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MINISTRY OFENERGYOF THE REPUBLIC OF LITHUANIA

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Ms Ilze Juhansone Secretary-General European Commission

3rd of October 202
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Ms Ditte Juul Jørgensen Director-General for Energy European Commission

MR Kurt Vandenberghe
Director-General for Climate Action European Commission

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

With this letter I would like to delightfully inform You that the final update of the latest notified Integrated National Energy and Climate Plan of the Republic of Lithuania has been prepared and approved by the Government of the Republic of Lithuania. In accordance with the Regulation (EU) 2018/1999[1], the Ministry of Energy of the Republic of Lithuania hereby submitting the final Plan update 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 ofLithuania (https://enmin.lrv.lt/lt/veiklos-sritys-3/neksvp- update).
We look forward to continuing cooperation with the European Commission regarding the implementation of the final Integrated National Energy and Climate Plan update.

Annexes:

1. Final update of the Integrated National Energy and Climate Plan of the Republic of Lithuania, 309 pages.
2. Annex 1 to the final update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 9 pages.
3. Annex 2 to the final update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 10 pages.
4. Annex 3 to the final update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 24 pages.
5. Annex 4 to the final update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 47 pages.

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1 Regulation (EU) 2018/1999of 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 663/2009and (EC) No 715/2009of 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) 2015/652and repealing Regulation (EU) No 525/2013of the European Parliament and of the Council (Text with EEA relevance)

6. Annex 5 to the final update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 28 pages.

7. Annex to the final update of the Integrated National Energy and Climate Action Plan of the Republic of Lithuania, 13 pages.

Yours Sincerely,

Dainos Kreivy

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Minister
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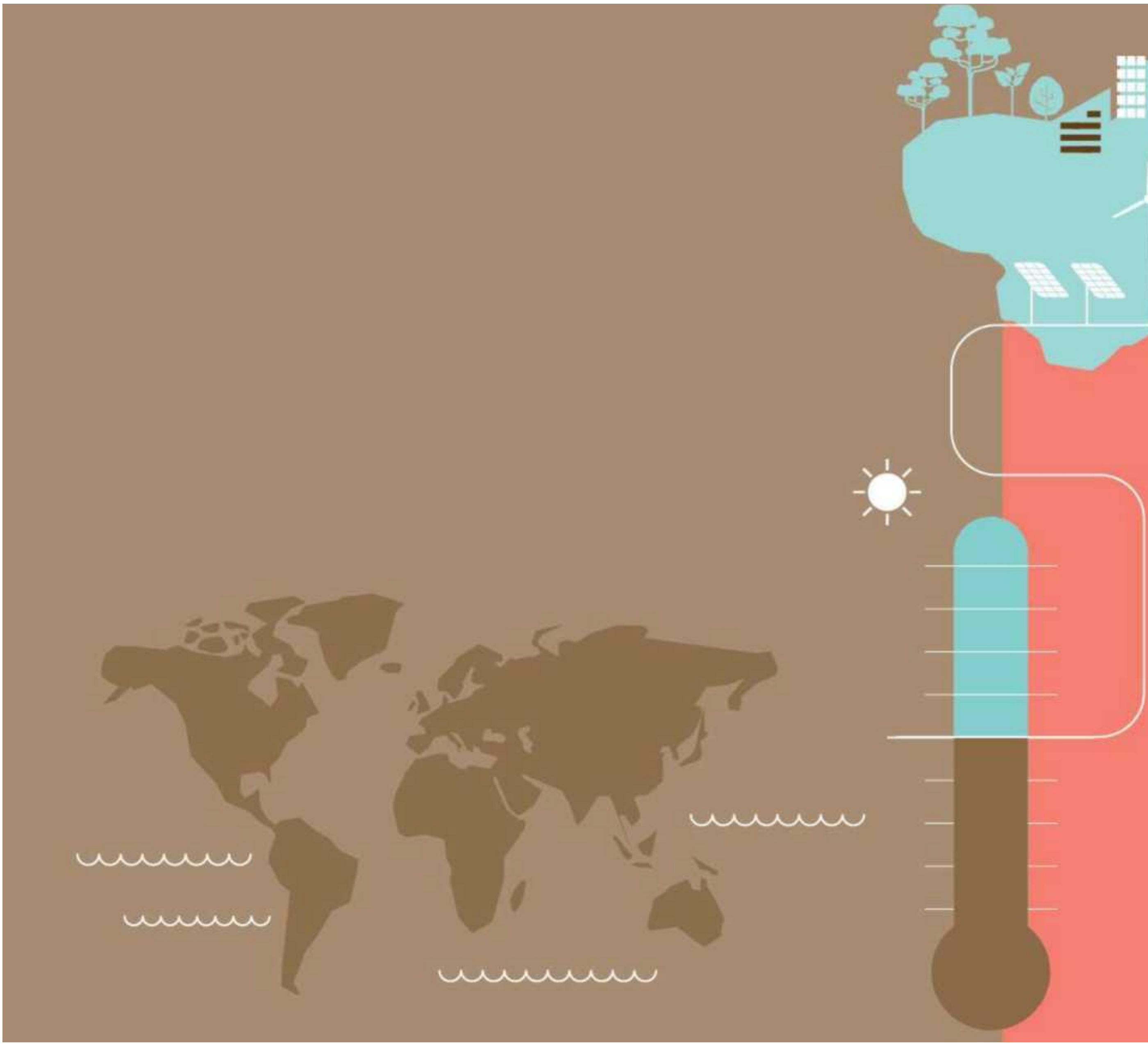
FINAL UPDATED NACIONAL ENERGY AND CLIMATIVEACTION PLAN of the Republic of Lithuania for the period 2021-2030



Abbreviations

ACER	Agency forCooperation 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	TheEmissions Trading System
BEMIP	Baltic energy market interconnection plan
OF GDP	Gross domestic product
CCS	Carbon capture and storage
CCU	Carbon capture and utilisation (CCU)

CCUS	Carbon capture, usage and storage
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	European Investment Bank
EIMIN	Ministry ofEconomy and Innovation
CEF	Connecting Europe Facility
EC	European Commission
ELLI	Project to increase thecapacity of thegas pipelineinterconnection between Latvia and Lithuania
ENMIN	Ministry of Energy
EPP	Existing policies and measures
EU	European Union
FINMIN	Finance Ministry
GAEC	Standardsfor good agricultural and environmental condition
GIPL	Gas interconnection between Poland and Lithuania
GWh	Gigawatt-hour
GWP	Global warming potential
HAE	Pumped-storage power plant
HFCS	Hydrofluorocarbons
HVDC	High -voltage direct current
Ignalina NPP	Ignalina nuclear power plant
IPS/UPS	Electricity transmission network in part of the CIS States and Baltic States
IS	Information systems
IT	Information technology
TEC	continental European Networks

KHAE	Kruonis pumped storage plant
ktoe	1000 tonnes ofoil equivalent
LitPol Link	Electricity interconnection between Lithuania and Poland
LMT	Science Council of Lithuania
LR	Lithuanian Republic
Small energy	Combustion plants up to 20 MW and thesectors usingit (excluding industry and transport), as well as all emissions from combustion of methane and nitrous oxide and fugitive emissions from energy.
TEPI	Research and experimental development and innovation
Mtoe	Million tonnes ofoil equivalent
SMES	Small and medium -sized enterprise
MW	Megawatt
MWh	Megawatt-hour
N/A	Not applicable
N_2O	Nitrous oxide
NECPS	National Energy and Climate Action Plan for2021-2030
NENS	National Energy Independence Strategy
NgCCUS	Carbon Capture, Use and Storage Networks Group
NCCVD	National Climate Change Governance Agenda

NGA	Products ofnational quality
NordBalt	Submarine power cable between Lithuania and Sweden
NOTMP	National Air Pollution Reduction Plan
NOx	Nitrogen oxides
NAP	National Progress Plan
NPPS	Independent heat producers
EIA	Environmental impact assessment
PPP	Planned policies and measures
WHO	Transmission System Operator
REMIT	Regulation on wholesale Energy Market Integrity and Transparency
RGMCG	Regional Gas Market Coordination Group
RRF	Recovery and resilience funds
SAZ	Sanitary protection zones
CNG	Liquefied natural gas
SKF	Social Climate Fund
SCPS	Social Climate Plan
SOx	Sulphur oxides
SP 2023-2027	Lithuania’s Strategic Plan forAgriculture and Rural Development 2023-2027
SPIS	Information system forsocial assistance to the family
DSOS	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-T	Trans-European Transport Network
IPCC	Intergovernmental Panel on Climate Change (IPCC)
TRL	Technology Readiness Level
TWh	Terawatt – hour
MFA	Ministry ofForeign Affairs
GWP	Global warming potential
GFAP	State plan for the prevention and management of waste
UDG	Internal combustion engine
VERT	National Energy Regulation Council
PIS	Public interest services
MOI	Interior Ministry
FNM	Land use, land use change and forestry sector

CONTENTS

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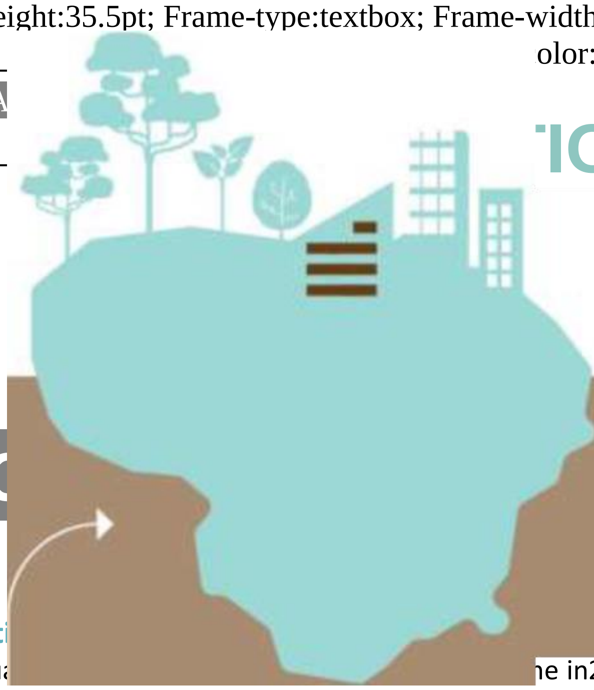
1. UPDA



ION A: NATIONAL PLAN

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Lithua he in2019, aNational Energy and Climate Plan (NECP) for 2021-2030, in line with the requirements[2] set out in the Energy Union Governance Regulation(e). TheNECPs are based on and integrate theprovisions, objectives, targets andmeasuresimplemented and planned in Lithuania's national legislation, international commitments, strategies and other planning documents. In line with the Energy Union Governance Regulation, a draft update NECP was prepared in2023 and submitted to the European Commission (EC) for assessment. Following the recommendations, the NECPs for this versionwere prepared and adopted in2024. This is the only possible update of the NECP for the period 2021-2030. All other ongoing changes are already possible in national legislation without amending the NECP, but without compromising the achievement of its objectives. In 2029, NECPs will be adopted for the next ten -year period 2031-2040.

Key strategy papers integrated in the updated NECPs:

1. Approved by Resolution No XIV-2856 of the Seimas of the Republic of Lithuania of 27 June 2024

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2 Regulation (EU) 2018/1999 of the European Parliament and of the Council of11 December 2018 on theGovernance of theEnergy Union and Climate Action , amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of theEuropean 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) 2015/652and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.

agenda “NationalStrategyfor Energy Independence”[3] (hereinafter referred to as “NENS”);

2. Approved byResolution No XIV-490 of the Seimas of the Republic of Lithuania of30 June 2021 "National Climate Change
the ‘Governance Agenda’[4] (hereinafter referred to as “IPCCMD”);

3. The ‘National Air Pollution Reduction Plan’ (‘ NOMP[5]’)wasupdated on13 July 2024;

4. theupdated NECP is linked to the‘National Progress Plan’[6] (NAP) approved on9 September 2020.

5. ResolutionNo 789 of theGovernment of the Republic of Lithuania of29 September 2021 on theterritory of the Republic ofLithuania
the master plan for the territory of the Republic of Lithuania has been approved.[7]

The purpose of the NAP is to identify the main changes that thecountry is aiming to achieve over the next decade, ensuring progress in social, economic, environmental and security areas. When planning changes, account shall be taken of thedirections ofspatial development of the national territory and the functional priorities for the use of the territory in theGeneral Plan of the Republic ofLithuania and of the reference framework set out therein, thefuture vision and development of theState in the ‘Vision for the future of Lithuania ‘Lithuania 2050’, the National Security Strategy, the United Nations 2030 Agenda forSustainable Development and other international agreements, commitments and European Union (hereinafter referred toas ‘EU’) legislation,andassesses thecurrent situation, therecommendations made by international organisations (the EU, the Organisation for Economic Cooperation andDevelopment (OECD), the International Monetary Fund and other international organisations), new challenges and possibilities forprogress by theState.

National development programmesare being drawn up to implement thechanges envisaged in the NAP. In order to achievecoherence between the two strategic planning documents, thetarget targets for the NAP assessment indicators are directly correlated with the objectives set in the NECPs. The NECPs are relevant to theobjectives set out in the NAPs:

- moving towardssustainable economic developmentbased on scientific knowledge, cutting-edge technologies, innovation and increasing the country’s international competitiveness;
- improving transport, energy and digital internal and external connectivity;
- ensuring good environmental quality andcoherence in theuse of natural resources, protecting biodiversity, mitigating Lithuania’s impact on climate change and increasingresilience to its impacts;
- strengthen national security.

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

The General Plan for the Territory of the Republic of Lithuania lays downguidelines for the implementation of the spatial development of the territory of the Republic of Lithuania, thespatial structure of theterritory of the Republic of Lithuania, the mandatory provisionsfor the use ofnational territory and other relevant solutions for[the]sustainable development ofareas.

a. in theinternational context ofnational integration and competitiveness, including reducing economic, social and regional disparities, providing high-quality and accessible public services,

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3 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.429490/asr
4 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/7eb37fc0db3311eb866fe2e083228059?jfwid=wqwn5j7x7
5 https://www.e-tar.lt/portal/lt/legalAct/56d38a90402011efbdaea558de59136c
6 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/c1259440f7dd11eab72ddb4a109da1b5/asr
7 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/ab6b8b21266f11ec99bbc1b08701c7f8

ensuring thenecessary systemic changes to address thechallenges of the environment and climate change domestically;

b. responsibly consuming, using resources, protecting, embeddingnatural and heritage values, continually building anidentity of anarea, municipality, region, country, a high quality oflife foritself, the family, the community, andsociety, byadopting a holistic approach in society, habits, behavioural models, pushing for state progress, competitiveness, gradual transition to acircular economy, adapting to climate change and building resilience toglobal challenges.

Energy context

The full-scale military invasion of Ukraine by theRussian Federation on24 February 2022 has created an unpredictable geopolitical context and a situation ininternational energy markets. Given that theincrease in energy resource prices already in thesecond half of2021 was largely pronounced by Russia's energy policy and decisions toreduce natural gas exports toEU countries, the assumptions thatRussia usesenergy supplies as atool for policy making, economic impact and blackmailagainst Lithuania and theEU as awhole have been finally confirmed, while energy supplies from the Russian Federation are not predictable, reliable and secure.

Inresponse tosanctionsimposed byEU Member States, the Russian Federation started torestrict natural gas supplies and decided to unilaterally change theterms of previous contracts by requiringpayment in roubles for the supply of natural gas. The latter condition resulted in the Republic of Lithuaniarefusing toimport pipeline natural gas from the Russian Federation since April 2022. SinceJuly 2022, following the adoption by theSeimas of theamendment[8] to the Natural Gas Law,the import ofRussian natural gas into Lithuania, as well as the import of liquefied natural gas through theKlaipėda Liquefied Natural Gas (LNG) terminal,have been banned. As a result,Lithuania completely renounced natural gas imports from the Russian Federation in2022.

In order to reduce Russia's budget revenues from electricity imports, adecisionwas taken inMay 2022 that any electricity imports from the Russian Federation had to be stopped. Moreover, in order to ensure security of electricity supplyand disconnectionfrom the BRELL ring Treaty, theinterconnection of the Baltic States'electricity system for synchronous operation with continental European networks has been brought forward for almost a year and is scheduled for February 2025.Finally, as ofApril 2022 , Lithuaniano longer importsfor its own use oil – oil used at theMažeikiai refinery mainly from Saudi Arabia and Western States.

The NENS excludes the four strategic energy objectives of Lithuania, namelya secure and secure energy supply, 100 % climate-neutral energy for Lithuania and the region, thetransition to an electricity economy and thedevelopment ofa high value-added energy industry and theavailability of energy resources to consumers. These four strands are directly correlated with the key dimensions of the NECPs as outlined in theEnergy Union Governance Regulation: decarbonisation (decarbonisation), energy efficiency, energy security, the internal energy market and research, innovation and competitiveness.

In line with the NENS, Lithuania has set ambitious targets thatwill significantly contribute to theachievement of the Energy Union and the EU's2030 energy and climate targets. Lithuania aimsto have the Baltic States' electricity system ready and operational in synchronously with continental European grids via Poland with a reliable and unified continental European electricity system as ofFebruary 2025 .RES ambitions arecurrently increasing by2030 to reach 55 % ofrenewable energy sources infinal energy consumption (one of the highest ambitions for RES development in theEU),

8 https://www.e-tar.lt/portal/lt/legalAct/TAR.0C5C33AA865C/asr

including 100 % ofelectricity and 90 % ofenergy in district heating. In order to ensure the sustainable development of prosumers, funding willcontinueup to an economically and technically acceptable level ofdevelopment for prosumers. The aim isto have at least 300000 prosumers and active consumers(including community energy actors) by 2030. Theshare of local electricity generation in Lithuania will increase from 35 % to 100 % and Lithuania will becomea leader in energy innovation in the region.

The NENS vision for 2050 is aself-consumption and exporting country witha climate-neutral and high -added energy industry. In line with the objectives of theUnited Nations 2030 Agenda forSustainable Development, the Paris Agreement, theEU's2030 climate and energy policy objectives, Lithuania's energy sector will produce 100 % of itsenergy from zero -emissionsources(low GHGs and ambient air pollutants) in2050, deliverenergy to consumerssafely and at competitive prices, and contribute to the development of the country's modern economy, its competitiveness and attractinginvestment. The sources of energy production will consist of renewable energy sources and technologies that ensure that energy is produced in a non-polluting environment. Consumers will be able toproduce the energy theyneedto meettheir needs.

Industrial context

Theimplementation of theenergy and climate policy framework forindustry by 2030 is a first step towards achieving the climate change management policy objective for2040 and achieving climateneutrality by 2050, as set out in the EU climate legislation. The vision forEuropean industry for2030 focuses on sustainability, energy efficiency, innovation and digitalisation to ensure thatindustry remains competitive in a single EU market and meets its ambitious climate targets in the transformation process towards a climate-neutral economy.

To encourageindustry to become climate neutral, circular and resource-efficient and low-carbon energy and raw materials, industry needs to transform its technologies, products, services and processes. Sectoral connectivity and circularity, power supply technologies are important drivers of this process. Industrial symbiosis and circularity will ensure thereduction ofdemand for primary raw materials, reuse, recycling,reduction ofimport dependency, and increase resilience to crises.

Given thatindustrial transformation is taking place in acontext oflong-term and structural global change and is facing a rapidly changing geopolitical and economic situation, a growing socialand societal polarisation, the increasing role of digitalisation and technology in all aspects of life, as well as climate change and other environmental challenges, it is necessary to focus on global sustainable development goals by promoting investment inresearch and technologies that reduce environmental pollution, improve resource efficiency and develop green products.

It should be noted that by 2030, the most significant reductions in carbon dioxide (CO2) will be achieved by using the technologies currently available. By 2050, climate neutrality and circularity will be facilitated by thedevelopment of new technologiesthat are currently in the experimental, demonstration or prototype development phase. This includes various digital technologies that might foster twinning across all sectors.

The NENS vision for industry by 2050 is anindustrialdecarbonisation course based on the Green Deal Industrial Plan (COM(2023) 2.6.)[9]. A successful transition will allow maintaining a strong industry insectors where it already has trade surpluses, such as wind energy, hydropower and electrolysers, and further increasing domestic production capacity ingrowing batteries, electrified vehicles,heat pumps, solar PV, carbon capture, use and storage (CCUS) and carbon capture and storage (CCS), sustainable biogas and biomethane technologies and other sectors and thecircular economy. Developed strong green and circular industries in Lithuania will help strengthen competitive sustainability, increase business opportunities for businesses, create highly skilled jobs that will underpin the climate transition andguarantee it is socially just and inclusive.

Environmental context

Over the past few decades, Lithuania has achieved hugeenvironmental gains. Lithuaniamore than doubled GHG emissions compared to 1990, with the highestdecrease of58%in theEU - 27,[10]while Lithuania had thethird lowest score for ES in2022 when measuring GHG emissions percapita [11]. It should be noted that these results have been achieved despite the country's economic growth and the positivedownward trends are projected to continue. This paves theway towards a net-zero GHG emissions economy in the future.

Lithuania is also among theleading European countries in calculating the share of domesticGHG removals from the country's forests,with only Sweden, Finland and Romaniadiscarding in theUnion[12]. In 2021, forests absorbed 5.9 MtCO2eq, representing 1/3 of the country 's total GHG emissions.

Despite these strengths, Lithuania is lagging behind EU countries in tax policy. The European Commission estimates that Lithuaniahas alower percentage of gross domestic product (GDP) in environmental taxation(1.9 %). GDP) than the EU average (2.2 % GDP 2021 data). Transport taxes are among the lowest in theEU and Lithuania are among several countries without anannual pollutiontax.[13] Motor vehicles are taxed in Lithuania on the basis of$_{CO2}$ only at the time oftheir registration. Incentives for lower CO2$_{emissions}$ are very limited and only started in 2019 forcompensationpayments for the purchase ofzero-emission vehicles. Lithuania has one of thelowest excise duties on petrol, diesel and other motor fuels in theEU. In2023, theexcise tax policy was revised inline with the recommendations and to address the differentemission factorsof fuels.

Lithuania provides fossil fuel and other environmentally harmful subsidies that could be considered for reform, while ensuring food and energy security and mitigating social consequences. Fossil fuel subsidies amounted to EUR198 million in2021, leaving low- carbon alternatives without demand and support. The European Commission recommends reviewing subsidies such as energy tax relief foragricultural and forestry companies onoil gas, excise and tax relief fornatural gas for industrial consumers, or a lowerCO2tax rate foragricultural gas oils[12].

Social context

Thesocial context of theNECP can be characterised by the energy poverty indicator. According to Eurostat's annualmeasurements of energy poverty indicators, Lithuania is one of theEU countries

9 https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52023DC0062
10 https://ec.europa.eu/eurostat/statistics-explained/index.php/Greenhouse_gas_emission_statistics#Trends_in_greenhouse_gas_emissions
11 https://www.statista.com/statistics/986392/co2-emissions-per-cap-by-country-eu /
12 https://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

mostaffected by energy poverty. Accordingly,existing and plannedmeasures onenergy efficiency, financial support for vulnerable consumers, thecreation ofrenewable communities, an adequate energy price andconsumer education and information will be mobilised toaddress this problem. There are financial incentives for natural persons in need to opt for less polluting means of mobility in order to reduce greenhouse gas emissions in thetransport sector and improve air quality.

The Social Climate Fund (SCF) planwill focus on the most vulnerable groups such ashouseholds,transport consumers, micro- enterprises, who will face an additional burden due to the increase inenergy prices due to theextensionof thenew EU emissions trading system to buildings and road transport and other sectors (ETS2). Thefollowingmeasures will be eligible for funding: building renovation,decarbonisation of heating, cooling, cooking, RES production, storage, support for RES communities, energy communities; connection to district heating systems (‘DH’), energy efficiency solutions,purchase of energy-efficient housing, zero- and low-emission vehicles,cycling, recharging, refuelling and other necessary infrastructure, market development forsecond-hand zero-emission vehicles , promotion of public transport, on-demand, sharing and active mobility. The SCF measures will also be combined with NECP measures that willcontribute to the achievement of climate change objectives.

TheSCF will be implemented between 2026 and 2032. InJune 2024 , theMinistry of theEnvironment (‘the Ministry of the Environment’) set up an interinstitutional working group composed ofrepresentatives of theMinistries of Environment, Energy, Economy andInnovation, Finance,Transport,Social Security and Labour, as well as theGovernmentCentre for Strategic Analysis and the State Data Agency for thepreparation of the Social Climate Plan (SCP). An ECtechnical assistance project has also been initiated to identify vulnerable social groups, assess thesocio-economic impact of ETS2, identify possible SCPs measures for themost vulnerable households, micro -enterprises, and carry out public consultations.

The following energy productsconsumed byhouseholds are covered by ETS2: natural gas, petroleum gas, heating gas oil and coal used forhousing heating, cooking and hot water treatment. 2022 19 % Energy products consumed by Lithuanian households and 93.8 % offuels consumed in road transport fall under the scopeof the ETS2. At a price ofEUR 45/tCO_2, fossil fuel prices may increase byaround EUR 0.07 to EUR 0.22. According to the study of the German Ok Environmental Institute, ‘Putting the ETS 2 and Social Climate Fund to Work’, which analyses the impact of ETS2 on population costs, the average cost increase for theLithuanian population may be around 1.1 %. (0.9 % for transport, 0.2 % for heating). The projected progressive impactof ETS2 on household incomes, i.e. higher-income and fossil fuel-intensive households will pay higher ETS2 contributions. Lower-income households consume relatively lessfuel and fuel (GHG) than higher-income households and thus have alower ETS2 tax base and lower nominal contributions. However, the expected inverse effect of ETS2 also onhouseholds’ total expenditure, i.e. for lower-income households, willresult in a higher percentage of GHG taxation.

Thesocial context of the NECPwas further assessed takinginto account the impact onmacroeconomic indicators such as GDP and jobs, which are detailed in Section 5.2 . The macroeconomic assessment showed that thepackage of planned policies andmeasures presented in the NECPs will have a positive impact on the country’s GDP,contribute to job growth and raise household incomes.

In2022, the Russian Federation, in acontext ofdecliningexports of natural gas to EU Member States, sought tomanipulate the prices of energy resources, inparticular natural gas prices, in an information space, while significantly increasing the prices of both natural gas and electricity on the markets. All this, as well as risingprices ofcrude oiland petroleumproducts due to uncertainty in the global oil market, led to a sharp surge ininflation, both in Lithuania and in other EU Member States. The increase in theprices of goods, especially food, and utilities has had anegative impact on thesocial conditions of thepopulation of all EU Member States.

InSeptember2022 , the Governmentof the Republic of Lithuania approved theNational Energy Savings Plan prepared by the Ministry of Energy, which setthe target of saving20 % over two years. In order to avoid a significant increase in the cost of heat production in thecity of Vilnius, a decision was taken to allow the temporary replacement of natural gas by heavy fuel oil.

Gender equality context

According tothe United Nations, the effects of climate change contribute to increasinginequalities betweenwomen and men. Theproblem mentioned above is particularly acute in regions of the world where womenwork in climate-sensitive jobs, such as agriculture . As a result,women are more affected by climate change. This is due to theunequal distribution of power between women and men, the gender gap in theeducation sector, theburden of unpaidcare work, etc.According toUNICEF[14], up to158.3 millionwomen and girlsmay be in poverty by mid-century inthe worst climate change scenario.[15]

The phenomenon of energy povertymentioned above also has a gender dimension. For example, a2022 Eurofound survey found that theproportion ofwomen whoare late in paying their energy bills increased sharply inspring 2022, while single women and motherswere more likely to face difficulties in paying theirenergy bills .[16] Given the Lithuanian context, many Lithuanians faced difficulties inpaying for energyand heating even before the energy crisis was more pronounced. In 2021, many single mothers (38 %) and single parents (41 %)were unable to keeptheirhomeadequately warm in Lithuania. [17]

In terms of power and decision-making, women are underrepresented in theenergy and transport sectors and in thedecision-making process in the EU. In Lithuania, the number of women employed in the transport and energy sectors is significantly lowerthan that ofmen. In Lithuania,only23 % ofworkers in theenergy sector were women in2022. In addition,women accounted for26 % of theworkforcein the transport sector in 2022. Women are also significantly less represented indecision-making. In2022 , only 29 % ofdecision-makers in parliamentary committeesfocusing on theenvironment and climate change were women.[18]

Headline targets in theNECPs

TheNECPs include national and EU-level targets for Lithuania tocontribute to the achievement of theEU'soverall energy and climate change targets for2030. EU-level targets for the transport sector are presented in addition to themultipliers provided for in Directive 2018/2001, but the energy content indicators in the NECPs are assessed without taking into account the multipliers applied to the transport sector.

Table 1.1.1. National and EU targets for2030

Purpose	EU		Lithuania		Implementation
	2020	2030	2020	2030	2021

14 What does gender equality have to do with climate change? | Climate Promise (undp.org)
15 Tackling gender inequality in a climate-changed world | UNICEF
16 Gender aspects of energy poverty (europa.eu)
17 Lithuania | 2023 | Gender Equality Index | European Institute for Gender Equality (europa.eu)
18 Lithuania | 2023 | Gender Equality Index | European Institute for Gender Equality (europa.eu)

GHG reduction targets under the DohaAmendment to the Kyoto Protocol andthe Paris Agreementin%compared to1990 levels	—20	> 55	—	≥-70	—58

Purpose	EU		Lithuania		Implementation
	2020	2030	2020	2030	2021
GHG reduction targets for the EU ETS sectorsin% compared to2005 levels	—21	—62	EU-level target	EU-level target	—39
GHG reduction targets fornon-EUETS sectors in% compared to2005 levels	—10	—40	+ 15	—21	+ 11
Shareof renewable energy sources in gross final consumption of energy,%	20	42,5	according to Directive 2018/2001, 30 % (according to NENS)	55	29,62 (2022)
Shareof renewable energy sources in gross final consumption of energy in transport, %	10	29 (with multipliers)	10	15,8 (without multipliers)*	6.28 (2022)
Levelof electricity interconnectivity, %	10	15	EU-level target		23 (LT)
Energy efficiency objectives • Primary energy consumption in2030 • Final energy consumption in2030	1124 Mtoe 864 Mtoe	—11.7 % 992.5 Mtoe 763 Mtoe	PEC – 6.6 Mtoe FEC – 5.7 Mtoe	PEC – 5.4 Mtoe FEC – 4.4 Mtoe 39.3 TWh**	PEC – 6.6 Mtoe FEC – 5.7 Mtoe

** Is inline withthe EU target.*
***Total savings target.*

1.2 Overviewof thestate of play ofexisting policies

Energy policy area

In line with itspolicies and measures, Lithuania pursues thefollowing objectives of theEU's energy policy:

- Delivering on theEU's climate and energy policy objectives. Promote a balanceddevelopment of the EU's RES and energy efficiency improvements. The commitments related to local and RES and energy efficiency improvements after 2020 are based on the principle of burden-sharing, ensuring therespective contribution of each EU Member State to the objectives of RES and energy efficiency improvements at EU level by 2030;
- CompletingtheEU's internal energy market. Long-standing isolation from the EU internal energy market and networks, Lithuaniasupports EU infrastructure, regulatory and financial measures for further integration into theEU internal energy market, while benefiting from 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 securityinthe Baltic Sea region. To be achieved assoon as possible implement the provisions of the European Energy Security Strategy and ensure that theresults ofits measures are regularly reviewed at EU level;

- Relevant EU long-term funding programming policy. The aim will be to ensurecontinuityandadequate financing of the EU financial instruments in the area of energy infrastructure and the closure of the Ignalina NPP in order to alleviate thefinancial burden on Lithuanian consumers;
- StrengtheningtheEU's external energy policy. Thestrengthening of the EU'sexternal energy policy, coordinated action by EUMember States and solidarity in theevent ofcrises also strengthen Lithuania'ssecurity and will further enhance the EU's dialogue with key energy suppliers, in particular with the US, Canada, Norway and Australia.

Over the last ten years,Lithuania's energy sector has been substantially restructured in order to reduce and eventually completely eliminate energydependence on Russia, which has led to unreasonably high resource prices and the use of energy as a political influence. The NENS,structural reforms and strategic projects in the energy sector, haveincreased thevariety ofroutes and sources ofenergy supply and reduced the cost ofenergy sources forconsumers.

In light ofthese results and the new EU energy and climate targets for2030 and new trends in the energy sector, in June2024 theParliament approved an updated NEPS, which includes the country'smain energy policy objectives, objectives and orientations up to 2050.

The NENS will maintain thecontinuity of existing policies and policies in theareas of RES and energy efficiency, improve Lithuania's investment attractiveness, implement newzero -emission and climate-resilient technologies, create the conditions for Lithuania to becomeexporters of energy resources, promote innovation in the energy sector, theproduction ofnew energy products and ensure progress in the energy field. Lithuania must become a fully self-sufficient and exporting country from an energysource importing country.

RES

RES development is carried outin accordance with EU and national strategic documents and legislation. The main policies and measures forRES development in each sector arelaid down in the NENS, the NCCVD, the Law onrenewable energy of the Republic of Lithuania andthe Law on alternative fuels of the Republic of Lithuania.

Theshare of RES in gross final energy consumption was 28.1 % in2021 and 29.62 % in2022, mainly due to the increasing shareof RES in the electricity and heat sectors. In2022, the shareof RES in heating and cooling was 51.77%, in electricity generation 25.5 % and in transport it was6.28 %.

Lithuaniareached and exceeded the EU target of23[19] % in2020 already in 2014,when the share of RES in gross final energy consumption was 23.66 %. As a result,Lithuaniatransferredpart of the accumulated surplus in2017 and 2020 to Luxembourg and theBrussels-Capital Region andallocated the resulting funds tofurther RES development and research.

Lithuania plans to reach 55 % by2030. The RES target in final energy consumption. This will be achieved bypromoting decentralisation and community energy, developing RES power plants in land and maritime areas, increasing theproduction and consumption of RES fuels, promoting theelectrification of industry and theproduction of hydrogen and its derivatives, and diversifying the RES used forheat production. In order to successfully integrate higher volumes of renewable energy and a large numberofelectricity prosumers ('prosumers'), investments are envisaged in smart energy systems, including transmission, distribution and storage infrastructure, and inincreasing theamount of required balancing capacity. In order to accelerate thedevelopment of RES in theland areaand to

19 Directive (EU) 2018/2001 of the European Parliament and of the Council of11 December 2018 onthe promotion of the use of energyfrom renewable sources, reference: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02018L2001-20220607

kick -start RES development in the maritimearea,the so-called ‘Provergic Package’ was approved on8 July 2022. The breakthrough package simplifies administrative conditions, improves theinvestment climate for RES developers, while promoting a more favourable public perception of RES development. The package introduced the following substantive changes:

1. For prosumers:
    - the surrender of permits for the development ofgeneration capacity and ofpermits for the production of electricity;
    - increasing thestorage period forprosumers from one to two years (1 April – 31 March);
    - provide for conditions enabling multiple power plants ofprosumers to be categorised as a single item of consumption;
- improve thepricing ofprosumers;
- the restrictionsrelating to the electrical power of the producing customer shall bewaived.
2. Renewable Energy Communities (hereinafter referred to as “AIEBs”):
- provides that any non-profit legal person may obtain AIEB status;
- simplifying the procedures for setting up the AIEB;
- over-claims arewaived;
- it is established that themajority of the AEIB Decision is held by persons present in the county in which the AIEB operates;
- extending the list of AEIB participants and the area in which themajority of AEIBparticipants are located;
    - provisionis made forinforming thepublic (communities) about the procedures for setting up theAEIB, operational possibilities, etc. through a one-stop shop.
3. For hybrid power plants:
    - regulates a completely new business model, which provides for thepossibility to build and connect several RES technologies and storagefacilities at a single connection point;
    - thedevelopmentand operation of hybrid power plants shall be subject to permit-regulated activities. Accordingly, permit -granting requirements,time limits and other necessary processes for the connection of a hybrid power plant to the electricity grid shall be established.
4. For wind turbines:
    - in non-urbanised and non-urbanised areas, the inclusion ofwind turbines inspatial planning documents ismade optional;
    - clear criteria shall beestablished when selecting an environmental impact assessment (EIA), providing that EIA selection is carried out when: (1) 3 windturbines ormore,at least one of which have a height of50 m or more; (2) wind turbines are built closer than 1 km from protected areas;
    - clear criteria shall beestablished when a full EIA is carried out, providing that a full EIA shall be carried out when: (1) 7windturbines or more are under construction; (2) wind turbines are built within5 km or less of wind turbines built, under construction or planned to bebuilt,and (3)wind turbines are to be built in the Lithuanian offshore area;
    - thedesignation and registrationof sanitary protection zones (SAZs) shall bewaived, but anew requirement on socialdistancing (wind power plants shall be installed at[4 x height of theelectric mast] from residentialhouses, kindergartens, schools, etc.) is introduced for the construction ofwind turbines. Accordingly, since thedistance to be introduced is similar to or greater than the current maximum range of SAZs, the scheme provides for more flexible conditions for both wind turbine developers and landowners as regards possible new constructions, clearly defines therequirements forobtaining consent, informing and submitting objections to the construction ofwind turbines.
5. For solar power plants:
- shortening thevalidity periods ofpermits forelectricity development from 36 months to 24 months;
- it is clearly regulated that EIA selection and full EIA for solar power plants are not carried out.
6. Storage facilities:
- thedevelopmentand operation of storage facilities have been identified as activities regulated by permits;
    - sets out the processes and requirements that storage developers mustimplement in order to connect storage facilities to the electricity grids.
7. Biogas plants:

- regulates the provisionsnecessary for the smoothconnection ofbiogas plants to thegas system;
- there are clear responsibilities and requirements for both developers and gas system operators regarding theconnection of biogas production facilities.
- theconditions for theinstallationof medium-sized biogas plants on agricultural land aresimplified.

8. General provisions:
   - allow for theconstruction ofhybrid power plants connected to the distribution grid, solar powerplants, wind power plants and biogas plants onagricultural land, without changing its use, but ensuring that theland can beused according to a defined basic land use and mode;
   - it is envisaged that thecapacityand capacity of the electricity grids shall be reserved from thedate of theconclusion of the letterofintent and the provision of the assurance of obligations, whichshall be increased to EUR 50/kW. These provisions apply to power plants and storage facilities;
   - theconnection ofsolar, windand hybrid power plants to the grid has been determined to assess the capacity of thepower plant to generate. This provision also applies to the connection of prosumer power plants.
   - there is anobligation topay aproduction contribution to producers operating for commercial purposes and operating wind,solar power plants connected to the transmission grid and biogas plants. The production contribution shall be determinedon the basis of theamount ofelectricityproduced duringthe calendar year and supplied to theelectricity grid multiplied by the statutory tax. The production contribution is allocated to projects designed tomeet theneeds ofcommunities or community-based organisations.

Thechanges made in2022 paved the wayforRES development in the maritime area. The Renewable Energy Law provides forprocedures for the organisation oftwo types of tenders:

1. a competition with theopportunity to acquire the right to promotion. If there is no incentive, participants may propose adevelopment fee. Winning participants who haveoffered the minimum amountof promotion or, if the promotionis not intended,the maximum development fee;
2. acall for tenders in which participants compete for the possibility ofusing thearea for the development of renewable power plants by proposing adevelopment fee. The tendererofferingthe highest development fee will win. The minimum initial amount of the development fee is EUR5 million, withan increase ofat least EUR 5 million.

In order to make it possible to connect the twowindfarms to be developed in Lithuania'smaritime area to the onshore grids, acapacity of1.4 GW isreserved for the two wind farms in Lithuania's maritime area and the possibility ofconnecting them at theDarbėnai substation.

Energy efficiency

One of Lithuania's top priorities in thefield of energy is improving energy efficiency along the energy chain,from energy production to energy consumption at final consumers. Energy efficiency becomes particularly relevant in a context of high energy prices, which require rapid national responses and encourage thedevelopmentand implementation ofnew energy efficiency measures, energy efficiency also improves thefinancial standing of the public, improves business competitiveness, reduces GHG and ambient air pollutant emissions and improves ambient air quality. The aim will be tomake the improvement of energy efficiency an integral part ofeveryday life, both within businesses and at the level of end-users. In order to achieve theobjective, therenovationof inefficient residential and public buildings, the improvement ofconsumer education and the improvement of theenergy efficiency performance ofcompanies are expected to continue. New measures are also envisagedto increase thetechnologicaland energy efficiency of industrial enterprises through theintroduction of AI and digital twin technologies and to create a legal requirement for companies to implement themeasures recommended in energy efficiency audits in order to achieve energy efficiency outcomes.

On theother hand,it is important to note the improvement in Lithuania'senergy productivity indicator (gross energy efficiency indicator), which shows thecountry's energy efficiency and makes it possible todistinguish between energy consumption andthe country*'s economic growth*(decoupling). In2021, Lithuania had the highest score among the Baltic countries, as well as a better score than neighbouring Poland, reaching EUR 5.12/kgoe (EUaverage energy productivity: EUR 8.54/kgoe).

Industrial policy area

Over the past decades, Lithuania'sindustrial sector, as well as Europe as a whole,has achieved significant results in terms ofenergy efficiency and climate change. These positive developments stem from aresponsible sectoral approach to environmental requirements and a more efficientuse of energy resources. Theindustry'soverall ambition to move away from high pollution andmore polluting production methods and, of course, thevoluntary participation ofcompanies in various environmental initiatives is also strongly influenced. Althoughsignificantimprovements are observed in the industrial sector, it remains one of themost important

economic componentsresponsible for significant environmental pollution and waste generation.

Industry plays a crucial economic and social role: productsare produced, jobs are created, and the relevant taxes contribute to the public budget. Despite these benefits, however, there are also significant negative consequences for theindustrial sector. This is because the largest industrial installations account for theshare of major air pollutants and GHG emissions. Equally significant and negative impacts on other environmental components, including water and soil pollution, waste generation and energy consumption.

In Lithuania,industries suchas ammonia, nitricacid and cement are the largestemitters of GHG emissions. And one of the most dangerous sources ofpollution in the industrial sector is thecombustion process, whichleads to the growth ofcarbon oxides in the atmosphere. For example, the production of cement, i.e. the heating of calcium carbonate,releases not only lime, but also a significant amount of CO_2 into the atmosphere. The global cement industry is estimated toaccountfor around 5 %of total artificial CO_2 emissions .

Accordingto 2022 data, Lithuania is the fourthlargest environmental polluter across the country inindustry and product use. According tothe 2022 National GHG inventory, theindustry sector is responsible for12 % oftotal GHG emissions per year.

Welcomes the fact that the country's total GHGemissions in theindustrial sectorare decreasing every year (15 % in 2020), mainlydriven by thedevelopment and deployment ofnew, moreenvironmentally friendly technologies.

In order tocontribute to climate change mitigation, theindustrial sector issuccessfully investing in initiatives for the use of alternative, sustainable and renewable energy sources such as solar, geothermal, wind energy and biofuels, as well as thelaunch in2024 of aproject on thedeployment ofhydrogen technologies in the chemical sector, which should become flagship projects not only in Lithuania but also in the European Union.

Industrial activities and long-term development arebased on the principles of sustainable development, and climate change policy objectives are implemented through themost efficientmeasures selected on the basis of a cost -benefit analysis. Since 2022, following the adoption of theProgressMeasure No05 -001-01-04-02 of theDevelopment Programme forEconomic Transformation and Competitiveness 2022-2030 'Incentivising thetransition ofenterprises towards a climate-neutral economy',Lithuania[20] has directed its activities towards a climate-neutral economy

20 https://www.e-tar.lt/portal/lt/legalAct/8e51896000f111ed8fa7d02a65c371ad/asr

and provides targeted financial support to promote thetransformation ofindustrial enterprises (change of clean technologies,deployment of energy efficiency measures), development ofnew technologies and products, use ofRES. According toapplications received and contracts signed by Q3-2024, these projects are fully expected toreduce GHG emissions from Lithuanian industry by129 thousandtonnes per year, representing around 5.7 %of total industrial GHG emissions. It is also planned that Lithuanian industry will generate and save628 GWh of energy per year using energy efficiency technologies, i.e. themeasures will reduce19.3 % ofthe total grid electricity demand in industry.

Transport

In the transport sector,fuel and energy consumption increased by 45 % between 2010 and2023, while theconsumption of petroleum products increased by 43 % since 2010,representing 93 % oftotal fuelconsumption in thetransport sector in 2023 . Road transport, public transport fleets and freight transport are still dominated by diesel vehicles.

Theshare of RES in transport increased from 3.63 %. To6.28 % in 2016. The increase was driven by legislativechanges with mandatory blending of biofuels throughout the year. In2023, themain share ofRES intransport was liquid biofuels, with only a small share ofelectricity used inroad and rail transport. Liquid biofuels aredominated by biofuels made from food and/orfeed crops, buttheir usehas been limited to 5.61 % since 2022.

In order to increase theshare of RES and alternative fuels in thetransport sector, theAlternative Fuels Law s[21]was adopted on23 March 2021,introducing mandatory RESfuel supply obligations forfuel suppliers. The Law on Alternative Fuels provides that each fuel supplier isto make anincreasing share of RES fuels available on theinternal market duringa calendar year. To promote theuptake of advanced biofuels and RESfuels of non-biological origin, fuel suppliers are also subject to additional mandatory targets for the supplyof these fuels. TheLaw onAlternative Fuels provides that theenergy consumption of the transport sector in2030 should account for at least 5.2 % of non-biofuels from RES or advanced biofuels. The provisions and objectives of the Alternative Fuels Law are currently being revised in order to transpose theprovisions of Directive (EU) 2023/2413 and increase thelevel of ambition.

In2023,investmentsupport for theinstallation of advanced biofuel production facilities was launched to ensure circular economy principles and to use domestic waste and residues for theproduction ofliquid biofuels, while ensuring additional fuel supply to fuel suppliersoperating in the country.

TheLaw on Alternative Fuels includes mandatory green public procurement targets for thepurchase ofnew vehicles or transport services, with the aim of reorienting public transport fleets and encouraging public entities to choose clean vehicles. The aim is also to develop theelectrification of thetransport sector, theresponsible ministries have planned and launched support schemes to promote thepurchaseofelectric vehicles and to promote theaccelerated development of private and publicly accessible recharging infrastructure. Around 54 thousandprivate recharging pointsand 6 thousandpublicly accessible recharging points are planned tobeinstalled in Lithuania in 2030. On1 July 2022,anaction planswas adopted for the development ofelectric vehicle and electricvehiclecharging infrastructure [22], withkey orientations for the electrification oftransport. It will aim tohave atleast262 thousandelectric vehicles on the country’s roads by 2030, accounting foraround 16 % of thetotalfleet ofvehicles registered in Lithuania.

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21 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/0409c522915c11eb998483d0ae31615c/asr

22 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/e80e6750fb7b11ecbfe9c72e552dd5bd?jfwid=ha0aozfl6

The Alternative Fuels Actalso includes the obligation toinstallcharging infrastructure innewly built or refurbished refuelling stations, bus and railway stations, airports and seaports as of2023 . Requirements for theinstallation of recharging infrastructure in thevicinity ofresidential and non-residential buildings are laid down in the technical regulations for construction.

Investmentsupport for biomethane gas productionstarted in2020 and is still ongoing. Most biomethane is expected to be used in transport and agriculture , andgaseous fuels from RES (biomethane, hydrogen, synthetic methane) are expected to be at least5.2 % in the transport sector's overall final energy consumption balance in 2030 . Additional efforts will be made to reduce the consumption of polluting fossil fuelsthrough tax measures.

Competitiveness of the energy sector

One of themost important challenges for theenergy sector is to improve thecompetitiveness of the country's economy and to ensure thesupply of energy and energy resources atcompetitive market prices, which are among thelowest in the region. In Lithuania, expenditure on energy and energy resources represents a significantshare of industrial costs and household budgets,energycosts in industry remain high interms of product cost and are 20 % higher than theEU average.[23] Lower energy costs and a positivebalance between importsand exports of energy resources and technologies would increase thecompetitiveness of thecountry's economy. Lithuania needs to reduce energy costs and increase thecompetitiveness of Lithuania's business, tointroduce more efficient and modern technologies for the production, supply and consumption of energy, to ensure optimal pricing ofenergy resources, topromoteliquidity in thetrading market for energy resources, and to improve theconditions, reliability andavailability of energy supplyand consumption. Thefunctioning andlong-term development of theenergy sector must be based on the principles of sustainable development, and climate change policy objectives must beimplemented through themost efficientmeasures selected on the basis of a cost -benefit analysis.

Climate change management policy area

The climate crisis, posing an existential threat tonatural ecosystems and humanity, exacerbating national security risks and societal stability, is a major challenge ofour time. The last 9 years (2015-2023) were the warmest in the history of meteorological observations in Lithuania. The hottest wasin 2020, when theaverage annual air temperature was ashigh as9.2 °C, followed by-8.8 °C in 2019, and after 2023 with 8.8 °C, it became the third lowest in2015 , down from 8.3 °Cto the fourth place. The consequences of climate change are indisputably illustrated by the increasing frequency ofstorms, floods and other extreme weather events. Lithuania's climate change management policy is developed and implemented in accordance with international agreements: TheUnited Nations Framework Convention on Climate Change,adopted in New York in1992,is implemented with specific commitments and mechanisms for reducing greenhouse gasemissions, signed by the Kyoto Protocol in1997 with two commitment periods: the first Paris Agreementsigned in 2008-2012 and the second Paris Agreement between 2013 and 2020and 2015 with[24] a defined commitment period for2021-2030, theUnited Nations2030 Agenda for Sustainable Development,adopted in2015 by theUnited Nations

23 https://www.ena.lt/energijos-vartojimo-efektyvumas/

24 Law NoXIII-184 of the Republic of Lithuania of 22 December 2016 on the ratification ofthe Paris Agreement adopted under theUnited Nations Framework ConventiononClimate Change.

General Assembly,which sets target13 ‘To take urgent action tocombat climate change and its impacts’ and targets toachieve this, theEU’s climate and energy targets for2030, the EU Green Deal initiatives, the EU climate adaptation strategy and long-term climate change policy planning documents defining a vision for a climate-neutral EU by 2050. [25]

In order to ensure theimplementation ofinternational agreements on climate change and the objectives set forLithuaniain EU legislation, the LithuanianParliament adopted in June 2021 the NCPD, which sets climate objectives andtargetsfor Lithuania’s climate policy for 2030 , 2040 and long-term 2050 .

25 Communication fromthe Commission to the European Parliament, the Council, the European Economic andSocial Committee, the Committee of theRegions and the European Investment Bank of28 November 2018. A Clean Planet for all. AEuropeanstrategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM(2018) 773 final.

mitigation and adaptation. Climate change mitigation policies aim to reduceGHG emissions and increase their removals. Climate change mitigation is particularly important in the energy, transport, industry, agriculture, waste, forestry sectors. Adaptation policies aim to strengthen adaptive capacity, increase resilience and reduce vulnerability to theimpacts of climate change in order tocontribute to sustainable development, ensure adequate adaptationresponses. Measures to achieve the 2021- 2030 targetsand targets of the NCPD are included in the NECPs.

