJ in 1995 and less than 600 TJ from 2008 onwards), as well as a decrease in the use of coal, petrol and natural gas, but an increase in wood consumption. The reduction in the use of heavy fuel oil was primarily affected by environmental requirements: the use of sulphur fuel oil has been banned since 1 January 2004 and even stricter requirements have entered into force since 2008. As it was not economically viable for companies to remove sulphur from fuel oil, these requirements led to a shift from fuel oil to other fuels (e.g. natural gas), leading to a significant reduction of annual GHG emissions.

The last significant decrease in 2009 was linked to the economic crisis in Europe, while after 2009 GHG emissions stabilised at around 20 Mt ofCO_2eq.

Overall GHG emissions decreased by 1 % in 2020 compared to 2019. (excluding FISH)



the

4.2.1.1. figure: Trends in GHG emissions 1990-2020

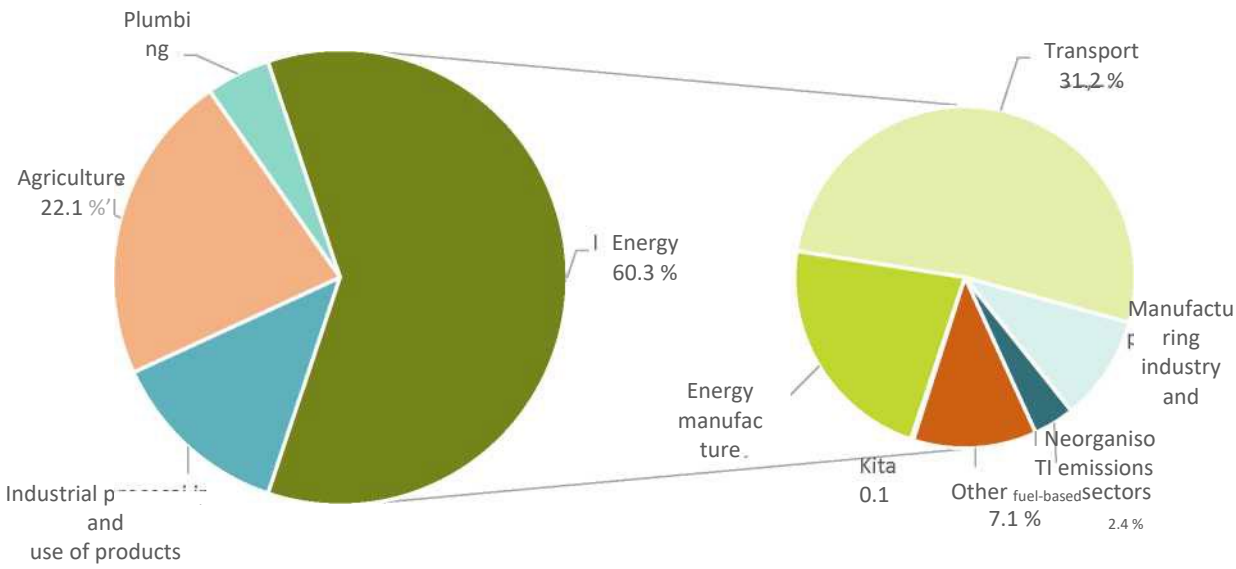
The energy sector accounts for thelargest share of greenhouse gas emissions, accounting for 60.3 % of total GHG emissions in 2020. CO_2– 82.1 % of total CO_2emissions and CH_4 – 15.4 % of total CH_4 emissions – were the largest contributorsfrom the energy sector, with small N_2O accounting for 5.3 % of totalN_2Oemissions.

The second largest emitter is agriculture, accounting for 22.1 % of total GHG emissions. Agriculture accounted mainly for N_2O – 87.4 % of total N_2O gas and CH_4 58.6 % of total CH_{4gas} in 2020, as well as a small amount of CO_2– 0.2 % of total$_{CO2}$ emissions.

Industrial processes and the use of industrial products accounted for 13 % of total GHG emissions, of which $CO_{2\,17.7}$ % of total $CO_{2emissions}$ and N_2O – 5 % of total$_{N2O}$ emissions. One of the main sources of GHG emissions in industrial processes and products in the sector is the use of fluorinated greenhouse gases, where GHG emissions accounted for 16.7 % of total industrial emissions in 2020.

The waste sector accounted for 4.6 % of total GHG emissions in 2020. The sector was mainly responsible for CH_4 gas, accounting for 261 % of the total CH_4 content, as well as a small quantity of N_2O, 2.3 % of the total N_2O content.

4.2.1.2. figure 2.1 shows the sectoral breakdown of GHG emissions in 2020.

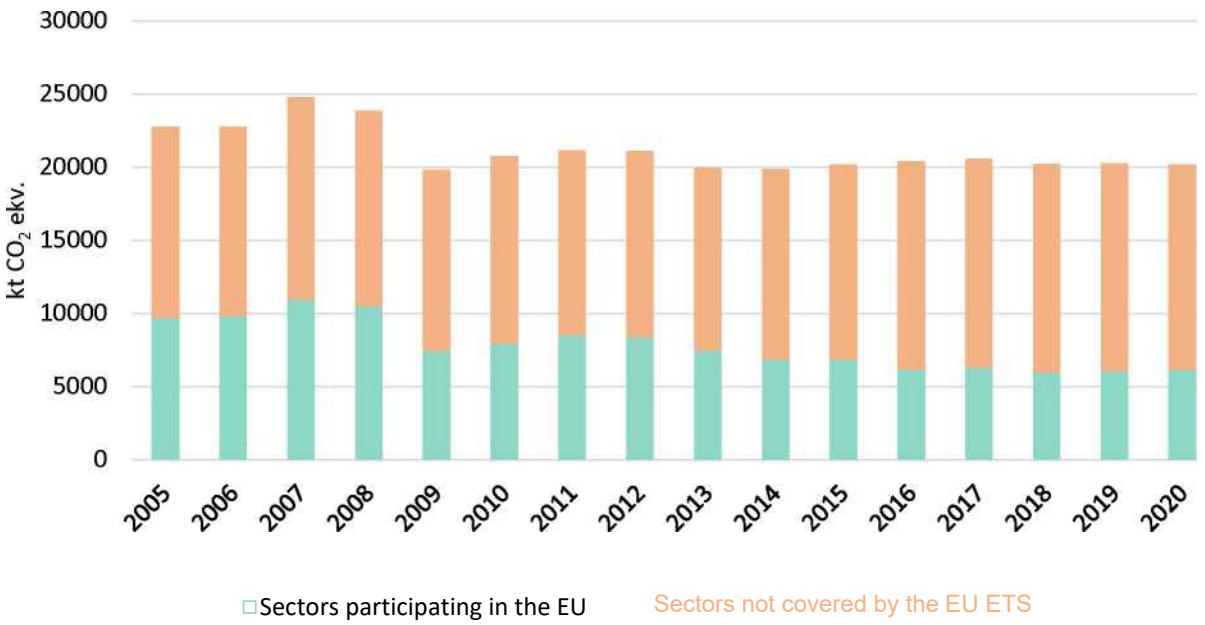


4.2.1.3. figure: Breakdown of Lithuania's GHG emissions by sector (excluding GIFCM) in 2020

In Lithuania, the share of GHG emissions from non-ETS sectors is higher than that of the sectors participating in the EU ETS. Between 2005 and 2020, this share increased from 57 % to 70 % of total GHG emissions (Figure 4.2.1.3).

Greenhouse gas emissions in the sectors covered by theEU ETS amounted to 6121$_{ktCO2eq}$or 30 % of total GHG emissions in 2020, while non-ETS sectors accounted for 14081 ktCO 2 eq.$_{or}$70 % of national GHG emissions. Greenhouse gas emissions from the sectors participating in the EU ETS decreased by 37 % in 2020 compared to 2005, while emissions from non-ETS sectors were below the allocation of 7.9 % in 2020. It should be noted that since 2013, the chemical industry processes with 3.1 Mt CO2-eq. of the non-EU ETS have been allocated to the sectors covered by the EU ETS and therefore the change in emissions$_{from}$non-EU ETS sectors is considered positive/increased, although it is negative (decreased) according to actual data.

SECTION B



4.2.1.4. figure: Trends in total GHG emissions 2005-2020 broken down by EU ETS participating and non-EU ETS sectors

Projections of sectoral developments under existing policy measures

The projected emissions were based on projections of activity data for the sectors concerned. Table 4.2.1.2 shows the projected emissions for the period 2025-2040.

Table 4.2.1.2. Greenhouse gas emissions generated in 2005, 2019 and 2020 and projected emissions for the period 2025-2040 (with existing policies and measures)

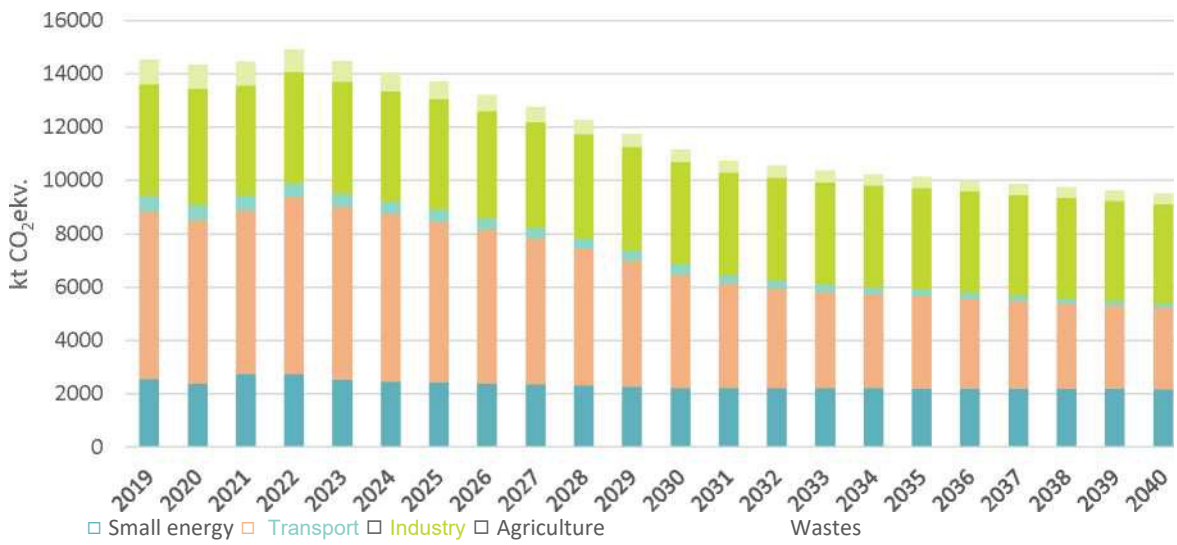
Greenhouse gas emissions by individual gas	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2eq.						
CO_2 emissions excluding CO_2 from the FISH	14 117	13 920	13 649	13 745	11 260	10 462	10 034
CO_2 emissions including	9 611	8 021	7 376	8 254	4 704	3 916	3 666
CH_4 emissions excluding CH_4 from FISH	4 352	3 311	3 207	2 789	2 413	2 345	2 285
CH_4 emissions including	4 353	33 12	3 208	2 790	2 414	2 346	2 286

N_2O emissions excluding N_2O from FIFCM	4 109	2 616	2 799	2 715	2 580	2 519	2 453
N_2O emissions including	4 222	2 738	2 914	2 820	2 678	2 611	2 542
HFCS	86	511	481	390	310	183	97
PFC	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uncorrected mixture of HFCs and PFCs	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SF_6	2	5	10	7	7	7	7
NF_3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total GHG emissions (excluding GIFCM)	22 714	20 387	20 174	19 646	16 570	15 517	14 875
Total GHG emissions (including FISH)	18 336	14 612	14 013	14 261	10 112	9 063	8 597
Greenhouse gas emissions by sector	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2eq.						
1. Energy (excluding transport) (sector)	8 981	5 645	5 713	5 613	5 246	5 215	5 184
2. Transport	4 279	6 285	6 138	6 058	4 259	3 476	3 071
3. Industrial processes and product use	3 770	3 355	3 076	3 183	2 738	2 596	2 495
4. Agriculture	4 146	4 183	4 347	4 133	3 864	3 806	3 736
5. Land use change and forestry	—4 392	—5 775	—6 161	—5 385	—6 458	—6 454	—6 278
6. Wastes	1 492	922	903	658	463	423	389
Greenhouse gas emissions in sectors participating in the EU ETS and outside the EU ETS	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2eq.						
EU ETS (from stationary	9 690	6 047	6 121	6 216	5 678	5 662	5 641
EU ETS (from domestic aviation)	2	2	1.9	2.1	2.2	2.3	2.4

EU ETS (total GHG emissions)	9 692	6 049	6 123	6 218	5 680	5 664	5 643
No-ETS	13 062	14 531	14 338	13 705	11 168	10 131	9 510
Greenhouse gas emissions in the GFCM sector under EU Regulation 2018/841 to the UNFCCC	**2021-2025**		**2026-2030**	**2031-2035**		**2036-2040**	
	kt CO_2eq.						
Amount of GHG accounted for by the GIFCM (credits if negative): EU/GIFCM (20212030)	—29 753		N/A	N/A		N/A	
Greenhouse gas emissions per energy sub-category	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2eq.						
1. Energy	13 175	11 930	11 851	11 672	9 505	8 691	8 255
A. Fuel combustion	12 767	11 368	11 388	11 079	8 919	8 109	7 673
1. Energy production	5 655	2 278	2 646	2 501	2 397	2 407	2 407
2. Industry and construction	1 491	1 299	1 186	1 090	902	886	871
3. Transport	4 195	6 285	6 138	6 058	4 259	3 476	3 071
4. Other sectors	1 413	1 476	1 390	1 400	1 332	1 311	1 295
5. Military	13	29	28	29	29	29	29
B. Futy fuel emissions	408	562	463	593	586	582	582
1. Solid fuels	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Oil and natural gas and other GHG emissions in energy production	408	562	463	593	586	582	582

The analysis of GHG emission projections showed that CO_2 emissions will increase in the transport sector in 2022, as the sector is recovering from the lockdowns imposed by the COVID-19 pandemic in 2020 and 2021. Thereafter, GHG emissions in the transport sector are projected to decline due to the planned policy measures and the evolution of vehicles in use. GHG emissions from road transport account for 96 % of total transport GHG emissions, of which 55 % come from passenger cars. Industrial GHG emissions are driven by technological processes, the integration of electrolysis into the ammonia installation and the use of biomethane gas, which is expected to gradually reduce CO_2

emissions. At the same time, in the industrial sector, emissions will decrease due to the decrease of fluorinated greenhouse gases resulting from the implementation of Regulation (EU) No 517/2014. The dynamics of GHG emissions in the agricultural sector depend on the quantities of mineral and organic nitrogen fertilisers used, livestock numbers, crop yields and cropland. The distribution of GHGs in agriculture is projected to remain stable until 2030. Agricultural soils will contribute 55 % and intestinal fermentation to 37 % of total agricultural GHG emissions. In the waste sector, GHG emissions are projected to decrease due to improved waste management systems that promote reuse by publicity companies, waste sorting. There are also projects to increase the provision of centralised waste water services to the population, which makes a significant contribution to reducing GHG emissions.



4.2.1.5. figure: Trends in GHG emissions between 2019 and 2040 by non-EU ETS sector

Sectors outside the EU ETS will continue to account for the largest share of Lithuania's GHG emissions in the future. Transport and agriculture are the main sources of GHG emissions. Figure 4.2.1.4 shows projected emissions by non-ETS sectors.

Projected emissions from sectors participating in the EU ETS are presented in Table 4.2.1.3. The forecast does not take into account changes in the price of allowances.

Table 4.2.1.3. Projected emissions in sectors participating in the EU ETS for the period 2025-2040

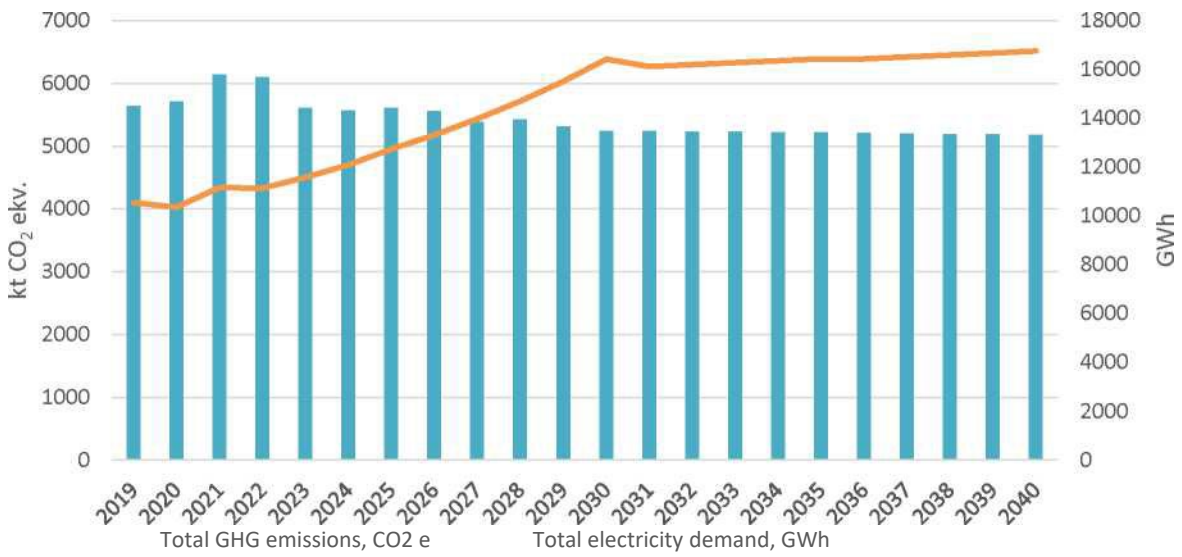
	Year 2025	2030	2035	In 2040
GHG emissions, kt_{CO2eq}.	6 218	5 680	5 664	5 643

Energy

GHG projections for the energy sector are based on estimated fuel burning projections for individual sub-sectors. The volatile fuel emissions of natural gas were calculated on the basis of the estimated quantities of natural gas released into the atmosphere provided by AB Amber grid and AB ESO. GHG emissions have been calculated on the basis of the methods95 set out in the 2006 IPCC Guidelines.

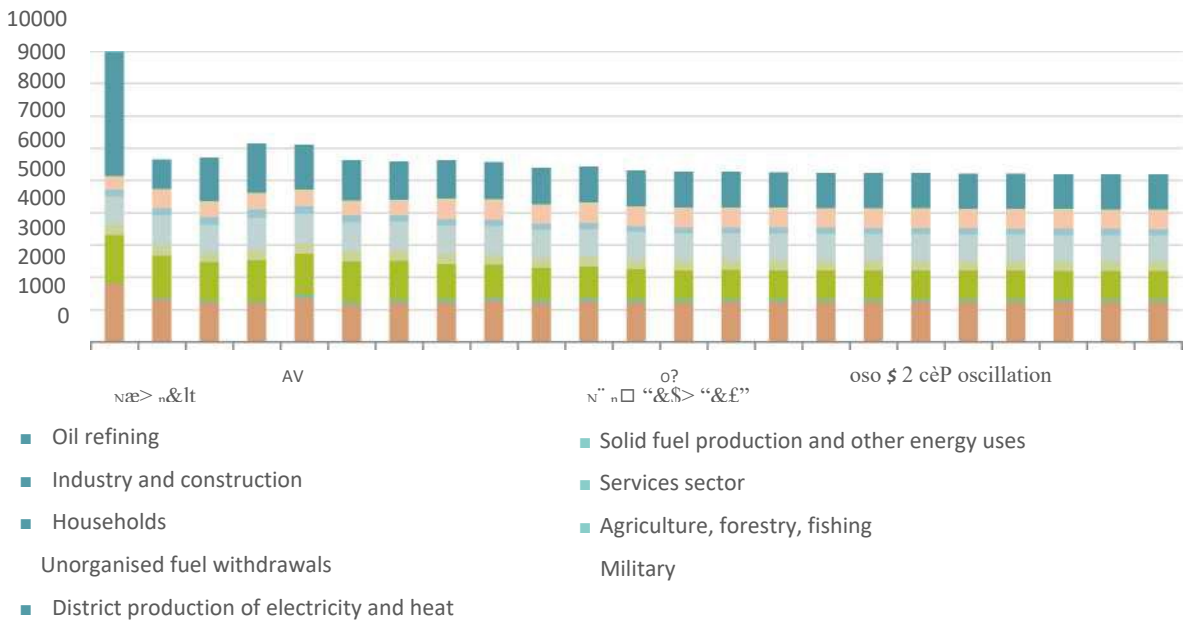
952006 Guidelines for National Greenhouse Gas Inventories by the Intergovernmental Panel on Climate Change (IPCC).

The average electricity demand is projected to increase by 55.7 % by 2030. thereafter, 58.9 % by 2040 until the end of 2040 to reach a total of 16 755 GWh, but this is unlikely to lead to higher GHG emissions in the energy sector, as electricity will mainly be produced from RES. The increase in electricity consumption is due to the development of electric vehicles in road transport and the increasing use of electrical appliances in households and in all branches of the economy.



4.2.1.6. figure: Projected total electricity demand and GHG emissions in energy sector (except transport)

The main sources of greenhouse gas emissions in the energy sector are expected to remain in district electricity and heat production, oil refining, industry and construction, as well as sub-sectors of households.



4.2.1.7. figure: Historical and projected GHG emissions, kt$_{CO2eq}$. (except for: transport sector)

Overall, GHG emissions in all sub-sectors will decrease or remain stable compared to 2020, except for other energy needs (due to the LNG terminal becoming fully operational as of 2022) and volatile fuel emissions due to projected higher hydrogen production volumes in the refined oil product plant. Increased energy efficiency and the use of biomass in 2040 are projected to reduce the use of fossil fuels by 17 % and final energy consumption by 4.5 %, leading to lower GHG emissions in this sector.

Transport

GHG projections for the transportsector are based on projections for road transport, freight and passenger transport and fuel consumption (in domestic aviation and rail transport). The fuel and energy projections for the number of cars in the baseline scenario have been calculated using a regression analysis. The baseline scenario projections for the number of goods vehicles and buses have been calculated using the expected road freight and passenger transport data presented in the study "Assessing the effectiveness of measures to reduce greenhouse gas (GHG) emissions in the transport sector and modelling projections"96. Data on internal aviation activities were provided by the Ministry of Transport and Communications and data on railways were provided by AB Lietuvos geležinkeliai. The fuel consumption for the transport of natural gas in the pipeline until 2024 is calculated as the sum of the estimated natural gas consumption provided by the natural gas transmission operator AB 'Amber grid' and the estimated consumption of the distribution operator AB ESO. Fuel consumption has been calculated from 2025 onwards on the basis of the gross consumption of natural gas simulated in the energy sector. GHG emissions have been calculated on the basis of the methods97 set out in the 2006 IPCC Guidelines.

96https://sumin.lrv.lt/uploads/sumin/documents/files/Transporto%20priemoniu%20SESD%20vertinimas%2020210610.pdf
972006 Guidelines for National Greenhouse Gas Inventories by the Intergovernmental Panel on Climate Change (IPCC).

The total number of internal combustion engine road vehicles is projected to increase until 2028, and thereafter due to the measures envisaged, this figure is expected to decrease by 2030. As regards Lithuania's demographic situation (population decline) and the development of electric vehicles, the number of internal combustion engine vehicles is also projected to decrease between 2030 and 2040, with an average of 4.2 % per year (from 1.9 million road vehicles in 2030 to 1.24 million in 2040). This development will lead to a corresponding trend in GHG emissions in the transport sector.

Historical and projected emissions from transport sub-sectors 2005-2040, thousand t CO_2 eq., are shown in Figure 4.2.1.7.

4.2.1.8. figure: Historical and projected GHG emissions from transport by categories

Compared to 2005, GHG emissions in all transport sub-sectors will increase or remain stable in 2030, with the exception of rail transport, where there is a significant decrease in freight turnover and rail electrification is currently taking place. As a result, the use of fossil fuels in rail is projected to decrease by 64.4 % in 2030, leading to lower GHG emissions in the sector.

The road transport sub-sector is estimated to remain the main source of GHG emissions in transport, accounting for 96.2 % of transport GHG emissions in 2019 and 95.7 %. Greenhouse gas emissions in 2040

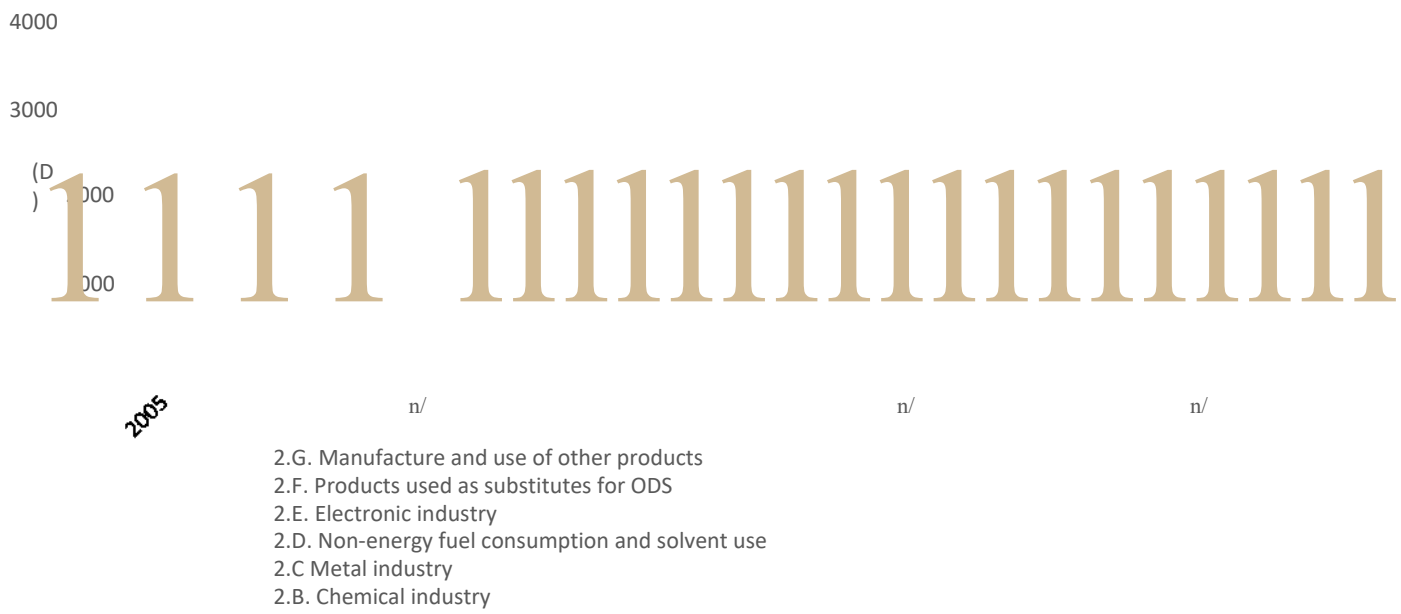
Industrial processes and product use

Projections of GHG emissions from the industrial processes and product use sector using existing policies and measures (EPP) based on production levels data (activity data) provided by major industrial production companies (cement, glass, lime, ammonia and nitric acid).

For 2025, 2030, 2035 and 2040, the interim data were interpolated. The forecast of fluorinated greenhouse gases is based on macroeconomic (GDP and population projections) indicators, on the number of vehicles including restrictions and prohibitions provided for in Regulation No98 517/2014 and Directive 2006/40/EC99. The GHG emission forecast was calculated using the methods100 provided by the 2006 IPCC.

The main sources of GHG emissions in industrial processes and product use are the chemical industry, the production of mineral products and the use of fluorinated greenhouse gases (Figure 4.2.1.8).

According to data provided by the chemical industry (ammonia and nitric acid production), the trend in GHG emissions between 2025 and 2028 will remain stable due to stable production capacity without any assessment of changes in the price of emission allowances, while fuel consumption will decrease slightly in the same year. However, in order to achieve zero emissions by the company by 2050. As a first step, the company plans to refurbish one ammonia unit in such a way that 30 % of green hydrogen is supplied to the ammonia unit. The first phase is to be implemented from 2029 onwards. This phase would lead to a 12 % reduction in the company's total emissions.



4.2.1.8. figure: Actual and projected greenhouse gas emissions from industry by category

Emissions from the production of mineral products are based on projections by industry taking into account the expected maximum production capacity and the best available techniques under the environmental permits of the companies. A large part of GHG emissions in the mineral production category belongs to cement production. According to the data provided by the company, cement production will increase until 2021 and production will remain stable until 2040 from 2022.

Emissions of fluorinated greenhouse gases are projected to gradually decrease as a result of the implementation of the requirements of Regulation No 517/2014. Fluorinated greenhouse gases have been introduced in Lithuania since 1993 and their consumption has gradually increased. F-GHG emissions peaked between 2016 and 2017 and started to

Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April98 2014 on fluorinates greenhouse gases and repealing Regulation (EC) No 842/2006

Directive 2006/40/EC of the European Parliament and of the Council of 17 May99 2006 relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC

Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories,100 2006.

decrease as of 2018. Fluorinated greenhouse gases are projected to continue to decrease gradually. The most significant GHG savings are due to the replacement of HFC-134a in automotive conditioning systems with alternative gases with GAP<150 and the R-404A blend used in commercial refrigeration equipment by 2022 to GWP&2500 and from 2022 to GAP<150.

Compared to 2005, greenhouse gas emissions from industrial processes and product use are projected to decrease by 27 % by 2030 and by 34 % in 2040. The main GHG emissions from industrial processes and product use come from the chemical industry (the ETS sector) and this category is projected to remain the largest source of greenhouse gas for industry in the future.

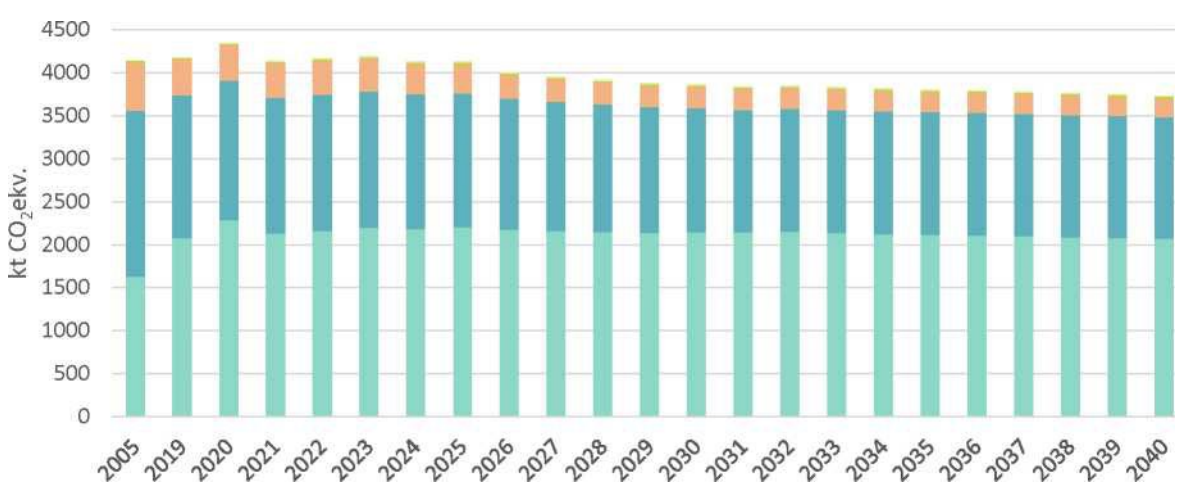
Agriculture

Projections of GHG emissions from agriculture, using existing policies and measures (EPP), based on livestock numbers, dairy cattle productivity indicators, distribution of manure management systems in the main livestock categories, use of mineral and organic N fertilisers, yields of main crops and yields used for soil liming. Activity data for GHG projections were provided by the Ministry of Agriculture of the Republic of Lithuania. GHG emissions have been calculated on the basis of the methods101 set out in the 2006 IPCC Guidelines.

The evolution of the number of livestock over the forecast period was assessed in the light of historical fluctuations in livestock numbers, prevailing market prices, demand and exports, and legislation. Mineral and organic (compos and sewage sludge) N fertilisers and substances used for soil liming have been assessed taking into account changes in crop area, and the need for N-fertilisation will also decrease as a result of the development of proprietary technologies. Crop yield forecasts have been assessed taking into account crop and soil fertility and forecast crop area. Cropland forecasts have been calculated on the basis of historical data, the situation on world markets and the development of agrobiotechnologies. Crop yields are projected to decrease, but wheat, barley and rapeseed will remain the main crops grown.

Compared to 2005, GHG emissions from agriculture are projected to decrease by 7 % by 2030 and by 10 % in 2040 (compared to 2005). Agricultural soils are the main contributors to the agricultural sector's GHG emissions. This category is projected to remain the largest source of greenhouse gas emissions in the agricultural sector in the future.

The resulting GHG emissions in the agricultural sector by agricultural category are shown in Figure 4.2.1.9.



1012006 Guidelines for National Greenhouse Gas Inventories by the Intergovernmental Panel on Climate Change (IPCC).

□ Agricultural soils □ Agricultural fermentation of the glands □ Manure management

□ Soil liming: use of urea

4.2.1.9. figure: Actual and projected emissions from agriculture by category

Land use, land use change and forestry (LULUCF)

The ESP forecast for the land use, land use change and forestry (LULUCF) sector is based on the National Forest Inventory (NFF) publication 'Lithuanian National Forest Inventory 1998-2017. From Measurements to Solutions", as corrected by the data on the use of forest productivity. Other key data used for forecasting are areas in the land use categories, increments and changes in volume of stands, volume of dead tree stems, areas of conservation agricultural practices.

The ESP scenario is based on measures already in place or planned in the near future. It is based on the areas of land use categories and the changes between the categories forecasted on the basis of the data reported in Lithuania's National GHG inventory report for102 2021. This scenario reflects the ambition to increase the forest area in Lithuania, as an average of 6.5 thousand hectares of new forest is expected to be afforested in the period 2023-2030. At the same time, a much more friendly approach to the environment in agriculture is expected to cover at least one third of the area under cultivation by 2030. Finally, more than 10 thousand ha of drained organic soils are expected to be restored to wetlands.

The total volume of Lithuanian trees, the increase in volume, the felling and the volume of trees that die naturally are predicted taking into account the evolution of the increase in the volume of forest inventoryd by the NMI between 2002 and 2017 and its use. The forecast of these parameters is based on the forest productivity forecast in the NMI publication, with the correction factor applied. According to the data obtained, the volume of live biomass stored in forests ranges from 4.49 to 6.15$^{\text{million m}^3}$ wood. For the entire period up to 2040 (see Table 4.2.1.4), uniform forest use (harvesting) was used for 10.4 million$^{\text{m}^3}$ wood. In addition, the proportion of dead wood in the overall balance of forest volume gains ranges from 2.6 to 3.0 million m^3.

102 https://am.lrv.lt/uploads/am/documents/files/Klimato_kaita/NIR_2021%2003%2015.pdf

Table 4.2.1.4. Actual and projected total increment of stand volume and its structure, millions[3]

Indicator	NMI data			Forecasts				
	2007	2012	2017	2020	2025	2030	2035	2040
Gross Increase	15,95	19,38	20,51	18,70	18,02	17,71	17,67	17,74
Stem volume used	9,68	8,05	10,11	10,39	10,39	10,39	10,39	10,39
Loss of trees	3,34	3,83	3,66	2,49	2,59	2,67	2,75	2,83
Annual accumulation of gains	2,93	7,50	6,74	5,82	5,04	4,65	4,53	4,52

The annual carbon removals in newly afforested forests are calculated separately and added to the projected CO_2 removals in permanent forests. CO_2 removals in new forests have been calculated on the basis of the volume change patterns determined by the trends in volume changes of newly established or self-forested areas measured at the time of NMI.

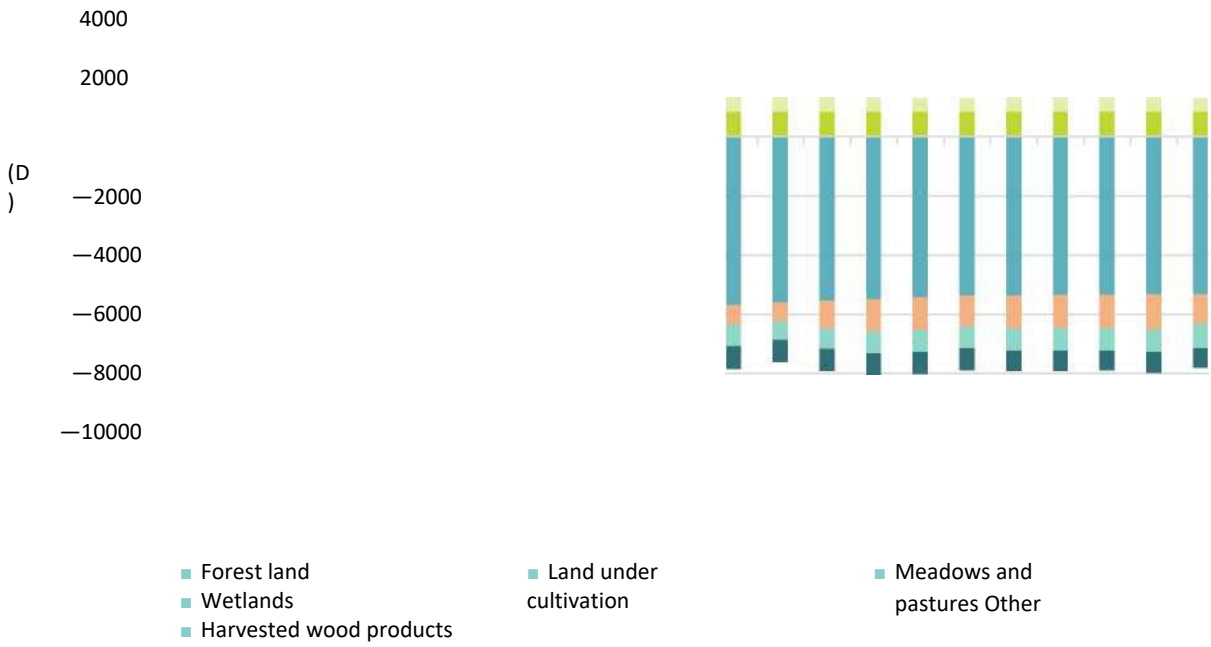
Removals in harvested wood products are forecast in proportion to the volume harvested by increasing the production of different timber products. The distribution of timber products between the different product groups (cut wood, wood-based panels and paper products) is forecast at the same level as in the base year (2019).

Table 4.2.1.5. Actual and projected GHG emissions from the GIFCM sector by land use category, kt CO_2eq.

Categories of the FISH sector	2005	2019	2020	2025	2030	2035	2040
Forest land	—4 307	—6 978	—7 092	—5 759	—5 661	—5 351	—5 295
Producing land	1 236	1 193	1 006	497	—637	—964	—885
Meadows and pastures	—1 647	—812	—765	—713	—734	—716	—736
Waters and wetlands	888	820	810	818	825	833	841
Built-up area	596	570	617	592	516	462	462
Other land	47	60	48	36	12	0	0
Harvested wood products	—1 210	—808	—784	—855	—779	—718	—664
Total GHG emissions	—4 397	—5 883	—6 161	—5 385	—6 458	—6 454	—6 278

Total removals in the GFCM sector are projected to reach -6 458 ktCO 2 eq.in 2030 and a relative increase in absorption of 9 % compared to 2019, while the projected increase in removals compared to 2005 is 47 %. Removals in 2040 (compared to 2005) will increase by 47 %. The main contributor to the increase in GHG removals in the GIFCM sector is the increase in carbon removals in mineral soils of the producing land category.

Removals and emissions generated by the GIFCM sector by land use category are shown in Figure 4.2.1.10.



4.2.1.10. figure: Actual and projected GHG emissions and removals from the GIFCM sector by category

The updated LULUCF Regulation (EU) 2018/841 distinguishes between two accounting periods during which its requirements have to be met. For the first period 2021-2025, we need to reach a forest accounting level of -5 164 kt CO_2 eq., which includes emissions/absorption managed forest land and harvested wood products. Reference levels are also distinguished for producing land, grassland and pasture, based on average GHG emissions/absorptions generated in the period 2005-2009. The preliminary values of these reference levels are 2186 and -1 201 kt CO 2 eq.respectively.

For the second accounting period, the target to be achieved is common to the entire FHFCM sector. It is part of the European Union's overall target of 310 Mt CO_2 eq. absorption. Currently, the 2030 target for Lithuania is -7 084 kt CO 2_{eq}. This is obtained by adding Lithuania's 2030 target of absorption of an additional -661 kt CO_2 eq to the average GHG balance of the NFCM sector in base year (2016-2018). At the same time, the binding period is the years 2026-2029, during which the GHG balance budget will have to be at least equal to the estimated trajectory of the target on which we need to move towards the 2030 target. Currently, Lithuania does not achieve the planned budget and target under the ESP scenario, as the projected GHG balance in the GFCM sector in 2030 is only – 6458 ktCO 2_{eq}.

Wastes

Projections of GHG emissions from the waste sector – ESP, with existing policies and measures103, based on macroeconomic (GDP and population forecast) indicators and the development of municipal waste management infrastructure. GHG emissions have been calculated on the basis of the methods104 set out in the 2006 IPCC Guidelines.

Municipal waste generation was estimated by a regression analysis based on national statistics (amount of municipal waste per capita), population and GDP. The amount of municipal waste generated is projected to increase to 1 288 kt

103The measures adopted and implemented are presented in Chapter 3.
1042006 Guidelines for National Greenhouse Gas Inventories by the Intergovernmental Panel on Climate Change (IPCC).

in 2030 and to 1193 kto in 2040. It is planned that no more than 5 % of all waste generated will be landfilled in 2030, the same percentage of waste being disposed of until 2040. Methane generation is estimated by the FOD (First Order Decay) method 105 presented in the 2006 IPCC Guidelines. Biogas generation and collection from landfills are projected to gradually decrease due to the decreasing amount of waste disposed of in landfills. Biogas collected from landfills is used to generate heat and electricity and is included in energy projections.

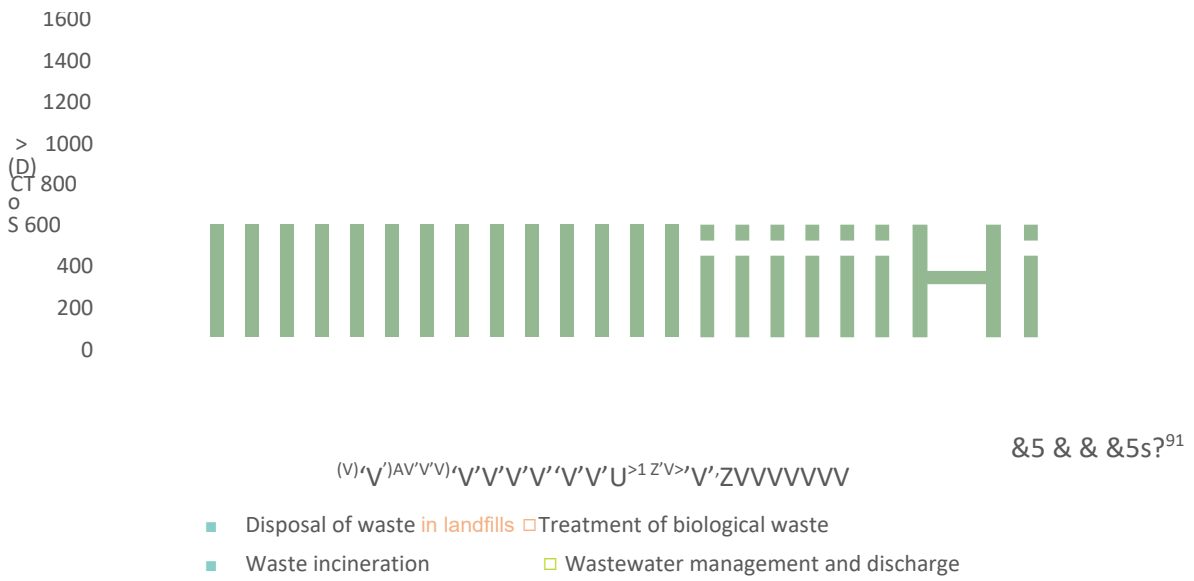
Projections of methane and nitrous oxide from composting of biodegradable waste have been assessed taking into account the existing capacity of mechanical-biological waste treatment plants and the predicted home composting. Home composting was measured by the number of composting boxes distributed and by the quantity of composted waste (220 kg) per household.

GHG emissions from waste water treatment and discharges have been predicted based on the expected bio-oxygen use, population forecast and the share of the population connected to the centralised water and waste water collection system. The share of connected population is estimated on the basis of EU-funded infrastructure development projects, reluctance to connect to centralised networks and other conditions, which assumes 85 % of the population connected in 2030 and 90 % in 2040.

Waste incineration without energy recovery represents only 0.1 % of total GHG emissions in the waste sector. Similar amounts of waste incineration are expected to continue in the future. In addition, Vilnius and Kaunas CHP plants started operating in 2020, with a view to improving heat and energy efficiency, making more efficient use of indigenous and renewable resources in heat generation installations and reducing CO_2 emissions, and can use up to 360 tonnes of biomass and municipal waste per year for energy production, representing 30 % of total municipal waste.

The analysis of the sector's projections shows that GHG emissions are gradually decreasing due to the planned development of separate waste collection, preparation for recycling, waste incineration, re-use or other uses of capacity (sorting lines, other equipment) and modernisation of the waste management information system and monitoring. Compared to 2005, significant GHG emission reductions of 69 % and 74 % are projected in 2030 and 2040 respectively. The largest reductions in GHG emissions are expected from landfilling (81 % in 2030, 84 % in 2040 compared to 2005) and wastewater treatment and discharge (61 % in 2030, 72 % in 2040 compared to 2005).

The105 FOD method assumes that the decomposition of organic carbon in the waste is slowly degraded over several decades and produces CH4. If the conditions are constant, the rate of formation of CH4 depends only on the carbon content of the waste. Emissions of CH4 are the highest in the first few years after disposal and then gradually decrease.



4.2.1.11. figure: Actual and projected GHG emissions generated in the waste sector by category

Energy from renewable sources

The current situation in the definition of the level of use of energy from renewable sources in different sectors is considered to be

Fact 2020: Specific values for indicators are given in Table 4.2.2.1.

Table 4.2.2.1: Current RES share in gross final energy consumption and relevant sectors (heating and cooling, electricity, transport)

	In 2020
Final energy consumption, total, ktoe	5339,3
RES share of gross final energy consumption, %	27,36
RES share of final energy consumption for heating and cooling, %	50,23
RES share in the DH sector, %	74,7
Share of RES production in local electricity generation, %	47,18
RES share in gross electricity consumption, %	20,17
RES share of final energy consumption in transport, %	5,50

The fuel balance for district heating in 2020 is shown in Table 4.2.2.2.

Table 4.2.2.2. Fuel balance for district heating in 2020

Select fuel type	% (in terms of fuel consumption)
Firewood, wood for fuel, agricultural and other wastes and other RES	74,7
From natural gas	19,0

Municipal waste (non-RES part)	4,0
Fuel oil	0,6
Other fuels	1,7

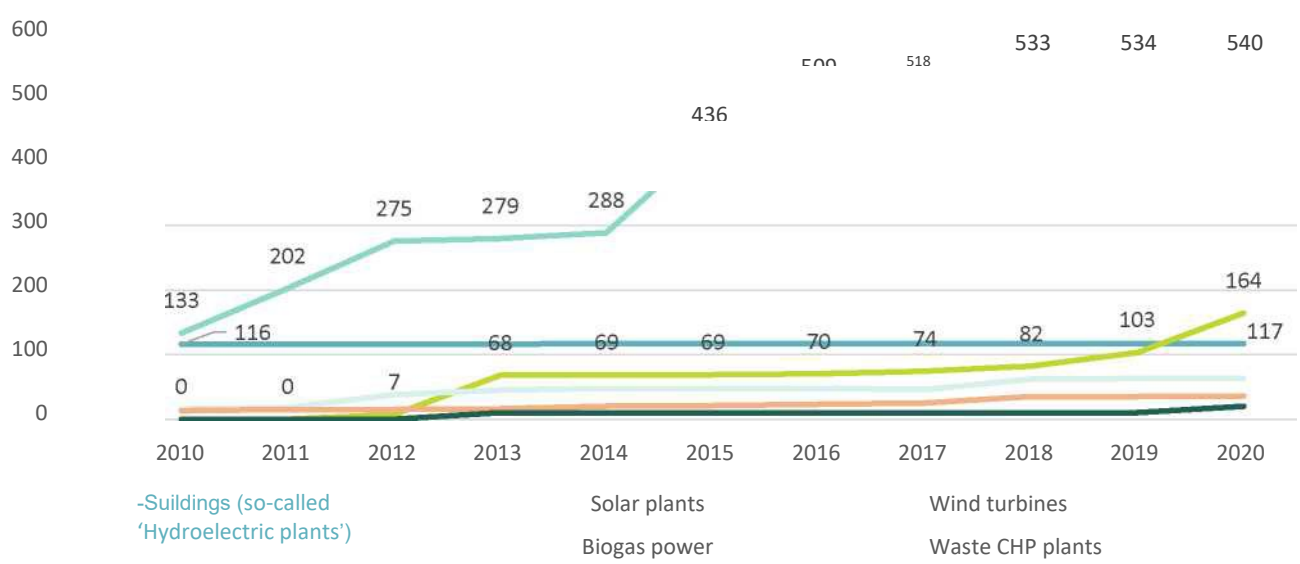
The production of electricity from renewable energy sources and the technologies used are shown in Table 4.2.2.3. Most electricity is imported by the country (approximately 70 %). The remaining local electricity production consists mainly of RES, where solar and onshore wind farms predominate. The development of solar power plants has been particularly high in recent years. This process involves improvements in the concept of prosumers and increased energy prices and subsidies in this area.

Table 4.2.2.3: Gross electricity production from renewable energy sources in 2020

Technology	Quantity,	%
All electricity generation installations	221,4	100
Hydropower plants	25,8	11,7
Solar plants	11,1	5,0
Wind plants	133,4	60,3
Biofuel plants	27,3	12,3
Biogas power plants	12,8	5,8
Cogeneration plants for industrial and municipal waste	11,0	5,0

By the end of 2030, existing RES promotion policies are expected to include around 930 MW solar power plants, 1 400 MW (two wind farms each 700 MW) offshore wind turbines, around 150 GWh of new biofuel production capacity, around 950 GWh of new biomethane production capacity, new and/or upgraded existing district heating installations, around 190 MW, and around 40 MW of heat pumps in the district heating sector.

The development of electricity generation capacity from RES over the period 2010-2020 is shown in Figure 4.2.2.1.