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

The short-term objectives			
Description	**2021:**	**Year 2025**	**By 2030.**
Reduction of GHG emissions in sector (e) not participating in the EU Emissions Trading System[26]	Mt CO_2eq.	Mt CO_2eq.	Mt CO2eq*
Share of energy from renewable sources in gross final consumption of energy, %**	28,10	39,3	55
Final energy savings	Save 0 TWh	TWh (2025)	39.3 TWh

** tobe revised in2025*

***Actual data for 2021, deducted by objectives/forecasts in2025.*

Since 1990, thestructure ofGHG emissions has evolved asa result ofthe transformation of the country's economy(decreaseof the industrial sector and thedevelopment of theservice sector, changes in the energy resources used, etc.) and the implementation ofGHG reduction measures.

In2022,18.9 milliontonnes ofgreenhouse gases were emitted to the atmosphere in Lithuania, some6 % less than in2021 . Thetransport (31.8 %) and energy (30.3 %) sectors were the largest emitters. Agriculture ranks thirdly (21.4 %), followed by industry (12.1 %) and waste (4.3 %).

Compared to 2021, GHG emissions decreased in all sectors of the country's economy – energy (-7 %), transport (-2 %), agriculture (-6 %), waste (-4 %), but the overall reduction in Lithuania's GHG emissions was due to a relatively significant decrease in emissions from industry (-17 %). The significant decrease in emissions was due to a decrease in the production volume of mineral products and the chemical industry.

In 2022, the total GHG balance of the land use, land use change and forestry sector in Lithuania was -6.4 million tonnesCO2eq. This represents an increase of almost 16 % compared to 2021, mainly due to absorptionin forests (- 6.5 MtCO2eq), permanent grassland (-0.6 MtCO2eq) and carbon stored in harvested wood products (-1.5 MtCO2eq). In addition, 0.7 Mt CO2eq was emitted on cropland, 0.8 Mt CO2eq in wetlands, 0.5 and 0.06 tCO2eq in the built-up area and other landrespectively .

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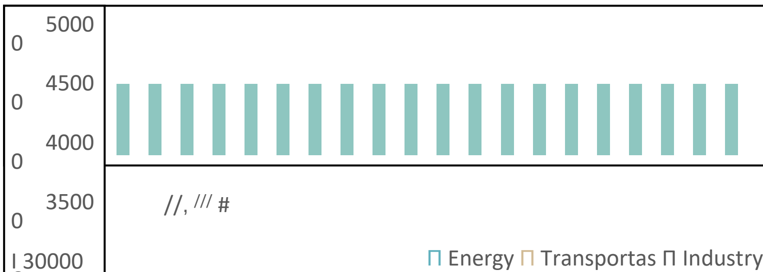

Figure 1.2.1 Lithuania's GHG emissions by sector

Administrative structure of implementing national energy and climate policies

Lithuania's energy policy is developed andimplemented under thecoordination of the Ministry of Energy. Lithuania's climate change mitigation and adaptation policy design and implementation iscoordinated by the Ministry of the Environment. Bothministries actively cooperate with theGovernment Chancellery, the Ministry ofFinance, Transport, Economy andInnovation, Education,Science and Sport, Agriculture, Foreign Affairs, National Defence,Culture, Social Security and Labour, Health and Labour, as well as the relevant committees of the National Parliament,municipalities, the Lithuanian Science Council, state higher education and researchinstitutions, companies, organisations and other social partners and individuals in the formulation of energy and climate policies.

Table 1.2.2. Authoritiescoordinating the implementationof GHG reduction targetsare identified in the NCPD:

Sector	**Institution**
Transport	Ministry of Communications
Industry (including EU ETS)	Ministry ofEconomy and Innovation Ministry of Environment (construction)
Agriculture	TheMinistry of Agriculture
Energy (including buildings)	Ministry of Energy Ministry of the Environment
Waste	Ministry of the Environment
Promoting green investment	Finance Ministry
Border correction mechanism	Ministry of Foreign Affairs
Overall target for Lithuania	Government of the Republic of Lithuania

ANational Climate Change Committee has beenestablished for independent scientific advice on the design, assessment andimplementation ofnational climate change management policies. It is composed of 11 representatives fromdifferent HEIs in the country. Scientists shall provide guidance on the research or funding streams needed toimplementclimate change policy measures inorder to achieve GHG reduction targets, on the development ofclimate-relevant research and experimental development and innovation that could be adapted at national level, thepreparation of national climate change management reports and draft reports.

The National Climate Change Committee shall make proposals for theimprovement of national GHG inventories,impact assessment of policies and measures,GHG forecasting and applied GHG measurement methods, activity data collection and emissions indicators used. The National Climate Change Committee is independent, works independently and acts as an advisory body of the Ministry of the Environment.

The Prime Minister’s Decree of12 February 2020 established a working group tocoordinate theimplementation of theNECPs andtoaddress the Green Deal agenda. The working group brings together 9 Ministries: Environment, Energy, Economy and Innovation, Finance, Social Security and Labour, Transport, Education, Scienceand Sport, Home Affairs and Agriculture .

The Seimas of the Republic of Lithuania approves the main national energy and climate change strategies/agendas andtheir implementation action plans and developmentprogrammes forall economic sectors by theGovernment. New plans are prepared every five years andmore frequently if there is a needat national level.

Every year, Ministries and their system institutions draw up strategic plans containing measures with allocations for the3 rd year period. The funds for theimplementation ofprojects and measures are allocated annually from theState and municipal budgets. EUfunds –EU Structural andInvestmentFunds and other dedicated fundinginstruments (e.g.Connecting Europe Facility) – as well as national Climate Change Programmes and the Modernisation Fund account for a significant share of investments in the field of energy and climate. Investments fromtheInnovation, Social Climate Funds and the‘Next Generation Lithuania’ plan (*Recovery and*Resilience Facility([27] RRF)) are alsoexpected tocontribute significantly to theachievement of theenergy andclimate objectives.

1.3. Consultations andinvolvement of national and Union entities and their outcome

Thedraft updated NECP has been prepared with theinvolvement ofministries, institutions, in close consultation with socio-economic partners, associations and the public. The Ministry of Energy and the Environmentinitiated an update process inautumn 2021, striving to makeit asinclusive as possible . To this end,5 working groups ondecarbonisation (industry, transport,waste and circular economy, energy and agriculture andforestry) and 3 energy (energy efficiency, internal market and research, innovation and competitiveness) were set up. Themembers of the working groups were representatives ofdifferent ministries and institutions (designated according to their remit) and socio-economic partners. 53 meetings of theDecarbonisation and 9 Energy Working Groups, held remotely, public and recorded on Environment

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

and the social media of theministries of energy.

Members of theWorkingGroups on Decarbonisation were briefed on existing and planned NECPs measures, OECD expert guidance entitled ‘Climate neutrality by 2050: options forreform for Lithuania’, participated in discussions and proposed additional measures to achieve the2030 climate mitigation targets.

Representatives frominterested groups in society (public authorities, science, industry, NGOs, etc.) proposed around 600 measures from which themost effectiveexternal experts were selected, whichwere already assessed by agencies andministries – themost effective and in line with the strategic objectives – were selected in the updated NECPs.

TheLIFE integrated project “Improving energy efficiency in Lithuania”was developedandimplemented to facilitate asmoother and more inclusive implementation of the update and implementation of the NECPs. Lithuania aims to increase energy efficiency, reduce carbon emissions and promote public awareness of sustainable energy practices. Life IP EnerLITstarted its activities at theend of2021, leading the goal ofhelping Lithuania move towards climateneutrality by2050. In particular, by integrating energy efficiency and climate change into sectors with the highest GHG reduction potential in the country: transport, buildings, industry (including agriculture). The energy efficiencychallenges have been brought together by a wide range ofspecialists from 15 different national, regional andnon- governmental organisations in Lithuania and Poland.

Forthe implementation ofenergy efficiency improvement measures in theNECPs,LIFE IP EnerLIT has identified 5 activities focusing ondeveloping financial and legal incentives, introducingnewer and less energy -intensive technologies, increasingconsumer education and changingtheir behaviour.

Activities include theimplementation of energy efficiency and GHG reduction measures and the building ofstrategic capacities. These initiatives contribute to strengthening national and regional capacities, building sustainable and energy-efficient buildings, promoting climate friendly mobility, green industrial development and green public procurement, thus contributing to long-term sustainable development in Lithuania. The project “Improving energy efficiency in Lithuania” (No LIFE20 IPC/LT/000002) is funded by theLIFE Programme of the European Union andby the Republic of Lithuania. Project implementation period 9 years (01.10.2021-31.12.2030).

Strategic Environmental Assessment

Since the NECP lays down theframework for the development of planned economic activities included in Annexes1 or 2 to theLaw of theRepublic of Lithuania on theassessment of the effects of planned economic activities on the environment and is prepared for the entire territory of the Republic of Lithuania,it mustbe subject to a strategic environmental assessment in accordance with European Union and national legislation. Strategic Environmental Assessment (SEA) is a process by which: identify, describe and assess the likely significantenvironmentalconsequences of the implementation of the plan or programme; ensure that public authorities responsible for theprotection of the environment,cultural heritage, public health, municipalauthorities, the public are consulted; it shall be ensured that the organiser has detailed information on the likely significantenvironmental consequences of theimplementation of the plan or programme and takesit into account.

At European Union level, the provisionsof an SEA are defined byDirective 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on theassessment of theeffects ofcertain plans and programmes on the environment (‘ theSEA Directive’)[28]. Basiclegislation of the Republic of Lithuania

28 https://eur-lex.europa.eu/legal-content/LT/ALL/?uri=CELEX%3A32001L0042

governing thestrategicenvironmental assessment ofplans and programmes, therelationship between theparticipants in theprocess and thelinks between the assessment and the decision -making process– Description of the procedure for thestrategic environmental assessment ofplans and programmes approved byResolution No 1467 of theGovernment of the Republic of Lithuania of23 December 2014 approving the description of theprocedure for thestrategic assessment of theeffects of plansand programmes on the environment (hereinafter ‘ thedescription of the SEA procedure’).[29]

In accordance with the description of the SEA procedure, the assessment must be carried out before the adoption or approval of the NECP,so that theorganiser of the plan – theMinistry of Energy and the Ministry of the Environment – initiated an SEA during which SEA documents are drawn up and theSEAprocedures provided for in international and nationallegislation are carried out. It should be noted that the Ministry of the Environment participated in that SEA both as co-organiser of the planand theauthor of the SEA documents and as the subject of the SEA.

TheNECP SEA scoping document was prepared inMarch2024 andpresented to the SEA entities. In accordance with theprovisions of paragraph 7 of the Procedure for SEA, the following entities shall beinvolved inthe assessment of theState -level plan: The Ministry of the Environment of the Republic of Lithuania; The Ministry of Health of the Republic of Lithuania; Ministry of Culture of the Republic of Lithuania; StateServiceforProtected Areas. The NECP SEA report was finalised inearly July 2024 and was submitted for public consultation together with the final updated NECP. Apublic event onthe presentation of the SEA report and the NECP to the public took place on 22 July. The final report of the NECP SEA can be consulted on the Ministry of Energy’s website[30].

Involvement of the national parliament

The National Parliament (Seimas) is directly involved in the preparation and implementation of the NECPsby legislating and approving thestate budget that provides funds to ensure theachievement of theEnergy Union objectives. It should be noted that on27 June 2024, theSejm adopted theupdated National Energy Independence Strategy and theNational Climate Change Governance Agenda on30 June 2021. These documents were central to the preparation of theupdated final NECP. It should be notedthat, according to these agendas, the NECPs constitute theimplementationplan for these agendas.

During thepreparation of theupdated final NECP, the Sejm also exercised regular parliamentary scrutiny.

Involvementof local and regional authorities (municipalities)

The involvement oflocal andregional authorities is crucial for the preparationand implementation of the NECPs. Municipalities make a significant contribution to reducing GHG emissions by developing and implementing sustainable urban mobility plans, participating in theCovenant of Mayors for Climate and Energy, in order to achieve the RES targets set out in the special plans fordistrict heating. 17 municipalities inLithuania havejoined the Covenant of Mayors. Two Lithuanian cities – Vilnius and Tauragė –are included in the hundred cities in theEuropean Union thatwill become climate neutral by 2030 . Selected cities will have to develop plans to achieveclimateneutrality in energy, buildings, waste management, transport, etc. Thecommitments made in the Climate City Contracts willenable cities to work together with EU, national and regional authorities and,mostimportantly , withtheir inhabitants.

29 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/f7c31d308f8111e48028e9b85331c55d?jfwid=-rvhtvfgfc

30 https://enmin.lrv.lt/lt/veiklos-sritys-3/neksvp-atnaujinimas/

Consultation of interested parties and the public

During thepreparation of thedraft updated NECP, apublic consultation of stakeholders and the public took place from the beginning of the update process. Consultations were held in the context of themeetings of the decarbonisation and energy working groups, which are public. They presented the existing measures, theconsultants' analyses ofexisting measures, Lithuania's progress since thestart ofthe plan, proposed new measures, and theconsultants' analysis of theproposed new measures. In total,around600 proposalsformeasures per1 trillion were submitted for the new measures. EUR. Themaximum technological potential of themeasures was assessed by external consultants on the scale of possible measures, thesocio-economic impact, the investments needed, etc.Ministries coordinating theimplementation of sectoral GHG reduction targets haveidentified around130 measuresfor almost EUR 12 billion oftotal investments,which have become planned measures in this draft updated NECP, on the basis of simulations carried out by the Environmental Protection Agency and the Lithuanian Energy Agency. Further to the Government 's decision, the public consultation was conducted in parallel with the submission of thedraft commentsby the European CommissionfromJuly toSeptember2023[31]. The public consultation received close to200 comments and 19 recommendations were submitted by theEuropean Commission to theupdated draft NECP.

In 2024, following thepublic consultation and theEC'scomments received, theNECPs were revised andre -submitted to thepublic consultation between 5 July and 5 August 2024, together with the SEA assessment, which received 316 different contributions from thepublic and fromdifferent organisations. Following a public consultation, therevised NECP is approved by the Government.

Consultation of other Member States

The first regional consultation of the2023 update of the NECP was carried out on26-27 October 2023.The drafters of theNECPs fromneighbouring countries (Estonia, Poland, Latvia) wereinvited to Lithuania. During the consultation, practitioners and policy makers discussed the accessibility of the objectives, the challenges in thedesign of the plan and theevaluation ofmeasures and other issues. On16 June 2024,a remote seminar was organised to discuss the Baltic Sea countries'national energy and climate plans prior totheir submission to the EC. This consultation focused more on discussing energy objectives and measures, implementing the plan with a perspectivefor 2040 . Regional consultations are included in the scope of the LIFE integrated project "Improving energy efficiency in Lithuania", which aims to support theimplementation of the NECPs. Colleagues from Poland, Latvia and Estonia will be invited to meet to discuss NECPs in2024, 2026, 2028 and 2029.

Guidance bythe European Commission

1.4. On18 December 2023,the EC prepared and presented apackage for theassessment of21 Member States'draft updated NECPs and provided country-specific recommendations (other Member States submitted their draft NECPs later, so their NECPs were assessed later). Lithuania's draft updated NECP received 19 recommendations, which were taken into account in the final updated NECP. For Lithuania alone, the EC had no comments on thepublic consultation process. The Commission's assessment and the recommendations provided in the updated Lithuanian NECP can be consulted on the European

31 Government meetingof 21 June 2023, https://lrv.lt/media/viesa/saugykla/2023/8/gebGLuD1vyA.pdf

Commission’s websitee-[32]Cooperationin the preparation of theplan.

Lithuania is an important element of regional cooperation to achieve the EU’s energy and climate change objectives and thedimensionsof the Energy Union,mainly energy security and the internal energy market. The main formats for regional cooperation, in which the content of the NECPs was regularly harmonised, are two: *The Baltic Energy Market* Interconnection Plan(BEMIP) Working Group and the Baltic Councilof Ministers.

BEMIP

Lithuania is activelyinvolved in the Baltic Energy Market Interconnection Plan. Its main objective is to createa well-functioning and integrated energy market and thenecessary energy infrastructure, as well as to achieve acompetitive, sustainable and secureenergy market in the Baltic Sea Region.

Thepriority project at EU level is currently largely addressed, namely theacceleration of theinterconnection of the Baltic States’ electricity system with continental European networks for synchronous operation (synchronisation project) and desynchronisation from the PIC /UPSsystem, planned forFebruary 2025.

The regional gas market coordination groupset up in2015 under the BEMIP initiative,consisting ofrepresentatives ofMinistries of Finland, Estonia, Latvia and Lithuania, nationalregulatory authorities,transmission systemoperators, LNG terminal operators and distribution system operators, coordinates thecreation of a regional gas market in theBaltic States and Finland.

BEMIP Offshore Wind Working Group

Together with Latvia, Estonia, Finland, Germany, Sweden, Poland and the BEMIP, anon-binding agreement was signed on19 January 2023 on the2050 targets foroffshore renewable energy with intermediate steps for theBaltic Energy Market Interconnection Plan for offshoregrids (BEMIP offshore) of thepriority offshore grid corridor for2040 and 2030, inaccordance with Article 14 (1) of theTrans -EuropeanNetworks forEnergy (TEN-E) Regulation ((EU) 2022/869)[33]. Thefollowing meetings took place in the following format: On26 April 2022,theplenary of the BEMIP High Level Group presented the "European Interconnection Tool Cross-Border Project on Renewable Energy: Lithuania in cooperation with the Flemish Region’,held ameeting of the BEMIP OffshoreWind Working Group on22 September 2022 and presentedoffshore wind projects to theBEMIP Offshore WindWorking Group on12 December 2022 andpresented Lithuanian offshore wind planned tenders without support and withstate support at themeeting of theBEMIP Offshore Wind Working Group on 28 April 2023 . Thesecondtender for the Lithuanianoffshorewind farm was presented at the meeting of theBEMIP Offshore Wind Working Group on 23 February 2024. On12 June 2024,the BEMIP Offshore Wind Working Group discussed cooperation between Baltic Sea countries to assess thefeasibility of potential hybrid offshore wind projects in theBaltic Sea

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32 https://commission.europa.eu/publications/commission-recommendation-assessment-swd-and-factsheet-draft- updated-national-energy-and-climate-8_en?prefLang=en

33 Non-binding agreement on goals for offshore renewable generation in2050 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.

Carbon Capture, Use and Storage Network Creation Group (NgCCUS)

The NgCCUSwas establishedin 2019 by theCommittee ofSenior Officials of Nordic Energy Policy (EC-E), composed ofrepresentatives of theMinistries of Sweden, Denmark, Finland, Iceland, Norway, the Faroe Islands, Greenland, the Åland Islands, Estonia, Latvia and Lithuania. The NgCCUS meets twice a year (spring and autumn) to:

- promote informationexchange and cooperation on decarbonisation issues, focusing on thedevelopment of CCUS and related policies;
- promote thecreationand dissemination of new knowledge in thefield of CCUS;
- promote dialogue onCCUS-related policy issues and evaluate joint actions related to EU/EEA processes;
- promote dialogue on CCUS related strategies and consider how theNordic, Baltic and EU strategies can work together and reinforce each other;
- prepare proposals for theCommittee ofSenior Officials onNordic Energy Policy (EC-E) and assist formal Nordic cooperation in theNordic Council of Ministers.

The NgCCUS also acts as an advisory board in the annual Baltic Coal Forumorganisedby the BASRECCS network. Nordic Energy Research is the secretariat of NgCCUS and supports thework of the group.

During themeetings of theNgCCUS group on26-27 June 2023 and 15 November 2023, Lithuania'splans for biogenic carbon dioxide capture and utilisation, carbon dioxide transportinfrastructure and potential utilisation, biogenic carbon capture potential were presented.

Baltic Councilof Ministers

The synchronisation project, electricity imports from third countries, otherissuesrelevant to the region are regularly discussed and coordinated with regional partners (Latvia, Estonia and Poland) in theCommittee ofSenior Energy Officers of the Baltic Council ofMinisters and bilateral consultations betweenrepresentatives of theLithuanian-Poland Ministries ofEnergy, as well as in close cooperation with the European Commission. Climate issues are discussed at Baltic Environment Ministers' meetings. On9 August 2024,ameeting of the Committee ofSenior Energy Officers ofLithuania, Latvia and Estonia of the Baltic Council ofMinisters took place in Lithuania to discuss the national energy and climate plans, theprotection and resilience of critical energy infrastructure, and an exchange of views on regional cooperation.

All these elements of regional cooperation areincluded in the NECPs and further mentioned in Chapters 2 and 3 respectively.
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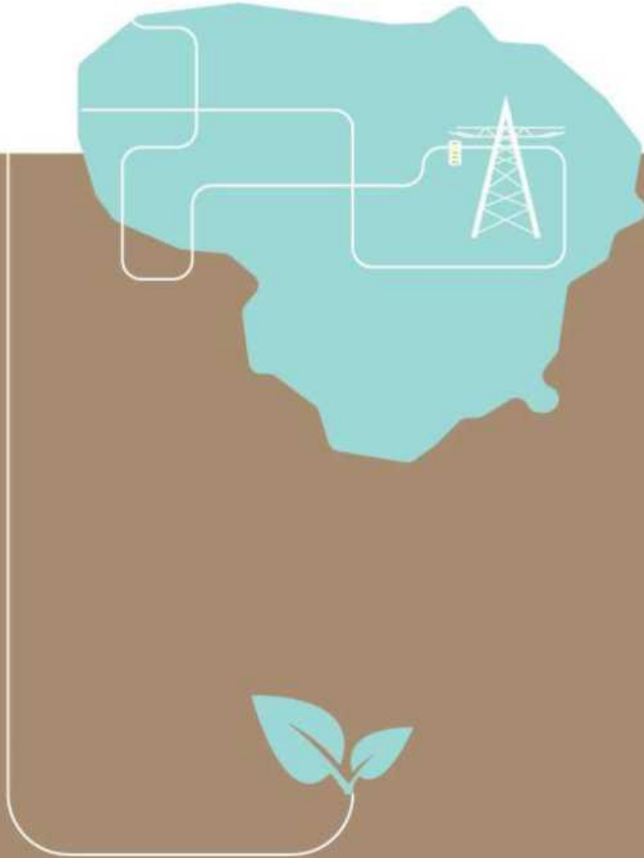

SECTIONA: NATIONAL

ND TARGETS

PLAN

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SectionA:

2.1. Decarbonisation dimension (decarbonisation)

2.1.1. GHG emissions and removals

Lithuania is implementing GHG reductions on the basis of the NCPD, which sets targets andtargetsfor climate change mitigationand adaptation for Lithuania's climate change management policy until 2030, 2040 and long-term objectives to2050. Climate change mitigation policies aim to reduceGHG emissions and increase their removals.

In 2016, Lithuania signed and ratified the Paris Agreement. Under it,Lithuania, together with the EU and its Member States, made a binding commitment toreduceeconomy -wideGHG emissions by at least 40 % by2030, compared to the2030 climate and energytarget endorsed by theEuropean Council in its conclusions of10-11 December 2020 and the2023 EU Fit for 55 legislative package toreduce GHG emissions by at least 55 % compared to1990.

Thesectors participating in theEU Emissions Trading System (EU ETS) in which Lithuanian operators participate, together with operators fromother EU Member States participating in the EU ETS, have to reduce their GHG emissions by 62 %compared to 2005 levels.

Sectors not participating in the EU ETS (transport, agriculture,waste management, industry withother activities or combustion plants withinstalled capacity of boilers below 20 MW (small district heating plants), public sector buildings, households, fishing, construction, services, etc.) will have tocomply withLithuania's annualGHG emission reduction limits (tCO2eq) and achieve areduction ofat least 21 % in 2030 compared to2005.

In order to meet theobjectives of the Paris Agreement and to preserve the EU'sinternationalleadership in the fight against climate change, Lithuania is working with other EU Member States to increase ambition, long-term climate and energy policy goals for the next decade. Theimplementation of the objectivesand objectives of theNCPD is based on the concept of the General Plan for the Territory of the Republic of Lithuania, contributes to theorientations and principles of theState Progress Strategy, theobjectivesand objectives of the NAP, the NENS and thenational securityinterests enshrined in theNational Security Strategy in ensuring sustainable state development. The national climate change mitigation targetfor 2030 is to reduce GHG emissions by 30 % compared to 2005, including land use, land use change and forestry (LULUCF; (hereafter referred toas 'LULUCF') sector removals through thetransition of economic sectors towards innovative, low GHGemissions and environmentally friendly technologies and RES use:

1. In thesectors covered by the EU ETS (energy generation and supply sectors, industrial processes),a reduction of at least 50 % compared to 2005;

Forsectors not participating in the EU ETS (transport, industry, agriculture, waste, small energy),a reduction of at least 25 % compared to2005, including removals from theFNM sector, and not exceeding the set annual emission allocations for the period2021-2030. GHG emission reduction targets for individual sectors not participating in the EU ETS are presented in Table 2.1.1.2.

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A SKIRSNIS

Theobjective of the LULUCF sector is toincrease theabsorption potential, themost efficientuse ofnatural habitats (forests, grasslands, wetlands) by2030 through the sustainable use ofutilisedagricultural land and forest land, the conservation and restoration of natural habitats that store organic carbon (forests, grasslands, wetlands, wetlands), increasing the use of wood in construction and the production of long-lived products without causing additional negative impacts on ecosystems, achieving significantly highergreenhouse gasremovals and atleast 6.5 milliontonnes of CO2eq over theperiod 2021-2030.

Table 2.1.1.1. National climate change mitigation targets adopted by the NCPD:

GHG emission targets	**Lithuania**		
	By 2030.	**In 2040**	**Total**
%Compared to 1990 levels*	≥-70	—85	—100
%Compared to 2005 levels*	≥-30	—	—
%Of sectors covered by the EU ETS compared to2005 levels	≥-50	—	—
%Of non-EU ETS sectors compared to2005 levels*	≥ 25	—	—

** Including GHGremovals from the FNM sector. Following the update of the EC's2030 GHG targets for Lithuania*

the reduction excluding FNM 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 not participating in the EU ETS for theperiod2021-2030 through the adoption of the UCPD, in %:

Sector	**Average 2016-2018 compared** to**2005**	**2025 target % compared** to**2005**	**% Achievementof the 2030 target compared** to**2005**
Transport	+ 36,2	+ 11,3	—14
Industry	+ 23,5	+ 2,2	—19
Agriculture	+ 3,2	—3,8	—11
Waste	—36.6	—50.6	—65
Small energy	—3,2	—14.8	—26

In themeantime, the LULUCF sector has been included in theEU's GHGemission reduction targetsfor the period 2021-2030 as a flexibilities. Lithuaniawill be able tooffset 6.5 Mt CO2eq throughthe Flexibility

Instrument for the period2021- 2030. Tomeet the greenhouse gasemission reduction target of non-ETS sectors if GHG removals in the FNHR sector are higher than in this sector

SectionA:

emissions. If GHG emissions are generated in the LULUCF sector, they will be covered by theannualemission allocation units of sectors not participating in the EU ETS.

Adaptation policies aim to strengthen adaptive capacity, increase resilience and reduce vulnerability to theimpacts of climate change in order tocontribute to sustainable development, ensure adequate adaptationresponses. Theobjective of Lithuania’s adaptation policy to climatechange environmental changeis toreduce existing and foreseeable potentialvulnerabilities of natural ecosystems and sectors of the country’s economy, tostrengthen adaptive capacity, to reducerisks and damage in a cost-effective manner, and to maintain and increase resilience toclimate change change, in order to ensure favourable livingconditions forsociety and sustainable economic activities so as not tothreaten food production. Adaptation will be implemented through measures in climate 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 .

TheNCPD sets outthe main strands ofhorizontal climate change management policy implementation:

1. assess theimpact of policymeasures (new or amended legislation and investment projects) interms ofGHGemissions and other measurable environmental indicators in decision-making;

2. establish an effective system forassessing the impact ofclimate change management policies (*ex-ante* and ex-post), ensuring cooperation between stakeholders, planning of measures, monitoring the achievement of theclimate targetsset;

3. implement the polluter pays principleso that taxpolicies provide economic incentives to mitigate climate change;

4. integrate climate change management objectives, targets and measures into national development programmes, ensuring consistency betweennational policies andgivinga clear signal tocapital markets and investors that thetransition to a climate-neutral economy is irreversible, and encouraging innovation to turn sustainable solutions into cost-effective solutions;

5. effectively plan theactions and financial resources neededto implement climate change management policies;

6. make the government climate-neutralas of2024 , the public sector as a whole – asof 2027 . Obligation forpublic bodies touse only green electricity and heat, use only clean transportandpurchase goods and services only through green procurement – from 2023;

7. promoting harmonised and green procurement, prioritising equipment and labelled products that meet the latest energy efficiency standards in all sectors of the economy, with a view tomaking green procurement thepredominant type ofpublic procurement from 2023 onwards;

9. strengthen international cooperation and therole of municipalities, create an urban environmental index by encouraging municipalities to compete on the Green Deal and share good practices and improve public education and engagement.

Thevision of climate change management policies envisagesLithuania’s economy to be circular and climate neutral by 2050 . The country’s economic sectors and regions are resilient toclimate change environmental change, are characterised by modern, resource-efficient, socially responsible and competitive, innovative technologies and research-based development, anddecoupled economic growth from resource use.

There is a reliable, sustainable, competitive, competitive and secure energy system based on a well-functioning EU internal market. Maximum useshall be made of natural sinks limited to environmentally safe carbon capture and utilisation (CCU) technologies to offset GHG emissions insectors where no technological potential for zero GHG emissions will be identified.

Protect and conserve biodiversity, strengthen natural frame structures, ensure climate-resilient ecosystem balance, maintain and enhance natural sinks through sustainable use offorest, agricultural land and restoration of damaged wetlands and other carbon-rich ecosystems. Urbanised areas create abalance between nature and urban elements, making extensive use ofgreeninfrastructureandother nature-based solutions that improve the living and resting conditions of the population .

Becoming a climate-resilient society adapted to the unavoidable consequences ofclimate change. Contain negative impacts on thehealth and well-being ofcitizens, environmental factors and risks, reduce societal vulnerability to climate change and enhance well-being by keeping planetary boundaries within reach.

InApril2023,the OECD presented the policy[34] recommendations of thestudy “Climate neutrality by 2050 – optionsforreforms in Lithuania”, thepath and measures to bechosen by Lithuania in thecontext of thedecarbonisation objectives, how this will affect our country and what opportunities Lithuania is developing for a climate-neutral economic model.

The study assessed Lithuania’s climate change policy and its implementation. It was found that Lithuania’s economic growth has been successfully decoupled from GHGemissions. However, theGHG intensity ofenergy consumption in Lithuania remains higher than the EU average. Lithuania’s GHG intensityindex was close to 14 percentage points in 2017 and increased to 23.4 pps in 2020.

To achieve the country’s GHG reduction targets, OECD experts highlight theneed for an ambitious cross-sectoral climate change policy, an increase in environmentaltaxes, theimportance of carbon pricing and the elimination of fossil fuel subsidies. According to them, the decarbonisationof the Lithuanian economy will require long-term measures. Priority must be givento increasing GHG reductions in the transport sector, while the old and inefficient car fleet, increasingroad freight transport and urban development require urgent solutions. Ensuring the energy efficiency of buildings is another challenge, as the lack of an energy-efficient building stock hasa negative impact on the significant progress made inreducingGHG emissions from heating through theuse ofbiomass and waste. In the industrial sector, historically low fossil fuel prices have hampered the faster transition to renewable energy, although thecurrent geopolitical situation and the energy price crisis are changing incentives. Finally, agriculture should regulate the increasing use of mineral fertilisers incrop production and encourage crop rotation and other sustainable agricultural practices instead ofmonoculture production.

The study indicates that carbon pricing alone is not sufficient for Lithuania to become a climate-neutral country by2050. The development of innovative technologies,especially in the transport and industrial sectors, is essential. Targeted support is necessary to stimulate technology uptake and innovation.

According toOECD experts, the economiccosts of meetinghigh climate ambitions would be minimal if environmental taxes were properly regulated. Significant emission reductions only marginally

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

slows the annual growth rate, and with constant technological developments, innovation would balance minimum economic costs. The current focus on subsidies may crowd out private investment. TheOECD recommends filling the existing significant funding gap inlow-carbon infrastructure with private sector investment.

Small capital markets should be further scaled up at regional level in order to give investors an interest in financingenvironmentally friendly solutions and technologies, while measures need to be adapted to the different needs ofinvestors. It is recommended that the self-government cooperates more closely in order to pool knowledge, for example by creating joint service centres or projects, while at the same time reaching a larger scale and reducing costs.

Energy from renewable sources

Lithuania's commitment toreach 23 % in the EU by2020 RES final energy consumption wasalready implemented in2014.Lithuania isimplementing RES development on the basis of the NENS, which sets long-term energy targets. The strategy sets targets for the share of RESin gross final energy consumption, heating, transport and electricity by 2050 (Table 2.1.2.1.). TheMinistry ofEnergyhas now set more ambitious targets of 55 %. RES in final energy consumption and 100 % RES gross electricity consumption by 2030.It should be noted that achieving the2030 targets requires full implementation of the planned policy measures, as described inSections 3.1.2 and 5.1.

Table 2.1.2.1. Share of RES in gross final energy consumption and in the relevantsector e[35]:

	2020[36]	2020[37]	2022	2025	2027	2030	2050
Share of RES in gross final energy consumption %	26,77[38]	30 (23)	29,62	39,3	45,3	55	95
Share of RES-E in final energy consumption of the electricity sector, %	20,17	30	25,50	52,5	72,1	100	100
RES-T share of final energy consumption in the transport sector, %	5,50	10	6,28	8,60	14	29	90
Share of RES in heating and cooling, %	50,23	—	51,77	63,0	69,6	80	100
Of which RES share in DH (%)	74,7	70	73,1	81,28	84,65	90	100
The startingpoint for the overall increase inthe share ofenergy from renewable energy sources between thebinding 2020 national target of theMember States concerned and their contribution to the 2030 target, expressed in %.		—	18	43	65	—	—

[35]Theshare of RES in gross final energy consumption in intermediate periods calculated on the basis of Article4 (2) of Regulation (EU) 2018/1999 of the European Parliament and ofthe Council in the assessment of the 2020 national target and contribution to the 2030 target. The share of RES per sector in intermediate periods is calculated by assessing theactual percentage in 2020 and thecontribution to the2030 target, takinginto account the percentagesreferred to in Article 4(2) ofRegulation (EU) 2018/1999 of the European Parliament and of the Council.
[36] Fact sheet:
Target set for[37]NENS.

[38] After the assessment of statistical transmission.

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Theintegration ofrenewable energy sources into the transport sector is inefficient and too slow, with the expectation of speeding up theprocess, with theadoption of theAlternative Fuels Act in2021 implementing theprovisions ofDirective 2018/2001 on the decarbonisation of the transport sector. Amendments on thetransposition ofDirective 2023/2413 are currently being preparedto set more ambitious targets in the transport sector. In line with the NationalEnergy Independence Strategyand Directive 2023/2413, the share of RES energy consumption in transport is expected to beat least 29 % in the medium term by2030. (after assessing themultipliers provided for in Directive 2018/2001).

In thefuture, theincrease in the share of RES in gross final energy consumption will bemainly driven by theincrease inRES in theelectricity and transport sectors, although consumption in the heating andcooling sector will be the main contributor (Table 2.2).

Table 2.1.2.2. RES contribution ofeach sector to final energy consumption in 2022, ktoe and %:

	ktoe	%
Total final RES consumption in the heating and cooling sector	1297,9	77,5
Total final RES-E consumption	241,3	14,5
Total final RES consumption in the transport sector	135,2	8,0
Total RES consumption	1674,4	100

Theshare of RES in gross final energy consumptionshall be achieved by increasing the share of RES in the electricity, transport and heating and cooling sectors.

In order to achieve the above RES targets and implement theamendments toDirective 2018/2001 thatentered into force on20 November 2023, thefeasibility ofsetting and implementing new targets shall be assessed by ensuring that:

- innovative RES technologies represent at least 5 % ofnewly installed renewable energy capacity (indicative target);
- building on existing cooperation frameworks, the aim will be to establish a cooperation model with one or more other Member States for joint RES production projects by 31 December 2025. The aim will be to reach agreement on the establishment of at least two joint projects by 31 December 2030.
- the share of RES energy produced in or nearby buildings or supplied from the electricity and/or DH network in the final energy consumption of buildings is not less than 49 %;
- the aim is to increase the annual share of RES in energy sources used for final energy and non-energy purposes in industry, on an indicative basis of at least 1.6 percentage points, calculated as an annual average for the periods from 2021 to 2025 and from 2026 to 2030, considering the possibility of counting waste heat and cold towards this target;
- The contribution of RES fuels of non-biological origin used for final energy and non-energy purposes in the industry sector is at least 42 % of hydrogen by 2030 and 60 % by 2035, including the reduction potential of this target.
- Advanced biofuels and RES of non-biological origin contribute at least 5.5 % by 2030, ensuring that the share of RES fuels of non-biological origin is at least 1 %.

Electricity sector

According to the2023 State Energy Regulatory Council, theproduction in Lithuaniawould amount to10.7 TWh/year,taking into account the amount ofelectricity produced and planned for the construction of all the power plants under development.

By 2030,the aim will be toincrease theshare of RES-E to 100 % of gross final electricity consumption. Wind energy is estimated to remain the main resource for electricity generation, with around 75 %, solar 19 %, biofuels 3 %, hydropower 2 % and biogas 1 %. (Table 2.1.2.3.).

Table 2.1.2.3. Projected RES-E production trajectory with planned policies and measures, KTNe[39]:

	2020:	**In 2022**	**Year 2025**	**Total**	**By 2030.**
Final electricity consumption, ktoe	890,4	917,0	1 062	1 218	1 686
Hydropower plants, ktoe*	25,8	39,9	38	38	38
Wind turbines, ktoe*	133,4	130,1	373	739	1 301
Solar power plants, ktoe	11,1	29,4	265	315	340
Biofuel power plants, ktoe	38,3	47,2	50	50	50
Biogas plants, ktoe	12,8	13,6	14	14	14
RES-E, ktoe	221,1	260,2	740	1 156	1 743

** Normalisedelectricitygenerationfrom power plants based onhistorical electricity generation data.*

Investments inwindand solarpower plantsfor electricity generation are estimated to be the most attractive for investors in the period 2020-2030 due to their economic attractiveness and simple installation.

Part RES-E will be aimed at maintaining existing generation capacity, upgrading it and introducing new ones (see Table 2.1.2.4 and Table4.2.2.5).

Lithuania has beendeveloping RES since 2002, when the first hydropower andwind power plants were built. The useful life ofhydropower plants ranges from 30 to50 years and thedevelopment ofthese power plants in Lithuania is limited by environmental laws andit is estimated that thedevelopment of these plants will not take placebetween 2020 and 2030.

Wind turbines havea useful lifespan of around 20 years, therefore retrofitting can take place to maintain existing capacity until 2030. It is estimated that the totalinstalled capacity of wind turbines could increase to 5915MWbetween2020 and 2030.

In2003 , thefirst biogas plantsstarted operations, with a useful life span of between 15 and20 years. In thiscontext, themodernisation ofthese plants could take place in order to maintain the existing capacity. Given that theuse of biogas is expected to bedirected towards biomethane production, it is estimated that thedevelopment of these plants in theelectricity sector will be marginalbetween 2020 and 2030.

Theconstruction of thefirst biomass -using power plantstarted in2007 with a useful life span of around 15 years. In thiscontext, themodernisation ofthese plants could take place in order to maintain the existing capacity. Planned increase in capacity of new biomass plants 2023

Calculated based on the targetsin Table 2.1.2.1 ofChapter 2.1.2.

m, with the entry into operation of thebiomass plant currently under construction.

The expansion of solar power plants started in2011 and, given their useful life span of around20 years, it is estimated that they will not need tobe upgraded between 2020 and 2030 . The development of new solar power plantswill be largely influenced byenergy consumers, self-generating electricity (generating consumers).

Table 2.1.2.4. New RES-E power generation capacityi[40]:

	2020:	2021/2022	2023 to 2025	2026-2027	2028-2030
Wind power plants, MW	540	946	1 153	1 515	2 301
Hydropower plants, MW	117	—			
Solar power plants, MW	164	572	2 592	597	339
Biofuel and biogas combined heat and power plants, MW	83	103	188	—	—

TheNENS sets ambitious targets forthedevelopment of electricity consumers capable of generating electricity andself -consumption (for details see SK 3.2) of havingatleast 300000 prosumers and active consumers(including community-based energy actors) by 2030 .

The activeinvolvement of localcommunities ininvesting in co -ownership RES facilities will also be encouraged. By2030, theinstalled RES generationcapacity managed by the energy communities is planned to accountfor at least 1 % of theelectricitygenerationcapacity from RES operating across Lithuania.

Transport sector

Lithuania, like other Member States, has difficulties in meeting the targets for thetransport sector. In2022, the share of RES in transport was 6.28 % below the EU average. In the transport sector, a gradual shift towards theuse of alternative fuels and electricityis expected, in line with the updated NEBS, to achieve a share ofat least 15.8 % of RES energy consumption in transport in 2030 . (without taking into account the multipliers provided for in Directive 2018/2001). The updated Directive 2018/2001 envisages that theshare of RES in transport should beat least 29 % in2030, so theprojected trajectories for energy from RES in transport per fuel type indicate that the29 % multiplication target would be achieved and exceeded. (Table 2.1.2.5).

Actionhas beenstepped up accordingly toimprove thesituation in the transport sector. As of1 January 2020,highertargets for mandatory blending ofbiofuels into each litre all year round haveentered into force. InMarch 2021,the Law on Alternative Fuelswas adopted, which:

- requirements for entities that procure energy, transport or postal services

39. The results of the PPP modelling scenario are presented, assuming thatall planned policy measures will be implemented. For theperiod2020-2022, we provide actual data.

services. The requirements aim to incentivise the purchase ofzero-emission vehicles and/or services by public entities, with a share ofat least 100 % ofzero-emission light -dutyvehicles and buses in2030 compared to the total fleet and at least 16 %of zero-emission heavy-duty vehicles .

- amore ambitious mechanismhas been introduced for the use of biofuels and RESfuels by setting an increased minimumshare of biofuels per litre offuel sold in Lithuania (petrol 6.6 % and diesel 6.2 % in terms of thetotalenergy content of the fuel blend). The obligations apply to allfuel suppliers operating in the country who are responsible for paying excise duties on fossil fuels. The mandatory RESfuel supplyobligation for fuel suppliersis gradually increased annually. Fuel suppliers implement the obligations through a system ofunits of account forfuel from RES, and fuel suppliers arerequired to collect an appropriate amount ofunits of account (credits) issued for the supplyof RES fuel to the internal market. Part of theobligation on fuel suppliers is tobe implemented through thephysical incorporation ofbiofuels into thefuel, while the other may be implemented through the purchase ofunits of account (credits) from other fuel suppliers, biomethane suppliers or operators of recharging points.
- from 2025 onwards,obligations will also apply to natural gas suppliers supplying natural gas to vehicles.
- there arealso mandatory RES supplyobligations foradvanced biofuels and fuels of non-biological origin for fuelsuppliers. In 2030 , each supplier shall ensure that its fuel balance contains at least 3.5 % of advanced biofuels or RES- FNBOs;
- thetarget is that thecombinedshare of biogas and gaseous fuels of non-biological origin from RES in the final energy consumption of the transport sector isatleast 5.2 %. 2030;
- targetshave been set for the useof electricity in the transport sector,with the number ofelectric cars registered for the first time accounting for at least 40 % of annual purchases by2030 .

On1 July 2022,anActionPlanfor the development ofelectric vehicleand electric vehicle charging infrastructure was adopted, with measures and actionsto increase the uptake ofelectric vehicles and ensure the efficient development ofrecharginginfrastructure for electric vehicles. The Action Plan also aims to ensure that recharging infrastructure isdeveloped evenly, witha strong focus on theintegration ofrecharging points into the country’s energy system.

The Alternative Fuels Law also provides for areduction ofoil fuel consumption in road transport by at least39 % by2030 compared to theconsumption of oil fuels in 2021.

Table 2.1.2.5. Expected trajectories of energy from RES by technology for transport in the sector, without applying themultipliers set out in Directive 2018/2001, PSR e[41]:

	2020:	In 2022	Year 2025	Total	By 2030.
Projected consumption in transport, ktoe	2 190,3	2 214,7	2 150	2 039	1 828
Bioethanol, ktoe	15,7	19,6	20	28	29
Biodiesel, ktoe	87,2	100	141	177	224
Biogas (biomethane), ktoe	—	—	34	54	83

[41] Provide the results of the PPP modelling scenario assuming that all planned policy measures will be implemented. For 2020 and 2022,we provide actual data.

Electricity RES, ktoe	1,2	2	21	56	102
Aqueous from RES, ktoe	—	—	2	4	8
RES-T, ktoe	104,1	151	218	319	446

Heating and cooling sector

Lithuania's primary objective for theheat sector is thedecarbonisation of the heat sectorand the coherent and balanced renewal (optimisation) of DH, ensuring efficient heat consumption, reliable, economically attractive (competitive) supply and production, enabling thedeployment of modern and environmentally friendly technologies using local and renewable energy sources, ensuringflexibility of the system and enabling investment environment. In accordance with good practice inEU countries, Lithuania should promote thetransition to fourth generation (4G) district heating by integrating solar power plants into district heating networks and promoting theuse ofexcess and waste heat forheating buildings.

In Lithuania, the district heating system is an integral part of the overall energy sector, with technological and energy flows closely linked to the electricity system, fuel supply and other systems. All Lithuanian cities have well-developed district heating systems, from which around 57 % of thecountry's heatingis supplied andaround 80 %of all buildings are supplied in cities. [35] The main users of district heating services are residents living in multi-apartment buildings.

According todata from theLithuanian Heat Suppliers Association, solid fuel combustion plants with condensing economisers used byheatsupply companies and independent heat producers (hereinafter ' NGOs') had a total thermal input ofalmost 1844 MW in2022. Of these,about 791 MW were installed inNPP boilers and power plants. Thetotal installed capacity of heat generation installations hasdecreased by around 22 % overthe last 6 years, from 10000 MW in2015 to almost 7800 MW in2021, with acapacity demand for DH systems ofup to 3200 MW. During the summer, theaverage load of the systems is around 400 MW.

Theefficiency of heat and hot water production technologies in the decentralised sector is rather low and there is considerable potential forenergy savings. The sector also has thepotential toconvert primary energy sources, which can significantly improve theconditions for thesupply ofheat to thepopulation and encourage a more efficient use of renewable energy sources, some of whichcould be used in other sectors.

The overall share of RES in the heating and cooling sectorwill reach 90 % by 2030, where themain part will be heat energy from local biofuels. Additional policy measures (such as thedeployment ofsolar energy and heat pumps, low- temperature heating, waste heat recovery) areexpected to reducedemand forall fuels as energy efficiency gains and further districtisation in decentralised heat production continue. Due to the specificity of the building stock, the energy demand of thecooling sector in Lithuania is likely to be negligible. Astheshare of new constructionbuildings with cooling systems in the nationalbuilding stock grows, energy demand in this sector is likely to increase

35 https://lsta.lt/wp-content/uploads/2019/10/LSTA_apzvalga_2018.pdf

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Table 2.1.2.6. Projected trajectories for RES energy production by fuel type in theheating and cooling sector, KTNe[43]:

	2020:	In 2022	Year 2025	Total	By 2030.
Energy demand for decentralised heat generation, ktoe	1 497,4	1 508	1 351	1 252	975
Decentralised heat production from RES, ktoe	644,5	602	566	546	491
Coal for decentralised heat production, ktoe	147,8	177	131	109	79
Petroleum products for decentralised heat production, ktoe	150,7	176	164	158	142
Useof natural gas fordecentralised heat production, ktoe	554,4	553	490	439	263
Energy demand for district heating, ktoe	1029	947	940	870	870
District heating heat from RES, ktoe	723	728	811	791	790
%Share of energyfrom renewable sources in combined heat	**50,2**	**51,77**	**63,7**	**68,3**	**80,3**
%Share of energyfrom renewable sources in district heating	**74,7**	**73,1**	**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 reduceenergy demand by 2030. New technologies (heat pumps,modern biofuel boilers, etc.) and therenovation ofmulti- apartment buildings will have the greatest impact. If theadditionalmeasures envisaged are implemented, a higher share of RES in heat and cooling than currently foreseen could alsobe achieved. It should be noted that achieving the2030 targets requires full implementation of the planned policy measure, as described in Sections 3.1.2 and 5.1.

According to theupdated NEPTs, the DH sector aims to movetowards climate- neutral heat production pathways and an enabling environment for investments in technologies promoting energy efficiency and the deployment ofnew RES technologies. The mainobjective is thatall heat energy is produced from biomass and other RES by 2050.

Theshare of RES in the composition of fuelsused in heat production shall be at least 90 % in 2030 and100 % in2050.

[43] Results of the PPP modelling scenario assuming that all planned policy measures will be implemented

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Section A:

Key orientations for thetransformation of the DH sector:

(solar energy;

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diversificationof climate - neutral energy sources for heat generation, waste heat, other RES technologies,installation of heat storage);

- Partialelectrification ofDH systems using ambientenergy, electricity, waste heat and excess heat (cool);
- thecreation ofshort-and long-term energy storage capacities;
- bio-cogeneration and the use of sustainable local biofuels;
- theinvolvement ofheat suppliers (producers) in the provision of electricity system flexibility and balancing services;
- Transformation ofDH systems to adapt them to low- temperature operation (fourth generation DH systems);
- useofwaste heat from hydrogen production and processes inother industries in DH systems;
- Deployment ofCCS technologies in heat generation installations;
- Digitalisation ofDH systems and deployment ofsmart grid management solutions;
- Enhancing the resilience ofDH systems againstexternal (climate and hybrid) threats;
- Developmentof DH in towns, densely populated areas, replacing polluting individual heating;
- implementation ofmeasures to improveheat efficiency, includingmodernisation of multi-apartment housing systems and heat stations, efficiency ofmaintenance.

The district cooling networkis not developed in Lithuania. Residential and commercial premises are individuallycooled using electricity to produce cooling . The annual preliminary demand forcooling energy in Lithuania ranges from 5 TWhto 6 TWh. Theneed forcooling has been identified on the assumption that the need for cooling in Lithuania is about 60 kWh/m^2 per year, but in order to develop this sector,it is necessary to assess that this would only be useful when only buildings that are alreadyequipped with acentralised (common mechanical) ventilation system, i.e. offices, supermarkets and new high- energy multi-apartment buildings, are connected to the grid, as investments inold multi-apartment buildingswould be unreasonably high in order to exploit the advantages of district cooling. In this case, the annual cooling energy demand wouldbe reduced to 2-3 TWh.

On6 April 2023,amendments toLaw No IX-1565 on theheat sector were adopted to promote long -termplanning ofheat supply systems and motivating measures for investments related to thedecarbonisation of heat supply systems, increasing heat efficiency, reducing heat consumption demand and reducing heat losses:

- legal regulation for the purchase of wasteheatandthe purchaseof heat fromindependent heat producers has been introduced to promote the decarbonisation ofheat supply systems.
- strengthens heat sector planning and moves to ten-year planning by introducing two layers ofheat sector planning documents: special plan for the heat sector andten- year investment plan for thedevelopment of theheat sector of the heat supply undertaking:

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and thespecialplan for theheat sector is amunicipal special planning documentdrawn up for a period of ten years, identifying existing and planned newareas forheat customers, identifying potential andalternative heating methods, heatgenerationinstallations,meeting theneeds of heat consumers atreasonable andminimum costs and not exceeding the permissible negative environmental impacts, as part of theimplementation of heat sectormeasures.;

and theten- year investment plan for thedevelopment of theheat sector of the heatsupply undertaking shall specify the plan for the development and modernisation of the heat supply system and theprospectiveareas for the development of the heat supply system; planned investments, timelines and sources of financing for thedevelopment of theheat supply system based on acost -benefit analysis; forecasts ofdemand for energy resources by fuel type; theneed fornew heat generation facilities (capacity (MW), location of connection to the district heating system and planned start of operation), prioritising greenhouse gas emission-reducing technologies; a plan to improve energy efficiency and reduce heat consumption; thedevelopment of the services provided by the heating undertaking and a plan toimprove thequality of those services; effective measures to reduceenergy poverty, improve energy efficiency, improve heat security and competition; potential sources ofuse of renewable energy sources, waste heat and theways and means ofintegrating them in theheat supply system and their development planned in thelong term.

- heat suppliersshall, in cooperation with thedistribution system operatoroperating in the area covered bytheir operating licence,assess at least once every three years the feasibility ofusing the district heatingsystem to provide flexibility services in the electricity system, usingelectricity demand management, storage ofexcess electricity produced from renewable sources.

Market for biofuels

The inevitable development of the biofuels market is linked to the tightening of sustainabilityrequirements forbiomass fuels in the EU. In thelong term, the DH sector will need todiversify the RES resources used in heat production and thecomposition of RES fuels, since too much dependence on a single energy source in energyis not asustainable and long-term solution, buta diversification of RES and technologies used inheat productionis essential. The biofuel unit of the Vilnius CHP plant (the biofuel unitwill consist of two 95 MW identicalsteam boilers and one steam turbine with anelectricity generator of about 73 MW)will have a significant impact on the biofuel market due to the increasing demand for biofuels.

The NENS has identified biofuels as an energysource of strategic importance for one of the most important services,namely the provision ofdistrict heating tourban residents. Itis in the interest of theState to ensure sufficient supply ofbiofuels, sustainable use of biofuelsin energy production, low levels ofconcentration on theLithuanian biofuel market, an optimal balance between local biofuel production and biofuel imports from neighbouringEU countries ,and to increasetransparency in the biofuel market, which would allow Lithuania tohave reliable information on the state'sstocks ofbiofuels and more predictable information on biofuel supply.

The increasing demand for biofuels (including thesanctionsimposed by theEuropean Union as a result ofRussia's and Belarus's war against Ukraine and the halted imports of timber from these countries) istaking place ina number of ways

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measures:

- Scientific work carried out on behalf of theMinistry of the Environment in2023 entitled ‘Establishinganassessment and proposals for thedevelopment potential of the use of domestic wood fuels for heat production, possible scenarios andtheir impact on biofuel and its raw material, heating prices and sustainability’[36]. This scientific work assesses thesupply ofwood fuel from local resources and the untapped potential in Lithuania, including from sources such as electricity, maintenance and cleaning ofpipeline routes, self-forested agricultural land,etc.;
- In2022,the State Forest Serviceoffered 430.3 thousand 3 years tothe market, andbuyers bought 299.2 thousandyearsof ^{3}deforestation residues and in 2023 315.2 thousand$^{m^3}$. In addition, biofuel -producing companies were able to procure thefollowing raw material(lower quality and cheaper raw wood sorters) for the production ofbiofuelsfrom the auctions for the sale of wood : the stormsold 552 thousand^3 papersin2022 , 639.5 thousand^3 in2023 , 540 ^{thousand} in2022,623.9 thousand ^{3}in2023 and611 thousand ^{3}in 2022 , 685.8 thousandin 2023 . Similar quantities of this wood are sold annually;
- in order to ensure thestable supply oflogging residues to themarket, the Operational Strategy of theState Enterprise State Forests 2023 -2027approvedby Order No V-3 of the Minister for the Environment of13 January 2023 approving theOperational Strategy of the State EnterpriseState Forests 2023-2027 sets the following strategic objective: offer for sale and/or processing of biofuel raw material (deforestation residues) of 400 thousand KTM. In order to achieve theobjectives, targets and plans set, the EUproduces biofuel raw materials (deforestation residues) not only in primary, educational and sanitary cuttings, but also through the crossing ofdangerous trees in the protection areas of power lines, the cleaning of ground, packets, quarries and boundary lines and other special fellings.

As regards increasing theplacing onthe market of logging residues as the worst raw material,the increase in supply of this raw material is severely constrained bynatural conditions: inwet forests, logging residues are used for technological purposes by harvestingtimber from harvesting sites, while dry forests, dominated by pine forests, naturally retain lowerlevels of felling residues due tolower pine branching (the branches between felling residues account for around 90 %). In addition, harvesting residues are a by-product of felling and, in general, an increase in the volumeof felling ispossibleonly through an increase in the volume of felling, but there is no intention to increase the volume of felling. The above- mentioned scientific work is one of theactions of the Ministry of the Environment onissues related to the supplyof biofuel raw materials, which includes anassessment ofLithuania’s wood fuel supply potential, methods and sources of supply(including logging residues).

Taking into account theresults of this scientific work and expert assessments, thesustainability criteria for REDIII biomass will not have a substantial impact on thedomestic supply offorestbiomass available forenergy purposes from 2021 to2030 and the potential wood fuel flow from ongoing logging isexpected toremain around KTM4.3-4.5 millionbetween 2024 and 2030. Accordingly, thiswill also have no material impact on theachievement of theLULUCF targets for2026-2030.

The transfer of approximately 20 thousandha of state-owned forests fromthe Free State Land Fund by theGovernment Order will increase thesupply of biofuel wood to the market(KTM 200 thousand and more per year). As the amount of wood stored in these forests in mature stands amounts to aroundKTM 1.8 million, the potential to be used for biofuels is sufficiently significant.

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36 https://am.lrv.lt/public/canonical/1720515372/13624/LT%20APM%2018%20medienos%20 kuro%20panaudojimo%2 0galimybi%C5 %B3 %20value%20v.3 %20(5).pdf

In accordance withResolution No972 oftheGovernment of the Republic of Lithuania of 17 November 2017 approving thedescription of the procedure for trade in raw timber and logging residues produced in state forests, the State Forests Ministryof State Forestswas entrusted with the production and sale ofbiofuels. Tothat end, thefollowing sorts ofwoodraw have been reserved for biofuel production in the period 2023-2024 (up to 20 % oftheir planned production per calendar year): fuel wood, flat timber, paper logs (total amount of about 380 thousand KTM) and logging residues (approximately 80 thousand KTM).

Similarly, following anamendment in early2024 to thedescription of the procedure for trading in raw timber and logging residues produced in state forests, approved by Resolution No 972 of theGovernment of theRepublic of Lithuania of30 November 2017 approving thedescription of the procedure for trade in raw timber and logging residues produced in state forests, theprinciples for the application ofopen auctions (competition for the real-timepurchase oftimber) for thepurchase oftimber produced instate forests under short-term contracts (around 10 % to 20 % of the totalvolume of timber sold) were laid down. There are no restrictions on participation in the auction (the wood will be sold to thehighest bidders), increasing the ability for buyers to compete effectively for timber and to procure it at a higher price inopen auctions. From thebeginning of 2025, the principles forthe application ofopen auctions are planned for all auctioned timber. This is alsolikely to have a positive impact on the supply ofraw materials forbiofuel production by the biofuel sector.

It should be noted that theincrease in demand for biofuel feedstocks and themeasures taken and envisaged to meet these demand will not have anegative impact onforest ecosystems and biodiversity, as these measures are selected and applied onlyin the light ofall environmental requirements. Theapplication of thegenerally recognised principles ofsustainable forest management in the country’sforestry and its regulation is also counterproductive, while Directive (EU) 2018/2001and its amendment /addendum 2023/2413on thepromotion of the use of energy fromrenewable sourceson thesustainability and GHGsaving criteria of biofuels and Regulation (EU) 2023/1115 of the European Parliament and of the Council on the makingavailable on theUnionmarketandexport from the Union ofcertain commodities and products associated with deforestation and forest degradation provide additional protection andrepealing Regulation (EU) No 995/2010.

Other significant events affecting thecountry’s biofuel market include:

- RenewableSources ofthe Republic of Lithuania approved on28 April 2022
  the provisionsamending andsupplementing Article2 ofLaw NoXI -1375 onenergy, whichtranspose the provisions [37] of Directive (EU) 2018/2001on thepromotion of the use ofenergy from renewable sources asregards thesustainability andgreenhouse gas saving criteria for biofuels,which are bindingon allMember States of the European Union, as well as the provisions laying down theprocedure for the certification of compliance with sustainability requirements forbiomass or raw materials for the production of biomass fuels;
  - witheffect from 1 May 2023, therequirement laid down in theLaw on energy from renewable sources for all Lithuanian energyresource market participants operating installations for theproduction of electricity, heating and/orcooling using biomass fuels with atotal rated thermal input of20 MW or more when using solid biomass fuels (or 2 MW or more in the case of gaseous biomass fuels) to use onlybiomass fuels that meet sustainability requirements;
- to develop theuse of indigenous, sustainable renewableenergy sources in biomass fuel production

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

in addition to thevoluntary biomassfuel certification schemes recognised by theEuropean Commission, theRES Act provides for the introduction of a national scheme to verifycompliance withsustainability requirements throughout the supplychain, making useof existing administrative structures, in addition to the voluntary sustainabilityverification process applied in practice. BALTPOOL, the operator of theEnergy ResourcesExchange, has been appointed toimplementthe voluntary national scheme.

In the heat sector, individual heat self-suppliers will moveaway from inefficient biofuel installations in households, while in the DH sector the goal is thatall heat energy is produced from biomass and other RES by 2050 . The RES share shall be at least 90 % in2030 and 100 % in2050.

More efficient use of biofuels in households requires:

- replacinginefficient biomass and fossil fuel boilers into more efficient, RES-based heat production technologies or efficient biofuel boilers;
- deploy efficient heat generation technologies using RES;
- limit theuse of solid biofuels for space heating in densely populated areas inorder to reduce the damage caused by particulate matter;
- promote theuptake of RES technologies.

The widespread use of indigenous biomass fuels not only increases energy independence, reduces theuse of fossil fuels, but also keeps energy prices stable, avoids high energy price hikes and has a positive impact on thecountry's economy. One of the main objectives is to increase the supply of sustainably producedlocal biofuels and to ensure that the production of biofuels can maximise the use of local raw materials, in particular deforestation residues.

The development ofsustainable biofuels will respect the following principles:

- biofuel suppliers and producers must seek to ensure that biofuels used in Lithuania comply with theestablished sustainability criteria;
- it is necessary to ensure that theprinciple ofcascading use ofbiomass isrespected in the production of biofuels,so that woody biomass is used in accordance withits highest economic and environmental added value, in accordance with theestablished order of priority, consisting ofusing only biomass that is no longer capable ofbeing used for wood-based products, re-use, recycling.
- where economically justified, the replacement of obsolete biofuel boilers with cogeneration or alternative RES technologies;
- it is important to increase thetransparency of the biofuels market, which would make it possible to assess theavailable stocks of biofuels suitable for heat production in Lithuania, toallow for amore reliable forecast ofdemand and supply, andto avoid significant increases inbiofuel prices duetouncertainty as to the availability ofsufficient biofuel supply on themarket.

The decarbonisation ofthe heat sector shall lead to the following results in the field of biofuels:

- 100 %share of RES in DH by2050 (biomass up to 50 %), RES share in decentralised heat supply 90 % (biomass up to 30 %);

- the supply oflocal, sustainable biofuelsmatches demand, thefluctuations in the quantities ofimported biofuels do not affect market participants, do not lead to a deficit or surplus of biofuels;
- a gradualreduction in the use of biofuels in the DH sector, replacing it with other RES technologies that would provide between 30 % and50 % of the annual DH demand;

reduction of particulate matter damage and final energy consumption by eliminating inefficient use of biofuels inhouseholds.

The mainchallenges for the biofuels market, the DH sector in the coming heating seasons , are tobalance thegrowing demand for biofuels and diversify the sources of heat productionby replacing depreciated biofuel boilers with other RES technologies.

Creating ahydrogen market

Climate change management objectiveswill lead to a transition to climate-neutral energy, withelectricity as akey driver, by reducing GHG emissions in transport,industry and other sectors with a view to achieving a climate- neutral economy. Theelectrification of the various processes currently using fossil fuels and theproductionof water-based green hydrogen ('hydrogen') and derived hydrogen products (ammonia, methanol, green synthetic fuels, etc.) will increase their consumption.

Lithuania has the opportunity and theconditions tocapitalise on the ongoing energy developments and boost the creation of a new energy industry. The rapiddevelopment of RES production facilities, carbon capture potential and energy infrastructure create favourable conditions for thedevelopment ofhydrogen and derived hydrogen productionin Lithuania.

While there are different types ofhydrogen, it is green hydrogen to be considered as one of themain energy carriers in thefuture and a tool to achieve theEU's climate change management objectives. There are noplans topromote the uptake of low-CO2 hydrogen as it does not guarantee theachievement ofenergy independence. Low-CO2 hydrogen is typically produced from fossil fuels withcarbon capture , andLithuania'sdependence on imported fuels therefore remains.

Hydrogen is seen as a measure to reduce GHG emissions and replace fossil fuels in part ofpolluting industrial processes, as well as as alternative fuels in the transport sector, and asa means tobalance the energy system and store excess renewable electricity.

Hydrogen is considered to be the axis of the entire energy transformation,which is essential for the decarbonisation of industry, transport, as well as for the further development ofrenewable electricity, using periods of surplus electricity. This enables energy independence to be achieved and thegrowing demand forelectricity to be met.

Fordecarbonisation purposes, hydrogen can be afeedstock or a source of energy in processes and sectors where direct electrification isnot technically feasible or competitive. Lithuaniacanproduce around264 thousandtonnes of fossil-based hydrogen per year based on existing fossil-basedhydrogen production capacity. The primary consumer of fossil-based hydrogen is industrialcompanies that use it in their own processes or in theproduction ofproducts. About 200 thousand tonnes ofhydrogen are used for ammonia production and some54 thousand tonnes are used for theproduction ofrefined petroleum products.

SectionA:

In theEU Hydrogen Strategy for a climate-neutral Europe (the 'EU Hydrogen Strategy'), published in2020, hydrogen plays an important role in delivering on theEU'scommitments to becomeclimate neutral by 2050. In the energy system of the future, hydrogen is expected to play an important role in reducing GHG emissions and building a competitive climate- neutral economy. The planned location of the green hydrogen ecosystem in the EU-wide energy system creates theneed for each Member State to prepare and approve more detailed nationaldocuments for thedevelopment of the hydrogen ecosystem.

Having assessed theEU's objectives and its potential to develop a green hydrogen ecosystem, Lithuania also envisages highlighting the mainstages of thedevelopment of green hydrogen, activelyinvesting in theproduction and use ofhydrogen inorder to achieve its commitments toreduce the impact on climate change and increase energy independence. In order toassess and define thesteps to be taken for thedevelopment of hydrogen in Lithuania, theGuidelines for thedevelopment of hydrogenin Lithuania for2024-2050 (hereinafter ‘ theGuidelines’) were drawn up andapproved by Order No 1 -81 of the Minister for Energy of the Republic of Lithuania of26 April 2024approving theGuidelines for thedevelopment ofhydrogen in Lithuania for 2024-2050. The document defines thestrategicorientations and milestones for the development ofhydrogen, the business environment and challenges for thedeployment of hydrogen technologies inindustry, transport, energy generation and other sectors.

The objectivesand targets set out in theGuidelineswill be pursued in line with the Roadmap Implementation Plan, which aims toensure theefficient and seamless development ofhydrogen by2030 , while creating the right preconditions for the furtherdevelopment of hydrogen by2050 . Theimplementation plan outlines measures to achieve theobjectives and targets of thehydrogen guidelines.

Key orientations for thedevelopment ofhydrogen and derived products up to 2030:

- development ofovercapacity inRES production;
  - establishing aflexibleinfrastructure and market for theproduction, transport and market of green hydrogen and its derivatives;
  - promoting international cooperation for theintegration of hydrogen markets, the competitiveness of the internal market (avoiding monopolistic market formation), the introduction of a competitive price for hydrogen for consumers and thecreation ofopportunities for Lithuania to export hydrogenand hydrogen derived products;
  - ensuringtechnical safety and health standards for theproduction, use, storage and transport ofhydrogen and derived hydrogen products;
- developing, puttinginto practice and exportinggreen hydrogen technologies.

From 2030 to 2050, hydrogen technologies, especiallyelectrolysis production and storage, should be sufficiently developed to reach allhard-to-decarbonise sectors where other GHG reduction alternatives may notbe feasible or entail higher costs. As part of thedevelopment of the hydrogen ecosystem and infrastructure, new hydrogen projectswill be launched by2030 to create new production, transport and utilisation capacities, as well as additional studies or demonstration projects. Theprojects implemented will enable the adaptation of theuse of hydrogen in industry and transport, the development of hydrogen infrastructure, the development ofcompetences and the wider use ofhydrogen after 2030. Cooperation between theLithuanianstate, higher educationinstitutionsand energy companies in the training ofprofessionals, their involvement in ongoing pilot projects and thepromotion of industry is essential.

SectionA:

cooperation with other countries.

By 2050,green hydrogen should become a critical tool for achieving a climate-neutral economy, reducing GHG emissions fromindustry, transport, energy and other sectors, as well as becoming an integral part of the transition to a100 % climate-neutral energy system.

Lithuania is likely to become a significant producer of hydrogen, given the planned significant RES development, the localindustry that will require significant volumes of green hydrogen, and the geographically favourable conditions for creating import and export routes with other EU countries. Attracting hydrogen derivative producers, energy -intensive industries and services toLithuania could make a significant contribution to Lithuania’seconomic prosperity, further promote thedevelopment of RES production facilities and the payback ofinvestments in energy infrastructure. Thedevelopment of a high value- addedindustry would also ensure that the energy produced in Lithuania provides maximum added value to thecountry’s economy. Therefore, the export ofhydrogen derivatives over electricityis preferred to the economic benefit of Lithuania.

Lithuania hasa well- developed gas network that can be adapted to transport hydrogen. It is also envisagedto review options for thetransport and storageof green hydrogen,from heavy transport to hydrogen pipelines. Lithuania will have the opportunity to participate not only in thenormal European electricity trading market, but also in themarkets for hydrogen produced from green electricity and its derivatives, creating export capacity forhydrogen derivatives and exploiting thepotential ofKlaipėda State Seaport . The development ofbalancing andreserve capacity in the electricity system under economically justifiable conditions, aswell as flexible demand-side measures, would make it possible toexploit the country’sgeographical advantage by connectingEurope’s surplus countries with its industrialised regions. Due to the high supply ofRES energy, itis planned that in theNordic and Baltic States itwill be cost-effective todevelop generation capacity for thetranslation of electricity into hydrogen and derived hydrogen products, as well as to enable thefurtherdevelopment of RES in these countries.

The main priority is to use hydrogen locally for theproduction ofderived hydrogen products, while at the same timedeveloping infrastructure fortransporting hydrogen via pipelines. Thisinfrastructure is expected toallow the export ofpure hydrogen, as well as increased energy security, cross -border access to hydrogen storage and help Lithuania’s integration into the EU hydrogen market. The main project for thedevelopment ofpipeline hydrogen transport infrastructure is theNorth -Baltic Hydrogen Corridor Development Initiative, which aims to establish theinterconnection of hydrogen gas systems between countries with a high supply ofhydrogen resources (Finland) and demand (Federal Republic of Germany, Republic of Poland)that will be able toimport hydrogen from other European or neighbouring countries toensure storage and demand forhydrogen.

By 2050,Lithuania will self-build the necessary energy resources and become anexporter. Hydrogen and derived hydrogen products will be the basis for these exports and the residual heat generatedduring the production of these products can be used in DH systems for heatingbuildings and hot water.

It is projected that around1.12 TWh ofwaste heat from hydrogencould be recovered in2030.

One of the main tools to harness thepotential of green hydrogen and its derivatives in the Lithuanian economy and export markets is thecreation ofgreen hydrogen valleys. Two green hydrogenvalleysare expected to be set up in Lithuania to develop production capacity, integrated projects in theindustry, transport and energy sectors, green hydrogen value chain components (e.g. electrolysers)

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production, creating a favourable investment environment and exploiting Lithuania’s geographical location and cross-border interconnections. Green hydrogen valleys are planned to be developedin or near existing industrial sites,using thepotentialof existing industries toproduce and consume hydrogen, as well as thedistance to electricity from RES production sites. The exactlocations of green hydrogen valleys will be selected after thorough assessments. Green hydrogen valleys will not be developed in protected areas.

The main sectors in which hydrogendevelopment is envisaged are industry, transport and energy. In other sectors, the use of hydrogen will also be promoted to the extent that it contributes to Lithuania’s climate change management objectives and energy independence. In the industry, transport and energy sectors, hydrogen has thepotential to replace theuse ofpolluting fossil fuels, reduce GHG and other emissions, as well as contribute to balancing imbalances in electricity generation from RES.

In the industrial sector, hydrogen plays an important role in its use in production processes and in the production ofvarious chemical compounds, the refining of petroleum products and the processing of metals. Hydrogen as a raw material is used in the production of ammonia, methanol, hydrogen peroxide, solvents,plastics, polyester, nylon. Hydrogen is also frequently mixed with argon and used in metal welding. The industrial sector is one of themost promising for theuptake of green hydrogen if hydrogen believers ensure acompetitive price forit. In addition to thefertiliser and refinery industries replacing fossil-based hydrogenproduced and consumedso far in significant quantities, green hydrogencould potentially be used in other high-temperature industrial processes (glass, cement, etc.) and substitute natural gas.

In the transport sector, hydrogen and green synthetic fuels can be used asanenvironmentally friendly alternative to petrol, diesel, natural gas or petroleum gas. Hydrogen in gaseous or liquid form may be used in fuel cells or specially designed internal combustion engines anddoes not release harmful particlesinto the environment during combustion. Some of the existing vehicles, especially passenger cars, can be replaced by electric cars, but the electrification of heavy-duty transport is much more complex due to limited technical feasibility and high costs. There are practicalproblemswith theuse of batteries in heavy-duty vehicles on long journeys, leading toother energy sources (e.g.: hydrogen, synthetic methane, green synthetic fuels) can be abetter alternative for fuelling on non- electrified lines on trains, inland and short distance shipping or air transport.

In the energy sector, the developmentofelectricity generationcapacity using RESis essential to decarbonise . The dependence onhydrometeorological conditions makesit difficult for generating installations using RES to ensure thestability of electricity generation, which complicates thetransmission and distribution of electricity. In order to make efficient use of thegenerated electricity and to reducethe technical challenges associated with the management of the electricity grid, it is necessary todevelop energystorage solutions that allow for the storageand use ofexcess energywhen the market lacks electricity.

The most widespread uptake of green hydrogen in the energy sector will be the use of surplus electricity from RES to exploit low and negative market prices, thus achieving competitive hydrogen cost. Green hydrogen production through electrolysis will be used toensure flexibility of electricity generation, electricity system flexibility services and stability of electricity grids, while implementing hydrogen storage and/or other hydrogen system flexibility solutions. In the context of limited hydrogen storage possibilities, it is important that theproduction ofhydrogen derivatives is also flexible inorder toensure participation in energy system flexibility markets. Low electricity prices enable the production ofgreen hydrogen at competitive prices, as well as the use ofderived hydrogen

themanufacture ofproducts. It is theproduction ofhigher value-added derived hydrogen products that is one of the most important objectives for thedevelopment of hydrogen use in Lithuania.

Creating and expanding thegreen hydrogen ecosystem is also one of themost important challenges for the EU’s path toclimate neutrality and a competitive climate- neutral economy. It is planned thatthe EU could investup to EUR470 billion in green hydrogen by 2050. The investment scale forecastset out in the EU Hydrogen Strategy ensures that in the future, the EU will focuson promotinghydrogen technologies and its production when designingfuture support mechanisms. Lithuania could generate around EUR2.2 billion in investment by 2030 and EUR14.4 billion in investment by 2050.

Looking at possible scenarios for the development of the hydrogen market, there is a significant investment need for the constructionof new infrastructure. This will include ensuring the investment and borrowingcapacity of the hydrogen transport network operator, upgrading theregulatory environment to allow thedevelopmentof hydrogen transport infrastructure, ensuring early connectivity of hydrogen production, storage facilities andconsumers, andmaking financing decisions faster and more efficient.

It is estimated that investments in the development ofhydrogen and thedevelopment of theRES production facilitiesneeded for it will require around EUR 4389 million by2030. By combining public and private funds, this need could be met by EU funding programmes and public investment, and partly by private funds.

It is estimated that hydrogen -related works and servicescan create around 7 thousand new jobs by 2030 andaround 20 thousand jobs in 2050. The benefits of the hydrogen ecosystem for the country's economy are setto grow from EUR414 million to EUR3.1 billion over two decades, from 2030 to 2050 . Additional savings fromreduced fossil fuel imports are also expected.

In2030,4.26 TWh (129 thousandtonnes) of green hydrogen production is projected torequire 1.3 GW ofelectrolysis capacity and6.51 TWh of electricity consumption. The highest demand for 7electricity is expected for hydrogen production in the areas of fertilisers and oil refining. Theneed for other areas will be marginal and willnot have asignificant impact on electricity transmission and distribution networks. Lithuania plans to export around33 thousand tonnes of hydrogen in2030.

Lithuania's needs in2050 may require 24.16 TWh (732 thousand tonnes) ofgreen hydrogen, whichwill require8.5 GW ofelectrolysis capacity to be installed and36.36 TWh of electricity consumed. Lithuaniaplans to export around44 thousand tonnes ofhydrogen in 2030

Table 2.1.2.7. Expected need for green hydrogen between 2030 and 2050

Need for green hydrogen	**By 2030. (in ' 000 tonnes)**	**In 2040 (in ' 000 tonnes)**	**Total (in ' 000 tonnes)**
Export	33	51	43
Transmission losses	1	4	7
Production of electricity	0	0	17
Transport	8	32	51
Industry (fertilisers and chemical production)	82	240	472
Industry (oil refining, green synthetic fuels)	5	92	141
Total:	129	419	732

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Creatingacarbon capture market

The CO_2emissions of thelargest companies participating in theETSare projected to reach -1 milliontonnes of fossil CO_2and0.6 million tonnesof biogenicCO_2 in2050. The installation ofCO_2capture facilities inthese plants would facilitate the economic use of CO_2capture ofdifferent origins at the same time.

In addition to thewaste incineration sector, large sourcesof biogenic carbon dioxide in Lithuania are the biomethane and biofuel combustion sectors. Biogenic carbon dioxide can also be released during ethanol production.

Lithuania is rapidly developing biomethane production. Biomethane production in Lithuaniaaims toreach 1.4 TWh in 2030 and 3.4 TWh from 2040 onwards. If $CO_{2capture}$ facilities were to be installed inall biomethane production sites, thenaround0.19 milliontonnes ofbiogenic carbon dioxide could be captured from the total biomethane production in 2030 andaround 0.45 milliontonnes per year from 2040 onwards.

In biofuel combustion plants,biogenic CO2 will be around 2.3 milliontonnes per yearbetween 2030 and 2040in the major facilities and1.4 million tonnes of CO2per year, of which approximately 420 thousand tonnes ofbiogenic CO2per year.

It is appropriate to construct CO2capture facilities in plantswhich, due totheir specific production process, are unable to meet the climate neutrality objectives and have no other possibilities for decarbonisation, in the largestbiofuel and waste incineration facilities, as well as in areas whereseveralsources of biogenic CO2 areconcentrated, if this isfinancially appropriate.

Table 2.1.2.8. Potential for carbon capture in Lithuania, million tonnes /year.

	By 2030.	In 2040	2050 *
Fossil CO2capture forecast (Source CO_2: companieswith thehighest share ofemissions in the Lithuanian ETS)	0	2,4	1,0
Biogenic CO2capture forecast (Source CO_2 – Biomethane production, waste incineration, biofuel production and/or use)	0,2	3,5	2,4-3,5

**In 2050 ,biogenic capture potential may decrease if heat networks are electrified and/or heat producers decide to electrify(the40 %reduction threshold is indicated).*

In theabsence of CO2 emissions avoidance, a climate- neutral economy and zero CO2 emissions at national level can be achieved through the promotion of negative emissions or other forms ofoffsetting of GHG emissions, theexpansion of forest areas and theexpansion offorestry activities,or where theCO_2 captured frombiogenic and/or atmospheric origin is used or transportedfor disposal ingeological structures and/or is permanently locked in chemical compounds such as concrete products or other products.

Lithuania may, on the basis of aneed assessment, be equippedwith a CO2 export terminal. This terminal would allow thereliable and efficient transport ofCO_2 captured in the region to itsfinal offshore storage sites (outside the territory of Lithuania).

Transport of carbon dioxide will take place via gas carriers, rail and pipelines. The specific mode of transportwill depend on thequantities , distances, economic and financial feasibility of the CO2 captured.

Biogenic CO2fromrenewable sources will be used for higher value-added products

production as a raw material in various industries, production ofsynthetic green fuels or other chemicals to meet Lithuania's needs and exports to other countries.

One of themost promising uses ofbiogenic CO2 is theproduction ofsynthetic green fuels (synthetic methane, methanol, aviation fuels and synthetic diesel), decarbonising aswell. Theproduction ofsynthetic green fuels could take place in areas where there are good conditions for biogenicco2 capture.

The objective is that, by 2050 , fossilcarbon dioxide emissions from companies thatare unable to achieve climate neutralityobjectives due to their specific production process and have no other potential for decarbonisationareequal to their captured carbon dioxide. By promoting thedevelopment of the circular economy in thecountry and contributing to Lithuania's economic growth by developing highvalue- added products, biogenic CO2captured by the production ofbiomethane, theuse ofbiofuels or the incineration of wastewould be used for theproduction ofinnovative productssuch as synthetic green fuels in Lithuania.

Streams topromote CO2capture:

- Deployment ofCO2capture technologies, prioritising biogenic CO2capture from biomethane production andbiofuels and waste incineration plants that can becapturedmainly from biogenic CO2;
- Constructionof CO2 transport infrastructure;
- Creatinga CO2 exploitation market and developing its potential;
- Promotion ofCO2capture business and investment;
- dissemination of information and public awareness ofco2 captureand utilisation technologies and benefits;
- technological innovation and research for efficient and technologically mature CO2capture technologies;
- regional cooperation to develop efficient co2 transport infrastructure;
- development of a monitoring system to accuratelyassess theeffectiveness and efficiency of CO2 capture, including CO2 capture based on its origin.
- Creating aregulatoryand legal environment for the CO2capture value chain.

Stages oftheCO2 value chain for capture, transport, storage and utilisation:

- by 2030, first biogenic CO2 capture and utilisation projects for the production ofsynthetic green fuels wereimplemented, prioritising the biomethane sector;
- by 2040, thefirst projects for CO2capture in large biofuel and/or waste incineration facilities wereimplemented;
- by 2050, fossil fuel CO2emissions from companiesthat are unable to achieve climate neutralityobjectives due to their specific production process and have no other potential for decarbonisationshall be equal to their CO2captured (i.e. climate-neutral companies);
- biogenic CO2 captured: 0.2million tonnes in 2030 and 3.5million tonnes in 2050.

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In order to promote biogenicco2 capture from biomethane production, biofuels and waste incineration processes,it is proposed to establish support mechanisms for the capture, transport anduse of CO2 for the production of synthetic green fuels. Such incentive mechanisms should encourage the use ofbiogenic co2 in the production ofhighvalue- added products such assynthetic green fuels and other chemicals .

TheInnovation Agency undertheMinistry of Economy and Innovation is currently carrying out ananalysisof theuse of CCUS technologies in Lithuania.

Production of new energy products and their export potential

The totalamount ofbiogenic CO2 captured in Lithuania from 2050 onwards could be produced in the following quantities ofsynthetic green fuels (optional) :

- synthetic methanol: around 2.5 million tonnes (14 TWh), which would require around 0.5 million tonnes of hydrogen, with an electricity demand for hydrogen production andco2 capture of around 30 TWh;
- synthetic methane: around 1.3 million tonnes (17 TWh), which would require around 0.5 million tonnes of hydrogen, with an electricity demand for hydrogen production andco2 capture of around 30 TWh;
- synthetic aviation fuels: approximately 0.85 million tonnes (10 TWh) and synthetic diesel: around 1 million tonnes (13 TWh) wouldrequire around 0.7 million tonnesof hydrogen, with an electricity demand for hydrogen production andco2 capture of around 43 TWh.

These CO2- based synthetic green fuels would become an important economic and environmental element to diversify energy sources and reduce dependence on fossil fuels. At present, it is not yet clear on the market which synthetic green fuels will be the most in demand and whichspecific green fuels will beneeded in the future. Thedevelopment ofgreen fuels is influenced byvarious factors, such asmarket trends, fuel production costs, competition with other alternative fuels and advances inscientific innovation.

Other hydrogen derivatives, such as ammonia,may alsobe produced in Lithuania, which can contribute both to national decarbonisation objectives and to theexport of energy products. Based on the above projections, Lithuania will aim to produce at least 2 TWh of hydrogen derivatives in2030, i.e. synthetic green fuels (theproduction of which wouldrequire around 0.4 million tonnes ofbiogenic CO_2),and at least 9 TWh in2050. It is likely that about one third can be used locally.

2.2. Dimension energyefficiency

Improvingenergy efficiency (EE) is a key priority in thefield of energy until 2050 and is enshrined inthe NationalEnergy Independence Strategy adoptedin2018 and updated in2024. Lithuania aims to continuously and consistently increase EE, introduce newer and less energy-intensive technologies, increase consumer education and change their behaviour. Industry, buildings and transport have thegreatest potential to increase EE when assessing the cost -effectiveness ofefficiency measures. Primary and final energy consumption in2022 and target for2030 are shown in Table 2.2.1. It should be noted that achieving the 2030 EE targets requires full implementation of the planned policy measures, as described in sections3.2and 5.1.

2.2.1. *table. Primary and final energy consumption and target* in*2030 ktoe:*

	In 2022	**By 2030.**
Primary energy consumption	6 574,6	5 440
Final energy consumption	5 478,7	4 384

2 WRAP-mode:wrapped-both; Frame-height:18.5pt; Frame-type:textbox; Frame-width:12.700000000000001pt; BG-s background-color:FFFFFF; position-to:column-above-textwrap-mode:wrapped-both; Frame-height:13.450000000000001pt; Frame-type:textbox; Frame-width:157.20000000000002pt; BG-style:1; background-color:FFFFFF; position-to:column-above-textypos:0.000000 in; Frame-width:2.320139 in; Frame-height:0.359722 in; xpos:6.034722 in; Frame-type:imagewrap-mode:wrapped-both; Frame-height:15.85pt; Frame-type:textbox; Frame-width:47.5pt; BG-style:1; background-color:FFFFFF; position-to:column-above-text

The targets inTable 2.2.1, as required by the new EE Directive 2023/1791, tookinto account: (1) theEuropean Union's final energy consumption target (maximum 763 Mtoe) and theprimary energy consumption target (maximum 992.5 Mtoe) for2030; 2) measures to promoteenergy efficiency atstate level and at EU level; (3) other relevant factors affectingefficiency efforts (early efforts and ongoing actions in the field of energy efficiency, equitable allocation of effort across the EU, energyintensity of the economy and remaining cost-effective energy savings potential); (4) other national circumstances affecting energy consumption (GDP and demographic changes and forecasts, changes in energy imports and exports, changes in the energy mix and deployment of new sustainable fuels,development of all renewable energy sources, nuclear energy, carbon capture and storage, decarbonisation ofenergy intensive industries,level ofambition of national decarbonisation or climate neutrality plans, economic potential forenergy savings and available climate conditions and climate change projections).

The objectives of this plan and the NENS in the field of energy efficiency have been aligned. In order to achieve the objectivesset out in Table 2.2.1, Lithuaniahas identified priority axes, namely:

- promote integrated renovation of residential (multi-apartment and individual) and public buildings (priority for renovationof residential areas) andenergysavings of up to 18.6 TWh by 2030;
- encourage theindustrial sector to develop, deploy and develop innovative, energy-efficient and environmentally friendly technologies and facilities;
- increase EE in transport throughfleet renewal, transition to modern and efficient public transport, optimisation of transport and alternative fuel infrastructure, electrification or use of alternative fuels.

In line with therequirements ofArticle 5 of the new EE Directive 2023/1791, from 2026 onwards,Lithuanian public sector bodies'final energy consumption will decrease by1.9 % annually comparedto 2021 excluding public transport and theenergyconsumption of the armed forces. This will be achieved by public sector bodies through the renovation of public buildings, the replacement of conventionally fuelled vehicles into electric vehicles, and the modernisation of existing outdoor lighting systems into more efficient ones. In2024 , a study on the analysis of the legislation on themodernisation of public buildings, collecting data from electricity,gas and heat suppliers, as well as from public authorities on fuel consumption, found that public sector bodies (excluding public transport and national defence) had consumed 5523,4 GWh of energy in2021. Of this, 3237,1 GWh (or 58.6 %) were consumed bymunicipal authorities and 2286,3 GWh (or 41.4 %) bycentral government authorities.

In line with therequirements ofArticle 8 of the new EE Directive 2023/1791, the mandatory end-useenergy savings target for Lithuania has been calculated at39.3 TWh (3383,9ktoe) of end-useenergy savings by 2030.According to Eurostat,final energy consumption in Lithuania was 5099 ktoe in 2016, 5344ktoe in 2017 and 5568ktoe in 2018. The averagefinalenergy consumption in Lithuania for these 3 years is 5337 ktoe. As the building sector accounts fora significant share of final energy consumption, Lithuania is making significant efforts to improve the energy performance ofbuildings. Around5000 multi-apartment buildingsare planned to be renovated by 2030, or 750000 m 2[buildings], withenergy savings of around 5.5 TWh. By 2030

therefurbishment of individuals' individual dwellings (one or two)is expected to save 5-6 TWh of energy. Therewill also be a strong focus on refurbishment of public buildings. Accordingto 2021 data, Lithuania'scentral government owned around 5.88 million $m^2$of buildings, of which around 1.9 million m^2 are below energy performance class C. Thereform of thecentralgovernment buildings sector is currently being implemented and therefurbishment ofpublic buildings is being stepped up. Theobligation under Article 6 of the Energy Efficiency Directiveto refurbish every year 3 % of the floorarea of central government and municipal buildings by 2030 would amount toapproximately 510000 m 2 and[450000]m 2 respectively.

By decision of31 March 2021 (Protocol No 18), theGovernment of theRepublic ofLithuaniaapproved Ilgalaikei's renovation strategy, according to which all public and private buildings and residential buildings in Lithuaniawill have tobecome fully decarbonised by2050 and have azero carbon footprint.

Order No D1-336 of theMinister for the Environment of19 October 2022 approving the implementation plan for the long- term building renovation strategy [38]_approved theimplementation planof theLong-termBuilding Renovation Strategy , which is currently being implemented. One of the key elements oftheimplementation plan is the integratedrenovation of the district. ByOrder No V- 50 of the Minister for

38 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/35ee7b044fe511edba0ded10be2fa21c?jfwid=-shyvsv7so

the Environment of 27 April 2023 on theestablishment of aworking group to prepare the model for urban renewal,aworking group was set up to submitproposals and recommendations for the development of the model. The objective of the Task Force is to enable and implementpilot projects for the quaternal complex renovation model and torevise theintegratedrenovation model on the basis of these.

Targets for theimplementation of therenovation strategy and indicative milestones for2030, 2040 and 2050 are envisaged. To achieve these objectives,it is envisaged tofacilitate thecost-effective modernisationof440 thousand buildings, or some110 million squaremetres intheir area, over the next three decades. The strategy envisages reducing the annualprimary energy consumption of the building stock by60 % compared to2020, primary energyconsumption from fossil fuels (replaced by renewable sources) and CO2 emissions by 100 %.

According to the UCPD, the2030 targets for the transport sector forenergy efficiency oflight and commercial vehicles are:

- by 2027,to achieve that all public transport, taxis and transport forride hailing services in major cities use only RES energy;
- reach atleast20 % of thelight -duty vehicle fleet for electric and zero -emissionvehicles , develop the necessary recharging and refuelling infrastructure ;[39]
- by increasing thenumber of electric vehicles, achieve that:
  - by 2025, thenumberof electric vehicles of class M1 shall beat least 10 % and the number ofelectric vehiclesof class N1 shall beat least 30 % of the annual procurement transaction;[40]
  - by 2030, thenumber of M1 electric vehicles would represent at least 50 % of the number ofelectric vehicles and 100 % of theannual purchases of N1 class vehicles;
  - witheffect from 1 January 2030,vehicles of category N1 equippedwith internal combustion engines, with the exception of alternatively fuelled N1 vehicles, shallnot be registered;

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- by31 December 2030 , achievezero-emissionroad transport vehicles procured or used for the provision of services and consist, in relationto the total number ofroad transport vehicles purchased or used for the provision of services, of:
  - 100 % for M1, M2, M3, N1vehicles ;
  - 16 %for N2and N3vehicles ;
- increasing energy efficiency, RES and theuse of alternative fuels, promotingsustainable mobility for clean, connected and digitalised intermodal transport, ensuring a50 %reduction in the use of fossil fuels inroad transport by 2035;
- by 2035, limit passenger and logisticsservices to zero-emission vehicles.

2.3. Energy security dimension

WhenLithuania became a member of theEU in 2004, Lithuania becamepartof the EU’s single economic market,paving the way forrapidgrowth in Lithuania’s economy and otherareas of public interest. However, in the energy context, the conditions remained broadly unchanged, asLithuania remained systematically and infrastructurally linked to Russia’s energy system. Thefinal shutdown ofUnit 2 of the Ignalina Nuclear

39 Of which 15 % - EV

40 The TP classes shall be interpreted in accordance withRegulation (EU) 2018/858: https://eur-lex.europa.eu/legal-content/LT/TXT/?uri=CELEX%3A02018R0858-20240701

Power Plant on31 December 2009 further strengthened the Lithuanian energy sector'shistorical dependence on a single externalsupplier of energy sources. Considering that Lithuania did not have energy connections to the EU continental part and that all natural gas and most electricity were purchased from a single monopoly supplier, Lithuania started implementinginfrastructure projects of regional importance to connect the Lithuanian and EU energy systems.

Over the last decade, as partofa coherent energy security policy,Lithuania has been able tobreak Russia's pre-existing almost absolutedependence on energy supplies . In line with theobjectivesset out in the Energy Independence Strategy, the sources ofsupply of energy and energy sources were diversified, when theKlaipėda liquefied natural gas terminal (Klaipėda LNG)became operational in2014, electricity interconnections with Poland (LitPol Link) and Sweden (' NordBalt') were put into operation in 2015 and2016 , theconstruction of theLithuanian-PolandGas Interconnection (GIPL) in Lithuania was completed in2021 (launched in2022) and thelargest electricity storage system in Europe (200 MW/200MWh) started operating in2023 as awork reserveservice for the Litgrid isolated electricity system. In addition, theBūtingeOil Terminal was already set up and putinto operation in 1999. All this infrastructure allows Lithuania to secure thesupply of energy sources from alternative sources, so that thecompleteelimination of Russian imports of electricity, gas and oil does not have a negative impact on the Lithuanian energy sector and security of supply.

Theaim is therefore to continue theactivities undertaken, to make good use of thepotential ofimplemented and pending projectsof strategic importance to integrate into theEU's energy systems and to promote thesustainable, competitive and efficient development of theenergy sector through increased use oflocal and renewable resources, thedevelopment of competitive local energy generation capacity and the diversification ofimports of energy sourcesthat cannot be replaced by local ones.

The main measures inEU regulations toaddress the impact of the energycrisis caused by the Russian Federation include sufficient stockpiling of natural gas instorage facilities, reduction of natural gasdemand, limitation of natural gas prices,reduction ofelectricity demand and from Russia

Price cap onimports of crude oilby the Federation.

Lithuania responsibly appreciates and supports the EC's initiatives and therefore immediately started planning energy saving measures and developing recommendations for consumers thatwere accepted by thegovernment inautumn 2022 andthat were in line with theprinciples of the Saved Gas fora SafeWinter Communication. The main objective of the Energy Savings Plan is tosave20 % ofenergy over the next two years. In order to achieve thisobjective,public authorities were encouraged to save energy by changing behaviour and participating in the 'putinOut'national energy saving competition. However, when looking at thevolume of reduced gas demand, consumption was mainlyaffected by thesharp increase innatural gas prices , which resulted in consumption falling by around 30 % in Lithuania andby more than 50 % in the winter season.

Electricity sector

Following thecollapse of theSovietUnion, the accession states of theEuropean Unionhavegradually joined theContinental Europe Network (hereinafter referred to as the "Continental Europe Network") byPoland , the Czech Republic, Slovakia and Hungary in 1995,Romania and Bulgaria in2004 andUkraine and Moldova in2022. Theoperation of the Baltic States' electricity systems in theelectricity system of theCommonwealth ofIndependent States (hereinafter referred to as "the IPS /UPS system")is unique in this respect. Lithuania, Latvia and Estonia are the only Member States in theEuropean Union whose electricity systems are still operating in the PIC /UPS system, where the frequency of the system is managed centrally from the dispatching centre in Moscow. However, Lithuania and the other Baltic countries aim to become a self-sufficient part of the decentralised European electricity system and move towards transparent European standards for themanagement of the electricity system. A sufficientlevel ofenergy security for Lithuania and the Baltic States and full integration into theEU markets can onlybe achieved when our electricity system is desynchronised from IPS /UPS and connected to continental European electricity grids for synchronous operation.

Thesynchronousoperation of the Lithuanian electricity system at CET would eliminate the risk that cross-border transmission lineswould be disconnected as aresult ofunforeseen or uncoordinated actions/inactions by third countries , whichwould result inanisolatedoperation of theBaltic States'electricity systems or *a*blackout. Synchronisation with the traffic networks wouldmake it fully independent ofdecisions taken in Russia and wouldeliminate thepossibility of technically influencing thefunctioning of the Baltic States'electricity system.

In2021 , Litgrid completeda pilot battery project that allowed setting requirements for batteries connected to the electricity transmission grid and technologically testing different battery management techniques for the powersystem. On the basis of this pilot project, there is already a 200 MW battery energy storage system in Lithuania.

On24 February 2022, the Russian Federation launched an open military aggression against Ukraine and its people. In view ofthis and theincreased threat to thenational and energy security interests of the Republic of Lithuania, Lithuania intensified discussions with the other Baltic States and the European Commission on the desynchronisation of theaccelerated electricity system since theimplementationof the PIC /UPS system.

On22 April 2023, the Lithuanian electricity transmission system operator AB LITGRID successfully tested the isolated operation of the Lithuanian electricity system. Duringthis test, the Lithuanian electrical system was disconnected for thefirst time fromthe PIC /UPS system and operated independently.

On3 August 2023,the Prime Ministers of Lithuania, Latvia and Estonia signed a joint declaration committing to synchronise the Baltic States' electricity networks with theWestern European electricity networksby no later than

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February2025 .

On19 December 2023, the European Union Energy Commissioner and theBalticandPolish ministers responsible for energy signeda political declaration reaffirming thecommitment to connect theelectricity systemsof thethree Baltic States in synchronous operation with continental European networks via Poland byFebruary 2025. This declaration confirmed thedate of theprevious synchronisation at political level inFebruary 2025 by all countriesinvolvedin the implementation of the synchronisation. The declaration also confirmed the possibility that the second electricity transmission connection between Lithuania and Poland – Harmony Link – would be implemented by land instead of the previously planned off -shore connection.

Europe's largest electricity storage systemstarted its work in autumn 2023. Thesystem ofelectricity storagefacilities of200 MW/200 MWh shall providean instantaneous reserve ofelectricity for isolated work, i.e.large- capacity reserve storage devices shall be supplied immediately within 1 second when needed. This ensures the reliable provision of active power to the electricity grid until other sources of power generation are started. Lithuanian power plants currently operating in the IPS/UPS systemcan start providing energy within 15 minutes. The Lithuaniansystem of electricity storage facilities is necessary to ensure thesecurity of the Lithuanian energy system and theability to work in isolated mode. Theenergystorage system providingLithuania with aninstantaneous electricityreserve for isolated work before synchronisation with Continental European grids (KET) will be used for the integration ofenergy fromrenewable energysources after synchronisation. Similarly, in view of thedevelopments in the Electricity Market Design (EMD) reform (theprovisions of the ETD package published in the Official Journalof the EU inJune 2024, namely Directive (EU) 2024/1711 of the European Parliament and of the Council of13 June 2024on improving the electricity market design in theEuropean Union), theabove-mentioned 200 MW and 200 MWh storage system can alsobe used for theprovision of balancingservices in the electricity system. Fourbattery parks of 50 MW and 50 MWh eachinstalled Energy cells in Vilnius, Šiauliai, Alytus and Utena substations.

It should be notedthat, already at theend of2021, theelectricity system was successfully tested for emergency connection to the electricitygrids of the Republic of Poland via thesynchronous connection. The successful performance of these tests confirmed thereadiness of the Lithuanian electricity system to act autonomously if needed, to ensure desynchronisation fromthe PIC /UPS system and to connect to the TEC for synchronous operation before 2025 .

Thesynchronisation of theBaltic States with the continental European networks will take place through theextended existing connection between Lithuania and Poland, LitPol Link. When synchronisation is being prepared, internaltransmission grids in the Baltic States and Poland are strengthened, synchronous compensators areinstalled, and systems are prepared for disconnection from the EPS/UPS system and for self-contained frequency control. A new connection between Lithuania and Poland – Harmony Link– will play a market integration role by trading electricity with othercountries of the European Union. Lithuania remains energy dependent on imported energy. Lithuania imports most electricity. Electricity demand in Lithuaniaamounted to12.8 TWh in 2022. In 2022, three quarters of electricity was imported and4.2 TWh were produced to meet Lithuania's needs. In2022,72.6 % oftotal electricitywas produced from renewable energy sources. The main reasons for more imports than production are economic, i.e.there is insufficient competitive generation capacity in Lithuania.

The NENS provides thatimports of electricity will bereplaced by local electricity generation: electricity production in Lithuania is planned to be 100 % by 2030.

The electricity transmission system operator AB LITGRID, whichis responsible, in accordance with the procedurelaid down by law, for

draw up, at least every two years, a ten-year transmission network development plan ('the10-year plan ') for the purpose ofassessing theadequacy andneed of theelectricity system, ensuring security and security of electricity supply,as well as requirements for thequality, efficiency, management and environmental protection of electricity supply to customers, improving theconditionsfor access to the electricity system, planning thelong-term development of theelectricity system and effective measures toensure theadequacy of the electricity system and the security of electricity supply to customers.