4.2.2.1. *figure: Expansion of electricity generation from RES and technologies used, MW*

Since 2010, the installed capacity of RES generation capacity has almost increased by 3.4 times from 278 MW to

940 MW by 2020. Solar photovoltaic power plants have seen the fastest increase in installed capacity, increasing their installed capacity to 164 MW since their inception in 2012. Between 2010 and 2020, the installed capacity of wind turbines increased by 4fold, biofuel plants by 3.2 times and biogas plants almost tripled. The installed capacity of hydropower plants remained almost unchanged, while the capacity of CHP plants for industrial and municipal waste increased by 10 MW to 20 MW in 2020. Onshore wind farms account for 57.4 % of installed capacity of all power plants, 17.4 %. solar power plants, 12.4 % —for hydropower plants.

Projections of developments with existing policies and measures

In the context of the energy modelling of existing policy instruments in 2030 (2040 perspective), it is necessary to discuss the main measures and the preconditions for their implementation that determine the development of RES in the sectors under consideration.

- ***RES2-E – RES development in the Baltic Sea***. Electricity generated after the installation of plants will reach 5519 in 2030 GWh/year. This measure will increase the share of RES in gross final energy consumption by 7.87 % in 2030.
- ***RES20-E – Implementation of local and RES CHP projects, priority for Vilnius and Kaunas.*** Kaunas CHP plant has a capacity of 26 MW and a thermal capacity of about 70 MW. Vilnius CHP plant has an electrical capacity of 100 MW and a thermal capacity of about 240 MW. This measure will increase the share of RES in gross final energy consumption by 2.66 % in 2030.
- ***RES8-E – Mandatory blending of biofuels into mineral fuels***. Estimated level of biotenal petrol will reach 208.5 GWh in 2030 and 2 692.9 GWh of biodiesel in diesel. The measure will increase the share of RES in gross final energy consumption by 1.00 % in 2030.
- ***RES1-E – Financial support for prosumers.*** Planned installation by 2030 477.9 MW of additional solar capacity, which is expected to generate around 46.6 GWh in 2027. The new wind turbine installed capacity is expected to reach 0.60 MW in 2027 and generate about 2 GWh of electricity. This measure will increase the share of RES in gross final energy consumption by 0.67 % in 2030.
- ***RES4-E – Deployment of RES plants and storage facilities for legal persons and RES communities.*** Solar power plants will have installed capacity of 220 MW in 2025 and wind power plants will reach 30.1 MW in 2026. By 2026, the total production of electricity from RES isprojected to reach 311.76 GWh. This measure will increase the share of RES in gross final energy consumption by 0.51 % in 2030.

These existing policy measures described above have the greatest impact on RES use and contribute most to increasing the share of RES in gross final energy consumption. The modelling results of all existing energy policy measures are presented in Table 4.2.2.4 and Figure 4.2.2.2.

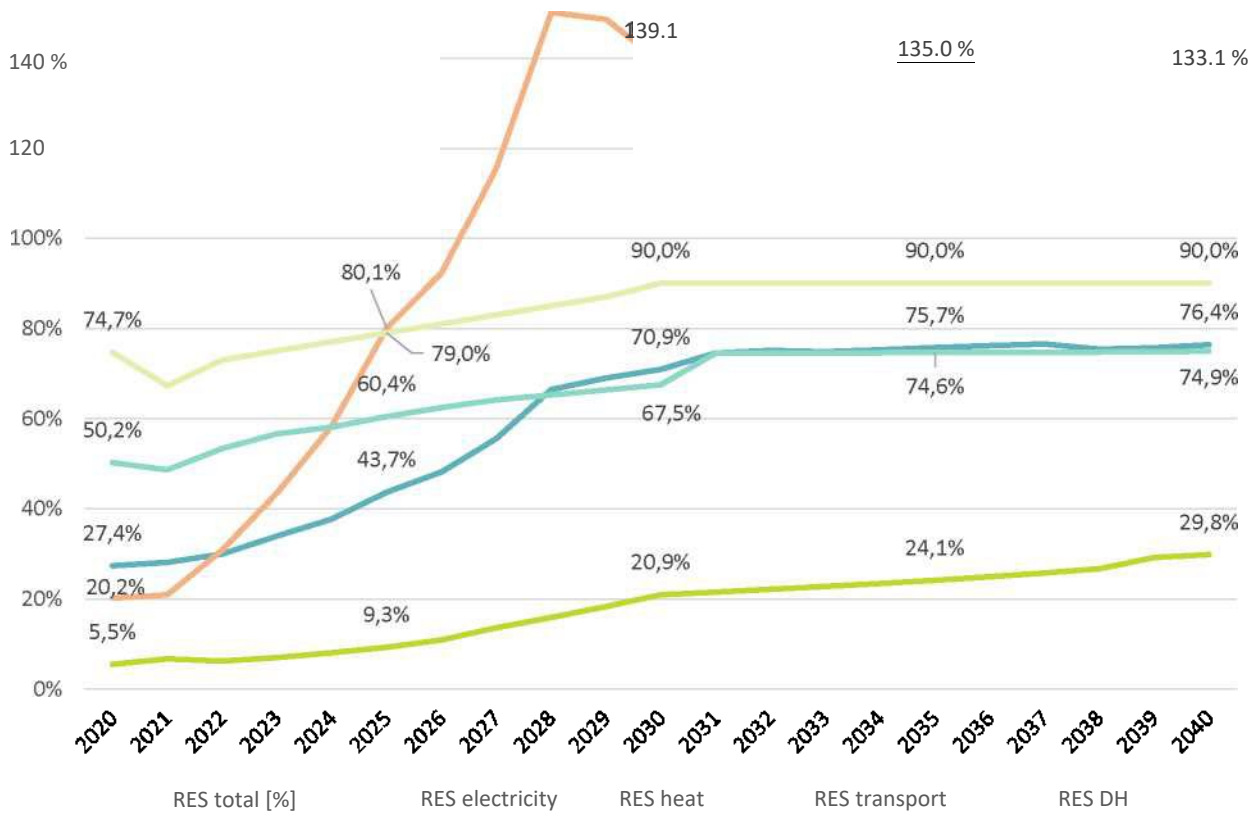
Table 4.2.2.4. Share of RES in gross final energy consumption and relevant sectors (EPP)

	In 2020	Year 2025	2030	2035	In 2040
Final energy consumption, total, ktoe	5339,5	5756,2	5614,6	5259,5	5097,9
RES share of gross final energy consumption, %	27,36	43,7	70,9	75,7	76,7
RES share of final energy consumption	50,23	60,4	67,5	74,7	74,9

for heating and cooling, %					
RES share in the DH sector, %	74,7	80,7	90,0	90,0	90,0
Share of RES production in local electricity generation, %	47,18	75,0	100,0	100,0	100,0
RES share in gross electricity consumption, %	20,17	80,1	100,0 (139,1)	100,0 (135,0)	100,0 (133,1)
RES share of final energy consumption in transport, %	5,50	9,3	20,9	24,1	29,8

160 %

4.2.2.2. *figure: Share of RES in gross final energy consumption and relevant sectors (EPP)*



Electricity

In theESP scenario, the increase in RES generation capacity between 2021 and 2030 is shown in Table 4.2.2.5. It is worth noting that the planned development of electricity generation is based exclusively on RES technologies. Most of the solar photovoltaic plants and the development of onshore and offshore wind parks, followed by biomass and biogas. The planned development of solar power plants is mainly linked to the development of renewable energy communities of prosumers, remote prosumers and renewable energy communities. Meanwhile, wind turbine power growth is expected to take place on a market-based basis.

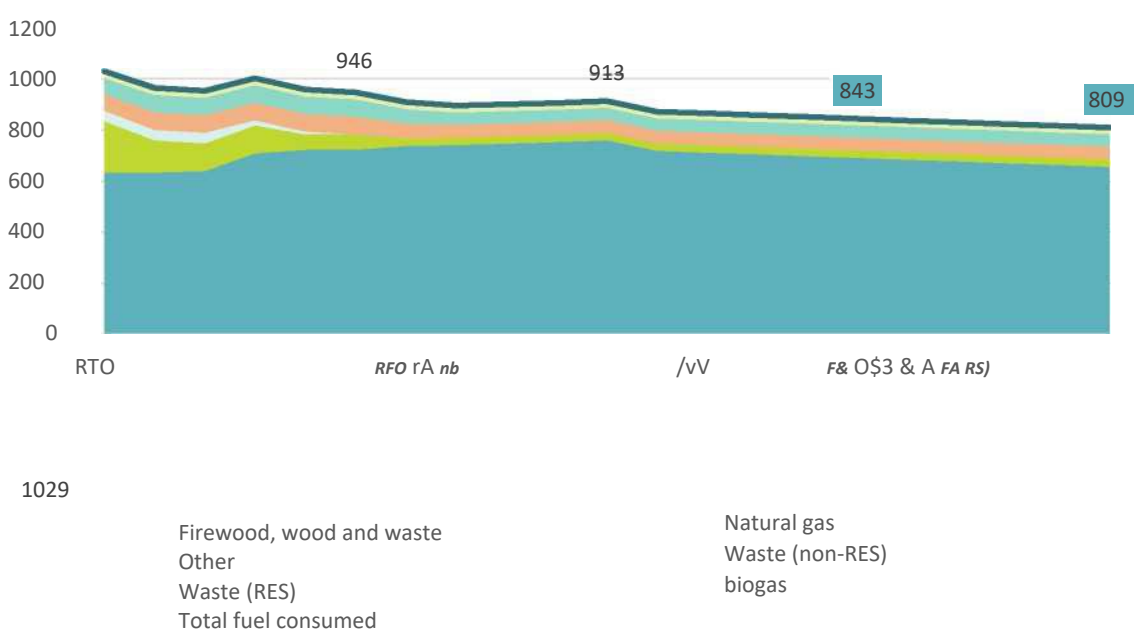
Table 4.2.2.5. Expansion of electricity generation capacity in the EPP scenario

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Solar e.g. MW/year	61	91	317,0	141,8	1168,8	1819,7	190,5	39,6	27,3	31,8	33,0
Total solar e-e., MW	164	255	572,0	713,8	1882,6	3702,3	3892,8	3932,4	3959,6	3991,4	4024,4
Wind e.g. MW/year	6	83	323	206,8	332,9	538,4	706,7	1458,5	1810,1	320,1	110,0
Total wind e.g. MW	540	623	946,0	1152,8	1485,7	2024,1	2730,8	4189,3	5999,4	6319,4	6429,4
Of which									1400	1400	1400
Biofuel cogeneration, MW	63	73	73,0	73,0	73,0	73,0	73,0	73,0	73,0	73,0	73,0
Waste cogeneration, MW	20	20	40,0	70,0	70,0	70,0	70,0	70,0	70,0	70,0	70,0
Total cogeneration, MW	83	93	113,0	143,0	143,0	143,0	143,0	143,0	143,0	143,0	143,0

District heating

In the district heating system, several major changes are envisaged during the period covered by the EPP. Vilnius CHP plant will be fully operational in 2023. Its heat production capacity will be 240 MW (approximately 60 MW for the waste unit and around 180 MW for biomass). By 2030, new and upgrades of existing district heating installations of around 190 MW are planned.

The results of the simulation of the DH sector are presented in Figure 4.2.2.3.



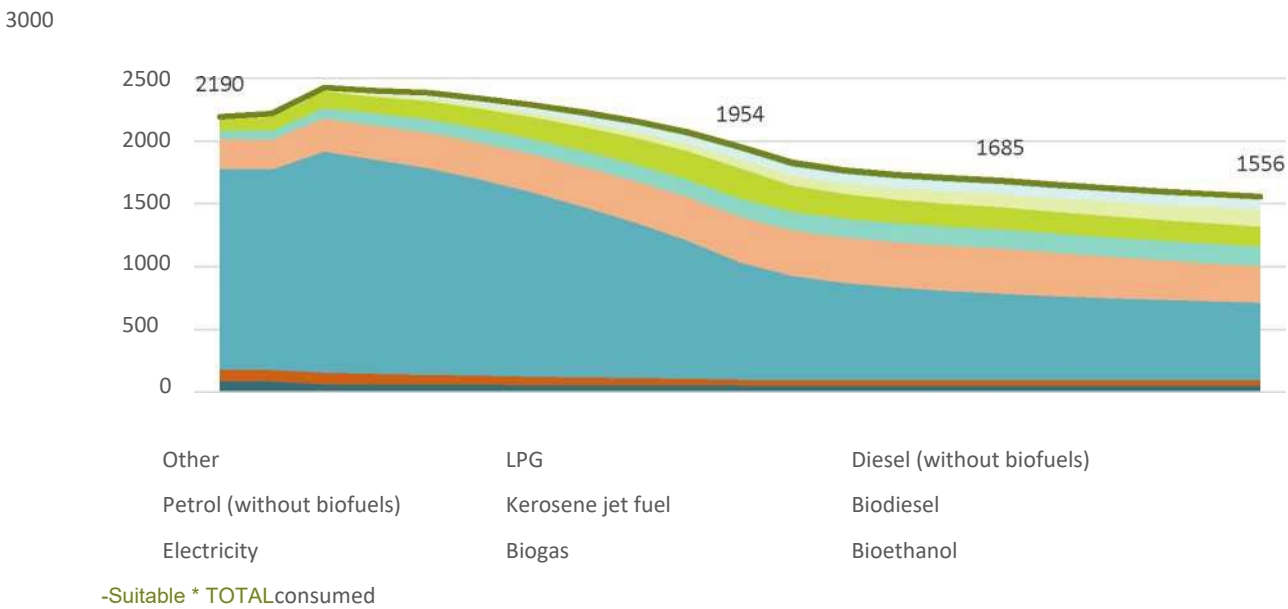
4.2.2.3. *figure: DH fuel balance forecast EPP*

The graph above shows that the volume of fuels used for district heating production will decrease. This concerns in

particular energy efficiency improvement measures (renovation of buildings, increasing consumer awareness, digitalisation of accounts, etc.) and efficiency gains in energy production. In 2020, total fuel consumption in the DH sector was 1029 ktoe. Fuel demand will decrease to 913 and 808 ktoe in 2030 and 2040 respectively, i.e. 11.3 % and 21.4 % respectively.

Transport

The results of the simulation of the ESP scenario for the transport sector are shown in Figure 4.2.2.4.



4.2.2.4. *figure: Results of the modelling of ESP in the transport sector*

The results of the ESP scenario show a gradual decline in diesel consumption, instead of using RES more widely: biodiesel, biogas, electricity and hydrogen. The implementation of electronic tolls in freight transport and EE measures to reduce energy consumption per passenger-kilometre will also have a significant impact: promoting sustainable mobility and public transport, reducing congestion.

In the EPP-Scenario, fuel consumption in the transport sector is expected to decrease by about 10.7 % in 2030 compared to 2020. The scenario projects a significant drop in diesel consumption by around 51 % between 2020 and 2030 and a fast-growing share of RES by 2030. The RES share is expected to increase by about 3 times by 2030 (without considering the RES share in electricity).

4.2.2.5. figure 2.1 shows the total final energy consumption in the transport sector (VISO consumption in transport; left-hand scale, etc.) and energy consumption of renewable fuels such as biogas, biodiesel and bioethanol (scale Y on the right-hand side of the diagram, ktoe). Electricity is presented in full in the graph (the specific share of RES in electricity depends on the achievement of the RES-E target in a given year).

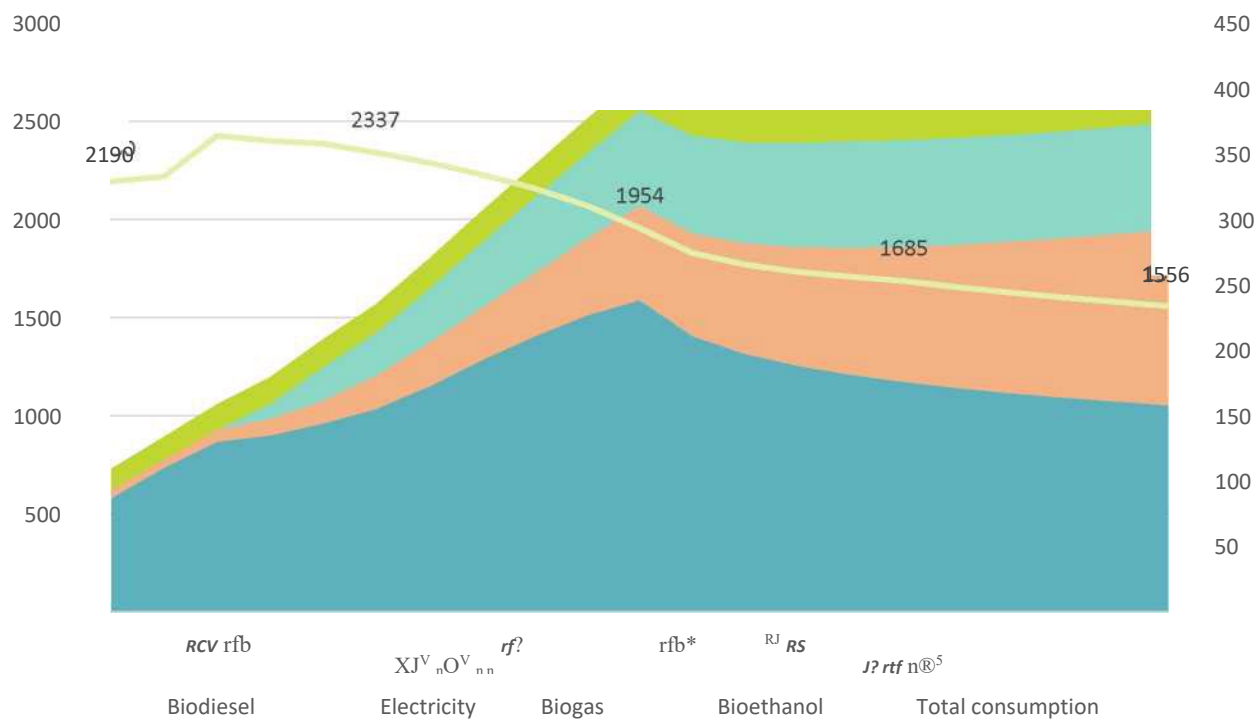


Figure 4.2.2.5. RES transport sector in the EPP scenario

4.3 Energy efficiency dimension

The current levels of primary and final energy consumption are reflected in the presentation of actual consumption in 2020 in individual sectors of the economy. It is worth noting that the Lithuanian economy is dominated by the transport sector (41 % of the final energy consumption balance) in terms of energy consumption, 26.9 % in households, 18.4 % in industry and 10.8 % in services. Other sectors, such as construction, agriculture and fishing, account for around 3 % of final energy consumption.

Table 4.3.1 Current primary and final energy consumption in sectors

	In 2020	%
Primary energy consumption, ktoe	6442,6	—
Final consumption, ktoe	5339,3	100 %
Industry sector, ktoe	981,3	18.4 %
Household sector, ktoe	1433,8	26.9 %
Services sector, ktoe	576,0	10.8 %
Transport sector, ktoe	2190,3	41.0 %
Other sectors, ktoe	157,9	3.0 %

The detailed assessment of the potential for high-efficiency cogeneration and efficient district heating in the Republic of Lithuania106 (hereinafter 'the assessment of the potential for cogeneration') was drawn up on the basis of an

106https://ec.europa.eu/energy/sites/ener/files/documents/Lithuania_DOC_88658.pdf

integrated analysis of the development and functioning of electricity and district heating and fuel supply systems, carried out using modern mathematical models, assessing end-users' behaviour in the field of energy efficiency improvement, the requirements and environmental commitments made by the country and aspects of security of energy supply. The CHP feasibility assessment analysed heat and power generation and supply technologies, the heat and power generation capacity of the 10 major cities and Elektrėnai, the fuel balances consumed, changes in the prices of fuels used and energy produced, the directions for the development of the heat supply system, the 9 scenarios analysed and the economic calculations made for CHP plants.

Projections for primary and final energy consumption in each sector

The forecasts for primary and final energy consumption were obtained from the systematic modelling of fuels and energy consumed in the Lithuanian economy. The model is based on statistical data reflecting the current energy situation, specific assumptions that influence energy consumption and the estimated impact of policy measures (such as direct energy efficiency improvement measures, energy efficiency efficiency, fuel substitution, measures to encourage changes in consumer behaviour, etc.). The energy efficiency policy measures in place and their assumptions are as follows:

- ***EE1-E – The impact of higher excise duties and taxes on fuel consumption.*** The measure is projected to deliver energy savings of 8.657 TWh over the period 2021-2030.
- ***EE2-E – Renovation/modernisation of multi-apartment buildings.*** Energy after the implementation of the measure savings for the period 2021-2030 will amount to 6.3 TWh.
- ***EE3-E – Renovation of public buildings.*** Projected energy savings in 2021-2030 it will reach 0.442 TWh over the period.
- ***EE4-E – Agreements with energy suppliers on consumer education and consultation.*** Forecast, that these measures will achieve energy savings of 2.773 TWh over the period 2021-2030. The impact assessment of the measure assumes that, in terms of energy type, annual energy savings will be distributed as follows: electricity will account for 55 % of the savings, 25 % for heat and 20 % for natural gas.
- ***EE5-E – PIS allowance for industrial enterprises.*** Energy savings from the measure 2021— It will reach 4.228 TWh in 2030. The assumption is that 70 % of the first energy audits of the measure will be carried out in installations and technological processes. The second 18 %, the third 8 %, the fourth 5 %, the second 18 % and the fourth 5 % of the companies eligible for the PIS allowance will be repeated every 4 years, while fuel consumption could be reduced by 1.41 %, electricity by 4.82 % and heat by 1.84 %.
- ***EE6-E – Energy saving agreements with energy companies.*** Estimated energy savings for the period 2021-2030 will amount to 3.745 TWh. The impact assessment of the measure assumes that the measure will achieve 50 % of electricity savings, 48 % of fuel energy savings and 2 % of total energy savings.
- ***EE7-E – Transforming products into more efficient technologies.*** Forecast after implementation of the measure 2021— Savings of 7.623 TWh in 2030.
- ***EE8-E – Modernisation of indoor heating and hot water systems in multi-apartment buildings ("small" renovation).*** Energy savings will amount to 0.03 TWh between 2021 and 2030. It is accepted that the replacement of an elevator heat point for a new automated heat point results in an average 8 % reduction in

thermal energy consumption.

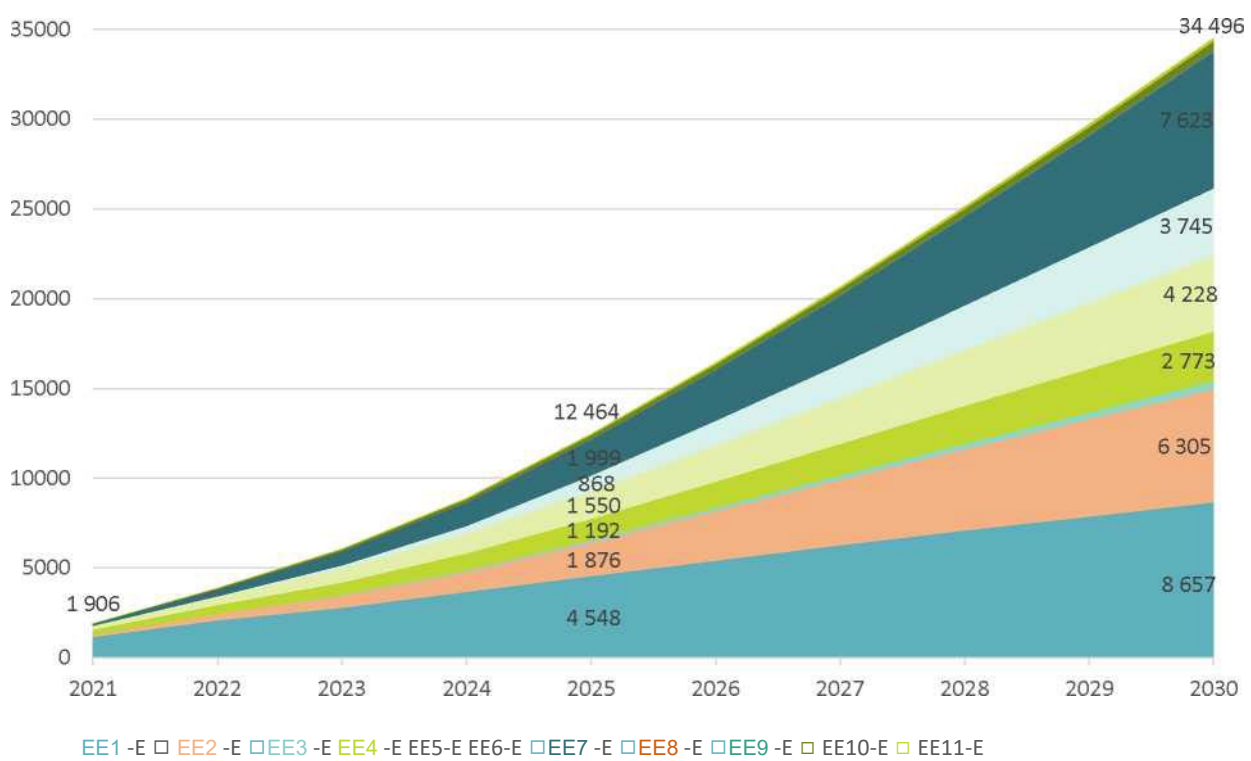
- ***EE9-E – Implementation of energy efficiency measures by private legal entities under energy audit reports.*** By 2024, 44 projects are projected to deliver energy savings of 0.105 TWh over the period 2021-2030. Analysis of data from existing project applications shows that one project will achieve minimum annual energy savings of 330 MWh and the measure will generate 60 % of natural gas savings and 40 % of electricity savings.

- ***EE10-E – Renovation/modernisation of one or two apartments for natural persons.*** Energy savings will amount to 0.430 TWh over the period 2021-2030.

- ***EE11-E – Modernisation of street lighting systems.*** The assumption used in the assessment of the effects of the measure;

  an annual saving of 280.6 kWh per luminaire will be achieved by refurbishing one luminaire. The measure is projected to save 0.159 TWh over the period 2021-2030.

These existing energy efficiency measures are expected to save 34.5 TWh between 2021 and 2030. The projections of energy savings are presented below. Measures EE1-E and EE7-7 have the greatest impact on energy savings.



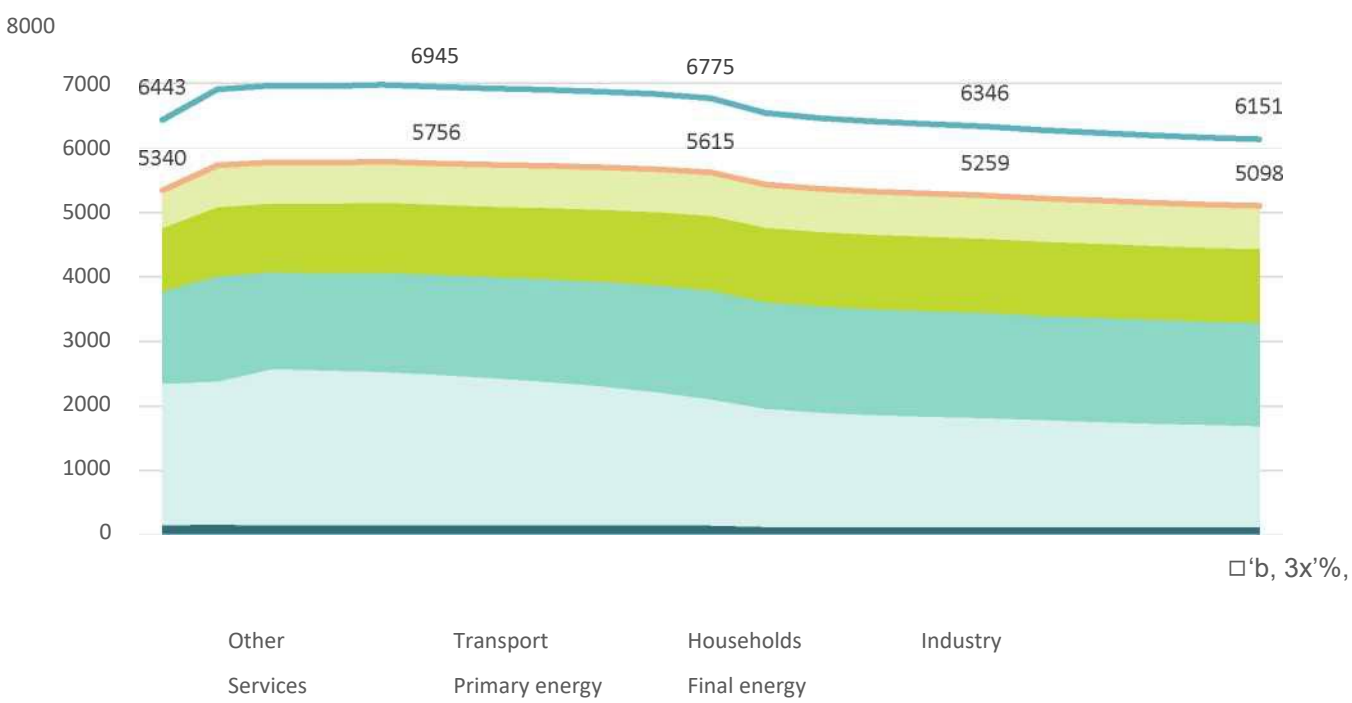
4.3.1. figure: Forecast of energy savings after the introduction of existing policy measures, GWh

The following is a forecast of the evolution of energy needs up to 2040. In assessing primary energy consumption, it is calculated on the basis of the requirements of the Efficiency Directive, subtracting from gross domestic costs non-energy consumption and transformed in other companies, i.e. primary energy excludes fuels (imports of oil and petroleum products and natural gas) used as feedstock.

Table 4.3.2. Energy consumption projections with existing energy efficiency policies, measures and programmes (EPP)

	2020	2025	2030	2035	2040
Primary energy consumption, ktoe	6442,6	6945	6775	6346	6151
Final consumption, ktoe	5339,5	5756	5615	5259	5098
Household sector, ktoe	1433,9	1548	1680	1628	1600
Industry sector, ktoe	981,3	1082	1159	1148	1144
Services sector, ktoe	576,0	638	669	667	664
Transport sector, ktoe	2190,4	2337	1954	1685	1556
Other sectors, ktoe	157,9	151	151	132	134

The ESP scenario modelling shows that final energy consumption will be 5.2 % higher in 2030 and 4.5 % lower in 2040 compared to the 2020 actual level.



4.3.2. figure: Energy consumption after assessment of the impact of existing measures (EPP), ktoe

The determination of primary energy consumption in individual sectors is currently complicated by more

than 70 %. The electricity consumed in Lithuania is imported from neighbouring countries and its energy mix is unknown.

The total energy consumption in the ESP scenario is shown below in Figure 4.3.3.

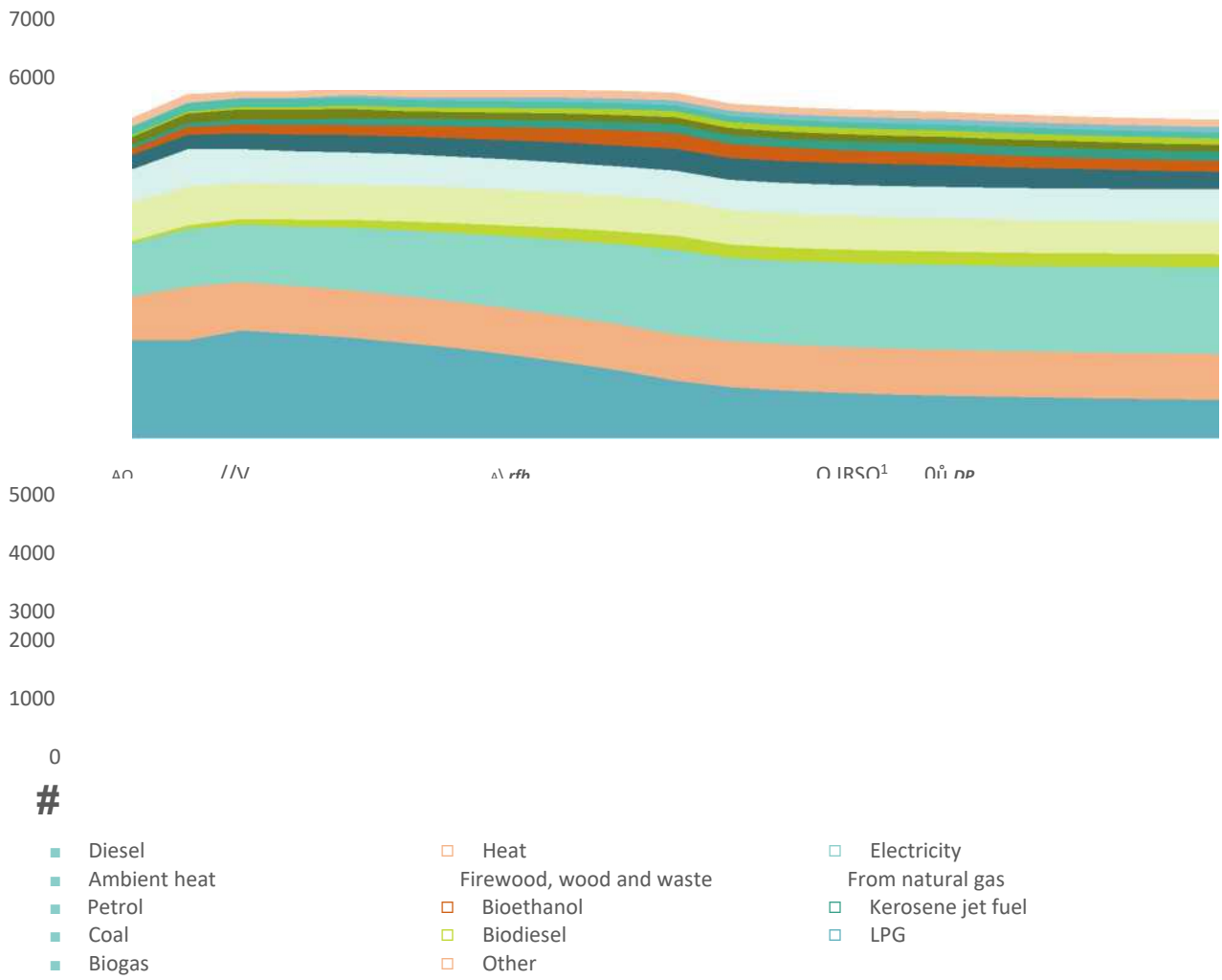


Figure 4.3.3 Total fuel consumption in the ESP scenario, ktoe

In the scenario of existing policy measures, the overall energy consumption of the country for energy use will decrease and will be 4.5 % lower in 2040 than in 2020.

4.4 Energy security dimension

4.4.1. the table below shows the expected energy mix of Lithuania for 2030 and 2040 (energy 'mixas'). Final consumption of energy types is estimated by subtracting energy transformed from other enterprises and energy used for non-energy purposes from gross inland consumption. This is only the proportion of energy that is not used as a raw material for recycling.

Table 4.4.1. Existing energy mix and projections (EPP)

Select fuel type	Consumption, ktoe			% Of total consumption		
	In 2020	2030	In 2040	In 2020	2030	In 2040

Diesel	1647,0	976	657	29.3 %	17.1 %	12.6 %
Firewood	1322,5	615	567	23.5 %	10.8 %	10.9 %
Electricity (imports)	775,0	0	0	13.8 %	0.0 %	0.0 %
From natural gas	752,5	368	328	13.4 %	6.5 %	6.3 %

Other oil prod.	421,1	651	585	7.5 %	11.4 %	11.2 %
Petrol	238,1	364	290	4.2 %	6.4 %	5.6 %
Coal	147,8	134	125	2.6 %	2.4 %	2.4 %
Wind e.g.	119,7	1719	1809	2.1 %	30.2 %	34.7 %
Biofuels	104,1	409	395	1.8 %	7.2 %	7.6 %
Hydropower plants	37,4	32	30	0.7 %	0.6 %	0.6 %
Biomass e.g.	27,3	58	58	0.5 %	1.0 %	1.1 %
Biogas	12,8	13	13	0.2 %	0.2 %	0.3 %

Table 4.4.2. Local renewable energy sources (RES)

Energy sources, ktoe	In 2020	2030	In 2040
RES	*1952,8 (93.1 %)*	*2216,5 (93.7 %)*	*2159,3 (93.6 %)*
Firewood	1322,5	615	567
Wind e.g.	119,7	1719	1809
Biofuels	104,1	409	395
Hydropower plants	37,4	32	30
Biomass e.g.	27,3	58	58
Biogas	12,8	13	13
Solar e.g.	11,1	337	337

Almost all energy production from indigenous energy sources in Lithuania comes from RES. Non-renewable indigenous energy sources represent a negligible share and are not further assessed. By 2040, the main change in wood consumption will be 2.3 times, wind and solar power generation will grow very sharply, 15 and 30 times respectively, and biofuel consumption will increase by about 4 times.

In 2020, the main sources of imported energy in the balance were crude oil and other upstream products for the oil refinery (63.7 %), natural gas (18.7 %), electricity (7.6 %) and petroleum products (petroleum and other petroleum products) (7.2 %).

Almost all crude oil imports are imported and about half of the imported natural gas annually is used for the production of mineral fuels and fertilisers. A sudden increase in the price of crude oil and natural gas would directly affect the largest mineral fuel and fertiliser producers, but would not have a significant impact on Lithuania's energy sector. Thanks to the LNG terminal, LitPol Link and NordBalt's interconnections, Lithuania's access to energy supplies from several different suppliers offers additional opportunities and flexibility to respond to fluctuations in energy prices and security of supply.

4.5 Dimension internal energy market

4.5.1. Extent of electricity interconnectivity

In Lithuania, the level of electricity system connectivity is already above the 2030 target set by the EU. As the connectivity target has been met, no measures are foreseen for this purpose. However, given that Lithuania's electricity system does not operate in synchronous mode with KETs, the main objective in the electricity sector is the integration of Lithuania and the Baltic States into KETs in synchronous mode. This is further described in section 4.5.2.

The maximum capacity in 2030 is projected to be 2 389 MW. In this case, the nominal interconnection capacity at peak times in 2030 is expected to be 111 % and the nominal capacity of interconnectors in relation to installed renewable generation capacity is estimated at 91 %.

4.5.1.1. the table shows the projected installed capacity for 2030 and the available power expected for 2030.

4.5.1.2. table. Projected installed capacity in 2030 expected in 2030[108]

Generation		Installed capacity, MW
Thermal power stations:	**Fuels**	**771**
Lithuanian	From natural gas	445
Vilnius E3	From natural gas	0
Kaunas	From natural gas	0
Panevėžys	From natural gas	35
Other TE	Oil, natural gas	291
Pumped-storage power plant	**Fuels**	**900**
Kruonio HAE	Pumped storage	900
Renewable:		**10582**
Kaunas HE	Hydro	101
Low HE	Hydro	27
Onshore wind E	Wind	5030
Marine TE	Wind	1400
Sun	Sun	4024
Biomass:		**192**
Vilnius E2	Biomass	29
Vilnius combined heat and power plant (biomass combustion unit)	Biomass	79
Šiauliai E	Biomass	11
Small biomass	Biomass	73

[108] Source AB LITGRID.

Biogas:	Biogas	50
Incineration of waste:		**70**
Vilnius combined heat and power plant (carried out by the combustion unit)	Wastes	22
Klaipėda, Fortum (Type TP)	Wastes	21
Fortum CHP plant (Kaunas, Biruliškiės TP)	Wastes	26
Small waste incineration	Wastes	1

The main connections with EU countries in 2030 are set out in Table 4.5.1.2.

Table 4.5.1.2. Main connections 2030107 108 109

Connections		Maximum capacity in MW	Market throughput
NordBalt	HVDC	700	700
Harmony Link	HVDC	700	700
LitPol Link	HVDC	700[110]	0[111]
LV-LT	AC OHL	1234	950, 800110

4.5.2 Energy transmission infrastructure

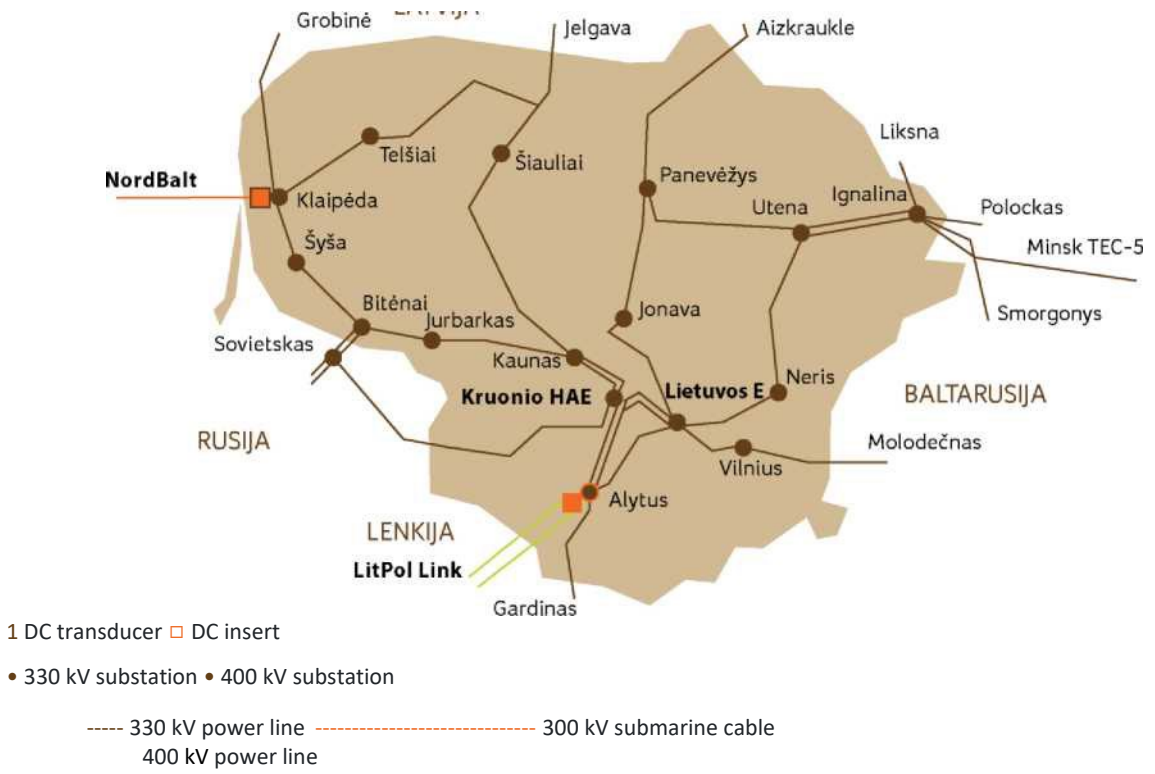
Electricity

Lithuania's electricity transmission network (Figure 4.2.2.1) is well connected to some neighbouring electricity systems:

- Lithuania connects four 330 kV and three 110 kV power lines with Latvia;
- four 330 kV and seven 110 kV power lines are connected to Belarus;
- with the Kaliningrad region, three power lines of 330 kV and three 110 kV;
- with Sweden, one 300 kV DC cable;
- and two 400 kV lines with Poland.

Lithuania's electricity transmission network at a voltage of 400-330-110 kV includes 239 transformer substations and distributors and 7 289.3 km of power transmission lines and cables. 400 kV transformers have installed capacity of 3 163.5 MW, 330 kV transformers with installed capacity of 5 448.5 MW and 110 kV transformers 92.6 MW.

107Source AB LITGRID.
108It is planned that the connection after synchronisation with KET will be designed to ensure the security of the electricity system.
109It is planned that the connection after synchronisation with KET will be designed to ensure the security of the electricity system.
110from 2025 onwards (after synchronisation with KET), different capacity according to direction: 950 MW from Latvia to Lithuania, 800 MW from Lithuania to Latvia



4.5.2.1. figure: Electricity transmission schema and data111

The electricity systems of Lithuania, Latvia, Estonia and Belarus are currently part of the IPS/UPS system operated by the Russian electricity system operator. However, Lithuania and the Baltic States are working towards becoming an autonomous part of the decentralised European electricity system and moving towards transparent European standards for the management of the electricity system. The most important strategic priority for Litgrid is integration into the European electricity system (Figure 4.2.5.2.2.).

On 7 August 2019, the Government approved the list of synchronisation projects:

1. Construction of the 110 kV power line Pagėgiai – Bitėnai;
2. Reconstruction of the 330 kV electricity transmission line in Lithuania-Vilnius;
3. Extension of the LitPol Link connection;
4. Construction of the 330 kV power line at Kruoni HAE-Bytein;
5. installation of electricity storage facilities (200 MW);
8. Construction of the Harmony Link connection;
9. Construction of 330 kV power line between work and Bethena;
10. Construction of 330 kV power line Vilnius-Neris;
11. optimisation of the electricity transmission network in north-east Lithuania and preparation for synchronous work with the continental European energy system;

111 Source: AB LITGRID, reference: https://www.litgrid.eu/index.php/energetikos-sistema/elektros-energetikos-sistemos-information/transmission-net-schema-and-data/501

12. installation of new synchronous compensations in the Lithuanian EES;
13. Extension of 330 kV Bitėnai transformer substation;
14. Construction of the 330 kV Distribution Facility 'Mšaša';
15. Construction of 330 kV Distribution Debates;
16. installation of the Frequency Stability Assessment (FSAS) management system;
17. installation of automatic generation control system;

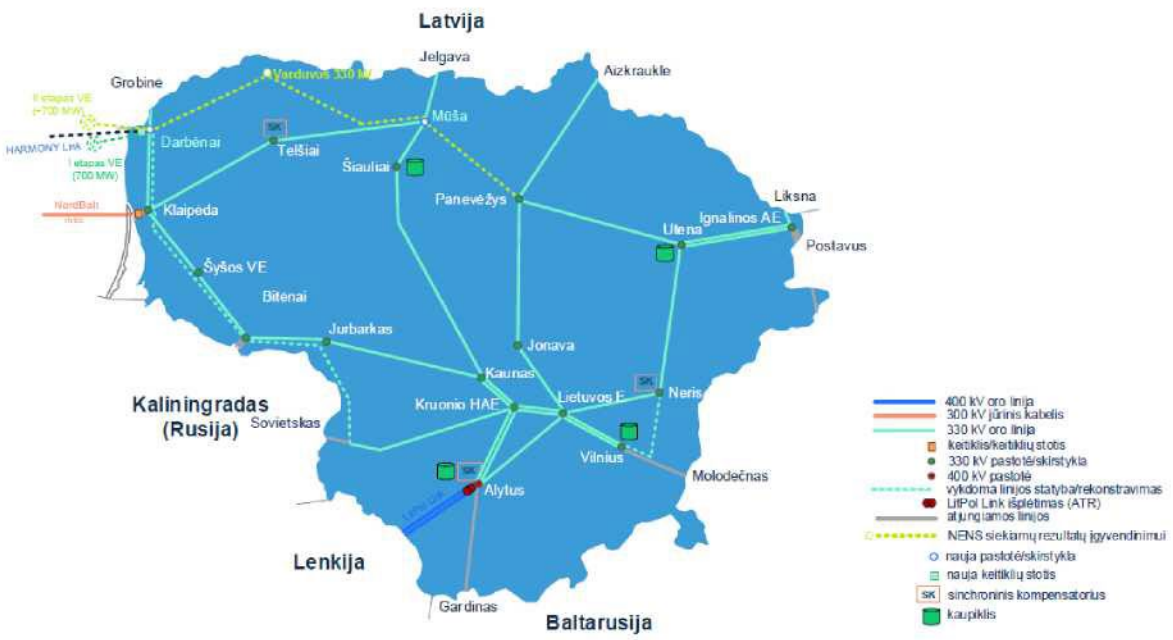


Figure 4.5.2.2. 400-330 kV transmission network in 2031, when Lithuania's EES will work synchronously with KET[114]

From natural gas

Lithuania's natural gas transmission system is connected to four countries: The gas transmission systems of Latvia, Belarus, Poland and Russia, the Klaipėda LNG terminal and the Lithuanian gas distribution operators' systems.

The development of the pipeline network in Lithuania started in 1961. The most commonly used pipelines have a diameter of 700 mm, while the largest gas pipelines operating on the Lithuanian network have a diameter of 1 220 mm. The design pressure of the major part of the transmission system shall be 54 bar. Following Lithuania's installation of the Klaipėda LNG terminal, most of the gas destined for Lithuania's and the Baltic States' needs passes through it.

In 2 022.32090 GWh of natural gas (8 181 GWh in 2021) was injected into the natural gas transmission system from the Klaipėda LNG terminal to Lithuanian consumers and 1 914 GWh from Latvia to Lithuania.

[114] Source: Lithuanian electricity system 40-110 kV network development plan 2022-2031, ref: https://www.litgrid.eu/index.php/tinklo-pletra/lietuvos-elektros-perdavimo-tinklu-10-metu-pletros-planas-/3850 (80 GWh in 2021), 491 GWh of natural gas from Poland to Lithuania. The Klaipėda LNG terminal, the main gas supply source for Lithuania and the Baltic States, supplied 79 % of the total gas transported to the system. The flow was almost 8 % from Latvia and 5 % from Poland. In January – around 8 % of gas was transported via the Lithuanian-Belarus link in

March. Since April 2022, all gas coming from Belarus is intended exclusively for consumers in the Kaliningrad region of the Russian Federation.

In 2 022.15575 GWh of natural gas was transported to Lithuanian consumers to the internal exit point. Compared to 24 136 GWh of natural gas in 2021, transmission volumes decreased by 35.5 %. Exports to Latvia in 2022 were 15 311 GWh of natural gas, almost 10 times higher than in 2021 (1 414 GWh). In 2 022.4616 GWh of natural gas was exported to Poland. 23 399 GWh of natural gas flowed into the Russian Kaliningrad region (24 524 GWh of natural gas per year from Belarus).

Technical capacity of interconnections with cross-border transmission systems and LNG terminal:

- 325.4 GWh per day at the entry point through Kotlovka DAS;
- at the entry point through Klaipėda DAS (at the point of connection of the transmission system to the LNG terminal system) 122.4 GWh per day;
- 65.1 GWh per day at the entry point through the Kiemen DAS to Lithuania;
- 73.3 GWh per day at the entry point via Santakos DAS to Lithuania;
- 67.6 GWh per day at the exit point through the Kiemenian DAS from Lithuania;
- at the exit point through the Šakiai DAS: 114.2 GWh per day;
- 58 GWh per day at the exit point through the Central DAS.