Electricity system capacity and flexibility

Taking into account the 2022 electricity systemadequacyassessment carried out by the Lithuanian electricity transmission system operator for the period2026-2030, the entry into operation of theelectricity transmission interconnector Harmony Link has asignificant impact on the adequacy of the electricity system. Prior to the start of operation of this interconnector, thecapacityofall reliable power plants operating in Lithuaniais required to ensure the adequacy of thepower of the electricity system after assessing the ability of the Lithuanian electricity system tooperate in isolated mode.

Until thecompletion of theproject for the synchronisation of the electricity system with thecontinental European grids – the second Lithuanian-Polish electricity transmission interconnection Harmony Link project – theadequacy of the electricity system of the Republic of Lithuania will be ensured by maintaining the existing reliable electricity generation capacity by continuing theservice ofensuring the availability ofelectricity generation facilities for the isolated operation of the electricity system.

In order to ensure theadequacy of Lithuania’selectricity system and its preparation for the isolated operation of the electricity system after 2030,in view of the particularly rapid expansion ofRES - based generation capacity and thegrowth of electricity demand, itwill be necessary to set upa capacity mechanism in the meantime to maintain existing and develop new generation capacity, thereliable availability of which is essential for thesafe operation of the Lithuanian electricity system. Their need and importance will increase by developing energy generationcapacity using RES and increasing demand for electricity.

The200 MW electricity storage system put into operation in2023 at least until the end of the electricity system synchronisation project (until the second electricity transmission connectionto theRepublic ofPoland is completed) will play an important role in ensuring the provision of the electricity system balancing services and theprovision of an isolated electricity system work reserve. Following thecompletion of thefifth synchronous unit project of the Kruonis Pumped Storage Power Plant in2026, theKruonis Pumped Storage Plant willbe able to participate effectively in theancillary services market with thefull potential of 1010 MW.

Natural gas sector

Lithuaniadoes not have its natural gas resources and therefore allnatural gas consumed in Lithuania is imported. Since thelaunch of theKlaipėda Liquefied Natural Gas Terminal since 2014, the sources of supply have been diversified and Lithuania is able to source natural gas from LNG international markets (asmentioned above, gas has not been imported from Russia since April2022).

The constructionofa liquefied natural gas terminalin Klaipėda at the end of2014 led to theabolition of a decades-longnatural gas monopoly in Lithuania and the creation of competition. Lithuania has become self -sufficient

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supply (and supplysignificant quantities ofnatural gas to the Baltic States) exclusively through theLNG terminal. These fundamental changes in thenatural gas sector haveled to the elimination of theprice difference between the Lithuanian market and theWestern European natural gas markets of 10 EUR/MWh and more natural gas imports, making Lithuania one of theEU Member States with the lowest ratesof natural gas imports. Considering the ongoing geopolitical tensions, theresults achieved, the global dynamics of the liquefied natural gas market and thepotential of theregional natural gas market to ensure acompetitive and reliable supply of natural gas, it was strategically important for Lithuania to ensure thelong-termcontinuity of the operation of the Klaipėda liquefied natural gas terminal. InDecember 2018, theSejm decided that Lithuania would ensure along- term LNG supply by purchasing anLNG vessel after 2024. This allows theoperatingcosts of theKlaipėda LNG terminal to be spread over the10 -year leaseperiod of the LNG Storage Facility,as is the case today, but evenly over theexpected life of theLNG terminal. On25

February 2022, theBoard of Directors of the State- owned oil and liquefied natural gas terminal operator AB KN Energies (formerly AB Klaipėdos nafta) adopted a decision on theacquisitionof theKlaipėda LNGterminal leased by the Norwegian company Hoegh LNG as of2014, at the end of2024 at the end of the lease.

On1 May 2022,the GIPL gas pipelinelinkingLithuania and Poland became operational. The508 km GIPL interconnection betweenLithuania and Polandeffectively expands the European gas market by integrating the Baltic States and Finland (notethat the Balticconector gaspipeline, which connected theFinnish and Estoniangas networks,became operational on1 January 2020). In addition to integrating thegas markets of the Baltic States and Finland into theEU's single gas market, GIPL alsocreates access to alternative sources ofgas supply, roads and increases thecompetitiveness, security and reliability of gas supplybycreatingboth additional gas transmission capacities and EU countries' emergencysolidarity mechanisms. GIPL allows for amore flexible and efficient use of Polish and Lithuanian LNG terminals and transmission networks, increases theliquidity ofgas trading in theBaltic and Polish bidding zones and strengthens their regional role.

Following thecompletion of theELLI(*Enhancementof Latvia-Lithuania interconnection) project for thestrategic interconnection capacity with Latvia, thecapacity of the* gas pipeline increased by one third in the year Amber Grid (7 December 2022). This improves the region's ability to supply gas,allowing for faster refilling of theunderground gas storage facility in Latvia in Inčukalnis, where gas is stored by all Baltic countries. Lithuania's ELLI project has improved the integration of thegas market in theBaltic States and the energy security of the region.

Oil sector

In Lithuania, oil is found but the quantities arenot significant, so almost all consumption is imported. It should be noted that Lithuania has the only oil refinery located inthe Baltic country and therefore imports ofcrude oil are more than sufficient for Lithuania's needs. The oil refinery capacity of AB ORLEN Lietuvais 10 million tonnes per year. Other raw materials–gas condensate, fuel oil and medium distillates – are also being processed to make better use of production capacity.

AB ORLEN Lietuva signed a contractwithPetrofac Ltd. in autumn 2021 for theimplementation of aprojectfor the construction of aresidual oil raw material conversion facility. The project, which is expected to be completed by theend of2024, isexpected toincrease refinery efficiency from 72 %to 84 %, so the company will be able to obtain the same volume of products froma 20 % reduction in the amount of oil raw material and its operating profits are expected toincrease by around EUR 68 million annually. Implemented by the company for theconstruction of aresidual oil raw material conversion facility

theproject is important both for Lithuania and in the regional context. In these unstable energy resource market times,the project will increase the competitiveness of the Lithuanian economy and will also contribute tostrengthening the security of supply of petroleum products across the region.

Inthepast, oil was supplied by pipeline to Lithuania, but analternative supply of raw material became possible with theentry into operation ofthe reverse import-export terminal in Būtinge. In the event ofa disruption of the oil pipeline, AB ORLEN Lietuvasupplies the raw material through the Būtingė terminal. It has an annual design capacity of 14 million tonnes of oil per year.

The domestic market is dominated by oil products produced by AB ORLEN Lietuva, with only a small proportion ofsome petroleum product types coming from other countries. In addition,rail orautomobile transport maybe used to supply petroleum products. Lithuania has all the technical possibilities to diversify thesupply of oil and oil products.

As mentioned above, the potential of the Lithuanian oil sector fully meets the needs of domestic consumers ofpetroleum products. The vast majority of domestically produced petroleum products aresupplied to other markets. Lithuania currently has all the technical means to export and import oil and its products from different countries and sources around theworld. The countryhas a sufficient level ofpublic stocks of petroleum products toprotect itself against disruptions in thesupply of petroleum products.

For more than two decades, the oil sector has been operatingunder market conditions, i.e.:

- there are no legal restrictions on the transport offuel from European Union countries or imports from third countries;
- theprices ofpetroleum products are notregulated by the State (except for LPG supplied to group installations);
- the State imposes only the rates of excise duty andvalue added tax on petroleum products;
- it should be noted that there are mandatory quality indicators forpetroleum products consumed and no entry or import quotas have been established.

Oil production is projected to decline due to lowerdemand for oil fuels in the transport sector, inline with policies and measuresgeared towards areduction inoil fuel consumption. Lithuania aims to reduce oil fuel consumption in road transport by 39 % compared to theconsumption of oil fuels inroad transport in2021 and to significantly increase theuptake of alternative fuels in transport.

Security of supply and stocks

Lithuania has plans in place that provide for both crisis prevention andcrisis response measures. Preventive measurestoensure the security of supply of energy and energy resources shall include, in particular, thedevelopment of the above -mentioned infrastructure aimed at ensuring reliable imports ofenergy resources, as well as increasing local production, with aparticular focus on electricity generation from RES. Both adequate diversification of imports and the improvement of the RES balance in the energy market allow not only to securea secure and secure energy supply, but also to reduce the volatility of energy sources and energy prices. The emergency plans shall include and describe theactions of theresponsible persons and competent authorities in theevent ofor after emergencies and crises. The plans are based on a riskassessment in the energy sector. The implementation of theactionsand measures provided for in the planswould, inparticular,ensure thesupply of energyand energy resources to vulnerable consumers and essential services, thereby ensuring thecontinuity of energy companies and allowing thenormal supply ofenergy and energy resources to be restored as soon as possible.

The Electricity Law laysdown[41] the framework for the safe and secure operation of the electricity system, the generation, transmission, distribution and supply of electricity.

Article 23 (1) of that law provides that the electricity transmission system operator is responsible for thestability and reliability of the operation of the electricity system, theperformance of the national balancing function in theterritory of the Republic of Lithuania, the provision of system services, theoperation, maintenance, management and development of interconnectors with theelectricity systems

41 Lithuanian Of the implementation electricity energy to the Law link: https://www.e-tar.lt/portal/lt/legalAct/TAR.F57794B7899F/asr

ofother countries, reducing capacity constraints in transmission networks and takinginto account theneeds of theelectricity system and electricity network users.

Article76 (1) (2)of thesame law provides that VERTs shall cooperate with thenational energy regulatory authorities of foreign countries to ensure that the transmission system operator hasone or more regionally integrated capacity allocation and network security systems covering one or more Member States.

The supply of electricity in the event of an energy emergency shall be limited or suspended in accordance with the electricity supply and use rules[42].

Lithuania's natural gas transmission systemisable toensure thesupply of natural gas in normal mode without restriction, while theentry intooperation of the SDG terminal in Klaipėda and Lithuania with Poland on the GIPLpipeline allows the supply of natural gas from diversified sources to the country. As a result, gas supply risks are significantly reduced, especially due to geopolitical factors. Diversified gas supply sources also reduce the riskof gas supply due totechnical failures.

On25 October 2017, theEuropean Parliament and the Council adopted Regulation (EU) 2017/1938concerning measures tosafeguard the security of gas supply and repealing Regulation (EU) No 994/2010 ('theRegulation concerningmeasures tosafeguard the security of gas supply'), theobjective of which is to safeguard thesecurity ofgas supply byensuring theproper and continuousfunctioning of theinternal market in natural gas, by allowing theimplementation ofexceptional measures when the market is no longer able to supply the necessary quantities ofgas andby clearly defining and allocating theresponsibilities ofnatural gas undertakings, the Member States and the Union for preventive action and response to specific disruptions of supply. This Regulation also establishes solidarity- based mechanisms to coordinate preparedness and response in the event of a Member State, regional and European emergency. The Ministry of Energy has been designated and notified as the competent authority for theimplementation of the measures laid down in this Regulation.

When assessing thecapacity of thetransmission system to ensure thesupply ofgas to customers in the event of a disruption of supply, the calculation of the N-1 criterion, in line with the Regulation onmeasures tosafeguard the security ofgassupply, found this indicator of security of gas supply to be met in Lithuania.

Thesupply ofpetroleum products in the event of an energy emergency shall be carried out in accordance with theplan for the application ofrestrictions on thesupply and consumption of petroleum products [43]. It lays down measures tostabilise and/or reduce the supply ofpetroleum products when an energyemergency isdeclared as a result of areduction in thesupply of petroleum products to such anextent that the safety, health oreconomic activity of the population is threatened.

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In accordance with EU and Lithuanian legislation, the country must accumulatequantities of petroleum products and oil stocks sufficient to cover a greater proportion of the following needs: 90 days of average daily net imports or 61 days of average daily domestic consumption. Part of the stocks consists ofspecial stocks built and managed bya state enterprise withState resources of theLithuanian Energy Agency (Lithuanian Energy Agency), which theLEA must build up to a minimum of30 days, calculated on the basis of

42 Approvedby Order No1-38 ofthe Minister for Energy of theRepublic of Lithuania of11 February 2010 approving theRules on thesupply and use of electricity.

43 Approvedby Order No1-107 of the Minister for Energy ofthe Republicof Lithuania of24 May 2013 approving theplan for the application ofrestrictions on thesupply and consumption of petroleum products.

theaverage daily domestic consumption in theprevious calendar year. The remainingstockpiling shall be carried out by obligated undertakings.

The internal energy market dimension

2.4.1. Degreeofelectricity interconnectivity

In2014,the European Council seta target ofat least 10 % ofthe total electricity generation capacityinstalled in a Member Stateby 2020 and 15 % by2030 for electricity systems between EU Member States. Projects ofcommoninterest should contribute to this objective. Nominal interconnection capacity should reach 30 % of peak load and nominalinterconnection capacity ofat least 30 % of installed renewable generation capacity. It should be noted that all these indicators are met in Lithuania – thelevel ofelectricity interconnection is above 60 %, while the nominal capacity ofinterconnectors during peak load and nominal interconnection capacity inrelation toinstalled renewable generation capacity is more than 60 %.[44]

It should be notedthat, prior to the construction of theinterconnections with Sweden and Poland, Lithuania's high- voltage transmission networks were directly connected only with the high-voltage networks in the region of Kaliningrad in Latvia, Belarus and Russia. These interconnections allow fortheexchange of extremely high energy volumes with these neighbouring systems. The main challenge for electricity in Lithuania and all Baltic States is to integrate theirenergy systems into the single European electricity market and tostart a synchronous operation with the European continental electricity grid by 2025.New interconnectors with Sweden (NordBalt700 MW) and Poland (LitPol Link500 MW) were installed and launched at theend of 2015/early2016. Together with Estlink I (350 MW) and Estlink II (650 MW), the total Baltictransmission capacity with other Member States between Finland and Estonia is 2200 MW, which represents about 23 % of the interconnection level.

For thecompetitiveness of the Lithuanian economy andattracting foreign investment, it is important that theaverage final electricity pricefor business and industrial consumers is lower than in otherEUMember States of Scandinavia and Central and Eastern Europe. Inthe first half of2022,Lithuania [45]ranked 8th inthe lowest average final electricity price (including taxes on domestic consumersin EU Member States). It is important forLithuania to improve this indicator andto move to 3 rd to 3 rd place.

2.4.2. Energy transmission structure

In order to fulfil theEnergy Union dimensions of energy security, integration into the internal energy market, thefollowing key electricity and gas transmission infrastructure projects arecurrently being implemented, which are alsocovered by:

the NENS, as well as most ofthem,have thehighest status that can begranted to theproject in Lithuania, which arerecognisedby theGovernment as important economic projects for the State:

44 TYNDP 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

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

Electric domain

Synchronisation project

A sufficientlevel of energy security and the fullintegration of the energysystems in theEU markets between Lithuania and the Baltic countries can onlybe ensured once the Lithuanian electricity system has been deynchronisedwith theelectricity system of thecountries of theCommonwealth of Independent States (IPS /UPS), which currently connects the systems of Belarus, Russia, Estonia, Latvia, Lithuania and the road network for synchronous operation and all synchronisation projects with the TEC have been completed.

Synchronisation with continental European networks will allow the Baltic States to become fully independent of thedecisions taken by the Russian Federation and will eliminate the possibility of technically influencing theoperation of the Baltic States'electricity system, monitoring and receiving information on the electricitysystem of the Republic of Lithuania. Theinfrastructure installed in thecontext of thesynchronisation project with thecontinental European grids will also helpintegrate moreelectricity generationcapacity from RES into the electricity system of the Republic ofLithuania.

Desynchronisation from the PIC /UPS system and the interconnection of the electricity system of the Republic of Lithuania with thecontinental European networks for synchronous operation shall take place nolater than February 2025.

Whenthe electricitysystem of the Republic of Lithuania isconnected to continental European networks, the simultaneous operation of theelectricitysystem ofthe Republic of Lithuania shall not have the effect of leaving electricity from non-European Economic Area countries available to the Lithuanian electricity system.

The project for synchronisationwith Continental European grids will beimplemented once the Harmony Link project for the second Lithuanian-Poland electricity transmission connection has been completed, ensuring integration with theEU internal electricity market and enabling more efficient use of local RES generation capacity.

The importance of synchronisation is recognised as one of the main objectives ofEU 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 essential for the EU's energy security. The Baltic States' synchronisation with thecontinental European networks by 2025 is also onthe agenda ofsenior officials meetings of*the Baltic Energy Market Interconnection Plan (BEMIP*) . On13 June 2019,the Lithuanian Parliament adopted theLaw on theinterconnection of the Lithuanian electricity system with thecontinental European networks for synchronous operation and related legislation. They shall lay down the basic conditions forthe organisation andimplementation of the synchronisation process. The Act provides that a synchronisation project and related infrastructure projects will be granted the statusof project of critical state importance. This makes it possible to speed up spatial planning procedures in synchronisation-related projects, establish easements and expedite environmental impact assessment procedures. The project measures are described in more detailin section 3.4.2 .

Natural gas area

Gas interconnection between Poland and Lithuania (GIPL)

In thefield ofnatural gas, one of themost important projects implemented is theinterconnection ofgas pipelines between Poland and Lithuania (GIPL), which hasconnected theBaltic States and Finland to theEU's single gas market, increased security ofsupply anddiversification of supply routes in theregion, fosters greaterliquidity in the regional market and competition between suppliers,and allows for a more efficient use of theLNG terminal in Klaipėda. The project was completed in early2022. The pipeline has a lengthof about 508 km, ofwhich 165 kmin Lithuania, witha maximum capacity from Poland of 2.4 billionm3/year,and 1.9 billion $m^{3/year}$from Lithuania. The project was implemented by theLithuanian natural gas transmission system operator AB Amber Grid and the Polish natural gas transmission system operator GAZ-SYSTEM. The project was included in the list of projects of common interest andits implementation is supported by theConnecting Europe Facility (CEF). The GIPL interconnector plays a crucial role in diversifying natural gas supplies toboth Lithuania and other Baltic helmets and allows thecapacity of theKlaipėda LNG terminal to be used to themaximum extent.

Project to increase thecapacity of thegas pipelineinterconnection between Latvia and Lithuania (ELLI)

A project toincreasethecapacity of thepipelineinterconnection between Latvia and Lithuania (ELLI) was also implemented in2023. The project extended the Kiemenian gas metering station in Lithuania, as well as upgraded the main gas pipelines on the territory of Latvia to increase thepressure to 50 bar (now40 bar) and on the Lithuanian side completed the works on the Lithuanian side inNovember 2022, while in Latvia the project's works to increase capacity were completed in2023. As aresult of this project, thecapacity of the gas interconnection between Latvia and Lithuania wasincreased by one third in both directions. The project's objectives were to ensure sufficient capacity between the Baltic and other European countries, tobenefit from alternative sources ofgas supply and road transport for the countries of the region, to increase security ofgas supply,to contribute to thecreation of an internal energy market, toincrease market integration and competition,and to strengthen energy solidarity between EU countries. It will also facilitate access to Latvia's Inčukalnis underground gas storage. This project was implemented by theLatvian natural gas transmission system and underground natural gas storage facility AS Conexus Baltic Grid and the Lithuanian natural gas transmission system operator AB Amber Grid. The project was included in the list of Projects of Common Interest (PCIs) and received support from the CEF.

Projects toimprove the reliability ofLithuania's electricity and natural gas transmission systems of local significance are foreseen in the NationalImplementation Plan for electricity and natural gas transmission infrastructure projects [46]. These projects were co-financed byinvestments from the European Union (seesection 3.3.)for further detailson the activities financed. The strategic documents include the 10 -year development plansofoperators (both transmissionand distribution), which set out theoperators' main projects, development and investments.

2.4.3. Market integration

On14 March 2023, theCommission proposed areform of the EU's electricity market design to accelerate thedevelopment ofrenewable energy and phase outgas faster, consumer bills areless dependent on volatile fossil fuel prices, consumers are more empowered and protected from prices

futureleaps and potential market manipulation,making EU industry clean and more competitive. The reform includes two legislative proposals: a regulation amending the relevant electricity market legislation

46 Nationalimplementationplan for electricity and natural gas transmission infrastructure projects approved byResolution No 476 of theGovernment of the Republic of Lithuania of22 July 2014 approving the National ImplementationPlan for electricity andnatural gas transmission infrastructure projects.

and another regulation focusing onimproving the Union ’s protection against market manipulation through better monitoring and transparency.

The proposals seek to address a number ofshortcomingsidentified by the Commission during therecent energy crisis relating inparticular to theimpact ofhigh and volatile fossil fuel prices onshort-term electricity markets thatexposed households and companies tosignificant price spikes and excessiveelectricity bills . The proposed measures plan to address theimpact offossil fuel prices, deliver less costlyrenewable energy benefits to consumers, and address affordability, decarbonisation and security of supply objectives.

In orderto make theenergy bills of European consumers and companies more independent from theshort-term price fluctuations while providing stable revenuesto investors in renewables and nuclear power, theproposal seeks to improve the way thelong-term market works by:

- thepromotion of thePPA market by ensuring theavailability of products to cover the risk ofdefault and by leveraging renewable energy tenders;
- stabilisingelectricity prices by providing stable investment incentives and limiting excessrevenues of energy producers by requiring two-way contracts for difference in thecase ofnew investments in renewable energy and nuclear energy, where public funding in the form of operating support is required; and
- improving theforward electricity markets so that they become more liquid and better integrated.

To accelerate the deployment ofrenewable energy and phase out gas, the Commission proposal includesmeasures to:

- secure market access foroffshore renewable energy production;
- improve the efficiency of short-term markets;
- facilitating and incentivising development of flexibilitysolutionssuch as demand response and storage, throughmeasures on network tariffs, specific products, and growing themarket for flexibility, including the possibility ofspecific support schemes.

TheCommission’sproposal also seeks to improve consumer protection and further empower consumers,through:

- establishing suppliers oflast resort, in case of a supplier ’s failure, and extra protectionfrom disconnections for vulnerable consumers;
- allowing Member States to intervene in thesetting of prices inretail markets intimes ofcrisis, in order to ensure that households and small and medium-sized enterprises (SMEs) have access to aminimum amount ofelectricity ataffordable prices;
- hedging requirements forsuppliers undercertain conditions;
- giving consumers widechoice of contracts, including fixed price contracts;

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- enabling consumers to have direct access to renewable generation through energysharing and self-consumption.

Finally, the reform intends to increase market monitoring and transparency by amending theRegulation on Wholesale Energy Market Integrity and Transparency (REMIT) and to provide better protection against market manipulation and abuse through:

- anenhanced role for theAgency for theCooperation of Energy Regulators (ACER) in theinvestigation of significant cross-border cases in relation to REMIT;
- harmonisation ofpenalties imposed byregulatory authorities at national level for REMIT infringements; and
- better data collectionandmarketmonitoring by ACER and regulatory authorities.

2.4.4. Energy poverty

A cornerstone of a sustainable internal market is theavailability of energy services for all, in order to ensure thatconsumers meet their basic needs and health. However, Lithuania faces the problem of energy poverty, where it is difficult orimpossible forthe population toprovide adequate heating or access to essential energy services such as lightingortransport.

Energy poverty is the result of four major problems: energy inefficiencies, high energy prices and low household incomes and lack of consumer awareness. The problem of energy poverty is also reflected in the indicators on energy poverty (see Table 2.4.4.1):

- according to the EUsurveyon income and living conditions a[56] -in 2018, more than a quarter (27.9 %[57]) could notafford to keep home adequately warm due to lack of funds. This is the second highest rate among EU countries, which isfar off from the EU average of7.4 %;
- while the existence of energy poverty is still being monitored, thestatistics of theMember States of the European Union show an improvement in the situation of energy poverty. Lithuania hasreduced energy poverty bymore than 11 % over a decade, but is still well above the European Union average and continues to require active measures to combat energy poverty at national level.

Table 2.4.4.1. Energy poverty dynamics in Lithuania, %:

	In 2015	2016	2017	2018	In 2019	2020:	2021:	In 2022	Year 2023
Theshare of persons livingin households who cannot afford sufficient heatingdue to lack of money (LT)	31,1	29,3	28,9	27,9	26,8	23,1	22,5	17,5	20,0
Theshare of persons livingin households who cannot afford sufficient heatingdue to lack of money (EU)	9,4	8,7	7,8	8,1	6,9	8	7	9,3	10,8

[55] European Economic and Social Committee, 2011/C 44/09.
[56]https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/19-06/member_state_report_-_lithuania.pdf
[57] Eurostat, Inability to keep home adequately warm -EU-SILC, 2019. (In Lithuania,around1.560 millionhouseholds are billedfor energy on amonthly basis.)

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The supply of energy is among the basic services to whicheveryone is entitled. Supportmeasures must be taken for those who do nothave access to the service. Energy price hikes and energy supply disruptions have prompted EU countries to react with one voice and better protect the EU'swholesale energy market and fight manipulation by strengthening thetransparency of thewholesale energy market, monitoring mechanisms and paving theway for its reform. In order to achieve theobjective ofaffordability ofenergy resources for consumers, measures are being implemented in Lithuania to alleviate theenergy poverty of thepopulation. NEPT targets for 2050 toprioritise population education, effective and targeted structural measures (addressing the root causes of energy poverty) related to energy efficiency,building renovation, retrofitting of heat systems (depending on the nature of buildings), access toenergy efficient appliances and renewable energy, targetedmeasures toimprove energy affordability (e.g. targeted income support, social tariffs, temporary support tohouseholds in energy poverty), ensuring that these measures do not promote inefficient energy consumption. Energy efficiency information campaigns targeting households affected byenergy poverty will be stepped upto ensure that those population groups receive tailored information and advice, while exploiting the fullpotential of energy advisory networks and one-stop shops .

FollowingRussia’s far- reaching war in Ukraine in2022, the energy sector suffered a drastic and unprecedented increase inenergy resource prices, affecting the entire population of thestate and thegroup ofpeople in extreme poverty. Unpredictable geopolitical circumstances, the difficult situation ininternational energy markets leading to anincrease inenergy prices, andextreme inflation hikes – Lithuania has taken short-and long-term measuresto amortise price increases in response tonew sudden challenges. These include increasingincome for residents (increased old-age pensions, social assistance, child benefits, increased tax-free income, leading to anincrease in theminimum wage), measures tosupport residents affected by theincrease ingas and electricity prices, the extension of compensation tohousing heating bills, etc.

Themeasurestaken by Lithuania toaddress energy poverty were targeted and contributed to thereduction ofenergy poverty in2022 in a fairly significant percentage. However, energy poverty is a dynamic and broad issue, amulti-factor “response” process requiring not only short-term measures toaddress sudden challenges, but also a permanent, highly sectoraldirection of the state, in particular energy and social policy. The energy poverty management framework shall allow forinter-agency and verticalcooperation between national, regional and local authorities, as well as a broader consultation of relevant stakeholders and social partners from different sectors, leadingto joint, informed solutions (measures toachieve these objectives aredescribed in more detailin section 3.4.4.).

Enshrining the definition ofenergy poverty in national law is a first step towards recognising and identifying theproblem and its wider context, as well as a starting point for taking appropriate solutions to tackle energy poverty, takinginto account the causes ofpoverty. Theupdating and demarcation of theconcepts of ‘person affected by energypoverty’ and ‘vulnerable energy consumer’ in national legislation, with attributes attributed to therelevant group, makes it possibleto betterassess thesituation ofenergy poverty in Lithuania and address theneeds ofpeople affected by energy poverty by means of relevant measures, taking into account relevant data, with the aim oftargeting target groups. So far, national legislation has onlyintroduced theconcept of vulnerable energy consumer, but in accordance with the European

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TheEnergy Efficiency Directive, adopted by the Council of theUnion, provides foramendments to the Energy Law in2024 by transposing the Directive’s concept of ‘person affected byenergy poverty’ into national law.

Inaddressing energy poverty and in cooperation with other institutions, Lithuania is focusing on reducingthe root causes of energy poverty,i.e. reducing high energy costs compared tothehousehold budget, increasing incomeand improving theenergy performance ofbuildings. The share of households accounting fora significant share oftheir income in energy expenditure is calculated using the datafrom the5 -yearly household budget statistics to ensure the speed ofmonitoring. Themonitoring of thehousing indicator, the dynamics of whichare linked topopulation income growth,changes in energyprices, heating compensation recipients, etc., is also carried out for persons who are unable to heat adequately because of thelack of funds, inorder to provide a timely response to the indicator’s assessmentby appropriate measures. One of the objectives set is theestablishment of a national set ofstatistical indicators and tools to identify, analyse and eliminate energy poverty by2030.

Datain the EU also point to hidden energy poverty, where households may be under-exploited and do not provide services. Energy poverty affects in particular socially vulnerable groups: seniors, children, people with chronic diseases, single parents, unemployed. This urgent social challengerequires a comprehensive policy approach combining social and environmental policies.

To address energy poverty, theNational Progress Plan sets the target for2021-2030 'reduce energy poverty of the population' and identifies one nationaltarget with targets for2025 and 2030 (see Table 2.4.4.2).

Table 2.4.4.2. Energy poverty targets for2030 in the National Progress Plan 2021-2030:

Impact indicator	**%Baseline (year)**	**Milestone** in**2025, %**	**Target for 2030, %**	**Data source**	**Institution responsible for providing data**
Share of households that spenda significant part oftheir income on energy expenditure	17,1 (2016)	15	8,6	State Data Agency	EM

In order to achieve these objectives, Lithuania istaking cross-cutting measures, described in more detail (section3.4.4), covering energy efficiency, household income, energy prices and consumer information. As in 8 other EU countries, the EU-funded Horizon2020 project ' STEP–Solutions to Tackle Energy Poverty' (STEP– Solutions to Tackle Energy Poverty) waslaunched in 2019.[47] The main objective of STEP is to alleviate energy poverty by encouraging changes inconsumer behaviour. This project and national measures to tackleenergy poverty takeinto account financial support (reimbursement of theshare ofhousing heating and water costs for the poor,public support for the renovation (modernisation) of multi-apartment buildings through credit and interest payments), improving theenergy efficiency ofbuildings and equipment andraising consumer awareness

47 For further information: https://www.stepenergy.eu/

2.5 Research, innovation and competitiveness dimension

In order for Lithuania to become a more developing and exporting country of accessible, secure and sustainable energy technologies, an integratedapproach is needed tostrengthen research and innovation aimed at developing efficient energy production and storage systems, accelerating thedeployment ofnew technologies and solutions, improving integration into national and international energy systems, and increasing demand for innovation in business and public sectorsupply. Research and experimental development in the field of energy are being carried out inLithuania, and the resulting products must be integrated into industrial production and become part of Lithuania's exports, thus contributing to the country's economic growth. Lithuania needs to identify at national level the priorityaxes for energy research and innovation and create a competitive advantage by focusing on them. There arecurrently two strategic documents which provide national policy guidance for thepromotion ofresearch and experimental development and innovation related to the Energy Union – NENSand the Concept of Smart Specialisation (Smart Specialisation) forR & Dand Innovation (Smart Specialisation) ([48] hereinafter referred to as the "Smart Specialisation Concept").

Objectives set out in the NENS

The2024 update of the NENS foresees that, takinginto account thespecificities and needs ofLithuania's energy sector, the impact offuture energy developments on thecountry's economy, the strategic objectives, available and desired competences and the development of innovation through energy technology development centres, the following priority areas forenergy research and experimental development are to be distinguished:

- developingcompetences for thedeployment and use ofnew low GHG and ambient air pollutant technologies, climate-resilient energy generation and storage (especially electricity storage facilities);
- technologies forenergy production from indigenous energy sources and RES;
- technologies fordistributed energy production, smart grids and smart cities, production and use of new promising forms ofenergy;
- development of anew technological generation ofdistrict heating and cooling through heat pumps of industrial size, waste heat, electrode boilers and integration with other energy sectors;
- MBR as an additional source of stable electricity to balance electricity in theLithuanian energy system based on RES and decommissioning ofnuclear facilities and radioactive waste management;
- carbon capture, transport and utilisation (including carbon from non-fossil sources), especially in alternative fuels, cement and fertiliser manufacturing industries;
- power-to-*Gas*and *Gas* -to-*Power*technologiesto help balance the energy system and facilitate energy

48 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/8b31ef00221011edb36fa1cf41a91fd9?positionInSearchResults=1&searchModelU UID=0c634bb9-2508-46b6-808a-1e96339cbf74

cross- sectoral integration;

- analysis ofthe functioning of the electricity systemand improvement of electricity system management;
  - thefunctioning ofelectricity markets, power mechanisms, virtual powerplants, demand response (including the use of electric vehicles) and the active involvement of consumers in the functioning of the electricity system and markets;
  - ensuring thereliability andquality ofelectricity supply,vulnerability of power systems andoptimisation of operating modes;
  - energy and cybersecurity,reliability of energy installations and systems, resilience to cyber threats.

In order toexploitthe results of energy R & D in other areas, to stimulate export growth, thecreation of new businesses in thecountry and to develop innovative solutions, it will:

- at least one energy technology development centrein Lithuania has been established by2030 ;
  - promote investments in thetechnological development andimprovement of theproduction of solar, wind, other RES and higher value-added products (hydrogen , synthetic green fuels, synthetic methane, methanol, ammonia, aviation kerosene and other products), simplified implementation of pilot projects;
  - theaim is to consolidate Lithuania'sstatus asthe largest solar technology exporter and centre of excellence in the Baltic and Nordic region;
- encourage theproduction of electricity storage technologies in Lithuania by attracting investment in it;
- options foroffshore wind technology productionare assessed and attracted

  investments in Klaipėda State Seaport ;
- digital solutions to optimise the energy sector are promoted and tested in Lithuania;

  encourage the export ofsuch products;

  •inorder to keep pace with global energy technology trends and the development of the EU energy system, Lithuania needs toactively contribute to thedevelopment and implementation of the EU'sHorizon Europe Framework Programme for Research and Innovation (including its missions, in particularclimate-neutral and smart cities), theEU Strategic Energy Technology Plan, theInternational Energy Agency'sTechnology Cooperation Programme and other international initiatives onenergy transformation.

An additional forward-looking area for thedevelopment of energy innovation and theexploitation of energy competences, research and experimental development in other areas of the economy, as well as thegrowth of exports and thecreation ofnew forms ofbusiness in thecountry – use of hydrogen in energy, industry and transport.

Itis also necessary to further develop carbon capture and utilisation / storage technologies and to analyse their applicability in Lithuania. It is also necessary tobuild an open-access CO_2transport infrastructurethat creates theconditions for transporting CO_2 captured from emission sourcesto geological storage storage sites (inDecember 2022,interested companies in Poland, Lithuania and Latviasubmitted two applications for PCI CO_2 transport infrastructure.

projects). Another crucialdirection for the development of carbon technologies is CO_2 captureand usefor other applications, which will contribute to thedecarbonisation ofcertain industrial sectors by2030. The European Union Innovation Fund willsupport more thanEUR 38 billion between 2020 and 2030 infive strategic areas,two ofwhich are directly related to CO_2 storage and utilisation.

Objectives in the Smart Specialisation Concept

TheResearch andExperimental Development and Innovation (Smart Specialisation) concept of Lithuania for2021-2027 is intended topromote innovation -based and sustainable economic growth, byseeking scientific and business cooperation and by concentrating resources on areaswiththe highestpotential for research and experimental development and innovation (hereinafter referred to asR & D & I). In total, aroundEUR747 millionhas been allocated between2021and 2027 to implement the objectives and activities of the Smart Specialisation Concept in Lithuania.

Lithuaniaadopted anupdated SmartSpecialisationConcept on17 August 2022 tofocus resources on areas with the highest potential.

Based on the Lithuanian environmental analysis, three mainchallengeshave been identified in this area that will be addressed bythe development of theTEPI (smart specialisation):

- low innovationcapacity of SMEs;
  - low -value-added enterprises and lowratio of business investment in TEPI relative to GDP;
- low level of internationalisation of business and science (participation in transnational projects, networks).

In order to address thechallenges identified, thedevelopment of TEPI (smart specialisation) aims topromote innovation -driven and sustainable economic growth through science-business cooperation and by concentrating resources onareas withthe highest potential for TEPI.

Orientations for thedevelopment of TEPI (smart specialisation):

- strengthen research and innovation capacities by: creating an enabling environment andconditions and developing the necessary skills and competences;
- develop and apply a high level of scientific knowledge, advanced technologies and innovation for the market uptake of new and sustainable technologies, products, processes, methods;
- promote active international cooperationandinvolvement in,creation and development of international value chainsamong actors in the R & I priority ecosystem.

In implementing theconcept of smart specialisation, theMinistry ofEconomy and Innovation, together with thepublic body Innovation Agency,provides for themonitoring and evaluation of this concept, as described inOrder No4 -33 of theMinister for EconomicInnovation of the Republic of Lithuania of25 January 2023 approving thedescription of the procedure formonitoring and assessing the impact of theconcept of research andexperimental development andinnovation (smart specialisation) [49].

One of the three priorities of the Smart Specialisation R & I, relevant for the National Energy andClimate Plan, is “New Manufacturing Processes, Materials and Technologies”. It aims to ensure efficient and sustainable

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

business development and deployment ofdigital solutions and new technologies, business-science cooperationin industry, increasing productivity, added value and energy efficiency. The priority includes developing technologies for energy storage and use, energy markets, changes in thefunctioning of the electricity system, new approaches to themanagement of the electricity system, power mechanisms and theactive involvement of consumers in the functioning of theelectricity system and markets. The priority contributes to improving energy efficiency in thesectors with the highest potential – industry,buildings and transport.

Theimplementation of all the measures of the Smart Specialisation Concept in all priorities is expected to lead to:

- investment in TEPI in Lithuania will increase to 2.2 % of GDP (1.03 %. GDP 2022);
- TheGlobal Innovation Index willtake Lithuania 30th place (34th in2023);
- thenumber of innovative businesses will increase to 57 %. (53 % 2020);
- share of high-tech (mediumand high)exports of Lithuanian origin in total goods theexport structure will increase to 44 %. (40.3 % in 2020);
- thenumber ofsmalland medium-sized enterprises innovating will increase significantly to 51.4 %. (38 % in 2020).

National targets forpromoting cleanenergy technologies

The current situation, national targets and measures topromote investments in innovative technologies that ensure the development of zero-emission, renewable sources and energy efficiency are also included in the following national strategy papers:

- *The 2021-2030 National Progress Plan* – Industrial incentives to invest in climate increasing neutral technologies (NPP target1.4);
- *Theimplementation of cleaner production methods, thepromotion of recycling ofsecondary raw materials and thebuilding of recycling capacity as one of the more importantchallenges forindustrial development in thesustainable development strategy;*
- *The* NCPD has established ambitious national climate change mitigation targets for theindustrial sector.

The objectives set out in the documents in question are described in more detail in the industrial andindustrial process sectors in section 3.1. ‘ Decarbonisation dimension’, section 3.1.1. ‘ GHG emissions and removals’of this plan. This part also identifies already achieved and expected GHG emission reduction targets.

By 2030, Lithuania will aim to invest EUR 10 million ofpublic funds in clean energy research and innovation.

With regard to theintroduction ofnet-zero manufacturing technology tools, regulated at European level by the[50] Net-*Zero Industry Act (NZIA),*we hope that this will help tostrengthen Lithuania’snet-zero technology manufacturing capacity and overcome barriers to increasing manufacturing capacity.

Lithuania welcomes the measures foreseen in the Regulation as they will increase thetechnology industrial base

50 https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal- industrial-plan/net-zero-industry-act_lt

competitiveness. In orderto fully engage in these initiatives and strengthen thecompetitiveness of the national industry, given the limited administrative, scientific and technicalcapacity of Lithuania as a small state, theMinistry ofEconomy and Innovation initiated and applied for technical support from theEC for theproject“Enhancing Lithuania’s Competitiveness in the Net-zero Industry and Critical Raw Material Sectors” for theimplementation of the Regulation. As a result of this project, we plan to identifyscenarios for theimplementation of the Regulation and investmentplans for increasing the production capacity ofclean energy technologies until 2030 and beyond, based on adetailed analysis. The NECPs for the next decade and the update will incorporate the conclusions of this project.

In order to keep pace with global energy technology trends and the development of the EU’s energy system, Lithuania needs toactively contribute to thedevelopment and implementation of Horizon Europe (including itsmissions, in particularclimate-neutral and smart cities), theEU Strategic Energy Technology Plan, theInternational Energy Agency’sTechnology Cooperation Programme and other international initiatives onenergy transformation.

Directions for analysingprocesses related to climate change

The NCPD provides for the promotion of R & Dbyprioritising innovation focused on the implementation of theEU Green Deal,enabling sustainable solutions to be turned into cost-effective solutions:

1. ensure thedevelopment of R & TPIs contributing to thetransformation oflow GHGemissions inall sectors of theeconomy, in thefollowing areas: cross-cuttingstudies on economic integration, forward-looking development and climate change and the economy, renewable energy, smart energy systems, electrification, zero-emission solutions forall modes oftransport,exploring alternatives to fossil fuels (green hydrogen, etc.), energy storage and storage,transforming energy -intensive industries into zero-carbon technologies, circular economy, bioeconomy, sustainable food systems, resilient forestry fornatural disasters, disease and pest impacts of forest ecosystems, smart agriculture, digitalisation ofall economic sectors, environmentally friendly CCU technologies, etc.;
2. provide incentives for thedevelopment of low- emission R & T & I inall sectors of the economy by strengthening cooperation betweenstate and municipalinstitutions, scientific institutions, business and financial institutions, promoting joint research and enhancing the practical application of TEPIs;
3. ensure theefficientuse of public and EU funds byproviding additional support totransnational and EU -funded projects and programmes, including theFP Horizon Europe, to promote interdisciplinary Green Deal research;
4. ensure that the state innovation system promotes technological renewal ofLithuanian companies inline with the objectives of the Green Deal and a shift towards theproductionand export of innovative, environmentally friendly goods and services;
5. consistently strengthen the mobilisation ofpublic and private investment for TEPI activities, reaching 2 % by2030. GDP for public and private investment, 2040 : 4 % GDP;
6. develop and implement aprogrammetoenhance the excellence ofprofessionals needed for research related to the Green Deal (in its implementation activities);
7. carry out an assessment ofnational (farm -level) benchmarks for specific sectors of the economy.

Lithuania is currently carrying out various research on climate change, but there is no unified frameworkfor publishing theresults of thestudies. Closer cooperation between science and business is needed to increase the practical application of TEPIs.

National objectives with regard to competitiveness

In order to ensure that Lithuania is actively involved in theprocesses of theFourth Industrial Revolution and toensure industrial competitiveness while pursuing ambitiousclimate objectives, theMinistry of Economy andInnovation of the Republic of Lithuania aims to:

- promote active digitisation of industry, thereby enhancing internationalcompetitiveness;
- promote an efficient industrial transformation towards a climate-neutral economy;
- promote industrial integration in Europe's strategic value chains. Strategic value chains related to the NECPs and relevant to Lithuaniaare the following:
- batteries;
- connected, clean and autonomous vehicles;
- low-carbon industry;
- hydrogen technologies and systems.

In order to integrate theconcepts of recyclability and circularity and reduce dependence on imported raw materials, it is important to diversify the supply ofimported componentsnecessary forclean energy technologies. Thedraftguidelines forLithuania'stransition to acircular economy by 2035 were approved by a protocol decision of21 June 2023 at the meeting of theGovernment of the Republic of Lithuania. These orientations include industry -relevant orientations: accelerating circularity, economic fairness, transition through research, innovation and digitalisation; thedirection of circularindustry – ensuring asustainable transformation of industry towards a circular economy – and compliance with theprinciples of thewaste prevention and management hierarchy (circular waste recovery).

Challenges in the global market:

1. Market barriers: trade barriers, inconsistent policies and complex regulations that can hamper thecompetitiveness of clean energy technologies.
2. Fossil fuelsubsidiesthat can distort themarket and reduce the competitiveness of clean energy technologies. Phasing out fossil fuel subsidies orredirecting towards clean energy would level the playing field.
3. Underdeveloped infrastructure – transmission and distribution networks limiting clean deployment ofenergy technologies, especially in remote or developing regions.
4. Intellectual property rightsrestricting access bysmaller market players to patented technology and their use.
5. Technology transfer – ensuring efficient transfer ofclean energy technologies is challenging due to high technology costs andlack of local capacity.

Challenges ininternal markets:

1. Policy and regulatory uncertainty: frequent policy changes and regulatory uncertainty in the country discourageinvestment in clean energy technologies.

2. Limited access to finance: limited access to affordable financing opportunities forclean energy projects hampering their competitiveness in the internal market.

3. Network integration. Thevolatility of renewable energy sources requires efficient grid integration and energy storage solutions, which maybe difficult in some regions.

4. Infrastructure requiring refurbishment. Existing infrastructure andinterests in conventional energy sources may pose challenges for thedeployment of clean energy technologies.

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

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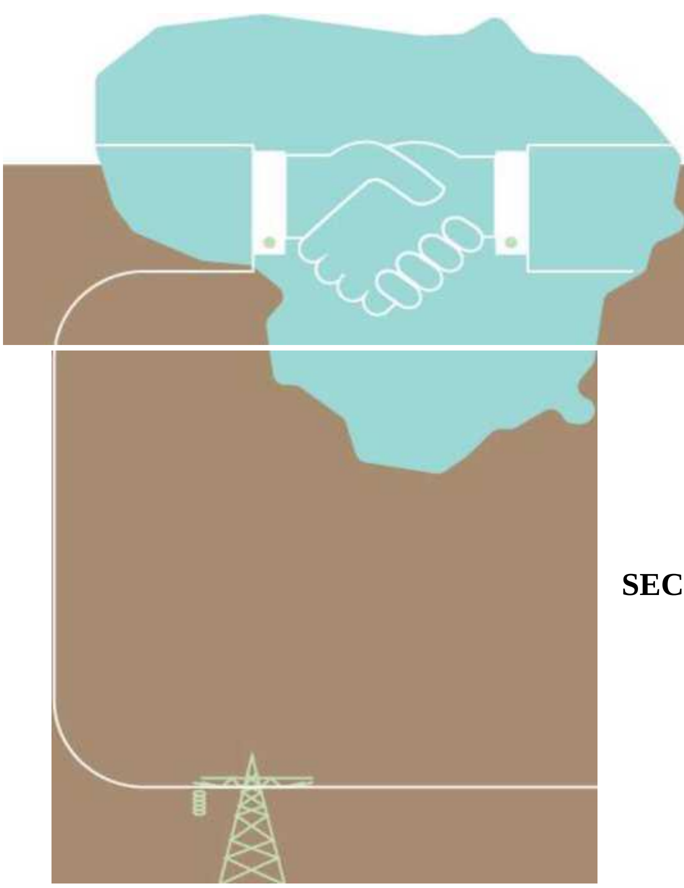

SECTION A:

National

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3. POLICIES AND MEASURES

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PLAN

SectionA:

This chapter describes the policies and measures that will be used to achieve thenational objectivesand targets set out inChapter2. The policy measures presented are divided into three groups:

- **Existing policy instruments** (hereinafter referred to as "ESP"), presented in the green tables, are already adopted inlegislation and have clear implementation mechanisms and secured funding. Theimpactof theESPpackage and external factors on theachievement of the national targets is described as an ESP scenario in Chapter4.
- **The planned policy measures** (hereinafter ' DP') presented in the blue tables are proposed as complementary measures to the ESP package in orderto achieve the2030 targets, but are currently not enshrined in legislation or strategic planning documents and/or their implementation depends on ensuringdifferent sources offunding. The PPP effect to achieve national targets has been assessed in themodelling of the PPP scenario, which is described in detail in Chapter5.
- The measuresreported for the other sector, as the GHG effect is also in another sector, are presented in theorange tables. For each sector, only theimpact of themeasure is reported in terms ofGHG savings and/or total fuel and energy savings.

A summary ofthe measures can be found in Annex 4. "Existing and planned policy measures in the NECCP".

The planned policy measures will be adopted in2024 and beyondby translating them into sectoral development programmes or other strategic planning documents and/or other legislation.

Theresults of the adopted and implemented policy measures will be regularly monitored and compared to projections. In case of underperformance and threat ofmissed climate targets, options for replacing inefficient measures withmore effective and/or increasing thescope of themeasures chosen will be considered, as well as strengthening and/or early economic and legal signals toencourage the desirable behaviour of market participants and consumers, and public consultation on changes inpolicies and measures.

The NECPwas submitted to the European Commission on31 December 2019 in agreement with the institutions and approved by theGovernment'sprotocol decision of 30 December 2019. By the same protocol decision of the Government, it was decided to set upa working group tocoordinate theimplementation of theNECPs andtoaddress the Green Deal agenda and was established bythePrime Minister's Decree of12 February 2020.

It has been appointed to coordinate thealignment of the Republic of Lithuania’spositions on theEuropean Union 2040 climate target and the trajectory to achieve climate neutrality by 2050 and,if necessary, to submit proposals for these positions of theRepublic of Lithuania to thePrime Minister and theGovernment Commission of theEuropean Union; address topicalissues related to theimplementation of the NECPs, discuss issues related to theimplementation of the Green Deal agenda and,if appropriate, submitproposals to the Prime Minister for theimplementation of theNECP and the Green Deal agenda initiatives in Lithuania.

SectionA:

3.1. Decarbonisation dimension (decarbonisation)

3.1.1. GHG emissions and removals

Climate change mitigation objectives are closely linked to the energyefficiency targetsdefined in theNational EnergyIndependence Strategy (NEIS), the NationalRenewable Energy Development Programme, theLong-Term Renovation Strategy, the Renewable Energy Law, the Alternative Fuels Act and the existing NECP.

The State Progress Strategy “Lithuania’s long-term vision “Lithuania 2050”[51] highlights that climate change and theecosystem crisis on the planet aredriving the EU and other Western countries towardsa green transition, i.e. across-cutting transformation of the economy towards climate neutrality by 2050.In order to implement theEuropean Green Deal, EU Member States (includingLithuania) have committed toreforming their energy, industrial, transport, construction, waste managementand agricultural and forestry sectors, changing theprevailing consumer society attitudes towards the natural environment and its challenges. As energy demand in Europe will continue to grow, the green transition agenda turns into a major challenge in terms of accesstogreen energy and the raw materials needed for its production.

TheNAP states that Lithuania aims to adequately implement Lithuania’scommitments on sustainable development and climate change mitigation and to separate economic growth from GHG emissions. Strategic objective6 is to ensure good environmental quality andcoherence in theuse of natural resources, protect biodiversity, mitigate Lithuania’s impact on climate change and increaseresilience to its impacts.

In this section, policies and measures are grouped and presented by sector. Detailed measures and policies to this end shall be discussed for each sector emitting and forwhich removals need to be improved,in line with the long-term vision and theobjective ofa low -carbon economy and thebalance between emissions and removals in line with the Paris Agreement.

The following are the policies and measures for the sectorsnot participating in the EU ETS and for the FNHR sectors that will be implemented or planned to be implemented inorder toachieve the2030 GHG emission reduction targets.

Transport sector

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

51 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/a8b03ef0a55511ee8172b53a675305ab?jfwid=1z7qrkybq

1. For the transport sector, the UCPD has the following mitigation targets and targetsfor 2030:

1.1. to increase energy efficiency, the use ofRES, alternative fuels and promote zero-emission, interconnected, digitalised and sustainable mobility in multimodal transport;

1.2. a 15 % shareofRES energy in the transport sector's energy consumption, of which 5 % — gaseous fuels from RES;

1.3. establish low-emission zones formunicipal councils incities;

SectionA:

1.4. ensure that all public, taxi and ride-hailing transport inmetropolitan areas uses only RES energy;

1.5. reach a minimum of60 %of urbanjourneys by public transport, cycling and walking:

1.1.1. increase theattractiveness of public transport bydeploying intelligent transport systems, technological solutions and other solutions to prioritise public transport traffic, to ensurecompatibilitybetween urban and suburban public transport routes, and toensurelinks between different modes ofpublic and private transport;

1.1.2. ensure thedevelopment ofinfrastructure for bicycles and pedestrians by creating anattractive, safenetwork of cycling and walking paths integrated into the overall transport system, by constructing or reconstructing at least 600 km ofnew or existing bicycle and pedestrian paths;

1.6. promote theproduction ofadvanced biofuels and RESfuels of non-biological origin to ensure that they account forat least 3.5 % offinal energy consumption in the transport sector;

1.7. electrification at least 35 %. Lithuania's railway network (8 % in 2021);

1.8. to achieve a20 %reduction in the use of fossil fuels in inland waterway transport;

1.9. to achieve that electric and zero-emission vehicles account for at least 20 % ofthe light duty vehicle fleet andensure thedevelopment of the necessary charging and refuelling infrastructure;

1.10. by increasing thenumber of electric vehicles, achieve that:

1.1.3. by 2025,the number of electric vehicles of categoryM1 would represent at least 10 % of the numberof electric vehicles and30 %of theannual purchases of N1 vehicles;

1.1.4. by 2030, thenumberof electric vehicles of category M1 would represent at least 50 % of the number ofelectric vehicles and100 % of theannual purchases of N1 class vehicles;

1.1.5. asof 1 January 2030,electricvehicles of class N1 with internal combustion engines, except for electricvehicles ofclass N1 powered by alternative fuels, arenot registered;

1.11. by31 December 2030 , achievezero-emissionroad transport vehicles procured or used for the provision of services and consist, in relationto the total number ofroad transport vehicles purchased or used for the provision of services, of:

1.1.6. 100 % for M1,M2, M3, N1vehicles ;

1.1.7. 16 %for N2 and N3vehicles ;

1.12. theinstallation ofat least 60000recharging points for electric vehicles, of which 6000 publicly accessible recharging points;

1.13. ensure that from 2023 atleastone publicly accessible high -power recharging point is tobe installed at all service stations, bus and railway stations, airports and seaports under construction or refurbishment.

Table3.1.1.1. GHG emission reduction targets for the transport sector for theperiod2021-2030 have been set in % of the UCPD:

Sector	**Average 2016-2018 compared** to**2005**	**2025 target % compared** to**2005**	**% Achievementof the 2030 target compared** to**2005**
Transport	+ 36,2	+ 11,3	—14

2. The above -mentioned obligations for thetransport sector are enshrined intarget6.1 of the**NAP**'s sixth objective 'Ensure good environmental quality andcoherence in theuse of natural resources, protect biodiversity, mitigate Lithuania'simpact on climate change and increase resilience toits impacts','Increase theshare ofenergy from renewable energy sources and theuse of alternative fuels in transport, promote sustainable intermodal mobility and reduceenvironmental pollutioncaused by transport'. A**Transport** Development Programme for**2022-2030** (the ' Connectivity**Development Programme**') was also developed to meet the objectives set out inthe NAPsfor the transport sector.
3. **The Transport Development Programme** aims to develop public policies in the fields of theoperation of thetransport system and thedevelopment of transport infrastructure inall modes, electronic communications and mail, as well as to formulatepublic policies in the fields oftraffic safety, transit, logistics andcombined transport, passenger and freight transport byrail, road, sea, inland waterwayand air transport in all modes of transport and to organise, coordinate and monitor the achievement of these operational objectives. Theobjectives set out in theNAPs will be pursued through objectiveswhose cross-cutting outcome will ensure theimplementation of thehorizontal principles in the field ofsustainable development, innovation /creativenessand equal opportunities for all in thefield of mobility, and the resolution of the identified problems and theelimination of the causes of the problems.

In particular, theimplementation oftarget6.1 "Increasing theshare ofenergy from renewable energy sources and theuse of alternative fuels intransport, promoting sustainable intermodal mobility and reducing environmental pollutionfrom transport" contributesto the reduction of GHG and nitrogen oxide (NO_x) emissions from transport. an increase in theshare ofrenewable energy sources in gross energy consumption in transport and in energy savings in the transport sector; the share oftrips bybicycles and other non-motorised means of transport in the overalltravel structure and increasing the share oftrain journeys in the overall travel structure; increasing theshare ofrail and inland waterway transport in total freight transport.

This objective will address the following issues:

- lack ofrecharging/refuellinginfrastructure for alternative fuels and public incentives to use zero-emission vehicles;
- increasing the popularity of public transport,adapting public transport and its infrastructure topeoplewith individual needs, improving theintegrity of publictransport between different modes of transport;
- increasing thedevelopment ofmissing solutions for sustainable mobility in urban areas and for non-motorised transport infrastructure;
- increasing the shareoffreight and passengers transported by clean road transport and missing alternative zero-emission vehicles and the necessary infrastructure forpassenger and freight transport.

4. The**Lawof the Republic of Lithuania on Alternative Fuels** establishes thedevelopment of theuse of alternative fuels in the transport sector in the Republic ofLithuania. This law aims to reduce theimpact of the transport sector on climate change and ambient air pollution, with a view toincreasing the share ofrenewable energy sources in transport in 2030 bygradually ensuring that thetargetsset out in Directive 2018/2001 are met through obligations on fuel suppliers. The alternative fuels law also aims to reduce theconsumption ofoil fuels inroad transport by atleast39 % by2030 compared tothe consumption of oil fuels in 2021. Theseobjectives are achieved by consistently increasing thediversity of energy sources in the transport sector, by imposing obligations on fuel suppliers for thesupplyof renewable fuels, by increasing theuse ofadvanced biofuels, by promoting theuse of electricity in transport, bydevelopingalternative fuels infrastructure, by increasing thenumber ofzero-emission vehicles registered in the Republic of Lithuania and by laying down requirements for public procurement in the transport sector. It is foreseen that 60000recharging pointsare tobe installed in the Republic ofLithuania by 2030, of which 6000 are publicly accessible. Amendments to the law are currently being prepared, takinginto account the provisions of theEU Regulation (EU) 2023/1804, which enteredinto force.

5. **The** NOTMP aims to limit national anthropogenic emissions of SO_2,NO_x,NH_3,$PM_{2.5}$ and NMVOCs toambient air inorder to comply with the2020 and 2030 targets set for Lithuania in the Environmental Protection Strategy. Theroad transport sectorhas the biggest impact on NO_x emissions. WhileNO_x emissions from lorries and buses decreased by 29.5 % in2022 compared to 2005, their share in the total NO_x emissions structure in2022 was as high as35.3 % of total NO_x emissions. It is also important for the passenger cars sector, where NO_x emissions in2022 accounted formore than 18.4 % of total NO_x emissions. One of thepriorities of the Ambient Air Protection Act is the reduction ofpollution caused by vehicles by reducing theuse of internal combustion engine vehicles and increasing theuse ofelectric vehicles.

6. **The actionplanfor the development** of electric vehicles**and recharging infrastructure** [52-53] aims to provide for measures and actionsto increase theuse ofelectric vehicles and ensure the efficient development ofrecharginginfrastructure for electric vehicles in Lithuania for the period2022-2030. Thenumber of electric vehicles is projected to beat least 262248 by 2030. The plan will be updatedin line with thechanges to the introduction of alternative fuels and the entry into force ofEU Regulation (EU) 2023/1804.

7. **The guidelinesfor thedevelopment of hydrogen refuelling infrastructure and thepromotion of hydrogen-powered road vehicles** in Lithuania [54] aims to provide objectives and measures to ensure thedevelopment of hydrogen refuelling infrastructure and to promote theuse of hydrogen-powered vehicles in Lithuania for the period2023-2030. Thetarget is to have atleast 10 (public andprivate) hydrogen refuelling points in Lithuania by2030 and at least 5 % ofall newvehicles purchased in thecountry are hydrogen-powered.

Current situation. The transport sector, which includes road, rail, air and inland waterway transport, is responsible for thehighest share ofroad transport, representing asmuch as97.6 %of total emissions (2022). It accounts for54.1 % of emissions frompassenger cars. It is necessary to change theold car fleet (currently theaverage age ofpassenger cars in Lithuania is 15 years, i.e. one of the oldest in theEU) to a newer and more efficient fleet, using transport

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52 https://eur-lex.europa.eu/legal-content/LT/TXT/?uri=CELEX%3A32023R1804
53 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/e80e6750fb7b11ecbfe9c72e552dd5bd?jfwid=ha0aozfl6
54 https://www.e-tar.lt/portal/lt/legalAct/c3b5bdb0bf5011ed97b2975f7dad7488

measures based on alternative fuels to promote innovative transport technologies, theuptake ofzero-emission vehicles and electric mobility forall modes of transport.

Thedemand for electric vehicles on the Lithuanian market and thepaceof acquisition are growing at an increasing pace every year. Asof1 April 2023, according toVĮ Regitra, 13692 electric vehicles were registeredin Lithuania, of which 6928 pure electric vehiclesof classes M1 and N1, and as many as 21352 electricvehicles on1June 2024, of which 12283 pure electric vehicles. However, with the increase in thetotal number ofpassenger cars in Lithuania (especially old and polluting cars), theshare of electric cars is marginal. There is aneed for incentives to move away from polluting own cars and towards zero-emission cars and other sustainable mobility measures. One of the main measures to reducepollution in the transport sector – in particular the most polluting road transport – is thepromotion ofelectrification and other alternative fuels.

There isa need to change thebehaviour, activitiesand habits of society, business and the public sector by encouraging the abandonment ofpolluting vehicles . The maincommunication objectives of the Communication Plan for theDevelopment ofElectronic Mobility set out in the internal legislation of the Ministry of Transport and Communications are as follows: encouragethe transition of thepublic, business and the public sector to electric vehicles, inform about the support available for their purchase and other incentives; inform about thepossibilities and support available for thedevelopment of recharging infrastructure; changing societal, business and public-sector travel habits towards more sustainable travel.

Theinfrastructure for charging electric vehicles is developed in Lithuania on the core trans-European road network, i.e. near the E85and E67international motorways (highways of national importance) and other roads forming part of the trans- European transport network (TEN-T) for approximately every 50 kilometres of electric mobility between cities. In 2022,28 public recharging points forlarge -scaleelectric vehicles (56 recharging points)wereinstalled on the Vilnius-Klaipėda motorway, Vilnius-Panevėžys and next to other roads of national significance, at the national initiative. The planned charging infrastructure is available on theelectric vehicle charging infrastructure map. 17 Lithuanian municipalities took advantage of the EU’s investment opportunity to install rechargingpoints for electric vehicles (a total of56 recharging points for electric vehicles wereinstalled at the initiativeof the municipal authorities, 33 high power and 23 conventional power). Another 100 recharging points for electric vehicles were installed by theTransport Competences Agency together with 39 municipalities in thecountry. As ofMarch 2024, 46 rechargingoperators and 1440 publicly accessible recharging pointswere registered in Lithuania according to theregistrationsystem for publicly accessible recharging points for electric vehicles.

Thedevelopment of publicly accessible recharging infrastructure along nationalroads is planned in line with national targets, but also witha particular focus on new EU requirements, ensuring thecirculation ofelectric vehicles not only at national level but also across the EU. Thedevelopment ofrecharging infrastructure on roads of national significance is planned on sections where ultra-high power recharging pools (over 150 kW recharging points) will have tobe developed. It is also very important todevelop recharging infrastructure in municipalities. All Lithuanian municipalities developed plans forpublic recharging points to be installed by 2030 (recharging infrastructure close to dense accommodation,shopping, recreational and leisure centres,health, educationalestablishments, etc.)in2022. This publicchargingInfrastructure for electric vehicles (in addition toroadsand municipalities of national significance) shall bedeveloped and developed in accordance withapproved European Union standards, but also enabling the charging ofother types of electric vehicles (combined recharging pointswith three types ofpoints: AC, DC (Combo2) and DC (CHAdeMO))

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Table3.1.1.2: Existing and planned policy measures in thetransport sector until 2030

NO	MEASURE	Total GHG SUBMITTING effect, thousand t CO2eq. 2021-2030	Total savings for CURO-ENERGY, GWh
EXISTING POLICY INSTRUMENTS (EPF)			
T1-E	Promoting the acquisition of electric cars	709,07	2287,77
T2-E	Alternative fuel infrastructure and TP promotion	1029	2414,2
T3-E	Electrification of railways and rolling stock	315,05	750,31
T4-E	Promotion of intermodal transport	155,86	581,76
T5-E	Promoting less polluting mobility measures	115,09	482,86
T6-E	Car registration tax	152,89	127,21
T7-E	Abolition of the reduction in the pollution tax	34,70	144,55
T8-E	Electronic tolls infreight transport	344,59	1342,67
T9-E	Reducing traffic congestion	365,18	1395,95
T10-E	Public awareness	135,02	319,39
T11-E	Vehicle refurbishment with green procurement	277,44	1685,60
T12-E	Designation of low emission zones in cities	103,08	392,81
T13-E	Charginginfrastructure for electric vehicles	547,21	1625,18
T14-E	Eco-driving	174,84	709,90
T15-E	Implementation ofsustainable mobility measures	527,22	2378,70
T16-E	Sustainable Mobility Fund	*	*
T17-E	Rail development and infrastructure improvement projects	*	*
T18-E	Development of cycling infrastructure	96	366,30
T19-E	Transport measures discarded pollutant monitoring system	10,00	38,16
T23-E	Promoting sustainable mobility	134,56	551,21
T26-E	Development ofsustainable airport infrastructure	6,16	4
T27-E	Law on excise duties	769,03	7435,06
T28-E	Implementationof ETS2	283,14	2584,74
T29-E	Renewal of the KVJUD fleet	1,80	6,87
T30-E	Use ofalternative fuels in theport of Klaipėda	5,00	***
T31-E	Development of electricity supply in amaritime port	*	*
T32-E	Promoting sustainable inland navigation	5,00	19,08
T33-E	Calculation ofGHG and air pollution emissions	*	*
T34-E	Port environmental management system PERS	2,00	7,63
A14-E	Reducing the use of fossil fuels inagriculture	210,46	726,27
A15-E		441,05	1521,99
A7-E		272,80	941,45
L4-E		198,21	684,00
A3-E		3,91	13,53
A5-E		218,48	833,60
A13-E		18,95	***
RES12-E	Use of alternative fuels	1372,60	***
RES13-E		*	*

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REI10-E		860,46	***
REI15-E	Development of green hydrogen production	8,37	***
AMOUNT		**9904,22**	**32372,75**
PLANNED POLICY MEASURES (PSD)			
T1-P	Promoting the acquisition of electric cars	98,37	346,57
T2-P	Promoting thedevelopment ofalternative fuels infrastructure and transport	333,93	732,49
T3-P	Electrification of railways and rolling stock	59,68	111,58
T4-P	Promotion of intermodal transport	164,66	614,62
T20-P	Restrictions onpolluting vehicles	*	*
T21-P	Upgrading of trains	5,00	19,08
T22-P	Promoting thepurchase ofbicycles and motor bicycles	3,14	3,08
T23-P	Promoting sustainable mobility	18	68,69
T24-P	Promoting sustainable inland navigation	114,5	422,58
T25-P	Development of electricity supply in amaritime port	*	45,16
T26-P	Development ofsustainable airport infrastructure	0,82	***
T27-P.	Amendment to theLaw on Excise Duties	*	*
A3-P	Reducing the use of fossil fuels inagriculture	3,12	10,69
A13-P		20,97	***
REI10-P	Use of alternative fuels	**	***
AMOUNT		**882,18**	**2374,52**

**The impact of themeasure is not assessed as it does not directly reduce GHGs or fuels and energy, but it is essential for thesuccessful implementation ofother envisaged measures.*
***The impact of the measure is not assessed as it saves GHG or fuels and energy in another sector.*
**** Implements renewable energy solutions within the scope of the measure that do not directly contribute to fuel and energy savings but ensure thedeployment of clean technologies*

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T1-E. Promoting the***acquisition of electric cars***: The aim is to promote thepurchaseand wider use of electric vehicles, thereby reducing pollution in thetransport sector. Activitiesforeseen forthe implementation of theFacility: (1) Fosteringthe purchase ofpure M1class new and used electric vehicles(up to 4 years) through compensation to natural persons and thepurchase ofpure M1 and N1 new electric vehicles through compensation to legal persons (ref. MF-SM-EVF01 of 6 June 2022; NoMF- SM-EVJ01 of 6 June *2022 (2022-2027)*; 2) Promotingzero -emission new and second-hand passenger cars (pure electric vehiclesor hydrogen -powered cars) through public sector compensation (08-2023 No 08-008-J-0001-J02) *(2023-2026);* (3) the replacement of polluting public transport by electric vehicles in theremote areas of the ruraldistrict, the purchase ofelectric vehicles, the installation of charging infrastructure, theprovision of social taxi servicesthrough themobile application and thecall centre (2022*-2030); (*4) Promoting theacquisition of pure electric vehicles through financial instruments (and legal regulation). With financial incentives (compensation), natural and legal persons purchased over 2.6 thousand pure electric vehicles (in*2021-2022)*; (5) Prohibition of registration of vehicles equipped with internal combustion engines (fossil fuelled). In accordance with theprovisions of the Alternative Fuels Act, from *2030* onwards,vehicles of category N1 equippedwith internal combustion engines (' VDV'), with the exception of N1vehiclespowered by alternative fuels, may not be registered. (6) Preferential RES vehicles (*2022-2030*). Under the Road Maintenance and Development Programme Financing Act,commercial (N1 class) electric and hydrogen-powered cars are exempted from road tax as of1 July 2023 and willbenefit from a75 % rebateas of2026; (7) Including VAT onthe admission of an electric vehicletotheVAT deduction (*2023-2030). From* 2023, up to50 thousandelectric vehicles have beenmade available to natural and legal persons who are subject to value added tax (VAT). VAT onacquisitions ofEUR (includingVAT) is included in the VAT deduction.

T1-P: Promotion of***the acquisition of electric cars***: Financial supportmeasures for the purchase ofelectric vehicles and/or the installation or upgrading ofinfrastructure necessary for charging them shall continue until they account for at least 10 % of the total number ofpassenger cars registered in the country. For funded activities for natural persons: purchase ofpure M1 class new and second-hand electric vehicles. For legal persons for thefunded activities: Purchase of M1 and N1 pure electric vehicles *(2026-2030)*

T2-E. Promoting thedevelopment ofalternative fuels infrastructure and transport. The measure includes: (1) Promotion of clean public transport vehicles (2017 *-2023).* Financial incentives for the take-up of alternatively fuelled (electricalor natural gas) M2 or M3 buses. As part of the measure,189 public transport vehicles, including90 trolleybuses, 51 electric busesand 48 buses driven by compressed natural gas (No 04.5.1-TID-V-517) werepurchased in Lithuania throughinvestmentsfrom EU funds and nationally financed projects. (2) Development ofzero -emission urbanandsuburban public transport and necessary recharging /refuelling infrastructure (No 08-016-K, No 08-009-K) (*2024-2029).* Financial incentives for the installation ofzero-emission (electricor hydrogen -powered) M2 or M3 buses and the provision of recharging/refuellinginfrastructure*;* (3) Promotion ofelectric production / remanufacturing ofpublic vehicles (No 08-014-T)/(No 08-025-T) (*2024-2026)* Financial incentives for the reduction of theproduction of zero -emission (electric) buses of category M2 or M3 (No 08-025-T) and conversion ofpolluting, fossil-fuel, buses into zero-emission (electric) M2 or M3 class; (4) Establishment/development of recharging/refuelling infrastructure foralternative fuels (electricity, biogas and hydrogen) (*2023-2027).* Financial incentives for the development anddevelopment ofpublic compressed biogas refuelling points (No 08-013-T), publicly accessiblehydrogen refuelling points (No 08-007K, No 08-023-K),publicly accessible recharging infrastructure forheavy- duty electric transport (No 08-015-J); (5) Heavy-duty vehicles (categories N2, M2, N3 and M3) driven by alternative

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fuel, promotion (No 08-020-T, No 08-021-T, No 08-022-T), (No 08-017-T, No 08-018-T, No 08-021-*T*) (*2024-2030).* Financial incentives for the purchase of zero-and zero-emission vehicles powered by electricity, hydrogen or biogas produced from REDII compliant feedstock; (6) National legislative and regulatory measures for thedevelopment ofalternative fuels infrastructure (*2023-2030)*. Set national development targets and measures to drive change; (6) EU legislative and regulatory measures for thedevelopment ofalternative fuels infrastructure (*2023-2030)*. Set requirements and volumes for the development ofpublicly accessible recharging /refuelling infrastructure at designated locations.

T2-P: Promoting thedevelopment ofalternative fuels infrastructure and transport. The measure includes: (1) Refurbishment of urban and suburban public transport by promoting the use of alternatively fuelled vehicles (electricity and hydrogen) (*2027-2030)*; (2) Fostering thedevelopment ofrecharging and refuellinginfrastructure for alternative fuels (electricity and hydrogen)*(2026-2030)*; (3) thepromotion ofheavy-duty vehicles of categories N2, M2, N3 andM3 fuelled by alternative fuels *(2025-2030)*; (4) Digital solutions tooptimisefreight flows and reduce empty mileage *(2024-2030)*. (5) Assessment of thetechnical feasibility ofconnecting recharging infrastructure to theelectricity transmission grid andreview of pricing of the electricity transfer service related torecharging infrastructure (*2026-2030)*

T3-E.electrification of railways androlling stock. The measure includes: (1) electrification of railways in*2016-2023* and (2) electrification of railways in*2022-2027* . The renewal, upgrading and development of the1520 mm gauge railway infrastructure (including the constructionand electrification of the second tracks) in theIX B transport corridor, the electrification of the Vilnius node, theelectrification of Kaišiadorys-Radviliškis, Radviliškis-Klaipėda sections (around 420 km) in Lithuania (394 km); (3) Purchase of alternative energy -powered trains for public services *(2024-2028)* Replacement of non-compliant diesel trains withmodern, environmentally friendly electric and battery trains for passenger transport*;* (4) Installation ofcharging infrastructure forbattery trains*(BEMU)* (2023-2026*).* Installationof recharging points for charging battery trains forpart of theroutes on non-electrified sections.

T3-P:electrification of railways androlling stock. Purchaseofelectric locomotives (2024-*2028*) Electric locomotives will be used on an electrified railway section to transport goods instead of diesel traction locomotives.

T4-E. Promotionof intermodal transport. Promotion of intermodal transport on the1520 *mm*network (*2022-2023)* The measure has been implemented by adapting the platform wagons of the defined model (construction and installation of reusable semi-trailer anchorages).

T4-P: Promotion of intermodal transport. The measure includes: (1) the promotion of intermodal transport on the1435 mm network*towards*Italy (*2023-2030);* (2) Promotion of intermodal transport on a1435 mm network *(2022-2030)* (3) Technical development ofVilnius and Kaunas intermodal terminals (*2022-2025).* The aim is to adapt terminals for theloading of semi-trailers and for increased container flows; (4) adjusting the tax base to favour the least polluting mode oftransport (e.g.increasing road charges for trucks, compensation ofrail infrastructure charges, etc.) and promoting the transport ofgoods by less polluting transport (*from2025to 2030).* In order to adjust the tax base forthe transfer of goods transportedthrough Lithuania byheavy-duty vehicles (HVs) torailways; (5) Feasibility study on thetransfer ofheavy-duty vehicles transportedthrough Lithuania to rail (2024-2030). In order to move goods on the Lithuanian border where it ispossible to move and continue to transport goods by rail, it is necessary to establish

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thefeasibility and effectiveness ofsuch a measure,supported by a feasibility study.

T5-E:Promotion of lesspolluting means of mobility. The measure includes financial incentives for natural persons who have put a polluting passenger car in circulationin Lithuania as an end-of- life vehicle for aspecified period of time: (1) acompensatory allowance for the purchase ofa low-emission passenger car; (2) compensatory allowances for thepurchase ofalternative means of transport, such asbicycles, e-scooters, e-bikes, public transport tickets or sharing services; (3) Compensation allowances for deprived persons who have purchased aless polluting car (*2020-2025)*

T6-E Car Registration Tax*.* The Law of the Republic of Lithuania on motor vehicle registration tax establishes[55]that, since 1 July 2020,registration of passenger and light goods vehicles (categories M1 and N1) is subject to a registration tax depending onthetype and combinationoffuels and where the CO2 emissions exceed 130 g/km. *(2020-2030)*

T7-E – Abolition of pollution tax relief. The reduction in the tax on environmental pollution from mobile sources ofpollution granted to natural persons engaged in an individual activity within themeaning of the Personal Income Tax Act and the use of private vehicles in their activities (in*2021) has*been abolished.

T8-E. Electronic tolls infreight transport. The measure includes: (1) Implementation of eTollingin freight transport *(2026-2030).* Theintroduction of a new'e- tolling' road charging system, whereby a fee is levied ondistancetravelled rather than time, encouraging vehicle operators and users to move away from an empty mileage, to consolidate consignments, optimise routes, use environmentally friendly vehicles, andpurchase less polluting (higher EURO) vehicles; (2) Road charging by vehicle Euro classes and reductions for the least*polluting*vehicles (*2024-2030)* Tariff ranges will be linked to theEURO classof vehicles. Zero-emission (AD)measures will also be included in the largest Euro class and are planned to be subject to thelowest tariff.

55 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/1cf36232227211eab86ff95170e24944/asr

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 through theintroduction ofsmart traffic regulation technological tools (smart traffic lights,crossings, *etc.*) (*2021-2030);* (2) Preparation of recommendations for municipalities covering spatial planning solutionscontributing to efficient traffic management (optimal location of public transport charging points, developmentof commercial areas according to traffic volume, etc.) (2022 *-2030)*; (3) Educationand information for employersand employees on theapplication offlexible working time options (remote working, start and end of flexible working time,additional days of absence, etc.) that would reduce commuting (2019 *-2030)*.

T10-E. Public information: The objective of the measure isto inform and educate the public to encourage zero-emission vehicles and other alternativeways of travelling for their own car. This will be achieved through: (1) Training, publicity, presentations,advertising, etc. in kindergartens, schools, universities, residents, public, municipal and private companies and organisations, *etc.*(*2017-2030)*; (2) the organisation ofhackathons and thefinancing of winning initiatives that influence the behaviour of groups*in*society (*2022-2030);* (3) conduct of the e-mobility communication campaign and market investigation (*2023-2024* [56])

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T11-E. Refurbishment of vehicles with green procurement. The measure implemented achange in the legal framework to increase theuptake ofzero-emission vehicles and reduce thenumber ofconventionally fuelled vehicles by implementing theminimum procurement targets (*2022-2030).*

T12-E.Determination of low pollutionzones in cities. Accordingto the Alternative Fuels Law, low-emission zones must beestablished in cities by1 January 2025. The Ministry of Transport and Communicationsissued guidelinesfor the designationof low emission zones in 2023. Municipal authorities must identify low-emission zones in cities with spaor spa status or more than 50 thousand inhabitants and are ready toinstall them (*2022-2030*).

T13-E. Charging infrastructure for electric vehicles. The measure includes: (1) Development of publicly accessible recharging infrastructure (2023 *-2029).* Financial incentives for thepurchase/installationof publicly accessible recharging points in municipalities according to plans and private initiative, alongside public roads; (2) Development ofpublic charging infrastructure (for light and heavy transport) (2024 *-2026).* Financial incentives for the development ofpublicly accessible recharging infrastructure along roads along the TEN-T network and other locations identified by EU requirements; (3) Establishment of a primary public recharginginfrastructure for electric vehicles *(2021-2022*). Thefirst 160 recharging points in municipalities and major roads ofnational significance were equipped with financial incentives. (4) Development of private charginginfrastructure for electric vehicles (*2022-2027).* Financial promotion of theacquisition/equipment ofprivate recharging points in the areas where electric vehicles spend the most time while standing: privately owned premises, multi-apartment areas, yards, parking areas, workplaces, etc. Private charging infrastructure ispromoted through smart charging functionalities. (5) Legal and regulatory incentives for thedevelopment of charging infrastructure: the adoption of anactionplan for the development of electro-mobility; level playing fieldfor economic operators to install and develop publicly accessible recharging points along roads of national significance; changes to road traffic rules by making theuse of electric vehicles more attractive; compensation for theconnection of the recharging infrastructure to the electricity grid, simplification of theconditions for connection to the electricity grid ,implementation of separate accounting for electricity within a single consumption facility ensuring thepossibility ofseparateaccounting for electric vehicle charging, possibility to participate in thesystem of DAEIunits of account, obligations toensure the power ofpublicly accessible recharging infrastructure per

56 https://sumin.lrv.lt/lt/veiklos-sritys/darnus-judumas/elektromobilumas/persesk-i-elektromobili/

electric vehicle *(2021-2030)*; (6) EU legal and regulatory obligations for thedevelopment ofrecharging infrastructure in accordance with Regulation 2023/1804/EUon thedeployment of alternative fuels infrastructure, which provides for the deploymentof publicly accessible recharging infrastructure for light-duty and heavy-duty transport on the territory of EU countries by31 December 2030, in accordancewith the requirements (power, distances, etc.) toallow electric light and heavy-duty vehicles tocirculate seamlessly across the EU *(2023-2030)*.

T14-E. Ecological driving. Driving schoolshave alreadyincluded eco-driving training intheir driver training programmessince 2010, and VĮ Regitrahas successfully tested the knowledgeand skills of economic and eco-driving during the examinations since 2014. New drivers aretherefore familiar with the principles of eco-driving. However,people who have previously learned to drive may not have knowledge ofeco-driving,and it is planned toset up an e-learningplatform /computer program on cost-effective and eco-driving accessible to thepublic inorder to enable every member of the public tobenefit from information and communication technology tools, high-quality training and effective training (e-learning) oncost-effective and eco-driving. *(2021-2030)*

T15-E.Implementation of sustainable mobilitymeasures. The measure is addressed to municipalities and includes: (1) the implementation of Sustainable Urban Mobility Plans (SUMPs) *(2018-2022).* Funded Intelligent Transport

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measures for thedeployment and development ofurbansystems, theadaptation of urban streets and other transport infrastructure to public transport needs, the deployment of cable transport, theadaptation of urban transport infrastructure topeoplewith special needs, thedeploymentanddevelopment of publicand private transport interoperabilitysystems, cycling infrastructure and its systems, theadaptation ofpublic local (urban and suburban) vehicles for the transport of bicycles and peoplewith special needs, and theinstallation and development ofpublic transport safety equipment; (2) Preparation of the*SUMM (2016-2023)* The GMPhas been developed by18municipalities from 2014- 2020 EU funds; (3) Further implementation of the*SUMM (2021-2027).* Implementation of measures to promote walking, cycling, public transport and theuse ofalternative fuels in 18 municipalities (No 08-025-T); (4) Reducing theattractiveness of urban use of cars (*2021-2030). Reducing thenumber ofparking spaces and* /orincreasing the price for parking.

T16-E Sustainable Mobility Fund. The Fund was created in implementation of theprovisions of theLawof the Republic of Lithuania on Alternative Fuels. The Fundwill be used tofinancemeasures undersustainableurban mobility plans, topromote the uptake ofalternative fuels vehicles, todevelopand develop alternative fuelsand transport infrastructure, toinstallinternal combustion engine vehiclesin cities, toconvert internal combustion engine vehicles (ICVs) into alternative fuel vehicles, and tofinance theimplementation of measures to reduce ambient air pollution (from*2023to 2030)*.

T17-E. Rail development and infrastructure improvement projects. The objective of the measure is to adapt maintenance activities and infrastructure tonew electric passenger trains: upgrade and develop amaintenance and repair base for passenger trains to serve existing, newly procured electric and battery passenger rolling stock; deploying renewable and green solutions for themaintenance and repair of passenger rolling stock; improve thesafetyand healthconditions forworkers in themaintenance and repair of passenger rolling stock (*2024-2027)*

T18-E. Developmentof bicycle transport infrastructure . The objective of the measure is to plan and build infrastructure suitable for cycling inurban, suburban and rural areas in order to reduce thevolume ofcar traffic inurban and suburban areas (*2022-2030)*.

T19-E – Vehicle Emissions Monitoring System. The aim is to reduce the use ofvehicles that are not technically in good order,to test and implement a mobile system for remote monitoring of emissions fromvehicles: remotely measuring theemissions ofvehicles on the road using mobile equipment (pilot project of an educative and/or informative nature); take adecision on the application of the remote monitoring system following an analytical assessment; introduce a system for remote monitoring ofvehicle emissions and/or strengthentechnicalroad controls ofroad vehicles (*2021-2029)*.

T23-E: Promoting sustainable mobility: The measure includes: (1) makingpublic transportmore attractive byreducing ticket prices/free, allowing faster mobility, convenientconnections and benefiting from thesharing ofelectric vehicles, bicycle rental (*2023-2030)*; (2) Theintroduction of a smart ticketing system forLGTs with new ticketing channels, a loyalty scheme based on CO_2 consumption history and adapted for persons with disabilities *(2024-2030);* (3) harmonisation of timetables forpassenger trains and public road passenger transport, provision of seats for electric car sharing, bicycle rental services (2023 *-2030*); (4) Inland and maritime passenger ports aconvenient connection to public road transport, if compatible,rail transport, use of electric vehicles

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opportunities for sharing, renting bicycles (2023-*2030*); (5) Improving theattractivenessof public transport by making it possible tomove fasteralongspecified routes (*2023-2030*); (6) regularly reviewed public transport fares or discounts *(2023-2030);* (7) arrangement of bus stops,revision of routes and traffic schedules to be mutually compatible between urban /suburban /interurban and long-haul routes (2023-2030).

T26-E. Development of**sustainable airport infrastructure.** The measure includes: (1) ensuring electricity supply for stationary aircraft atVilnius, Kaunas and Palanga airports *(2024–2030)*; (2) installation of recharging points for electric vehicles in theaerodromeareas of Vilnius and Kaunas airports *(2023-2025)*.

T27-E Amendment tothe Excise Act. As of2024,excise duty exemptions (or reduced volumes)forheating gas oils, coal, coke, lignite, LPG for heating purposes (bottled and in bulk indomestic gas bottles) are being waived, andexcise duty rates on gas oils, coal, coke and lignite are gradually increased over the period2024-2026. Excise duties are introducedfor a new type of fuel,peat for heating, and are consistently increased (to avoid thispolluting fuel becoming an alternative to coal) *(from 2024)*.

The amendmentsto theLaw on Excise Duties from 2025 onwardswillinclude in theexcise duty rates applicable topetrol, kerosene, diesel, heating gas, oil gas and gaseous hydrocarbons (except for non-business heating), coal, coke, lignite, fuel oil and orimulation, aCO_2 componentproportional to the CO2emissions of the fuel, takinginto account the calorific value, whichwill increase annuallybetween 2025 and 2030 (*from 2025 onwards)*. In addition to the already established 60 EUR/1000 l CO2 component from2025 onwards, asafety component of25 EUR/1000 l in2025 for gas oils foragricultural use shall be introduced andEUR 50/1000l for theperiod 2026 - 2030.

T27-P Amendment to theExcise Duties Act. Amendment tothe Law onExcise Duties introducinga reduction for biogas. The objective isto provide that biogas, as defined in theLaw of theRepublic of Lithuania onenergy from renewable sources, isnot subject to theexcise dutyrates forpetroleum gas and gaseous hydrocarbons (excluding natural gas) laid down in Article 39 of the Law onexcise duty. Also supplement Article $58^1$by providing that biogas is also exempt from excise duty on natural gas. In this way,make it possible to promote biogas production in the Republic ofLithuania in order to increase itsshare in thenatural gas supplied to consumers, thereby reducing theimpact on climate change *(from 2025)*.

Implementation ofT28-E ETS2: The ETS2 system is taxed byfuel suppliers that place fossil fuels or fuels on themarket. Theamount of fuel supplied is converted into CO_2 tonnes andfuel suppliers will have toaccount for each tonne ofCO_2 with theemission allowancespurchased on the market. The aim is to accelerate thephase -out of fossil fuels and theincreaseduse of renewable energy sources *(from 2027)*. A public information campaign will also be carried out toraise awareness among citizens and small businesses about theinclusion of the heat and transport sectors inthe ETS and itsimpact on fuel prices and the potential to change their heating and transport choices.

T29-E. KVJUD fleet renewal. The measure includes: (1) thepurchase of awaste collection ship with an electric power plant (and the possibility of introducing hydrogen technologies) *(2025–2026)*; (2) thepurchase ofnew hybrid-powered pilot boats (2 units) to replaceexisting fossil fuel/diesel boilers. Theplanned installation of electric motors, power accumulators (energy storage systems) and other innovative measures in pilot boilerswill reduce diesel consumption by around30 %, depending on the intensity of work, compared to the current fuelconsumption of pilot boilers*(2025– 2026*)

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T30-E. Use of alternative fuels in theport of Klaipėda. Installationof publicly accessible hydrogen refuelling points: maritime, land transport and/or mobile *(2023–2026)*

T31-E. Development of electricity supply in the**maritime port. Installation of anelectricity supply system for ro-ro and ro-pax vessels at berth in theport of Klaipėda.** Klaipėda CentralTerminal (CKT) plans installations at three existing quays, Klaipėda Container Terminal (KKT) – one existing quay. Shore-side electricity connections will enable ferries to turn off auxiliary engines and supplyvessels with electricity during their stay in the port, and theenergy needed forhotel activities will also be sourced from the shore-side electricity grid *(2026)*.

T32-E: Promoting sustainable inland navigation: The measure aims at renewing the existing fleet for the management of inland waterways through the purchase of an electric pusher, not self-propelled barge and electric crane *(2024-2025)*.

T33-E.Calculation of GHG air pollution emissions. In2022,emissions of Klaipėda port activities, shipping and port transport to ambient air were assessed and recommendations/measures were developed to reduce them. A separate assessment was made of air pollutant and GHG emissions from different types ofshipscalling and continuously operating in the port, port companies, road and rail freight transport through theport of Klaipėda *(2023)*.

T34-E Port environmental management system PERS. A port sector -specific Port Environmental Review System (PERS) has been put in place to ensure effective management of theport environment. PERS builds on thepolicy recommendations of the European Maritime Ports Organisation (ESPO), the scheme is specifically designed to help port authorities achieve regulatory compliance and ensure thesustainable development ofport activities, protect the environment and address climate challenges *(2023-2025)*.

Reducing the use offossil fuels inagriculture:

A13-E: Promotion of second-generation biofuels and electric agricultural machinery. *(More about the measureinthe agricultural sector)*

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

A15-E. Revision of technological cards. *(More about the measureinthe agricultural sector)*

A7-E. Development of non-arabletechnologies, in particular direct sowing. ***(More about the measure inthe agricultural sector)***

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

A3-E. Development of targeted fertilisation technologies. *(More about the measureinthe agricultural sector)*

A5-E: Promotingthe short supply ***chain and agriculture inurbanised areas***. *(More about the measureinthe agricultural sector)*

Use of alternative fuels:

REI12-E: Mandatory blending ofbiofuels into ***mineral fuels.*** *(More on the measure* in the*renewable energy sector)*

REI13-E: Investment support for second-generation biofuel production installations. *(More on the measure* in the*renewable energy sector)*

REI10-E: Investment support for the installation of biomethane production and biogas treatment plants. *(More on the measure*in the *renewable energy sector)*

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REI15-E – Development of green hydrogen production. *(More on the measure*in the *renewable energy sector)*

T20-P. restrictions onpolluting vehicles .

Limit the registration of polluting road vehicles by vehicle registration tax: (a) carry out an assessment (analysis (reasonableassumptions) of thecomposition of the M1, N1vehicle fleet registered in Lithuania, themandatory roadworthiness data and other relevant information and data, with a view to revising theLaw on Motor Vehicle Registration Tax and significantly reducing the attractiveness of the purchase ofpolluting (Euro 4 and lower emission classes) road vehicles); (b) amend theMotor Vehicle Registration Tax Act (*2024-2025).*

T21-P. Upgradingof trains: Retrofitting of existing three bi-wave power plants "SkodaEJ575" trains into electric battery trains. The closure of the 'Škoda EJ575' trains on the Vilnius- M Minsk route and the limited electrification of therailway network in Lithuania. Turning trains into battery-electric powertrains would allow them to travel on a non-electrified path and replacepart of diesel trains on routes (*2024-2030)*

T22-P: Promotion of thepurchase ofbicycles and motor bicycles. The financial incentive wouldapply to thepurchase ofbicycles and motor bicycles. There are various options for a financial incentive, such as: compensation, tax incentives for businesses, etc. *(*from*2025 to 2030).*

T23-P: Promoting sustainable mobility: The measure includes: (1) acycleof lectures on sustainable mobility to promote achange in travel habits insociety and the most environmentally friendlyway of travelling (*2024-2030);* (2) financial incentives for the development and deployment of integrated public transport ticketing schemes that facilitate travel planning and reimbursement forpassengers across differentmodes of public transport (*2024-2026);* (3) Creating amobile application of sustainable mobility to change theinternal settings of TA users through access to feedback on distance,time, CO2footprint and energy consumption and more sustainable alternatives (*2024-2030)*

T24-P: Promoting sustainable inland navigation: The measure includes: (1) thepurchase ofnew cargo ships and barges which would allow thetransfer ofpart of the goods from polluting car transport to less polluting or zero-emission inland waterway transport; (2) upgrading ferryinfrastructure (adaptation to the needs of electric ferry ferries) for thereplacement offuels used by Klaipėda -Curonian neria with less polluting or zero -emission fuels; (3) thereplacement of power plants installed on boardinland waterway vessels withless polluting or zero-emission ones; (4) increasing theflow ofpassengers by waterborne transport and, consequently,reducing theflow ofpassengers byroad and aiming for new ships to be fuelled with LNG or

RES; (5) Establishmentand/or upgrading ofinland waterway infrastructure, including portsand berths *(2024-2030)*.

T25-P. Development of electricity supply in the***maritime port.*** The measure includes: (1) theinstallation of anelectricity supply system for vessels at berth in theport of Klaipėda; (2) Ensure amaritime port minimum electricity supply infrastructurefor maritime containers and passenger ships (*2024-2030).*

T26-P. Development of sustainable airport infrastructure. The measure includes: (1) thedeployment ofinfrastructure for thesupply ofsustainable aviation fuels; (2) upgrading theairport infrastructure by installing new or adapting existing aircraft stands according to the criteria required for the operation of hydrogen-powered and/or electric aircraft (*2024-2030)*.

Reducing the use of fossil fuels inagriculture:

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A3-P. Development of targeted fertilisation technologies. *(More about the measureinthe agricultural sector)*

A13-P: Promotion of second-generation biofuels and electric agricultural machinery. *(More about the measureinthe agricultural sector)*

Use of alternative fuels:
REI10-P: Investment support for the installation of biomethane production and biogas treatment plants.
*(More on the measure*in the *renewable energy sector)*

Table3.1.1.3: Indicative financing needs for existing and planned measures in thetransport sector:

Sector	Existing measures, EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Transport	Total Funding	Public funds	Climate change programme, Modernisation Fund, EU funds investments (20142020) and (20212027), Recovery and Resilience Facility, other sources	Total Funding	Public funds	Climate Change Programme, Modernisation Fund, EU funds investments (20212027) including Sustainability Fund, Social Climate Fund, ETS2 funds, other sources
	4055,28	1576,06		2796,32	480,53	

Industry and industrial process sector

The transition of industry towards 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 sector. The transformation to a climate-neutral industry has a multifaceted impact and is itself affected bymany interlinked social, economic, legal, political, geographical, technological and other dimensions. Both in Lithuania and in any other country, a climate-neutral industry would have a clear positive environmental impact in terms ofreducing GHGemissions and air pollution. This can alsobe asignificantcompetitive strength of local industries, creating new jobs, markets, efficient use of raw materials and reducing dependence on external raw materials suppliers, etc. Thus, climate-neutral industries have both global and localbenefits. Nevertheless, the potential negative impacts and costs of such a transformation 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 towards climate neutrality are set out in the strategic documents of the Republic of Lithuania:

1. Article4(4)(1) of the**Law** of theRepublic of Lithuania on**Energy Efficiency Improvement** provides that theMinistry of the Economy and Innovation of the Republic of Lithuaniais responsible between 1 January 2021 and31 December 2030 for theimplementation of energy efficiency improvement measures in the industrial sector in order to achieve an amount ofenergysavings of at least 5456GWh .
2. The National Climate Change Mitigation Targets and Targets for the PCCVD**industry** are thefollowing:

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Achieving the2030 GHG reduction targets by:

1.1. **Industries participating in the EU ETS:**

1.1.1. improving energy efficiency in the industrial sector by encouraging the replacement of polluting technologies with less polluting ones, applying circular economy principles that will save resources and pursue waste prevention,deploying a wide range of smart solutions and introducing new business models;

1.1.2. to promote the substitution of polluting industrial processes and raw materials in thecountry'smain industrial enterprises by supporting skillsdevelopment and reorientation programmes for workers, ensuring a fair transition to less climate-damaging technologies;

1.1.3. to encourage industrial enterprises to become prosumers through the use of RES;

1.1.4. promote the use of hydrogenin industrial processes for the productionoffertilisers and/or other products;

1.1.5. promote pilot projects for the production of green hydrogen that contribute to reducing the impact ofindustrial processes on climate change and environmental pollution by diversifyingconventional fuels and raw materials used in industry ;

1.1.6. promoting waste- freeand low-waste production, circular economy models, waste reuse /recycling and industrial symbiosis in industrial plants;

1.1.7. promote therationaluse of resources, secondary and climate- friendly raw materials so that by 2025 theuse ofsecondary raw materials (circularity) index isequal to orhigherthan the EU average (11.9 in 2019);

1.1.8. to promote innovations inindustrial processes reducing energy consumption and industrial reorientation and digitalisation projects.

1.2. **Sectoral climate change mitigation targets and targets forindustrial sectors not participating inthe EU ETS to achieveat least19 %GHG emission reductions by 2030 compared to 2005:**

1.1.9. thedeployment of innovative, more energy -efficient technologies,developing a competitive circular economy and abioeconomy based on theuse ofbiomass raw materials;

1.1.10. A 79 % reduction in theuse of fluorinated gases on theinternal market, replacing them with substitutes, tighteningcontrols on imports and uses;

1.1.11. rapid development ofRES and industries producing alternatives to fossil fuels;

1.1.12. increase energy efficiency by achieving 5.45 TWh of energy savings and theuse of RES and alternative fuels in industry;

1.1.13. promote waste- and low-waste production, circular economy models, waste reuse /recycling and industrial symbiosis in industry through theEco-Innovation Index 122 in 2025; 133 in 2030);

1.1.14. reduce theuse of natural resourcesby promoting thesecondaryuse of materials, products and waste, implement circular economy objectives across all sectors of the economy, with a view to achieving by 2025 thevalue of thesecondary raw materials (circularity) index equal to or higherthan theEU average (11.9 in 2019), ensuring theuseof recovered materials (8.1 in 2025; 2030: 10.6;

1.1.15. encourageenergy -intensive businesses to take measures toimprove energy efficiency;

1.1.16. achieve that all public buildings are constructed with at least50 % of organicand wood- based construction materials byincreasing the use of secondary raw materials and reducing the generation of construction waste.

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Table3.1.1.4: Greenhouse gas emission reduction targets for theindustrial sector for theperiod2021- 2030 % of NCCMD identified:

Sector	**Average 2016-2018 compared** to**2005**	**2025 target % compared** to**2005**	**% Achievementof the 2030 target compared** to**2005**
Industry	+ 23,5	+ 2,2	—19

3. The above -mentioned obligations forthe Lithuanian industry have been established in the**NAP. Objective1 : Transition towardssustainable economic developmentbased on science, cutting-edge technologies, innovation andinternational competitiveness of the country sets** target1.4 “Reorientation of industry towards a climate-neutral economy”. TheMinistry of Economy and Innovation is responsible for the impactindicators of this challenge, such as thechangein greenhouse gas (GHG)emissions from industry compared to2005, energy savings in theindustrial sector and others.

Current situation. The industrial sector plays a crucial role in the economy in producing products and creating jobs. Lithuanian industry directly generated more than 19.8 %of thecountry’s GDP in2023 (13.4compared to1995). In terms offull -time employment, Lithuanian industry is the country’s largest employer. Among thesectors ofthe country’s economy,industry is the sector withthe greatest impact 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, expert judgement shows that the overallimpact of industry in the economy ranges from 35 %to 45 %. This contributes to the country’s economic growth, innovation and technological progress.

The historically inherited structure of Lithuania’s manufacturing industry is dominated by labour-intensive, resource- and energy-intensive technologies compared to the EU average. Theshareof manufacturing enterprises classified as highand medium tech enterprises hasdecreased slightly over thelast decade and most of the value added comes fromlow and medium tech enterprises. The industrial structure is not intensive to global technologies and innovation, which presupposes dominant low-GDP on-demand production and weak involvement ofLithuania’s manufacturing industry in highvalue- added, EU strategic value chains and sectoral alliances.

As a result, business, especially industry, is inefficient in using materials to create value compared to the EU average and resource productivity is almost half of theEU average, but GHG emissions intensity is above the EU average. In addition, a largepart of the industrial sector is dependent on non-energy natural gas.

Accelerating industry's transition to investment in clean tech manufacturing capacity is essential to strengthen industrial competitiveness and security. Lithuania has the potential to transform its manufacturing sector and contribute to the clean tech supply chain. According to the latest OECD data, around 4 % Lithuanian start-ups are in the "green sector" (3 % OECD average). Total venture capital investment amounts to 0.73 %. GDP, of which 5.3 % is allocated to climate tech start-ups.

Industrial transformation includes the following objectives and objectives:

- reducedemand for carbon -intensive products through incentives

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the transition to a climate-neutral industry, including the circular economy and industrial symbiosis;

- thedeployment of innovative decarbonisation technologies and solutions, including electrification processes, using renewable electricity (solar, geothermal or bio -heat) and green hydrogen and CCUS;
- increase energy efficiency inall industrial sectors through the introduction of innovative tools and technologies;
- a holisticapproach that includes not only the use of standard industry energy efficiency, but also the decarbonisation of energy sources and other industrial processes.

Key emphasis on theimplementation of the transformation should focus ona holisticapproach to industrial transformation andharmonisation of sustainability elements through cooperation with other institutions,analysis of good foreign practices and impact assessment ofspecific measures.

To that end, theCollective Leadership Platform Industry 4.0, which was set up in2017, aims to improve and strengthen thecompetitivenessand productivity of Lithuanian industry and to promote the integration ofdigital solutions and new green technologies. In abottom-up approach, the Platformconsists of a High-Level Industrial Competitiveness Commission chaired by theMinister 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 thecircular economy. In the context of the dialogue between business associations, industry and academia, stakeholders set up a discussion forum to discuss theintegration of digital solutions, new technologies andskills and then submit appropriate proposals to theGovernment of the Republic of Lithuania.