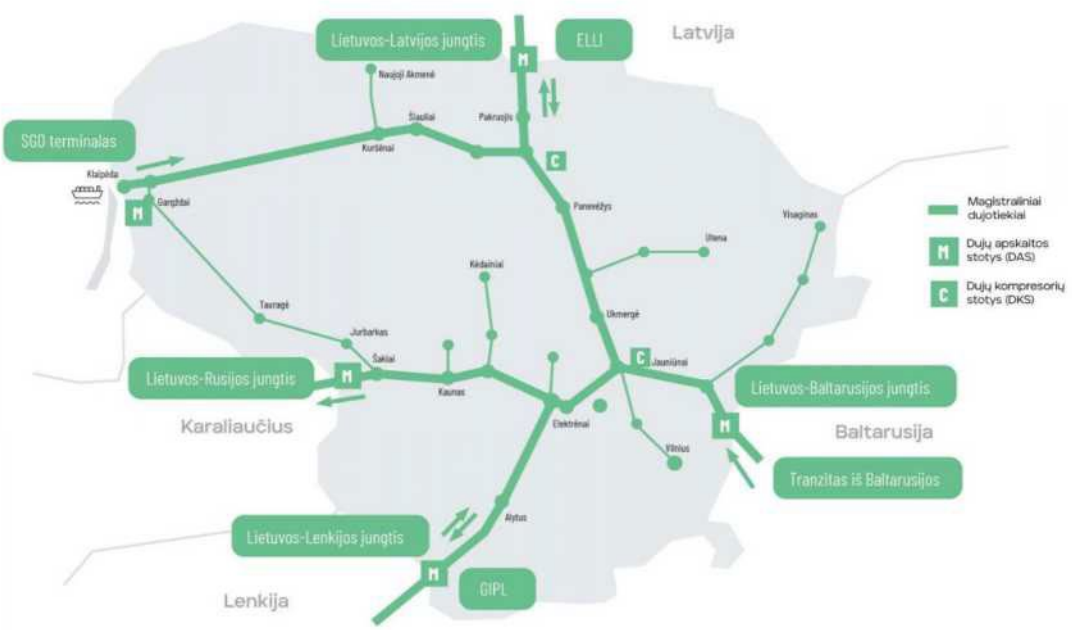


Figure 4.5.2.4. Natural gas transmission system in Lithuania –[115]

[115] Source: AB Amber Grid, https://www.ambergrid.lt/lt/perdavimo-sistema/Lietuvos-perdavimo-sistema

The main project carried out is the interconnection between Poland and Lithuania (GIPL), as further described in section 2.4.2.,which became operational on 1 May 2022. As well as the project to increase the capacity of the gas interconnection between Latvia and Lithuania (ELLI), the completion of which is expected to take place in 2024. The project is also further described in section 2.4.2. Other projects of local significance are described in the natural gas

transmission system operator's 10-year network development plan112.

4.5.3 Electricity and gas markets, energy prices

Electricity

At the end of 2021, 3815 economic operators (natural and legal persons) were in possession of permits issued by the VERT to produce electricity, out of which 1312 prosumers.

Lithuania's overall electricity consumption decreased from 12.76 TWh to 12.04 TWh (5.6 %) in 2022 compared to 2021 and technology costs for grids decreased from 0.924 to 0.846 TWh (-8.4 %). The volume of electricity needed to charge the Cruonis pumped storage plant (Cruonio HAE) decreased by 18.2 %: from 0.977 TWh in 2021 to 0.799 TWh in 2022.

In 2022, the installed electricity capacity in Lithuania was 4 271 MW, an increase of 15.8 % compared to 2021 (3 687 MW).

The licences issued by the VERT at the end of 2021 were: AB Litgrid – Electricity TSO, AB Energy Distributor, AB Achema, AB Lifosa, AB Akmenės cementas and UAB DainavosElektr – SSO, UAB Ignitis, AB Lifosa and AB Akmenės cementas – public electricity suppliers.

In 2021, 96 companies held independent electricity supply permits, of which 29 were independent electricity supply activities.

According to 2022 data, the volume of electricity traded on the Nord Pool power exchange decreased from 5 531 GWh in 2021 to 3 603 GWh in 2022 (-34.9 %). The amount of electricity purchased decreased from 12 748 GWh in 2021 to 11 619 GWh in 2022 (-8.9 %).

The forecast of changes to the electricity market situation, including prices, with existing policies and measures at least until 2040 (including 2030) was not assessed in Lithuania.

Gas

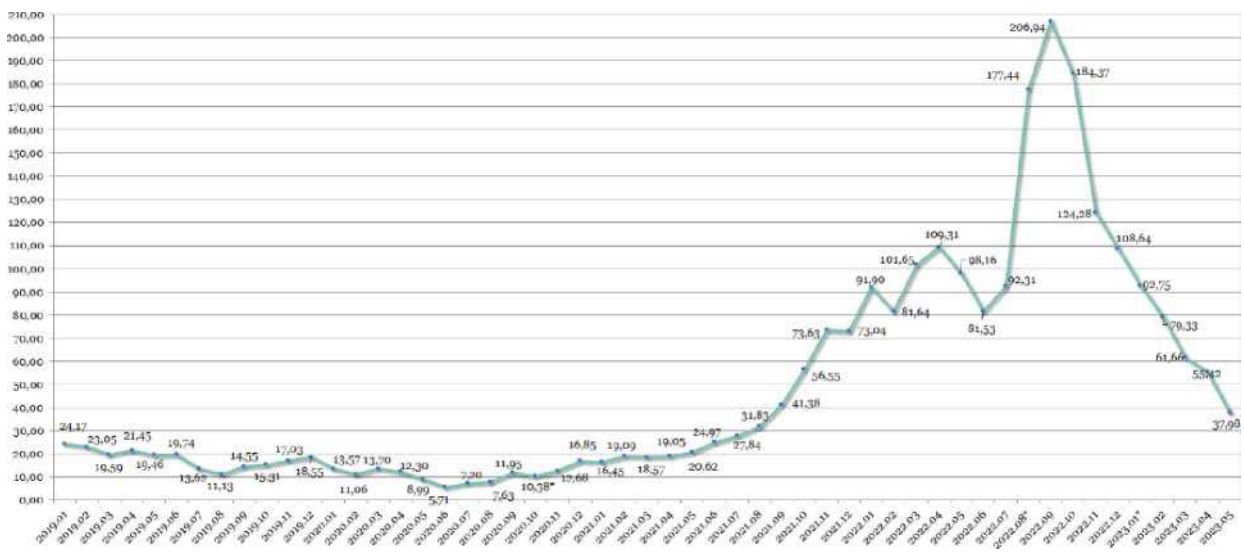
In the natural gas sector, VERT regulated 44 operators in 2021. In the natural gas sector, the activities of transmission, distribution, storage, regasification, supply and market operator of liquefied natural gas (LNG) shall be licensed or regulated. The licences issued by the VERT at the end of 2021 were: AB Amber Grid – Natural Gas TSO, AB Energija Distributor, UAB Intergas, UAB Gren Lietuva, AB Agrofirma 'Josvainiai', UAB SGgas – Natural Gas SSO, AB Klaipėdos nafta – an undertaking engaged in LNG regasification activities and UAB GET Baltic – operator of the natural gas market. 36 undertakings held authorisations for the supply of natural gas, of which 20 were active. In 2021, 6 natural gas supply permits were issued.

Lithuania's natural gas consumption decreased by as much as 35.5 % in 2022 compared to 2021, due to gas saving measures and the previous temporary shutdowns of industrial companies: Lithuania used 15 575 GWh in 2022 and 24 136 GWh in 2021. It is true that, due to the abandonment of Russian gas in the Baltic States and the growing importance of the Klaipėda LNG terminal in the region, AB Amber Grid's Lithuanian gas transmission system transported a record of 64 TWh in 2022. This is 21 % more than in 2021, when 53 TWh of natural gas were transferred through the system.

In the natural gas sector, the number of domestic and non-household customers has been steadily increasing since 2010: In 2018, there were 595 thousand natural gas consumers in Lithuania, of which 587.6 thousand domestic and 7.4 thousand non-domestic. In 2017, there were 575.3 thousand household and 7.2 thousand non-domestic

112 Reference: https://www.ambergrid.lt/lt/perdavimo-sistema/perdavimo-sistemos-pletra/perdavimo-sistemos-pletros-planas

consumers. The weighted average import price (in EUR/MWh) of natural gas imported into the Lithuanian natural gas supply market shall be made public, where the calculations shall include an estimate of the total quantities of natural gas imported into the Republic of Lithuania and the purchase costs of natural gas, with the exception of the quantities of natural gas imported by AB Achema, UAB Kaunas cogeneration power plant and the costs of purchasing natural gas incurred for its own use and the quantities of natural gas and the costs supplied from storage facilities located in the Member States of the European Union.



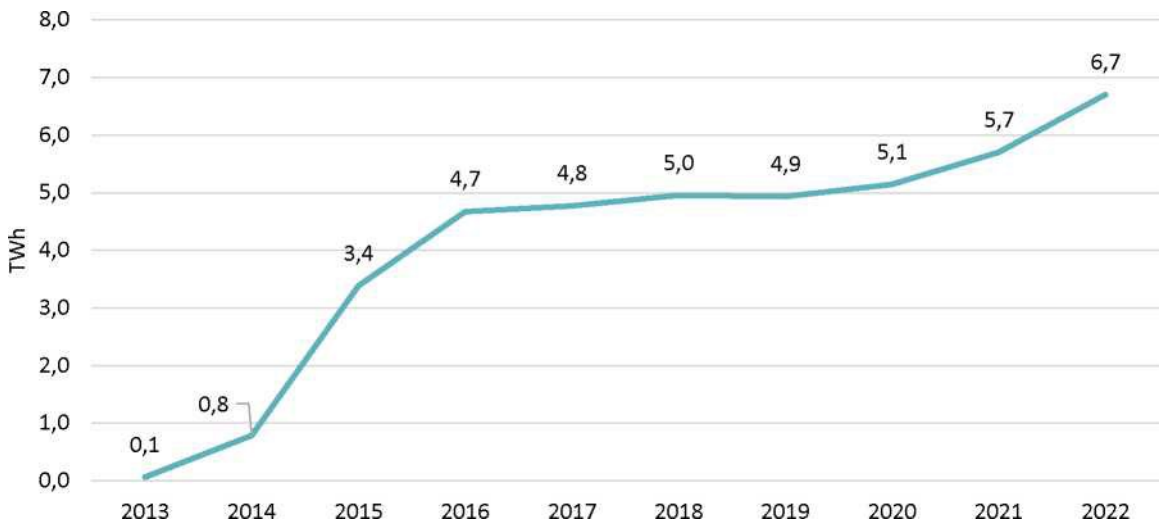
4.5.3.3. *figure: Weighted average imports of natural gas placed on the Lithuanian natural gas supply market price, EUR/MWh. Source: VERT113*

Lithuania has not assessed the evolution of the natural gas market situation, including prices, with existing policies and measures until at least 2040 (including 2030).

Heating and cooling

The use of biofuels for heat production and district heating has been steadily growing over the last 10 years. Biofuel turnover on the Baltpool exchange reached 6.7 TWh in 2022. After the start of operation of the Vilnius CHP plant in 2023, the share of biofuels in the production of heat in Lithuania is planned to exceed 80 %. It is important to note that the raw material for biofuel production is 100 % sourced from Lithuanian resources.

113http://www.regula.lt/dujos/Puslapiai/duju-kainos/importo-kainos.aspx



4.5.3.4. *figure: Biofuel turnover on the Baltpool Stock Exchange 2013 – 2022,* TWh

Average price dynamics for district heating (excluding VAT) in Lithuania 1997-2022

4.5.3.5. figure 6.4: In 2022, the price of central heating increased significantly as a result of the energy crisis caused by Russia.

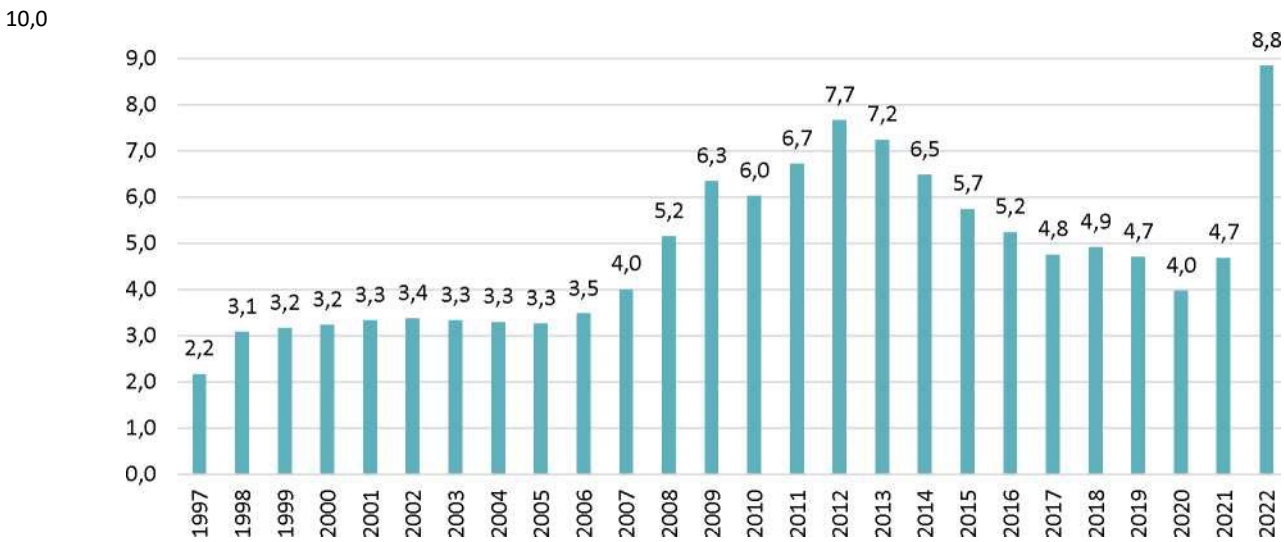


Figure 4.5.3.5 The dynamics of the average price of district heating (excluding VAT) in Lithuania

The forecast of changes to the heat and cooling market situation, including prices, with existing policies and measures at least until 2040 (including 2030) was not assessed in Lithuania.

4.6 Research, innovation and competitiveness dimension

State of play in the low-carbon sector

The EU can achieve climate neutrality by 2050 by substantially decarbonising all sectors of the economy and achieve higher greenhouse gas emission reduction targets by 2030.

The recent disappearance of renewable energy technologies, the digitalisation of the economy and the emergence of

new technologies for batteries, heat pumps, electric cars or hydrogen offer opportunities to accelerate the profound changes in our energy system and its design over the next two decades. Europe's energy future must rely on an ever growing share of geographically distributed renewable energies, integrate different energy carriers flexibly, while remaining resource-efficient and avoiding pollution and biodiversity loss.

Innovation-driven investments in energy infrastructure typically have a cost-effective lifetime of between 20 and 60 years. Action taken over the next five to ten years will determine whether we will put in place an energy system that will help Lithuania and Europe reach climate neutrality by 2050.

Innovation can ensure a more efficient use of energy resources, thus reducing energy demand and its climate and environmental impact. Some end-use applications are likely to require new or energy intensive fuels. This is the case, for example, with hydrogen or synthetic fuels.

The mature solar and biomass industries are accelerating the transition to RES, which is economically, socially, politically acceptable, leading to the development of state-of-the-art technologies that are increasingly affordable.

Solar energy

Lithuania has high ambitions for renewable energy development and has made significant progress in this area. Companies operating in Lithuania produce and export highly innovative solar modules to foreign markets.

Moreover, the potential of Lithuanian higher education institutions and businesses in the field of solar energy is relatively high. The institutions carry out substantive investigations and investigations on the basis of contracts, and cooperate with Lithuanian and foreign undertakings and research institutions; highly skilled professionals are also trained. Lithuania is carrying out research in the fields of solar energy, optimisation of combustion processes, energy-efficient materials, energy-efficient lighting, the biotechnology industry, biofuel production, hydrogen technology and other relevant research.

UAB Solitek R&D, together with scientific institutions, universities and research centres from all over the world, is continuously conducting solar technology research to help develop increasingly energy-efficient solar modules and to explore new ways of using solar energy more efficiently. Since 2019, Solitek R&D has been focusing on research into the efficiency of solar modules, the conversion of solar modules and solar electricity in various fields, and other project activities.

Creation of clusters

In Lithuania, clusters are being developed to promote innovation. In addition to the Biopower Development Cluster (designing modern, innovative biofuel equipment and technologies for the efficient use of biomass) and the Photoelectricity cluster (development of environmental energy technologies), a number of new technologies have been established. These include the Smart Green City (encouraging the use of new technologies for environmentally friendly solutions), Lithuania's Clean Technologies and Circular Economy Cluster.

The growing number of clusters shows that Lithuanian companies are becoming more environmentally responsible and understand the benefits of eco-innovation. These clusters are also a good basis for the future of Lithuania's circular economy, as they are already based on energy efficiency and resource efficiency.

Science, technology and innovation policy

The Ministry of Education, Science and Sport develops the country's study and science policy. Studies and RTEPI are closely linked to all areas of development in the country. High-quality research contributes to tackling global challenges, as well as climate change, promoting the involvement of Lithuanian researchers in Horizon Europe and

other international scientific programmes, and the integration of Lithuanian researchers into international R & I infrastructures such as the European Organisation for Nuclear Research (CERN).

The Ministry of Economy and Innovation is responsible for shaping technology and innovation policy. Innovation objectives in different areas of economy (energy systems, industry, transport, agriculture) are included in the general framework of innovation policy. Lithuania's innovation policy is currently implemented in the context of the Lithuanian Progress Strategy "Lithuania 2030", a programme of the Government of the Republic of Lithuania.

European Innovation Indicator

According to the results of the European Innovation Scoreboard published by the European Commission in 2023, Lithuania's innovation ecosystem has reached its highest level of development in history. In terms of long-term progress in the innovation ecosystem, our country ranks 6th this year among the other Member States of the European Union (EU), while overall Lithuania has maintained its position and ranked 19th in this light. The top five indicators for Lithuania are trademark applications (+ 70.9 points), venture capital expenditure (+ 62.7 points), companies introducing product innovation (+ 59.4 points), companies introducing process innovation (+ 47.3 points).

National funding for MTEPI

4.6.1 the table below shows the sources of funding for R & D activities by sector and year. It can be noted that funding increased by EUR 78.87 million in 2020 compared to the previous year and EUR 60.92 million respectively in 2021.

Table 4.6.1: Sources of funding for R & D activities by sector

	Sources of funding for R & D activities, EUR million			
	2019	**2020**	**2021**	**2022**
Higher education sector	176,76	210,086	218,907	251,703
General government	99,058	89,385	98,223	104,129
Business enterprise sector	210,18	265,397	308,658	—
Total by sector	**485,998**	**564,868**	**625,788**	**—**

Number of researchers: The number of researchers involved in R & D activities increased to 19609 in 2021 (Table 4.6.2).

Table*4.6.2: Staff involved in R & D* activities

Staff involved in R & D				
Year	2018	2019	2020	2021
Researchers	19198	18811	19431	19609

Number of patents: According to the information provided by the Patent Office, 61 European and 19 national applications and patents were published in the field of energy in 2022.

Price elements

By 2021, all household customers purchased electricity from a public supplier and the price was set by VERT. As a result of the liberalisation of the electricity market from 2021, domestic electricity customers were gradually obliged to phase out monopolistic public supply services. As of 2021, household customers who consume more than 5 000 kWh of electricity per year had to buy electricity from a selected independent supplier whose prices are no longer regulated by VERT. Lower electricity consumers will be able to gradually enter the "free market" by 2026 and

the extent to which they will be subject to public electricity tariffs. When consumers choose their electricity supplier, VERT will regulate only about half of the price per kWh of electricity (the price components of the infrastructure and system services provided by TSO Litgrid and DSO ESO). The other half will be determined by the electricity exchange price and competition between suppliers.

Vert argues differentiated public electricity tariffs for household customers receiving electricity from low-voltage electricity grids, which, with compensation for the supply price, were 24 ct/kWh including VAT in the second half of 2022, and 28 ct/kWh including VAT in the first half of 2023. Compensation for independent supply to household customers shall be levied on the final consumer's price at the same level of compensation. It should be noted that the VERT, in response to developments in the wholesale energy market, forecasted a lower market price for electricity in the second half of2023, set lower public electricity price caps for domestic consumers, i.e. 22.264 ct/kWh (excluding VAT), which is 18.84 % lower than in 2023 for 3-6 months.

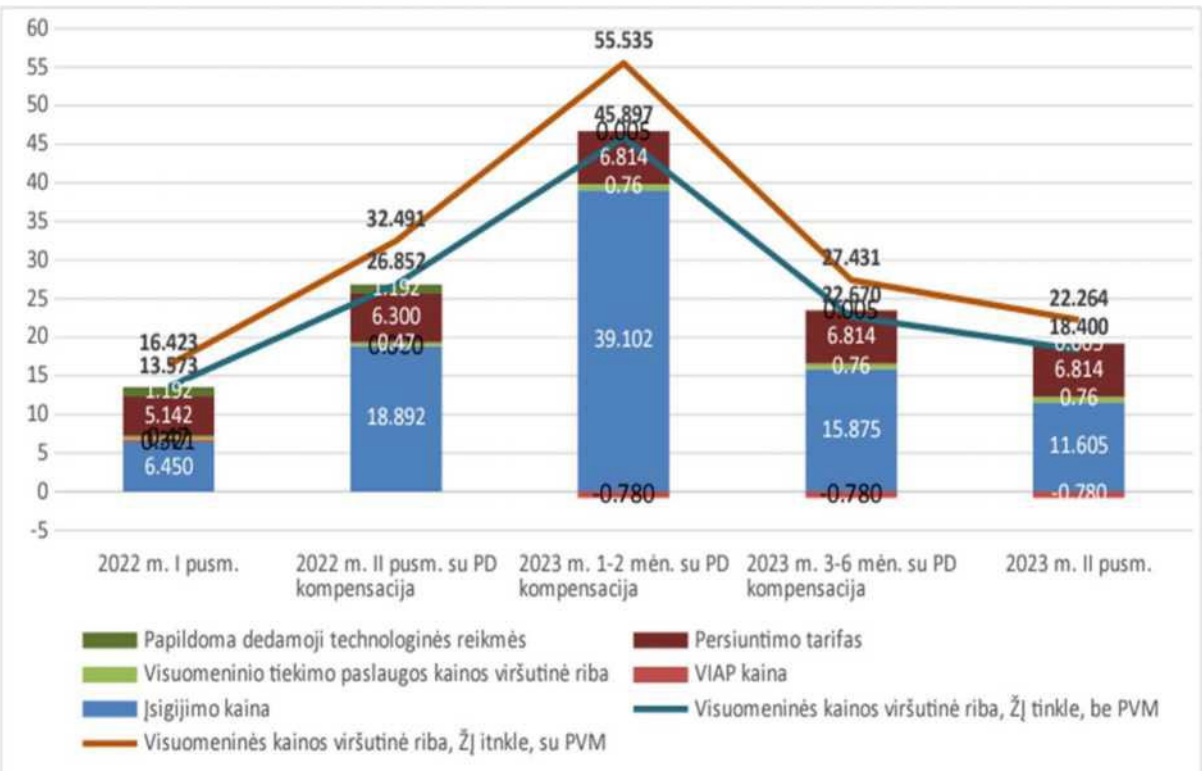


Figure 4.6.1. Dynamics of public electricity price caps for household customers purchasing electricity from the LV networks in the first half of 2022. —2nd half 2023 Price caps in 2022 II

for half a year and half 2023 for the supply activities and technology of the additional components for the purposes of reimbursements.114 115

In the electricity sector, transmission and distribution activities are regulated and have a corresponding effect on prices for the final customer. Price caps for regulated services are given in Table 4.6.1.

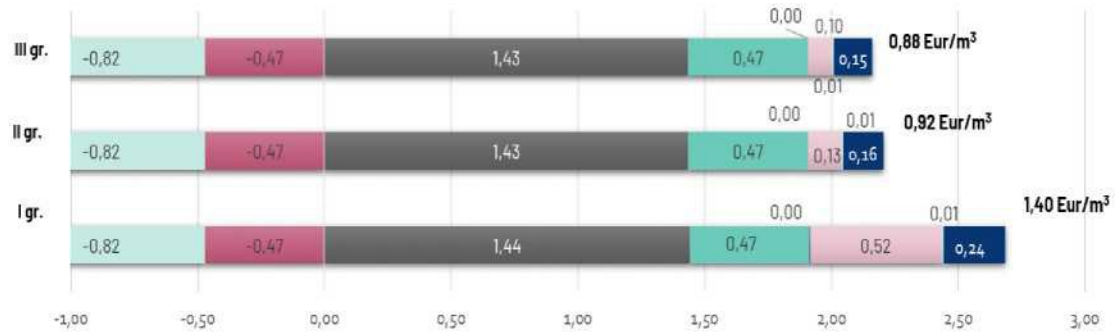
Table 4.6.1. Price caps for electricity transmission and distribution services, 2019-2023 (ct/kWh)[119]

Name of regulated service	Regulated service provider	Regulated service price cap (ct/kWh)				
		2019	2020	2021	2022	2023
Electricity transmission	WHO LITGRID	0,658	0,814	0,721	0,684	0,654
Distribution of electricity through medium voltage networks	ASU ESO	0,862	1,076	1,167	0,892	1,609
Distribution of electricity through low voltage grids	ASU ESO	1,871	2,092	2,171	1,959	2,905

Natural gas tariffs for domestic consumers are recalculated twice a year. Amendments to the Law of the Republic of Lithuania on Energy and Natural Gas entered into force on 24 May 2022, which provided for the inclusion of part of the compensation amounts for the natural gas price in the natural gas tariffs for domestic consumers, thereby reducing the impact of the increase in the import price of natural gas on domestic consumers (Figure 4.3.3.). The IC approved the natural gas tariffs applicable to household customers from 1 July 2023, i.e. Gr. III – EUR 1.36/m^{3plus} VAT. —EUR 0.87/m^3 inclusive of VAT and EUR 0.83/m^3 plus VAT^{in} Gr. I. The amount of compensation for the part of the company's natural gas supply price relating to the cost of purchasing natural gas was fixed by Government Decree at $EUR^{0.63/m\ 3}$ plus VAT.

114 Source: https://www.regula.lt/Puslapiai/naujienos/2023-metai/2023-05-15/mazeja-visuomenines-elektros-energijos-kainos-virsual-riboe-house-consumers.aspx
115 Sources: https://www.regula.lt/SiteAssets/vkekk-metines-veiklos-ataskaitos/ataskaita_2023_05-03.pdf, https://www.regula.lt/SiteAssets/veikla/VEIKLOS_ATASKAITA_2021_04_29_su%20priedu_galutine.pdf

SECTION B



■ Gas supply price
■ Variable part of the
■ Additional component —Distribution price
■ VAT, 21 %
Amount of compensation for part of the price for the supply of natural gas relating to the cost of purchasing natural gas

Figure 4.6.3. Structure of the tariff for the first half of 2023 per cubic metre of natural gas, EUR/m³. Source: VERT.

Description of energy subsidies, including for fossil fuels

Lithuania will aim to gradually reduce polluting and wasteful energy consumption by 2030, as well as market distortions in favour of fossil fuels. Excise duties on energy products are currently applicable until 31 December 2023. In 2022, the Law on Excise Duty, which will enter into force on 1 January 2024 and increases the excise duty rate120, as well as the introduction of a carbon component of the excise duty rate, have been amended to implement the gradual reduction or elimination of tax reductions. In total, thirteen energy subsidies were identified in Lithuania to be phased out by 2026 and described in detail in Section 3.1.3.

In the case of direct subsidies, it is appropriate to stress that all existing support schemes for projects of strategic importance for Lithuania and the region ensuring energy security are in agreement with the European Commission. They currently include the annual fixed operating costs of the LNG terminal121, its infrastructure and connection, which are not included in other State-regulated prices, and the reasonable costs of supplying the LNG Terminal's minimum quantity are included in the additional contribution to the natural gas transmission price for the security of natural gas supply.122

120 Lithuanian Law on Excise Duties, https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/81998ea9efef11edb649a2a873fdbdfd
Law121 of the Republic of Lithuania on the LNG terminal, https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.427221/asr?positionInSearchResults=4&searchModelUUID=48884f0c-894d-4f31-9989-d6a5d881996f
122Vert Resolution on the setting of an additional component to the natural gas transmission price for 2019 for the security of natural gas supply

SECTION B:
ANALYTICAL BASIS

5. IMPACT ASSESSMENT OF PLANNED POLICIES AND MEASURES[123]

123Planned Policies and Measures – Potential Policies and Measures under consideration that are likely to be adopted and implemented after the date of adoption of the updated NECPs. Therefore, in addition to the policies and measures implemented and adopted (forecast of existing policies and measures), the projections under point 5.1(i) must also include planned policies and

measures.

5.1 Impact of planned policies and measures on the energy system and GHG emissions

This chapter describes the scenario for the implementation of the planned policies and measures (P & M): the impact of the planned policies and measures on achieving the GHG emission reduction targets, increasing the use of RES and energy efficiency. It shall also describe the financing needs for the implementation of the planned policies and possible sources and impacts on macroeconomics, social aspects and regional cooperation.

5.1.1 GHG emissions and removals

Regulation (EU) 2018/842 of the European Parliament and of the Council imposes obligations on Member124States with regard to their minimum contributions for the period from 2021 to 2030 in order to meet the target set for non-ETS sectors. Lithuania will be required to reduce GHG emissions from non-ETS sectors (energy, transport, industry, agriculture, waste) by 21 % compared to 2005. To achieve this, Lithuania has put in place a number of additional measures, detailed in section 3.1.1.

5.1.1.1. figure: Projected GHG savings in sectors outside the EU ETS (PPP)

With additional policies and measures, non-ETS sectors will reduce GHG emissions by 7 % compared to the ESP scenario in 2030 and reach the target set for Lithuania. Overall GHG emissions will decrease by 3 % over the whole period 2021-2030 and by 9 % between 2031 and 2040

124https://eur-lex.europa.eu/legal-content/LT/TXT/?uri=CELEX%3A32018R0842

compared to the EPP scenario. In the transport sector, planned policies and measures will have the greatest impact on GHG emissions reductions compared to other sectors. Emissions from transport will decrease by 4 % between 2021 and 2030 and by 17 % between 2031 and 2040 compared to the EPP scenario. In other sectors, GHG emissions will decrease more moderately, by 1-3 % between 2021 and 2030 and between 1 % and 5 % in the period 2031-2040.

Table 5.1.1.1. Greenhouse gas emissions generated in 2005, 2 019,2020 and projected emissions for the period 2025-2040 (with planned policies and measures)

Greenhouse gas emissions by individual gas	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2eq.						
CO_2 emissions not including CO_2 from the FISH	14 117	13 920	13 649	13 462	10 297	9 475	9 003
CO_2 emissions including CO_2 from the FISH	9 611	8 021	7 376	7 765	3 493	2 665	2 384
CH_4 emissions excluding CH_4 from the FISH	4 352	3 311	3 207	2 750	2 347	2 281	2 220
CH_4 emissions including CH_4 from FISH	4 353	33 12	3 208	2 751	2 347	2 281	2 221
N_2O emissions excluding N_2O from the FISH	4 109	2 616	2 799	2 641	2 447	2 384	2 312
N_2O emissions including N_2O from FISH	4 222	2 738	2 914	2 746	2 545	2 475	2 400
HFCS	86	511	481	387	306	180	93
PFC	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uncorrected mixture of HFCs and PFCs	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SF_6	2	5	10	7	7	7	7
NF_3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total GHG emissions (excluding GIFCM)	20 387	20 174	20 174	19 246	15 403	14 326	13 635
Total GHG emissions (including FISH)	14 612	14 013	14 013	13 656	8 697	7 607	7 105
Greenhouse gas emissions by sector	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2eq.						
1.Energy (excluding transport)	8 981	5 645	5 713	5 503	4 859	4 825	4 797
2. Transport	4 279	6 285	6 138	5 883	3 716	2 911	2 454

3.Industrial processes and product use	3 770	3 355	3 076	3 180	2 697	2 555	2 454
4. Agriculture	4 146	4 183	4 347	4 028	3 674	3 617	3 547
5.Land use land use change and forestry	—4 392	—5 774	—6 161	—5 591	—6 706	—6 718	—6 530
6. Wastes	1 492	922	903	652	458	418	384
Greenhouse gas emissions in sectors participating in the EU ETS and outside the EU ETS	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2 eq.						
EU ETS (from stationary installations)	9 690	6 047	6 121	6 140	5 349	5 323	5 302
EU ETS (from domestic aviation)	2	2	1.9	2.1	2.1	2.2	2.3
EU ETS (total GHG emissions)	9 692	6 049	6 123	6 142	5 351	5 325	5 304
No-ETS	13 062	14 531	14 338	13 383	10 331	9 279	8 609
Greenhouse gas emissions in the GFCM sector under EU Regulation 2018/841 to the UNFCCC	**2021-2025**	**2026-2030**		**2031-2035**	**2036-2040**		
	kt CO_2eq.						
Amount of GHG accounted for by the GIFCM (credits if negative): EU/GIFCM (-20212030)	—29 970	N/A		N/A		N/A	
Greenhouse gas emissions per sub-category of the energy sector	**2005**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	kt CO_2eq.						
1. Energy	13 175	11 930	11 851	11 386	8 575	7 736	7 251
A. Fuel combustion	12 767	11 368	11 388	10 793	7 990	7 154	6 669
1. Energy production	5 655	2 278	2 646	2 445	2 268	2 268	2 268
2. Industry and	1 491	1 299	1 186	1 033	680	664	649

3. Transport	4 195	6 285	6 138	5 883	3 716	2 911	2 454
4. Other sectors	1 413	1 476	1 390	1 403	1 297	1 282	1 269
5. Military	13	29	28	29	29	29	29
B. Futy fuel emissions	408	562	463	593	586	582	582
1. Solid fuels	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Oil and natural gas and other GHG emissions in energy production	408	562	463	593	586	582	582

It should be noted, however, that according to Regulation (EU) 2018/842, the verification of GHG emissions will be carried out on an annual basis, so it is essential that each year's emissions do not exceed a given quota. Based on projections of greenhouse gas emissions in non-ETS sectors, emissions will be higher than the estimated annual emission allocations for the period 2022-2029, while emissions are projected to be close to the allocation in 2030.

According to OECD experts125, Lithuania's current level of ambition for climate change policy is sufficient to cover all sectors of the economy, but financial incentives for mitigation action and technology deployment are largely based on subsidies and grants. Achieving Lithuania's climate targets requires more financial solutions across all branches of the economy. The carbon pricing in Lithuania is still below what is necessary. They noted that phasing out fossil fuel subsidies and linking excise duties to fossil fuel emissions would provide a clear direction for industry and consumers and would compensate for the ambition gap to reach the 2030 targets. At the same time, extending the EU Emissions Trading System to buildings, road transport and other sectors from 2027 would have similar effects and reinforce climate ambitions. Therefore, the additional measures T28-P and T29-P have one of the greatest effects and contribute to Lithuania's 2030 climate targets.

The sectors of the Lithuanian economy and the drivers of the changes in their GHG emissions are described below.

Energy (ATL and no-ATL, without transport)

Planned policies and measures in the energy sector will focus on the development of RES, improving energy efficiency and improving the internal energy market. Electrification processes in transport further accelerate the growth of electricity consumption in this scenario.

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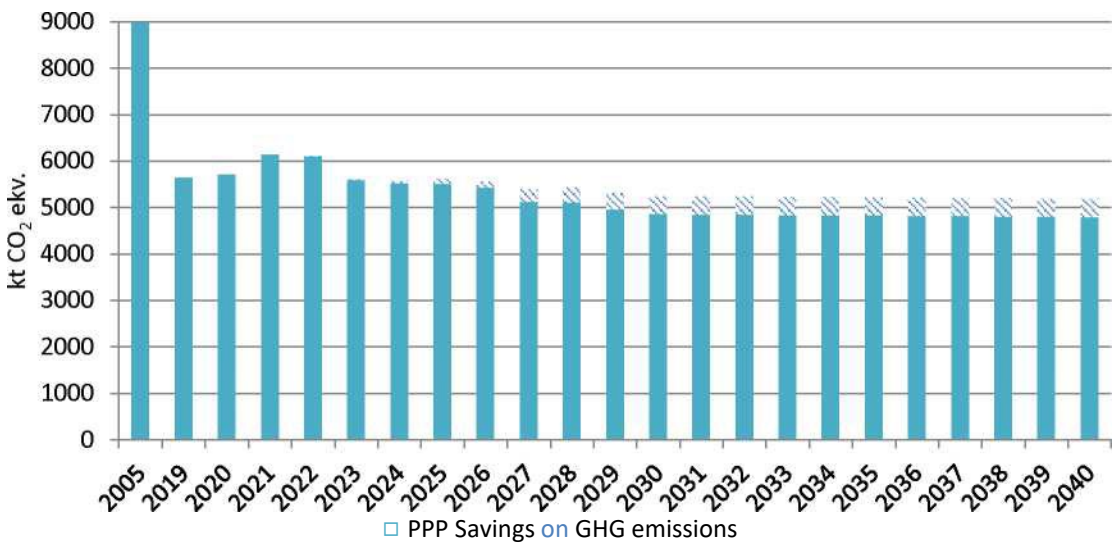
125https://am.lrv.lt/uploads/am/documents/files/Poveikio%20klimatui%20neutralumas%20iki%202050%20m_%20%E2%80%93%20reform%C5 %B3 %20Lithuanian%20abilitymyb%C4 %97s%20(LT%20translation).pdf

AV 9) 0s/vV "%V rA/ >so-O & ty \ <A/)9) *&;
##

□ ETS □ No-ETS

5.1.1.2. figure: Projected GHG emissions from the energy sector with accompanying measures List of measures and cumulative GHG reduction effect for the period 2021-2030 with planned policies and measures in Chapter 3 – Policies and Measures.

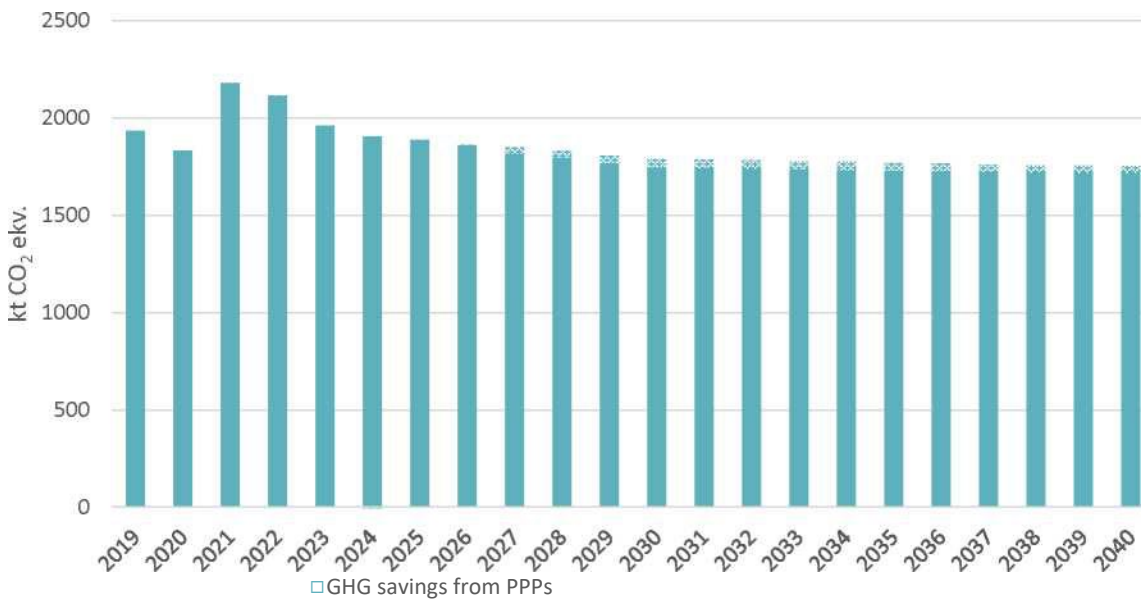
Compared to 2005, planned policies and measures are projected to reduce greenhouse gas emissions in the energy sector by 45 % in 2030 and stay around the same level as in 2030 by 2040.



5.1.1.3. figure: Projected GHG savings in the energy sector (ATL and no-ATL) measures

Energy sectors outside the EU ETS (small energy)

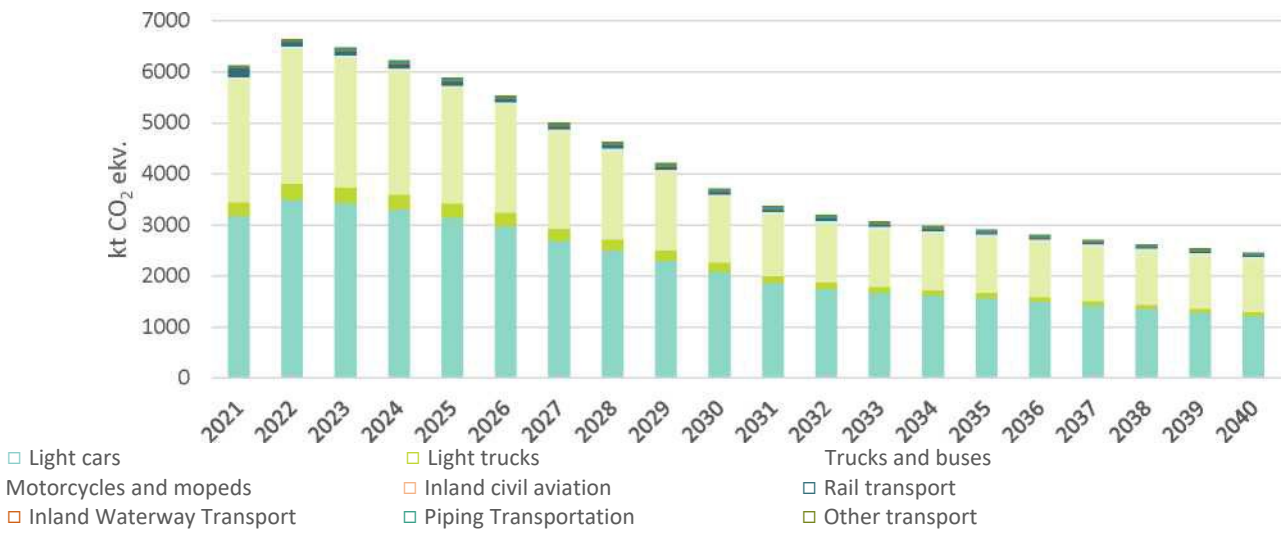
The NECD aims to reduce GHG emissions by 26 % by 2030 in the small energy sector. With the implementation of existing policies and measures, the sector will achieve a 20 % reduction compared to 2005, but does not meet the sector's target, and additional measures are planned to achieve this objective, such as residential renovation, biomethane production and cleaning. Additional policies and measures will reduce greenhouse gas emissions in the small energy sector by 22 % in 2030 compared to 2005. Other sectors are planned to contribute to the remaining part of the target.



5.1.1.4. figure: Projected GHG emissions from the small energy sector (PPP)

Transport

The planned policies and measures in the transport sector will focus on taxes aimed at replacing road transport with less GHG emissions and promoting their replacement with alternative energy sources (electricity, biomethane, hydrogen), as well as improving the efficiency of passenger and freight transport (public transport, promotion of intermodal transport, etc.). The increased fuel excise duty, the $CO2_{component}$ of the fuel price and the EU ETS covering the transport sector (T27-P and T28-P) will have the greatest impact on GHG emission reductions.

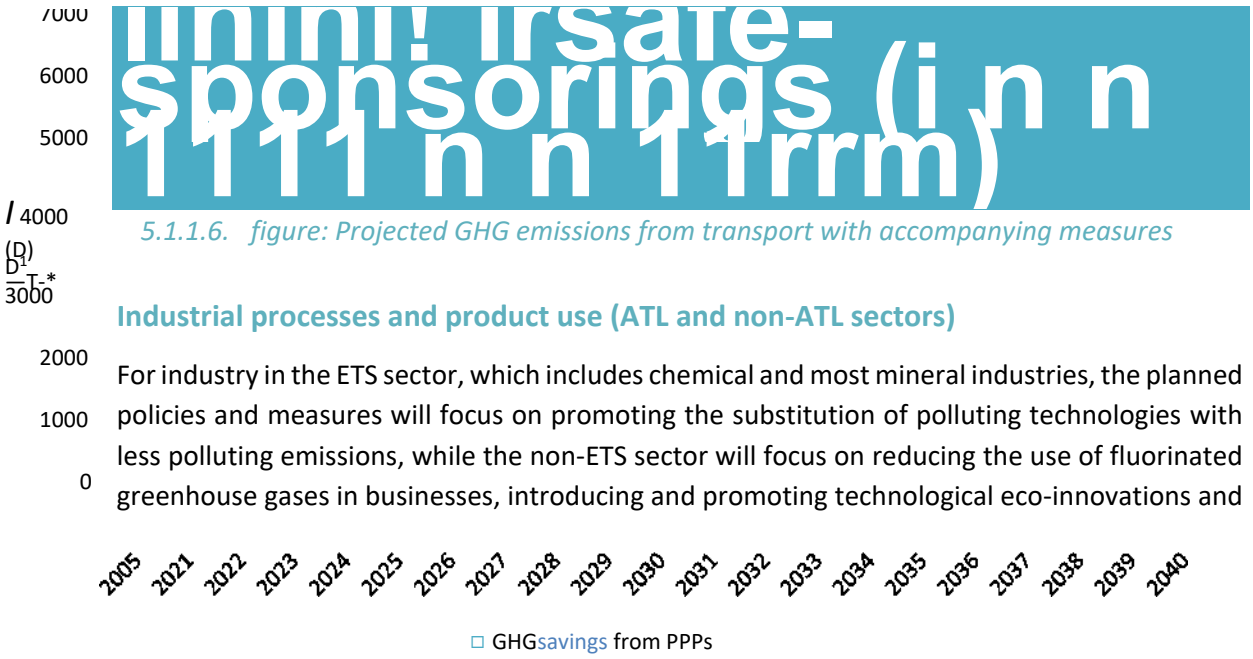


5.1.1.5. figure: Projected GHG emissions from transport with accompanying measures

The list of measures and the cumulative GHG reduction effect for the period 2021-2030 with planned policies and measures in the transport sector are set out in Chapter 3 'Policies and measures'.

The planned additional measures will lead to a 4 % reduction in GHG emissions in the transport sector over the period 2021-2030 compared to the ESP scenario. Planned policies and measures are projected to reduce GHG emissions in the transport sector by 13 %. 43 % in 2030 and 2040 compared to 2005.

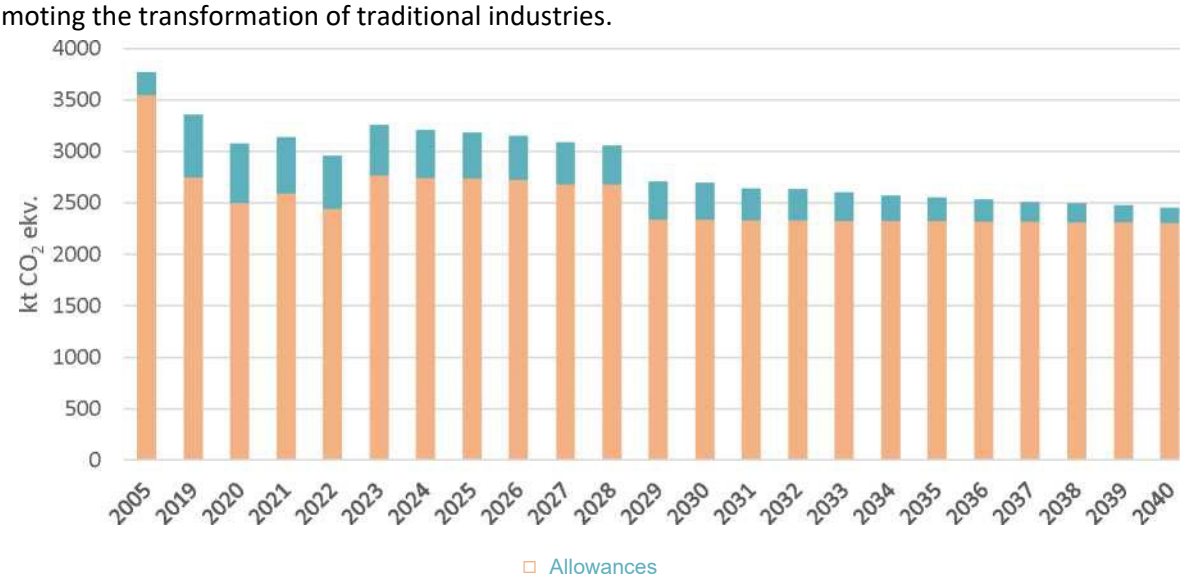
The impact of the planned additional measures will gradually increase, resulting in GHG emissions in transport going beyond its allocation, only close to reaching the target in 2030. Other sectors will contribute to the remaining part of the target.



5.1.1.6. figure: Projected GHG emissions from transport with accompanying measures

Industrial processes and product use (ATL and non-ATL sectors)

For industry in the ETS sector, which includes chemical and most mineral industries, the planned policies and measures will focus on promoting the substitution of polluting technologies with less polluting emissions, while the non-ETS sector will focus on reducing the use of fluorinated greenhouse gases in businesses, introducing and promoting technological eco-innovations and promoting the transformation of traditional industries.

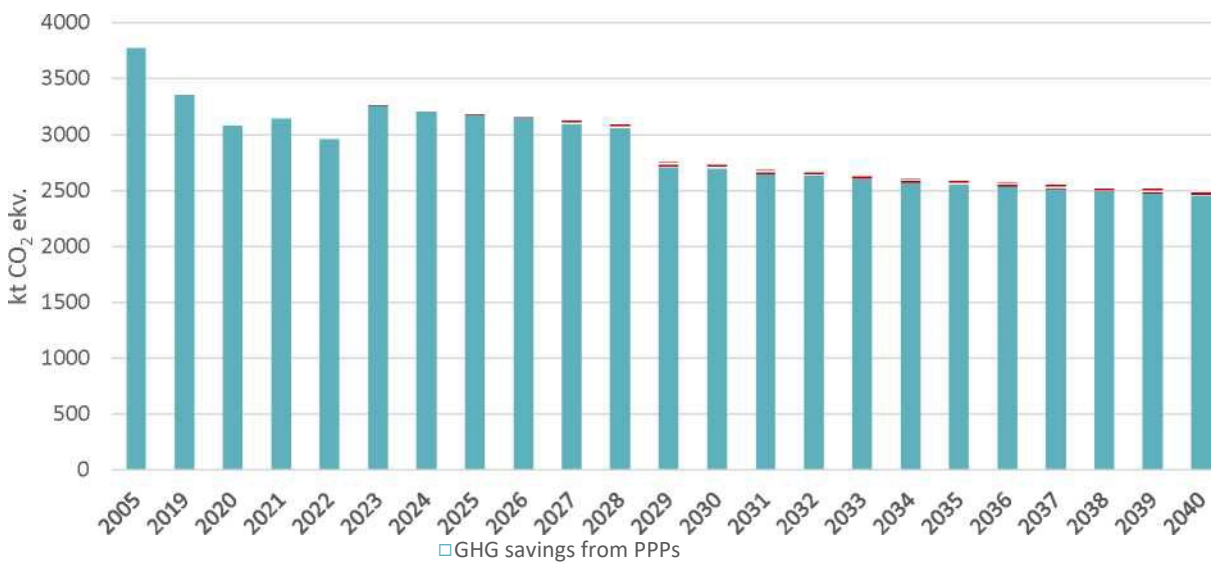


5.1.1.7. figure: Projected greenhouse gas emissions from industry with accompanying measures

The list of measures and the cumulative GHG reduction effect for the period 2021-2030 with planned policies and measures in the industrial sector are set out in Chapter 3 'Policies and measures'.