In 2023, the European Commission presented new initiatives to promote a more sustainable use of resources, thestrengthening of the circular economy and thewider deployment ofclimate- neutral technologies, thus strengthening the EU'sglobal competitiveness. Member States are encouraged to takeinto account the provisions of these initiatives, in particular the Net-Zero Industry *Act,*when draftingtheir NECPs. Stressingthat the technologies listed in the latter act should build on the existingstrengths of the EU andgive each Member State theopportunity to take advantage of thetechnological advantages, we advocate anextension of this list, including theproduction of components and technologies such as bio-solutions, offshore wind infrastructure technologies,solar energy integration solutions, CCU.

The2023 analysis of thedecarbonisation of Lithuania's manufacturing industry by 2050 identified three scenarios on the basis of which the decarbonisation of theinvestigated industrial sectors could evolve. For this purpose, amodel ofthree scenarios has been developed for each of theindustries concerned, which would then be appliedby combining these industries into a general picture:

The first scenario includes changesinabsolute GHGemissions from fuel combustion and industrial processes, takinginto account the averagechange inemissions from industrial processes and fuel combustion of the industries concerned over the last 20 years, i.e. if the respective GHG reductions follow the historical trend.

The second scenario refers to themaximum achievable reduction inGHGemissions of theLithuanian industries under investigation, based on a consistent approach to thebest availabletechnologiescurrently available and already proven on the market.

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roll-out, as well asinnovations already started by Lithuanian companies, which go beyond the solutions currently in placeon the market. It is also assumed that the lack of development or competitiveness oftoday's technologies does notlead to breakthrough innovations necessary to achieve climate-neutral production. GHG savings would be backed up by modernisation focused onimproving energy efficiency, a wider use ofbiomass, less polluting fuels and RES electricity by replacing fossil fuels currently burnedfor thermal processes. This is aplausible scenario until 2030.

The third scenario is aligned with the expecteddevelopment trends in the required technologies and theeffective adaptation of therequired changes, and relies on assumptions with a view toaccelerating its implementation. A more significantdecline indemand for theproductsconcerned (in particular refined petroleum products, ammonia, high - fixture cement) isassumed, which will act as an additional factor for theneed to move away frombreakthrough innovations inherent in decarbonisation. CCUS, electrification ofthermal processes, efficient use ofbiomass resources, green hydrogen gas and synthetic fuels technologies and relatedinfrastructure are needed. Successfuldecarbonisation of production is also inextricably linked to cooperationbetweenrelated stakeholders based on theprinciples of a circular economy. This scenario stressesthat, despite the fact that significant results ofthese breakthrough innovations areexpected already in the next decade, the regulatory, infrastructural and financial framework for their empowerment must be developed without delay. This is a plausible scenario after 2030.

Climate-neutrality scenarios are not predictions, but reflect thedesired development of the industries analysedthatwould allow for a transition to climate-neutral productionby 2050.

Table3.1.1.5: Existing and planned policy measures in the industrial and industrial processes sector until 2030

NO	MEASURE	Total GHG SUBMITTING effect, thousand t CO2eq. 2021-2030	Total savings for CURO-ENERGY, GWh
EXISTING POLICY INSTRUMENTS (EPF)			
P1-E	Reduction ofF-gases	184,75	**
P2-E	Improving energy efficiency (EES)	795,44	6545.70
P3-E	Incentives for investment and innovation	*	**
P4-E	Industrial use of RES	22,10	***
P5-E	Changing polluting technologies	691,34	608,87
P6-E	Promoting technological eco-innovation	*	**
P7-E	Deployment of modern technologies	45,31	**
P8-E	Promoting non-technological eco-innovation		**
P9-E	Development of non-technological innovation		**
P10-E	Promotingthe technological transformation of traditional industries		**
P11-E	Promotingthe digitisation of industry		**
P12-E	Improving Energy Efficiency (EES) in Enterprises	96,56	4830,20
P13-E	Production and use of hydrogen	605,52	**

	(Following AB Achema's withdrawal or postponement in2024, theproject can onlybe implemented by private funds)		
P14-E	Feasibility study onCO2capture and storage	*	**
P15-E	Innovative green products and services	95,92	481,49
P16-E	Building Data Bank	*	**
P17-E	Deployment of alternative fuels	22,21	34,56
P18-E	Reduction of F-gases	21,6	**
P19-E	Decarbonisation ofindustry	356,2	1189,23
P21-E	Life cycle modelling methodology for construction works	*	**
P22-E	Fostering industrial change	114,9	4572,38
REI10-E	Investment support for theinstallation of biomethane production and biogas treatment plants	340,5	**
REI15-E	Development of green hydrogen production	120,80	**
EE4-E	Agreements with energy suppliers on consumer education and consulting	59,86	**
A5-E	Promoting short supply chains	50,28	**
T27-E	Law on excise duties	44,5	182,44
T28-E	Implementationof ETS2	46,2	222,31
AMOUNT		**3473,33**	**18733,34**
PLANNED POLICY MEASURES (PSD)			
P17-P	Deployment of alternative fuels	199,9	311,05
P19-P	Decarbonisation ofindustry	116,3	361,69
P20-P	Long-term hedge contracts	21,9	109,78
EE12-P	Increase the technologicaland energy efficiency of industrial enterprises for the implementation of artificial intelligence and digital twin technologies	3,5	—
EE13-P	Create a legal requirement for companies to implement energy consumer efficiency in audits recommended measures	16,7	—
REI10-P	Investment support for theinstallation of biomethane production and treatment plants.	108,30	—
EE14-P	Promoting theintroductionof internal monitoring systems for energy efficiency in businesses and industry	10,1	—
REI15-P	Development of green hydrogen production	286,47	**
AMOUNT		**741,27**	**782,52**

*The impact of themeasure is not assessed as it does not directly reduce GHG emissions, but itis essential for thesuccessful implementation ofother envisaged measures.

** The impact of themeasure is not assessed as it does not directly contribute to fuel and energy savings, but it is essential for thesuccessful implementation ofother envisaged measures.

***The scope of the measureimplements renewable energy solutions that do not directly contribute to fuel and energy savings but ensure thedeployment of clean technologies.

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P1-E. F-gas reduction: The measure includes: (1)implementation ofRegulation (EU) 2024/573 of the European Parliament and of the Council of7 February 2024 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937and repealing Regulation (EU) No 517/2014, whichwill reduce greenhousegas emissions by two thirds in2030 compared to2014 levels (2015-2030); (2) theKigaliAmendment to the Montreal Protocol to ensure global climate protection against theuse and production ofgreenhouse gases – hydrofluorocarbons (HFCs) with high warming potential (2019-2032).

P2-E – Enhancing energy efficiency (EE) The measure includes: (1) thepreferential payment for servicesof public interest (PIS) toindustries participating in the EU ETS,i.e. companies will receive compensation for theimplementation of energy efficiency improvement measures, is in line with measure **-** EE5 (*2021-2028).* (2) thedeployment ofenergy efficiency production technologies in large and medium-sized manufacturingenterprises participating in the EU ETS: digitalisation, modernisation, optimisationand automation ofproduction processes (2023*-2030*).

P3-E: Investment & Innovation Relief. There are currently corporate tax exemptions for investment and innovation: for the promotion of entrepreneurship,applicablefrom 1 January 2018 to one-year corporate income tax forsmall start- ups, with an exemption from corporate tax in thefirst year of their operation; to stimulate investment,thereduction is focused on technological renewal, innovation, which allows taxable profits to bereduced to 100 % ofthe eligible costs incurred for investment projects (2009-2028); to promote innovation,theincentives are targeted at companies that develop state-of-the-art technologies in their activities and subsequently usethem to generate revenue in their activities: (1) triple deduction ofresearch and experimental costs (R & D) by allowing threedeductions from revenue ofcostsincurred by undertakings in carrying out R & D work; (2) fasterdepreciation of assets used in R & D activities,allowing thecostof purchase offixed assets used in R & D activities to be written off within two years; (3) Thereduced tax ratefor the commercialisation of R & D– an additional relief forcompanies investing inR & D from 2018 – is reduced by 5 %. (from1 January 2025,6 %) corporate tax rate for thecommercialisation ofinventions created by R & D activities (profit from the use or disposal of assets generated by R & D activities).

P4-E. Use of RES in industry. Activities of the measurein companies not participating in the EU ETS: (1) Installation ofenergy generation capacityusing RES,development and deployment of new technologies for more efficient use of RESin industrial plants inorder to use energy to meet theinternal needs of theenterprises themselves and to enable thesupply of excess energyto other industries or to be transferred to centralised energy networks (Renewable Energy Resources for Industry LT+ (No 04.2.1-LVPA-K-836) (2014*-2023)*); (2) conducting energy audits in industrial enterprises (Audit for industry LT (No 04.2.1-LVPA-K- 804) (*2014-20);* (3) According to the energy efficiency audit reports, investments will be made for the installation ofenergy generation capacityusing RES, for thedevelopment and deployment of new technologies for more efficient use of RESin industrial plants to use energy to meet theinternal needs of thecompanies themselves, allowing for thesupply of excess energy to other industriesor for the transfer to centralised energy networks *(2022-2027).*

P5-E. Change in***polluting technologies.*** Activities targeted at companies participating in the EU ETS: (1) replace polluting production technologies with less polluting ones, implement best available techniques , *etc.*(*2020-2021); (2)* Incentivising investment in the generation and utilisation ofRES electricity bymanufacturing plants

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in industrial plants, including investments in tangible assets (installations, technologies) that reduceGHG emissions and ensure continued environmental impact (*2023-2030).*

P6-E. Fostering technological eco -innovation. Activities targeted at small, small and medium-sized enterprises: (1) encourage micro- enterprises and SMEs to introduce technological eco-innovations. (ECO-innovation LT+ (No 03.3.2- LVPA-K-837) (*2014-2023));* (2) Promote thedevelopment, demonstrationand deployment ofinnovative environmentally friendly technologies for SMEs active in areas. Investments in eco-innovation, the developmentand production of sustainable "circular" products. Creating incentives for companies to demonstrate the digital and environmentally friendly technologies they have developed toSMEs that are potentially able to deploy them, enabling SMEs to familiarise themselves with thebenefits ofthese technologies (from2021*to2027*); (3) encourage micro -enterprises and SMEs to implement non-technolological eco-innovations, i.e. environmental management/management systems (EMS), production technological and/or environmental audits, and the application of eco-design principles in product design. It is envisaged to support projects to improve theenvironmental performance of products throughout their life cycle (raw materials selection and use, production, packaging, transport, use), systematicallyintegrating environmental aspects atthe earliest stage of product design. As well as projectspromoting eco -labelling ofproducts, i.e. certification ofproducts or services that are less harmful to the environment and human health than otherproducts of the same group (Eco-innovation LT (No 03.3.2-LVPA-K-832) *(2014-2023);* (4) provide micro-enterprises and SMEs with the necessary information, advisory methodological and other support onresource efficiency,conservation of natural resources, eco -innovation, etc., thereby encouraging SMEs to invest ineco-innovation and other resource-efficient technologies (Eco-Consultant (Ref. 03.3.2-IVG-T-829) (2014*-2021)).*

P7-E. Deployment ofmodern technologies: Theactivities of the measure are targeted at small and medium-sized enterprises: (1) Transformation of thetraditional industry through the deployment of key technologies for industrial innovation and growth of the economy as a whole – promotion/deployment of Key EnablingTechnologies (KETs) in production processes for micro and SMEs (DPT industry LT+ (No 03.3.1-LVPA-K-841) 2014*-2021)*; 2) Incentivising micro-enterprises and SMEs to invest in thestart -upandexpansion ofinnovative manufacturingand /or innovative services (Regio Invest LT+ (No 03.3.1-LVPA-K-803) (*2014-2021))*; (3) Encouragingmicro -enterprises and SMEs to invest in the deployment of modern technologies enabling theadaptation of existing productioncapacities and the creation ofnew production capacities for new and existing products (Regio Potential LT (No 03.3.1-LVPA-K-850) (*2014-2023*))

P8-E.Promoting non-technological eco -innovation. Encourage companies toinvest in product/service design solutions to increase theattractiveness of thecompany's products or servicesand thus thedemand and productivity of the company (Design LT (03.3.1-LVPA-K-838) (*2014-2023*).

P9-E. Development of***non-technological innovation.*** Promoting investment in brands, company process (excluding digital technology),design and organisational innovations, in particular sustainable and increasing integration into thedevelopment ofbusiness models in the international value chain (2022*-2027).*

P10-E: Fostering thetechnological transformation of traditional industries. Support projects for theconstruction and construction ofinfrastructure, theacquisition of research and experimental development and innovation (R & D) and innovation advisory, innovation support or R & D services. *(2014-2023).*

P11-E: Promotingthe digitalisation of industry. The measure includes: (1) conductingatechnological audit ofindustrial SMEs to assess theopportunities and prospects ofdigitalisation of industrial SMEs'production processes; and

/or technologicalsupervision of theimplementation of technological audit provisions (technological advisory services) and installation ofindustrial SME production process equipment with integrated digitalisation technologies, based on the recommendations of the technological audit carried out (digitalisation of industry LT (No 03.3.1-LVPA-K-854)) (*2014-2023*); (2) thedeployment ofindustrial enterprises' production process equipment with integrated digitalisation technologies (prioritising technology compliant with the smart specialisation strategy), includingconducting industrial technology audits and/or technologicalsupervision of the implementation of technological audit provisions (technological advisoryservices) (*2024-2027);* (3) Promote investments in thedeployment ofmanufacturing process equipment in industrial enterprises with integrated digitalisation technologies to accelerate and efficient companies' involvement in international value chains (*2024-2028).*

P12-E: Improving energy efficiency in enterprises: The measure includes: (1) incentives to carry out energy efficiency audits inindustrial enterprises. According to theresults of theaudits,investments are expected to be made inimproving energy efficiency andreducing its intensity, enabling industryto invest in theadaptation of state-of-the-artand environmentally friendly equipment and technological solutions tomanufacturingprocesses,ensuring the continuity ofthese production processes, i.e.upgrading thenecessary technological equipment and existing technological processinfrastructure (2022*-2027).* (2) Energy efficiency training in industry to provide education for companies and increase competences in energy efficiency (*2022-2027)*

P13-E Hydrogen production and use. AB Achema, located in the Kaunas region, envisages step-by-step steps towards achieving0 emissions generated by thecompany by 2050. In thefirst phase, thecompany plansto reconstruct one ammonia assembly in such a way as todeliver 30 % of green hydrogen to thisammonia assembly, while CO2 emissions will be significantly reduced, even by27 %, by12 %atcompany level. As asecond step, thecompany envisages continuing theinvestment in ammonia assemblies and aiming to replaceall hydrogen needed for production with green hydrogen. In parallel, the company envisages further exploring the feasibility ofCO2 capture , utilisation andstoragetechnologies(*2023-2027)*.

We note that AB Achema'sabandonment orpostponement of theproject in 2024 can onlybe carried outby private funds.

P14-E. Study on thefeasibility of catching and storing CO_2. The study should assess thefeasibility ofdeveloping and usingCO2 capture and storage technologies in Lithuania,assessing directGHG emission reductions by/entity, industry. The study should includethe existing national legislative framework inthis regard, the ongoinglegislative processes at EU level (on hydrogen, the update of the RES Directive, the EU Carbon Border Adjustment Mechanism, etc.), assess what changes to the legislative frameworkwould be needed and thenecessary infrastructure upgrades, preparation forpotential expansion. The analytical recommendations should be consistent with Lithuania's strategic energy and climate change objectives (*2023-2025)*.

P15-E – Innovative green products and services There will bea financial instrumentand a specialised knowledge exchange platform established to promote environmentally-friendly products and technologies. The objective of the measure is to: set up Hubs for Circularity. Such hubs would encourage the green and digital transformation. Possible activities of such hubs include (a) infrastructure investments; (b) investments in ecosystem facilitation and international networking; (C) green innovation advisory services; (D) investment in high technology readiness (TRL) (6-9) R &Dactivities (*2022-2026*).

P16-E Buildings Databank. Provision is made for the creationofa databank where the information will be collected

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on building characteristics, maintenance documentation, condition of buildings, energy characteristics, energy and/or fuelconsumption (cost),analysis of these data formonitoring, promoting and providing information to the public on thecurrent state of buildings and the renovation process, ensuring more efficient and data- driven decision-making in relation tobuildingrenovation and building maintenance (2023*-2025*).

P17-E – Alternative Fuels Deployment: For the success of industrial transformation and decarbonisation of industrial processes, investments are envisaged for the deployment of alternative fuels, e.g.replacing fossil fuel boilers withrenewable heat pumps (air-water, ground-to-water, water-to-water, air-to-air), replacement of fossil fuels used in the production process by RES/electricity, etc., non-EU ETS industrial plants operating in the Kaunas, Šiauliai and Telšiai regions. This activity will also enable thecreation of sustainable jobs ,both in the municipalities most affected by the transition and in the targeted regions, by fostering thesustainable development of allregions, enabling thetransformation ofbusinesses operating in the regions,decarbonisation and reducing dependency on a single employer (2023*-2026*).

P17-P – Alternative Fuels Deployment: The continuation oftheactivities ofMeasure T17 -E (2025-2027).

P18-E. Reduction of F-gases: The objective of this measure is to promote thereplacement ofoldequipment or installations containing F-gasesor combinations of F-gases in public buildings (e.g. medical facilities , hospitals, homes for grandparents orchildren's homes, etc.) or the installation ofalternatives replacing F-gasesfilled with new equipment or equipment, with minimal environmental and climate impact for the cooling of premises (2024 *-2025*).

P19-E. Decarbonisation of***industry:*** The objective of the measure is to encourage companies to invest in energy efficiency and to replace polluting technologies with less polluting ones. Support investments in tangible assets (installations, technologies) that increase energy efficiency and reduce thenegative environmental impact ofeconomic activities and ensure continued environmental effects, i.e. investments in cleaner production innovation (introduction),digitalisation, modernisation, optimisationand automation ofproduction processes that increase the efficient use ofenergy and/or raw materials resources and contribute to reducing GHG emissions (from 2025 *to 2030*).

P19-P. Decarbonisation of***industry:*** Theactivities of measure T19-E *(2027-2030) would continue.*

P21-E – Building life cycle modelling methodology. The implementation of the measure would include thedevelopmentand validation of amethodology for building life-cycle modelling (*2024-2029*)

P22-E: Fosteringindustrial change. In the context of theEuropean Green Deal, theprovision of debt finance (subordinated loans, syndicated loans, direct loans) to improveaccess to finance for companies investing intransformation (changes) by increasing circularity, investing in decarbonisation and energy efficiency, deployment ofenvironmentally friendly, low-waste and innovative and digital technologies, manufacturing ofhigh value-added and low-CO2-footprint products, defence and security industries (2024 *-2026*)

REI10-E – Biomethane production and cleaning. *(More on the measure*in the *renewable section)*

REI15-E – Development of green hydrogen production. *(More on the measure*in the *renewable energy sector)*

EE4-E. Agreements with energy suppliers on consumer education and consultation. *(More about the measure*

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(*in the energy efficiency chapter)*

A5-E: Promotion of short supply chains: *(More about the measureinthe agricultural sector)*

T27-P. Excise Act. *(More about the measurein the transport sector)*

***Implementation ofT28-E ETS2**: (More about the measurein the transport sector)*

P20-P: Long-term hedzg contracts. The objective of the measure is tobuy in advance theresult ofGHGemission reductions from non-participating companies in the EU ETS (hazard principle). Plans for long-term contracts with companies, initiating and ensuring long-termreductionof GHG emissions. Such contracts wouldprovide companies with fixed public support per tonne ofGHG emissions that could besaved on the basisof the best technological measures at the highest level of the day, and theprice of CO_2 saved is determined on the basis of a forecast of a possible longer-term price. A technological audit is carried out to assess CO_2 emissions, at appropriate intervals, theundertakingsubmits a report (on-going monitoring). At the end of the period, an audit is carried outagain on the extent to which thecompany has saved/reduced itsGHG emissions and whether ithas fulfilled its commitments, the fundsmust be repaid in the event of non-*fulfilment* (from 2029*to*2035).

EE12-P: Improve the***technologicaland energy efficiency of industrial enterprises*** 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)*

REI10-P: Investment support for the installation of biomethane production and treatment plants. *(More on the measure* in the*renewable energy sector)*

EE14-P:Fostering the deploymentof internal monitoring systems for energy efficiency in businesses and industry. *(More on the measure*in *the energy efficiency sector)*

REI15-P – Development of green hydrogen production. *(More on the measure*in the *renewable energy sector)*

Table3.1.1.6. Indicative financing needs for existing and plannedmeasures in the industry and industrial processes sector:

Sector	**Existing measures, EUR million**		**Available sources of funding**	**Planned measures in EUR million**		**Potential sources of financing**
Industry	Total Funding	Public funds	Climate Change Programme, Modernisation Fund, EU Funds Investment (2014-2020) and (2021-2027), Recovery and Resilience instrument, Just Transition Fund, other sources	Total Funding	Public funds	Climate Change Programme, Modernisation Fund, New Perspective of EU Funds, RRF other sources
	2951,31	1760,04		235,47	96,94	

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Agricultural sector

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

1. **The** UCPDsets climate change mitigation targets and targets for theagricultural sector by 2030 as follows:

    1.1. introducing innovative technologies, developing sustainable farming and adding value toall agricultural sectors;
    1.2. to ensure theefficient, cost- effective and environmentally safe use of fertilisers andreduce theuse of nitrogen mineral fertilisers in agriculture by at least 15 %, compared with 2020;
    1.3. to promote innovative, pollution -reducing technologies and practicesin livestock farming, cattle feeding, digitalisation of livestock farms and to carry out productivity research;
    1.4. in order to reduce methane, nitrous oxide and ammonia emissions in livestock farming, improve thesustainability ofmanure and slurry management, achieveat least70 % ofmanure and slurry production managed in a sustainable manner;
    1.5. to implement measures reducing direct and indirect releases ofnitrogen compounds to the environment from agricultural activities;
    1.6. to double thearea under organic farming, compared with 2020;
    1.7. 50 % of pig and cattle manure to be used for biogas production;
    1.8. promote the use of science -based safe alternatives to protect yields from pests and diseases by reducing chemical pesticides and expanding the integrated pest management system;
    1.9. bringingthe food supply chain closer to consumers, promoting agriculture in urbanised areas in order to reduce transport needs and distances;
    1.10. develop and implement a GHG inventory systemat farm level by2025 at thelatest.

Table3.1.1.7: GHG emission reduction targets for theagricultural sector for theperiod2021- 2030
% of NCCMD identified:

Sector	**Average 2016-2018 compared** to**2005**	**2025 target % compared** to**2005**	**% Achievementof the 2030 target compared** to**2005**
Agriculture	+ 3,2	—3,8	—11

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2. In order toachieve strategic objective6 of the**NAP**, entitled ‘Ensure good environmental quality and coherence in theuse of natural resources,protect biodiversity, mitigate Lithuania’simpact on climate change and increase resilience toits impacts’, it is envisaged todevelop sustainable and bioeconomy-based activities in the agriculture, forestry and fisheries sectors (Progression Target 6.2). This objective includes theexpansion ofnature friendly farming and the promotion oflow GHG emission technologies, the implementation of a sustainablefarming policy based on thesustainable use ofmineral fertilisers and pesticides, thereby reducing water pollution bynitrogen and phosphorus compounds and air pollution byammonia, strengthening economic operators’ knowledge of theconsequences of climate change, air pollution impacts and biodiversity loss,linking investment support to thedeployment ofsustainable production methods andtechnologies, sustainable use of soil, water and otherinputs, and promoting afforestation, perennial crops, storageand restoration of wetlands, thereby increasing the removal ofagricultural land and forests, and implementing climate change adaptation measures inagriculture and forestry.

3. **The Agriculture andFood, Rural Development and Fisheries Development Programme 2022-2030** identifies sectoral challenges, including those related to both climate change mitigation and resilience building, and thecausesto be addressed.
4. One of thespecific objectives set out in**Lithuania**’s**Strategic Plan forAgriculture and Rural Development 2023** -2027 (‘SP 2023-2027’) is tocontribute to climate change mitigation and adaptation, including by reducing GHG emissions and increasing carbon sequestration, as well as developing sustainable energy (Specific Objective 4, SO_4). This objective is to be achieved through standardsfor good agricultural and environmental condition (GAEC) and management requirements (SMR) and different interventions. GAEC and SMR standards and interventions will reduce theuseof mineral fertilisers and GHGemissions from fertilisation,reduce GHG emissions from thelivestock sector,increase thecontribution ofplant residues to soils and reduce themineralisation of soil organic carbon,thereby increasing soilorganic carbon sequestration, increasebiomass growthandincrease GHG removals in forests, and make farms more resilient toclimate challenges. The investment support will encourage farmers tointroduceon-farm technologies that reduceGHG emissions, ammonia emissions and improve air qualityas well as convertfarm manure and waste into energy (supporting theinstallation of biogas plants forfarm purposes) andinvest in technological solutions that improve animal welfare, which can also contribute to reducing GHG emissions. TheIfS will be complemented by funds from other sources for the period2023-2027: the State budget, the2021-2027 EU funds investment programme, the European Recovery and Resilience Facility, the Modernisation Fund.

The following GAEC and SMR standardscontribute toachieving theSO_4 objective referred toabove: GAEC1 requiring the maintenance of permanent grassland, GAEC2 laying downrequirements for the protection of peatland and wetlands, GAEC3 prohibiting stubble burning, GAEC6 providing for soil protection for themost sensitive period, GAEC7 laying down minimum requirements forplant exchange, GAEC8 establishing aminimum agricultural areafor non-productive areas or features, GAEC9, to protectbiodiversity -rich permanent grassland, VR2, which protects water against pollution caused by nitrates from agricultural sources, VR3 and VR4,which include prohibitions on the proximity and drainage of grasslands in designated areas of interest for birds and onareas for the conservation ofnatural habitats and ofwild fauna and flora.

To enhance theircontribution to climate change mitigation and adaptation, including by reducingGHG emissions and increasing carbon removals, payments are envisaged for participating in schemesbeneficial for the climate, the environment and animal welfare (eco-schemes), as well as in rural development interventions, committingto achieving a higher level ofenvironmental protection than

minimum GAEC and SMR standards and relevant minimum requirements for theuse offertilisers and plant protection products, animal welfare, as well as other relevant mandatory requirements laid down innational and EU law.

TheSP is expected tocommit 404 thousandha (13.59 %) of theutilised agricultural area in2023-2027 toimprove climate changeadaptation, and839 thousandha (28.21 %) of theutilised agricultural area will be committed toreducing GHG emissions or maintaining/increasing carbon storage in soil and biomass. It is also planned that 382.1 thousand ha (12.84 %) of theutilised agricultural area will be subject tocommitments to convert to andmaintain organic production. By 2030, the aim is to increase theshare of utilisedagricultural area(UAA) from agricultural producers to16.2 % oftheutilised agricultural area. TheIfS will also supportinvestments in renewable energy generation capacity, includingbio-based, between 2023 and 2027. The target value of the indicatoris 1 MW.

Forinterventions related to climate change mitigation, adaptation and enhancement of absorption potential, thetotal area supported by the IfS is estimated at around 1.67 millionha or 56 % of theutilised agricultural area and 122268 notional livestock (LU) or 17.02 % of the total SG over the period2023-2027.

Therenewaloftheagricultural parts of theNECP agriculture and FNHR was closely linked to the ongoing SP project2023-2027. The aim was to align the two processes and ensure that NECPs measures are consistent with theplanned IfS interventions for2023-2027. In theNECPs,references to theLithuanian SP intervention codes (e.g. KP31tvi, KP14gra, TI05eko1.8, etc.)wereincluded in the descriptions ofagricultural and FNM agricultural measures inorder to make this link clear. The IfSwas adopted in November 2022 in 2023-2027 and initial assessments of themitigation /absorption effect of theproposed NECPs were received inspring 2023. As this quantitative assessment showedthat the proposed measures achieve thenational target set for the Lithuanian agricultural sector,it was decided not to provide additional measures for theSP in2023-2027. InApril 2024, the EC approved the SP amendment 2023-2027, which increased thescope of themost effective GHG reduction measures (such as non-arable farming, catch crops, crop change), as well as envisaged changes to encourage organic farming, promote landscape features, create a new intervention for the establishmentand maintenance of grasslands. In thiscontext, the relevantmeasures in the NECPs have been modified. The quantitative assessment of the effect of themeasures was repeated and the agricultural sector's target for2030 remained within reach. In total, more than 75 % GHG savings in the agricultural sector are planned thanks to themeasuresplanned in theIfS for2023-2027 (assessing existing measures).

5. **The National** Water**Plan 2022-2027, the NOTMP, the Soil Action Plan to 2030 include** measures toreduce air, water and soil pollution from agriculture and food, fisheries, andensure a more sustainable use of these resources, while also contributing to climate change mitigation and adaptation.

Current situation. Inefficiencies in thedeployment oflow GHG technologies, lack ofinvestment havepartly contributed to the absence ofsubstantial reductions inGHGemissions from agriculture between 2005 and 2021, while the share of the sector's GHG in the total GHG composition of the country increased from 18 %to 21 % and theGHGemissions from thecrop sector increased by 28.1 %. Due toalackofinnovative approaches to land and energy , Lithuania'sagricultural share of total renewable energy production (10.3 %) is below the EU average (12.1 %).

The results of thenational greenhouse gas inventories show that crop -related emissions from 2005 onwards.

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there wasa significant increase. Between 2005 and 2021, N_2O emissions from soils increased by 42 %. The main drivers behind thegrowth ofGHG emissions from the agricultural sector are related to the growth of the crop sector: theincreasingconsumption of mineral fertilisers, the growing area and yields of cereals and the increasing cultivation of organic soils.

Most of themeasures planned in theNECPs in theagricultural sector to promote more sustainable crop and soil use practices contribute to reducing theuse ofmineral fertilisers and/or improving efficiency in the use of mineral fertilisers. These measures directly contribute to reducing N_2O emissions from agricultural soils. In assessing these measures,their effect on reducing N_2O emissions into CO2eq was calculated . Examples ofthese measures are A6-E 'Protein plant development', A7-E 'Development of non-arable technologies', A9-E 'Organic farming', as well as part ofmeasures in the FNM sector such as L4-E 'Promoting catch crops'. Measuresrelated to therestoration and more extensive use oforganic soils (peat soils) allow both methane and CO2emissions to be reduced.

The livestock sector in Lithuania has beenshrinking for socio-economic reasons in recent years, with corresponding reductions inGHG emissions from both intestinal fermentation and manure management systems. It should be noted, however, that theincrease in the productivity of theremaining animals and theincrease in annual CH_4 emissions per animal result in aslower reduction intotal emissions from thelivestock sector than thereduction in livestock numbers.

In order to find the most effective means to further reduce emissions from thelivestock sector, researchis being carried out,including through theEuropean Innovation Partnerships, to identify how these emissions can be reduced through the use of different types offeed, food supplements or other measures that could maintain animal health and productivity but reduce harmful effects on theenvironment. The aim is to introduce innovative technologies,practices that improve animal welfare, as well as IT solutions thatwould allow forbetter management oflivestock farm emissions in general. Lithuania participates in the international project “Climat- friendly cattle farming systems”, which aims to develop climate -smart cattle systems that reduce GHG and ammonia emissions while maintaining the socio -economic perspective of thefarm’s business.

Agriculture, unlike other sectors, cancontribute to combating climate change not only by directly reducing GHG emissions, but also by increasing theaccumulation of CO2 in soil orplant biomass. Soil is the largest carbon store on land, and theuse ofsustainable practices to reduce direct soil emissions and increase absorption is therefore essential. It should be noted that some of theexisting and planned measures in the NECPs fall into both the agriculture and the LURC sectors and contribute to thereduction ofGHG emissions inboth sectors and to CO_2 storage (accounted for in the FNHR sector). These include: crop change, catch crops, restoration of peatlands usedin agriculture, extensivegrassland management and bearusfarming (non -arable cropping). Over 90 % of the savings in theLWF sector are planned thanks to themeasuresplanned intheIfS for2023 -2027 (assessing existing measures).

Table 3.1.1.8. Existing and planned policy measuresinthe agricultural sector until 2030

NO	**MEASURE**	**CUMULATIVE GHG REDUCTION Effect, thousand t CO2eq. 2021-2030**	**Total savings for CURO-ENERGY, GWh**
EXISTING POLICY INSTRUMENTS (EPF)			
A1-E	Climate-friendly livestock farming (manure management)	656,09	*
A2-E	Promoting the consumption of organic products	*	*
A3-E	Development of precision fertilisation	45,70	**
A4-E	Extensive grassland management	—88,53****	*
A5-E	Promoting short supply chains	**	**
A6-E	Development of protein crops	192,63	*
A7-E	Development of non-arbitrary technologies	73,61	**
A8-E	Climate-friendly livestock farming (gut fermentation)	38,14	*
A9-E	Promotion oforganic farming	120,91	*
A10-E	Promoting bioeconomy businesses	*	*
A11-E	Nature-friendly managementof orchards and berry	*	*
A12-E	Sustainable horticulture	4,52	*
A13-E	Ad-powered machinery	**	***
A14-E	Reducing the use of fossil fuels	**	**
A15-E	Review of technological cards	**	**

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A16-E	Promotion of research	83	*
A17-E	Information and counselling	1,02	*
A21-E	Balanced fertilisation system	452,78	*
L5-E	Promotingplant change	76,29	*
L4-E	Promotion of catch crops	80,17	**
L1-E	Restoration of peatland(re -establishment of hydrological regime onagricultural land)	194,02	**
L3-E	Conservation of wetlands		**
L6-E	Restoration of peatland (grazing)		**
AMOUNT		**2018,88**	**0**
	PLANNED POLICY MEASURES (PSD)		
A1-P	Climate-friendly livestock farming (manure management)	713,47	*
A2-P	Promoting the consumption of organic products	*	*
A3-P	Development of precision fertilisation	37,59	**
A13-P	Ad-powered machinery	**	***
A18-P	Environmentally friendly diets	19,86	*
A19-P	Sustainable use of public land	61,98	*
A20-P	On-farm GHG accounting	35,88	*
AMOUNT		**868,78**	**0**

*The impact of themeasure is not assessed as it does not directly reduce GHG emissions and fuels and energy in the sector, but is essential for thesuccessful implementation ofother envisaged measures.
**The impact of the measure is not assessed as it saves GHG or fuels and energy in another sector.
*** Implements renewable energy solutions within the scope of the measure that do not directly contribute to fuel and energy savings but ensure thedeployment of clean technologies
**** The measure saves GHG in another sector, theFNHR, which offsets the GHG emissions generated by the sector.

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A1-E – Climat-friendly livestock farming (manure management). Investments will be directed towards efficient equipment and technology to reduce GHG emissions from livestock farms, especially those related to manure management. The aim is to applythe acidification of slurry, the addition of slurry to soil, and theuse of manure forbiogas production. In addition toreducing GHG emissions, this will also increase theefficiency of plant fertilisation with organic fertilisers (based on actual cropneeds and ensuring all qualitative soil parameters) (KP31tvi Sustainable investment in the agricultural holdings[57])(*2023-2027)*.

A1-P. Climat-friendly livestock farming (manure management). Theextension ofthe scope of measure A1 -E (2023-*2027)*is envisaged.

A2-E. Promotion oforganic products. The objective of the measure isto promote theconsumption of organically and environmentally friendly production andto reduce the consumption of environmentally friendly, unsustainable products. The measure provides for compensation for theprice difference between organic, NGA and conventional products in order toensure that food produced in pre-school education is largely environmentally friendly. Thepromotion ofgreen procurement (*2021-2026*) should also contribute to this.

57 Therelated IfS measures2023-2027 (measure codes from IfS 2023-2027) are furtherflagged here.

A2-P: Promotion of theconsumption of organic products. Extension ofthe scopeand period of measure A2-E (for*2025-2030)*.

A3-E. Extension of targeted fertilisation. The measure is intended to support the purchase of precision technologies that will save fuel, reduce theuse of plant protection products and fertilisation,improve soil health (*2022-2023).*

A3-P. Extension of targeted fertilisation. The measure provides for the adaptation ofthe national legislative framework to thewider use ofprecision technologies (including drones), the transfer of knowledge to end-users and the promotion of the acquisition ofthese technologies. Enabling technology will save fuel, reduce theuse of plant protection products andfertilisation and improve soil health (*2024-2030)*.

A4-E. extensive grassland maintenance. The measure is designed to encouragefarmers to grazeextensively on grassland. The objective of the measure is to positively influence the various grassland habitats bymaintaining and maintaining grasslands and improving their condition. This will reduce soil losses due toerosion, increase soil organic carbon stocks, reduce theneed for mineral fertilisers or exclude the use of mineral fertilisers,reduce nutrient leaching into water bodies and avoid GHG emissions from conversion of grassland to arable land. The measure willalso contribute to animal welfare objectives by promoting higher housing standards forcattle, as well as lower GHG emissions. The measure provides for compensation to farmers eligible (TI05eko6 1 – Extensive management of permanent grassland through grazing; TI05eko9.1 – Higher standardsfor keepingbovine animals: for access to pasture for dairy cattle, including grazing in the fields during the warm season ; TI05eko9.2 *– Advanced* housing standards forbovine animals: free access for cattle to openareas, pastures (2023 *-2027)*

A5-E: Promotion of short supply chains: Short supply chains reduce thenumber ofpotential intermediaries between the manufacturer and the final consumer andreduce the transport costs of the products. This has a significant impact onensuring the viability ofsmall and medium-sized farms and the increased integration of producers into the food supply chain. The measure contributes to theobjectives of protecting the environment and improvingpublic health by promoting the consumption of local production, payingparticular attention to organic and quality production, andreducingthe carbonfootprint by optimising transport costs. Short supply chain schemes aim to reduce the distances the production is transported to

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end-user. And bringing the food supply chain closer to urban consumers by promoting agriculture/urbanfarming in urbanised areas (KP14gra Trumpa supply chains) (*2024-2027)*.

A6-E. Development of protein crops. The cultivation of herbaceous herbs requires large quantities offertilisers to reachthe yield, whichreleases N_2O gases into the atmosphere. Release of1 kg N_2O into the atmosphere is equivalent to approximately 265 kg CO_2e (100 GWP). Leguminous grasses having symbiotic links with nitrogen- fixing bacteria with sufficient air capacity and mineral content in the soil do notadditionally require added nitrogen fertilisers, unlike grasses. In addition, leguminous grassland has a high nutritional value, in particular protein content, andtherefore ensures the sustainable further useof protein material throughout the food chain (TI03sus01.1 Coupled income support forprotein crop growers) (*2023-2027).*

A7-E. Development of***non-arbitrary technologies.*** The measure aims to promote non-arable tillage, with a particular focus on promotingdirect sowing. Neartic agriculture, and in particular direct sowing, improves the characteristics,fertility and carbon storage of the soil (TI05eko1.8 Arable land – Unarable conservation farming technologies) (*2023-2027)*.

A8-E. Climat-friendly livestock farming (gut fermentation). The objective of the measure is to inform farmers about theimpact of achange in thecomposition of a given feed onGHG emissions while maintaining productivity: changes in the feeding of pigs, limited changes in thecomposition of feed for cattle, reduction of methane released bycattle, informing cattlefarmers about thepossibilities fordiversifyingfeed composition by improving feed quality and, at the same time, livestock productivity (e.g. conventional wheatstraw, barley straw to maize, millet, etc.), reducing carbohydrates and replacing them with unsaturated fatin feed, addingnitrogen additives with slowly digestiblenitrogen compounds to feed, reducing theprotein content of feedfor dairy cows and avoiding over *-feeding (2022-2023)* In addition to providing a fair and adequate diet, which leads toreducedGHG emissions, Lithuania promotes andsupports genetic testing through breeding systems, which assesses theanimal's health, potential to increase production and release less emissions. *(2021- 2027)*

A9-E.Promotion of organicfarming. The measure is designed to promote organic farming. This measure will address the challenges of providing thepopulation with quality food, reducing negative impacts on the environment, preservingbiodiversity and maintaining the stability ofecosystems (TI05eko8 Transition to organic farming; TI05eko10 Organic farming (fruit, berries, vegetables, herbs and herbs); KP01ecū Organic farming. Continuedcommitments fororganic farming) (*2023-2027)*

A10-E: Boostingbioeconomy businesses. The objective of the measure is to encourage the production of innovative highvalue- added products based on agricultural productionproduced in Lithuania. To that end, subsidiesfor productive investments in innovative bioeconomy businesses (KP14prd Investment in Bioeconomy Businesses) (*2023-2027) are*provided.

A11-E. Nature-friendly management***of orchards and berry.*** The intervention is designed toencourageagricultural operators to manage orchards and berry in a nature-friendly way that aims to reduce theuse ofplant protection products, reduce nutrient leaching from soil, contribute to biodiversity conservation (TI05eko2Nature-friendly management of orchards and berry) (*2023-2027)*.

A12-E. Sustainable horticulture . The objective of the measure is to promote fruit, berries and vegetables

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growers to implement more environmentally friendly production technologies, thereby contributing to thepreservation and improvement of soil quality and thereduction of pollution of surface and groundwater (TI05eko3–Sustainable fruit, berries and vegetables programme (NCP) *2023-2027)*

A13-E. Alternative fuelled techniques. The measure aims at replacing fossil fuel agricultural machinery and vehicles withsecond -generation biofuels and electric techniques (e.g. tractors, trucks, harvesters) byprioritising the adaptation ofexisting techniques to second-generation fuels. The measure shall only apply to entities that useat least 50 % of second generation biofuels during thecommitment period (*2024-2025)*.

A13-P. Alternative fuelled techniques. Theactivities of measure A13-E *(2026-2030) will*continue.

A14-E: Reducing the use of fossil fuels. The measure aims to promote the reduction of the use of fossil fuelsin agriculture and forestry and fisheries through: (1) regulatory actions (e.g. limiting consumption of gas oils for agricultural use) *(2021-2030)*; (2) theplanning of new investment measures to boost thetransition from fossil fuels to renewable energy sources and increase energy efficiency *(2022-2027)* Also, through consultation and thecreation of a platform,encourage the sharing oftechniques between farmers, which would make it possible to exploit theoverall potential ofLithuania'sagricultural machinery resources. A potential land manager can farming with all the necessaryservices and farming without capital, but using already existingcapacities (often underused by other farmers) (2023*-2027)*.

A15-E. Revision of technological cards. The objective is to reduce theuse of gas oils intended for usein agriculture . A lower fuel allocation would save 20 % of the fuel consumption (*2023-2030)*.

A16-E. Promotionof research. The measure would investigate different farming practices, measuring theirGHG emissions, output and carbon capture. The aim isto identify which farming practices are the most energy-efficient and climate-friendly (KP22eip – European Innovation Partnership for Agricultural Productivity and*Sustainability*) (*2024-2027)*

A17-E. Information and counselling. 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 theimplementation of eco-schemes under the IfS 2023-2027 direct support measures and other policy instruments. Outdoor days, information campaigns on soil -friendly technologies, practices promotingmoreefficient use of fertilisers and plant protection products and other climate friendly agriculture areplanned. The measure also aims to improve theknowledge 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 become more sustainable, utilise state-of-the-art technologies, implement good practices (*2023-2027)*

A21-E: Balanced fertilisation system. Establish asystemof balanced fertilisation withefficient and reduced use of mineral fertilisers (per crop unit or per hectare ofcrop): introduce a requirement for the farm to provide data on the use ofmineral fertilisers(by active substance) on thefarm; develop a methodologyfor the establishment of fertilisation plans to calculate the optimal quantity offertilisers per crop and introduce a requirement for farms to draw up mineraland organic fertilisation plans. The measure also provides for the creation of a dedicated digitalinventory base for fertilisers and chemical plant protection products, on thebasis of which national records andcontrolsare carried out and implemented .

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other digital solutions. The use of mineral N fertilisers on cropland is expected todecrease by 10 %. *(2021-2024)*

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

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

Restoration of L1- E. peatlands(re -establishment of hydrological regime onagricultural land). *(More on the measure in the land use, land use change and forestry sector)*

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

Restoration of L6- E. peatlands (grazing). *(More on the measure in the land use, land use change and forestry sector)*

A18-P. Environmentally friendly nutrition. The measure envisagesa series ofcommunication and education campaigns informing the population about thenegative impact ofunsustainable agricultural production (planting and livestock farming) on theenvironment and human health *(25-2027).*

A19-P: Sustainable use of state-owned land. The measure provides that new contractsfor the lease of state- owned land (pursuant to the Resolution of the Government of the Republic of Lithuania on the saleand lease of plots of state agricultural land) wouldhave to processit organically or with very low levels of pollution (e.g. by using limited quantities of mineral fertilisers and plant protection products, indicating that non-arable farming may be carried out, etc.). Ensure the sustainability of activities on State-owned land leased and limited negativeenvironmental and climate impacts (*2023-2030)*.

A20-P. GHG accounting on farms. The measure is designed to enable thecollection of data on farms (GHG emissions, soil health), as well as through this data, the provision ofadvice tofarmers on energy efficiency,livestock or crop technology, with a view to identifying and advising on how toreduce GHG emissions in production, on a farm. Empower the use of data -driven GHG reduction solutions *on-farm (2022-2025)*.

Table3.1.1.9: Indicative financing needs for existing and plannedmeasures in the agricultural sector:

Sector s	Existing measures, EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Agriculture	Total Funding	Public funds	Modernised o Fund, Lithuanian Agricultural and Rural Development Strategic Plan2023-2027, Lithuanian Rural Development 2014-2020. programme, Lithuanian fisheries sector 2021-2027 programme	Total Funding	Public funds	Climate Change Programme, Modernisation o Fund, EU funds investments (2021-2027), other sources
	887,30	823,13		204,40	119,05	

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Waste management sector

The obligations forthe waste sector related to the transition to climate neutrality are set out in the strategic documents of the Republic of Lithuania:

1. **The** UCPD waste sector has the following climate change mitigation targets and targetsfor 2030:

   1.1. toreducefood waste by 50 %per capita (41 kgin 2019);

   1.2. limit the proportion ofmunicipal waste landfilled to 5 % byweightof municipal waste generated;

   1.3. recycling of at least 70 % byweightof all packaging waste;

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

   1.5. achieveby 2025 that the use ofsecondary raw materials (circularity) index should be at least equal to the EU average (11.9 in 2019).

Table3.1.1.10. GHG emission reduction targets for thewaste sector for the period2021 -2030 % NCCVD:

Sector	**Average 2016-2018 compared** to**2005**	**2025 target % compared** to**2005**	**% Achievementof the 2030 target compared** to**2005**
Waste;	—36.6	—50.6	—65

2. The**Sustainable Development Strategy** stressesthat the inefficient application of thepolluterpays principle towaste 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 theenvironment by waste. The vision highlights the creation of a regional waste management system and the initial waste sorting will significantly reduce waste flows to landfills andincrease recycling. At present, aregional waste management system is in place and primary waste sorting ispromoted through both regulatory and financial measures.

3. The**NAP** states that, in order to make rational use of natural resources, ensuring thequality of public utilities in the environmental sector would contribute to theimprovement ofquality of life. The specific objective of the programme is exclusively for the waste sector. In implementing this objective, attention shall be paid not only to theprevention of the generation ofwaste from municipal wastebut also to the generation ofwaste from economic activities, so thatwaste from production and other economic activities does not increase;or

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at least do more (at least twice) at a slower rate than production. The aim is to maximiserecycling or re-use of waste, to promote technologiesand production methodsthatreduce theuse ofnatural resources and/or prevent waste generation. The Industrial Development Programme emphasises thedesire to encouragebusinesses to jointly implement theprinciples ofindustrial symbiosis in the region, which can save raw materials and reduce waste generation.

4. **The National Waste Prevention and Management Plan for** the period**2021-2027** (hereinafter ‘ the LPCP’), approved byResolution No 579 of theGovernment of the Republic of Lithuania of1 June 2022, identifies the opportunities and risks associated with waste management in Lithuania, stressing that the implementation of waste prevention measures at national levelwill reduce the generation and non-use of waste, rationalise the use of natural resources and materials and reduce the risk ofadverse effects ofwaste on public health and the environment. One of the targets of the GWP is to reduce GHG emissions in thefield of waste. To that end,it is planned toincrease theamountof municipal waste that is prepared for re-use and recycled toat least 60 % (byweight) of municipal waste generated by 2030. By contrast,landfilling needs tobe significantly reduced by2030, with onlyup to 5 % (byweight) ofall municipal waste generated, in line with thetarget set in theNational Progress Plan.

In order to achieve these objectives, the GWPP provides that themanagement ofmunicipal waste must be organised in such a way as to encourageproper preparation for re-use and recycling. And the amount of bio-wastetreated 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. By 2024, households are expected to be provided with bio-waste collection tools or composting on-site.

The aim is to promote the development of recycling infrastructure for textiles, plastics, green and food waste by 2030, with the target of recycling 88.5 thousand tonnes of additional waste into secondary raw materials, as well as promoting the introduction and development of technologies that enable more secondary raw materials to be used in production. This will encourage recycling and recovery of waste as a raw material and reduce resource use, waste and GHG emissions.

Waste prevention is anequally important aspect of GHG reduction in the waste sector. The plan sets a target per capita of municipal waste below the European Union average. The GFAP provides for the promotion of the reuse of objects and a stronger focus on food waste prevention.

5. **Lithuania’s 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 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 exploit the country's growth and competitiveness potential through new technologies, business models and forms of cooperation. The aim of the guidelines is to address the effects of depletion of natural resources and the "take-down-discard" of the traditional linear economy, with a significant impact on climate change, biodiversity loss and environmental degradation, 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 which have to reduce its negative environmental impact. One of these is the significant reduction in the amount of waste landfilled. In 2022, 15.36 % of municipal waste was landfilled
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According to recent surveys, energy consumption at homeis reduced by24 %, water consumption by 20 %, waste generation by 22 %, and[58] household waste partially or fully sorts as much as 91 -95 % of thecountry's population. According toa survey commissioned by the Ministry of the Environment in [59] 2020,60% ofhousehold waste was sorted. Lithuania's population is the best score since 2015 (55 %).[60]

Table 3.1.1.11: Existing and planned policies in thewaste management sector until 2030:

NO	MEASURE	Total GHG SUBMITTING effect, thousand t CO2eq. 2021-2030	COMMON Fuel and ENERGY savings, GWh
EXISTING POLICY INSTRUMENTS (EPF)			
K1-E	Waste management	115,83	*
K2-E	Development of waste collection tools	171,56	*
K3-E	Waste water treatment	374,48	*
K4-E	Sorting of waste	20,15	*
K5-E	Food waste prevention	21,20	*
REI17-E	Implement local and RES CHP projectswithpriority for Vilnius and Kaunas	115,08	**
P15-E	Innovative green products and services	5	**
AMOUNT		**823,30**	**0**
PLANNED POLICY MEASURES (PSD)			
K6-P	Circularity in public procurement	28,64	*
K7-P	Research and development	*	*
K8-P	Domestic composting	30,35	*
AMOUNT		**59,00**	**0**

*The impact of themeasure is not assessed as it does not directly reduce GHGs or fuels and energy, but it is essential for thesuccessful implementation ofother envisaged measures.

58 https://am.lrv.lt/lt/naujienos/gyventoju-apklausa-rodo-aplinkosauga-yra-svarbi-devyniems-is-desimties-salies-zmonium

59 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/

60 https://am.lrv.lt/lt/naujienos/visas-atliekas-rusiuoja-60-proc-lietuvos-gyventoju

** The impact of the measure is not assessed as the measure saves GHG or fuels and energy in another sector.

K1-E. Waste management. The measure includes: (1) subsidies and grants for thepurchaseand management ofbio-waste collection tools (05.2.1-APVA-R-008) by establishing and/or adapting existing infrastructure for thetreatment offood/kitchen waste *(2021-2023)*; (2) Development of bio-waste treatment infrastructure through support

projects for theproduction of biomethane gas and/or biogas treatment plants *(2020-2030)*; (3) theharmonisation of the pollution tax, including anincrease in the landfill tax *(2021-2023)*.

K2-E. Development of waste collection facilities. The measure includes: (1) raisingpublic awareness ofwaste sorting possibilities, benefits, different waste disposal sites, sorted waste through various information channels and tools. The information shall include both theoretical information on theenvironmentalbenefits and impacts of recycling and practical information on where and how they can sort thewaste(*2024-2030)*. (2) thedevelopment ofinfrastructure forseparate collection ofmunicipal waste: modernisation, refurbishment or new construction ofbio-waste collection containers and/or composting facilities forindividual holdings; theinstallation / reconstruction ofcontainer sites and thepurchase ofcontainers for container sites; construction / renewal ofbulky waste collection sites and/or adaptable installation /refurbishment and/or adaptation for preparing for re*-use* (2014-2024 *)* (3) subsidies and grants for thepurchase of individual containers forsecondary raw materials (glass/paper/ board /plastics /metal) and textile waste containers and for thepurchase ofbio- waste collection tools *(2021-2026)*

K3-E. Waste watermanagement. The measure includes: (1) projects to rehabilitate newly stationed waste water treatment plants (05.3.2-APVA-V-013) *(2018-2023)*; (2) projects to reconstruct and/or rebuild drinking water supply/collection networks and to reconstruct and/or newly construct water improvement/waste water treatment plants (05.3.2-APVA- R-014) *(2014-2023)*; (3) The construction ofsewage sludge treatment plants for thetreatment ofsewage sludgefrom waste water treatment plants in the Telšiai and Utena regions *(2015-2023)*; (4) thedevelopmentof waste water management systems, including the establishment of separate and group waste water management systems, which would provide equivalent environmental protection to thecentralised waste water collection system; reconstruction ofurban waste water treatment plants that dischargeuntreated waste waterinto the natural environment and/or where the pollution load exceeds or is closeto thedesign capacity of the treatment plants and theconstruction ofwhich has not been financedby EU funds *(2024-2030)*.

K4-E. Waste sorting. The measure is intended to finance: (1) thedevelopment ofseparate collection ofmunicipal waste,with priority being given to thecollection of household -generated food (kitchen), green, textile, hazardous waste, construction ofbulky waste collection sites, waste for re -use collection infrastructure (regional measure 02-001-06-10-01 (RE) ‘Promote separate collection of waste’) *(2024-2030)*; (2) modernisation, development ofinfrastructure forpreparing for recycling and recycling ofwaste, installation of new facilities for textiles, furniture, plastics, composite packaging, bio, electrical and electronic waste and other waste (Progression Measure No02 -001-06-10-02 ‘Promote recycling and theuse of secondary raw materials’) *(2024-2030)*; (3) publicity campaigns carried out bymunicipalities 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’) *(2024-2027)*.

K5-E. Food waste prevention. The measure aims to finance national publicity campaigns on food waste reduction and food waste prevention, reuse ofobjects (Progression measure 02-001-06-10-03 'Promoting waste prevention') (*2024-2027)*.

REI20-E. Implement local and RES -based CHP projects, prioritising Vilnius and Kaunas. *(More on the measure in the renewable energy sector)*

P15-E – Innovative green products and services *(More about the measurein the industrial sector)*

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K6-P. Circularity in public procurement: Complement thedescription of theprocedure for the application of environmental criteria in green procurement withcircularity criteria and/or*principles*(*2024-2025)*.

K7-P. Research and experimental development: The measure provides for the financing of research and developmenton circular economy, providing for the maindirections for investment in re-use, thesubstitution of fossil raw materials withbio-based and secondary raw materials, theproduction of long-lived products, the development of new training programmes, and changes inconsumer habits (*2024-2027)*.

K8-P. Household composting: As part of the implementation ofthe measure, alegislative change is planned to provide that residents composting bio-waste in households would be charged a lower fee for waste management (in*2023)*.

Table 3.1.1.12. Indicative financing needs for existing and plannedmeasures in the waste sector:

Sector	**Existing measures, EUR million**		**Available sources of funding**	**Planned measures in EUR million**		**Potential sources of financing**
Waste	Total Funding	Public funds	EU funds investments (2014-2020) and (2021-2027) – Waste prevention and management programme	Total Funding	Public funds	Waste prevention and management programme
	830,38	549,24		3,00	3,00	

Land use, land use change and forestry sector

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

1. **The** UCPD has set the following climate change mitigation targets and targets for2030 for the FSCM sector:

    1.1. by 2030,through the sustainable use ofutilisedagricultural land and forest land, theconservation and restoration ofnatural habitats that store organic carbon (forests, grasslands, wetlands, wetlands) andtheir good ecological status, increasing theuse of wood inconstruction and in theproduction oflong-lived products without additional negative impacts on ecosystems, increasing theabsorption potential, making the most efficient use, achieving significantly higherGHGemissions than emissions from the sector and atleast 6.5 milliontonnes of CO2eq in theperiod from 2021 to 2030:

    1.2. to achieve asteadyreduction in GHGemissions from cultivated land in the LSCM sector through soil-friendly farming methods and improvement;

1.3. increase thestock oforganic carbon in forests and timber products, increase theannual removal of organic carbon through thedevelopment of sustainable forestry, and increasethe use of indigenous raw materials in wood products;

1.4. increasing the country's woodland to at least35 % by 2024 , prioritising areas naturally covered with trees and bushes, in line with ecological principles;

1.5. increase the areas under permanent grassland byat least 8000ha;

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1.6. increase the non-arbitrary technology area by 1.5 times by2024 and by3 by 2030;

1.7. at least 4 % of the utilised agricultural areaby 2024 and10 %of theutilised agricultural area by 2030 to be used for biodiversity- rich landscape features;

1.8. restoring at least 8000 ha ofcarbon-rich ecosystems, ensuring their sustainable use,halting the exploitationof new natural wetlands by 2024;

1.9. promotechanges in consumption patterns by increasing the use of renewable wood -based products and energy, andreduce the use ofmore polluting non-renewable resources;

1.10. ensure and continuously monitorsustainability requirements for the production of renewable timber products in order to avoid additional negative impacts on ecosystems;

1.11. promote the production ofplants suitable for industry (fibrous, etc.) and their use anduse of wood in industries by increasingstocks of stored organic carbon in long-lived products, ensuring that there are no additional negative impacts on ecosystems;

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

The LSCM sets the following National Climate Change Mitigation Targets and Targets for 2030 through the sustainable use ofutilisedagricultural landand forest land, the conservation and restoration ofnatural habitats that store organic carbon (forests, grasslands, wetlands) andtheir good ecological status, increasing theuse of wood inconstruction and long-lived products without additional negative impacts on ecosystems, increasing theabsorption potential, making the most efficient use, achieving significantly higher greenhouse gasemissions from the sector and atleast **6.5 Mt CO2eq over** the**period 2021-2030**.

2. **The State Progress Strategy "Lithuania's long-term vision "Lithuania 2050"** sets out thestrategic ambition that Lithuaniais developing in a sustainable manner a climate- neutral, climate-neutral, climate-resilient,nature -basedecosystem restoration, balanced growth and moderation economy. Domestic producers and consumers are guided by widely accepted and practicable principles ofresource responsible use and circular economy. All thebenefits ofnature (ecosystem services) areproperly valued and used carefully by theState.

3. **The National Sustainable Development Strategy** identifies the potential of the FNM sector for afforestation andmore fertile soils, notes theneed for economic and administrative measures to rebuild exploited quarries, peatlands, abandoned old farm buildings and a landscape management plan at national level. The vision envisages that, in the face of spontaneous naturalisationand increasing woodlandandperennial cropland in Lithuania, thedevelopment andintegration ofprotected areas and the natural frame into international ecological networks will ensure theprotection of landscape and biodiversity, slow down soil erosion andincrease the ecological stability of theareas. According to the mission, the increase in Lithuania's forestworthinesswill not only make it possible to rationalise the use of abandoned, low-productivity and agricultural production unsuitable land, but also strengthen the country'snatural frameby adding forest

elements andfacilitate the integration ofLithuania’ssystem of protected areas into theEuropean ecological networks by creating the necessary connections.

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4. **The national environmental strategy e**[61] and the**general plan for the territory of the Republic of Lithuania**[62]suggest that the country’s forest cover should increase to 35 % by2030.
5. **The national landscape management plan**was designed tostrengthen[63] thenatural frame and ecological balance, toimprove land use processes by addressing forest development strategies and forest degradation inan integrated way (landscape and biodiversity,ecological, social and economic aspects), by combining theterritorial layout offorests and the formation of a natural frame, withpriority being given to the afforestation of ecologically depleted natural frame areas.
6. The**NAP** provides for thedevelopment of sustainable and bioeconomy-based activitiesin the agriculture, forestry and fisheries sectors. The main lines of environmental protection and climate change management are set out in the EnvironmentalProtection and Climate ChangeManagement Development Programme of the Ministry of the Environment of the Republic of Lithuania, the manager of the2022-2030 development programme [64].
7. In the**description**of the**progressmeasure No02 -001-06-08-04 ‘Promoting thedevelopment of forestsand thesustainabledevelopment of the forest sector’ of the Ministry of the Environment of the Republic of Lithuania, theactivities provided for in the programme for the development of the environmentand the management of climate change are also aimed at increasing** forest sustainabilityand creating more productive stands, rationalising the use of forests and developingforest management, andincreasing forest resilience and adaptation to climate change; State budget funds are foreseen foractivities that will help to address theproblems raised in theEnvironmental Protection and Climate Change ManagementDevelopment Programme of the Ministry of the Environment of the Republic of Lithuania and their causes.
8. The objective of the**Land Holdings** Programme is to improve thestructures ofland holdings and to reduce areas ofabandoned land. The measures put in place to achieve this aim are: the restoration of productive abandoned land to good agricultural condition, including drainage operations (90hain 2020 as an assessment criterion); it is intended to provideareas that are not suitable for low-productivity agricultural activity forafforestation, including theformation of anatural frame and the creation ofan ecologically stable landscape.
9. One of thespecific objectives set out in**Lithuania**’s**Strategic Plan forAgriculture and Rural Development 2023** -2027 (‘SP 2023-2027’) is tocontribute to climate change mitigation and adaptation, including by reducing GHG emissions and increasing carbon sequestration, as well as developing sustainable energy (Specific Objective 4, SO4). This objective is to be achieved through standardsfor good agricultural and environmental condition (GAEC) and management requirements (SMR) and different interventions. GAEC and SMR standards and interventions will increase the contributionof plant residues to soils and reduce themineralisation of soil organic carbon,thereby increasing soilorganic carbon sequestration, increasing biomass in forests andincreasing GHG absorption, and makingfarms more resilient toclimate challenges.

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61 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/609a6f82ea4e11e4ada6f94d34be6d75/asr
62 https://e-seimasx.lrs.lt/portal/legalAct/lt/TAD/ab6b8b21266f11ec99bbc1b08701c7f8
63 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/733b3c1068fb11e5b316b7e07d98304b?jfwid=8fvznfzd2
64 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/7430b8b1b1c011ecba9197ac603309e4?jfwid=1aubb3rrrq

TheSP is expected tocommit 404 thousandha (13.59 %) of theutilised agricultural area in2023-2027 toimprove climate changeadaptation, and839 thousandha (28.21 %) of theutilised agricultural area will be committed toreducing GHG emissions or maintaining/increasing carbon storage in soil and biomass.

Overall climatechange mitigation, adaptation and absorption interventions

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by increasing the potential, the IfS is expected to support an area of around1.67 million ha or 56 % of theutilised agricultural area in2023-2027.

Over 90 % of the savings in the LWFsector are planned thanks to themeasuresplanned in theIfS for2023 - 2027 (assessing existing measures), such as thepromotion ofplant change, thepromotion of catch crops, theprotection of drained peatlandsused in agriculture, as well as extensive grassland maintenance and the development ofnon-arable farming.

10. **TheSejm Resolution on Forest Policy,which sets** out Parliament's views on long-term sustainable forest policies. Theresolutionof the Sejm is a non-legislative act intended to confirm in writing the Sejm's opinion on a matter of importance to the State.

Thechallenges ofclimate change and biodiversity, changing societal needs for the country's forests have prompted a major revision ofLithuania'sforest policies, and theMinistry of the Environmenthad already launched a National Agreement on Forests in2021 toagree ona long-term balanced forest policy orientation andto answer questions raised by different interest groups.

ThedraftNational Agreement on Forests was drafted by around 40 different organisations and nearly 400 participants. Discussions on this file took place in150 events indifferent formats and the final text of the agreements wasshaped by nine thematic groups, of which six werereached. The latter have been moved to the Resolution on ForestPolicy adopted today by the Sejm with72 votes. Insummer2024 , the Government approved amendments to theForest Law and accompanying laws prepared by the Ministry of the Environment, which wouldenshrine qualitative changes in theforestry sector, whichwill still have to be approved by the Sejm.

Current situation. To achieve these objectives,over thelast decade (2013-2022),7 thousand ha of newforests have been planted on state-owned land and10.5 thousandha ofnew forests under Lithuania's Rural Development Programme 2014-2020. Support for thedevelopment,maintenance, protection and education of forests and the restoration offorests resulting from natural disasters is also foreseen in Lithuania'sStrategic Plan forAgriculture and Rural Development for 2023-2027. The country's forest cover is also increasedby including around 3-4 thousandha of spontaneously forested areasannually in forestland accounts.

Due to their significant role in climatechange mitigation, organic soils (peatlands)are increasingly being addressed. Therestoration ofdrained peatlands through the restoration of thehydrological regime, which ensures permanent flooding and allows the restoration ofwetland processes, is a priority fornational climate change policies, as set out in the strategic documents. According to thenational GHG inventory, in2022 emissions from organic soils (peat soils) were 492 thousandtonnes CO2-eq , representing more than 11 % oftotalemissions fromthe agricultural sector in Lithuania in 2020 . GHG emissions fromorganic soils have been the fourth largest source ofemissions from the agricultural sector after mineral nitrogen fertilisers and intestinal fermentation ofdairy cows and beef cattle, so therestoration of organic soils on agricultural land could be one of themost effective ways toreduceemissions fromboth the agricultural and FNM sectors andtocontribute 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 until 2030:

NO	MEASURE	Total GHG	COMMON

		SUBMITTING effect, thousand t CO2eq. 2021-2030	Fuel and ENERGY savings, GWh

SectionA:

EXISTING POLICY INSTRUMENTS (EPF)			
L1-E	Restoration of peatland(re -establishment of hydrological regime onagricultural land)	—487	**
L2-E	Conservation andrestoration ofgrassland	—2772	386,80
L3-E	Conservation of wetlands	—80	3,30
L4-E	Promotion of catch crops	—5113	*
L5-E	Promotingplant change	—8189	*
L6-E	Restoration of peatland (grazing)	—967	*
L7-E	Promotion of thegreen spot	—190	*
L8-E	Preserving landscape features	—146,0	*
L9-E	Afforestation	—129	*
L10-E	Young people's education	—67	*
L11-E	Development of agroforestry and agro-horticulture	*	*
L12-E	Promotion oforganic construction	—1051	**
L14-E	Conservation of tree spontaneous	—250	*
L15-E	Improvingthe quality of forests	127	*
L16-E	Determination of GHG indicators	*	*
L18-E	Afforestation	—68	**
A4-E	Extensive grassland management	—494,00	*
A7-E	Development of non-arbitrary technologies	—2431	**
AMOUNT		—21 925	—390,10
PLANNED POLICY MEASURES (PSD)			
L1-P	Restoration of peatland(re -establishment of hydrological regime onagricultural land)	—163	*
L12-P	Promotion oforganic construction	**	**
L13-P	Promotion of carbon farming (on agricultural land)	*	*
L14-P	Conservation of tree spontaneous	—376	*
L17-P	Promotionof carbon farming (in forest)	*	*
L20-P	Restorationof peatlands(re -establishment of hydrological regime in forests)	—40	*
AMOUNT		**—579**	**0**

**The impact of themeasure is not assessed as it does not directly reduce GHGs or fuels and energy, but it is essential for thesuccessful implementation ofother envisaged measures.*
***The impact of the measure is not assessed as the measure saves GHG or fuels and energy in another sector.*

Restoration of L1- E. peatlands(re -establishment of hydrological regime onagricultural land). Identify areasof former drained peat wetlands where it is appropriate to restore thehydrological regime, identifying their effectiveness inreducing emissions and, in thelong term, absorbing GHG. Promote therestoration of drained wetlands by restoring adequate water levels and maintaining ecosystems through sustainable economic activities, with a particularfocus on wetlands, the development of whichwouldcontribute to the development of thecircular economy,

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conservation of natural habitats *(2024-2026)*

L1-P. restoration of peatlands(re -establishment of hydrological regime onagricultural land). Extension ofthe scope of measure L1-*E* (2026-*2030*)

L2-E. Conservation of***grasslands and species habitats.*** The measure is designed to encourage farmers to conserve grassland and natural habitats. The measure provides for compensation to farmers eligible (TI05eko62.1 - for the management ofnatural grasslands of EC interest; KP070Conservation ofwild birds outside the Natura 2000 site; KP07t Support for Natura 2000 agricultural land (*2023-2027)* Maintenance andmaintenance of permanent grassland and conversion ofarable land topermanent grassland (TI05eko11 - Grasslandconversion , maintenance and maintenance) (*2024-2027)*is also promoted.

L3-E. Preservationof wetlands. The measure is designed to encourage farmers to preserve wetlands. Provides for compensation to farmers eligible (TI05eko62.2 - for the management ofwetlands of EC interest; TI05eko7 Extensive wetland management (2023 *-2027)*

L4-E. Promotion***of catch crops***: In addition toimproving the agrochemicalcompositionand physical characteristics ofarable land, the measurewill encourage agricultural operators to grow catch crops, but will also make a significant contribution toreducing environmental pollution and adverse changes inclimate change (TI05eko1.2 Arable land activities – catchcrops) (*2023-2027)*.

L5-E. Promoting plantchange. Theannualvariation of at least 4 plants under this measure will have apositive impact on the maintenance ofsoil fertility. The transition from monoculturesand crop changewill increase the organic carbon content of the soil. By contributing to increasing soil carbon sequestration andreducing GHG emissions, themeasure will have a direct impact on climate change mitigation and adaptationobjectives. The measure provides for acompensation to farmers eligible (TI05eko1.1 Activitieson arable land –Plant change) (*2023-2027)*.

Restoration of L6- E. peatlands (grazing). The replacement of arable peat land with grassland will have a positive impact on reducing GHG emissions from peat soils, preserving soil fertility,reducing erosion, which is heavilyinfluenced by intensive agriculture, and increasingorganic matter. The measure aims to contribute to thereduction ofploughing of peatlands(organic soils) by promoting therestoration, conservation and regular maintenance of the cover of organic soils. (TI05eko4 Replacement of peatlands with*grassland*) (*2023-2027)*

L7-E:Promotion ofthe greencover. The measure aims to reduce soil erosion and GHG emissions, to increase theorganic matter content ofsoil and biomass through the establishment of grass strips, theinstallation and maintenance of grassland on the land displayed. Theconversion of arable land into grassland contributes to halting soil erosion andreducing GHG emissions (TI05eko5 Eroded land conversion; TI05eko1.6Strips of short- lived melliferous plants; TI05eko1.7 perennial grass bands (2023 *-2027)*

L8-E.Preservationof landscape features. The measure aims to preserve and restore the traditional mosaic landscape. High mosaic areas allow awide range of plant and animal species to liveand reproduce, thus contributing to the conservation ofbiodiversity. Landscape features protect soil from erosion andtherefore the measure can have a direct positive impact on theachievement of national targets formaintaining soil fertility, increasing organic matter, reducing erosion, as well as reducing GHGemissions depending on the type of landscape element; and increasing absorption (TI05eko1.5 Landscape surveillance) (*2023-2027)*

L9- E. afforestation. The measure aims to increase the country'sforestcapacityby providing support to private landowners for afforestation andmaintenance and protection (7 years after afforestation) (*2024-2027)*.

L10-E- young education. The measure aims to strengthen theresilience of forest ecosystems toadverse environmental factors, build stands fortarget tree species, increase theproductivityand absorption potential *of*stands (*2024-2027)*.

L11-E. Development of***agroforestry and agro-forestry.*** Define theconcept of agro-forestry and agro-horticultural economic activities to be applied in Lithuania, based on best practices inother countries. Assess thepotential for growing perennial crops (agro-forestry and agro-storage) onagricultural land (according to thespecificity of land use) and theeconomic, social and environmental (including carbon stock) potential of theproductsor raw materials produced, as well as thedevelopment of mixed perennial crop-pastoral systems (*2023-2025)*.

L14-E. Conservation***of spontaneous trees.*** The measure is designed to support theconservation oftree spontaneousnon- forest land (compensating part of the loss of income fromagricultural activities and thecosts of entry inforest land accounts) inorder to increase the country'sforest area *(2024-2025) by* 2030.

L14-P. Conservation***of spontaneous trees.*** Theactivities undermeasure L14-E *(2026-2030) are planned to* continue.

L15-E. Improving the quality of forests. The measure is designed to support the reforestation ofvaluable tree species and theconversion of loose and low-value stands to increase thearea ofmore resilient and good quality forests *(2023-2030) by2030*.

L16-E.Determination of GHGindicators. Set national GHG emissions targetsand carbon stock change indicators to adjust the current accounting ofGHG emissions / absorptions and to identify the most appropriatemeasures to reduce and increase removals in the*FNHR*sector (*2019-2023)*.

L18- E. afforestation. In order to increase the country'sforest areas, around 300 ha of new forests (*2023-2030)are planned annually on state-* owned land.

L19-E: Promotion oforganic construction. The measure includes: (1) theimplementation of pilot building refurbishment (modernisation) projects using standardised modular structures made of organic materials and,on thebasis thereof, the development of recommendations for themassive application ofthese solutions,which would lead to anaverage reduction of primary energy consumption of at least 30 %. *(2023-2025);* (2) support for thedeploymentin Lithuania (*2023-2025) of standardisedproduction capacity of modular structures based on organic material required to meet the targets of the Long-* Term Renovation Strategy.

A4-E. extensive grassland maintenance. *(More about the measureinthe agricultural sector)*

A7-E. Development of***non-arbitrary technologies.*** *(More about the measureinthe agricultural sector)*

L12-P. Organic construction promotion: Refurbishment (modernisation) of multi-apartment buildings using standardised modular structures made of organic materials. *(2026-2030)*

L13-P:Promotion of carbon storage ***farming (agricultural*** land) The measure aims to promote thedevelopment of carbon farming practices and, where necessary, the development of regulatory measures inorder to promote thelong-termstorage of organic carbon in soils, dead organic matter; and biomass, ensuring additionality and durability and respectingecological principles favourable to biodiversity and overall natural assets (*2022-2030)*.

L17-P:Promotion of carbon storagefarming (in wood). A forest owner (whether public or private) who has determined that it is necessary to carry out juvenile or thinning (intermediate) harvesting or other carbonfarming measures in the forest under his/her management initiates appropriate actions. The measure aims at increasing CO2 storage through timely thinning of trees and allowing trees to grow and store CO2 morefreely. Activities are currently taking place in state-owned forests, and it is planned to encourage private forest owners to carry out these activities, where possible. The level of compensation woulddepend on the type of harvesting or theapplication of a specific measure (from2025*to 2030)*.

L20-P. Restoration of peatlands(rehabilitation of hydrological regime in forests). At present,Natura 2000 habitats 9080 and 91D0 are assessed as unfavourable (U1). This is due to climate change and the renewal of old drainage systems inthese habitats. In order to avoid emissions from these bog forests, it isenvisaged to maintain or restore the*hydrological*regime (*2024-2030)*.

Table 3.1.1.14: Indicative funding needs for existing and planned measures in the HNSHRsector:

Sector	**Existing measures, EUR million**		**Available sources of funding**	**Planned measures in EUR million**		**Potential sources of financing**
FNM	Total Funding	Public funds	Recovery and Resilience Facility, Strategic PlanforAgriculture and Rural Development 2023-2027, State Budget, Climate Change Programme	Total Funding	Public funds	Financing ofgeneral forestry needs, Climate Change Programme, other sources of funding
	598,19	561,83		21,80	21,80	

Small energy sector

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

1. **The** UCPDsets climate change mitigation targets and targets for the small energy sector by 2030 as follows:
   1.1. with a view to reducingGHG emissions by at least 26 % by2030 compared to 2005:
   1.2. increasing energy efficiency and shifting to zero- emission heat and cold production technologiesby prioritising the use of RES;
   1.3. transform thecurrent building sub-sector intoenergy-efficient (with conditions forconversion to nearly zero- energy buildings) in 2050 and decarbonisedfrom fossil fuels compared to2020, reducing annual primary energy consumption by60 %, primary energyconsumption from fossil fuels and GHG emissions by 100 %, and theshare ofrenovated buildings would be74 %;

1.4. to achieveenergysavings of at least6 TWh in individual homes and public buildings by promoting the comprehensive renovation of multi-apartment buildings, individual homes and public buildings (with priority given to therenovation ofhousing estates);
1.5. to achieve that 30 % of households are active energy prosumers by promoting decentralised electricity production and energy storage;
1.6. advise final customers on energy -saving measures and solutions that change consumers' behaviourand behaviour by improving energy efficiency;
1.7. increase thenumber ofcustomers connected to district heating by promoting theefficient use ofthermal energy.

Table 3.1.1.15: GHG emission reduction targets for the small energy sector for theperiod2021-2030 set in % for the UCPD:

Sector	**Average 2016-2018 compared** to**2005**	**2025 target % compared** to**2005**	**% Achievementof the 2030 target compared** to**2005**
Small energy	—3,2	—14.8	—26

' Small energy 'means energygeneratinginstallations (small combustion plants up to 20 MW) and sectors using it (households, public, services, construction, fisheries,forestry, etc.) which are not covered bythe EU EmissionsTrading System.

Table 3.1.1.16: Existing and planned policy measures in thesmall energy sector until 2030:

NO	**MEASURE**	**Total GHG SUBMITTING effect, thousand t CO2eq. 2021-2030**	**COMMON Fuel and ENERGY savings, GWh**
EXISTING POLICY INSTRUMENTS (EPF)			
EE7-E	Replacementof boilers with more efficient technologies	276,05	3744,84
EE4-E	Agreements with energy suppliers on consumer education and consulting	50	2773,21
REI10-E	Investment support for theinstallation of biomethane production and biogas treatment plants	71,70	***
RES3-E	Use of RES inpublic and residential buildings	12,71	0,07
EE10-E	Refurbishment (modernisation) ofone or two dwellings ofnatural persons	23,34	611,44
EN3-E	Encourage thepurchase of solar power plants by deprived persons and / or the replacement offossil-fuel -based heat installations	0,26	1,05
A1-E	Investment support for the introduction ofclimate-friendly farming methods inlivestock farms (biogas production foron- farm consumption)	27,43	*
T27-E	Law on excise duties	102,99	318,10

T28-E	Implementationof ETS2	98,10	***
A14-E	Reducing the use of fossil fuels	35,69	123,17
A15-E	Review of technological cards	74,80	258,11
A7-E	Development of non-arbitrary technologies	46,26	159,66
L4-E	Promotion of catch crops	33,61	116,00
A3-E	Development of precision fertilisation	0,66	2,30
A13-E	Alternatively fuelled machinery	3,21	***
AMOUNT		**1106,77**	**977,34**
PLANNED POLICY MEASURES (PSD)			
REI10-P	Investment support for theinstallation of biomethane production and treatment plants	32,75	*
EE10-P	Refurbishment (modernisation) ofone or two dwellings ofnatural persons	191,96	1199,43
REI27-P	Limiting the use of solid fossil fuels by location	*	**
A1-P	Investment support for the introduction ofclimate-friendly farming methods inlivestock farms (biogas production)	111,79	*
A3-P	Development of precision fertilisation	0,53	1,81
A13-P	Alternatively fuelled machinery	3,56	***
AMOUNT		**340,59**	**1201,24**

**The impact of themeasure is not assessed as it does not directly reduce GHGs or fuels and energy, but it is essential for thesuccessful implementation ofother envisaged measures.*
*** The impact of the measure is not assessed as the measure saves GHG or fuel and energy in another sector.*
***The scope of the measureimplements renewable energy solutions that do not directly contribute to fuel and energy savings but ensure thedeployment of clean technologies.*

Small measures in the energy sector are measures inother parts ofdecarbonisation and energy that contribute to theachievement of thetargets for these sectors and are described in those paragraphs. Thefinancing ofthese measures is specified in the sectors to which thesemeasures belong, but thetarget fornon-ETS sectors requires investments inthe small energy sector as set out in Table 3.1.1.17.

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

Sector	**Existing measures, EUR million**		**Available sources of funding**	**Planned measures in EUR million**		**Potential sources of financing**
Lesser energy	Common funds	Public funds	Climate change programme, EU funds	Common funds	Public funds	Climate change programme,
	949,47	672,43	investment (2014-2020) and (2021-2027), Recovery and Resilience Facility, Lithuania's Agriculture and Rural Development 2023-2027.	1161,05	415,90	Modernisation Fund, Social Climate Fund, ETS2 funds, other sources of financing

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			strategic plan;			

Horizontal climate change management policy instruments

It should be noted that theneed for public interventions needed to achieve the national targets, as well as thecost of implementation , can be significantly reduced by strengthening horizontal climate change management policies that would enhance thecoordinated functioning of state bodies, municipalities and the private sector, aswell aspublic awareness and engagement.

Table 3.1.1.18: Horizontal climate change management tools:

NO	MEASURE	RESPONSIBLE ENTITY
H1	Integration ofGHG impact assessment into the legislative process	AM
H2	Extending the scope of green procurement and increasing public sector obligations	AM, MOI
H3	Mandatory application ofadaptation criteria to new infrastructure projects	AM, EIMIN, SUMIN, ENMIN
H4	Enhancing the inclusion of self-government in climate change management policies	AM, MOI
H5	Mainstreaming climate change in all educational programmes	AMSM, AM
H6	Increasing public awareness and inclusion in climate change management policies	AM, EIMIN, ENMIN, SUMIN, SADM, SAM, AMSM, VRM
H7	Implementation ofdevelopment cooperation projects (climate change) in developing countries	AM, FINMIN, MFA
H8	Promoting research on climate change mitigation and adaptation	NMSM, ESSENCE, LMT, AM
H9	Evaluation of existing measures to manage climate change from agender equality and equal opportunities perspective	SADM

H1. Integration of the impact assessment on GHG emissions into the legislative process. Make legislative changes to ensure that new and amended legislation isassessed forenvironmental impacts,including GHG emissions (*2024-2030*), depending on *their*theme.

As of1 March 2024,an updated methodology for assessing the impact of the envisaged legal regulation hasentered into force inLithuania, allowing drafters of legislation toassessenvironmental and climate changeimpacts in a more efficient and objective manner. The updated methodology provides clarityfor drafters of legislation

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guidelines for effective and objective impact assessment, which shall cover climate change mitigation, adaptation to climate change, thestate of ambient air and waters, natural resources,landscape and biodiversity, site use and resource efficiency.

The introduction ofspecific indicators on thestate of theenvironment and climate change with thresholds, if the evaluation indicates that they will be exceeded, thelegislators are encouraged to abandon or modify legislative initiatives.

Theassessment of the impact of the envisaged legal regulation is carried out in order to improve public policy -making, decision-making, to providepublic authorities andbodies preparing and taking decisions with information on possible alternatives tosolutions and theconsequences oftheir implementation, and to allow for thechoice of themost appropriate solution to the problem. The description of thelegislative procedure forassessing environmental and climate change impacts (ex-ante)[65] sets out the procedurefor the(ex ante) assessment of the impact of legislation on the environment and climate change.

17 open-access calculatorsare currently available on the website of theEnvironmental Protection Agency to analysethe development ofindicators measuring theimpact of legislation on climatechange mitigation and ambient air status. These spreadsheets are easy to manage and clearly understand according to users'needs and will be continuously improved and developed.

H2. Broadening the scope of green procurement and increasingobligations for the public sector. Extensionof the scope of green procurement to include but not limited to: green electricity and heat (through guarantees oforigin), purchase of low-emission transport services, purchaseor rental of buildings forpublic use (highest energy efficiency classes), waste management (compulsory sorting infrastructure), etc.Improve and expand the legal framework for green public procurement toenable procurers toreduce negativeenvironmental impacts through green procurement (2022*-2030*).

H3. Mandatory application of adaptation criteria to new ***infrastructure projects.*** Make legislative changes toensure that adaptation requirements are set for all new infrastructure projects (*2024-2030*).

H4. Enhancingthe inclusion of self-government in climate change management policies. Develop attractivemechanisms for the implementation of climate change management policies that encourage regional development councils and individual municipalities to effectively contribute to theachievement of national targets (2022*-2030*).

H5. Mainstreaming climate change in all education systems. Ensurethatclimate change educationis included in all levels of educationandhigher education programmes (*2023-2030*) for changing societal behaviour .

Climate change themes are revisited andhave already been included in theupdated school education programmes launched as of1 September 2023 (school year 2023-2024). Climate change topics are presented systematically and consistently even in thelearningcontent of several subjects: natural sciences: inbiology, chemistry, physics and public affairs: geography and other subject matter. The complexity of delivering learning contentdepends on pupils' age. A pupil who started learning about climate change in the first classwill follow them consistently until the end of the lower secondary education and will have the opportunity to continue in upper secondary education.

The aim is for students to understand what are effectiveways to mitigate climate impacts, such as:

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thesocial consequences ofclimate change; know what policy decisions in this area are taken inour country, in the EU and globally, how they are implemented, understand and beable to explain their necessity and importance andcontribute to the prevention of climate change themselves.

Sustainable development skills are developed through all vocational training programmes. However, climate change determinants, climate mitigation pathways and their relevance, decision-making and their consequences insome areas, suchas engineering and engineering professions, manufacturing and processing, transport services, architecture and construction, forestry andvocational training inagriculture, are identified as mandatoryqualifications for the qualifications sought. E.g. thevocational training programme for the driver ofmotor vehicles for the carriage of goods in thefield of transport services (e.g. safe and economicdriving, explain the drivers of environmentally friendly (economic) driving); engineering and the field ofengineering – theprofessional training programme of the wastemanagement operator (e.g.

65 https://www.e-tar.lt/portal/lt/legalAct/0635c170d54511eead77e967e3995264

knowledge ofwaste management rules, management requirements forspecific streams, definition ofwaste hazard criteria); ‘forestry’ means a vocational training programme for a forest worker (e.g. studyingpatterns and conservation problems in thefunctioning of ecosystems, applying forest protection measures); the field ofarchitecture and construction is theFasadian Heated Vocational Training Programme, etc.

In thefield of engineering and engineering, the professional training programme of the installer of renewable energy equipment to obtain aqualification for theinstallation ofrenewable energy equipment in or near buildings (e.g. installation of solar photovoltaic installations, installation ofsolar thermal collectors system, installation ofbiomass boilers, installation of heat pumps, installation ofwind power plants, etc.) should be highlighted.

Synergies between school education and vocational education and training help students to strengthen theirskills and competences for sustainable development for qualifications.

In Lithuania, educatorshave beengiven the opportunity to improve their competences on climate change issues by participating in professional development programmes (with a duration of40 academic hours) since 2009. Educators areoffered the following programmes to improve theireducators’ qualifications on climate change:

- “Causes and problems of climate change and their examination in education”;
- “Extreme weather and climate change”;
- ‘Climate warming and its impact on moulds’;
- “Climate change”;
- “Climate change, renewable energy and energy efficiency: Integration with updated educational programmes”.

Upskilling programmes are implemented by accredited education providers andregistered in theregister of non-formal education programmes.

On relevant climate change / environmental issues, where this is related to a specific vocational training programme or to the development of keycompetences in vocational training, the professional teacher shall participate in upskilling courses and shall provide opportunities for re - skilling as needed.

H6. Increasingpublic awareness and inclusion in climate change management policies. Raise public awareness onclimate change, pollution, public health, through research -based innovative and intensive communication. With a stronger focus on sectoral policies

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climate change mitigation and adaptation. (*2021-2030*)

H7. Implementation of development cooperation projects (climate change) in developing countries. Implementingadaptation andmitigation measuresinthird countries under European Union legislation, the ClimateChange Convention, theKyoto Protocol and other international agreements (*2022-2030*).

H8. Promoting research on climate changemitigation and adaptation. Expand climate change research, ensure research andexperimental development and innovation in the field of climate change; leveraging funds from the business sectorforclimate research and development and innovation (*2022-2030*).

H9. Evaluation of existing measuresto manage climate change from a***gender equality and equal opportunities perspective.*** The NAPs enshrine the horizontal principle ‘Equal opportunities for all’. The application of the horizontal principle of equal opportunities for all ensures that all persons, regardless oftheir sex, nationality, racial or ethnic origin, nationality, language, religion, beliefs, beliefs or opinions, disability,state of health, social status, age, sexual orientation or other characteristics, have equal rights and access to services, facilities, transport and other means to participate in public life. Inthis context, it is important to assess whether and how climate change management measures takeinto account theprinciple of gender equality and equal opportunities.

Astudy is planned to analyse how existingmeasures to manage climate change take into account theprinciple of gender equality and equal opportunities and make recommendations on how theprinciples ofgender equality and equal opportunities can be integrated into themeasures envisaged to manage climate change *(2025).*

Strategies, plans andmeasureson adaptation to climate change

In accordance with the Law on Climate Change Management of the Republic of Lithuania and theimplementation[66] of theRegulation of the European Parliamentand of the Council on theGovernance of theEnergy Union and Climate Action , the objectives andobjectives ofadaptation policy to2030,2040 and long-term 2050 have been updated following theadoption of theNational Climate Change Governance Agenda in2021[67] .

The**strategic objective ofLithuania's policy** on adaptation to climate change **environmental** changeis toreduce existing and foreseeable potentialvulnerabilities of natural ecosystems and sectors of the country's economy, toenhance adaptive capacity, to reducerisks and damage in a cost-effective manner, and to maintain and increase resilience toclimate change change, in order to ensure favourable livingconditions forsociety and sustainable economic activities so as not tothreaten food production.

The strategic objective onadaptation shall meet the objectives of :

- floodprotectionforall populations in flood risk areas

SectionA:

measures

- theannual shareofclimate-related economic losses in a country's GDP does not exceed 0.08 %;
- theproportion of anticipated adverse, natural and catastrophic weather events is at least 90 % ofthe actual events.

In addition, the strategic objective will be pursued along the following key axes:

- more systematic adaptation: coherence and synergies between mitigation and adaptation measures;
- data -based solutions: enhance knowledge and research on theimpacts of climate change, vulnerability and adaptive capacity, promote R & T & I;
- open data: compiling and disseminating information on ongoing climate change, resulting damageand levels of damage, providinginformation to interested parties and the public, and sharing good practices and examples.

Themain long-term orientations for adaptation to climate change up to 2050 are:

- continuous monitoring of theeffects andimpacts of climate change and theintroduction of cost- effective measures to mitigate the consequences of climate change;

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66 Lawof the Republic of Lithuania on Climate Change Management, NoXI -329 (new version No XIV-2783 of 20 June 2024): https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.349514/

67 Regulation (EU) 2018/1999 of the European Parliament and of the Council of11 December 2018 on theGovernance of theEnergy Union and Climate Action , amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of theEuropean 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) 2015/652and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council: https://eur-lex.europa.eu/eli/reg/2018/1999/oj

- ensure theresilience of engineering infrastructure toclimate change and thesustainable useof natural resources such aswater, biodiversity and soil, promote thedevelopmentof green infrastructure (e.g. sustainable alternatives to grey infrastructure andmeasures to enhance theresilience of the living environment), other nature -based solutions;
- raise awareness, resilience, preparedness of thepublic and public authorities hazards and emergencies related to climate change;
- ensuring themanagement ofdisaster risks, natural events that mayarise from emergencies planning of the measures;
- improve themeteorological and hydrological monitoring, forecasting and warning system.

One of the strategic objectives of the NCPD in theenergy, transport and industry sectors is to increase the resilience of civil infrastructure against climate- related threats.

At the same time, the short-term cross-sectoral objective of adaptation is to continuously monitor and assess risks, sensitivities and adaptation opportunities in individual economic sectors at international, national, regional and municipal level.

The objectives and targets of the NCPD arealsoimplemented in cross-sectoral policies, such as theNational Progress Plane-2021-2030, the[68]National Sustainable DevelopmentStrategye[69] and thespecific economic sector development programmes or short-term planning documents. Climate change is also included in the

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National risk analysis and an overview offiscal risks. Municipalities, together with the relevant ministries atnational level, are responsible for achieving national adaptation objectives, targets and targets and measures.

The NENS is also dedicated to adaptation to climate change. It is stated that building resilience and adapting to climate change changes – theconsequences of climate change affect not only the number ofincidents in theelectricity system but also the stability of the electricity system as a whole. As weather conditions become increasingly extreme, different parts of the electricity grids have to be worn morequickly, making it necessary to invest inmore resilientcomponents of the electricity grids where it is economically profitable, i.e. the choice of underground lines, as well as the installation of remotely operated switchgear and grid solutionsfor failures without dispatching.

With regard tocrisis preparedness andensuring resilient energy infrastructure, NEBS notes that the negative effects ofclimate change increase risks related to energy security, in particular the risk of power supply disruptions, as heat, forest fires, droughts and floods have a negative impact on electricity demand, production, storage, transport and distribution. Climate change extreme events can also negatively affect theproductionand consumption ofother forms of energy. When planningdemand, generation, storage, transport anddistribution of electricity and other forms ofenergy, it is necessary toassess and provide for specific measures to increase the resilience ofinfrastructure and adapt to theadverse effects ofclimate change, with a focus on extreme weather events,forest fires, extendedperiods of absence ofsolar and/or wind, floods, as well as heat waves during the warm season . Energy transmission and distribution operators, RES producers,must assess the impact of the adverse effects ofclimate change ,both when maintaining existing infrastructure and when planning new ones.

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68 ResolutionNo 998 of theGovernment of the Republic of Lithuania of 9 September 2020 on theNational Progress Plan 2021-2030 approval': https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/c1259440f7dd11eab72ddb4a109da1b5/asr

69 ResolutionNo1160 oftheGovernment of the Republic of Lithuania of11 September 2003 approving andimplementing the National Sustainable Development Strategy: https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.217644/asr

The Ministry of Energy has also analysed theimpact of climate change up to 2030.Theimpact of extreme hydrometeorological phenomena in one part of Lithuania has no greater impact on theelectricity system as a whole,as both solar and wind power generation is sufficiently decentralised. As a result, storms,forest fires, floods, etc. will cause local electricity disruptions and losses in municipalities. Hydropower plants produce small quantities of electricity, so their inaction duringhydrological droughts or other extreme events does not have asignificant impact on theoverall system. The only more serious impact could be thesignificantreduction of water in theKaunas Lagoon and therestrictions on the operation of the Kruonis pumped storage plant.

According to theinitial report of the Lithuanian Energy System Modelling Study LT100,wind and solar power plants in Lithuania are complementary (in the absence ofsun, there is usually a stronger wind and vice versa). There are a number of episodes during the winter, where there is no sun or wind, but the existing other production capacity is sufficient to compensate for theneed. The NEBS also includes flexibilities (including seasonal energy storage) that can help secure electricity generation during periods without solar and wind.

Thereis currently a simulation of the Lithuanian energy system, which assesses thehourlyvariations in solar and wind production and assesses theaverage production efficiency/efficiency over different months. The evaluation of all theresults of thestudies found thatnomajor challenges to theeffects ofclimate change on Lithuania’s electricity system are visible until 2030.

The National Waters Plan2022 -2027 was approved by Resolution No 1292 of theGovernment of theRepublic of Lithuania of21 December 2022. Based on estimates (short- and long-term

SectionA:

outlook), springfloods are forecast to decline,but the risk of morefrequent floods from rainfall is observed. Due to rising air temperatures, theformation of snow cover is becoming more and less frequent during thecold season, with water melting in combinationwith spring rainfall causing spring floods. In the future, averagespring floods are expected to decrease inall rivers, withchanges inseasonal shifts, but there may be an increase in annual extreme, lowlikelihood of reoccurrence and flood flows. There isan increasingtrend in extreme hydrometeorological events. There has been an increasein thenumber ofprecipitation in Lithuania, with an increasein forecasts, which is likelyto result inmore frequentfloods caused by rainfall and an increase in thelikelihood ofextreme rainfall.

In 2022, updatedflood hazard and flood risk maps for theNemunas, Venta, Lielupe and Daugava river basin districts, consisting of separate maps of melting andrainfall of Sniego, different flood probabilities (0,1, 1 and 10 %) of thecoastal area being flooded,and different probability (0,1, 1 and 10 %) flood risk maps for the population and economic aspects ofEPAwere adopted. These maps confirm the dataset ofFlood Risk Objects and Areas, which contains data on risk objects that may causeaccidental pollution when flooded; water bodies receiving morethan 10 m of[drinking] water per day or serving more than 50 people; water bodies used for recreation and bathing water; protected areas andNatura 2000 sites in the European ecological network.

2018 update of preliminary flood risk assessment – analysis offloods over thereference period, estimated impacts of climate change on floods, trends inextreme events,revision of priority hazardous areas2019-2022, flood hazard and risk maps showing areas of flooding and potential adverse effects onhuman health, the environment, cultural heritage and economic activity
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Energy

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Daily average temperature Daily average temperature in January mm

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Extreme

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Abundance Wumpy Wasara Maximum daily amount of tints Daily denades with abundant precipitation

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Change

Sun-sllind

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Wind

Maximum wind gusts

of days

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UHalimotation

Changes in the cycle

• UH “Utno-JU”mo

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Temperatur e

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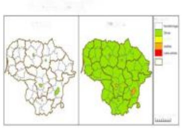
Average daily temperatura Aug NLMO season

Figure 3.1.1.1. Chains of impacts of climate change risks relevant for the energy sector [70]

Lithuania’s municipalities’ climate change risk assessment was carried out in2023 until 2100, one of the 7 sectors selected for the assessment was energy, where changes in heating and cooling demand and damage to electricity generation and transmission facilities and infrastructure were analysed in more detail.

Climate change has had and will have an impact on the change in energy demand for heating and cooling in the future. Overall energy demand is expected to remain broadly unchanged, but significant seasonal changes and impacts on the energy mix are expected, and significant regional disparities are also expected. Temperatures in Lithuania are projected to continue to rise. The trend of decreasing heating days and increasing cooling days is likely to continue and possibly accelerate further. Changes in demand for heating and cooling in particular will have a direct impact on electricity demand.77



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70 https://klimatokaita.lt/media/17620/lietuvos-savivaldybiu-jautrumo-ir-pazeidziamumo-klimato-kaitai-tyrimas.pdf

Spatial distribution of risk in municipalities: Change in heating and cooling demand

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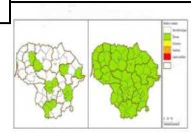
While climate change indices such as the duration of the cooling season and the duration of the heating season will change quite significantly in the future, the overall level of risk is not expected to increase significantly in most municipalities. High risk levels were observed in densely populated cities in 2100, i.e. Šiauliai, Klaipėda, Panevėžys, Kaunas and Vilnius, where particular attention should be paid to the future reduction of heating demand, while increasing demand for cooling. The modernisation of existing buildings and the setting of requirements for the cooling system of new buildings will be particularly relevant in a densely populated urban environment where the urban heat island effect will have an impact on rising ambient air temperatures.

A significant increase in the risk of damage to electricity generation and transmission installations and infrastructure is not expected in 2050 or 2100 as low risk level77.

Spatial distribution of risk in municipalities:
Damage to electricity generation and transmission facilities and infrastructure



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Climate change can also increase the risk of secondary disasters such as environmental pollution from extreme events. For example, groundwater can be polluted by impacts on infrastructure when the flooding caused a disruption of electricity supply, leading to an industrial accident that spilled dangerous substances into the environment. Such risks may affect different types of natural hazards and infrastructure.

When preparing adaptation measures, municipalities are recommended to take into account the following factors affecting the energy sector:

- current trends in damage to energy production and transmission due to extreme weather conditions,
- current trends and levels of energy efficiency;
- availability and technical condition of cooling systems,
- capacity and technical condition of heating systems,
- costs related to the operation and maintenance of heating and cooling systems,
- the current state and resilience of the energy network;
- availability of forecasts, information on risks and emergency plans drawn up,
  - the impact of this damage on the provision of vital public services (e.g. water, first aid, etc.),
- other socio-economic conditions at local level.

Lithuania does not foresee seasonal water scarcity or other emergency situations related to water scarcity. However, in order to reduce the impact of the continuing droughts, measures are envisaged in the agricultural sector: PR30-E "Promoting the development of crop and plant insurance", PR31-E "Promoting the development of new tools for managing risks in agricultural production" and PR32-E "Development of smart mobility systems".

Adaptation measures are further described in Annex 5 'National adaptation plan'. The majority of climate change adaptation measures contribute to

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the decarbonisation dimension and energy security. By contrast, the measures contained in the NECPs mainly contribute to adaptation in parts of agriculture, FNCM, RES, EE and energy security.

Regional cooperation on climate change. The implementation of the Paris Agreement and the EU's 2030 climate and energy targets are periodically discussed in different Baltic Assemblies, which include members of the Parliaments of the Republics of Lithuania, Latvia and Estonia, committees, summits of Prime Ministers, the Baltic Council of Ministers and meetings of senior officials groups, as well as fora on the implementation of the European Union Strategy for the Baltic Sea Region and meetings of Baltic Environment Ministers.

Energy from renewable sources

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

Electricity sector

RES development in the electricity sector, reaching 100 % The RES share target for 2030 shall be pursued in accordance with the following principles:

- consistent market integration of RES by developing the most cost-effective technologies, taking into account the maturity of the technologies, assessing both the trends in their near future progress and cybersecurity requirements;
- affordability and transparency – the design of the RES incentive scheme must be market-based, minimise distortions and ensure the least financial burden for energy consumers, clarity and a non-discriminatory competitive environment;

- active participation of energy consumers – increasing the share of RES in the overall energy mix must promote decentralised electricity generation, utilise existing building infrastructure, enable consumers to self-consumption of RES-generated electricity and receive market-compatible remuneration for excess electricity delivered to the electricity grids, and solutions must be put in place to manage consumer behaviour and energy demand and supply. Increasing the empowerment of consumers to operate in the electricity market not only through passive consumption but also by actively contributing to its generation, storage, aggregation and market outlet will enable all consumers – non-domestic and household – to engage in market processes, manage their energy consumption efficiently and consciously and achieve maximum efficiency and economic benefits, both through savings in energy consumption costs and revenues from electricity and/or services marketed on the market.