The planned additional measures in the industrial sector will reduce GHG emissions by 178 ktCO_2 eq over the period 2021-2030 and by 658 ktCO_2 eq over the period 2031-2040.

Compared to 2005, planned policies and measures are projected to reduce GHG emissions from industry (ETS and non-ATL) by 29 % in 2030 and 35 % in 2040.



5.1.1.8. figure: Projected GHG savings in the industrial sector (ETS and non-ATL) additional measures

Industrial sectors outside the EU ETS

The NECD aims to reduce GHG emissions by 19 % by 2030. Industrial sectors not covered by the EU ETS. With the implementation of existing policies and measures, the sector will achieve a reduction of 11 % compared to 2005, but does not reach the target for the sector, and additional measures are planned to achieve the target, with long-term hedžin contracts having the greatest impact on GHG reductions. Additional policies and measures will allow greenhouse gas emissions in non-ETS industrial sectors to be reduced by 17 % in 2030 compared to 2005. Other sectors are planned to contribute to the remaining part of the target.

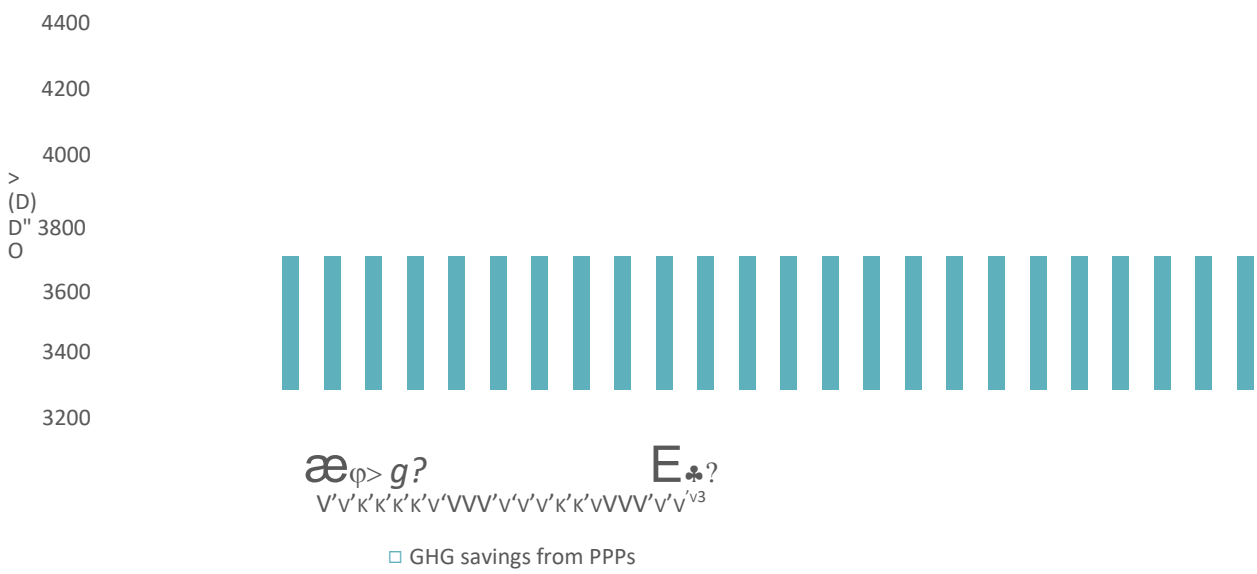
5.1.1.9. figure: Projected greenhouse gas emissions from non-ETS industrial sectors (PPP)

Agriculture

Planned policies and measures in the agricultural sector will focus on promoting sustainable and sustainable farming practices, maintaining and improving the agrochemical characteristics of soils and investment support for climate-friendly farming practices in livestock farms.

The list of measures and the cumulative GHG reduction effect for the period 2021-2030 with planned policies and measures in the agricultural sector are set out in Chapter 3 'Policies and measures'.

Most of the planned additional measures in the agricultural sector will be applied to reduce the use of mineral N-fertilisers, and particular attention will also be paid to promoting biogas production and managing the resulting manure through more environmentally friendly techniques, the GHG emissions from the use of mineral N fertilisers and the GHG savings resulting from the planned additional measures are shown in Figure 5.1.1.11..



5.1.1.10. figure: Projected emissions from agriculture with additional measures

Compared to 2005, total GHG emissions from agriculture are projected to decrease by 11 % in 2030 and by 14 % in 2040.

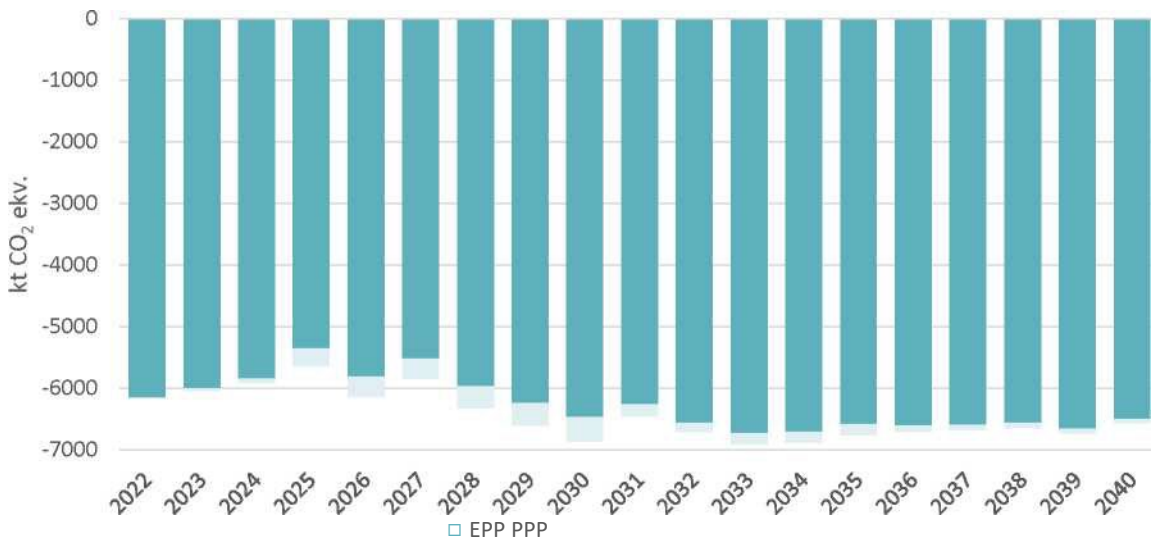
Land use, land use change from forestry (LULUCF)

The quantity of additional policy measures (AMs) is lower than the ECS list. However, these measures also make an important contribution to the achievement of the objectives in the FIFCM sector. The main focus is on the conservation of self-forested areas and on the production of timber products through which new modular wooden buildings will be renovated or built. At the same time, afforestation on state-owned land and the conservation of grassland areas are also planned. Finally, one measure will have a negative short-effect in reconversion of poor forests, leading to an increase in emissions that will be offset in the long term.

The list of measures and the cumulative GHG reduction effect for the period 2021-2030 with planned policies and measures in the GIFF sector are set out in Chapter 3 'Policies and measures'.

Projected emissions and removals in the GIFF sector, based on projected emissions and removals from existing policies and measures, with accompanying measures, as described in Chapter 4 'Current situation and projections with existing policies and measures', and accompanied by an estimate of the impact of the planned policies and measures. The impacts of the planned policies and measures have been assessed taking into account the estimated area of the land use category affected by the measure and the GHG inventory methodologies used in the National GHG inventory report in the different categories where GHG emissions

are generated or are absorbed (live biomass, dead organic material and soil).



5.1.1.11. figure: Projected GHG emissions from the FISH with accompanying measures

The planned additional measures will increase removals by 6 % in 2030 and by 1 % in 2040 compared to the ESP. Compared to 2005, planned policies and measures are projected to increase significantly by 64 % and 57 % respectively in 2030 and 2040.

In the PPP scenario, Lithuania does not achieve its projected GHG balance budget and 2030 target, as the projected GHG balance in the GFCM sector is only -6 706 ktCO $2_{eq.}$, the target of -7 084 ktCO2-eq.

Wastes

The planned policies and measures will focus on circularity studies, green purchasing and domestic composting. The planned measures focus on public education and regulatory changes that stimulate demand for circular and climate-neutral goods and services and composting in households and community gardens in urbanised areas. All planned measures will reduce the amount of waste landfilled, leading to a gradual reduction of GHG emissions.

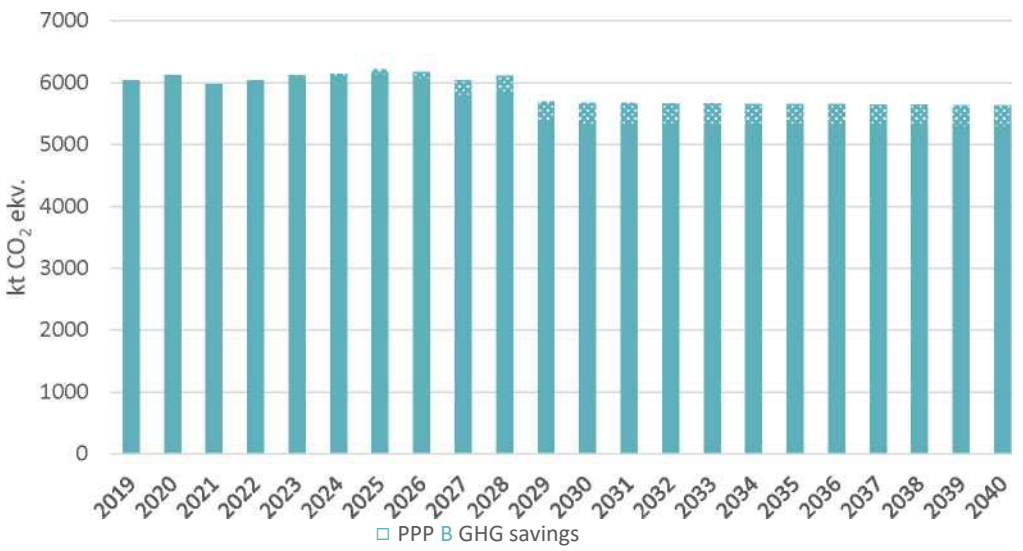
The list of measures and the cumulative GHG reduction effect for the period 2021-2030 with planned policies and measures in the waste sector are set out in Chapter 3 'Policies and measures'.

5.1.1.12. figure: Projected GHG emissions from landfilling additional measures

Planned policies and measures are projected to deliver significant GHG emissions reductions in 2030 and 2040, respectively by 69 % and 74 % compared to 2005.

Sectors participating in the EU ETS

In the sectors covered by the EU ETS, EU Member States' operators (combustion plants (over 20 MW), oil refining, chemical and mineral industries) have been allocated gradually decreasing quotas with the aim of reducing overall GHG emissions by 62 % compared to 2005. Additional measures are planned to achieve this objective, such as the development of renewable energy sources and the replacement of polluting technologies with less polluting technologies. Additional policies and measures will lead to a 45 % reduction in greenhouse gas emissions in the sectors covered by the EU ETS compared to 2005.



5.1.1.13. figure: Projected emissions from sectors participating in the EU ETS (ETS)

Planned policies and measures in the sectors covered by the EU ETS will reduce GHG emissions by 2 % between 2021 and 2030 and by 6 % between 2031 and 2040. It should be noted that the forecast did not assess the impact of the price of allowances. Policies and measures planned for fuel burning in manufacturing, compared to other sectors, will have the greatest impact on the reduction of GHG emissions. Between 2021 and 2030, combustion of fuels in the manufacturing subsector will decrease by 12 % and by 38 % between 2031 and 2040. In other sectors, GHG emissions will decrease more moderately to 10 %. 2021-2030 and up to 16 % For the period 2031-2040.

Interactions between existing policies and measures and planned policies and measures

Transport: The existing measure T3-E (Electrification of Railways) has an impact on the planned measure T4-P (Promotion of Intermodal Transportation), as the increase in rail freight due to measure T4-P does not directly increase GHG emissions in rail transport (due to T3-E for a large part of rail's benefits of electricity rather than fossil fuels). On the other hand, the planned measure T3-P, which purchases electric locomotives and trains, will have a greater impact on the existing measure T4-E (Promotion of Intermodal Transportation) by increasing rail freight traffic. Measure T11-E (Green Procurement) is designed to achieve the objectives of Directive (EU) 2019/1161 of the European Parliament and of the Council, but the objectives of the instrument are more ambitious than the said Directive.

Measures T1-E, T6-E, T12-E, T13-E, T10-E, T11-E, T1-P, T27-P and T28-P together contribute to an increase in the number of electric vehicles and cover aspects such as car and fuel pollution taxes, subsidies for their acquisition, infrastructure development and social dispersion. The absence of any of these aspects would significantly reduce the planned number of electric vehicles, e.g. in the absence of pollution taxes, it would be more difficult to subsidise the purchase of electric vehicles, and in case of poor infrastructure, electric vehicles would not be attractive. Of the above measures, only T1-E, T1-P and T13-E are aimed specifically at increasing the number of electric vehicles, all others reducing emissions

GHG emissions and other means.

Of the planned measures, measures related to fuel emission taxes (T27-P and T28-P) will have the greatest impact on GHG emission reductions. Without these measures, not only will the reduction target not be achieved, but many other measures requiring funding may not be implemented.

Industrial processes and use of products. Long-term hedgical contracts (P19-P) areplanned to advance the GHG reduction result from companies (hedge principle). Offer long-term contracts with companies to initiate and ensure long-term GHG reductions. Such contracts would provide companies with fixed public support for each tonne of GHG that could be saved on the basis of the best-performing technological measures available at that date, while the price of the savings tCO2eq is determined on the basis of a forecast of a possible longer-term price.

The planned measure to reduce the use of F-gases by businesses (P18-P) is a complement to existing policies and measures that are expected to achieve the objectives of the F-gas Regulation126 and the Kigali Amendment to the Montreal Protocol.

The planned measure P5-P on the replacement of polluting technologies with less polluting technologies will have an impact on greenhouse gas emissions not only in industry but also in energy. GHG savings from planned measures related to the combustion of fuels in industry and construction are included in the energy sector.

The measures recommended in energy audits are planned to be implemented in order to achieve the energy efficiency targets in industry by continuing the implementation of existing measures, to promote the introduction of internal monitoring systems for energy efficiency in businesses and industry, and to increase technological and energy efficiency in industry through the deployment of artificial intelligence and digital twin technologies.

Agriculture. The measures concern the use of mineral N fertilisers in the agricultural sector, affecting each other (A3-P, A12-E, A19-E and A21-P). The interlinkages between these measures were taken into account in the assessment of these measures. Measures A21-P and A1-P will have the greatest impact on GHG emissions. Measures A1-E and A1-P for biogas production will have an impact on greenhouse gas emissions not only in agriculture but also in the energy sector. GHG savings from existing (A13-E, A14-E and A15-E) and planned measures (A22-P and A3-P) related to the use of fuels from agricultural machinery are included in the energy and transport sectors. However, in the absence of reductions and quota reductions for gas oil intended for agricultural activities, there is a risk of not achieving the planned effect of other measures, such as the promotion of proprietary technology.

Land use, land use change and forestry (LULUCF). In the land use, land use change and forestry sector, measures that change tillage practices in agriculture (A7-E, L4-E, L5-E, L7-E) have the highest impact and best defined interlinkages in the EPP scenario. In assessing these measures, it was assumed that sustainable tillage

126https://eur-lex.europa.eu/legal-content/LT/TXT/PDF/?uri=CELEX:32014R0517&from=EN

practices could be applied together on the same area. These measures will also have an impact in the agricultural sector, as they may result in changes in the quantities of fertilisers used, as well as in the amount of fuel used for transport. Another group of measures (L1-E, L2-E, L3-E, L6-E) focuses on enhancing biodiversity and protecting and preserving organic soils. The implementation of these measures will contribute to the achievement of the objectives of the EU Nature Restoration Regulation under consideration. For the purposes of this Regulation, organic soils are defined as those that need to be restored if we are to preserve the specificity and biodiversity of wetlands. It is also beneficial in the context of climate change, as these soils are highly responsible for GHG emissions on productive land. Finally, the last set of measures (L8-E, L9-E and L10-E) concerns the maintenance and afforestation of landscape features (e.g. scattered trees and shrubs, trees and bushes, groups, etc.) and the development of forests. These measures do not have a particularly significant effect in the overall context of the NECPs, but they are an investment in the future as they need time to reach their maximum efficiency.

In the PPP scenario, the biggest effects are concentrated in measures related to forests and harvested wood products (L20-P, L14-P, L15-P, L18-P, L21-P). These measures contribute to increasing forest cover, improving the quality of forests and protecting organic soils. They will also encourage the use of domestic timber production on the national market rather than export as a raw material.

Waste. In thewaste sector, planned policies and measures are complementary to existing policies and measures which are expected to achieve the objectives of European Union legislation (Waste Directive[127],[128]Packaging Directive,[129]Landfill Directive).

The main objective of the planned policies and measures is to promote green procurement, domestic composting and to focus on circularity studies.

Household sector: When assessing the planned EE measures, modernisation measures for individual and multi-apartment dwellings are projected to have the greatest impact on energy savings. These measures will be implemented as part of the continuation of the programme for the renovation (modernisation) of multi-apartment buildings and the achievement of the objectives of Lithuania's long-term renovation strategy. As part of Lithuania's long-term renovation strategy, it is planned to renovate over 5500 multi-apartment dwellings and around 65900 individual dwellings by 2030 and save at least 40 % of energy.

Energy sector: renewable energy and the energy efficiency dimension

Energy efficiency dimension

Looking at the energy sector and its transformation in the PPP scenario, it is useful to start with an overview of the evolution of energy needs. The information on the projected changes in energy demand in 2020, 2025, 2030, 2035 and 2040 is presented below.

The main planned measures to increase EE, which will reduce energy consumption between 2020 and 2040, are: use of more efficient products and techniques in the context of technological developments, transition

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128https://eur-lex.europa.eu/legal-content/LT/TXT/PDF/?uri=CELEX:32018L0851&from=LT
129https://eur-lex.europa.eu/legal-content/LT/TXT/PDF/?uri=CELEX:32018L0850&from=LT

to low-temperature DH, modernisation of inlet heat points, extension of EE outside industry, deployment of smart metering and use of waste heat. The planned measures and their effects are detailed below.

- ***EE2-P – Renovation/modernisation of multi-apartment buildings.*** By 2030, 5521 multi-apartment buildings are projected to be upgraded to at least class B, or to be modernised every year after around 790 units of apartment blocks. The measure will save 5.269 TWh over the period 2024-2030.

- ***EE3-P – Renovation of public buildings.*** After the implementation of the measure to the 'nearly zero energy' level
  (In the case of energy performance class A++) approximately 363 800 m of 2municipal public buildings will be renovated between 2025 and 2030, and around 143500 in 2029-2030 2 of centralgovernment public buildings will save 0.295 TWh between 2024 and 2030. After the implementation of measures EE3-E and EE3-P, it is planned to renovate approximately 960 000 m of 2public buildings by 2030: approximately 510 000 m of 2 public buildings incentral government and around 450 000 m of 2 municipalpublic buildings.

- ***EE8-P – Modernisation of indoor heating and hot water systems in multi-apartment buildings ("small"***
  renovation). From 2023, annual energy savings of 5.65 GWh are projected, with an update of around 300 old heat points and the replacement of 2342 heat points during the implementation of the measure. Energy savings will amount to 0.204 TWh over the period 2023-2030. It is accepted that the replacement of an elevator heat point for a new automated heat point results in an average 8 % reduction in thermal energy consumption.

- ***EE9-P – Implementation of energy efficiency measures by private legal entities under***
  energy audit reports. By 2025-2030, 25 projects are projected to generate energy savings of 0.035 TWh. Analysis of data from existing project applications shows that one project will achieve minimum annual energy savings of 330 MWh and the measure will generate 60 % of natural gas savings and 40 % of electricity savings.

- ***EE10-P – Renovation/modernisation of one or two apartments for natural persons.***
  For the period 2023-2030, the measure projects the renovation of homes to at least the energy performance class B of houses of around 65900 individual dwellings, reducing their thermal energy consumption by at least 40 % After the implementation of the measure,
  projected energy savings of 5.513 TWh over the period 2021-2030.

- ***EE11-P – Modernisation of street lighting systems.*** Forecast to update 100 by 2030
  1000 units of street lighting lamps. In assessing the effect of the measure, it was assumed that the renovation of one luminaire would result in annual savings of 280.6 kWh. The measure is projected to save 0.099 TWh in the period 2024-2030.

- ***EE12-P – Enhancing the technological and energy efficiency of industrial plants through artificial deployment***
  intellectual and digital twin technologies. The amount of AI solutions that can be developed between 2025 and 2030 is 640 units, which will generate savings of 0.037 TWh between 2024 and 2030.

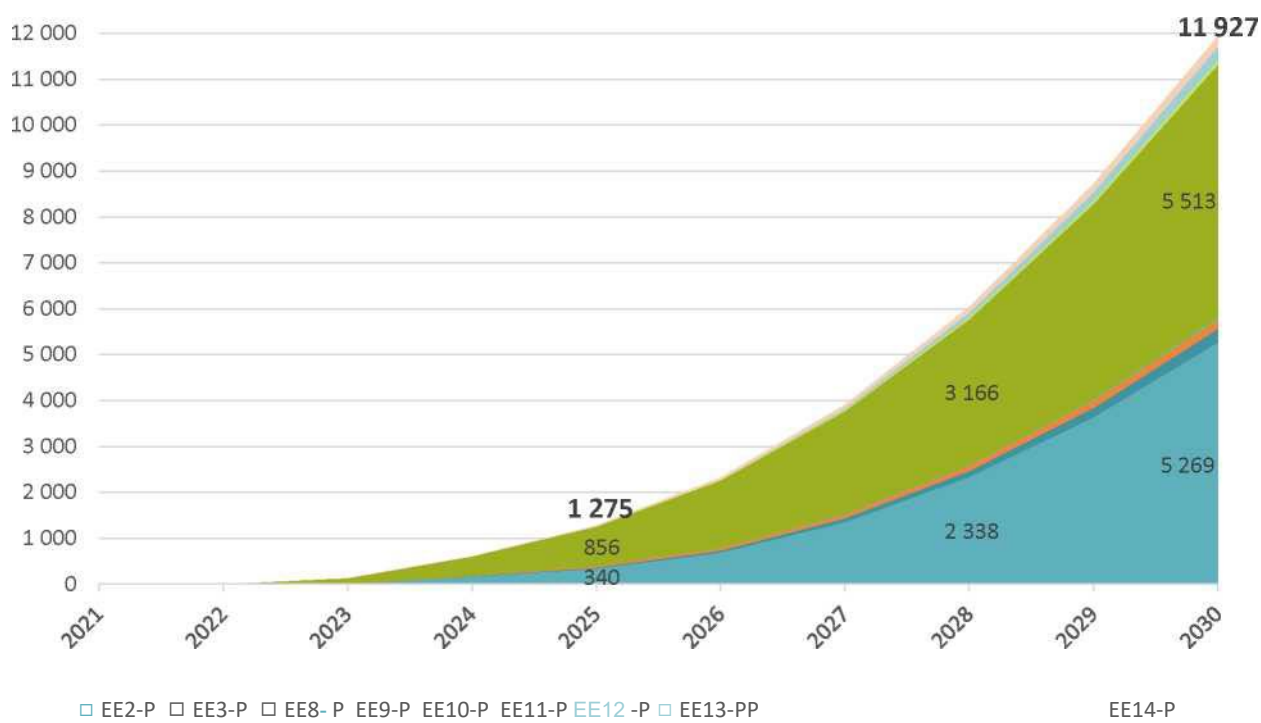
  It is accepted that the measure will generate 47 % of natural gas savings and 53 % of electricity

savings.

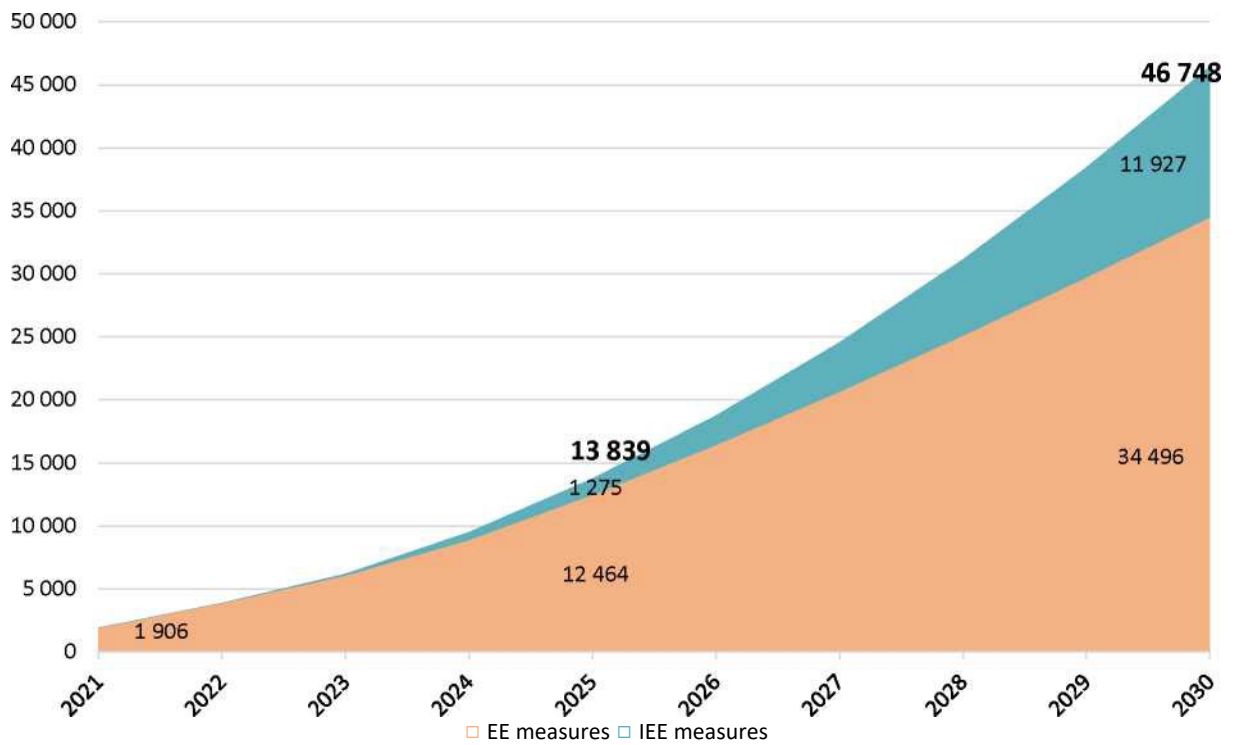
- ***EE13-P – Create a legal requirement for companies to implement energy efficiency the measures recommended in the audits.*** It is accepted that the measures will save 20 MWh of energy per year in medium-sized enterprises and 120 MWh in large enterprises (of which 32 % of natural gas, 55 % of electricity, 12 % of biofuels, 1 % of waste energy). The measure is projected to save 0.260 TWh of energy over the period 2027-2030.

- ***EE14-P – Fostering the implementation of internal monitoring systems for energy efficiency in businesses and industry.*** It is accepted that the monitoring system will save 20 MW of energy per year (of which 47 % of natural gas; 53 % of electricity). The measure is projected to save 0.215 TWh over the period 2027-2030.

These planned energy efficiency measures are expected to deliver additional savings of 11.927 TWh by 2030. The energy projections are shown below in Figures 5.1.2.1 to 5.1.2.3 and Table 5.1.2.1. Modernisation measures for individual and multi-apartment housing have the greatest impact on savings.



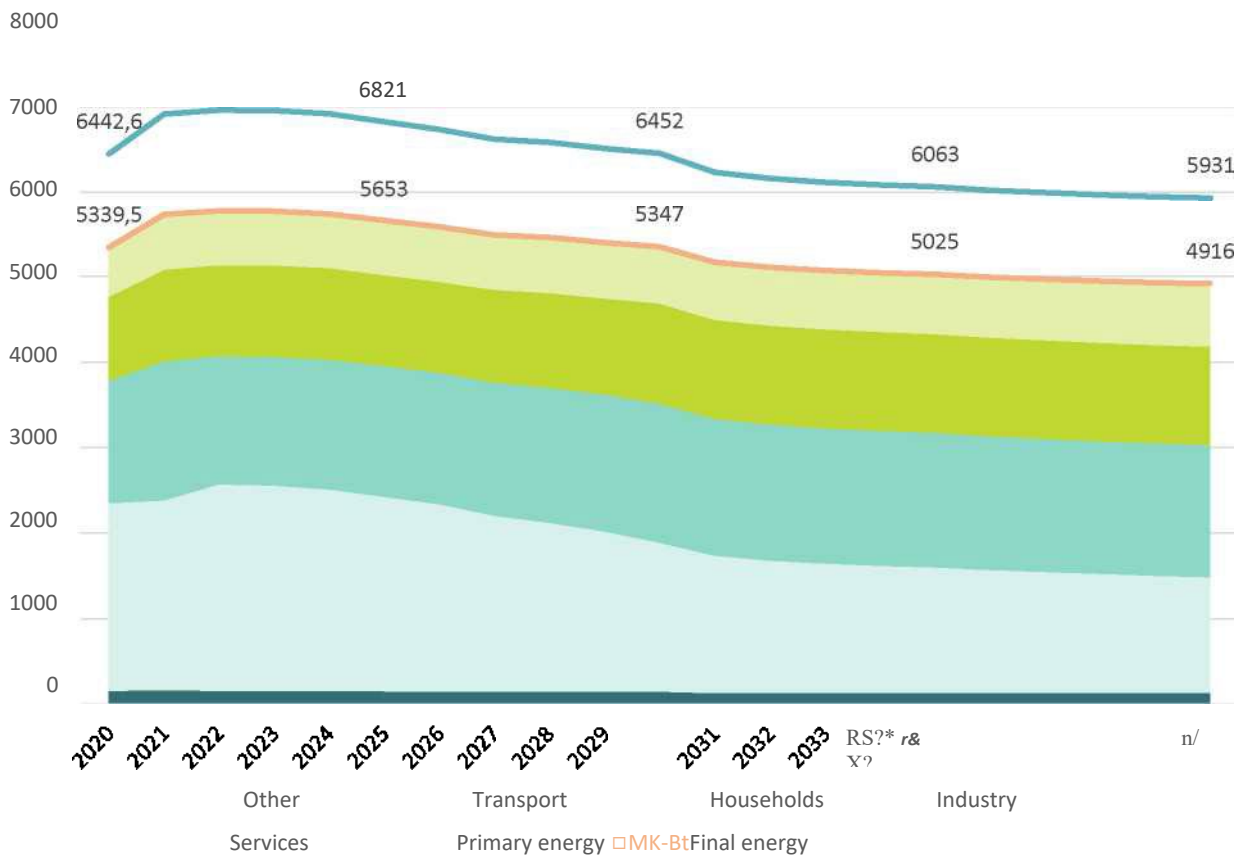
5.1.2.1. figure: Forecast of energy savings after the implementation of the planned policy measures, GWh



5.1.2.2. figure: Forecast of energy savings after the introduction of existing and planned policy measures, GWh

Table 5.1.2.1. Energy consumption projections with planned energy efficiency policies, measures and programmes (PPPs)

	In 2020	Year 2025	2030	2035	In 2040
Primary energy consumption, ktoe	6442,6	6821	6452	6063	5931
Final consumption, ktoe	5339,5	5653	5347	5025	4916
Industry sector, ktoe	1433,9	1531	1626	1574	1546
Household sector, ktoe	981,3	1061	1172	1152	1149
Services sector, ktoe	576,0	638	660	699	736
Transport sector, ktoe	2190,4	2272	1739	1469	1353
Other sectors, ktoe	157,9	151	150	131	132



5.1.2.3. figure: Energy consumption forecast PPP

The data provided show that for PPPs final energy consumption in 2030 will be close to 2020 and an 8 % reduction in energy consumption is planned in 2040. Compared to the EPP scenario, final energy consumption would be 5.2 % higher in 2030 and 4.5 % lower in 2040.

Renewable Energy

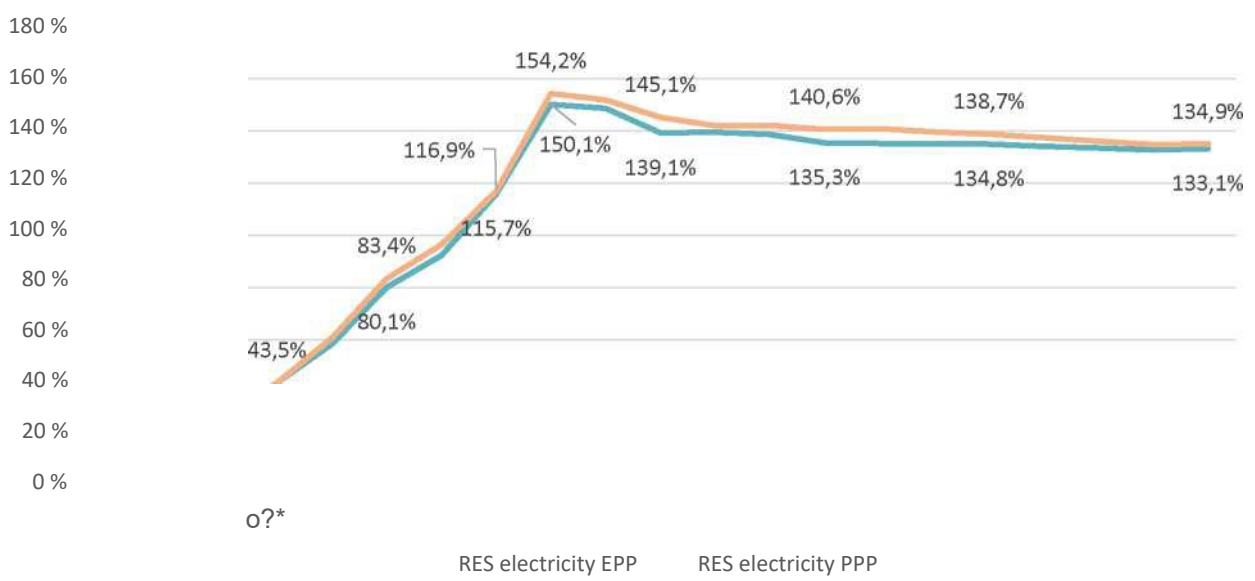
Electricity production. When assessing the impact of planned policies and measures on the energy sector, it has to be noted that existing policy measures have the greatest impact and that planned only to a limited extent contribute to the RES objectives. This is due to the fact that most of the measures that were "new, planned" in 2018-2020 have become existing. Among the planned policy measures, three can be identified as having the greatest impact, namely: 1.RES27-P for solar and wind power plants in the business sector. It is estimated that around 600 MW of new solar power plants will be installed; 2.RES29-P – Create renewable energy communities in municipalities, using revenues to compensate deprived (energy poor) inhabitants. It is estimated that some 340 MW of new solar power plants will be installed; 3.RES36-P – Investment support for the installation of biomethane production and treatment plants. New biomethane production capacity is expected to be installed to ensure annual production of 600 GWh of methane in 2030.

- ***RES27-P – Solar and wind power plants in the business sector.*** Newly installed solar

power plants are planned to reach 600 MW in 2030 and 585 GWh of electricity production. This measure will increase the share of RES in gross final energy consumption by 0.85 % in 2030.

- ***RES29-P – Develop renewable energy communities in municipalities using revenues compensation for deprived residents.*** Solar power plants are expected to be installed at 340 MW in 2030 and 331.5 GWh of electricity will be produced. This measure will increase the share of RES in gross final energy consumption by 0.47 % in 2030.
- ***RES36-P- Investment support for the installation of biomethane plants.*** Planned to be deployed in 2030 new production capacity, which will produce 51.6 ktoe (600 GWh) of biomethane gas annually, which will be consumed in the transport sector. This measure will increase the share of RES in gross final energy consumption by 0.18 % in 2030.
- ***RES28-P – Sun and wind power plants in the public sector.*** New solar installation planned power plants will have a capacity of 130 MW in 2030 and will generate 126.8 GWh of electricity. This measure will increase the share of RES in gross final energy consumption by 0.18 % in 2030.

A significant shift from fossil fuels for energy production to RES use is envisaged, taking into account the planned deployment of EE and RES by 2040. Figure 5.1.2.4 below presents a comparison between the ESP and PPP scenarios for the assessment of the penetration of electricity produced from RES (RES-E indicator).



5.1.2.4. figure: ESP and PPP penetration of electricity produced from RES

The PPP scenario envisages a slightly higher penetration of RES generation capacity, but has no significant impact. The size of electricity produced using RES above 100 % indicates that electricity production will exceed electricity consumption. That is to say, from 2027 to 2028, local electricity production from RES will be able to meet the demand at times and will exceed electricity demand. The main reasons for increasing electricity demand are: wider use of heat pumps for heating and cooling, electrification of road and rail transport, increasing demand for electricity

for hydrogen production (green hydrogen electrolysis), industrial modernisation and digitalisation.

5.1.2.2. the table below shows the estimated new RES capacity for PPPs. The development will take place through the installation of solar and wind turbines.

Table 5.1.2.2. Expansion of electricity generation capacity from RES to PPPs

	In 2020	2021 e	FISMA	ERDF*	Beyond	Year 2025	In 2026	EBA:	2028	2029 in m	2030 in m
Solar e.g. MW/year	61	91	317	142	1490	1980	351	200	188	139	33
Total solar e-e., MW	164	255	572	714	2204	4184	4535	4735	4923	5062	5095
Wind e.g. MW/year	6	83	323	207	333	538	707	1458	1810	320	110
Total wind e.g. MW	540	623	946	1153	1486	2024	2731	4189	5999	6319	6429
Of which Offshore,									1400	1400	1400
Biofuel cogeneration, MW	63	73	73	73	0	0	0	0	0	0	0
Waste cogeneration, MW	20	20	40	70	0	0	0	0	0	0	0
Total cogeneration, MW	83	93	113	143	143	143	143	143	143	143	143

As shown in the PPP scenario, no additional incentives or support are foreseen for the development of wind turbines (wind turbines have the same capacity as the EPP scenario). Market conditions are expected to be favourable without incentives. This is assessed in the EPP scenario. The development of solar power plants will continue to be encouraged. The PPP scenario envisages an additional expansion of 1 070 MW of solar power plants by 2030. The capacity of solar power plants is planned to be around 5 100 MW in 2030.

The emergence of new electricity generation capacity in the Lithuanian electricity system will enable local generation to be improved, thus contributing to ensuring the reliability and security of the system (through parallel development of system balancing measures). It is currently difficult to determine which specific technologies will be used to balance the system, but it can be assumed that in the short and medium term this function should be performed by the Cruonis pumped storage plant and gas combustion plants, while more innovative energy storage systems can be expected to enter the balancing market in the long term.

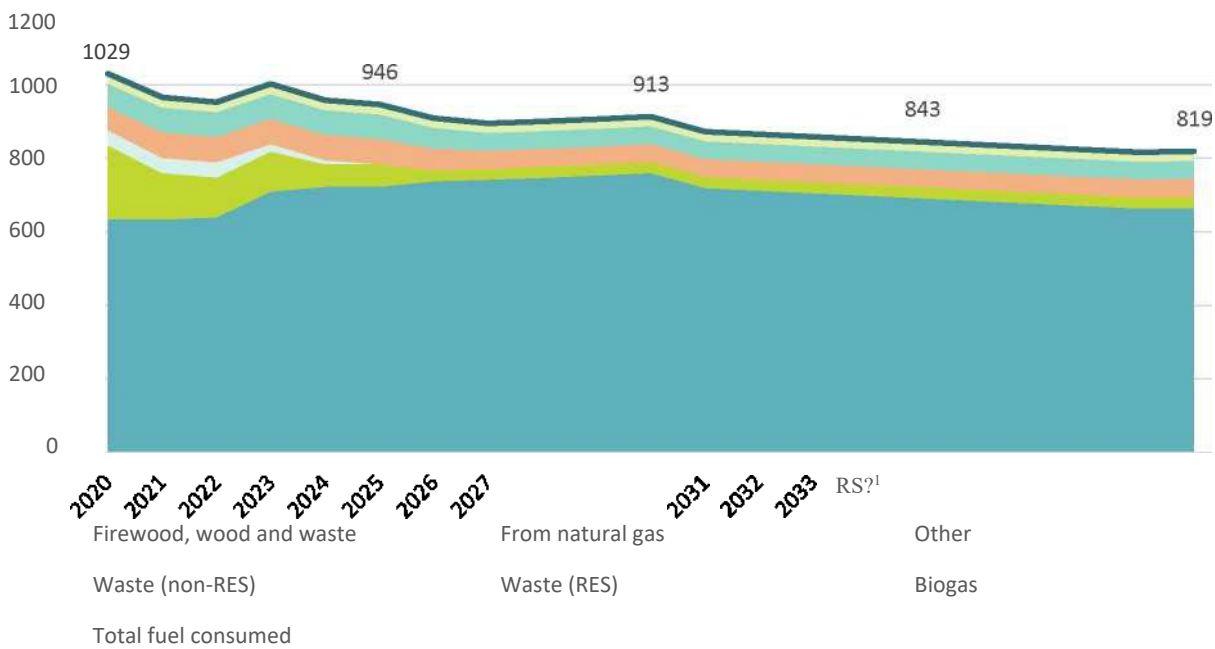
The heat sector will also change significantly, with the aim of increasing the share of RES in the production balance of district heating to 90 %. This will be largely driven by GCM and CCM projects, whose impact will be enhanced by ongoing support to low-power CHP plants, the use of waste heat DH

and the refurbishment of existing heat generation capacity.

This share of RES could not be achieved without continued EE measures such as refurbishment of multi-apartment buildings and public buildings, refurbishment of individual dwellings, replacement of boilers with more efficient or RES technologies, increasing EE in industrial plants and modernising street lighting systems.

In the PPP scenario, there are almost no measures to increase the share of RES in the district heating fuel balance. One larger measure, 'AEI38-P – Modernisation or replacement of depreciated biofuel boilers with other RES-using technologies', will not significantly change the fuel balance. As a result, both the composition of the fuel balance and the energy consumption are almost identical.

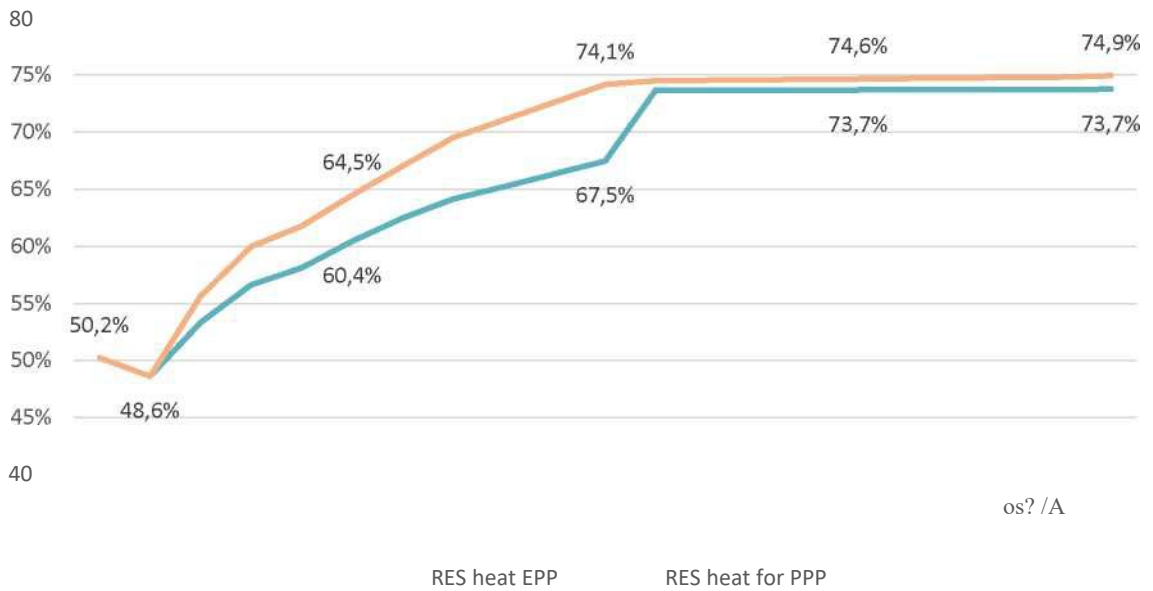
The balance of fuel consumed in district heating systems in the EEA scenario is shown in Figure 5.1.2.5.



5.1.2.5. figure: DH balance sheet, KN

It is worth noting that during modelling, the consumption of natural gas was reduced to the minimum necessary to meet peak needs and balance systems. As a result of this assumption and monitoring of the further decrease in heat demand, biofuels have become the balancing line in the fuel balance. This can be monitored since 2027, when the minimum amount of natural gas is recorded and the further balancing of production and demand by reducing the consumption of biofuels.

Looking not only at district heating production, but also in terms of combined heat production in Lithuania (plus the volume of decentralised heat production), RES is the heat indicator reflecting the proportion of RES in the total fuel balance used for heating. The evolution of the value of this indicator for the ESP and PPP scenarios is shown below in Figure 5.1.2.6.

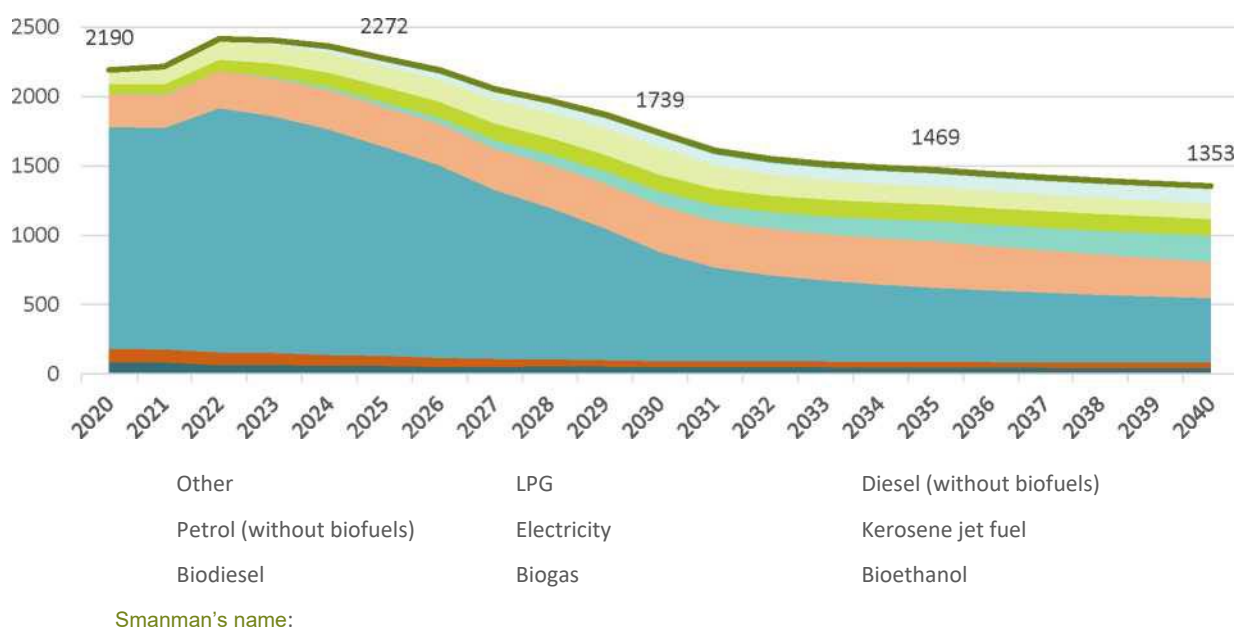


5.1.2.6. figure: RES Heating and Cooling ESP and PPP scenarios

EE measures and the switch to electric heating systems – the use of heat pumps – are the main influence of the assessment of the RES EPP and PPP scenarios in the heat sector.

When assessing the evolution of the share of RES in the **transport sector** in the PPP scenario, tax measures have been found to have the greatest impact: higher excise duties on petrol and diesel and the introduction of pollution taxes. The use of alternative fuels – biodiesel, bioethanol, biogas and electricity – and the promotion of sustainable mobility also have a significant impact. The largest change is expected in the decrease in diesel consumption. Between 2020 and 2040, diesel consumption is planned to decrease almost

The fuel balance structure of the PPP in the transport sector is shown in Figure



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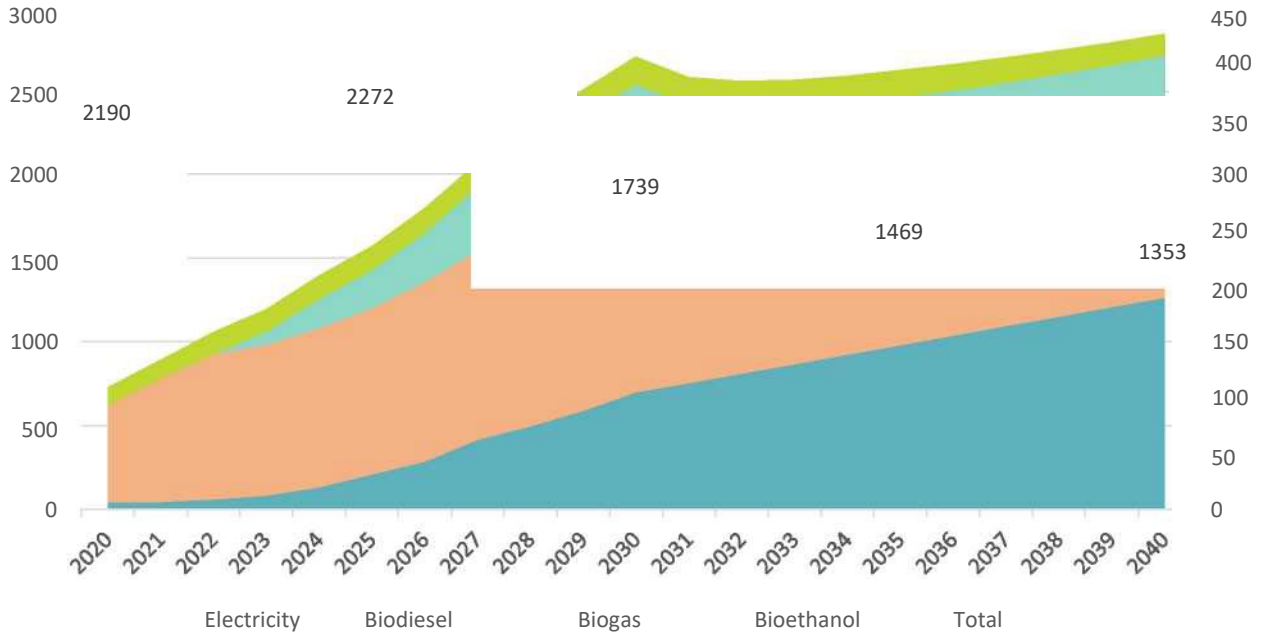
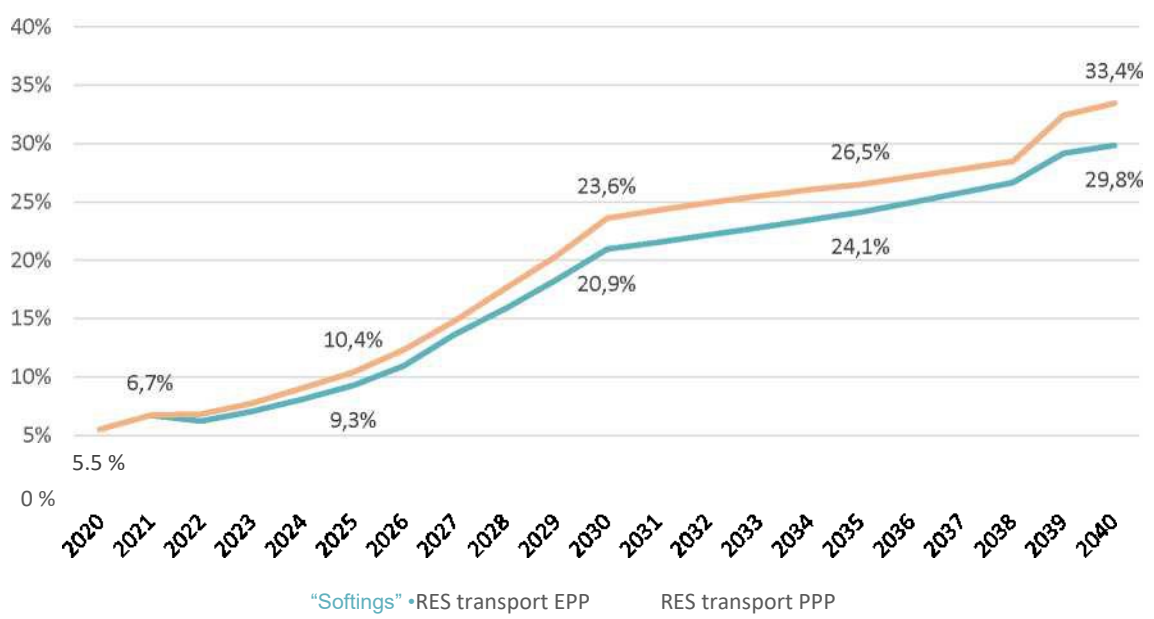
5.1.2.7. figure: Transport fuel balance PPP

As shown in the figure, the PPP scenario plans an even faster drop in diesel consumption than the ESP. The aim is to replace diesel with biofuels, hydrogen and electrification. As shown in Figure 5.1.2.8, RES and electricity consumption projections appear to be distinguished from the overall balance.



5.1.2.8. figure: Assessment of the use of RES fuels in transport PPPs, ktoe

In the transport sector, the PPP scenario achieves RES penetration as shown in Figure 5.1.2.9. It is important to note that, in this case, the calculations assessed actual RES volumes without applying multipliers.

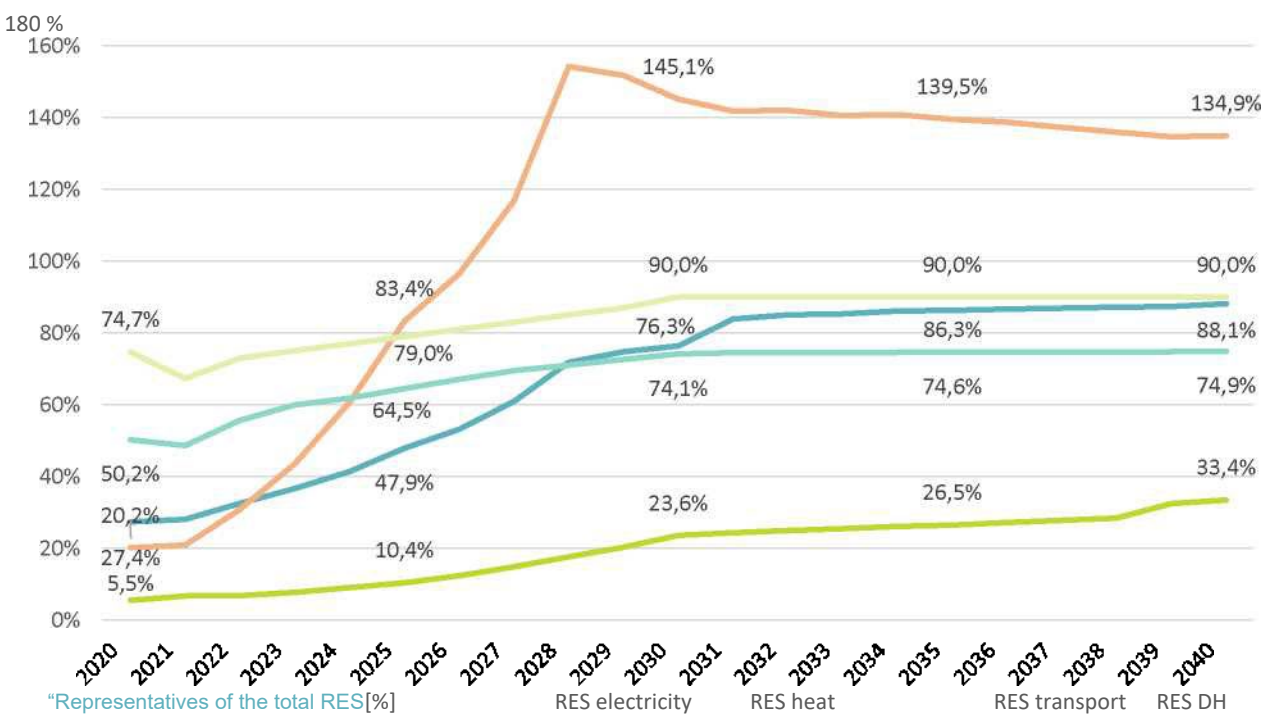


5.1.2.9. figure: RES penetration in the transport sector in the ESP and PPP scenarios based on actual RES flows (without multiplication factors)

5.1.2.3. the table below shows the share of RES in gross energy consumption and in the sectors concerned, following an assessment of the impact of the planned measures.

Table 5.1.2.3. RES share in gross final energy consumption and in relevant sectors

	In 2020	Year 2025	2030	2035	In 2040
Final energy consumption, total, ktoe	5339,5	5653	5347	5025	4916
RES share of gross final energy consumption, %	27,4	47,9	76,3/50	86,3/	88,1/
RES share of final energy consumption for heating and cooling, %	52,4	64,5	74,1	74,6/	74,9/
RES share in the DH sector, %/target	74,7	80,7	90/90	90/90	90/90
Share of RES production in local electricity generation, %/target	47,2	75	100/100	100/100	100/100
RES share of gross electricity consumption, %/target	20,2	83,4	145,1 (100)/70	139,5 (100)/	134,9 (100)/
RES share of final energy consumption in transport (without multipliers), %/target	5,5	10,4	23,6/15	26,5/	33,4/



5.1.2.10. figure: RES share of gross final energy consumption and relevant sectors (RES)

The reported data show that PPPs would fully achieve the 2030 RES targets for heating and cooling, electricity generation, transport and gross final energy consumption.

The total fuel and energy consumption (including RES resources) in the PPP scenario is shown below.

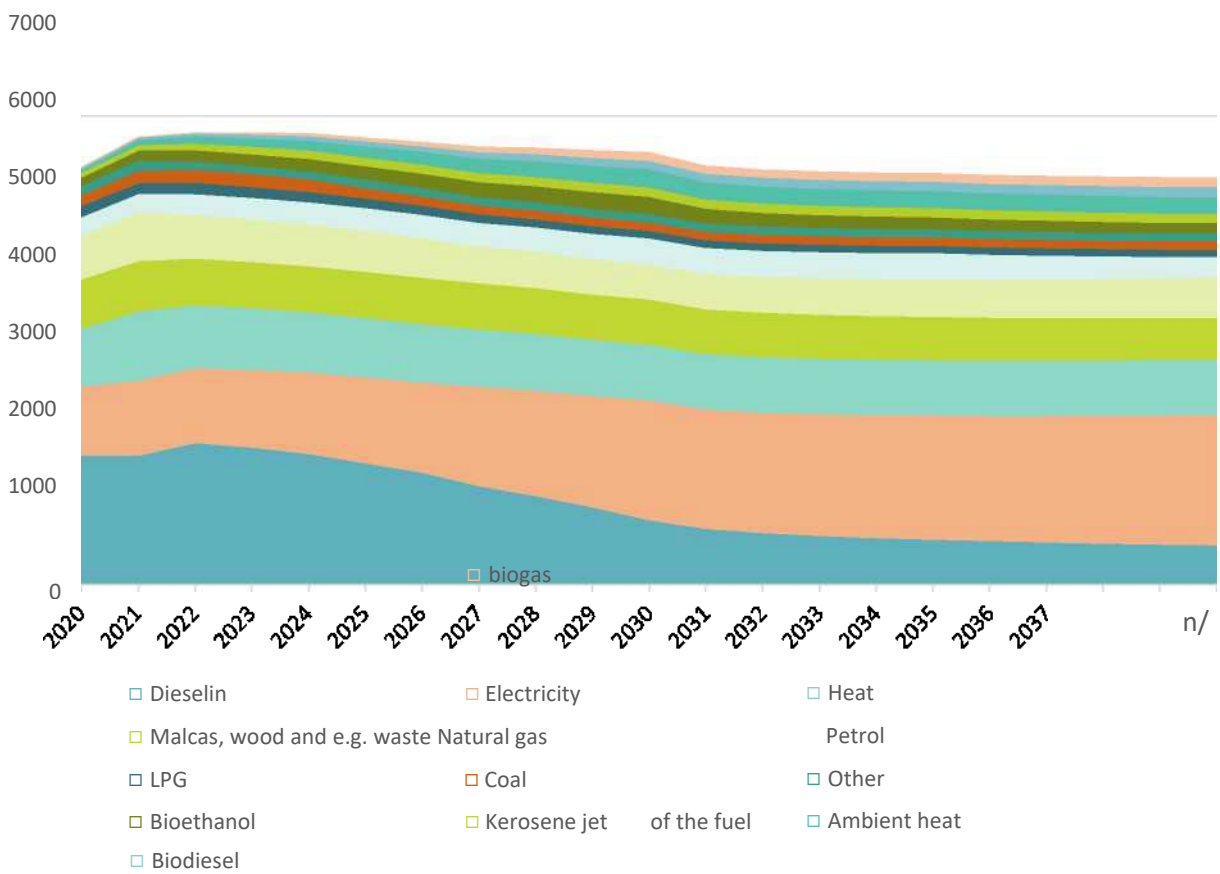


Figure 5.1.2.11 Total fuel consumption in the PPP scenario, ktoe

Lithuania's fuel and energy consumption will decrease marginally between 2020 and 2040. When comparing the current reality, i.e. 2020 with 2030, the projected consumption of fuels and energy will almost remain stable and decrease by 8 % in 2040.

This is linked to ambitious targets in the transport sector, where a strong electrification path is planned, covering both road light and heavy transport and electrification of railways. In addition, ambitious energy efficiency measures are planned, which, if successful, would aim at decoupling economic growth and energy consumption. In view of the projected fuel and energy consumption and estimates of the country's economic growth forecasts, decoupling has already started, with the added value added increasing when energy consumption remains almost unchanged at that time.

Impact ofplanned policies and measures on macroeconomic indicators

5.2.1 Impact of planned policy measures on macroeconomic indicators

At the request of the Ministry of Energy, an assessment of the macroeconomic, skills and social dimension of the planned policy measures was carried out between May and June 2023. The subject of the assessment is the planned policies and measures in Part 3 of the NECPs for the implementation of Lithuania's energy and climate change policy objectives and targets set out in Part 2 of the NECPs, together with the information provided in Part B of the NECPs on the impact of the measures on Lithuania's energy system and greenhouse gas emissions through the application of existing policies and measures and planned policies and measures.

The plan's planned measures are grouped by public policy area(s) where interventions are envisaged:

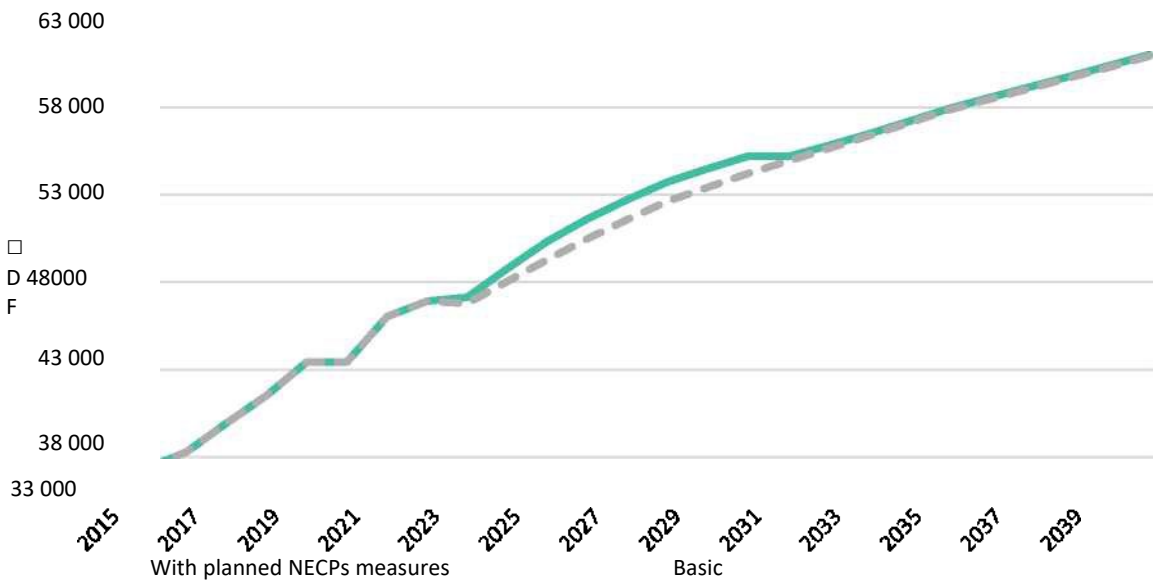
- transport;
- industry
- agriculture;
- land use, land use change and forestry (LULUCF);
- waste;
- renewable energy sources (RES);
- energy efficiency;
- the internal market;
- energy security;
- R & D.

The planned policy objectives and indicators set out in the NECPs are expected to mobilise around EUR 11,769 billion of public and private funds. About one third of the required financing (around EUR 4 billion) is planned to come from public investment, the remainder being private. Funding is intended to cover infrastructure, human resources, research and experimental development (R & D) activities and running costs.

Macroeconomic modelling assessed the macroeconomic and social impact of planned measures in the update of the NECPs. Two scenarios were modelled in the assessment of the macroeconomic impact of the updated NECPs measures: baseline (comprising the application of existing policies and measures in the NECPs) and scenario with planned policy measures. The assessment of the impact of the measures planned in the updated NECPs on macroeconomic indicators covers a period of 18 years. The results of the assessment show the impact of the planned measures over different periods, during the implementation of the measures planned in the NECPs (2023-2030130) and after the implementation of the NECPs (2031-2040). According to the results of the macroeconomic modelling, the implementation of the planned measures in the NECPs would lead to an increase in Lithuania's gross domestic product (GDP) and investment. The largest impact on GDP is projected in 2026, when the planned implementation of the NECPs would result in a country's GDP increase of 2.23 % compared to the baseline scenario. Lithuania's GDP would be on average 1.84 % higher during the implementation of the planned NECPs (2023-2030) and 0.2 % higher on average in

130While the NECPs plan covers the period 2021-2030, as part of its update, the start of implementation of the planned measures starts in 2023.

the post-NECP period (2031-2040) than would have been the case without the planned NECPs. At the time of implementation of the planned NECPs, investments would be 9.26 % higher than in the baseline scenario (Figure 5.2.2.1).

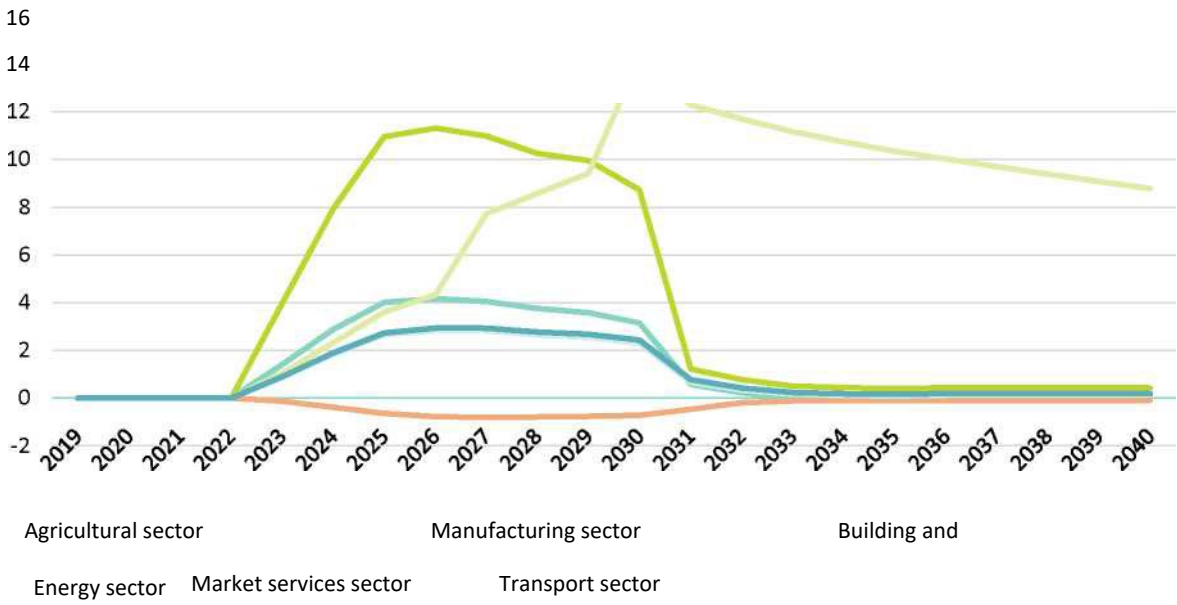


5.2.1.1. figure: GDP projection in the baseline scenario and scenario with planned NECPs measures in EUR million

At the time of implementation of the NECPs (2023-2030), Lithuania's import-export balance (net trade surplus as a percentage of GDP) would be 0.69 pps worse than if the planned NECPs had not been implemented. This is due to increased demand for imported manufacturing goods and related services due to the growth of investment activities financed in the framework of the NECPs, where the full positive impact of planned NECPs interventions has not yet materialised. However, in the period following the planned NECPs measures (2031-2040), Lithuania's import/export balance would be 0.23 pps better than would have been the case without the planned NECPs measures. A longer-term improvement in the import-export balance would result from a reduced need for energy imports compared to the baseline scenario.

Macroeconomic modelling reveals the costs of planned NECPs measures reaching different sectoral responses to the economy (Figure 5.2.2.2). For example, the construction sector would have a significant positive impact during the implementation of the NECPs (2023-2030), as the growth in investment activities financed under the NECPs would increase demand for services in the construction sector. The manufacturing sector would suffer from minor negative impacts during the implementation of the planned NECPs measures, partly due to

limited loss of international competitiveness due to the cost of planned NECPs measures due to the increase in input prices for inputs in production.



5.2.1.2. figure: Impact on sector-specific added value

The energy sector would have a significant positive impact both from the implementation of the planned NECPs measures and beyond, as a result of the development of physical infrastructures by NECPs measures that contribute directly and indirectly to the increase in energy production capacity and output generated by the energy sector. At the time of implementation of the planned NECPs measures (2023-2030), Lithuania's energy sector added value would be 6.31 % higher, and 10.32 % higher in the post-NECP period (2031-2040) than would have been the case without the planned NECPs measures. Additional generation capacity created through planned NECPs measures will contribute to this outcome.

As the country's population declines and population ageing, the total number of employed people in the country's economy is expected to continue to decline. Nevertheless, NECPs investments could, at least temporarily, mitigate these negative trends. The number of employed persons in Lithuania during the implementation of the planned measures (2023-2030) would be 1.69 % or 23.6 thousand people higher than in the baseline scenario. These are short-term effects in the form of the purchase of additional services by the planned NECPs, for which the private sector employs additional staff. In the period after the implementation of the NECPs (2031-2040), the number of employed persons in Lithuania is expected to be on average 0.13 % or 1.81 thousand persons higher than they would have been in the absence of the planned measures.

The package of interventions planned in the NECPs will have a short- and long-term impact on workers' skills development. The short-term impact on workers' skills will be felt through higher employment – additional workers employed in the construction, transport and services sectors during the implementation of the planned measures will improve their skills through *learning by doing*. The long-term impact will contribute to the development of workers' skills: demand for professionals from RES and related sectors will increase,

but there will be a parallel decline in demand for traditional energy and related professionals. In other sectors, due to decarbonisation processes and the transition to a circular economy model, there are also expected changes in demand for professionals. In the long term, job skills mismatches may arise, which should be addressed through training courses for the plan's implementers and businesses for the retraining of workers and the training of new professionals.

The measures planned in the NECPs would positively contribute to reducing the proportion of people at risk of energy poverty and social exclusion in Lithuania, both through the positive stimulus on household income, through investments in energy efficiency improvements and through the creation of renewable energy communities. At the time of implementation of the planned measures (2023-2030), the percentage of people unable to afford sufficient heating would be 3.75 % lower in Lithuania and 1.85 % lower in the post-NECP period (2031-2040) than would have been the case without the planned NECPs.

At the time of implementation of the NECPs, the average disposable monetary and in-kind income per household per month would be EUR 6.5 higher for the lowest income group and EUR 1.1 for the period after the implementation of the NECPs than would have been the case without the planned NECPs measures. Similar effects are observed in other income groups. The percentage of people at risk of poverty or social exclusion in Lithuania would be 0.43 pps lower in the year of implementation of the plan and 0.27 pps lower in the post-NECPs period than would have been the case without the planned NECPs measures.

Recommendations for increasing long-term impact

In order to maximise the contribution of NECPs interventions to the development of the Lithuanian economy, it is proposed to implement the following recommendations:

1. Action is recommended to maximise the impact of the NECPs' expenditure side on the economy's demand side. The growth in investment activities financed under the planned NECPs measures will increase demand for imported manufacturing goods (and materials) and related services. However, at least part of these imports can be replaced by domestic production and services. A practical example could be large-scale infrastructure projects (e.g. RES capacity development) where it is possible to split the subject of the procurement into lots, thus allowing local bidders to participate in the tender. Moreover, the splitting of large procurements into lots is likely to increase competition between suppliers and thus reduce the total cost of the works and the amount of funds needed to implement the planned Plan's measure. It is true that, on a case-by-case basis, the splitting of purchases may have both positive and negative aspects. However, this example illustrates how the planned NECPs could contribute through their actions to the wider positive impact of the current demand side on the Lithuanian economy. For example, there are several local producers of solar collectors/photo modules in Lithuania.

2. In order to maximise the impact of the expected costs on the demand side of the economy, it is also recommended that existing needs for equipment, technology and execution of works be communicated in advance to local suppliers, e.g. through associated business structures, prior coordination of technical specifications, etc., so that local suppliers have time to prepare. This recommendation is also relevant for the purposes of maximising the long-term impact, as the infrastructure created will have to be served, and in order for a larger part of this service to be passed on to Lithuanian companies, they must also have sufficient time to prepare. Such preparation may include both resource planning and human resource training or even RTEPI activities, which could also attract the attention of the supporter of public policy interventions.

3. Investment in physical infrastructure should be adequately complemented by investment in human capital and the R & D base. For example, a study by the Organisation for Economic Co-operation and Development (*OECD*) has131 shown that a state or region can only boost growth through a cross-cutting approach, i.e. focusing public intervention on physical infrastructure alone will not be successful unless it is accompanied by the promotion of endogenous growth factors such as human capital and innovation.

4. In order to maximise the long-term impact on the economy, it is also recommended to prioritise planned interventions and alternatives to their implementation that would increase the export potential of Lithuania's production. The options should aim at developing infrastructure and competences that will benefit future export potential.

5.2.2Impact of planned policy measures on air pollution

The planned policies and measures will have a significant impact on Lithuania's emissions of air pollutants and contribute to the accelerated implementation of the air pollution reduction targets set for the country in Directive (EU) 2016/2284 (in particular nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), ammonia (NH3)).

The impact of NECPs measures on ambient air emissions has been assessed by identifying (using assumptions) the potential impacts of each measure on fuel, product consumption, etc. and by applying emission factors in the Tier1 methodology of the EMEP/EEA Emissions Inventory. To ensure coherence, the same assumptions and activity data have been used to assess the impact of the measures on GHG and ambient air pollutant emissions, where possible.

Table 5.2.2.1. Change in nitrogen oxides (NOx) emissions to ambient air, thousand tonnes

Economic area	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (EPP)									
Transport sector	0,28	0,53	2,04	3,73	4,56	5,50	5,99	6,43	6,74	7,11
Power sector	—	—2,64	—2,45	—2,40	—2,32	—2,24	—2,16	—2,07	—1,99	—1,91
Industry sector	0,01	0,01	0,01	0,03	—0,06	—0,09	—0,08	—0,08	—0,07	—0,06
TOTAL	**0,29**	**—2,1**	**—0,4**	**1,36**	**2,18**	**3,17**	**3,75**	**4,28**	**4,68**	**5,14**
	Accompanying measures (PPM)									
Transport sector	0,00	0,00	1,13	1,53	2,27	2,63	3,79	3,75	3,74	3,79
Industry sector	0,00	0,00	0,00	0,04	0,05	0,05	0,12	0,11	0,11	0,10
TOTAL	**0,00**	**0,00**	**1,13**	**1,57**	**2,32**	**2,68**	**3,91**	**3,86**	**3,85**	**3,89**

The most significant impact on NOx emissions (Table 5.2.2.1) will be the implementation of the envisaged measures in the transport sector. Some measures related to the use of biofuels in combined heat and power plants will lead to an increase in NOx emissions. However, the cumulative impact of all measures on the emissions of this pollutant will be positive in the period 2024-2030.

131OECD. How regions grow: Trends and analysis. — 2009.

Table 5.2.2.2. Change in emissions of non-methane volatile organic compounds (NMVOCs) to ambient air, thousand tonnes

Economic area	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (EPP)									
Transport sector	0,08	0,22	0,33	0,51	0,63	0,74	0,82	0,88	0,94	1,01
Power sector	—	0,50	0,83	1,19	1,56	1,93	2,30	2,67	3,04	3,41
Industry sector	0,00	0,00	0,63	0,65	0,64	0,65	0,65	0,65	0,66	0,66
TOTAL	**0,08**	**0,72**	**1,79**	**2,35**	**2,83**	**3,32**	**3,77**	**4,2**	**4,64**	**5,08**
	Accompanying measures (PPM)									
Transport sector	0,00	0,00	0,01	0,06	0,15	0,19	0,49	0,49	0,50	0,53
Industry sector	0,00	0,00	0,00	0,02	0,02	0,02	0,02	0,02	0,02	0,02
TOTAL	**0,00**	**0,00**	**0,01**	**0,08**	**0,17**	**0,21**	**0,51**	**0,51**	**0,52**	**0,55**

Reductions in emissions of NMVOCs and PM2,5 (Table 5.2.2.2. and Table 5.2.2.4) will be mainly due to measures in the energy production (e.g. conversion of boilers to more efficient technologies) and transport.

Table 5.2.2.3. Change in ammonia (NH3) emissions to ambient air, thousand tonnes

Economic area	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (EPP)									
Transport sector	0,05	0,05	0,02	0,06	0,10	0,14	0,18	0,22	0,24	0,27
Power sector	—	0,00	0,01	0,01	0,02	0,03	0,03	0,04	0,05	0,06
Industry sector	—	—	0,03	0,12	0,12	0,16	0,16	0,16	0,21	0,21
Agricultural sector	0,16	0,31	1,54	2,04	2,53	2,93	3,35	3,53	3,72	3,92
TOTAL	**0,21**	**0,36**	**1,6**	**2,23**	**2,77**	**3,26**	**3,72**	**3,95**	**4,22**	**4,46**
	Accompanying measures (PPM)									
Agricultural sector	0,00	0,15	0,37	0,52	0,67	0,82	0,97	1,06	1,21	1,36
TOTAL	**0,00**	**0,15**	**0,37**	**0,52**	**0,67**	**0,82**	**0,97**	**1,06**	**1,21**	**1,36**

Measures in the agricultural sector will reduce the use of inorganic nitrogen fertilisers and replace manure management technologies with more efficient and less polluting manure management techniques. For these reasons, NH3 emissions are expected to decrease significantly from this sector (Table 5.2.2.3.).

Table 5.2.2.4. Change in particulate matter (PM2,5) emissions to ambient air, thousand tonnes

Economic area	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (EPP)									
Transport sector	**0,02**	**0,02**	**0,10**	**0,16**	**0,20**	**0,23**	**0,25**	**0,27**	**0,28**	**0,30**
Power sector	—	0,20)	0,32	0,46	0,61	0,76	0,91	1,06	1,21	1,35
TOTAL	**0,02**	**0,22**	**0,42**	**0,62**	**0,81**	**0,99**	**1,16**	**1,33**	**1,49**	**1,65**
	Accompanying measures (PPM)									
Transport sector	0,00	0,00	0,03	0,05	0,08	0,09	0,13	0,13	0,13	0,13
Industry sector	0,00	0,00	0,00	0,02	0,02	0,02	0,02	0,02	0,02	0,02
TOTAL	**0,00**	**0,00**	**0,03**	**0,07**	**0,10**	**0,11**	**0,15**	**0,15**	**0,15**	**0,15**

The reduction of SO2 emissions to ambient air (Table 5.2.2.5.) will be affected by the implementation of the Programme's measures in the energy production and industry sectors.

Table 5.2.2.5. Change in sulphur dioxide (SO2) emissions to ambient air, thousand tonnes

Economic area	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (EPP)									
Power sector		0,02	0,03	0,04	0,05	0,06	0,07	0,08	0,10	0,11
TOTAL		**0,02**	**0,03**	**0,04**	**0,05**	**0,06**	**0,07**	**0,08**	**0,10**	**0,11**
	Accompanying measures (PPM)									
Industry sector	0,00	0,00	0,00	0,10	0,10	0,10	0,10	0,10	0,10	0,10
TOTAL	**0,00**	**0,00**	**0,00**	**0,10**	**0,10**	**0,10**	**0,10**	**0,10**	**0,10**	**0,10**

5.3 Overview of investment needs

The total investment envisaged for the implementation of the existing policy measures described in Chapter 3of the NECPs for the period 2021-2030 amounts to around EUR 13.8 billion, of which the share of public funds is estimated at around EUR 8.2 billion (see Table 5.3.1).

Table 5.3.1. Planned funding for the implementation of existing policies in 2021-2030

Sector	Global funds in EUR million	Public money in EUR million
Transport	3270,80	1460,26
Industry	1717,50	913,97
Agriculture	961,70	908,02
CO2 storage	383,52	383,52
Wastes	721,12	549,24
Renewable energy resources	1077,25	910,92

Energy efficiency	2814,96	1094,68
Internal Market	1024,42	777,58
Energy security	1056,11	569,35
R & D	775,22	633,66
Total:	**13802,59**	**8201,20**

The ministries responsible for the measures assessed their planned public investment according to available sources of financing (see Table 5.3.2), the planned intensity of the financing of the measures and determined the share of private investment.

Table 5.3.2. Sources of planned funding 2021-2030

Sector	Public money in EUR million
Climate Change Programme	207,5
Modernisation Fund	258
Strategic Plan for Agriculture and Rural Development of Lithuania 2023-	1195,8
Lithuanian Rural Development Programme 2014-2020	9,4
Recovery and Resilience facility	870,3
Investments from EU funds (2014-2020)	1951,1
EU funds investments (2021-2027)	1865,5
Just Transition Fund	165,2
Programme for the Lithuanian fisheries sector 2021-2027	37
Waste prevention and management programme	7,2
State budget	404,1
EU CEF	1167,1
EU Municipal Development Fund	40
Other	23
Total:	**8201,20**

This is a preliminary assessment of the financing of existing policies, which will be refined through the transfer of NECPs measures into strategic planning documents.

Table 5.3.3. Indicative needs for the implementation of planned policies in 2021-2030

Sector	Global funds in EUR million	Public money in EUR million
Transport	3009,57	747,61
Industry	386,90	169,04

Agriculture	222,20	126,34
CO2 storage	45,44	45,44
Wastes	3,00	3,00
Renewable energy resources	864,10	726,20
Energy efficiency	7064,94	2179,17*
Internal Market	165,00	0,00
Energy security	0,00	0,00
R & D	8,70	8,70
Total:	**11769,84**	**4005,50**

* The planned financing needs for EE2-P have been revised downwards by 403,75 million euro of public funds, taking into account that the planned funding sources do not cover all the required NECPs financing needs and that the volumes of the existing instrument may not be fully met.

The planned policy measures presented in the NECPs will be assessed in terms of financial, economic, social and environmental benefits, with a view to ensuring that the most efficient and effective measures are the first to receive funding. It should be noted that the cost of implementing the NECPs can be significantly reduced by early and stronger economic signals to reduce GHG emissions for sectoral market participants, including, but not limited to earlier phasing out of fossil fuel subsidies, broadening the scope of application of the polluter pays principle, as well as innovative green finance solutions that increase the contribution of the private sector.

In the energy sector, future investments focus mainly on improving energy efficiency, increasing the use of RES in various sectors of the country and the necessary enhancement of the smartness, reliability and security of energy networks. The energy efficiency sector needs the largest share of the PPP envelope, even > 50 % of total public funds, the sector's needs are even higher and the renovation/modernisation of multi-apartment buildings would require at least EUR 400 million.

In order to achieve the 2030 climate and energy targets, the main sources of public funds for 2021-2030 will be investments from EU funds (European Regional Development and Cohesion Funds) 2021-2027, electricity and heat tariffs, public budgets (Climate Change Programme, Waste Prevention and Management Programme, etc.) and municipal budgets, the Modernisation Fund, the Innovation Fund, the Connecting Europe Facility (CEF), the Recovery and Resilience Facility (RRF), the Social Climate Fund, ETS II funds, Life Programme, etc.

To a lesser extent, but will also attract sources of public funds, such as funds received for services of public interest (PPP funds), statistical transfers, loans from the European Investment Bank.

5.4 Impact of planned policies and measures on other Member States and regional cooperation

Projects and initiatives in the field of energy which have or will have a regional impact:

Synchronisation with continental European networks

The objective is the development of infrastructure for deeper integration of the electricity market and the interconnection of the Baltic States' electricity systems for synchronous operation with continental European networks (hereinafter referred to as synchronisation with KETs).

The importance of synchronisation with KETs for the Baltic countries:

- The Baltic States will finally address the geopolitical risks of the electricity system;
- Lithuania, Latvia and Estonia will take over from Moscow the essential rights and responsibilities for the management of the electricity system frequency;
- The Baltic States' electricity systems will be managed according to uniform and transparent European rules;
- shift from centralised management of the e-transmission system to decentralised (diversification of system security risks).

Natural gas market

In cooperation with regulatory authorities and transmission system operators in the Baltic region, integration will be sought with the gas markets of other countries of the region (in particular Latvia, Estonia and Finland), by harmonising the legal and regulatory environment for the gas sector, removing cross-border transmission tariffs, connecting markets to a single balancing zone, conducting gas trading at a single virtual trading point and ensuring that sufficient gas infrastructure is built for a unified gas market. This would create better access to alternative gas sources for other countries in the region, facilitation of intra-regional gas trade and the preconditions for increased cross-border gas flows and more efficient use of gas infrastructure and increased competition.

Klaipėda LNG terminal, which became operational in December 2014, is capable of providing natural gas supplies to the whole region; created the conditions for competition on the Lithuanian natural gas market by importing natural gas from all over the world. Natural gas can be supplied to consumers from different suppliers at market prices.

In addition, the gas interconnection project between Poland and Lithuania (GIPL) integrated the Baltic and Finnish gas markets into the EU's single gas market, created access to alternative sources of gas supply and roads and improved the competitiveness of the gas market, increased security and security of gas supply in the region, both through the creation of additional gas transmission capacity and the possibility of solidarity mechanisms between EU countries in case of emergency, increased gas trade liquidity in the Polish and Baltic bidding zones, strengthened their regional role and facilitated integration of energy produced from RES.

The project to increase capacity between Latvia and Lithuania (ELLI) in 2024 will ensure sufficient capacity between the Baltic and other European countries, increase the security of gas supply in the region, improve the integration of gas markets in the Baltic region and improve the functioning of the regional gas market.

Promoting the use of LNG fuels

We promote the use of liquefied natural gas (LNG) as a clean fuel for heavy and ship transport in Lithuania and the region as a whole.

1. Use of LNG in heavy-duty transport (Synergies between RES and LNG)

The use of LNG as a fuel is the only currently available clean and available technology in heavy-duty transport. Compared to light transport, there are no other alternative technologies available in heavy-duty transport and decisions to reduce pollution need to be taken already today. It should be noted that the use of LNG in transport contributes to a significant reduction of emissions to ambient air. LNG can reduce CO2 emissions by 20 % compared to diesel fuels used in conventional transport. (note: biomethane can even reduce $CO2_{emissions}$ by more than 85 %). It is important to recall that CO2 accounts for the largest share of greenhouse $gas_{emissions}$. The use of LNG in transport reduces emissions of other pollutants such as SOx, NOx by 99 % and 80 % respectively and noise pollution by half.

We note that synergies between renewables and LNG are one of the forward-looking pathways. Improving energy efficiency in public infrastructure and reducing polluting energy intensity in transport through the synergies between RES and LNG would lead to a significant reduction in GHG emissions.

2. Use of LNG in ship transport

The development and importance of the liquefied natural gas market in the region is evident. Since the LNG fuel used on board ships significantly reduces pollution, AB Klaipėdos nafta proposes to promote the loading of LNG-powered vessels in the port of Klaipėda.

Reducing air pollution is currently a major issue at global level. Ambient air pollution is one of the most significant determinants of health and environmental problems and therefore particular attention must be paid to reducing pollution. Progress must be made in both Lithuania and Klaipėda State Seaport to reduce emissions into the environment. When assessing the adverse effects of pollutants, certain preventive measures with the highest added value and targeted reduction of air pollution must be considered and envisaged. Particular attention must inevitably be paid to reducing emissions in the maritime transport sector.

It should be noted that the current reduction of air pollution from ships is particularly relevant due to the entry into force of 0.1 % in January 2015. SOx fuel restrictions in ECA zones including the Baltic Sea region. For the time being, this restriction applies only to vessels operating in ECA areas, but the restrictions have been applied globally at 0.5 % as of 2020. SOx concentrations in fuel. Stricter requirements have influenced the development of new technologies contributing to emission reductions and the choice of these technologies in the maritime sector. It should be noted that one of the most promising approaches to reduce the toxicity of shipping emissions is to use liquefied natural gas as a less polluting alternative to conventional fuels. The use of LNG shall ensure the ship's compliance with both SOx requirements and tightened NOx requirements.

Using LNG as an alternative to less polluting fuels contributes to the reduction of greenhouse gas emissions and other emissions.

It should be noted that the use of LNG as a fuel throughout the life cycle of a ship contributes to a significant reduction in GHG emissions. Compared to fuels commonly used in the maritime sector, LNG can reduce GHG emissions,$_{including\ CO\ 2}$, by more than 20 %. It should be emphasised that LNG also contributes to reducing emissions of other pollutants into the environment. Compared to fuel oil, NOx emissions to the environment, e.g. SO_2, are close to zero, i.e. emissions of SO_2 and NOx are reduced by 99 % and 90 % respectively. The use

of LNG also reduces air pollution by 50 %.

It is important to note that one typical cargo ship operating in the Baltic Sea using LNG as a fuel emits about 50 tonnes of SOx per year, more than 150 tonnes of NOx and about 2000 tonnes of CO_2.

Renewable Energy

When implementing policies and measures aimed at increasing the share of energy produced from RES in the energy and transport sectors, the Lithuanian designated body (the natural gas transmission system operator) entrusted with issuing, transferring and withdrawing guarantees of origin for gas produced from RES, in cooperation with the designated bodies of other Member States and the RES gas sector organisations, will create a favourable regulatory environment for the trade of RES guarantees of origin with other Member States: harmonising national requirements for RES guarantees of origin (including sustainability certification) with those of other countries, developing a European operational scheme for the guarantee of origin registry, providing methodological support for the development of RES gas production projects in partner countries and establishing other national biomethane registries in EU countries where they are not established.

In the context of the intensive expansion of RES generation and the significant increase in RES share in the overall energy balance, integration into the electricity transport system and grid balancing (both at national and regional level) will be addressed through Power to Gas technologies, the transformation of excess electricity into gaseous forms of energy (hydrogen and methane) and the transport of gas transmission/distribution networks to energy storage and consumption sites in cooperation with gas and electricity transmission system operators in neighbouring countries.

Lithuania is also interested in cooperating on offshore wind projects and harmonising biofuel blending in transport fuels in the region.

Biofuel Exchange

Following the establishment of the biofuel exchange platform, the Member States of the region as a whole:

- the establishment of a regional-wide platform for an unrestricted range of biofuel suppliers;
- standardised biofuel products facilitate trade between individual Member States;
- active trade between individual Member States helps to make the EU biofuels market as a whole more liquid and accessible;
- a virtual biofuel supply system has been set up, making the most economically advantageous transactions with the closest biofuel buyer as an alternative to a pipeline or oil pipeline;
- security of supply is ensured by all biofuel suppliers in the region;
- small barriers for new entrants and a more attractive market for new investors;
- ensure the sharing and dissemination of information on the market for biofuels;
- the sustainability of the biofuels supplied and the neutrality of CO_2 shall be ensured.

All these considerations contribute to the objectives of the RES Directive and to ensuring a competitive alternative for the supply of sustainable and CO2-neutral biofuels to existing fossil fuel transmission networks (gas or oil).

The biofuel exchange platform shall standardise biofuel fuel products and their delivery processes. Such product standardisation in the region not only facilitates and speeds up transactions between Member States, but also ensures the reliability of the energy supply chain by diversifying the risk of supply disruptions to all members on the platform without paying additional fees to the platform operator, thus ensuring security of supply without increasing the price of biofuels.

The biofuel exchange platform system is programmed in such a way that the location of the supplier GPS determines the distance to each buyer (the seller of the biofuel may even limit the geography of the activity). Therefore, once the exact transport costs of 1 km have been set by biofuel suppliers, the system itself calculates precisely the transport costs of biofuels for each transaction (e.g. biofuels from the same supplier will be offered to different buyers at different prices due to different buyers) and is the most economically advantageous transaction between the closest biofuel suppliers and buyers. This reduces the $CO2_{footprint}$ of biofuels during transport and ensures their sustainability.

The biofuel exchange platform has increased market transparency and efficiency in Lithuania, which in turn almost eliminated the differences in biofuel prices between neighbouring municipalities. The establishment of a common biofuel exchange platform in the region, in order to ensure that the price of biofuels does not differ by more than 15 % in the neighbouring Member States of the region, reduces the transport of biofuels between Member States, thereby ensuring the sustainability of biofuels by further reducing the $CO2_{footprint}$ in the transport part of the biomass.

The biofuel exchange platform, by standardising biofuel products, also ensures their specifications and compliance, thus anticipating an increase in the marketing of certified biofuel products. By 2030, the objective is that all biofuels sold in the region are certified, thus ensuring that the biofuels sold areCO_2 -neutral, i.e. sustainable.

The standardisation of biofuel products also contributes to the sustainability of biofuels, as the lowest biofuel product promotes the use of all the biomass produced (residences from deforestation, industrial by-products, etc.). As of 28 April 2022, Baltpool has been designated to implement a voluntary national scheme for assessing compliance of biomass fuels with the sustainability and greenhouse gas (GHG) criteria.

Impact on energy prices

The biofuel exchange platform ensures competition between biofuel producers and sets clear conditions and facilitates trade, not only by reducing administrative costs for existing biofuel producers, but also by facilitating market entry throughout the region. The biofuel exchange platform also determines the real market price of biofuels, which helps market participants to determine the current market situation. All these conditions will lead to decreasing margins for biofuel producers or resellers, i.e. falling energy prices, and increasing the attractiveness of biofuels as a renewable energy source.

The biofuel exchange platform standardised biofuel products in the region contribute to the vertical integration of the individual sectors of the biofuel industry, as the production of the lowest-quality biofuel product on the platform makes it possible to use all residues from the wood industry (forest harvesting residues, industrial by-products, etc.). Such integration contributes to the promotion of the wood industry itself throughout the region.

In many cases, due to the natural monopoly in district heating, heat prices are regulated by the national

regulator and not by market competition. Therefore, buyers of biofuels that produce heat do not have a significant interest in finding an optimal price for consumers of energy sources. For Member States, the biofuel exchange platform helps to ensure reasonable heat prices for district heating consumers, who are in most cases the lowest incomes.

Regional cooperation:

In order for the biofuel exchange platform to be fully operational, it needs to comply with the legislation of individual Member States, timely exchange of information and rapid solutions to the problems encountered in individual Member States (e.g. easier prediction and resolution of ash removal problems), as appropriate, require partners in other countries in the region that are regularly sought by the biofuel exchange platform operator. Cooperation is currently ongoing with Poland, Latvia, Estonia, Denmark, Sweden and Finland.

Annex 4. Measure Tables

TRANSPORT SECTOR								
Instrument	**Name at operational level**	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (target 2030)**	**Deadline for implementation**	**GHG savings, kt CO2eq.**	**Total fuel and energy savings, GWh**
Existing policy instruments								
T1-E. Promoting the purchase of electric vehicles	Promoting the purchase of electric vehicles	SUMIN	Economic	Number of electric vehicles, units	M1: 13875 units; N1: 375 units	2022-2027	373,42	1197,96
	Promotion of zero-emission passenger cars (BEV and H2)	SUMIN	Economic	Number of electric vehicles, units	M1 12398 units	2022-2026		
	Promoting the purchase of electric vehicles	AM	Economic	Number of electric vehicles, units	2637	2021-2022	Implemented	
T2-E. Promoting the development of alternative fuels infrastructure and transport	Development of charging/refilling infrastructure for clean public transport.	SUMIN	Economic	Units of publicly accessible compressed biogas (ready for biomethane), hydrogen and charging stations for heavy electric transport.	—	2023-2030	145,57	437
	Refurbishment of urban and suburban public TP fleet by promoting the use of ADs and electric vehicles	SUMIN, municipalities	Economic	Public TP, units powered by ad/AEI	800	2024-2030		
	Charging of alternative fuels (electricity, biogas and hydrogen)/	SUMIN	Economic	Publicly accessible compressed biogas (for biomethane), hydrogen and charging stations for heavy	30 biogas, 4 hydrogen, heavy electric	2023-2027	187,57	195

	establishment/extension of replenishment infrastructure			electric transport, units	transport 10 points			
	Promotion of the purchase of vehicles of categories N2,M2,N3 and M3 adapted to use RES	SUMIN	Economic	Number of zero-emission TA purchased	1000	2024-2030		53
T3-E. Electrification of railways	Electrification of railways	SUMIN	Economic	Planned length of railway section electrified: TEN-T length of reconstructed or upgraded railways.	731	2016-2027	271,31	105
T4-E. Promotion of intermodal transport	Increase of intermodal transport volumes and revenues by diversifying the service portfolio on a 1 435 mm network (Italian axis)	SUMIN, AB LTG	Economic	Number of wagons for transporting semi-trailers for hire	23	2023-2024	19,42	673
	Increasing intermodal transport volumes and revenues by diversifying the service portfolio on a network of 1 520 mm	SUMIN, AB LTG	Economic	13-935A-04 platform wagons for the construction and installation of reusable semi-trailer anchorages, units.	177	2022-2023	160,48	
T5-E – Promotion of low-emission vehicles	Financial incentives to opt for less polluting mobility measures	AM, SUMIN	Economic	Number of units of less polluting L or M1 vehicles purchased.	9000	2020-2023	52,80	224,09
	Financial incentives to opt for less polluting mobility measures	AM, SUMIN	Economic	Purchased alternative TAs or public transport tickets (bicycles, e-scooters, e-bikes)	31000			

				number, sharing services, units				
	Financial incentives to opt for less polluting mobility measures	AM, SUMIN	Economic	Less polluting TA purchased by deprived persons	7			
T6-E. The registration fee	Variation of vehicle registration/re-registration tax according to pollution level	Am, finmin, SUMIN, VĮ Regitra	Fiscal	Percentage of polluting passenger cars that will be abandoned due to registration tax	1.58	2020-2030	152,70	127,25
T7-E: Removal of pollution tax relief	Abolition of the reduction of the pollution tax for self-employed persons	AM, FINMIN	Fiscal	Annual GHG emissions reduction in %	2	2021	36,78	153,14
T8-E. Electronic tolls in the field of freight transport	Implementation of the electronic toll in the field of freight transport	SUMIN	Economic	Electronic toll system in place	1	2021-2030	545,01	1851,06
	Road charging relief	FINMIN, SUMIN, AM	Fiscal	Adoption of legislation	1			
T9-E. Reducing traffic congestion	Reduction of traffic congestion through traffic organisation solutions.	Municipalities, SUMIN	Regulatory	% Reduction in fuel consumption	—	2022-2030	412,72	1607,58
	Reducing traffic congestion through spatial planning solutions	Am, SUMIN, municipalities	Regulatory	% Of fuels likely to be affected by measures taken to reduce congestion in 2030	—	2024-2030		

	Promoting flexible working hours and teleworking	SADM, public sector bodies	Education;	% Of total travel time spent in congestion	—	2022-2030		
T10-E. Public awareness	Broad social dissemination, information to the public, habits, pilot projects to reduce fossil fuel consumption	SUMIN, AM, ENMIN, SAM, NMSM (in accordance with Article 31 of the AWL), municipalities	Education;	Percentage reduction in fuel consumption due to measures, %	3.7	2017-2030	29,26	125,39
	Funding of Hackathons and winners' initiatives that influence the behaviour of groups in society	APVA, Vilnius Tech Zity	Economic	Hackathons and funded initiatives	4/4	2022-2030		
T11-E – Green procurement	Renewal of the transport fleet, using green procurement and ensuring minimum procurement targets for transport	SUMIN, ENMIN, VPT, MOI	Regulatory	Share of zero-emission light TA (categories M1, M2, N1, N2, N3 and M3) in the total fleet of TA from new procurements, %	100/16	2021-2030	322,11	691,68
T12-E Low emission zones	Creation of low emission zones in cities	Municipalities, SUMIN	Regulatory	Reduction in the number of VDV vehicles in cities, %	5	2022-2030	274,12	84
T13-E. Charging infrastructure for electric vehicles	Development of publicly accessible recharging infrastructure for electric vehicles	SUMIN	Economic	Recharging points for electric vehicles accessible to the public and semi-public are in place.	7242	2022-2029	286,84	506,09
	Installation of recharging points for electric vehicles in railway stations					2023-2027		

	in car parks							
	Installation of recharging points for electric vehicles in all bus and railway stations, airports and seaport under construction or reconstruction					2023-2027		
	Provision of shore-side electricity supply in inland ports					2025-2030		
	Installation of recharging points for electric vehicles in parking areas in inland and maritime ports					2023-2027		
	Development of publicly accessible recharging infrastructure for electric	SUMIN	Economic	Recharging points for electric vehicles accessible to the public and semi-	160	2021-2022		
	Development of private charging infrastructure for electric vehicles	ENMIN	Economic	Installed charging points for private electric vehicles.	53200	2022-2027		441,14
	Replacement of polluting public transport by electric vehicles in rural areas distant from demand	Lazdijai District Municipality	Economic	Project implemented	1	2022-2030		—
T14-E. Eco-driving	Developing and promoting economic and eco-driving skills	SUMIN	Education;	Percentage of drivers with economical and eco-driving skills	5	2021-2030	164,96	663,55

T15-E. Implementation of Sustainable Mobility Plans	Implementation of Sustainable Urban Mobility Plans 5	Municipalities	Economic	Sustainable mobility measures implemented	—	2018-2022	487,31	2458
		Municipalities	Economic	Number of sustainable mobility plans	18	2016-2023		
		Municipalities	Economic	Sustainable mobility measures implemented	35	2021-2027		
T16-E Sustainable Mobility Fund	Establishing a Sustainable Mobility Fund	SUMIN	Fiscal	A fund has been created.	1	2023-2030	0	0
T17-E: Promotion of the production of electric buses	Promoting the production of local electric buses and other electric vehicles and the recharging infrastructure they require	SUMIN	Economic	Number of buses produced by supported legal entities involved in the production of electric buses or other TA.	25	2024-2030	0	0
T18-E. Construction and reconstruction of bicycle tracks	Construction and reconstruction of cycle paths	SUMIN	Economic	Length of cycle path network, km	1015	2022-2030	100	90
Planned policy measures								
T1-P. Promoting the purchase of electric vehicles	Promotion of zero-emission passenger cars (BEV and H2)	SUMIN	Economic	Percentage of electric vehicles per total transport fleet	10	2026-2030	187,94	214,45
T2-P. Promoting the development of alternative fuels infrastructure and transport	Renewal of the urban and suburban public transport fleet by promoting the use of alternative fuels and electric vehicles	SUMIN, municipalities	Economic	Total number of buses to be replaced	978	2027-2030	191,12	515

	Establishment/development of recharging/refuelling infrastructure for alternative fuels (electricity and hydrogen).	SUMIN	Economic	Number of charging stations for heavy-duty electric transport	290 (electricity); 6 (hydrogen)	2026-2030	208,24	120
	Promotion of the purchase of vehicles of categories N2,M2,N3 and M3 adapted to use RES	SUMIN	Economic	Number of zero-emission TA purchased	2500	2025-2030		236
	Digital solutions for optimising cargo flows and reducing empty mileage	SUMIN	Economic	Number of digital subscriptions purchased per year	—	2024-2030	120,80	457,31
T3-P. Electrification of railways	Purchase of electric locomotives	SUMIN, AB LTG	Economic	Electric vehicles, units	17	2022-2027	103,57	173,00
	Procurement of trains powered by alternative energy sources for public services	SUMIN, AB LTG	Economic	Trains, units	15 (9 electric and 6 passenger batteries)	2022-2027		
	Installation of infrastructure for battery trains (BEMU) charging stations	SUMIN, AB LTG	Economic	charging stations, units	3	2023-2025		
T4-P. Promotion of intermodal transport	Increasing intermodal volumes and revenues by diversifying the service portfolio	SUMIN, AB LTG	Economic	Number of zero-emission traction units purchased, units/freight turnover, units/million.tkm	176/376	2022-2030	150,20	562
	Technical development of intermodal terminals in Vilnius and Kaunas	SUMIN, AB LTG	Economic	Number of containers and semi-trailers carried	525313	2022-2025		0

	Promoting the transport of goods with less polluting means of transport	AB LTG	Regulatory	Change in the legal framework, units	1	2025-2030		0
	Feasibility study on the transfer of heavy TA to railways transported through Lithuania	SUMIN, AB LTG	Scientific	Feasibility study, units	1	2024-2030		0
T5-P: Promotion of low-emission vehicles	Financial incentives to opt for less polluting mobility measures	AM, SUMIN	Economic	Units of less polluting vehicles purchased	6000	2024-2026	34,56	544,02
	Financial incentives to opt for less polluting mobility measures	AM, SUMIN	Economic	Number of units purchased for L-class vehicles, bicycles or bus tickets	12000			
	Financial incentives to opt for less polluting mobility measures	AM, SUMIN	Economic	Less polluting TA purchased by deprived persons	750			
T19-P. Vehicle emissions monitoring system	Establishment and operation of a remote vehicle emission monitoring system	Am, SUMIN, LAKD, LTSA, municipalities	Regulatory	Legislative amendments, units	1	2023-2030	10,00	38,16
T20-P. restrictions on polluting vehicles	Legislation to promote the acquisition and registration of less polluting road transport vehicles	Am, SUMIN, MoI, Regitra	Regulatory	Evaluation and improvement of legislation	1	2027-2029	0	0
T21-P – Modernisation of trains	Upgrading the existing trains of three two-way power plants 'Skoda EJ575' to	SUMIN, AB LTG	Economic	Number of battery systems installed on electric Scod EJ575 trains	3	2024-2030	5,00	9

	electric-battery trains							
T22-P. Rail development and infrastructure improvement projects	Adaptation of maintenance activities and infrastructure to new electric passenger trains	SUMIN, AB LTG	Economic	Upgraded and adapted to service new EMU and BEMU passenger rolling stock 1 (one) Industrial repair facility 78 Vilnius, units.	1	2024-2026	0	0
T23-P: promoting sustainable mobility	Lecture cycle on sustainable mobility	SUMIN, NMSM, AM	Education;	Population affected, units	174891	2024-2030	10,00	32
	Making public transport more attractive	SUMIN	Fiscal	Growth in take-up of MT, %	20	2023-2030	126,26	513,71
	Combination of timetables for passenger trains and public passenger road transport and TP sharing services	SUMIN	Regulatory					
	Promoting sustainable mobility at national and municipal level	SUMIN	Economic					
	Implementation of high-priority public transport solutions	SUMIN	Regulatory					
	Review of public transport fares (cascade or time free public transport)	SUMIN	Regulatory					
	Harmonisation of timetables for all public transport	SUMIN	Regulatory					

	Smart ticketing	SUMIN, AB LTG	Economic	% Of ticket sales purchased via internet channels in 2030, %	90	2024-2030	8,00	30,53
	Financial incentives for the development and deployment of integrated public transport ticketing	SUMIN	Fiscal	—	—	2024-2026		
	Creating a mobile application for sustainable mobility	SUMIN, AM	Education;	Reduced CO_2 emissions per travel kilometre of the app user, %	—	2024-2030	0	0
T24-P: Promotion of sustainable inland navigation	Acquisition of new cargo ships and barges	SUMIN, VVKD	Economic	New barges/vessels – pushers, units	30/20	2024-2030	100,00	381,56
	Less polluting Klaipėda – Curonian Neria ferries	SUMIN, AM	Economic	Less polluting ferry, units	5	2024-2030	7,50	14
	Replacement of existing power stations for inland waterway cargo vessels, passenger vessels, fishing vessels and other inland waterway vessels and updating of other mechanisms related to their	SUMIN, VVKD	Economic	Number of power plants replaced, units	270-350	2024-2030	10,00	38,16
	Acquisition of new passenger ships	SUMIN, VVKD	Economic	Number of passenger ships purchased.	10	2024-2030	1,00	3,82
	Construction and/or upgrading of inland waterway infrastructure, including ports and berths	SUMIN, VVKD	Economic	Modernised inland waterway infrastructure units, units	18	2024-2030	0	0

T25-P: Development of electricity supply at seaport	Installation of the power supply system for ships at berth in the port of Klaipėda	SUMIN, ENMIN, KVJUD	Economic	Installed capacity, MW	76 MW	2024-2030	0	45
	Ensuring a minimum electricity supply infrastructure for maritime containers and passenger ships at seaport	SUMIN, ENMIN, KVJUD	Economic	Power demand guaranteed, %	90	2024-2030		
T26-P – Development of sustainable airport infrastructure	Deployment of sustainable aviation fuel supply infrastructure	Lithuanian Airports	Economic	Share of sustainable fuels in total aviation fuel consumption, %	5	2024-2030	0,79	1
	Electrification of aircraft parking areas at Vilnius, Kaunas and Palanga airports	Lithuanian Airports	Economic	Number of mobile electric generators, units	65	2024-2030	1,16	4
	Refurbishment/installation of airport infrastructure to support hydrogen-powered and electric aircraft	Lithuanian Airports	Economic	Areas for the service of electric aircraft, units	25	2024-2030	0	0
T27-P. Act on Excise Duties	Excise duty and CO2 component fuel price	FINMIN	Fiscal	Legislative package, units	1	2024	733,87	5484,21
Implementation of the**T28-** P FF55 package	FIT for 55 package	AM	Fiscal/Regulatory	Legislative package, units	1	2024	671,58	2366

INDUSTRY SECTOR

Instrument	Name at operational level	Responsible entity	Type	Activity Indicator, Measurement Units	Scope of implementation (target 2030)	Deadline for implementation	GHG savings, kt CO2eq.	Total fuel and energy savings, GWh
Existing policy instruments								
P1-E – Fluorinated gas reduction	Implementation of the Regulation on fluorinated greenhouse gases	AM	Regulatory	% Reduction in HFC consumption	60	2015-2030	19857	0
	Implementation of the Kigali Amendment	AM	Regulatory			2019-2032		
P2-E – Enhancing energy efficiency	PIS allowance for industrial enterprises (EE5)	ENMIN, Baltpool	Economic	Total fuel savings resulting from the implementation of audit measures, GWh/year	4.23	2021-2028	313,44	4227,7
	Deployment of energy-efficient manufacturing technologies in industry participating in the EU ETS	EIMIN	Economic	Cumulative GHG effect in industry participating in the EU ETS through energy efficiency measures, t CO2e	1 252 240	2022-2026		
P3-E – Privileges for investment and innovation	Corporate tax relief for small start-ups	FINMIN	Fiscal	Number of enterprises affected	—	2018-2030	0	0
	Triple deduction of R & D costs	FINMIN	Fiscal	Number of enterprises affected	—	2018-2030		
	Accelerated depreciation of R & D assets	FINMIN	Fiscal	Number of enterprises affected	—	2018-2030		

	Reduced corporate tax rate for commercialisation of R & D	FINMIN	Fiscal	Number of enterprises affected	—	2018-2030		
P4-E – Industrial use of RES	Renewable energy sources for industry LT+ (No 04.2.1-LVPA-K-836)	ENMIN, EIMIN	Economic	Additional RES capacity, MW	77	2014-2020	22,10	0
	Audit for industry LT (No 04.2.1-LVPA-K-804)	AM, EIMIN	Economic	—	—	2014-2020		
	Promote RES deployment in industry	EIMIN	Economic	Total RES produced (of which: electricity, thermal energy), MWh/year	—313 170	2022-2027		
P5-E – Modification of polluting technologies	Promoting the substitution of low-emission technologies in companies participating in the EU ETS	EIMIN	Economic	GHG reduction effect, %	22	2022-2030	826,10	0
	Use of renewable energy sources in industries participating in the EU ETS	EIMIN	Economic	Cumulative GHG reduction effect tCO2e in industry participating in the EU ETS due to the introduction of RES solutions	98 016	2022-2026		
P6-E – Fostering technological eco-innovation	Eco-innovation LT+ (No 03.3.2-LVPA-K-837)	EIMIN	Economic	Number of enterprises affected	—	2014-2020	0	0
	Sustainable transformation of industrial SMEs	EIMIN	Economic	—	—	2021-2027		
	Eco-innovation LT (No 03.3.2-LVPA-K-832)	EIMIN	Economic	Number of enterprises affected	—	2014-2021		

	ECO-Consultant (No 03.3.2-IVG-T-829)	EIMIN	Economic	Number of enterprises affected	—	2014-2020		
P7-E – Deployment of modern technologies	KPT industry LT+ (No 03.3.1-LVPA-K-841)	EIMIN	Economic	Number of enterprises affected	—	2014-2021	45,21	0
	REGIO Invest LT+ (No 03.3.1-LVPA-K-803)	EIMIN	Economic	Number of enterprises affected	—	2014-2021		
	Potential of REGIO LT (No 03.3.1-LVPA-K-850)	EIMIN	Economic	Number of enterprises affected	—	2014-2022		
P8- E. Promoting non-technological eco-innovation	Design LT (No 03.3.1-LVPA-K—838)	EIMIN	Economic	Number of enterprises affected	—	2014-2020		
P9-E Design Decisions	Promoting investment in product/packaging/service design solutions	EIMIN	Economic	Number of enterprises affected	—	2020-2027		
P10-E – Fostering the transformation of traditional industries	Fostering traditional industrial transformation	EIMIN	Economic	Establishment of the platform	1	2022-2025		
P11-E – Fostering the digitalisation of industry	Digitalisation of industry LT (No. 03.3.1-LVPA-K-854)	EIMIN	Economic	Number of enterprises affected	—	2014-2020		
	Promote the automation of industrial production processes and the uptake of digitalisation technologies (digitalisation of industry)	EIMIN	Economic	Number of enterprises affected	—	2024-2027		

	Promote the digitalisation of the business processes of high value-added industries	EIMIN	Economic	Number of enterprises affected	—	2024-2028		
P12-E – Enhancing energy efficiency in enterprises	Increase energy efficiency in industrial plants	EIMIN	Economic	Annual primary energy consumption, MWh/year	—	2022-2027	76,83	0
P13-E – Production and use of hydrogen	Integration of electrolysis into the ammonia unit (amendment 30 % H2) Phase I	EIMIN	Economic	Percentage of electrolysis hydrogen in the ammonia production process	30	2023-2027	651,05	6211.00
P14-E Feasibility study on CO2 capture and storage	Options for the use of CO2 capture and storage, hydrogen and other innovative technologies (feasibility study)	EIMIN	Science and research	Feasibility study, units	1	2023-2025	0	0
P15-E – Innovative green products and services	Promote the development of green innovation	EIMIN	Economic	Number of innovative projects implemented	100	2022-2026	89,51	149,19
P16-E – Facility management system	Efficient governance system for monitoring the implementation, coordination and progress of energy efficiency measures	EIMIN	Regulatory	One-size-fits-all system, units	1	2022-2024	37,50	0,16
P17- E. Deployment of alternative fuels	Deployment of alternative fuels in industrial plants in Kaunas, Šiauliai and Telšiai regions	EIMIN	Economic	GHG savings calculated from the difference between initial and final GHG, t CO2	61412	2023-2026	230,37	0
Planned policy measures								

P5-P – Modification of polluting technologies	Promoting the substitution of low-emission technologies in companies participating in the EU ETS	EIMIN	Economic	Number of enterprises that received funding	5-7	2026-2029	440,58	0
P18-P – Reducing Fluorinated Gas Use	Reducing the use of F-gases in businesses	AM	Economic	Number of enterprises that received funding	—	2022-2030	28,49	0
P19-P – Long-term hedgical contracts	Reducing GHG emissions on the basis of long-term hedjag contracts	EIMIN	Economic	Number of enterprises affected	2507	2024-2030	204,11	5115,09
P20-P – Electricity price compensation	Compensation of greenhouse gas costs of the European Union included in electricity prices to industrial sectors and sub-sectors.	EIMIN	Fiscal	—	—	2024-2030	298,92	0
P21-P – Building life cycle modelling methodology	Development of a building life cycle (LC) modelling system	AM	Regulatory	A methodology for modelling the life cycle of construction works has been developed.	1	2023-2029	0	0
P22-P – Building Material Tracking Information System	Development of a unified information system for tracking building materials (IS)	AM	Regulatory	A unified information system for tracking building materials has been developed.	1	2024-2029	0	0
P23-P Action Plan for the transition to circular construction	Develop a 5-year agenda for the transition to a circular construction economy, focusing on the achievement of the strategy's final objective	VIS SSVA, AM	Planning	The agenda has been drawn up.	1	2024	0	0

P24-P Building Databank	Develop and implement a building databank solution to collect, store and process data on the building stock to be upgraded (upgraded)	AM	Economic	Building Databank information system developed	1	2023-2025	0	0

AGRICULTURAL SECTOR								
Instrument	**Name at operational level**	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (target 2030)**	**Deadline for implementation**	**GHG savings, kt CO2eq.**	**Total fuel and energy savings, GWh**
Existing policy instruments								
A1-E. Climat-friendly livestock farming	Investment support for the introduction of climate-friendly farming methods on livestock farms (biogas production)	ŽŪM	Economic	The amount of pig manure is used for biogas production and the amount of cattle manure is used for biogas production, m^3	1 000 000 000	2023-2027	489,00	0
	Investment support for the introduction of climate-friendly farming practices on livestock farms (slurry acidification)	ŽŪM	Economic	Acidified slurry in t	45 000	2023-2027	9,90	—
	Investment support for the introduction of climate-friendly farming on livestock farms	ŽŪM	Economic	Amount of slurry directly incorporated into the ground, m^3	17 000	2023-2027	0,07	—

	techniques (slurry insertion)							
A2-E: Promoting the consumption of organic products	Promotion of organic and national food quality system products in pre-school establishments	ŽŪM	Economic	% Of pre-school pupils who have received support to promote the consumption of food produced under quality schemes in pre-school establishments	up to 10-2026 until 15-2030	2021-2026	1,36	—
A3-E. Expansion of precision fertilisation	Development of precision fertilisation technologies	ŽŪM	Economic	Area of land affected, ha	16 500	2022-2023	48,15	0
A4-E. extensive grassland maintenance	Extensive grassland management through grazing	ŽŪM	Economic	Area affected by the measure, ha	31 334	2023-2027	—113,39	—
A5-E: Promoting short supply chains	Promoting short supply chains and agriculture in urbanised areas	ŽŪM	Economic	Support for cooperation between agricultural operators to create outlets for production.	28	2023-2027	128,50	—
A6-E: development of protein crops	Increasing the area of protein crops	ŽŪM	Economic	ha of converted grasses into legumes, ha	248 656	2023-2027	810,04	—
A7-E – Non -army technology development	Development of non-arable technologies, in particular direct sowing	ŽŪM	Economic	Area of utilised agricultural area of the holding under non-harvesting, ha	486 536	2023-2027	581,14	95,00
A8-E. Modification of feed	Studies to amend feed compositions to reduce methane and nitrous compounds emissions	ŽŪM	Science and research	Number of research/studies studying the sustainability of feedingstuffs	1	2022-2023	94,17	0
A9-E: Organic farming	Promotion of organic farming	ŽŪM	Economic	Area of the utilised agricultural area of the holding under organic farming, ha	382100	2023-2027	129,94	0

A10-E. Promoting bioeconomy businesses	Investments in bioeconomy businesses	ŽŪM, AM, EIMIN	Economic	Number of projects supported	10	2023-2027	271,38	0
A11-E: Nature-friendly orchard and berry management	Nature-friendly orchard and berry management	ŽŪM	Economic	Area of land affected by the measure, ha	4 607	2023-2027	0	0
A12-E: Sustainable horticulture and horticulture	Fruit and Vegetables conservation scheme	ŽŪM	Economic	Area affected, ha	8 832	2023-2027	10,06	—
A13-E – Renunciation of tax relief	Renunciation of tax advantages for transport used in agricultural activities	FINMIN	Fiscal	The proportion of diesel fuel in all diesel fuels is marked, per cent	14,1	2023-2030	0	1229,00
A14-E: Reducing the use of fossil fuels	Reducing the use of fossil fuels in agriculture, forestry and fisheries (regulatory)	ŽŪM	Regulatory	The percentage of diesel fuel labelled	5.7	2021-2030	0	1419,00
	Reducing the use of fossil fuels in agriculture, forestry and fisheries (investment)	ŽŪM	Economic			2022-2026		—
	Promoting the sharing model of agricultural machinery	ŽŪM	Education;	Number of research/studies exploring the feasibility of a sharing model for agricultural machinery	—	2023-2027		0

A15-E. Review of technology cards	Review of agricultural work technology cards to reduce fuel consumption	ŽŪM	Fiscal	The percentage of diesel fuel labelled	20	2023-2030	0	3591,00
A16-E – Encouraging research	R & D to find the most energy efficient and climate-friendly farming practices	ŽŪM	Science and research	Study on the most efficient and sustainable animal husbandry practices.	40	2023-2027	78,00	0
A17-E. Information and counselling	Information and advice on sustainable farming practices	ŽŪM	Education;	Number of farms above 50 ha affected	5424	2023-2027	1,07	0
Planned policy measures								
A1-P. Climat-friendly livestock farming	Investment support for the introduction of climate-friendly farming methods on livestock farms (biogas production)	ŽŪM	Economic	The amount of pig manure is used for biogas production and the amount of cattle manure is used for biogas production, m^3	2 000 000 000	2023-2027	754,29	—
	Investment support for the introduction of climate-friendly farming practices on livestock farms (slurry acidification)	ŽŪM	Economic	Acidified slurry in t	1 050 000 000	2023-2027	23,10	—
	Investment support for the introduction of climate-friendly farming on livestock farms	ŽŪM	Economic	Amount of slurry directly incorporated into the ground, t	33 000	2023-2027	0,15	—

	techniques (slurry insertion)							
A2-P: Promotion of organic products	Promotion of the consumption of organic products in public service bodies	MOA, AM	Economic/Regulatory	Percentage of organically and environmentally friendly production in public institutions	50	2025-2030	5,65	—
A3-P. Expansion of precision fertilisation	Development of precision fertilisation technologies	ŽŪM	Economic	Area of land affected, ha	66 000	2024-2030	24,90	0
A18-P: Environmentally friendly diet	Public education campaigns on healthy and environmentally friendly diets	SAM	Communication	% Of people affected	1	2024-2027	89,85	—
A19-P: Sustainable use of public land	Sustainable use of public land to improve soil quality and health	ŽŪM	Regulatory	Area of land affected, ha	57 861	2023-2030	98,30	0
A20-P on- farm GHG inventories	Develop and introduce a GHG accounting system at farm level to reduce GHG emissions on farms	ŽŪM	Science and research	Establishment of a seamless accounting system for COD	1	2022-2025	37,18	0
A21-P. Balanced fertilisation system	Balanced use of mineral fertilisers (including the establishment of a fertiliser accounting system)	ŽŪM	Regulatory/Economic	Total decrease in N fertiliser consumption, %	1	2021-2024	487,27	0
A22-P. AD-powered technique	Second generation biofuels and electricity	MOA, AM	Economic	Equipment powered by second generation biofuels for special purposes, units	422	2023-2030	0	0

	promotion of powered agricultural machinery							

WASTE SECTOR							
Instrument	**Name at operational level**	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (target 2030)**	**Deadline for implementation**	**GHG savings, kt CO2eq.**
Existing policy instruments							
K1-E – Waste management	Development of infrastructure for bio-waste treatment	AM, EPMA	Economic	Creation/improvement of food/kitchen waste treatment capacity, tonnes/year	36000	2021-2023	122,70
	RES14-E Investment support for the installation of biomethane production and biogas treatment plants	AM, EPMA	Economic	RES14-E. The measure contains:	RES14-E. The tool contains:	2020-2030	
	Increase of the landfill levy	AM	Fiscal	Share of municipal waste landfilled in 2030, %	5	2021-2023	
K2-E – Development of waste collection facilities	Improving people's waste sorting skills	AM	Education;	Number of projects carried out	120	2016-2030	172,64
	Development of infrastructure for separate collection of municipal waste	AM	Economic	Creation/improvement of separate collection capacity for municipal waste, tonnes/year	—	2014-2023	
	Subsidies and grants for the purchase of individual collection containers for secondary raw materials (glass)	AM, EPMA	Economic	Number of individual glass containers purchased	80 000	2021-2023	
	Subsidies and grants for the purchase of individual collection containers for secondary raw materials	AM, EPMA	Economic	Number of individual containers purchased for paper/cardboard/plastics/metal	65 000	2021-2023	

	Subsidies and grants for the purchase of collection containers for textile waste	AM, EPMA	Economic	Number of textile waste containers purchased	500	2021-2023	
	Subsidies and grants for the purchase of bio-waste collection facilities	AM, EPMA	Economic	Number of households equipped with bio-waste collection facilities	200000	2021-2023	
K3-E – Wastewater management	Improving drinking water supply and wastewater management	AM, EPMA	Economic	Population receiving waste water treatment services from newly built and/or reconstructed waste water treatment plants.	575166	2018-2023	290,10
	Renovation and development of drinking water supply and wastewater management systems, improvement of corporate governance	AM, EPMA	Economic	Population receiving waste water treatment services from newly built and/or reconstructed waste water treatment plants.	114441	2014-2023	
	Improving drinking water supply and wastewater management	AM, EPMA	Economic	Newly constructed sewage sludge treatment plants, units	2	2015-2023	
	Increase access to drinking water and wastewater services	Am, Municipalities	Economic	% Of population served by centrally provided waste water management services as a percentage of the total population	95	2014-2030	
K4-E – Waste sorting	Promote separate collection of waste	AM	Economic	Collected separately sorted waste, tonnes/year	38 527	2023-2030	268,41
	Promote recycling and the use of secondary raw materials	AM	Economic	Additional recycling capacity, tonnes/year	128 214	2023-2030	
	Publicity campaigns to promote separate collection of waste in households	AM	Education;	At regional level, organisation of various publicity campaigns to encourage the sorting of households.	10	2023-2027	
K5-E – Food waste prevention	Publicity campaigns to reinvigorate	AM, MOA	Education;	Long-term public awareness campaigns developed and implemented	1	2023-2027	21,30

	use objects and avoid waste of food			food waste prevention strategy			
Planned policy measures							
K6-P. Circularity in public procurement	Circularity in public procurement	AM	Regulatory	Definition and criteria for circular procurement developed, legislative package	1	2024-2025	28,67
K7-P – Research	Funding R & D on circular economy	AM, NMSM, SADM	Education;	Circular economy research implemented	10	2024-2027	0
K8-P – Domestic composting	Regulatory changes for the development of domestic composting	AM	Regulatory	Legislative amendments prepared and adopted	1	2023-2023	8,15

GIFCM								
Instrument	**Name at operational level**	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (target 2030)**	**Deadline for implementation**	**GHG savings, kt CO2eq.**	**Total fuel and energy savings, GWh**
Existing policy instruments								
L1-E. restoration of peatlands (restoration of hydrological regime on agricultural land)	Restoration of wetlands on arable peatland, protection of permanent grassland cover and promotion of wetlands	ŽŪM	Economic	Area affected, ha	8 000	2022-2026	—812,24	1
L2-E: Conservation of grasslands and habitats of species	Management of natural grasslands and habitats of species	ŽŪM	Economic	Area of grassland affected by the measure, ha	50 490	2023-2027	—184,39	—
L3-E. Conservation of wetlands	Management of natural wetlands	ŽŪM	Economic	Wetland area affected by the measure, ha	19 718	2023-2027	—159,15	—

L4-E. Promotion of catch crops	Promotion of catch crops	ŽŪM	Economic	Area affected, ha	200 511.51	2023-2027	—3357,20	—
L5-E: Promoting plant change	Promotion of plant change	ŽŪM	Economic	Area affected by the measure, ha	276 952.57	2023-2027	—4423,50	—
L6-E. peatland restoration (pasture translation)	Replacement of arable peatland with grassland	ŽŪM	Economic	Area affected, ha	9 258	2023-2027	—967,46	0
L7-E: promotion of a green litter	Promotion of green litter on agricultural land	ŽŪM	Economic	Area affected, ha	15 560	2023-2027	—190,10	0
L8-E: Retention of landscape features	Preservation and maintenance of landscape features	ŽŪM	Economic	Area affected, ha	86 200	2023-2027	—146,00	0
L9-E: afforestation	Afforestation on private land	AM	Economic	Area affected, ha	3 500	2023-2027	—143,00	—
L10-E- young education	Young people's education	AM	Economic	Area affected, ha	16 500	2023-2027	—72,10	—
L11-E. Development of agroforestry and agro-horticulture	Assessing and promoting the potential of agroforestry and agroforestry development on the utilised agricultural area	ŽŪM	Science and research	Scientific study, units	1	2023-2025	0	—
Planned policy measures								
L12-P: Conservation of grassland area	Conservation of grassland area	ŽŪM	Regulatory	Area of permanent grassland, ha	8 000	2023-2030	—62,16	—
L13-P: Promotion of carbon stock farming (on agricultural land)	Cross-cutting measure to promote soil organic carbon storage	ŽŪM	Regulatory	Percentage of areas on the utilised agricultural area of average humus in the representative territory of the country	43	2022-2030	0	—

L14-P. Retention of trees	Conservation and recording of tree self-growth in the accounts of forest land	AM	Economic	Area of newly created forests, ha	24 000	2023-2030	—748,17	—
L15-P: Improving forest quality	Improving the quality of forests	AM	Economic	Additional areas of better quality forests developed, ha	2 500	2023-2030	125,94	—
L16-P. Establishment of GHG indicators	Establishment of national GHG emission indicators and carbon stock changes	AM	Science and research	List of indicators, units	1	2019-2023	0	0
L17-P: Promotion of carbon storage farming (in woodlands)	Promotion of carbon farming in private forests	AM	Economic	—	—	2023-2030	0	—
L18-P: afforestation	Afforestation on public land	AM	Economic	Area affected, ha	2 262	2023-2030	—72,01	—
L19-P: Promotion of Organic Construction	Ensure implementation of pilot building refurbishment/modernisation projects using standardised modular structures from organic materials and develop recommendations on the mass application of these solutions	AM	Economic	Demonstration projects for green renovation have been implemented.	8	2023-2025	—1051,82	—
	Support measures to promote the deployment in Lithuania of standardised modular structures based on organic materials needed to meet the objectives of the Long-Term Renovation Strategy	AM	Economic	Construction of modular structures of an organic material plant	1	2023-2024		

L20-P peatland restoration (restoration of hydrological regime in forests)	Conversion of forests where it is appropriate to restore hydrological regimes	AM	Economic	Area affected, ha	4 000	2024-2030	—39,89	—

RENEWABLE ENERGY SOURCES (RES)								
Instrument	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (target 2030)**	**Deadline for implementation**	**GHG savings, kt CO2eq.**	**Total fuel and energy savings, GWh**	**Impact on RES target, %[1]**
Existing policy instruments								
Electricity sector								
RES1-E – Financial support for prosumers	ENMIN	Economic	Installed solar capacity, MW	477	2023-2029	0	0,67	0.66
RES2-E – RES development in the Baltic Sea	ENMIN	Research, economic	Installed offshore capacity, MW	2800	2020-2030	0	7,87	7,87
RES3-E – Use of RES in public and residential buildings (EU support)	ENMIN	Economic	Installed solar capacity, MW	46	2021-2030	12,71	0,07	0,07
RES4-E: Deployment of RES plants and storage facilities for legal persons and RES communities	ENMIN	Economic	Installed electricity generation capacity from RES, MW	298,12	2020-2026	0	0,50	0,50
RES5-E: Encouraging the deployment of energy storage	ENMIN	Economic	Storage capacity, MWh	15	2023-2029	0	0	0
Transport sector								

[1] Some measures that are assessed as 0 or do not affect the RES target as set out in the calculation methodology (but the measures are relevant to other objectives) or have a very small effect close to zero.

RES6-E Investment support for the installation of biomethane production and biogas treatment	ENMIN, MOA, AM	Economic	Planned production of biomethane, GWh	950	2020-2030	0	0	0
RES7-E Obligation for operators of natural gas refuelling points for the use of RES in the transport sector	EM, IN VALUE	Regulatory	Share of gas from RES in % of natural gas supplied by each natural gas supplier to the transport sector	> 16.8 %	2025-2030	0	1,78	1
RES8-E – Mandatory blending of biofuels with mineral fuels	ENMIN	Regulatory	share of biofuels in the total energy content of petrol and diesel, %	> 6.6 % (petrol), > 6.2 % (diesel)	2022-2030	0	0,09	0,05
RES9-E Investment support for second-generation biofuel production facilities	ENMIN	Economic	Annual production of second-generation biofuels, ktoe	12,4	2023-2026	0	0	0
RES10-E – Creating green hydrogen production capacity in the transport sector	ENMIN	Economic	Amount of hydrogen produced, m^3	1,680,000	2023-2030	4,48	0	0
RES11-E: Integration of operators of publicly accessible recharging points for electric vehicles into the DAEI unit of account system.	ENMIN	Regulatory	Integration into DAEI unit of account system, units	1	2023-2024	0	0	0
Heating and cooling sector								
RES12-E. Increase the use of RES for heating and cooling production in the DH sector	ENMIN	Regulatory, economic	Rated (nominal) thermal input of the replaced installations, MW	600	2018-2030	1,26	0,30	0,30
RES13- E: Promote the use of RES to generate heat energy from DH by assessing the potential of solar technologies, heat pumps and heat storage in DH systems	ENMIN	Economic	Nominal (nominal) thermal input of newly installed installations, MW	200	2021-2030	74,54	0,19	0,19

RES14-E Deployment of low-capacity biofuel cogeneration plants adapted for burning harvesting residues	ENMIN	Regulatory	Additional RES production capacity, MW	70	2018-2023	335,55	0,18	0,19
RES15-E: Promotion of low-power biofuel cogeneration	ENMIN, municipalities	Economic	Electric installed capacity of cogeneration units, MW	3,75	2023-2029	263,74	0,25	0,25
RES16-E Renovate and/or upgrade the heat transmission network and its installations/elements	ENMIN	Economic	Upgraded district heating networks, km	211	2015-2023	0	—	0
RES17-E: Promote the use of RES in district heating (using solar technologies, heat pumps and/or heat storage)	ENMIN, municipalities	Economic	Capacity of newly installed installations, MW	161,5	2021-2030	49,89	—	0
RES18- E. Promote the use of waste heat from industry, waste or cooling in the district heating sector	ENMIN, EIMIN, AM, VDA[1]	Economic	Waste heat in district heating, TWh/year	0.45 by 2030	2021-2030	0,468	—	0
RES19-E Modernisation of the heat accounting system	ENMIN	Regulatory, economic	Number of heat, hot water metering devices and remote data reading systems installed.	102 856	2021-2027	1,20	0,04	0,04
RES20- E. Implement local and RES CHP projects with priority to Vilnius and Kaunas	ENMIN	Economic	Electricity produced, heat quantity, annual increase	0.4 TWh by 2023	2014-2023	867,66	2,65	2,65
RES21-E – Use of residual heat in DH systems	ENMIN	Economic	Total power of recovered energy streams, MW	15	2023-2029	17,53	0,08	0,08

RES22-E – Installation of heat storage tanks for optimisation and efficiency of boilers	ENMIN	Economic	Amount of heat generated by newly installed and/or reconstructed heat storage tanks	1259	2023-2029	80,34	0,11	0,11
RES23-E – Installation of heat pumps to optimise the performance of heat production systems by increasing the operational efficiency	ENMIN	Economic	Power of installed heat pumps in district heating systems, MWh	13	2023-2029	81,88	0,11	0,11
RES24-E. Construction of solar collector systems for district heating activities with related engineering equipment (heat tanks, pipelines, automation, etc.)	ENMIN	Economic	Area of solar heating systems installed, M2	93750	2023-2029	74,06	0	0
RES25-E: Deployment of DH networks to Generation IV heat supply systems, lower temperature limits and technologies	ENMIN	Economic	Use of Generation IV heat supply systems and reduction of CO2 consumption, CO2eq/year	1	2023-2029	0,46	0	0
RES26-E Construction of biofuel boilers from logging residues reducing fossil fuel consumption in heat production	ENMIN	Economic	Installed capacity of SM3 combustion systems, MW	70	2023-2029	248,00	0,06	0,06
Planned policy measures								
Electricity sector								
RES27-P: solar and wind power plants in the business sector	ENMIN	Economic	installed capacity, MW	600	2024-2029	0	0,18	0,85
RES28-P: solar and wind power plants in the public sector	ENMIN	Economic	installed capacity, MW	130	2024-2029	0	0,83	0,18
RES29-P. Create renewable energy communities in municipalities managed by them	ENMIN	Economic	installed capacity, MW	340	2024-2029	0	0	0,47

using the capacity of renewable energy plants to compensate the poor (energy poverty)								
RES30-P: Incentivising electricity consumers to choose energy from RES	ENMIN	Education;	Persons reached by the education/information campaign, units	119395	2024-2026	0	0	0
RES31-P. Recommendations on the development of renewable energy communities (RECs) and citizen energy communities (PEBs) in Lithuania	ENMIN	Science and research	Study/recommendations prepared, units	1	2024-2025	0	0	0
RES32-P: Targeted and equitable education of pupils and students on the possibility and benefits of energy recovery from RES	ENMIN, NMSM	Education;	% Of target audience affected	5	2025-2030	0	0	0
RES33-P: Reduce CO2 emissions from the LNG terminal	ENMIN	Economic	Electrical connection installed, units	1	2023-2025	85,18	0	0
Transport sector								
RES34-P: Dissemination of information on biofuels traded at service stations.	ENMIN	Regulatory	% Of service station operators publishing information on the raw materials used for the production of biofuels in the fuel structure sold at service stations and their origin	100	2025-2030	0	0	0
RES35-P. regulatory changes for the establishment of a system of public biomethane gas access points	ENMIN	Regulatory	Adopted legislation, units	1	2024-2030	0	0	0
RES36-P: Investment support for the installation of biomethane production and treatment plants.	ENMIN, MOA, AM	Economic	Amount of biomethane produced, GWh	600	2026-2030	145,33	0,18	0,18

Heating and cooling sector

RES37-P Restriction of the use of fossil solid fuels by location	AM	Regulatory	Particulates, units	67964	2024-2030	0	0	0
RES38-P: Modernisation or replacement of depreciated biofuel boilers with other RES-using technologies	ENMIN	Economic	Rated (nominal) thermal input of the replaced installations, MW	665	2023-2029	0	0	0

ENERGY EFFICIENCY							
Instrument	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (target 2030)**	**Deadline for implementation**	**GHG savings, kt CO2eq.**	**Total fuel and energy savings, GWh**
Existing policy instruments							
EE1-E: The impact of higher excise duties and taxes on fuel consumption	ENMIN, FINMIN, AM	Regulatory (price regulation)	Energy savings, TWh	—	2021-2030	0	8657,20
EE2-E – Renovation/modernisation of multi-apartment buildings	AM, EPMA	Infrastructural	Energy savings, TWh	3267 multi-apartment blocks	2021-2026	206,32	6305,00
EE3-E Renovation of public buildings (central government)	ENMIN	Infrastructural	Energy savings, TWh	367 thousand m² of central government public buildings	2021-2028	20,32	441,81
EE3-E Renovation of public buildings (municipalities)	AM	Infrastructural	Energy savings, TWh	86 220 m² of municipal public buildings	2021-2024		
EE4-E – Agreements with energy suppliers on consumer education and consultation	Energy Suppliers, ENMIN	Regulatory	Energy savings, TWh	—	2021-2030	189,11	2773,21

EE5-E PIS allowance for industrial enterprises	ENMIN, Baltpool	Regulatory	Energy savings, TWh	Energy efficiency measures are put in place every year, leading to energy savings of around	2021-2028	110,27	4227,70
EE6-E: Energy-saving agreements with state and municipal enterprises	ENMIN, State-owned and municipal enterprises	Regulatory	Energy savings, TWh	Agreements with 50 state and municipal enterprises on energy savings	2021-2030	107,66	3744,84
EE7-E: Transforming products into more efficient technologies	ENMIN, APVA, LEA	Financial	Energy savings, TWh	50000 boilers replaced, other heat-consuming energy efficiency measures will be adapted, including heat pumps	2021-2030	244,94	7622,81
EE8-E Modernisation of indoor heating and hot water systems in buildings (“smart renovation”)	ENMIN, EPMA	Financial	Energy savings, TWh	Upgraded 158 heat points in multi-apartment buildings	2021-2022	3	29,94
EE9-E: Implementation of energy efficiency measures by private legal entities according to energy audit reports	ENMIN, EPMA	Financial	Energy savings, TWh	Number of 44 projects	2021-2024	2,16	104,68
EE10-E: Renovation/modernisation of one or two apartments for natural persons	AM	Financial	Energy savings, TWh	1600 individual houses updated	2021-2022	11,04	429,48
EE11-E Modernisation of street lighting systems	ENMIN, VIPA	Infrastructural	Energy savings, TWh	69353 units of replaced luminaires	2021-2023	7,93	158,93
Planned policy measures							
EE2-P Renovation /modernisation of multi-apartment buildings	AM, EPMA	Infrastructural	Energy savings, TWh	7534 units in multi-apartment buildings	2024-2030	293,06	5268,79

EE3-P Renovation of public buildings (central government)	ENMIN	Infrastructural	Energy savings, TWh	143 thousand m² of central government buildings	2024-2030	12,72	295,15
EE3-P Renovation of public buildings (municipalities)	AM	Infrastructural	Energy savings, TWh	363 780 m² of municipal public buildings	2024-2030		
EE8-P – Modernisation of indoor heating and hot water systems in buildings (“smart renovation”)	ENMIN, APVA, LEA	Financial	Energy savings, TWh	290 heat points annually	2023-2030	20,37	203,66
EE9-P: Implementation of energy efficiency measures by private legal entities according to energy audit reports	ENMIN, EPMA	Financial	Energy savings, TWh	25 projects	2025-2030	0,69	34,65
EE10-P – Renovation/modernisation of one or two apartments for natural persons	AM	Financial	Energy savings, TWh	65895 individual houses	2023-2030	212,35	5513,17
EE11-P – Modernisation of street lighting systems	ENMIN, VIPA	Infrastructural	Energy savings, TWh	100 thousand Replacement luminaires	2024-2030	4,96	99,19
EE12-P – Enhancing the technological and energy efficiency of industrial enterprises through the deployment of artificial intelligence and digital twin technologies	ENMIN, EIMIN	Investment	Energy savings, TWh	Deployment of digital twin or artificial intelligence solutions.	2026-2030	0,99	37,13
EE13-P: Create a legal requirement for companies to implement the measures recommended in energy efficiency audits	ENMIN	Regulatory	Energy savings, TWh	Amendment of the law/procedure to improve energy efficiency.	2027-2030	7,63	260,28
EE14-P. Introduction of internal monitoring systems for energy efficiency	ENMIN, EIMIN	Financial	Energy savings, TWh	Number of small and medium-sized enterprises in manufacturing, units 2686	2025-2030	16,17	214,88

promotion in business and industry							

ENERGY SECURITY					
Instrument	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (objective) 2030)**	**Deadline for implementation**
Existing policy instruments					
ES1-E – Lithuanian electricity system synchronisation project	LITGRID AB, ENMIN	Infrastructural	Fact that the Lithuanian electricity system is desynchronised from IPS/UPS and connected to continental European electricity networks for synchronous operation	Lithuania's electricity system operates synchronously with continental European electricity networks	2018-2025
ES2-E – Risk-preparedness plan in the electricity sector	ENMIN	Regulatory	A plan has been drawn up.	1	2022-2023
Implementation of**the construction project for Unit 5 of the Kruoni pumped** storage power plant (KHAE)	ENMIN, Finmin, Ignitis Group	infrastructural	Installation of a fifth hydro-installation, MW	110	2020-2026
ES4-E: Increasing capacity of the gas interconnection between Latvia and Lithuania (ELLI)	ENMIN, AB Amber Grid	Infrastructural	Increased capacity in Latvian direction, GWh/day	130,47	2017-2024
			Increased throughput in Lithuania, GWh/day	119,5	
ES5-E – Modernisation of electricity distribution networks through the deployment of smart technologies	ENMIN, ESO, VALUE	Infrastructural	Digital management systems for smart energy systems, units	4 265	2021-2030
			Customers for whom the quality of the electricity supplied has improved.	258 536	2021-2030
Planned policy measures					

ES6-P. Kaupti gas stocks in underground storage in the context of the implementation of EU Regulation 2017/1938 on the filling of	AB Ignitis Manufacture	Regulatory	NA	NA	2022-2025
ES7-P: Implement cross-border gas agreements on solidarity measures ensuring continuity of gas supply for protected household customers	ENMIN	Regulatory	NA	NA	until 2030 (rolling measure)

INTERNAL MARKET					
Instrument	**Responsible entity**	**Type**	**Activity Indicator, Measurement units**	**Scope of implementation (target 2030)**	**Deadline for implementation**
Existing policy instruments					
VR1-E: Ensure that decisions and recommendations on nuclear safety and environmental protection by EU and international organisations in the Republic of Belarus, in the Ostrovets district, are in the interests of Lithuania	MFA, ENMIN, AM	Regulatory	Decisions taken, units	8 (2022)	2009-2030
VR2-E – Renovate/upgrade heat stations and/or heating systems in multi-apartment buildings, individual and/or public buildings	AM, ENMIN	Infrastructural	Number of heat points and/or heating systems retrofitted, units	2000	2019-2022
VR3-E Renovate and/or upgrade the heat transmission network and its installations/elements	ENMIN, Heat Suppliers	Infrastructural	Upgraded district heating networks, km	1000 EU funds for 2021-2027 are expected to modernise/build 42 km of networks adapted to low-temperature working modes	2018-2030

VR4-E Remote retail electricity prices for household customers	ENMIN, IN VALUE	Regulatory	Number of household customers choosing an independent electricity supplier, households	1 717 556	2019-2026
VR5-E: Promote the development of smart grids	ENMIN, ESO	Infrastructural	Smart metering devices for household consumers, units	1200000	2022-2030
VR6-E: Promoting the use of environmentally and sustainably produced and supplied biofuels	ENMIN, Baltpool, LOSTA	Regulatory	RES Guarantees of Origin scheme for fuels used in the DH sector	1	2021-2030
VR7-E Balancing capacity market	LITGRID AB	Regulatory	1512	Not applicable	2018-2025
Construction of the**Harmony Link connection for VR8-** E	LITGRID AB, ENMIN	Infrastructural	700	NA	2019-2030
Energy poverty					
EN1-E – Reimbursement of heating costs for dwellings	SADM	Financial	Persons receiving compensation for heating costs of the dwelling, thousand persons	No indicators, number of persons receiving compensation depends on energy prices, personal income and costs incurred	since 1995 (permanent, continuous measure)
EN2-E. Credits taken out for the renovation (modernisation) of a multi-apartment building and interest payments for persons entitled to reimbursement of heating costs of the dwelling	AM, SADM	Financial	Persons who have paid credit and interest payments for the renovation/modernisation of a multi-apartment building, thousands of	indicators are not available, depend on the extent of renovation and the number of beneficiaries of compensation for heating costs, while the number of persons receiving compensation depends on energy prices, personal income and costs incurred.	from 2009 onwards (permanent, follow-up)
EN3-E –Incentivising deprived persons to purchase solar power plants and/or to replace heat installations using fossil fuels	ENMIN, AM	Investment	1) Number of persons benefiting from support 2) Installed power, kW	1) 69 2) 573	2023-2030
Planned policy measures					

VR9-P: Acquisition of a floating LNG ship/storage facility with a discharge facility (FSRU) “Independence”.	ENMIN	Infrastructural	Acquisition of FSRU ‘Independence’, units	1	2018-2024
VR10-P: Establish a legal framework for trade between electricity consumers and electricity sharing.	ENMIN	Regulatory	Legislative amendment, units	1	2023-2025
VR11-P: Establish a centralised data exchange platform – an information technology system for central and standardised storage, exchange and storage of energy data and other information related to energy activities	ENMIN, ESO	Investment	Updating of the database on production, supply and consumption of an open-access energy market.	1	2020-2025
VR12-P: Establish a legal basis for an open-access energy market production, supply and consumption database “Data HUB”	ENMIN	Regulatory	Legislative amendment, units	2	2022-2023
VR13-P: Establish provisions related to hydrogen market and infrastructure development in the Lithuanian legal	ENMIN	Regulatory	Legislative amendment, units	1	2023-2025
VR14-P: Implement pilot projects for flexibility services	ENMIN, ESO	Science and research	Pilot design of the flexibility service model, units.	4	2023-2025
Energy poverty					
EN4-P – Information for hard-to-reach consumers (not using IT tools) on compensation and energy savings	ENMIN, SADM, AM, municipalities	Other	NA	NA	2023-2030
EN5- P: Create an information hub containing energy information	ENMIN	Education/Information	Units of municipalities with access to the information hub	60	2023-2030

savings, compensations and energy communities					

R & D					
Instrument	**Responsible entity**	**Type**	**Activity Indicator, Measurement Units**	**Scope of implementation (objective) 2030)**	**Deadline for implementation**
Existing policy instruments					
MT1-E: attracting investors in the manufacture of electric batteries	EIMIN, Investing in Lithuania, SUMIN	Planning	Investor attracted, units	1	2022-2025
MT2-E: Enabling a pilot environment for energy innovation	ENMIN, IN VALUE	Regulatory	Number of innovative energy products and business solutions tested in the energy innovation pilot environment.	300	2019-2030
MT3-E Joint Nordic-Baltic Energy Research Programme	ENMIN	Financial	Energy research projects carried out intra-Baltic and Baltic Nordic, EUR million	0,216	2018-2024
MT4-E – Ignitis Group Smart Energy Venture Capital Fund	‘Contrarian Ventures, Ignitis Group	Financial	Not applicable	Not applicable	2017-2030
MT5-E: carrying out research by activating funds received from RES statistical surplus sold to Luxembourg in Lithuania	ENMIN	Science and research	Number of research proposals funded	2	2023-2028
MT6-E. “Smart Specialisation”	EIMIN, STRAT	Technological	Not applicable	Not applicable	2014-2023
MT7-E. “Experiment”	EIMIN, Innovation Agency	Economic	Number of enterprises receiving subsidies, units	224	2018-2023

MT8-E “Inteleta”	EIMIN, Innovation Agency	Economic	Number of enterprises receiving subsidies, units	275	2018-2023
MT9-E Pre-commercial purchases LT	EIMIN, Innovation Agency	Economic	Number of solutions implemented to stimulate innovation demand	17	2018-2023
Planned policy measures					
MT10-P: Implement research on catalytic materials to assess their potential use for CO2 reduction and/or hydrogen production	ENMIN	Science and research	Number of research proposals funded	1	2023-2029
MT11-P: Implement nuclear research to assess the future use of nuclear energy and monitoring methodologies	ENMIN	Science and research	Number of research proposals funded	8	2024-2026
MT12-P – Implement research on hydrogen applications for fuels, gas and sector integration	ENMIN	Science and research	Number of research proposals funded	10	2023-2030
MT13-P: Assess the feasibility of adapting the gas transport system to the transport of green hydrogen/methane blends and implement pilot projects for the development and adaptation of the system	ENMIN	Science and research	1) Pilot project, units 2) Study, units	1) 1 2) 1	2023-2025
MT14-P: Implement research in the field of energy digitalisation to boost the digitalisation of the sector	ENMIN	Science and research	Number of research proposals funded	5	2023-2029

ABBREVIATIONS

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EPA	Environmental protection agency
EPMA	Environmental Projects Management Agency
EIMIN	Ministry of Economy and Innovation
ENMIN	Ministry of Energy
ESOS	Energy Distribution Operator
FINMIN	Finance Ministry
LAKD	Lithuanian Road Administration
LAMMC	Forest Institute of the Lithuanian Agricultural and Forest
LEA	Lithuanian Energy Agency
LHMT	Lithuanian Hydrometeorological Service
LGT	Lithuanian Geological Service
LTA	Lithuanian District Heating Association
LTSA	Lithuanian Transport Safety Administration
SADM	Ministry of Social Security and Labour
SAM	The Ministry of Health
NMSM	Ministry of Education, Science and Sport
SSVA	Building Sector Development Agency
STRATA	Government Strategic Analysis Centre
SUMIN	Ministry of Communications
MFA	Foreign ministry
VDA	State Data Agency
VALUE	State Energy Regulatory Council
KVJUD	Klaipeda State Seaport Authority
CRMD	Inland Waterways Authority
VIPA	Public Investment Development Agency
VPT	Procurement Office

WSTT	State Protected Areas Agency
MOI	Interior Ministry
SFS	State Forestry Agency
ŽŪM	The Ministry of Agriculture
LTG	Lithuanian Railways
TM	Ministry of Justice
LMT	Science Council of Lithuania

Annex No 5. Climate Change Adaptation Plan

ADAPTATION				
Instrument	**Responsible entity**	**Sector**	**Scope and results/effect envisaged**	**Deadline for implementation**
Existing policy instruments				
PR1-E: Strengthening nature frame and creating green infrastructure in degraded agro-areas	Am (VSTT), MoA, municipalities	Forestry, ecosystems, biodiversity, landscape	Achieve good environmental status (stable geo-ecological potential) in intensive farming areas, promote the restoration of natural landscapes and ecosystems, enhance landscape and biodiversity, and ensure high-quality provision of ecosystem services in these areas in order to increase the resilience of these areas.	2021-2030
PR2-E: Reduce the impact of extreme weather events on transport infrastructure elements and on road surfaces	SUMIN, LAKD	Transport	Improving road infrastructure by 2030	2021-2030
PR3-E: Ensure continuous improvement of the information system for multiple weather conditions	SUMIN, LAKD	Transport	Regular improvement and updating of the road weather information system	2021-2030
PR4-E: Establishment of means of identification of project road sections	SUMIN, LAKD, municipalities	Transport	Create instructions for a single model to assess the roads and sections most vulnerable to precipitation in order to identify where floods and floods have occurred in recent years (or other periods) and to find critical points where floods have occurred repeatedly	2021-2022
PR5-E – Adaptation of several technical normative documents to climate change	Am, SUMIN, LAKD, LTSA, VVJUD, AB LTG, airports	Transport	Review technical normative documents for transport infrastructure (roads, bridges, land works, cableways, railways, ports, etc.) and update them in the light of changing climate and increasing extreme natural phenomena and the need to adapt to ongoing changes	2021-2022
PR6-E: Resilience of electricity distribution infrastructure to climate and environmental impacts	ENMIN, Economic Operators	Infrastructure	Underground replacement of electricity grid airlines, giving priority to the replacement of unreliable and accidental lines;	2021-2030

scaling up, including airline replacement by underground cable lines			wooded areas and solutions to improve the quality of tensions by increasing their resilience to climate change	
PR7-E: Promotion of the development of livestock insurance	ŽŪM	Agriculture	Support the insurance of livestock in order to ensure that the insurance scheme covers the majority of farmers keeping farmed animals and contributes to effective risk management and the minimisation of losses caused by risk factors for farm animal health	2021-2030
PR8-E: Promoting the development of crop and plant insurance	ŽŪM	Agriculture	Support crop and plant insurance to ensure that the insurance system ensures the effective management of risks and losses related to the effects of adverse climatic events on agriculture	2021-2030
PR9-E: Fostering the development of new risk management tools for agricultural production	ŽŪM	Agriculture	Create a legal environment and support measures to promote the development of new tools for managing agricultural production risks (such as agricultural risk management funds, income stabilisation tools, mutual funds, etc.)	2021-2030
PR10-E. Development of Intelligent Melioracic Systems	ŽŪM	Agriculture	Identify UAA areas where it is appropriate to install smart drainage instead of the current drainage system. In designated areas, support the installation of modern melracical systems that allow the drainage of excess humidity during the wet period and the accumulation of moisture during the dry period.	2021-2029
Analysis and assessment of options for multicultural (multi- species) farming in PR11-E.	ŽŪM	Agriculture	Identify UAA criteria, if needed, and areas where it is appropriate to develop multicultural (multi-species) farming. Identify the range of different species to be cultivated (including those planted with perennial plantations) in the rational bands to be cultivated, in order to achieve their best symbiosis, enabling them to achieve better production results in sustainable ways. Identify the economic-ecosystem benefits of the cultivation of such crops for agricultural production	2021
PR12- E: Agricultural Adaptation Advisory (L39)	ŽŪM	Agriculture	Establish, by 2027, an infrastructure for information and advice for farmers and municipal professionals on how to adapt to climate change	2021-2030

PR13-E: Ensure continuous improvement of the agro-meteorological observation network and forecasting system	MOA, AM	Agriculture	Regular improvement and updating of agro-meteorological observations, provision of agro-meteorological forecasts and regular monitoring and forecasting of plant diseases and pests.	2021-2030
PR14-E: Fostering the development of organic farms and the production of products produced under the national agricultural and food quality scheme (hereinafter referred to as NGA) by increasing demand for organic and NGA products	MOA, SAM	Agriculture	Expand organic products supplied to children and produced under the national agricultural and food quality scheme as part of the implementation of the Procedure for organising children's diet. Promote the use of at least 60 % of organic and NGA products in pre-school education.	2021-2030
PR15-E: Development of organic farming (including aquaculture)	ŽŪM	Agriculture/Aquaculture	Increase areas and production under organic farming	2021-2029
PR16-E. E. E. E. E. E. E. E. E. The creation and operation of an Interinstitutional Working Group to combat the impact of climate change on public health	The SAM and its subordinate bodies, the HM and its relevant authorities, municipalities	Public health	Inter-institutional working group aimed at increasing the resilience of the Lithuanian population to the various effects of climate change, drawing up plans of measures, submitting proposals for legislation or various studies	2021-2030
PR17-E: Raising awareness among health professionals on the effects of climate change on human health	The SAM and its subordinate bodies	Public health	Organise seminars, lectures, trainings to inform health professionals on climate change and health consequences	2021-2030
PR18-E – Improving and developing the alert and information infrastructure	MOI	Emergency management	Updating and strengthening the capacity to respond to the effects of extreme natural events caused by climate change	2021-2022
PR19-E: Strengthening the fire rescue force	MOI	Emergency management	Equipping fire rescue forces with equipment and equipment	2021-2023
PR20-E. Development of the Early Warning System for Nuclear Hazards in Lithuania	MOI	Emergency management	A unified system for warning and informing the public in sirens has been put in place	2020-2024
PR21-E: Preparation of adaptation plans in municipalities	AM	Urbanised areas	Preparation of adaptation plans for individual municipalities	2021-2030
PR22-E: Assess the sensitivity of Lithuanian territories to climate change by municipalities	AM	Urbanised areas	Assess and categorise the sensitivity of Lithuania's territory to climate change on the basis of individual municipalities and the necessary adaptation measures	2021-2030

PR23-E Presentation of climate projections and scenarios and planning of necessary adaptation measures	AM	Cross-sectoral objective	Regular update of climate scenarios and projections and review and update of adaptation measures based thereon	2021-2030
PR24-E: Business-to-business advice on adaptation to climate change	EIMIN, SUMIN, AM, EM, SAM, MOA	Cross-sectoral objective	Develop information and advisory services for businesses to adapt to climate change by 2030	2022-2030
Planned policy measures				
PR25-P: Ensure the functioning of the flood risk management system	AM (AAA, LHMT)	Water resources	Regular update of flood risk management plans	2021-2030
PR26-P: Implementation of flood risk management projects	Am, municipalities	Water resources	Implement preventive measures against floods in risk management plans (including green infrastructure measures)	2021-2030
PR27-P – Implement water management and protection projects	AM (LGT, EPA)	Water resources	Regular updating of the monitoring system for surface waters and groundwater resources and studies to assess the impact of climate change and the resilience of water bodies to climate change.	2021-2030
PR28-P: Implement rainwater management projects	Am, municipalities	Water resources	Upgrade and improve surface (rain) wastewater infrastructure in urbanised areas (including green infrastructure measures) by 2030 in order to protect these areas from the risks posed by excess rainfall and snow soaking and to prevent the spread of pollutants into the environment (surface waters)	2021-2030
PR29-P: Reduce adverse effects of rising water levels and extreme weather events on surface and groundwater quality	AM (AAA)	Water resources	Regular improvement of the management of water resources to improve the status of water bodies. Studies on the status of surface and groundwater bodies, identification of measures needed to improve status, improvement of regulation, monitoring and control	2021-2030
PR30-P: Improve the resilience of waste water management infrastructure to rainfall and climate change	AM (AAA)	Water resources	Rehabilitation of wastewater infrastructure due to excessive infiltration of rainwater into wastewater networks	2021-2030
PR31-P. Ensure protection of protected species and habitats	AM (VSTT)	Forestry, ecosystems, biodiversity, landscape	Develop and implement documentation for the protection and management of protected species and habitats and for regulating the abundance of invasive species by 2030. Encourage land managers to eradicate invasive species and reduce their prevalence	2021-2030

			in the most sensitive ecosystems. Continue research and monitoring of the status of protected species and habitats	
PR32-P: Conservation and sustainable use of biodiversity and ecosystems through an ecosystem services assessment mechanism	AM	Forestry, ecosystems, biodiversity, landscape	Create legal preconditions for the integration of ecosystem services assessment, ensure their application in decision-making to halt biodiversity and ecosystem loss and loss of benefits from nature as a result of climate change-related changes	2021-2030
PR33-P: Preparation of a programme for the management of the strip	AM	Forestry, ecosystems, biodiversity, landscape	Develop a Coastal Belt Management Programme	2021-2030
PR34-P. Implementation of coastal management measures in the coastal strip	AM	Forestry, ecosystems, biodiversity, landscape	Implement coastal lane management projects to increase the resilience of coastal shores to the effects of climate change	2021-2030
PR35-P: Restoration and protection of wetlands, ensuring their resilience and the provision of services relevant to adaptation	AM	Forestry, ecosystems, biodiversity, landscape	The restoration of damaged wetlands (unused for agriculture and without the potential to be used for agriculture through the restoration of an appropriate hydrological regime, as well as the conservation of these ecosystems to increase their resilience to climate change-induced changes and the provision of ecosystem services necessary for adaptation to climate change).	2021-2030
PR36-P: Enhancing forest resilience	AM	Forestry, ecosystems, biodiversity, landscape	Promote the development of young people, the formation of stands and forests, as well as unspent logging, in order to develop more climate-resilient multi-age and heterogeneous stands	2021-2030
PR37-P – Implementation of prevention measures for fire and natural disasters in forests	AM, MOA	Forestry, ecosystems, biodiversity, landscape	Implement fire and disaster prevention measures in forests, including the development of forest infrastructure for this purpose.	2021-2030
PR38-P: Promotion of sustainable forestry in the context of climate change in private forests	AM, MOA	Forestry, ecosystems, biodiversity, landscape	Provide advice, information and training for private forest owners on sustainable forestry in the context of climate change, promote cooperation and cooperation.	2021-2030
PR39-P: Preparation or updating of protected spatial planning documents and their implementation	AM (VSTT)	Forestry, ecosystems, biodiversity, landscape	By 2030, protected areas of importance for the conservation of species and habitats where the most sensitive and vulnerable species and natural habitats of EU interest can be identified or upgraded and implemented	2021-2030

			planning documents. Regularly carry out a spatial planning process for the review of the protection and use regime of protected areas, adjustment of thresholds, compensation and land grabbing	
PR40- P Forest research	VMT, LAMMC, AM	Forestry, ecosystems, biodiversity, landscape	Forest research and experimentation to increase forest resilience to climate change, selection and selection of resistant genotypes of tree species, dissemination and exploitation of research results in practical forestry	2021-2030
PR41-P: Reduce the impact of extreme weather events on airport infrastructure	SUMIN	Transport	Improvement of airport infrastructure by 2030	2021-2030
PR42-P: Reducing the vulnerability of the energy sector	ENMIN, Economic Operators	Transport	Carry out studies to assess the vulnerability of the energy sector to climate change, assess risks and identify the most vulnerable areas	2021-2030
Amendment of normative documents of PR43- P.	AM	Transport	By 2030, normative documents must be replaced, taking into account that construction projects must comply with current and future climate conditions.	2021-2030
PR44-P – Upgrading of waste infrastructure	AM	Infrastructure	Refurbishing waste infrastructure to increase its resilience to climate change	2021-2030
PR45-P – Selection and breeding of climate-resilient agricultural plant varieties	ŽŪM	Agriculture	Continually ensure the selection of climate-resilient agricultural plant varieties and promote their breeding	2021-2030
PR46-P. Promotion of multicultural (multi-species) farming	ŽŪM	Agriculture	Encourage farmers to develop multicultural (multi-species) farming. Give priority to operators with a multimodal farming approach and/or other incentives in RDP investment measures	2022-2030
PR47-P: Effective water use for irrigation in agriculture	ŽŪM	Agriculture	Promote the introduction of efficient irrigation systems (e.g. based on drip irrigation) in the agricultural sector, thus saving water resources	2021-2029
PR48-P – Development of green infrastructure in urbanised environments	Municipalities	Public health	Building high-quality and multifunctional green spaces (providing a wide range of ecosystem services), other elements of green infrastructure in the most vulnerable areas of cities and towns due to the effects of climate change, as well as residential personal health facilities, pre-school and school education, old people	2021-2030

			institutional care institutions. Develop green infrastructure elements according to demand and benefits on a scale from building to suburban level	
PR49-P – Installation of water columns	Municipalities	Public health	Installation of fountains and other water facilities to cool down and replenish water supplies in the most sensitive areas for heat	2021-2030
PR50-P – Improvement of phenological observations, pollen observations and prediction systems	Am (LHMT), SAM, Šiauliai University	Public health	Update the network of phenological observations, pollen monitoring and forecasting by 2030	2021-2030
PR51-P: promoting the prevention of diseases caused by ticks	The SAM and its subordinate bodies	Public health	Subsidise vaccines against ticks at least for the most vulnerable age groups (children under 18 and people aged 65 and above), inform those who cannot be vaccinated about alternative tick protection options	2021-2030
PR52-P: Enhancing public awareness of climate change and its threats to human health	SAM, AM	Public health	Develop short digital social animation advertising on the changes of climate change and the health threats it poses for television broadcasting and distribution on websites, social media; short promotional texts to be broadcast on public transport and on urban video screens in public spaces; develop large-format information-advertising posters to be distributed in waiting pavilions (bus or trolleybus waiting stops)	2021-2030
PR50-P – Preparation of legislation on reducing the impact of climate change threats on public health	SAM, AM, scientific institutions, municipalities	Public health	Establish a Public Health Adaptation Programme	2024-2030
PR50-P. Development of updates of the Hygiene Standards, adapting them to changing climate conditions and protecting human health	The SAM and its subordinate bodies	Public health	Develop amendments to hygiene standards for the most vulnerable groups in order to reduce the impact of climate change threats	2024-2030
PR50-P: Modernising the meteorological alert system for dangerous events	AM (LHMT)	Emergency management	Upgrade the weather forecast and warning system to impact-based warnings by 2025, with alert levels based on planned damage	—

PR50-P: Enhancing warning, information and self-protection of the population	MOI	Emergency situations	Public warning and information infrastructure expansion	2023-2029
PR50-P: Ensure continuous improvement of the	AM (LHMT)	Cross-sectoral objective	Regular hydrometeorological observation systems updating and forecasting	
PR50-P – Participation in international cooperation	AM	Cross-sectoral objective	Continuously involved in adaptation to climate change international cooperation and international in policy-making on adaptation to climate change	
PR50-P: Fostering research for climate change impacts	AM	Cross-sectoral objective	Research to assess the climate the impact of change;	

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Annex 1. Public consultation

1. Working Party on Decarbonisation

The draft updated NECPs have been prepared with the involvement of ministries, institutions, in close consultation with socio-economic partners, associations and the public. The refurbishment process was initiated by the Ministry of Energy and the Environment in autumn 2021, with the aim of making it as inclusive as possible. To this end, 5 working groups on decarbonisation (industry, transport, waste and circular economy, energy and agriculture and forestry) and 3 energy (energy efficiency, internal market and research, innovation and competitiveness) working groups have been set up. The working groups included representatives of different ministries and institutions (designated according to their competences) and socio-economic partners. Meetings were held remotely, public and recorded on the social media of the Ministries of Environment and Energy.

Representatives of interested public groups (public authorities, science, measure, non-governmental organisations, etc.) proposed around 600 measures, from which external experts were selected as the most effective and assessed by agencies and ministries, which were selected for the updated NECPs as the most effective and in line with the strategic objectives.

Date	Name of the working party	Result
22/10/2021	Joint meeting	Kick-off meeting to discuss the process
07/12/2021	Waste and circular economy (I)	The kick-off meeting presented greenhouse gas (GHG) emission reduction targets and the development of a circular economy action plan.
09/12/2021	Agriculture and forestry (I)	During the kick-off meeting, the members of the working group discussed issues related to the accounting of greenhouse gas emissions and the assessment of proposed measures, and discussed the organisation of the work of the working group.
14/12/2021	Transport (I)	The kick-off meeting presented the objectives that the transport sector will pursue in terms of reducing GHG emissions and moving towards more sustainable and environmentally friendly mobility.
21/12/2021	Industry (I)	During the kick-off meeting, the members of the working group discussed issues related to the accounting of greenhouse gas emissions and the assessment of proposed measures, and discussed the organisation of the work of the working group.
06/01/2022	Energy (including buildings) (I)	Presentation of key targets for the renewable energy sector by 2030, covering transport, electricity, cooling and heat and ETS power plants. Areas where there is a need to focus and step up efforts have also been identified.
20 JANUARY 2022	Agriculture and forestry (II)	The meeting presented the national greenhouse gas (GHG) inventories for agriculture and forestry and discussed the future instrument of farm GHG inventories.
25 JANUARY 2022	Industry (II)	The consultants of the Ministry of the Environment presented the assessment of existing measures in the industrial sector in the NECPs: which measures are already being implemented, to what extent they contribute to the socio-economic indicators of the country, whether they have an impact on the circular economy,

		Experts from the Organisation for Economic Co-operation and Development (OECD) presented the project “Reforming all sectors of the Lithuanian economy towards climate neutrality by 2050”, jointly with the European Commission, as well as the initial results of the industrial sector survey and shared good practices in other countries.
27 JANUARY 2022	Agriculture and forestry (III)	The evaluation of existing GHG reduction measures was presented to the members of the Working Group and the sources of financing were discussed by consultants from the Ministry of Environment. OECD experts presented the launch of a new project “Reforming all sectors of the Lithuanian economy towards climate neutrality by 2050”, presented the initial results of the study on the agricultural and forestry sector, but also shared good
01/02/2022	Energy (including buildings) (II)	A building strategy was presented. OECD experts presented the launch of a new project “Reforming all sectors of the Lithuanian economy towards climate neutrality by 2050”, presenting the initial results of the energy sector inquiry, but also sharing best practices from other countries.
03/02/2022	Transport (II)	The consultants of the Ministry of Environment presented the assessment of existing measures in the transport sector in the NECPs. OECD experts presented the project “Reform of all sectors of the Lithuanian economy towards climate neutrality by 2050”, jointly with the European Commission, as well as the initial results of the study on the transport sector and shared good practices in
04/02/2022	Waste and circular economy (II)	The consultants of the Ministry of the Environment presented an assessment of the existing measures in the waste sector in the NECPs: which measures are already being implemented, to what extent they contribute to the socio-economic indicators of the country, whether they have an impact on the circular economy, etc. Presentation of national greenhouse gas (GHG) inventories in
22/02/2022	Transport (III)	Presentation of national greenhouse gas (GHG) inventories in the transport sector Discussion of proposals for possible NECPs measures related to water and air transport.
24/02/2022	Agriculture and forestry (IV)	Presentation of No-till technology, measures of the Lithuanian Strategic Plan for Agriculture and Rural Development 2023-2027, recovery and resilience measures (RRF) and coal farming (Carbon farming) and discussion of proposals submitted by social partners (soil part).
25/02/2022	Waste and circular economy (III)	The management of greenhouse gas emissions from waste water; funding for waste water and waste management; presentation of ongoing NECPs waste sector measures and discussion of social partners’ proposals for possible NECPs measures (waste sorting)
03/03/2022	Industry (III)	Presentation of national greenhouse gas (GHG) accounting in the industrial sector Discussion of proposals for measures for the industrial sector.
10 MARCH 2022	Agriculture and forestry (V)	Presentation of emissions and targets in the livestock sector and report "Application of nitrogen conservation technologies in livestock farms: Investments in the livestock sector, biomethane production capacity, existing NECPs measures and proposals made (livestock farming) were discussed.
15 MARCH 2022	Transport (IV)	The presentation of strategic short-term greenhouse gas emissions from transport, rail and heavy-duty road transport; and

		long-term objectives: Proposals from the social partners and the Ministry of Transport and Communications for the rail transport and heavy road (N2 and N3) transport sectors.
24 MARCH 2022	Joint Meeting of Waste and Circular Economy and Industry Groupings	Presentation and discussion of measures proposed by the Ministry of Economy and Innovation in the field of the circular economy. Presentation by the Lithuanian Innovation Centre on circular industry. Presentation and discussion of measures proposed by the Ministry of the Environment in the field of the
29 MARCH 2022	Transport (V)	GHG emissions from transport, short-term and long-term strategic objectives for the light road transport sector were discussed. Social partners' proposals for the light road transport sector. Proposals by the Ministry of Transport and Communications for the light road (N1 and M1) transport sectors.
31 MARCH 2022	Agriculture and forestry (VI)	The protection of organic soils, extensive livestock farming, agroforestry, sequestration objectives, intestinal fermentation, organic farms were discussed as measures proposed by the social partners to reduce emissions and increase absorption.
06/04/2022	Energy (including buildings) (III)	The consultants of the Ministry of the Environment presented an assessment of the existing measures in the energy sector in the NECPs. Presentation of national GHG inventories in the energy sector. Discussion on the proposed RES measures in the transport
08/04/2022	Joint meeting of DG Waste and Circular Economy and Transport	Presentations on: circular transport; the applicability of green procurement in the context of decarbonisation and circular economy; the implementation of the circular economy from the point of view of producers. Discussion of proposed measures.
12 APRIL 2022	Transport	Presentation of GHG emissions from transport, strategic short- and long-term public and non-motorised transport targets, existing NECPs measures in the field of public and non-motorised transport; proposals from the social partners for the public and non-motorised transport sectors and from the Ministry of Transport and Communications for the public and non-motorised transport sectors.
14/04/2022	Agriculture and forestry (VII)	Overview of the Sixth IPCC report, the Republic of Lithuania's strategic objectives and the measures proposed by the social partners. Presentations: The Biomass4LIFE project "Circular Economy Model for Large Cities – Water Sludge and Biomass ash – Biomass4LIFE" and "Artificial Intelligence in Agriculture".
15/04/2022	Waste and the circular economy	Circular construction; the regulation of the construction sector; existing measures and planned actions; a vision for the circular economy in the construction sector; studies assessing the use of construction waste; presentation of the measures proposed by the social partners and discussion of the proposals.
18/04/2022	Joint AM/EIMIN/MOU meeting	Presentations on circular transport; the applicability of green procurement in the context of decarbonisation and circular economy; Presentation by the Lithuanian Association of Automotive Manufacturers and Exporters on the implementation of the circular economy from the perspective of producers.
21/04/2022	Industry	Presentations: Draft concept for implementing R & D and innovation (smart specialisation) priorities; Digital innovation

		centres: Links to the circular economy and decarbonisation; Presentation of the measures proposed by the Ministry of Economy and Innovation
22/04/2022	Waste and the circular economy	Presentations: Circular consumption, concepts, tools and good practices; The contribution of sociology to the promotion of sustainable consumption; How to empower sustainable consumption? TEXTALE: model of circular fashion (re-)sale
26/04/2022	Agriculture and forestry	The role of forests in the GIFCM sector: accounting and Climate Mitigation Presentation Proposals for updating the NECPs and discussion.
28/04/2022	Joint meeting	Presentations: Short food supply chains through regional development; 'Idea Live' means a farm run by a community-based garden; Reducing food waste; Actions by the Ministry of Agriculture to reduce food waste; Combating food waste: Discussion between the social partners.
02/05/2022	Energy (including buildings) (IV)	Presentation by the Lithuanian Ministry of Energy of the "Producement Package" and discussion of proposals for the inclusion of new measures.
12/05/2022	Energy (including buildings) (V)	The transformation of district heating, government priorities and social partners' proposals in this area were discussed.
19/05/2022	Agriculture and forestry	Presentation of the projections and effects of existing policy measures (EPP), the list of candidate measures and the next steps in the process. Welcome by the Swedish Embassy and presentation by Fossil free Sweden on the agricultural compass in their country.
24/05/2022	Waste and the circular economy	A forecast of greenhouse gas emissions from the waste sector in the context of existing policy measures; presentation of the list of candidates for waste and circular economy measures and the next
25/05/2022	Industry	Presentation of projections of industrial GHG emissions from existing policy measures, list of candidate measures and next steps in the process.
01/06/2022	Transport	Presentation of the list of candidate vehicles and the next steps in the process.
06/06/2022	Energy (including buildings)	Presentation of the projections of greenhouse gas emissions from the energy sector under existing policy measures, the list of candidate measures and the next steps in the process.
08/09/2022	Agriculture and forestry	Presentation of the list of planned NECPs measures.
15/09/2022	Agriculture and forestry	Presentation of the list of forestry measures planned in the NECPs.
16/09/2022	Waste and the circular economy	Presentation of an indicative list of measures for the decarbonisation of the waste and circular economy sector and a list of planned NECPs measures, as well as a draft of the 2030 efficiency and potential and circular economy action plan.
11/10/2022	Energy (including buildings)/OECD	The members of the working group participated in a sectoral seminar organised by the OECD and the EC to present the results of the project "Reforming the transition of Lithuanian economic sectors towards a climate-neutral economy by 2050".

13/10/2022	Agriculture and forestry/OECD	The members of the working group participated in a sectoral seminar organised by the OECD and the EC to present the results of the project "Reforming the transition of Lithuanian economic sectors towards a climate-neutral economy by 2050".
18/10/2022	Industry/OECD	The members of the working group participated in a sectoral seminar organised by the OECD and the EC to present the results of the project "Reforming the transition of Lithuanian economic sectors towards a climate-neutral economy by 2050".
20/10/2022	Transport/OECD	The members of the working group participated in a sectoral seminar organised by the OECD and the EC to present the results of the project "Reforming the transition of Lithuanian economic sectors towards a climate-neutral economy by 2050".
19/06/2023	Transport/EUKI	Measures in the transport sector in the updated NECPs were presented and discussed how these measures could/should be implemented. The event will also include a presentation of the EUKI project "Applying best practices in passenger transport policy".

2. Energy Working Party

During the update of the NECPs, the Ministry of Energy of the Republic of Lithuania set up three separate energy working groups (energy efficiency, energy security, internal market and research, innovation and competitiveness) to consult on the measures of the updated NECPs.

Date	Name of the working party	Result
13/05/2022	Energy efficiency (I)	The meeting presented the objectives for the building sector, discusses existing measures in the NECPs, presents proposed additional measures, comments, comments and suggestions for measures in the building sector.
18/05/2022	Energy efficiency (II)	During the meeting, industry objectives were presented, existing NECPs measures were discussed, proposed additional measures were presented, comments, comments and suggestions for industrial measures were presented.
18/05/2022	Research, innovation and competitiveness (I)	The meeting presented the objectives for the innovation and competitiveness sector, discusses existing measures in the NECPs, presents proposed additional measures, comments, comments and suggestions on measures in the sector of innovation and
25/05/2022	Energy efficiency (III)	The meeting presented the objectives for the transport sector, discusses existing measures in the NECPs, presents proposed additional measures, comments, comments and suggestions for measures in the transport sector.
02/06/2022	Research, innovation and competitiveness (II)	The meeting presented the objectives for research and funding, discusses existing measures in the NECPs, presents proposed additional measures, comments, comments and suggestions on research and funding instruments.
14/06/2022	Internal energy market (I)	The meeting presented targets for the energy poverty sector, discusses existing measures in the NECPs, presents proposed additional measures, comments, comments and suggestions on measures in the energy poverty sector.
16/06/2022	Internal energy market (II)	The meeting presented the objectives for the district heating (DC) sector, discusses existing measures in the NECPs, presents proposed additional measures, comments, comments and suggestions for measures in the DH sector.

21/06/2022	Internal energy market (III)	The meeting presented the objectives for the electricity/gas sector, discusses existing measures in the NECPs, presents proposed additional measures, comments, comments and suggestions for measures in the electricity/gas sector.

3. Other measures/events involving the public

Climate change week

The Ministry of the Environment organises a Climate Week every year, starting in 2019, to bring the most pressing climate change issues to the attention of the public, business and other stakeholders. Every year, a growing number of bodies, institutions, businesses, non-governmental organisations and communities are involved in the events.

The Climate Week 2021 closing event "Code Red |: does the climate crisis move from paraquots to centre?" was dedicated to launching an update of the NECPs and a meeting for the Decarbonisation Working Groups.

The 2022 Climate Week hosted the National Climate Change Conference on "Climate Change and Cities: will flowering meadows help shaving streets?" with the participation of representatives of municipalities, scientific and research institutions, social partners and others interested in this topical topic.

The conference learns interesting facts about the impact of climate change on cities, hears how Lithuania's climate will change in the future, and what measures will help adapt and implement the principles of a climate-neutral lifestyle and mitigate the negative effects of climate change.

Event "Updating the NECPs: presentation of an analysis of existing measures in the energy components'.

The event on 23 March 2022 presented an analysis of the existing instruments for the energy parts of the NECPs (energy efficiency, energy security, internal market and research, innovation and competitiveness). The event brought together social partners, consultants, members of the energy parts of the NECPs, representatives of the Ministry of Energy and representatives of the Lithuanian Energy Agency.

Conference "Climate-neutral Lithuania: mission 2050"

On 24 April 2023, a conference was held to present the results of the Organisation for Economic Co-operation and Development (OECD) review on "Reform of Lithuania's economic sectors towards a climate-neutral economy by 2050".

At the conference, OECD experts provided recommendations on the path and measures that Lithuania should take to achieve the decarbonisation targets, how this will affect our country and what opportunities Lithuania is developing for a climate-neutral economic model.

The event also included a discussion with representatives of the public sector, business, the public and economists. Taking into account the OECD's assessment of climate neutrality by 2050 and the recommendations made, Lithuania's progress already made and challenges ahead were discussed. The theme of the discussion is "CO_2 taxation in the context of current prices".

ANNEX 2:

List of parameters and variables to be included in Section B of the national plan: Scenario of existing policies and measures

All green highlighted parameters and variables are currently required by existing legislation (MMR, RES Directive or Energy Efficiency Directive)

All energy-related parameters and variables highlighted in red may need to rely on additional measures than standard energy system models

All orange variables correspond to indicators to be calculated on the basis of parameters and variables already present elsewhere in the Excel case.

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
1. General parameters and variables [units]																		
1	Population [million]	3322528	3097282	2904910	2796025	2788725	2777864	2760875	2737607	2707915	2680733	2653915	2627448	2601326	2575553	2452313	2339698	Official statistics portal
2	GDP [million EUR]	29247	31006	37346	43362	45505	46023	46542	47060	47579	48301	49023	49745	50467	51189	54153	57962	The Commission recommendations
3	Sectoral gross value added (including main industrial, construction, services, and agriculture sectors) [euro million]																	
	Agriculture																	
	Construction																	
	Services																	
	Energy																	
	Industry																	
4	Number of households [thousands]				1290264	1287448	1284711	1281964	1279187	1276370	1273495	1270557	1267557	1264511	1261445	1246924	1237787	
5	Household size				2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	
6	Disposable income of households [EUR/a]																	
7	Number of passenger-kilometres: all modes of transport, i.e. road (number of kilometres of cars and buses separately if possible), rail, air and inland navigation (if applicable) are reported separately [million passenger-																	
	Public road transport	3691	2695	2746	1631	1533	2327	2909	2940	2971	2987	3003	3010	3018	3018	NO	NO	
	Private cars	34793	32569	24865	39272	40268	41751	42879	43836	44816	45589	46296	46942	47611	48393	42501	38103	average mileage of passenger cars multiplied by 2 (average number
	Motorbikes																	
	Rail transport	428	373	361	234	287	381	NO	NO	NO	NO	NO	NO	NO	708	NO	814	
	Aviation	1099	1967	1469	250	1161	1601	NO	NO	NO	NO	NO	NO	NO	2742	NO	3318	Including
	Inland navigation	3	4	3	68	5	5	5	5	5	5	5	5	5	5	5	5	
8	Freight transport in tonne-kilometres																	
	Lorries	2137	2292	2913	3995	3862	3961	4091	4221	4350	4479	4609	4739	4868	4997	NO	NO	Internal transport
	Rail transport	12457	13431	14036	15865	14566	7375	NO	NO	8856	8912	9120	9360	9635	8815	NO	8815	
	Inland navigation	1	4	1	1	4	1	1	1	1	1	1	1	1	1	1	1	
9	International oil, gas and coal fuel import prices [EUR/GJ or euro/toe] based on the Commission's																	
	Oil																	
	Gas																	
	Coal																	
10	EU-ETS carbon price [EUR/EUA] based on the Commission's recommendations	NO	14	8	27	29	31	32	34	36	38	39	41	43	45	54	54	No. The trend of World Energy Outlook is used. It is not possible to
11	Exchange rates to EUR and to USD (where applicable) assumptions																	
12	Number of Heating Degree Days				3885	3882	3878	3875	3872	3869	3865	3862	3859	3856	3853	3840	3827	No change in
13	Number of Cooling Degree Days																	We do not have cooling degree
14	Technology cost assumptions used in modelling for main relevant																	
2. Energy balances and indicators																		

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
	2.1. Energy supply																	The supply side is not included in the
1	Indigenous Production by fuel type (all energy products that are produced in significant quantities) [ktoe]																	
	Solid substances				14.5	17.3	21.7	21.5	21.3	21.1	20.9	20.7	20.4	20.2	20.0	19.2	18.5	Peat
	Oil																	Petroleum products
	Of natural gas				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Nuclear				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Renewable energy sources				1520.6	1653.9	1793.7	2025.9	2258.9	2600.7	2855.5	3266.7	3890.8	4017.3	4088.7	4071.0	4040.6	
2	2) Net imports by fuel type (including electricity; net imports from EU countries and net imports from non-EU																	
	Solid substances																	
	Oil																	
	From natural gas																	
	Electricity																	
3	Import dependency from third																	
4	Main sources of energy carrier imports																	
	Main party to purchase electricity																	
	Main country 1 (please specify here)																	
	Main country 2 (please specify here)																	
	Main country 3 (please specify here)																	
5	5) Gross inland consumption by fuel source (including solid fuels, all energy products: coal, crude oil and petroleum products, natural gas, nuclear energy, electricity, secondary																	Gross domestic costs (primary energy production, + recycled products, + imports
	Solid substances																	
	Oil																	
	Of natural gas	2477	2492	2068	1972	1877	1282	0	0	0	0	0	0	0	0	0	0	https://osp.stat.gov.lt/statistiniu-indicator-analysis#/DG total internal costs (until 2022) are not modelled in the CMS model.
	Nuclear																	
	Electricity																	
	Forms of renewable energy																	
	Other																	
	2.2. Electricity and heat																	
1	Gross electricity generation [GWh]				485.4	473.2	551.7	697.8	881.5	1169.1	1362.3	1731.4	2311.1	2394.0	2424.4	2497.0	2524.0	Only from RES
2	Gross electricity generation by fuel (all energy products) [GWh]																	
	Atomic energy				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Solid substances																	
	Oil (including refinery gas)																	
	Gas (including derived gases)																	
	Biomass waste																	
	Hydro (excluding suction)				25.8	33.0	29.7	29.7	29.7	29.7	29.7	29.7	29.7	29.7	29.7	29.7	29.7	
	Wind				133.4	117.1	179.1	272.8	356.3	491.3	668.5	1034.3	1611.6	1691.9	1719.5	1792.0	1819.6	
	Sun				11.1	16.4	35.4	59.8	157.8	310.4	326.4	329.7	332.0	334.7	337.5	337.5	337.5	
	Geothermal and other renewable				51.1	58.8	58.3	86.2	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5	
	Other fuels (hydrogen, methanol)																	
3	Share of combined heat and power generation in total electricity and heat generation [%]																	
	Share of heat from cogeneration in total heat (share of CHP heat divided by total heat produced for district heating)																	
4	Capacity electricity generation by source, including retirements and new																	The model contains only some RES
	Atomic energy				0	0	0	0	0	0	0	0	0	0	0	0	0	

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
	Solid substances																	
	Oil (including refinery gas)																	
	Gas (including derived gases)																	
	Biomass waste																	
	Hydro (excluding suction)				877	877	877	877	877	877	877	877	877	877	877	877	877	
	Wind				540	671	779	1153	1486	2024	2731	4189	5999	6319	6429	6749	6859	
	Sun				164	255	422	714	1883	3702	3893	3932	3960	3991	4024	4024	4024	
	Geothermal and other renewable				51	59	58	86	89	89	89	89	89	89	89	89	89	Biofuels and RES
	Other fuels (hydrogen, methanol)																	
5	Heat generation from thermal power																	
6	Heat from CHP plants, including industrial waste heat																	
7	Cross-border interconnection capacities for gas and electricity [Definition for electricity in line with outcome of ongoing discussions on basis for 15 % interconnection target]																	
2.3. Transformation sector																		
1	Fuel inputs to thermal power generation (including solids, oil, gas)				1187.7	1373.0	1204.5	1224.8	1222.7	1221.8	1220.5	1219.6	1218.1	1216.7	1214.8	1214.8	1214.8	
	Solid substances				723.1	908.1	817.1	912.0	927.8	927.8	943.3	947.1	953.0	958.8	966.5	966.5	966.5	
	Oil				16.7	17.6	16.7	16.7	16.	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	Petroleum products
	Gas				392.2	387.3	314.9	240.4	222.5	221.7	204.9	200.0	192.8	185.5	175.8	175.8	175.8	
2	Fuel inputs to other conversion				55.7	60.0	55.7	55.7	55.	55.7	55.7	55.7	55.7	55.7	55.7	55.7	55.7	
2.4. Energy consumption																		
1	Primary and final energy consumption				6442.6	6908.5	6966.6	6953.8	6977.9	6945.4	6919.6	6899.5	6874.2	6837.5	6774.6	6346.1	6151.1	
1	Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and				5339.5	5725.6	5773.7	5763.1	5783.1	5756.2	5734.8	5718.1	5697.1	5666.7	5614.6	5259.5	5097.9	
2	Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and																	
	Industry				981.3	1066.5	1062.9	1073.6	1086.0	1081.8	1087.4	1099.2	1113.9	1134.2	1159.3	1147.6	1144.0	
	Residential				1433.9	1630.3	1499.8	1508.4	1529.6	1547.6	1565.2	1591.8	1620.2	1649.9	1680.5	1628.0	1599.9	
	Tertiary				576.0	646.8	632.9	631.6	633.4	638.4	644.0	649.9	655.8	662.3	668.9	666.6	664.2	
	Transport	1438	1551	1844	2190.4	2216.2	2423.8	2397.8	2382.8	2337.2	2287.2	2226.2	2156.2	2069.1	1954.5	1685.2	1556.1	
	Other				157.9	165.8	154.4	151.7	151.4	151.2	151.0	151.0	151.0	151.2	151.4	132.1	133.7	
	By transport activity, if possible																	
	Passengers																	
	(B)Freight transportation																	
3	Final energy consumption by fuel (all energy products) [ktoe]																	
	Solid substances				133.3	158.6	166.7	165.8	164.7	130.6	118.5	117.6	116.5	115.6	114.5	113.0	112.0	
	Oil				2090.3	2090.9	2309.4	2264.2	2218.3	2142.8	2063.0	1963.4	1856.3	1732.6	1585.9	1340.2	1203.6	Petroleum products
	Gas				560.7	624.2	559.9	551.0	538.4	525.7	511.6	506.9	502.9	496.0	497.2	521.0	545.0	
	Electricity				890.5	959.3	957.7	995.6	1040.0	1094.9	1145.3	1201.7	1263.3	1333.3	1411.6	1413.0	1441.0	
	Heat				737.3	893.2	801.1	795.8	790.1	779.4	773.3	770.8	769.2	768.8	768.4	766.0	765.0	
	Forms of renewable energy				804.0	872.3	886.6	916.3	974.5	1023.6	1080.7	1130.5	1177.0	1226.5	1266.1	1174.6	1130.8	
	Other				129.7	133.9	101.7	98.7	100.3	117.7	117.1	117.6	118.1	118.3	115.6	114.0	113.0	
4	Final non-energy consumption [ktoe]																	
5	Primary energy intensity of the overall economy (primary energy consumption per GDP [toe/euro]																	
6	Final energy intensity by sector (including industry, residential, tertiary and transport (including split between passenger and freight transport, when																	
	Industry																	
	Residential																	
	Tertiary																	
	Passengers																	
	(B)Freight transportation																	
2.5. Prices																		
1	Electricity prices by type of using sector (residential, industry, tertiary)																	

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
	Residential																	
	Industry																	
	Tertiary																	
2	National retail fuel prices (including taxes, per source and sector)																	
	Diesel																	
	Industry																	
	Households																	
	Private transport																	
	Transport public																	
	Petrol																	
	Private transport																	
	Transport public																	
	Natural gas																	
	Industry																	
	Households																	
2.6. Investments																		
	Energy-related costs of the economy as																	
	Energy-related investments for																	
2.7. Renewable energy																		
1	Gross final consumption of energy from renewable sources and share of renewable energy in gross final energy consumption and by sector (electricity, heating and cooling, transport) and by																	
	RES gross final energy consumption				27.4 %	28.1 %	30.0 %	33.9 %	37.7 %	43.7 %	48.1 %	55.5 %	66.4 %	69.0 %	70.9 %	75.7 %	76.4 %	
	RES-Hiluma fraction				50.2 %	48.6 %	53.3 %	56.6 %	58.1 %	60.4 %	62.5 %	64.1 %	65.2 %	66.3 %	67.5 %	73.7 %	73.7 %	
	RES-E				20.2 %	20.9 %	30.8 %	43.5 %	58.3 %	80.1 %	92.3 %	115.7 %	150.1 %	148.5 %	139.1 %	135.0 %	133.1 %	
	RES-T part				5.5	6.7 %	6.2 %	7.0 %	8.1 %	9.3 %	10.9 %	13.6 %	15.9 %	18.3 %	20.9 %	24.1 %	29.8 %	
	(final consumption of renewable energy in transport as a contribution to																	
	Contribution of biofuels and biogas produced from feedstocks listed in Part																	
	Contribution from biofuels and biogas produced from feedstock listed in part																	
	Contribution of other biofuels used in																	
	Total final RES consumption for				1198.4	1301.1	1334.9	1404.2	1429.9	1466.5	1502.1	1515.1	1533.5	1552.8	1573.6	1526.4	1506.9	
	Gross final electricity consumption				219.3	226.0	309.6	455.4	638.7	925.1	1117.5	1486.1	2064.7	2147.4	2177.7	2257.9	2264.9	
	Gross final consumption of energy from renewable sources in transport				104.1	128.2	151.3	169.1	195.8	220.2	255.2	297.7	340.8	376.1	409.4	386.8	394.9	
	Total RES end-use				1520.6	1653.9	1793.7	2025.9	2258.9	2600.7	2855.5	3266.7	3890.8	4017.3	4088.7	4071.0	4040.6	
	Total consumption for heating and				2375.1	2670.3	2502.6	2479.4	2460.5	2426.5	2404.6	2362.1	2351.5	2340.8	2332.4	2045.0	2011.2	
	Share of non-waste heat and cold in gross final consumption for heating																	
	Total final RES consumption from district heating and cooling																	
	RES share of district heating and cooling in gross final heating and																	
	Total consumption of waste from district heating and cooling																	
	Share of heating and cooling used in district heating and cooling in gross final consumption for heating and																	
2	renewable energy sources; this shall include, where available, disaggregated data on energy produced, consumed and injected into the grid by solar photovoltaic systems, solar thermal systems, biomass, heat pumps, geothermal systems, as well as all other decentralised renewables																	
3	Where applicable, other national trajectories, including long-term and sectoral trajectories, the share of food-based biofuels and advanced biofuels, the share of renewable energy in district heating, as well as renewable energy produced by cities and energy																	

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
3. GHG emissions and removals related indicators																		
1	GHG emissions by policy sector (EU ETS, effort sharing and LULUCF)	**22669104**	**20857787**	**20371732**	**20173653**	**20427203**	**20713714**	**20333883**	**19929571**	**19645502**	**19119655**	**18520465**	**18109289**	**17170606**	**16569564**	**15516597**	**14875023**	Total excluding
	Emissions from the ETS sector (from 2013; ETS open-ended + EMS aviation coverage, including departing	9689595	7921274	6872794	6128505	5992562	6029433	6148321	6168327	6236677	6202420	6061671	6138526	5727913	5698116	5682365	5661627	
	Total greenhouse gas emissions in the sector (scope valid 2021-30)	13062124	12851223	13371184	14338416	14448995	14898137	14482256	14057928	13705499	13213900	12755449	12267408	11739328	11168074	10130761	9509830	
	LULUCF (accounting in accordance with the requirements of EU	NA	NA	NA	NA	−6342244.94	−6134705.41	−6020093.82	−5871783.15	−5384900.66	−5846633	−5534072	−5977763	−6239441	−6457669	−6453612	−6277561	Accounted for under the LULUCF Regulation. No
2	GHG emissions by IPCC sector and by gas (where relevant, split into EU ETS and effort sharing sectors) [tCO2eq]	***GHG emissions by IPCC sector and gas are reported in the Excel template (a separate file) used for reporting under Commission Implementing Regulation (EU) 2018/1999 (latest submission in 2023).***																
3	Carbon Intensity of the overall economy [tCO2eq/GDP]	**869**	**750**	**607**	**323**	**310**	**317**	**308**	**299**	**289**	**278**	**264**	**254**	**234**	**220**	**193**	**173**	
4	CO2 emission indicators																	
a	GHG intensity of domestic power and heat generation [tCO2eq/MWh]	**NO**	**NO**	**NO**	**0.09**	**NO**	**NO**	**NO**	**NO**	**0.05**	**NO**	**NO**	**NO**	**NO**	**0.03**	**0.03**	**0.03**	Greenhouse gases from electricity and heat production
b	GHG intensity of final energy consumption by sector [tCO2eq/toe]	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	Greenhouse gas emissions from the combustion of fuels other than the
	Industry	NO	NO	1.21	1.20	NO	NO	NO	NO	1.01	NO	NO	NO	NO	0.78	0.77	0.76	Data on combustion of fuels in industry
	Residential	NO	NO	0.56	0.61	NO	NO	NO	NO	0.57	NO	NO	NO	NO	0.50	0.51	0.51	
	Tertiary	NO	NO	0.50	0.48	NO	NO	NO	NO	0.49	NO	NO	NO	NO	0.46	0.43	0.40	Data on combustion of fuels in commercial/instituti
	Passengers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	(B)Freight transportation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
5	Emission parameters for other (non-																	
a	Farmed animals: dairy cattle [1000 heads], non-dairy cattle [1000 heads], sheep [1000 heads], pig [1000 heads],																	
	of dairy cattle	425	367	307	237	229	225	224	222	217	211	204	198	192	186	178	171	
	non-dairy cattle	395	406	434	408	400	411	412	408	410	410	409	410	410	409	405	401	
	pig	1094	929	701	566	577	544	535	552	544	544	547	545	545	546	531	516	
	sheep	31	66	154	161	139	136	137	137	137	137	137	137	137	137	139	141	
	of which Poultry	8349	10577	9687	10435	8695	8853	8685	8744	8761	8730	8745	8745	8740	8743	8831	8918	
b	Nitrogen input from application of	119	143	168	199	183	184	184	184	184	185	185	185	185	185	180	173	
C	Nitrogen input from application of	34	33	35	32	30	31	31	32	32	29	29	29	28	28	28	29	
D	Nitrogen stored by nitrogen fixing crops [kt nitrogen] 21.12.2018 L 328/56 Official Journal of the	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	
e	Nitrogen in crop residues returned to	36	41	79	87	72	77	79	76	77	77	77	77	77	77	77	77	
F	Area of cultivated organic soils	117981	125852	126198	132189	133901	136350	140598	143269	146111	144513	140985	137241	135040	139159	138296	134918	
g	Municipal solid waste (MSW)	1287370	1252620	1299998	1349947	1385883	1387341	1381376	1367805	1346453	1333873	1321735	1310021	1298726	1287853	1222099	1193027	
H	Municipal solid waste (MSW) going to	109874	1085163	702127	207352	207882	192686	176510	159577	142125	125977	110144	94613	79367	64393	61105	59652	
I	Share of CH4 recovery in total CH4	0.00	2.9 %	15.0 %	16.4 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	

List of parameters and variables to be included in Section B of the national plan: Planned policies and measures scenario

All green highlighted parameters and variables are currently required by existing legislation (MMR, RES Directive or Energy Efficiency Directive)

All energy-related parameters and variables highlighted in red may need to rely on additional measures than standard energy system models

All orange 1 the marked variables correspond to the indicators to be calculated on the basis of parameters and variables already existing in others: Excel at the locations of

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
1. General parameters and variables [units]																		
1	Population [million]	3322528	3097282	2904910	2796025	2788725	2777864	2760875	2737607	2707915	2680733	2653915	2627448	2601326	2575553	2452313	2339698	Official Statistics Portal
2	GDP [million EUR]	29247	31006	37346	43362	45505	46023	46542	47060	47579	48301	49023	49745	50467	51189	54153	57962	Guidance by the European Commission
3	Sectoral gross value added (including main industrial, construction, services, and agriculture sectors) [euro million]																	
	Agriculture																	
	Construction																	
	Services																	
	Energy																	
	Industry																	
4	Number of households [thousands]				129026	128744	128471	1281964	127918	127637	127349	127055	126755	126451	1261445	1246924	1237787	
5	Household size [inhabitants/households]				2.1	2.1	2.1	2.16	2.1	2.1	2.1	2.1	2.1	2.16	2.16	2.1	2.1	
6	Disposable income of households [EUR] (pure)																	
7	Number of passenger-kilometres: all modes of transport, i.e. road (number of kilometres of cars and buses separately if possible), rail, air and inland navigation (if applicable) are reported separately [million passenger-kilometres]																	
	Public road transport	369	269	274	163	153	232	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Private cars	3479	3256	2486	3927	4026	4175	42683	4340	4475	4537	4520	4587	4664	47262	40660	3598	average mileage of passenger cars multiplied by 2 (average number of passengers)
	Motorbikes																	
	Rail transport	42	37	36	23	28	38	NO	NO	NO	NO	NO	NO	NO	708	NO	814	
	Aviation	109	196	146	25	116	160	NO	NO	NO	NO	NO	NO	NO	2742	NO	331	Including international
	Inland navigation	3	4	3	6	5	5	5	5	5	5	5	5	5	5	5	5	
8	Freight transport in tonne-kilometres																	
	Lorries	213	229	291	399	386	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Internal transport
	Rail transport	1245	1343	1403	1586	1456	737	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
	Inland navigation	1	4	1	1	4	4	11	NO	NO	NO	NO	NO	NO	NO	NO	NO	
9	International oil, gas and coal fuel import prices [EUR/GJ or euro/toe] based on the Commission's recommendations																	
	Oil																	
	Gas																	
	Coal																	
10	EU-ETS carbon price [EUR/EUA] based on the Commission's recommendations	NO	14	187	22	29	31	32	34	36	38	39	41	43	45	54	54	No. The trend of World Energy Outlook is used. It is not possible to predict after 2035.
11	Exchange rates to EUR and to USD (where applicable) assumptions																	
12	Number of Heating Degree Days (HDD)				388	388	387	3875	387	3869	3865	3862	3859	3856	3853	384	382	No change in degrees
13	Number of Cooling Degree Days (CDD)																	We do not have cooling degree days, we do not use them.
14	Technology cost assumptions used in modelling for main relevant																	
2. Energy balances and indicators																		
2.1. Energy supply																		The supply side is not included in the model
1	Indigenous Production by fuel type (all energy products that are produced in significant quantities) [ktoe]																	
	Solid substances				14.	17.	21.	21.5	21.	21.	19.	14.	14.	14.5	14.4	13.	13.	Peat
	Oil																	Petroleum products
	Of natural gas				0.0	0.0	0.0	0.	0.	0.	0.	0.0	0.	0.0	0.0	0.0	0.0	
	Nuclear				0.0	0.0	0.0	0.	0.	0.	0.	0.0	0.	0.0	0.0	0.0	0.0	
	Renewable energy sources				1520.	1857.	2016.	2267.8	2568.	2947.0	3253.1	3695.9	4349.	4498.9	4572.3	4551.3	4561.3	
2	Net imports by fuel type (including electricity; net imports from EU countries and net imports from non-EU countries are reported separately) [ktoe																	
	Solid substances																	
	Oil																	
	From natural gas																	
	Electricity																	
3	Import dependency from third countries [%]																	

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
4	**Main sources of energy carrier imports**																	
	Main party to purchase electricity (please specify here)																	
	Main country 1 (please specify here) country of origin of gas purchase																	
	Main country 2 (please specify here) country of origin of gas purchase																	
	Main country 3 (please specify here) country of origin of gas purchase																	
5	**Gross inland consumption by fuel source (including solid fuels, all energy products: coal, crude oil and petroleum products, natural gas, nuclear energy, electricity, secondary heat, renewables, waste) [ktoe]**																	**Gross domestic costs (primary energy production, + recycled products, + imports, – exports) are not included in the model**
	Solid substances																	
	Oil																	
	Of natural gas	247.7	249.2	206.8	197.2	187.7	128.2	0	0	0	0	0	0	0	0	0	0	https://osp.stat.gov.lt/statisti the CMS model is not simulated in the new indicator-
	Nuclear																	
	Electricity																	
	Forms of renewable energy																	
	Other																	
2.2. Electricity and heat																		
1	**Gross electricity generation [GWh]**				219.3	231.0	309.6	455.4	665.6	966.8	1174.9	1558.1	2151.4	2244.3	2275.4	2366.0	2407.1	**From RES only**
2	**Gross electricity generation by fuel (all energy products) [GWh]**																	
	Atomic energy																	
	Solid substances																	
	Oil (including refinery gas)																	
	Gas (including derived gases)																	
	Biomass waste																	
	Hydro (excluding suction)				25.	33.	29.	29.7	29.	29.	29.7	29.7	29.	29.	29.	29.	29.	
	Wind				117	117	179	272.	356.	491.	668.5	1034.3	1611.	1691.	1719.	1799.	1827	
	Sun				11.	21.	35.	59.8	184.	350.	380.3	397.0	412	424.4	427	438	453.	
	Geothermal and other renewable energy				51.	58.	58.	86.2	88.	89.	92.1	93.2	94.	95.	96.	96.	96.	
	Other fuels (hydrogen, methanol)																	
3	**Share of combined heat and power generation in total electricity and heat generation [%]**																	
	Share of heat from cogeneration in total heat (share of CHP heat divided by total heat produced for district heating)																	
4	**Capacity electricity generation by source, including retirements and new investment [MW]**																	**The model does not have a common capability/power**
	Atomic energy				0	0	0	0	0	0	0	0	0	0	0	0	0	
	Solid substances																	
	Oil (including refinery gas)																	
	Gas (including derived gases)																	
	Biomass waste																	
	Hydro (excluding suction)				877	877	877	877	877	877	877	877	877	877	877	877	877	
	Wind				540	671	779	115	148	2024	2731	4189	599	631	642	674	685	
	Sun				164	255	422	714	220	4184	4535	4735	492	506	509	521	537	
	Geothermal and other renewable energy				5	5	5	86	89	90	92	93	94	96	97	97	97	**Biofuels and RES wastes**
	Other fuels (hydrogen, methanol)																	
5	**Heat generation from thermal power**																	
6	Heat from CHP plants, including industrial waste heat																	
7	**Interconnection capacity [the electricity interconnection capacity shall be defined on the basis of the outcome of the ongoing discussions on the basis of the 15 % interconnection target] and its expected utilisation rate**																	
2.3. Transformation sector																		
1	**Fuel inputs to thermal power generation (including solids, oil, gas) [ktoe]**				1211.7	1398.4	1228.5	1248.8	1246.3	1247.8	1247.5	1247.6	1247.2	1247.0	1245.0	1245.0	1245.0	
	Solid substances				741.	930.	835.	930.	946.	955.	975.4	983.8	994.	1004.	1012.	1012.	1012.	
	Oil				16.	17.	16.	16.7	16.	16.	16.7	16.7	16.	16.	16.	16.	16.	**Petroleum products (liquid)**
	Gas				429.	425.	351.	277.	259.	251.	231.4	223.1	212.	201.9	192.	192.	192.	
2	**Fuel inputs to other conversion processes [ktoe]**				24.0	25.4	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
2.4. Energy consumption																		

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
1	**Primary and final energy consumption [ktoe]**				6442.6	6908.5	6955.9	6951.7	6913.8	6821.0	6731.3	6617.78	6579.7	6509.0	6452.8	6062.4	5931.4	
1	**Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and freight transport, when available)) [ktoe]**				5339.5	5725.6	5764.9	5761.4	5730.0	5653.0	5578.7	5484.62	5453.1	5395.3	5347.7	5024.8	4915.8	
2	**Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and freight transport, when available)) [ktoe]**																	
	Industry				981.	1066	1062	1070	1071.	1060.	1059.	1083.7	1107.	1119.	1172.	1152.	1148.	
	Residential				1433	1630	1499	1503	1514.	1531.	1538.	1554.9	1577.	1601.	1625.	1573.	1545.	
	Tertiary				576.	646.	632.	632.	633.	638.	641.	642.	648.	654.	660.	698.	736.	
	Transport	143	155	184	2190	2216	2414	2403	2360.	2272.	2188.	2053.1	1970.	1869.	1738.	1469.	1353.	
	Other				157.	165.	154.	151.	151.	150.	150.	150.	150.	150.	150.	130.	132.	
	By transport activity, if possible																	
	Passengers																	
	(B)Freight transportation																	
3	**Final energy consumption by fuel (all energy products) [ktoe]**																	
	Solid substances				133.3	158.6	166.7	165.8	160.	125.	113.	112.	111.	110.	109.	109.	107.	
	Oil				1948.	1956.	2164.	2123.	2062.	1954.	1849.	1679.2	1565.	1435.	1280.	1028.	884.	**Petroleum products**
	Gas				702.	758.	705.	687.	669.	645.	625.	585.2	566.	550.	536.	573.	609.	
	Electricity				890.	959.	957.	995.	1042.	1098.	1152.	1270.2	1350.	1421.	1535.	1590.	1671.	
	Heat				737.	893.	801.	791.	774.	763.	746.	733.8	726.	720.	713.	711.	709.	
	Forms of renewable energy				804.	872.	886.	923.	967.	1015.	1067.	1115.6	1162.	1210.	1250.	1149.	1129.	
	Other				129.	133.	101.	98.	100.	115.	111.	107.2	108.	108.	106.	104.	101.	
4	**Final non-energy consumption [ktoe]**																	
5	**Primary energy intensity of the overall economy (primary energy consumption per GDP [toe/euro]**																	
6	**Final energy intensity by sector (including industry, residential, tertiary and transport (including split between passenger and freight transport, when available))**																	
	Industry																	
	Residential																	
	Tertiary																	
	Passengers																	
	(B)Freight transportation																	
2.5. Prices																		
1	**Electricity prices by type of using sector (residential, industry, tertiary)**																	
	Residential																	
	Industry																	
	Tertiary																	
2	**National retail fuel prices (including taxes, per source and sector) [euro/ktoe]**																	
	Diesel																	
	Industry																	
	Households																	
	Private transport																	
	Transport public																	
	Petrol																	
	Private transport																	
	Transport public																	
	Natural gas																	
	Industry																	
	Households																	
2.6. Investments																		
	Energy-related costs of the economy as a whole																	
	Energy-related investments for industry																	
2.7. Renewable energy																		
1	**Gross final consumption of energy from renewable sources and share of renewable energy in gross final energy consumption and by sector (electricity, heating and cooling, transport) and by technology**																	
	RES gross final energy consumption				27.4%	28.1%	32.5%	36.6%	41.4%	47.9%	53.1%	61.0 %	71.8%	74.7%	76%	86.3%	88.1%	
	RES-Hiluma fraction				50.2	48.6	55.6	60.0	61.8	64.5	67.0	69.5 %	71.1	72.6	74	74.6	74.9	
	RES-E				20.2	20.9	30.8	43.5	60.6	83.4	96.5	116.9 %	154.2	151.7	145	139.5	134.9	
	RES-T part				5.50	6.69	6.82	7.73	9.04	10.40	12.31	14.80 %	17.58	20.33	24	26.50	33.40	

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
	(final consumption of renewable energy in transport as a contribution to the overall target)																	
	Contribution of biofuels and biogas produced from feedstocks listed in Part A of Annex IX and used for transport																	
	Contribution from biofuels and biogas produced from feedstock listed in part B of Annex IX and used for transport																	
	Contribution of other biofuels used in transport																	
	Total final RES consumption for heating and cooling				1198	1301	1335	1422	1447	1487	1523	1538	1559	1579	1601	1543	1522	
	Gross final electricity consumption from RES				219.3	231.0	309.6	455.4	665.6	966.8	1174.9	1558.1	2151.4	2244.3	2275.4	2366.0	2407.1	
	Gross final consumption of energy from renewable sources in transport				104.1	128.2	151.3	169.1	195.1	217.5	252.4	299.9	339.0	376.6	406.0	402.9	520.5	
	Total RES end-use				1521.6	1660.2	1795.4	2046.7	2307.1	2671.1	2950.3	3396.2	4049.7	4200.3	4282.8	4312.5	4449.1	
	Total consumption for heating and cooling				2286.6	2545.3	2399.4	2371.2	2342.4	2306.5	2272.3	2213.7	2193.8	2175.5	2159.6	2094.9	2063.9	
	Share of non-waste heat and cold in gross final consumption for heating and cooling																	
	Total final RES consumption from district heating and cooling																	
	RES share of district heating and cooling in gross final heating and cooling consumption																	
	Total consumption of waste from district heating and cooling																	
	Share of heating and cooling used in district heating and cooling in gross final consumption for heating and cooling																	
2	**Renewable electricity and heat production in buildings; disaggregated data shall be provided, where available, on the amount of energy produced by solar photovoltaic systems, solar thermal systems, biomass systems, heat pumps, geothermal systems and all other decentralised renewable energy systems consumed and delivered**																	
3	**including long-term and sectoral trajectories, percentage of food-based biofuels and advanced biofuels, share of renewable energy in district heating and renewable energy produced by cities and energy communities**																	
3. Indicators related to GHG emissions; and																		
1	**GHG emissions by policy sector (EU ETS, effort sharing and FISH)**	**22669104**	**20857787**	**20371732**	**20173653**	**20426848**	**20697745**	**20272024**	**19719665**	**19246423**	**18595755**	**17587080**	**17095585**	**16072240**	**15403279**	**14325705**	**13635344**	**Total excluding FISH**
	Emissions from the ETS sector (from 2013: ETS open-ended + EMS aviation coverage, including departing flights)	9688595	7921274	6928277	6128505	5992561	6029416	6131370	6133888	6160054	6101369	5827503	5868473	5424588	5368758	5343382	5322638	
	Total greenhouse gas emissions in the sector (scope valid 2021-30)	13062124	12851223	13371184	14338416	14448641	14882188	14437347	13882477	13383065	12792899	12056266	11523794	10944331	10331201	9278907	8609202	
	LULUCF (accounting in accordance with the requirements of EU legislation)	NA	NA	NA	NA	−6343133	−6135593	−6016969	−5883153	−5590747	−6065985	−5762781	−6209192	−6479153	−6705848	−6718217	−6530471	Accounted for under the LULUCF Regulation, No (EU) 2018/841
2	**GHG emissions by IPCC sector and by gas (where relevant, split into EU ETS and effort sharing sectors) [tCO2eq]**	***GHG emissions by IPCC sector and gas are reported in the Excel template (a separate file) used for reporting under Commission Implementing Regulation (EU) 2018/1999 (latest submission in 2023).***																
3	**Carbon Intensity of the overall economy [tCO2eq/GDP]**	**869**	**750**	**607**	**323**	**310**	**306**	**304**	**294**	**283**	**270**	**248**	**237**	**216**	**201**	**175**	**155**	
4	**CO2 emission indicators**																	
a	**GHG intensity of domestic power and heat generation [tCO2eq/MWh]**	**NO**	**NO**	**NO**	**0.09**	**NO**	**NO**	**NO**	**NO**	**0.05**	**NO**	**NO**	**NO**	**NO**	**0.03**	**0.02**	**0.02**	**Greenhouse gases from electricity and heat production**
b	**GHG intensity of final energy consumption by sector [tCO2eq/toe]**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**Greenhouse gas emissions from the combustion of fuels other than the energy industry.**
	Industry	NO	NO	1.21	1.20	NO	NO	NO	NO	0.97	NO	NO	NO	NO	0.58	0.58	0.57	Data on combustion of fuels in industry and construction
	Residential	NO	NO	0.56	0.61	NO	NO	NO	NO	0.57	NO	NO	NO	NO	0.52	0.52	0.52	
	Tertiary	NO	NO	0.50	0.48	NO	NO	NO	NO	0.50	NO	NO	NO	NO	0.43	0.40	0.38	Data on combustion of fuels in commercial/institutions
	Passengers	NO	NO	NO	NO	NO	NO	NO	NO	N	NO	NO	NO	NO	N	NO	NO	

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	Commentary
	(B)Freight transportation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	
5	**Emission parameters for other (non-CO2)**																	
a	**Farmed animals: dairy cattle [1000 heads], non-dairy cattle [1000 heads], sheep [1000 heads], pig [1000 heads], poultry [1000 heads]**																	
	of dairy cattle	42	36	30	23	22	22	22	22	21	211	204	198	192	18	17	17	
	non-dairy cattle	39	40	43	40	40	41	41	40	41	410	409	410	410	40	40	40	
	pig	109	92	70	56	57	54	53	55	54	544	547	545	545	54	53	51	
	sheep	3	6	15	16	13	13	13	13	13	137	137	137	137	13	13	14	
	of which Poultry	834	1057	968	1043	869	8853	8685	874	8761	8730	8745	8745	8740	8743	8831	8918	
b	**Nitrogen input from application of synthetic fertilisers [kt nitrogen]**	119	143	168	199	183	181	179	175	173	171	169	167	165	163	159	153	
C	**Nitrogen input from application of manure [kt nitrogen]**	34	33	35	32	30	31	32	33	34	31	32	32	31	31	31	31	
D	**Nitrogen stored by nitrogen-fixing crops [kt nitrogen] 21.12.2018 L 328/56 European Official Journal of the Union LT**	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	
e	**Nitrogen in crop residues returned to soils [kt nitrogen]**	36	41	79	87	72	77	79	76	77	77	77	77	77	77	77	77	
F	**Area of cultivated organic soils [hectares]**	1179812	125859	1261989	132181	133901	136350	140544	143161	145949	144296	140704	136970	134780	138910	138047	134669	
g	**Municipal solid waste (MSW) generation**	128737	125262	129999	134994	138588	138734	138137	136780	1346453	1333873	1321735	1310021	1298726	1287853	1222099	1193027	
H	**Municipal solid waste (MSW) going to landfills**	1098743	108516	7021272	20735	187094	173418	158859	143619	127913	113379	99130	85151	71430	57953	54995	53686	
I	**Share of CH4 recovery in total CH4 generation from landfills [%]**	0.00	2.9 %	15.0 %	16.4 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	15.0 %	

Annex 3

Description of energy efficiency improvement measures and methodologies implementing Article 7 of the Energy Efficiency Directive 2012/27/EU (Article 8 of the new Energy Efficiency Directive)

In implementing the energy savings requirement of Article 7 of Directive 2012/27/EU (Article 8 of the new Energy Efficiency Directive), Lithuania's binding target for 2030 is 39.3 TWh (338.9 ktoe) of cumulative final energy savings. According to Eurostat, final energy consumption was 5099 ktoe in 2016, 5344 ktoe in 2017 and 5568 ktoe in 2018. Average final energy consumption in Lithuania for these 3 years prior to 1 January 2019 5337 ktoe. The energy efficiency improvement objective will be achieved through the energy efficiency improvement policy measures outlined in section 3.2 of the NECPs.

1. Impact of higher excise duties and taxes on fuel consumption

Type of policy measure: fiscal measure:

Brief description of the measure: The measure promotes a reduction in the consumption of petrol, diesel and liquefied petroleum gas through higher excise duties and taxes than those set by the European Union, which improves energy efficiency.

Duration of the**policy measure: by 2030**at least.

Cumulative and annual forecasted energy savings: In Lithuania, fuel is subject to VAT of 21 %, i.e. 6 percentage points above the EU minimum of 15 %. At present, motor petrol is subject to the following duties only on a fixed basis: a rate of excise duty of EUR 466 per 1000 litres for unleaded petrol and a rate of excise duty of EUR 579,24 per 1000 litres for lead-containing petrol. Diesel is subject to a rate of excise duty of EUR 372 per 1000 litres of product. The rate of excise duty on LPG is EUR 304,10 per tonne. These rates are planned to be increased evenly (diesel will be subject to a rate of excise duty of EUR 410 per 1000 litres from 2024, unleaded petrol from 2024 and diesel will be subject to a fixed part of the excise duty rate of EUR 466 per 1000 litres from 2025 onwards, as well as a fixed part of the excise duty rate of EUR 500 per 1000 litres from 2026) and from 2025 onwards, fuel (petrol, diesel and liquefied petroleum gas) will be subject to an annual increase in variable excise duty components to be added to the fixed fuel excise duty components:

Table 1. Carbon dioxide component for energy products in 2025-2030.

Energy products	Year 2025	In 2026	EBA:	2028	Year 2029	2030
Petrol, EUR/1000 l	24	48	72	96	120	144
Diesel fuel, EUR/1000 l	26,2	52,4	78,6	104,8	131	157,2
Liquefied petroleum gas, EUR/t	30,6	61,2	91,8	122,4	153	183,6

[1] According to this year's figures, the energy saving target for 2030 is calculated at 39.3 TWh. The latest figures show energy savings of 557,654 ktoe in 2019, 5308,236 ktoe in 2020 and 5660,778 ktoe in 2021.

EU minimum excise duties on motor fuels currently aim to: EUR 359 per 1000 litres for unleaded petrol, EUR 421 per 1000 litres for lead-containing petrol, EUR 330 per 1000 litres for diesel and EUR 125 per 1000 litres for LPG. Thus, an analysis of these figures shows that the excise duties currently applied in Lithuania on petrol, diesel and LPG are higher or significantly higher than the minimum rates of excise duty provided for in the European Union. Taking into account the volume of fuels sold in Lithuania (petrol, diesel and liquefied natural gas) and the elasticity of demand, as well as the experience of other countries (Sweden, Spain, Germany and Estonia) in calculating the impact of energy efficiency improvements on fuel consumption, the revised simulations carried out by the Lithuanian Energy Agency predict that by 2030 higher taxes and excise duties on fuel will lead to cumulative energy savings of 8.66 TWh or about 157 GWh of energy per year.

Implementing authorities: Ministry of Energy, Ministry of Finance, Ministry of Environment.

Target sectors and taxpayer segment: transport sector, natural and legal persons.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Savings will be calculated according to the following methodology, where the calculation of energy tax savings in practice is based on a common equilibrium model. The first stage estimates the difference (change) in the price of the unit of energy resulting from different amounts of taxes:

$$\frac{E_{Tax}P - E_{Æ}Um\ in\ TaxP}{E_{E}UminTaxP} = Ůp$$

where

E_{Taxp}= price per unit of energy (transport fuel) plus corresponding value taxes in Lithuania;
$E_{E\ UMINTAXP\ is}$ the calculated average price per unit of energy (transport fuel) with marginal relevant minimum tax estimates in the European Union;

Δ
P is the tax difference (the effect of the tax) on the unit cost of energy (transport fuels).
In the second stage, the projected energy consumption (transport fuel) is calculated if the appropriate tax estimates have not been applied. The elasticity estimate forms part of this second stage:

$$E_{ACtu\ Alcon} \quad {}^{S}1 + o\ P\ X_{elaccepted} \quad \frac{1}{Ons\,w/o\ tax}$$

where

$E_{ACtualCon\ ir}$ is the actual energy consumption (transport fuel)
$EL_{accepted}$ = estimates of short-term elasticities in the 2020 study “Evaluation of the impact of taxes applied in Lithuania on the consumption of energy and energy resources”;

E_{cons}w/$_{o\ tax}$– Estimated consumption of energy (transport fuels) in the absence of corresponding tax levels.

The third stage calculates energy savings from taxes:

$$E_{c}ons\,w/_{o\ tax} \quad E_{ACtualCons} \quad E_{skv1ngs}$$

where

$E_{skvings}$ – energy savings from a fiscal measure.
Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will verify a statistically significant and representative sample of data.

2. Renovation/modernisation of multi-apartment buildings

Type of policy measure: financial instrument:

Brief description of the measure: The measure encourages the owners of multi-apartment buildings constructed in accordance with the technical construction standards in force until 1993 to renovate (modernise) multi-apartment buildings in order to improve the energy performance of buildings. The Programme for the Renovation of Multi-apartment Buildings provides preferential credits and other statutory State support to owners of apartments and other premises and encourages the implementation of energy-saving measures on the initiative of the owners of apartments and other premises.

Cumulative and annual forecasted energy savings: For the measure for2021-2026, the calculated savings are expected to be 3267 multi-apartment units by the end of 2026, saving around 120 GWh annually and 6.6 TWh by 2030. A total of 7534 multi-apartment buildings are planned to be renovated in the 2024-2030 measure, leading to annual energy savings of approximately 96 GWh and 5.27 TWh by 2030.

Implementing authorities: Ministry of the Environment, Environmental Project Management Agency of the Ministry of the Environment of the Republic of Lithuania.

Target sector: households (multi-apartment residential buildings).

Measure implementation actions (works): The renovation programme formulti-apartment buildings includes the following main measures to improve energy efficiency: renovation/modernisation of heating and/or hot water systems; installation of installations for the production of energy from renewable sources; repair or conversion of the ventilation system; heating of the roof or overlay in the shelter; heating of external walls, caps; glazing of balconies or lotions; replacement of windows; heating of the cellar overlay; renewal of elevators refurbishment of the general-use electrical engineering system and/or lighting system.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of the building's energy performance certificates issued before and after the implementation of the measure. The reduction in energy consumption per square metre will be calculated according to the certificate data. The responsible authorities will calculate the savings for each project and submit the final savings to the authority responsible for verifying the data.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

3. Renovation of public buildings

Type of policy measure: financial instrument:

Brief description of the measure: The measure promotes the improvement of heat and electricity efficiency in public buildings, the reduction of greenhouse gas (CO2) emissions and the compliance of public building infrastructure with hygiene standards. The public building programme sets a basic requirement for the renovation of buildings, i.e. the building must reach at least the energy performance class B of the building after the renovation. The programme to improve the energy efficiency of public buildings shall be financed from the State budget of the Republic of Lithuania, municipal budgets, European Structural Investment Funds, international organisations, private investors and other sources.

Cumulative and annual forecasted energy savings: The central government public buildings measure, implemented between 2021 and 2028,is planned to renovate around 367 000 m² of central government public buildings by 2030 and the municipal public buildings measure implemented in 2021-2024 will renew approximately 86220 in 2 municipal^{public} buildings by 2030. The public building renovation measure, implemented between 2024 and 2030, will renovate around 143 thousand m of^{2} central government public buildings and 363 780 m² of public buildings in 2^{municipalities} by 2030. Under the current legal framework, public buildings must reach a minimum class B or C after refurbishment and, as of 2024, B. The measures for the renovation of central government public buildings in 2021-2028 and for the renovation of municipal public buildings in 2021-2024 will save around 8 GWh of energy each year, bringing energy savings of around 0.44 TWh by 2030. The 2024-2030 public building renovation measure will deliver annual energy savings of around 2.5 GWh and will lead to overall energy savings of around 0.138 TWh by 2030.

Implementing authorities: Ministry of Environment, Ministry of Energy. The Ministry of the Environment is responsible for

municipal public buildings and the Ministry of Energy for central government public buildings).

Target sectors: services sector, municipal and central government public buildings.

Measure implementation actions (works): The energy efficiency improvement programme for public buildings includes the following measures to improve energy efficiency: modernisation of heating/cooling and hot water engineering systems; modernisation or installation of ventilation and/or recuperation systems; roof heating, heating of the outer walls of the building and cap; heating of overways, entrances, outdoor and lab doors; conversion of windows to less heat-capacity windows; heating of the cellar overlay and/or floor, modernisation of the lighting system, modernisation of the boiler room installed in the building and installation of renewable energy sources, renovation of general-use engineering systems.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of the building's energy performance certificates issued before and after the implementation of the measure. The reduction in energy consumption per square metre will be calculated according to the certificate data. The responsible authorities will calculate the savings for each project and submit the final savings to the authority responsible for verifying the data.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

4. Agreements with energy suppliers on consumer education and consulting

Type of policy measure: information tool:

Brief description of the measure: The objective of this measure is to educate and advise consumers on energy-saving measures and solutions that change consumer behaviour and habits in improving energy efficiency. Energy suppliers will ensure the implementation of the scope of consumer education and advice and the measures provided for in the agreements or agreements concluded through others.

Cumulative and annual forecasted energy savings: calculated savings – the average annual savings will be around 50 GWh; 2.77 TWh by 2030.

Target sectors: natural and legal persons, heat, electricity and gas sectors.

Measure implementation actions (works): Education and consultancy agreements provide that energy suppliers may apply established educational and advisory measures, i.e. publication of information on a website, project publicity events, e-mail consultations, online or telephone consultations following a consumer's request, consultations upon arrival at the customer, lending of electricity meters or other measuring equipment, training in the efficient operation of ventilation systems and other rational use of energy, publication of information in the press or printed material.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Savings will be calculated on the basis of an estimation of the estimated savings by means of a survey to determine the reaction of consumers to recommendations, information campaigns, labelling or certification schemes or the use of smart meters. First, the estimated amount of energy savings shall be determined by reference to the average annual energy consumption of the target group of consumers and by an assessment of the type of education and advisory measure. The savings shall be equal to the product of the average annual target energy consumption of the consumer, both for education and the implicit energy savings factor for the advisory measure. Implicit energy saving factors for education and advice have been adopted in accordance with the procedure laid down by law. At a later stage, an assessment of the perceived savings shall be carried out by means of a survey to determine the response of consumers to the educational and advisory measures taken.

Implementing bodies: Ministry of Energy and Energy Suppliers.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

5. PIS allowance for industry

Type of policy measure: financial instrument:

Brief description of the measure: A support mechanism to finance the implementation of energy efficiency improvement measures in all major Lithuanian industrial plants with energy consumption above 1 GWh. Companies will receive compensation for the implementation of energy efficiency improvement measures by recovering 85 % of the public interest service price paid for the consumption of electricity in excess of 1 GWh in the previous calendar year, provided that the recovered funds are earmarked for investments in energy saving measures.

Cumulative and annual forecasted energy savings: Energy savings will be calculated on the basis of the information provided in the audits on savings from energy efficiency improvement measures. The average annual savings are 77 GWh and 4.23 TWh by 2030.

Implementing authorities: Ministry of Energy and UAB Baltpool.

Target sectors: Industrial sector:

Measure implementation actions (works): The measure will require the deployment of all measures identified in the energy audit in transport, technological processes and buildings (introduction of regulatory equipment, modernisation of lighting, installation and renewal of compressed air systems, upgrade of cooling systems, installation of efficient electric motors and other measures).

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of the energy efficiency improvement measures reported in the energy audits, i.e. comparable energy consumption before and after the introduction of the energy efficiency improvement measure.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

6. Energy-saving agreements with state-owned and municipal undertakings

Type of policy measure: Voluntary agreements, regulatory.

Brief description of the measure: Companies will save energy according to the energy levels specified in the energy savings agreements (either by themselves or through others) by applying economically justifiable energy efficiency improvement measures at final energy users' facilities (installations, equipment, transport).

Cumulative and annual forecasted energy savings: The legal entities that have signed the agreements are expected to save 68 GWh each year and will save around 3.75 TWh in total by 2030.

Implementing bodies: Ministry of Energy and State and Municipal Enterprises.

Target sectors: industry, heat, water management, transport, services, utilities, etc.

Measure implementation actions (works): The measure shall deploy energy efficiency improvement measures in transport, technological processes and buildings identified in the energy audit, i.e. retrofitting of lighting, heating and cooling, transport, automation, route optimisation and other various technological equipment, and other energy efficiency improvement measures. Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Savings will be calculated by comparing energy consumption before and after the introduction of the energy efficiency improvement measure. Individual measures may be subject to modulation of savings using engineering estimates of energy savings or measurement of savings, or an estimation of the estimated amount of energy savings.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

7. Transforming boilers into more efficient technologies.

Type of policy measure: financial instrument:

Brief description of the measure: A financial measure to encourage residents to switch inefficient heat production plants to more efficient heat production technologies using renewable energy for heat production. In accordance with the provisions of Article 14(1) of Directive 2012/27/EU of the European Parliament and of the Council, Lithuania's comprehensive assessment of the applicability of high-efficiency cogeneration and efficient district heating and cooling identified the planned policy measure as a high-priority measure in the decentralised household sector in order to achieve the energy efficiency and climate neutrality objectives by transforming the supply of low-efficiency and high-emission fuels. The measure will promote the deployment of heat pumps, representative bio-fuel boilers that meet pollution and energy efficiency requirements and the adaptation of other measures to improve heat energy efficiency.

Cumulative and annual forecasted energy savings: 5000 household boilersare planned to be upgraded annually, leading to at least 139 GWh of final energy savings per year, or 7.62 TWh by 2030.

Implementing authorities: The Ministry of Energy, the Environmental Project Management Agency of the Ministry of the Environment of the Republic of Lithuania, the Lithuanian Energy Agency.

Target sectors: household sector:

Measure implementation actions (works): Inefficient individual boilers will be replaced with more efficient heat generation installations based on the measure. Such installations are biofuel boilers, land-to-water and water-to-water heat pumps with an efficiency (COP) equal to or greater than 3.5 at standard rating conditions (or at outdoor temperature + 7 °C) and air-water heat pumps with an efficiency (COP) of 3,0 or greater at outdoor temperatures of + 7 °C, class 5 according to standard EN 303-5:2012. The class of biofuel boilers and seasonal performance factors shall be specified in the technical documentation of the installations in accordance with Commission Regulation No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated by modulation of savings for each heat production installation in accordance with the methodologies described below and approved by national legislation, assessing the exact technical parameters of each installation.

Methodology for calculating the energy efficiency improvement following the replacement of the biofuel heat production installation:

The demand for primary fuel or energy of every heat generation installation, outdated and new ones individually, expressed in energy equivalent (kgne) is calculated according to the formula:

$$SC_P = \frac{COR}{F \text{ Đ X } N} \text{ X } PKK$$

where
PK_p – Primary fuel/energy demand (kgoe)
RK_K – Required heat production in the household per year (kWh). Calculated according to the formula:
$R\mathring{U}_K = G_{kW} \times {}^{Hh}$, where:

G W - the rated heat output of the installation (Prated, kW) is specified in the technical documentation of the installation in accordance with Commission Regulation No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters or Commission Regulation (EU) 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel boilers or the rated heat output of an old unit taking into account the area of a household (building for which heat is produced by the heat installation) accepting that a 1 kW rated heat output is required to produce a total heat demand of 10 m^2;
H_V £ isthe annual equivalent number of operating hours per year of the installation recommended in Commission Decision 2013/114/EU of 1 March 2013 establishing guidelines for Member States to calculate the share of renewable energy from heat pumps from different technologies in accordance with Article 5 of Directive 2009/28/EC of the European Parliament and of the Council. In view of the climate conditions in Lithuania, they are as follows:

Table 2 — Equivalent number of operating hours per year for heat pumps, hours

Installation	Equivalent installation hours per year, hr
Heat pump air-water, biofuel boiler	1 710
Heat pump ground-to-water, water-to-water	2 470

Đ – Fuel net calorific value (calorific value) for which the equivalent value referred to in Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC:

Table 3. Fuel's net calorific value (calorific value) by type of fuel or energy, kWh.

Primary fuel or energy type	Đ, kWh
Wood (standard 25 % humidity), kg	3,833
Pellets (standard 10 % humidity), kg	4,667
Electricity, kWh	1

N_K is *the* efficiency of the installation producing heating. The efficiency of the new installation is indicated in the technical documentation of the installation. The efficiency of the old inefficient installation is indicated in the technical documentation of the installation or accepted as $N_K = 0,65$.
PKK - The conversion factor of primary fuels or energy into an equivalent unit of energy is specified for the values referred to in Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC:

Table 4. Is the conversion factor of the primary fuel/energy to the equivalent unit of energy by fuel/energy type, kgtoe.

Primary fuel or energy type	PKK, kgne
Wood (standard 25 % humidity), kg	0,33
Pellets (standard 10 % humidity), kg	0,401
Electricity, kWh	0,086

Methodology for calculating the energy efficiency increase in case of replacement of the fossil fuel heat plant:

The demand for primary fuel or energy of every heat generation installation, outdated and new ones individually, expressed in energy equivalent (kgne) is calculated according to the formula:

$$SC_P = \frac{COR}{FT \times N_K} \times PKK$$

where

PK_P – Primary fuel/energy demand (kgoe)

RK_K – Required heat production in the household per year (kWh). Is calculated using the formula $RK_K = G_{kW} \times H_{AL}$ where:
G_{kW} -the rated heat output of the installation (Prated, kW) is specified in the technical documentation of the installation in accordance with Commission Regulation (EU) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters or Commission Regulation (EU) 2015/1189 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel boilers or the rated heat output of an old unit taking into account the household/building area by accepting that a 1 kW rated heat output is required to produce a total heat demand of 10 m^2;
H_V⇦ L is the annual equivalent number of operating hours per year of the installation recommended in Commission Decision 2013/114/EU of 1 March 2013 establishing guidelines for Member States to calculate the share of renewable energy from heat pumps from different technologies in accordance with Article 5 of Directive 2009/28/EC of the European Parliament and of the Council. In view of the climate conditions in Lithuania, they are as follows:

Table 5. Equivalent number of operating hours per year for heat pumps, hours

Installation	**Equivalent installation hours per year, hr**
Air-water heat pump, biofuel boiler, fossil fuel boiler	1 710
Heat pump ground-to-water, water-to-water	2 470

Đ – Fuel net calorific value (calorific value) for which the equivalent value referred to in Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC is adopted (with a maximum and minimum threshold, a mid-value is adopted):

Table 6. Fuel's net calorific value (calorific value) by type of fuel or energy, kWh.

Primary fuel or energy type	**Đ, kWh**
Coal	4,778 TO 8.528
Peat	2,167-3,833
Peat briquettes	4,444 TO 4.667
Domestic fuel oil	11,750
From natural gas	13,10
Wood (standard 25 % humidity), kg	3,833
Pellets (standard 10 % humidity), kg	4,667
Electricity, kWh	1

N_K is *the* efficiency of the installation producing heating. The efficiency of the new installation is indicated in the technical documentation of the installation. The efficiency of the old inefficient installation is indicated in the technical documentation of the installation or in the case of solid fuel boilers, it is accepted that N_K = 0.65 and for other fossil fuel heat plants N_K = 0,9.
PKK - The conversion factor of primary fuels or energy into an equivalent unit of energy referred to in Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (with a maximum and minimum threshold, a middle value shall be adopted):

Table 7: Is the conversion factor of the primary fuel/energy to the equivalent unit of energy by fuel/energy type, kgtoe.

Primary fuel or energy type	***PKK*, kgne**
Coal	0,411-0,733
Peat	0,186-0,330
Peat briquettes	0,382-0,401
Domestic fuel oil	1,010
From natural gas	1,126
Wood (standard 25 % humidity), kg	0,33
Pellets (standard 10 % humidity), kg	0,401
Electricity, kWh	0,086

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

8. Modernisation of indoor heating and hot water systems in buildings ("smart renovation") Type of **policy measure: financial instrument:**

Brief description of the measure: The measure encourages owners of multi-apartment buildings constructed in accordance

with the technical construction standards in force until 1993 to upgrade (modernise) indoor heating and hot water systems. It is planned to reimburse up to 30 % of the investment costs.

Cumulative and annual forecasted energy savings: The estimated savings of the measure implemented in2021-2022 are the refurbishment of 158 heat points and annual savings of 0.55 GWh and 0.03 TWh by 2030. The estimated savings of the measure implemented between 2023 and 2030 are updated on average annually around 290 heat points and annual savings of 3.6 GWh and 0.2 TWh by 2030.

Implementing authorities: The Ministry of Energy and the Environmental Project Management Agency of the Ministry of the Environment of the Republic of Lithuania.

Target sector: households (residential multi-apartment buildings), including households of consumers in energy poverty.

Measure implementation actions (works): The measure provides for the renewal or modernisation of heating and/or hot water systems.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of assumed energy savings, with an estimation of the deemed savings at a later stage.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

9. Implementation of energy efficiency measures by private legal entities according to energy audit reports

Type of policy measure: financial instrument:

Brief description of the measure: It is a financial instrument that will encourage companies to introduce energy efficiency improvement measures identified in the energy audit.

Cumulative and annual forecasted energy savings: Energy savings will be calculated on the basis of the information provided in the audits on savings from energy efficiency improvement measures. The measure is expected to save around 2 GWh per year on average and 0.105 TWh by 2030 on average over the period 2021-2024. The average annual savings of the measure implemented between 2025 and 2030 are expected to be around 0.63 GWh and 0.035 TWh by 2030.

Implementing authorities: The Ministry of Energy and the Environmental Project Management Agency of the Ministry of the Environment of the Republic of Lithuania.

Target sectors: Industry and services.

Measure implementation actions (works): The measure will be able to receive funding for energy overlaps through the introduction of the measures referred to in the energy audit in transport, technological processes and buildings (introduction of regulatory equipment, modernisation of lighting, installation and renewal of compressed air systems, upgrade of cooling systems, installation of efficient electric motors and other measures).

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of the energy efficiency improvement measures reported in the energy audits, i.e. comparable energy consumption before and after the introduction of the energy efficiency improvement measure.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

10. Renovation/modernisation of one or two apartments for natural persons – Type of **policy measure: financial instrument:**

Brief description of the measure: This is a financial incentive for owner-occupied houses to renovate their individual homes. At least the energy performance class B of the house must be achieved.

Cumulative and annual forecasted energy savings: A total of 1600 individual homes will be refurbished in the2021-2022 measure and a total of 65895 individual homes are planned for 0 in 2023-2030. For the 2021-2022 measure, the estimated savings are estimated at around 8 GWh each year and 0.43 TWh by 2030. In the measure implemented between 2023 and 2030, the estimated savings are estimated at around 100 GWh each year and 5.5 TWh by 2030.

Implementing authorities: Ministry of Environment.

Target sector: households:

Measure implementation actions (works): The measure includes the following main measures to improve energy efficiency: renovation/modernisation of heating and/or hot water systems; installation of installations for the production of energy from renewable sources; repair or conversion of the ventilation system; heating of the roof or overlay in the shelter; heating of external walls, caps; glazing of balconies or lotions; replacement of windows; heating of the cellar overlay; refurbishment of the electrical engineering system and/or lighting system.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of the building's energy performance certificates issued before and after the implementation of the measure. The reduction in energy consumption per square metre will be calculated according to the certificate data.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

11. Upgrading street lighting systems

Type of policy measure: financial instrument:

Measure description: Municipalities or their undertakings carrying out projects to modernise urban street lighting systems can benefit fromthis measure. A total of around 69353 luminaires are being replaced and upgraded under the 2021-2023 measure, while a total of around 100 thousand luminaires are planned to be replaced in the period 2024-2030. Municipalities wishing to benefit from the guarantee can implement projects both on their own and through energy-saving service providers (ESCO).

Cumulative and annual forecasted energy savings: The measureis expected to achieve annual energy savings of around 3 GWh between 2021 and 2023 and cumulative electricity savings of around 0.16 TWh by 2030. The measure is expected to achieve annual energy savings of around 2 GWh between 2024 and 2030 and cumulative electricity savings of around 0.1 TWh by 2030.

Implementing authorities: Ministry of Energy, VŠĮ Innovation Agency, UAB Public Investment Development Agency.

Target sectors: Public street lighting infrastructure, electricity sector.

Measure implementation actions (works): The measure will update inefficient lamps, old luminaires, cables, control cabinets and smart light control and fault detection technologies.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and Commission Recommendation (EU) 2019/1658. Energy savings will be calculated on the basis of energy savings in street lighting refurbishment projects. The difference in energy consumption before and after the update of the luminaires will be calculated per 1 kilowatt power.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

12. Improving the technological and energy efficiency of industry through the deployment of artificial intelligence and digital twin technologies.

Type of policy measure: financial instrument:

Brief description of the measure: The measure will be implemented between 2026 and 2030 to increase the level and efficiency of automation of industry. Within the scope of the measure, subsidies will be awarded to deploy digital twin or artificial intelligence solutions for the digitisation of a company's process or part of it. The tool combines fully real-time data-driven company-based decisions in its own right, leading to energy and cost savings; the enabled automatic optimisation of the production line by IoT technology by comparing existing data (parameters) with historical and regularly informed energy efficiency deviations, and by using smart video surveillance solutions to report line mistakes, thereby reducing human labour demand and increasing efficiency; an AI-enabled machine learning algorithm allows for anticipating, containing and preventing potential increases in costs and energy consumption, as well as early identification and prevention of potential energy quality problems, as well as analysing different energy consumption scenarios and implementing Energy 4.0 solutions. The subsidy intensity will be up to 50 %.

Cumulative and annual forecasted energy savings: the measure is planned to save around 0.8 GWh per year and is expected to save 0.04 TWh by 2030.

Implementing authorities: Ministry of Energy and Ministry of Economy and Innovation.

Target sectors: industrial sector:

Measure implementation actions (works): The instrument will provide support to industry to deploy AI and digital technologies that will improve the energy efficiency of industries.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

13. Creation of a legal requirement for companies to implement the measures recommended in energy efficiency audits.

Type of policy measure: regulatory measure:

Brief description of the measure: Within the scope of themeasure, the Law on the improvement of energy efficiency and/or the description of the procedure for energy audits will be supplemented by a provision on the obligation for companies to implement the measures recommended in the energy efficiency audit with an expected payback period of up to 5 years.

Cumulative and annual forecasted energy savings: the measure plans annual energy savings of around 4.7 GWh, with energy savings of 0.26 TWh by 2030.

Implementing authorities: Ministry of Energy.

Target sectors: industry, services.

Measure implementation actions (works): the Law on Energy Efficiency Improvement and/or the Procedure for Energy Audits has beenamended and will be supplemented by an obligation for companies to implement the measures recommended in the Energy Efficiency Audit with an expected payback period of up to 5 years.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

14. Promoting the introduction of internal monitoring systems for energy efficiency in businesses and industry.

Type of policy measure: financial instrument:

Brief description of the measure: It is a financial instrument designed to reduce companies' energy costs. The measure is intended to encourage businesses to start measuring and monitoring their energy waste. This makes it possible to monitor

the evolution of their energy consumption more efficiently than using bills or meters. The measure will be implemented between 2025 and 2030 with an aid intensity of up to 40 %.

Cumulative and annual forecasted energy savings: The measure is expected to save around 4 GWh each year, with energy savings of 0.215 TWh by 2030.

Implementing authorities: Ministry of Energy and Ministry of Economy and Innovation.

Target sectors: industry, services.

Measure implementation actions (works): companies are equipped with internal monitoring systems that will allow them to monitor the evolution of their energy consumption more efficiently than using bills or meters.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

15. Renewal of the urban and suburban public transport vehicle fleet.

Type of policy measure: financial instrument:

Brief description of the measure: Promoting the replacement of pollutingbuses with new zero-emission buses (electricity, hydrogen, biomethane) through financial incentives and the provision of recharging/refuelling infrastructure for them. The final beneficiaries of the measure are municipal enterprises.

Cumulative and annual forecasted energy savings: A total of 800 buses powered by RES areplanned to be procured. This measure will lead to annual energy savings of around 0.393 TWh up to 2030.

Implementing bodies: Ministry of Transport and Municipalities.

Target sector: transport sector (public transport)

Measure implementation actions (works): New electric buses purchased by municipalities.

Methodology for calculating the measure: Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and the energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of the new vehicle per 100 km and multiplied by the average annual distance travelled.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

16. Electrification of railways.

Type of policy measure: financial instrument:

Brief description of the measure: Railway infrastructure upgrade – 814 kilometres of railway lines will be electrified and cover 70 % of rail freight.

Cumulative and annual forecasted energy savings: This measure will save around 61 GWh of energy each year and will save around 3.36 TWh by 2030.

Implementing authorities: Ministryof Transport and Communications.

Target sector: transport sector (public transport)

Measure implementation actions (works): Electrified railways, new electric trains and electric vehicles purchased.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and the energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of the new vehicle per 100 km and multiplied by the

average annual distance travelled.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

17. Implementation of Sustainable Urban Mobility Plans:

Type of policy measure: regulatory measure:

Brief description of the measure: Implementation of measures in the Sustainable Urban Mobility Plans (SUMPs) that will reduce the use of passenger cars and promote walking, cycling, public transport and the use of alternative fuel vehicles.

Cumulative and annual forecasted energy savings: It is planned that SUMPs will save around 22 GWh each year and will save around 1.2 TWh by 2030.

Implementing authorities: municipalities.

Target sector: transport sector:

Measure implementation actions (works): Measures included in sustainable mobility plans shall beimplemented which will contribute to reducing the use of individual transport and increasing the competitiveness, attractiveness and promotion of alternative modes of transport for users. The main measures identified in the SUMP are the refurbishment of public transport, the development of cycling and walkway infrastructure, the deployment of mobility management systems, and the deployment of alternative fuels infrastructure.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and energy savings will be calculated on the basis of the modal shift in travel distribution between 2018 and 2030 foreseen in the Sustainable Urban Mobility Plans (20 Lithuanian cities (5 major, 4 resorts, 1 resort, 10 medium-sized cities) after the implementation of the measures provided for in the plans. The calculation is based on the number of reduced travel by passenger cars (the reduction in travel is assimilated to the number of passenger cars.

reduction by the same percentage). Assumptions used in the calculations: average diesel cost per 100 km: 7.53 litres; average petrol cost per 100 km: 6,6 litres; average mileage in cities is taken separately from each Sustainable Urban Mobility Plan; the modal distribution of travel by other modes of transport (increasing use of public transport, increase in the number of bicycles and pedestrians) will not have a significant impact on efficiency due to the more efficient use of the existing infrastructure and the unanticipated intensive development.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

18. Renewal of the transport fleet, using green procurement and ensuring minimum procurement targets for transport.

Type of policy measure: regulatory measure:

Brief description of the measure: The measure provides for a change of the legal framework to increase the uptake of zero-emission TA and to reduce the number of conventionally fuelled TA by meeting the minimum procurement targets. The share of zero-emission light-duty vehicles (M1, M2 and N1) in the total fleet is estimated at 100 % in 2030.

Cumulative and annual forecasted energy savings: The measureis planned to deliver annual energy savings of around 9 GWh and energy savings of about 0.521 TWh by 2030.

Implementing authorities: Ministry of Transport, Ministry of Energy, Public Procurement Office, Ministry of Interior.

Target sector: transport sector:

Measure implementation actions (works): Change oflegal framework – transposition of Directive (EU) 2019/1161 of the European Parliament and of the Council of 20 June 2019 amending Directive 2009/33/EC on the promotion of clean and

energy-efficient road transport vehicles.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and the energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of the new vehicle per 100 km and multiplied by the average annual distance travelled. Energy savings will be calculated for the number of vehicles above a specified minimum level.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

19. Promotion of electric vehicles and development of charging infrastructure.

Type of policy measure: financial instrument:

Brief description of the measure: The measure will promote the deployment of 7242 recharging points for public and semi-public electric vehicles by 2030.

Cumulative and annual forecasted energy savings: The measureis planned to deliver annual energy savings of around 27 TWh and around 1.5 TWh by 2030.

Implementing authorities: Ministry of Transport and Communications, Ministry of Energy, Municipalities.

Target sector: transport sector:

Measure implementation actions (works): Promotionof the purchase of electric vehicles, development of charging infrastructure.

Methodology for calculating the energy savings of the**measure:** Energy savings will be calculated in accordance with the requirements of Directive 2012/27/EU and the energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of the new vehicle per 100 km and multiplied by the average annual distance travelled.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to verify a statistically relevant and representative sample of data.

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