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

table. Existing and planned policy measures for electricity from renewable energy sources
s

3.1.2.1.

Section A:

sector by 2030

NO.	MEASURE	Total GHG SUBMITTING effect, thousand tCO2eq. 2021-2030	Impact on the share of RES in ENERGY final consumption, %
EXISTING POLICY INSTRUMENTS (EPF)			
RES1-E	Financial support to prosumers	*	0,72
REI2-E	RES development in the Baltic Sea	*	2,45
RES3-E	Use of RES in public and residential buildings	12,71	0,14
RES4-E	Deployment of RES power plants and storage facilities for legal persons and RES communities	*	0,56
REI5-E	Promoting the deployment of energy storage facilities in households	*	—
REI6-E	Create energy resource communities in municipalities, with a share of built power plants being allocated to the poor (energy poor)	*	0,51
RES7-E	Solar and wind power plants in the business sector	*	0,90
RES8-E	Creation of electricity storage facilities	*	—
RES9-E	Reduce CO2 emissions from the LNG terminal	71,47	—
AMOUNT		84,18	5,28
PLANNED POLICY MEASURES (PSD)			
REI20-P	Encouraging electricity consumers to choose energy generated from RES	**	**
REI21-P	Recommendations on the development of renewable energy communities (AIEBs) and citizen energy communities (PEBs) in Lithuania	**	**
REI22-P	Targeted and equitable education for pupils and students on the possibility of extracting energy from RES and its benefits	**	**
AMOUNT		0,0	0,00

** Renewable energy solutions implemented within the scope of the measure that do not directly contribute*

to fuel and energy savings but ensure the deployment of clean technologies
*** The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, but is essential for the successful implementation of other envisaged measures*

REI1-E – Financial support to prosumers. The Electricity Prosumers Scheme was set up in 2015 to promote the active participation of electricity consumers in the market. By 2030, we aim to have at least 300000 prosumers and active consumers (including community energy actors).

To ensure that all electricity consumers can benefit from the Prosumer Scheme, support for the purchase of the power plant shall be provided from the European Union Structural Funds and national Climate Change

Section A:

programme funds. Since 2019, prosumers benefit from a 1 kW solar power plant installed or purchased power from remote power farms. With the creation of an attractive financing instrument, it contributes to the objective set out in the Commission's Communication on an EU Solar Energy Strategy to promote the rapid and massive deployment of light power plants through the European solar rooftop initiative. (2018-2023).

RES2-E. RES development in the Baltic Sea. 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 installed power of these power plants. In 2022, amendments were made to the Renewable Energy and Electricity Laws, in which the State Energy Regulatory Council approved the Procedure for the organisation of tendering procedures for the use of offshore areas for the development and operation of plants using renewable energy sources and for the granting of permits to use parts of the offshore area for the development and operation of plants using renewable energy sources, which regulates the procedure and procedures for conducting tenders. The construction of power plants in the Baltic Sea is subject to the award of a tender for the authorisation of the offshore area for the development and operation of plants using renewable resources. On 30 March 2023, a single invitation to tender was launched for the authorisation of the development and operation[71] in ***the*** designated area by Government Decree. The successful tenderer is identified and must obtain, within 3 years from the date of receipt of the development and operation permit, that is to say, from 9 February 2024, a building permit and, within 6 years, a permit for the production of electricity. Taking into account the duration of tendering procedures and the construction of power plants, electricity generation is planned to start around 2030. The MRV's resolution on the area and capacity of offshore power plants was adopted on 22 June 2020 and revised on 15 March 2023.[72] The invitation to tender for the development and exploitation permit for the area

71 Resolution No 171 of the Government of the Republic of Lithuania of 15 March 2023 on the parts of the territorial sea of the Republic of Lithuania and/or of the exclusive economic zone of the Republic of Lithuania in the Baltic Sea , where it is appropriate to organise a tender (tenders) without the application of incentive measures for the development and operation of plants using renewable energy sources, and setting out the maximum power to be generated and the minimum installed capacity of those plants.

72 Resolution No 697 of the Government of the Republic of Lithuania of 22 June 2020 on 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 where it is appropriate to organise a tender (tenders) for the development and operation of plants using renewable energy sources and setting out the maximum

covered by this Government Resolution was launched on 15 January 2024, but due to the insufficient number of participants, it will be reopened. The aim is to develop and connect two onshore wind farms around 2030, generating around 6 TWh of electricity per year and a bidding process (tendering) of up to 1.4 GW of offshore wind power. (2020-2030).

RES3-E. Use of RES in public and residential buildings. The Climate Change Programme promotes the use of renewable energy sources (solar, wind, geothermal, biofuels, etc.) in public and residential buildings (for people from various social groups) through a grant. With the creation of an attractive financing instrument, it contributes to the objective set out in the Commission’s Communication on an EU Solar Energy Strategy to promote the rapid and massive deployment of light power plants through the European solar rooftop initiative. (2021-2030).

RES4-E. Deployment of RES power plants and storage facilities for legal entities and RES communities. The objective of the measure is to encourage legal entities and renewable energy communities to invest in the generation and individual storage of electricity from renewable sources. To be supported

investments by legal entities, farmers and renewable energy communities in onshore solar power and wind power plants, giving priority to self-consumption, farm or economic activity needs. (2020-2026)

REI5-E: Promoting the deployment of energy storage facilities in households. The measure is designed to promote the deployment of electricity storage facilities in households. For the period 2023 to 2029, EUR 3.291 million of grants are foreseen for households under the 2021-2027 EU funds operational programme, with which households will deploy 20 MWh of electricity storage solutions. (2023-2029)

REI6-E. Create energy resource communities in municipalities by allocating some of the power plants built to the poor (energy poor). The measure is aimed at alleviating energy poverty set up by RES or citizen energy communities owned by municipalities and/or municipal bodies and/or municipally owned enterprises. A soft loan (interest of up to 3 %) with a grant of up to 50 % is provided. Construction or acquisition of RES power plants from the park. Part of the installed capacity of the power plant shall be distributed free of charge to those affected by energy poverty in the municipality. The measure received EUR 206 million from the State budget. It is planned to create 144 MW of RES for electricity generation. (2024-2029)

REI7-E. Solar and wind power plants in the business sector. The estimated need for the REPowerEU loan amounts to EUR 549 million net of VAT, which would generate 460 MW of RES for the generation of electricity. Funding intensity for private legal entities (JA) up to 80 %, public JA 100 %, business own contribution of EUR 110.4 million net of VAT. With the creation of an attractive financing instrument, it contributes to the objective set out in the Commission’s Communication on an EU Solar Energy Strategy to promote the rapid and massive deployment of light power plants through the European solar rooftop initiative. (2024-2029)

REI8-E – Establishment of electricity storage facilities. In the context of the rapid development of RES capacity and in line with the future strategic LT objectives of increasing local electricity generation, measures must be put in place in parallel to ensure the flexibility and stability of the electricity system in response to dynamic electricity generation. The Lithuanian Transmission System Operator (TSO) estimated that due to the rapid increase in intermittent wind and solar generation, the need to increase FRR balancing capacity in the Baltic region will increase significantly from 700 MW in 2024 to 1 238 MW in 2030. Taking into account existing flexible generation and ongoing new projects, Lithuania is expected to

power to be generated and the minimum installed capacity of those plants (current version as of21 March 2023) lack at least 300 MW of FRR balancing capacity by the end of 2027. As storage facilities will primarily be used for the provision of FRR balancing services, sufficient energy storage capacity is needed to ensure uninterrupted service provision for more than 99 % of the time in order to maintain the SOGL requirement (Article 157 of Commission Regulation (EU) 2017/1485). Based on TSO modelling, a directly connected storage facility can only provide 100 % of its capacity to FRR balancing services with a capacity of 4 hours. If the storage facility has a capacity of less than 4 hours, it is necessary to increase the required balancing power (MW) to meet the SOGL requirement for FRR availability. Accordingly, 2 hours of energy storage facilities would need approximately double the capacity to meet the SOGL reserve availability requirement. Irrespective of the capacity of future storage facilities (2 hours or 4 hours), the system will require the creation of plants of between 300 and 600 MW of additional capacity. Based on the current market analysis and experience from other European countries, the current volatility of service demand and future baseload prices cannot only ensure the operation of a profitable electricity storage facility. Accordingly, this requires an additional financial incentive for market participants to start investing in the development of battery equipment. Modelling

Section A:

shows that an investment subsidy of up to 30 % is needed to ensure the viability of the project. (2024-2028)

REI9-E: Reduce CO2 emissions from the LNG terminal. The measure aims to reduce GHG emissions by installing an electricity connection from the LNG terminal to land by reducing CO2 emissions by 30 %. The effect of the measure is planned from 2028 (2023-2028)

REI20-P: Encouraging electricity consumers to choose energy generated from RES. The measure aims to increase the share of final consumption of electricity produced from RES in Lithuania. An education campaign will inform citizens about the principles of green energy plans and encourage green electricity. (2024-2026)

REI21-P. Recommendations on the development of citizen energy communities (CECs) in Lithuania. The objective of the measure is to carry out an assessment of existing barriers and opportunities for community development, identifying unjustified regulatory and administrative barriers, facilitating intra-Community energy transfers, cross-border participation in community activities. (2024-2025)

REI22-P: Targeted and equitable education for pupils and students on the possibility of extracting energy from RES and its benefits. Public education is needed already in the age of school in order to promote the popularity of RES in society. It is planned to establish a programme and communication plan for the promotion of RES and their energy consumption, involving companies, schools and higher education institutions in the energy sector. Examples of plan activities include: setting up an initiative of energy ambassadors for students/pupils, visits to schools, school visits to energy companies. Synergies will be sought with other energy promotion initiatives such as Energy Smart Start. (2025-2030)

Accompanying measures contributing to the development of RES-E:

- Exemption from excise duty on RES-E. Electricity produced using RES is exempt from excise duty. This provision applies to both electricity produced in Lithuania and imported;
- guarantees of origin RES-E: Guarantees of origin shall be issued to RES-E producers who have been successful in an auction and receive an electricity price supplement;
- RES sales contracts. RES producers shall have the right to sell electricity to final customers under renewable power purchase/sale agreements without a licence from an independent electricity supplier. Such producers must meet the requirements of an independent electricity supplier and inform the National Energy Regulatory Council of the exercise of electricity supply

activities directly after the contract has been concluded with the consumer within 5 working days of the conclusion of the contract;

- The design of (parts of) new public, industrial and commercial buildings and residential buildings shall provide for the installation of an electricity generating installation using RES with a permissible capacity equal to or greater than that made available to the consumer's facility. Where it is technically impossible to install a RES generating facility with the specified power to generate RES, the manager of the (part of) the building for the specified purpose must ensure that the demand for electricity consumption is covered by the electricity purchased on other grounds.[73]

Financing of planned measures in the RES electricity sector Most of the investment related to the use of renewable energy in the electricity sector is earmarked for self-consumption or farm needs and for installing solar and wind power plants. Support is planned for natural and legal persons, the public sector, and the creation of renewable energy communities in municipalities with income compensation for people affected by energy poverty. The total financing of RES measures is shown in Table 3.1.2.4.

Transport (and fuel) sector

The development of RES in the transport sector is carried out in accordance with the objectives set out in national legislation to ensure that at least 29 % of fuels and energy in the transport sector come from renewable energy sources. An essential principle for the decarbonisation of the transport sector is the efficient integration of alternative fuels, ensuring technological neutrality of the energy mix. The aim is to use a variety of fuels in Lithuania's transport sector: biofuels produced from food and/or feed crops, advanced biofuels produced from waste and residues, biomethane, electricity from RES and RES fuels of non-biological origin. The measures already adopted aim to ensure that the combined share of biogas and renewable gaseous fuels of non-biological origin in final energy consumption in the transport sector is at least 5.2 %. In 2030, the number of electric vehicles would reach 240 thousand in the country. The transport sector aims to achieve a significant reduction in the use of fossil fuels, building on the UCPD will aim to achieve a 50 % reduction in the use of fossil fuels in road transport by 2035. In order to realise the potential of bio-based waste and residues generated in the country, emphasis is placed on developing the production capacity of biomethane and advanced biofuels and adapting the regulatory environment. The aim is to exploit the potential of biofuels produced in Lithuania, but taking into account the limitations on the use of biofuels produced from food and/or feed crops.

Since 2022, Lithuania has a system of energy credits in the transport sector (DAEI unit of account system), where fuel suppliers record the quantities of fuels placed on the internal market and the units of account allocated to them for the supply of RES fuel are used for the implementation of mandatory obligations. The system combines different types of RES fuels, thus promoting technological neutrality.

In order to achieve the RES objectives, measures are in place (Table 3.1.2.) 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 transport until 2030

NO.	MEASURE	Total GHG SUBMITTING effect, thousand tCO2eq. 2021-2030	Impact on the share of RES in ENERGY final consumption, %

73 Pursuant to Article 48 (2) of the Law on energy from renewable sources

EXISTING POLICY INSTRUMENTS (EPF)			
REI10-E	Investment support for the installation of biomethane production and biogas treatment plants	860,46	1,460
REI11-E	Obligation on the use of RES in natural gas	**	0,010

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	completion points operators, supplying natural gas for the transport sector		
RES12-E	Mandatory blending of biofuels into mineral fuels	1372,60	1,490
RES13-E	Investment support for installations producing second generation biofuels	*	0,070
REI14-E	Integration of the operators of publicly accessible recharging points into the system of DAEI units of account.	**	**
REI15-E	Development of green hydrogen production	8,37	0,470
T13.4-E	Development of private charging infrastructure	142,70	0,000
AMOUNT		2384,13	3,420
PLANNED POLICY MEASURES (PSD)			
REI10-P	Investment support for the installation of biomethane production and treatment plants	50,85	0,20
REI23-P	Information about at service stations traded biofuel dispersion	**	**
REI24-P	Regulatory changes for the establishment of a system of biomethane gas access points	**	**
REI15-P	Development of green hydrogen production	**	4,72
REI25-P	Deployment of CCS/CCUS technologies	*	*
AMOUNT		50,85	4,92

** Renewable energy solutions implemented within the scope of the measure that do not directly contribute to fuel and energy savings but ensure the deployment of clean technologies*
*** The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, but is essential for the successful implementation of other envisaged measures*

REI10-E: Investment support for the installation of biomethane production and biogas treatment plants. The measure aims to finance biomethane production plants, including biogas treatment plants. The aim is to create a production capacity of 1 400 GWh of biomethane gas production in 2030. The construction of the pipeline to the overall gas network is not financed. (2020-2030)

REI11-E: Obligation on the use of RES by operators of natural gas refuelling points supplying natural gas to the transport sector. In order to ensure parallelity between demand and supply of produced biomethane gas, and in view of 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 fixed and gradually increasing quantity of renewable gas. (2025-2030)

REI12-E: Mandatory blending of biofuels into mineral fuels. Petrol that complies with Lithuanian or European standards and which contains at least 6.6 % biofuels on the basis of the total energy content of a blend of fuels and biofuels (optional to blend A98 petrol) and diesel fuel containing at least 6.2 % biofuels on the basis of the total energy content of the blend of fuels and biofuels must be marketed at the points of sale. (2022-2030)

REI13-E: Investment support for second-generation biofuel production installations. Investment aid to biofuel producers is expected to produce at least 12.4 ktoe of second generation in Lithuania

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biofuels produced from waste and/or residues. Investment aid would be granted to new production facilities to be installed in the vicinity of existing biofuel production facilities or to set up a production infrastructure from the outset. The investment aid intensity shall not exceed 50 % depending on the size of the enterprise. (2023-2026)

REI14-E – Integration of charging point operators into the system of DAEI units of account. Operators of recharging points would be able to obtain from RES for electricity supplied to electric vehicles a DAEI accounting unit that could be traded with oil fuel suppliers. A clear control system based on the demonstration of smart metering devices must be put in place to ensure accurate accounting of electricity from RES. The integration of improved metering technology enabling several electricity consumption equipment at one point of consumption would also include private entities in the system of DAEI units of account (2023-2028).

REI15-E – Development of green hydrogen production. The measure includes: (1) Establishment of green hydrogen production capacity in the transport sector. New production capacity for green hydrogen (hydrogen produced by electrolysis using RES electricity) will be created, which will be used in transport to replace conventional fossil fuels and reduce GHG emissions. (2023-2026). (2) Establishment of green hydrogen capacity (I). New production capacity for green hydrogen (65 MW) will be created in various sectors to replace the use of polluting fossil fuels. (2023-2028). (3) Creation of green hydrogen capacity (II). It is planned to finance flexible expansion of green hydrogen production capacity (21 MW) to replace fossil fuels in different sectors, help balance the electricity system and produce hydrogen derived products.

The measure will contribute to increasing the flexibility capacity of the electricity system (2024-2030).

REI15-P – Development of green hydrogen production. The measure includes: (1) Establishment of production capacity for green hydrogen (III). There is a need, in line with Lithuania's vision for hydrogen, to ensure a flexible development of green hydrogen production, using produced hydrogen to reduce GHG emissions, balancing the electricity system and producing derived hydrogen products. The planned electrolysis equipment has a capacity of 996 MW. (2024-2030). (2) Assessment of the development of hydrogen infrastructure. A feasibility study will be carried out together with gas transmission system operators from neighbouring countries for the construction of the European Hydrogen Network Corridor, which will connect Finland with Germany (the Nordic-Baltic Hydrogen Corridor). (2024-2026).

T13.4-E – Development of private charging infrastructure. ***(More on the measure in the transport sector)***

REI10-P: Investment support for the installation of biomethane production and treatment plants. The measure aims to develop additional biomethane production capacity. The EU and Lithuania's regulatory environment and planned requirements for the management of agricultural waste and food waste are increasingly tightening, leading to an increasing amount of bio-based raw materials that can be used for energy production. Demand for biomethane is emerging not only in transport but also in other sectors such as industry, heating and agriculture. The Repower EU initiative foresees that the amount of biomethane produced in the EU must increase to 35 billion cubic metres by 2030, and in this context, biomethane production capacity and utilisation infrastructure must be actively increased. The objective of this measure is to provide additional production capacity of at least 600 GWh of biomethane, which together with measure REI10-E would amount to 2 TWh of biomethane production in 2030 (2026-2030).

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REI23-P. Dissemination of information on biofuels traded at petrol stations. For the purposes of 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 of the petrol stations and their country of origin. As the measure is of a regulatory nature, legislative changes would be necessary to implement the measure. (2025-2030)

REI24-P. Regulatory changes for the establishment of a system of biomethane gas access points. The objective of this measure is to enable producers away from gas networks to feed biomethane into the gas networks without a direct connection to the production facility. The measure is needed as the supply of biomethane to the gas grids is a complex and costly process to build a gas pipeline to a biomethane production facility and is not an efficient and cost-effective process in the case of off-site production. The gas injection access points would allow part of the biomethane producers to feed the gas into the gas network without direct connection to the gas grid by transporting biomethane produced without direct connection to the gas injection point by means of gas carriers. This measure would create a regulatory environment enabling the injection of gas and determining the authorities responsible for control and supervision. (2024-2030)

Deployment of REI25-P. CCS/CCUS technologies. The measure includes: (1) Deployment of carbon capture technologies with priority for biogenic carbon capture. The activity promotes the capture of biogenic and atmospheric CO2, which can then be used for the production of synthetic energy products (e-methane and e-methanol), or transfer to permanent storage with negative emissions (2024-2050). (2) Establishment of carbon dioxide transport infrastructure. This activity promotes the greening of national and regional industries, focusing on hard-to-decarbonise industries through CO2 capture and transport. Open-access infrastructure is being developed to enable all CO2 emitters, without exception, to join the project. The infrastructure will be dedicated to both the export of fossil (grey) CO2 and the import of biogenic (green) CO2 that will be used by local actors as feedstock (e.g. for the production of synthetic fuels). (2024-2030). (3) Establishing a carbon recovery market and developing its potential. Development of standards and market conditions for synthetic products produced using H2 and CO2. (2025-2030). (4) Establishment of a CO2 monitoring system. The aim is to establish a framework to accurately assess the effectiveness and efficiency of carbon capture, including carbon capture by its origin. One example is the voluntary CO2 reduction certification scheme that replaces the ETS. (2025-2030). (5) Establishing support mechanisms for carbon capture, transport and carbon utilisation in the production of synthetic green fuels. These activities plan to set up support mechanisms for carbon capture, transport and carbon utilisation in the production of synthetic green fuels. Such incentive mechanisms should encourage the use of biogenic carbon in the production of high value-added products such as synthetic green fuels and other chemicals. (2025-2030).

Financing of planned measures in the RES transportsector[74]. The sector's investments focus on support for the installation of biomethane production and treatment plants, the development of green hydrogen production and the deployment of CCS/CCUS technologies. For other measures, there is no need for regulatory and public funds. The total financing of RES measures is shown in Table 3.1.2.4.

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Heating and cooling sector

Individual households mainly use the cheapest heating fuel on the market, biomass. RES development of heat and

in the cooling sector, reaching 90 % The RES share target for district heating and heat production in households shall be met by 2 030 in accordance with the following principles:

- transparency – to ensure that heat supply activities are managed in an efficient, transparent and non-discriminatory manner between operators active in the heat market and its users, including the purchase of energy resources in the most transparent and competitive way;
- ‘competitiveness’ means the rational use of the investments needed to provide consumers with clean and environmentally friendly heat at a reasonable price, ensuring that district heating is able to compete with alternative heat supply options;
- ‘efficiency’ means the establishment of regulatory principles that promote the deployment of technical and managerial solutions in the systems of district heating undertakings, ensuring a reliable and high-quality supply of heat to the final customer;
- ‘smartness’ means adapting the system through the deployment of different, environmentally friendly and cost-competitive innovative technologies in the production, supply and consumption of heat.
- decarbonisation – Consistently increase the use of RES in heating and cooling production, introduce energy efficiency measures.

Existing (enabling) policies in the heating and cooling sector:

- the establishment of a regulatory environment that promotes the attraction of investments and provides a non-discriminatory environment for all actors in the district heating market;
- increasing transparency in the biofuels market;
- promoting the supply of heat from district heating in buildings and prioritising urbanised areas in order to reduce air pollution;
- reduce the amount of heat prices checked and single-fixed by the national regulator (by shifting part of the responsibility from the VERT to municipal councils);
- increase the number of new heat customers connected to DH.

In order to achieve the RES targets, measures (Table 3.1.2.3.) are in place to increase the share of RES in the heating and cooling sector.

3.1.2.3. table. Existing and planned policy measures in the renewable heating and cooling sector until 2030

NO.	MEASURE	Total GHG SUBMITTING effect, thousand tCO2eq. 2021-2030	Impact on the share of RES in ENERGY final consumption, %
EXISTING POLICY INSTRUMENTS (EPF)			
REI16-E	Renovate and/or modernise the heat transmission network and its installations/elements	65,52	0,030
REI17-E	RES use in district heating	1968,76	1,552

	promotion		

REI18-E	Modernisation of the heat metering system	1,20	0,030
REI19-E	Transition of DH networks to Generation IV heating systems	0,46	0,003
AMOUNT		2035,94	1,615
PLANNED POLICY MEASURES (PSD)			
REI27-P	Limiting the use of solid fossil fuels by location	*	*
AMOUNT		0,00	0,000

** The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, but is essential for the successful implementation of other envisaged measures*

REI16-E. Update and/or upgrade the heat transmission network and its installations/elements. Upgrading the pipelines of the heat transmission network by replacing old (channel) pipelines with new, channelless ones, reducing heat transmission technological losses and increasing the reliability of heat supply. Renovated and modernised deteriorated heat transmission networks, 1 000 km. (2015-2023)

REI17-E: Promoting the use of RES in the district heating sector. The measure includes:

1. Promotion of small-scale biofuel cogeneration. The measure provides for funding for CHP plants under construction of up to 20 MWth and 5 MW e-capacity (total rated thermal input between 1 MW and 20 MW). (2019-2022)

2. Installation of small-scale biofuel cogeneration plants suitable for combustion of felling residues. The measure provides for funding for CHP plants of up to 20 MWth and 5 MW e-capacity (total rated thermal input up to 20 MW). (2023-2030)

3. Implement local and RES CHP projects with priority for Vilnius and Kaunas. Vilnius CHP was granted a EUR 190 million European Investment Bank loan in December 2016, backed by the European Fund for Strategic Investments, a key element of the Investment Plan for Europe. Vilnius's combined heat and power plant will produce about 0.3 TWh of electricity. The total electrical capacity of the plant will be around 92 MW. The boiler will only use municipal waste remaining after sorting and unrecyclable municipal waste. The other two biofuel boilers with a capacity of approximately 3 times that of a waste boiler will use biofuels. The Kaunas CHP plant was not supported. A high-efficiency waste-fired cogeneration plant with an electrical capacity of around 26 MW will be installed. Municipal waste remaining after sorting and non-recyclable municipal waste, non-hazardous industrial waste and sludge from water treatment plants will be used. Such capacity will generate around 175 GWh of electricity annually. Activities also contribute to the flexibility of the electricity system. (2014-2023)

4. Use of residual heat in DH systems. Installations for the recovery and adaptation of thermal energy emissions into the environment to the needs of DH users. Heat can be recovered from water treatment emissions, from digital information data centres, from industry, etc. (2023-2030)

5. Installation of thermal storage tanks. The measure would introduce facilities to store heat produced in biofuel boilers. The stored 'green' heat energy would be used to meet the peak needs of the heat system, avoiding heat production using fossil fuels

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installations. The final beneficiary of the measure is heat suppliers, independent heat producers operating heat production systems using biofuels. (2023-2030)

6. Installation of heat pumps. The adaptation of heat pumps in DH systems is based on optimising the work of biofuel-using systems and, in natural gas systems, on reducing the share of fossil fuels in the balance, by replacing fossil fuel units with compressor heat pumps in whole or in part. The measure is implemented by heat suppliers and independent heat producers operating biofuel and/or natural gas heat production systems. (2023-2030)

7. Construction of solar collector systems for district heating activities. The measure aims at reducing the use of primary fossil fuels or biofuels for energy production. The measure is implemented by heat suppliers and independent heat producers operating biofuel and/or natural gas heat production systems. (2023-2030)

8. Construction of biofuel boilers produced from logging residues. The objective of the measure is to diversify the fuels used for heat generation and to reduce the use of fossil fuels. The measure is implemented by heat suppliers and independent heat producers operating biofuel and/or natural gas heat production systems. (2023-2030)

REI18-E – Modernisation of the heat accounting system. The EU Internal Market Directive (2009/72/EC) and its revision (2016/0380(COD)) stipulate that in case of a positive cost-benefit analysis, all heat meters must be replaced by remote reading by 2027 (2023-2030).

The transition of REI19-E. DH networks to generation IV heat supply systems. This measure promotes the transition of DH networks to generation IV heat supply systems by adapting heat transmission networks for low-temperature operation, thus reducing heat transmission technological losses. (2023-2030)

REI27-P: Limiting the use of fossil solid fuels by location. Prohibition (restriction) on the use of solid fossil fuels for space heating in densely populated areas, i.e. where the damage caused by particulate matter is the highest. (2024-2030)

In the DH sector, the planned measures are intended to implement the NAP 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 introduce pollution reduction measures in the energy sector'. Two activities were planned, entitled 'Increase use of RES for heating and cooling production in the DHT sector' and 'Improve the energy efficiency of district heating, hot water and cooling systems and expand systems', which include:

- deploy new and/or modernise existing low-power RES technologies (e.g.: biofuel boilers, biofuel cogeneration plants);
- replacing depreciated biofuel boilers with other RES technologies, giving priority to the deployment of RES-fired cogeneration plants and high-efficiency biofuel boilers equipped with heat pumps or tanks;
- use ambient energy in DH systems through the deployment of solar technologies;

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- use ambient energy in DH systems by installing heat pumps and thermal storage tanks for short and long term;
- promote residual energy (waste heat and cold from e.g.: industrial, water treatment or waste sector, cooling systems or power plants) in the DH sector;
- in order to reduce primary and final energy consumption and GHG emissions in the DH sector, promote the transition of DH networks to a 4th generation heat supply system through the development of integrated DH systems, efficient use of residual and ambient energy;
- to reduce energy consumption in DH networks by around 12-13 % and CO2 emissions by more than 2 200 tonnes per year, invest in the modernisation and expansion of district energy pipeline systems through the introduction of lower temperature modes, technologies (e.g.:

circulating pumps, heat transformation points, heat exchangers, pipelines for low-temperature mode, measuring instruments, etc.);

- upgrade building induction heat and install remote reading systems for data. At least 10 thousand induction heat metering devices are planned to be retrofitted.

Assessmentof heating and cooling consumption

Lithuania has taken the decision to count waste heat (or cold) in the gross final consumption of renewable energy sources for heating and cooling up to 2030.

Waste heat and cold shall be included in the gross final consumption of renewable energy sources for heating and cooling, up to a maximum of 40 % of the average annual increase of at least 1,3 percentage points calculated for the periods 2021 to 2025 and 2026 to 2030, starting from the gross final consumption of renewable energy sources for heating and cooling in 2020.

Lithuania currently excludes renewable electricity used for heating and cooling from heating and cooling production installations with an efficiency above 100 % when assessing the share of RES in the heating and cooling sector. Currently, there are no such heat (or cooling) installations in the DH sector with an efficiency of more than 100 % and using renewable electricity for heat production. The first such installations (compressor heat pumps) could be tentatively available in 2030 with the successful uptake of the 2021-2027 EU funds.

Financing of planned measures in the RES heating and coolingsector[75]. Investments in the sector are foreseen to modernise and develop heat generation and transmission infrastructure. Most of the investment will be dedicated to the development of RES production capacity and only a relatively small part will be used to modernise heat transmission infrastructure. The total financing of RES measures is shown in Table 3.1.2.4.

Financingof planned measures in the RES sector

In order to achieve such RES targets for 2030, the largest investments will be made in the RES electricity sector to promote the development of solar and wind turbines. The investment from the Next Generation Lithuania Plan will make a significant contribution to this.

(RRF, RRF) (Table 3.1.2.4.).

Table 3.1.2.4. Indicative financing needs for existing and planned measures in the renewable energy sector.

Sector	Existing measures, EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total Funding	Public funds		Total Funding	Public funds	
Renewable energy resources	2417,67	1806,05	Climate change programme, EU funds investments (20142020) and (20212027), Recovery and	3237,4	1047,4	Climate Change Programme, Modernisation Fund, Connecting Europe Facility (CEF), State Budget, other sources.

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			Resilience Facility, other funds.			

General/specific measures to promote RES development:

Contact Centre

There are several contact points in Lithuania that advise applicants throughout the administrative permit application process for renewable electricity projects and are the only ones to apply for permits.

Article 15 of the Law on energy from renewable sources provides that the LEA is to provide advice and methodological assistance on activities in the electricity sector as well as on possible promotion measures for installations using renewable sources. Advice and methodological assistance on activities in the electricity sector include permit-granting processes in which the responsible authorities take decisions on the granting of permits.

It should be noted that permits for activities in the electricity sector are issued by the State Energy Regulatory Council, which also advises on administrative applications for activities in the electricity sector and accepts permit-granting applications.

The State Spatial Planning and Construction Inspectorate under the Ministry of the Environment shall provide advice and methodological assistance on the application of the provisions of the legislation governing and relating to State supervision of spatial planning and construction and shall accept applications for the issue of building permits.

Simplify administrative procedures:

The Energy Act lays down a general time limit for the issue of licences, permits and certificates for energy activities within 30 calendar days from the date of application for the issue of a licence, permit or certificate and registration of all duly documented documents before the issuing authority in accordance with the procedure laid down by law.

Lithuania issues 3 key permits for the development of plants using renewable energy sources – authorisation for the development of electricity generation capacity, building permit and permit to produce electricity. All these permits do not take longer than 1 year for all

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power plants, irrespective of their power.

The development of a renewable power plant (installation) requires a permit for the development of electricity generation capacity (hereinafter referred to as “development permit”). The construction (installation) of a power plant requires a permit for the production of electricity (hereinafter referred to as “production permit”).

Electricity generators operating installations for the production of electricity from renewable sources of any capacity and persons who intend to build or install installations for the production of electricity from renewable sources with an installed capacity of up to 100 kW, with the exception of persons who intend to carry out activities in accordance with Article 201(8) of the Law on energy from renewable sources, are subject to a simplified permit-granting procedure – there is no need to apply to the National Energy Regulatory Council for authorisation to develop electricity generation capacity and for a permit to produce electricity, i.e. it is sufficient to apply to the electricity network operator for the connection of the power plant to the grids for its activities.

Provision 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. Promoting research and experimental development and innovation, public education, civil servants and vocational training in the field of RES. The use of pilot projects is encouraged.

Information on support measures, legal information, organisations, statistics and other information relating to the development and use of RES is published on the website of the Lithuanian Energy Agency.[76]

Information on the issue of certificates of operation of energy installations and holders of certificates is available on the VERT website.[77]

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 purchase/sale of electricity from RES

The legislation lays down the general principles that a producer may sell electricity to the final consumer under contracts for the purchase and sale of electricity from renewable sources. These generators do not require authorisation from an independent electricity supplier, but to protect them

in the interests of the consumer, this producer must meet the requirements of an independent supplier.

Prosumers (RES self-consumption)

Natural and legal persons planning to produce electricity in plants using renewable energy sources with no limit on installed capacity may become prosumers.

A prosumer has been given the opportunity to ‘capture’ electricity produced by him and not used for his own use and for the needs of the economy in the electricity grids for a period of two years from 1 April to 31 March. The producer pays for the use of the electricity networks in respect of the amount of electricity he has ‘accumulated’ and recovered from the electricitygrid[78]. The amount of electricity supplied to the grid in excess of the electricity consumed by the customer during the storage period shall not be carried

76 https://www.ena.lt/atsinaujinantys-energijos-istekliai/; https://www.ena.lt/kvietimai-teikti-paraiskas/

77 https://www.regula.lt/Puslapiai/bendra/technine-prieziura/energetikos-irenginiu-eksploatavimo-veiklos-atestatu- dispensation.aspx

78 https://www.vert.lt/atsinaujinantys-istekliai/Puslapiai/elektros-energija-gaminanciu-vartotoju-naudojimosi- electricity grids-service-prices.aspx

forward to the next storage period. The customer producing this quantity shall be reimbursed by an independent supplier on the basis of a mutually agreed price.

Prosumers can install power plants themselves or buy bilateral contracts from third parties, thus creating the possibility for people living in multi-apartment buildings to become the producing consumer. The power plant of the prosumer may also be remote from the point of electricity consumption. In such a case, the power plant must be owned by the producing user or by another management right.

The 'net billing' model is also available to prosumers, where excess electricity fed into the grid is accounted for in euro instead of kilowatt-hours. This enables the prosumer to reduce its electricity consumption bills by selling the electricity produced by him.

This method of settlement would apply to legal (business) prosumers (with the exception of non-profit legal entities and the manager of centrally managed state-owned assets) and to all prosumers operating a wind power plant. Other prosumers would have the right to opt for this method of payment on a voluntary basis.

For already existing non-domestic prosumers, the electricity accounting principle will apply until 31 December 2030, i.e. net settlement for these customers will only apply from 1 January 2031.

Renewable energy communities (RES self-consumption)

The Renewable Energy Law regulates the operating conditions of the AIEB. AIEB is defined as the legal status granted to a non-profit legal entity that meets the established criteria and owns and develops and has the right to produce, consume, store and sell energy from renewable energy sources in a defined area.

A non-profit legal person seeking and obtaining the status of a renewable energy community shall comply with the following requirements:

1. participants are natural persons and/or medium, small and micro enterprises and/or other profits

non-target legal persons, and/or municipalities and/or municipal bodies;

2. at least 51 per cent of the votes at the meeting of participants shall be held by the participants referred to in point 1 living or operating in the county in which the energy generating installation (facilities) owned by the AIEB is planned to be built or installed;

3. the founding documents of a non-profit legal person have as their primary objective the provision of environmental, economic or social societal benefits to their participants.

AIEB shall be entitled to participate in the auctions without the obligation to produce and feed into the grid all the electricity winning in the auction. AIEB participants shall not lose their rights and obligations as an electricity customer, except for the consumer's right to choose an independent electricity supplier, which may be limited by the procedure laid down in the AIEB's statutes to vote on the right to choose an independent electricity supplier

In order to facilitate the establishment of the AIEB, municipalities are obliged to assess and make public the locations where renewable energy production facilities can be built or installed. The LEA has also issued recommendations on the establishment of renewable energy communities.[79]

System of guarantees of origin for renewable energy sources

79 https://www.ena.lt/aieb/

Lithuania has a system of guarantees of origin for renewable energy sources. In order to demonstrate to final customers the share or quantity of energy from renewable sources in the energy supplier's energy mix and in the energy supplied to customers under contracts, a guarantee of origin shall be issued per unit of electricity produced from RES and fed into the electricity grid, heat or cold produced from RES and supplied to the heating supply system and gas produced from RES and supplied to the natural gas system. Guarantees of origin shall be issued at the request of the manufacturer with a minimum power limit of 10 kW and shall be issued per unit of energy (1 MWh). The guarantee of origin shall be valid for 12 months from the date of manufacture of the unit concerned and the unused guarantee of origin shall cease to be valid at the latest 18 months after the production of the unit concerned.

A guarantee of origin shall be issued to electricity producers in respect of electricity produced from RES, including electricity produced in pumped storage power plants, for which water previously recharged to the upstream basin has been used, as well as a guarantee of origin for electricity produced and sold from RES in the course of technological tests in accordance with contracts for the purchase and sale of electricity from renewable sources and/or in accordance with the procedure and methods laid down by the Minister for Energy, upon submission of supporting documents by the person concerned.

A guarantee of origin shall be issued to gas producers in respect of gas produced from RES and supplied to the gas transmission or distribution system by connection to that system or through a gas injection point, provided that the power generating installation is not directly connected to the system.

A guarantee of origin shall not be issued for energy produced from RES and used by the energy producer for its own use and for the needs of the economy, nor shall it be issued for electricity if the producer has obtained the right to benefit from a fixed tariff for electricity from renewable energy sources.

Guarantees of origin are transferred on the basis of bilateral agreements and are always deemed to have been used when energy is sold to the final consumer in order to prove the origin of the energy supplied.

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The system of guarantees of origin allows for the identification, recording and monitoring of the origin of the energy produced and enables consumers to know whether the energy they consume is produced using RES. Guarantees of origin are managed by two designated entities and the registers of guarantees of origin are for electricity and gas. Guarantees of origin for gases are linked to other systems – sustainability compliance assessment and RES fuel system.

Regional cooperation

In the field of RES, regional cooperation mainly takes place in the field of electricity on issues such as opening up support, joint projects and a common support scheme. Lithuania is also open to the statistical transmission of energy to other Member States or, where necessary, to the statistical acceptance of energy from another Member State.

Statistical transfers. The above measures are assessed to be sufficient to achieve the target in 2030 and therefore there is currently no foreseen excess energy that could be transferred by Lithuania to other Member States.

Lithuania already has experience in bilateral cooperation for the transfer of surpluses to other Member States, as it became the first Member State to sign a cooperation agreement with Luxembourg on the transmission of statistics on renewable energy sources in October 2017.

In a situation where Lithuania's RES share will reach and exceed the target set by 2030, Lithuania is ready to enter into agreements with other Member States on the statistical transfer of a specified RES quantity from the Republic of Lithuania to another country. Similarly, if the measures identified would not be sufficient to achieve the target by 2030, the Seimas of the Republic of Lithuania may decide to adopt a statistical quantity of RES from another Member State. This transmission or reception may take place in the framework of the European Union Platform for the Development of Renewable Energy.

Opening up support. Lithuania has opened its support scheme to other Member States. Another Member State may participate in auctions organised in Lithuania which allocate the annual amount of electricity production and the supplement to the price of electricity from renewable sources for the electricity produced. The auctions organised in Lithuania shall be open to participation by a Member State which has direct electricity connections with the Republic of Lithuania, which has concluded an agreement with the Republic of Lithuania and has undertaken to grant the right to participate in the distribution of support organised in that Member State to 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. Where there is an agreement with another Member State, the auction allocation shall be calculated taking into account: the amount of electricity imported from the Member State seeking to participate in the auction in the previous calendar year; the share of RES in electricity production in the Member State seeking to participate in the auction, in the previous calendar year; the gross final consumption of electricity in the Republic of Lithuania in the previous calendar year; the annual amount of electricity production to be allocated in the auction, as indicated in the timetable.

Joint projects and a common support scheme. Lithuania is open by means of an agreement with other Member States to carry out joint projects or organise joint support schemes.

3.1.3 Other elements of this aspect

Section A:

Policies and measures affecting the EU ETS sector

Targets and targets for sectors covered by the ETS in relation to the transition to climate neutrality are set by the UCPD in the sectors of energy production and supply by 2030:

1. achieve a share of RES in the country’s overall final energy consumption balance of 45 % (note that the NEPT is 55);

2. 30 % by 2025 and 50 % (NNS 100) of domestic electricity consumption by 2030 from RES;

3. achieve a share of energy from RES of at least 90 % in district heating systems;

4. achieve 27 TWh final energy savings in 2030, of which 5.45 TWh in industry, 10.36 TWh in services and households, 10.9 TWh in transport and 0.54 TWh in agriculture;

5. develop technological solutions to contribute to the balancing of excess electricity from RES through pilot projects for the production of green hydrogen;

6. adaptexisting natural gas network infrastructure to hydrogen and biogas transport, prioritising gas from RES.

For the industrial sectors participating in the EU ETS, objectives and targets are listed under the industry sector.

Table 3.1.3.1. Existing and planned policy measures in the EU ETS sector until 2030

NO	MEASURE
EXISTING POLICY INSTRUMENTS (EPF)	
P2-E	Improving energy efficiency

P3-E	Incentives for investment and innovation
P5-E	Changing polluting technologies
P13-E	Production and use of hydrogen
P19-E	Decarbonisation of industry
P22-E	Fostering industrial change
RES1-E	Financial support to prosumers
REI2-E	RES development in the Baltic Sea
RES4-E	Deployment of RES power plants and storage facilities for legal persons and RES communities
RES8-E	Create energy resource communities in municipalities, with a share of built power plants being allocated to the poor (energy poor)
RES9-E	Reduce CO2 emissions from the LNG terminal
REI10-E	Investment support for the construction of biomethane plants
REI15-E	Development of green hydrogen production

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REI16-E	Renovate and/or modernise the heat transmission network and its installations/elements
REI17-E	Promoting the use of RES in district heating
REI17-E (1)	Installation of small-scale biofuel cogeneration plants for combustion of logging residues
REI17-E (2)	Promotion of small-scale biofuel cogeneration
REI17-E (3)	Implement local and RES CHP projects with priority for Vilnius and Kaunas
REI17-E (4)	Use of residual heat in DH systems
REI17-E (5)	Installation of thermal storage tanks
REI17-E (6)	Installation of heat pumps
REI17-E (7)	Construction of solar collector systems for district heating activities
REI17-E (8)	Construction of biofuel boilers produced from logging residues
REI18-E	Modernisation of the heat metering system
REI19-E	Transition of DH networks to Generation IV heat supply systems
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
EE5-E	PIS relief for industry
EE6-E	Energy saving agreements with state-owned and municipally owned enterprises
EE8-E	Modernisation of domestic 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	Modernisation of street lighting systems
EE15-E	Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons)
PLANNED POLICY MEASURES (PSD)	
P19-P	Decarbonisation of industry
REI10-P	Investment support for the installation of biomethane production and treatment plants
REI15-P	Development of green hydrogen production
REI25-P	Deployment of CCS/CCUS technologies
EE2-P	Renovation/modernisation of multi-apartment buildings
EE3-P	Renovation of public buildings
EE8-P	Modernisation of domestic heating and hot water systems in buildings
EE11-P	Modernisation of street lighting systems

EE12-P	Increase the technological and energy efficiency of industrial enterprises 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
EE15-P	Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons)
EE16-P	Implementation of integrated urban district renovation

In 2023, 73 stationary installations and 4 aircraft operators in Lithuania were active within the scope of the EU ETS. Most of these installations have low GHG emissions (up to 25 ktCO2eq) in district heating. GHG emissions in the EU ETS in Lithuania amounted to 4752 ktCO2eq. EU-level mechanisms in the ETS sector, such as the Market Stability Reserve, and funds for innovation and modernisation will affect the operators of installations in the EU and Lithuania 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 sectors participating in the EU ETS are RES17-E 'Promoting the use of RES in district heating', P2-E 'Enhancing energy efficiency' and P5-E 'Change of polluting technologies'. Existing policies and measures in the EU ETS will reduce GHG emissions by 42 % in 2030 compared to 2005 levels. Further investments in energy efficiency and the replacement of polluting technologies (measure P19-P), renovation of multi-apartment buildings (EE2-P), etc. The implementation of the planned policies and measures will result in a 52 % reduction in GHG emissions in 2030 compared to 2005, in order to further reduce GHG emissions in the EU ETS sectors.

Policies and measures to achieve low-emission mobility

All the policies and measures listed in section3.1.1. of the transport sector have a certain impact on the promotion of low-emission mobility. The following existing policies are the main contributors 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 depleting energy consumption by 2030, as well as the introduction of tax incentives for fossil fuels that foster market distortions. The Law on Excise Duties was amended on 9 May 2023 to implement the gradual reduction or withdrawal of tax benefits, which increases excise duties, as well as the introduction of the carbon dioxide component of the excise rate as of 2025. In total, thirteen energy subsidies to be phased out by 2026 were identified in Lithuania:

1. reduced rate of excise duty on heating gas oils (reply from 2024);
2. reduced rate of excise duty on coal, coke and lignite used for business purposes (reply as of 2024);
3. reduced rate of excise duty on natural gas used as heating fuel for business purposes uses (reduced by increasing the existing tariff of EUR 0.54/MWh to EUR 1/MWh in 2026);

4. As of 2025, a security component of EUR 25/1000 l for marked diesel used in agriculture (the security component of EUR 50/1000 l will apply from 2026) in addition to the current excise duty rate of EUR 60/1000 l;

5. exemptions for petroleum gas and gaseous hydrocarbons for domestic use (reply from 2024);

6. a lower rate of excise duty on electricity used for business purposes (temporary suspension pending the adoption of the new Energy Tax Directive);

7. exemption from excise duties on natural gas used for combined heat and power generation (temporary suspension pending the adoption of the Energy Tax Directive);

8. exemption from excise duty for electricity supplied to household customers and beneficiaries (temporary suspension pending the adoption of the Energy Taxation Directive);

9. exemption from excise duty of natural gas supplied to household customers and beneficiaries (temporary suspension pending the adoption of the Energy Taxation Directive);

10. exemption from excise duties on electricity produced using renewable energy sources (temporary suspension pending the adoption of the Energy Tax Directive);

11. exemption of natural gas for use as motor fuel (suspended until 2030);

12. biofuels rebates (repealed with effect from 1 January 2024);

13. preferential 9 % VAT rate applicable to heat energy supplied for the heating of residential spaces, hot water supplied to dwellings or cold water (not yet considered).

Some of them have been phased out or reduced (see Table 3.1.3.1). Some subsidies, such as exemptions from excise duties on natural gas supplied to household customers and beneficiaries, are essential to ensure the well-being of the population. For more detailed information on subsidies, see Section 4.6.

Energy efficiency dimension

Lithuania has the highest final energy consumption in buildings, road transport and industry, and energy efficiency measures are therefore primarily targeted (focused) on these sectors. Energy efficiency improvements in Lithuania by 2030 will be implemented in accordance with the following principles:

- cost-effectiveness – priority should be given to the most cost-effective energy efficiency improvement measures when implementing energy efficiency objectives;
- active training and education for energy consumers – as energy consumers can contribute to energy efficiency objectives by changing their behaviour and habits, training and education for energy consumers must be strengthened;
- competition – enabling energy efficiency investors

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compete with each other for the implementation of the most economically advantageous projects, in the context of energy efficiency obligations or competition for state incentives;

- as regards energy efficiency improvements, priority shall be given to alternative (1) cost-effective energy efficiency measures to improve energy demand and energy supply efficiency, in particular measures to reduce final customers' energy consumption in a cost-effective manner, (2) effective solutions to achieve climate neutrality, (3) demand-side initiatives and (4) more efficient conversion, transmission and distribution of energy, while ensuring that the objectives of those decisions are met, as a priority in planning and in policy and investment decisions.

Article 3(4) of the Law of the Republic of Lithuania on Energy Efficiency mentions as one of the key principles for improving energy efficiency the principle of priority for improving energy efficiency, whereby priority is given to energy efficiency improvement measures that reduce energy demand when deciding on the planning and financing of energy transmission or distribution networks or systems, if they are more cost-effective than the corresponding energy supply decisions. The principle is detailed in separate laws in the energy sector.

Article 33 of the Law on Electricity of the Republic of Lithuania lays down the obligation of the transmission system operator to draw up and submit to the National Energy Regulatory Council, by 1 July at least every 2 years, a 10-year transmission network development plan containing an assessment of the available and foreseeable supply and demand of electricity and the conclusions of the probabilistic assessment of the adequacy of the electricity system. In accordance with Article 33(2)(4) of that law, that plan must identify possible alternatives to demand reduction by introducing or encouraging the installation of energy efficiency improvement measures in transmission networks in the context of investment projects, in order to implement the principle of priority for improving energy efficiency laid down in the Law on Energy Efficiency Improvement. Article 391(1) of the Law on electricity provides that a distribution system operator serving more than 100000 customers is to draw up every 2 years a 10-year plan for the development, upgrading, upgrading and investment of distribution networks, based, inter alia, on the optimisation of the network based on energy efficiency improvements, with a view to implementing the principle of priority for improving energy efficiency laid down in the Law on energy efficiency.

In essence, similar provisions on the principle of priority to increase energy efficiency, as in the Law on Electricity, are also laid down in the Law on natural gas, the obligation on the natural gas transmission system operator to take account of the principle of priority of energy efficiency improvements in the ten-year network development plan laid down in Articles 31(1) and 31(2)(4) of the Law on natural gas. Articles 371(1) and 371(2)(4) of the Law on natural gas provide that the distribution system operator must take account of that principle when drawing up a ten-year plan for the development, renewal, modernisation and investment of the network (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 municipal councils. Article 8(3) of the Law on the heat sector provides that, in drawing up special plans for the heat sector, the principle of priority for improving energy efficiency laid down in the Law on improving energy efficiency is to be taken into account.

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As part of the implementation of the new Energy Efficiency Directive, changes are envisaged to the Energy Efficiency Law and other necessary legislation to extend the priority principle of improving energy efficiency (1) to sectors other than energy sectors that influence energy consumption and energy efficiency, (2) to enable effective solutions to achieve climate neutrality, (3) to enshrine in legislation how this principle will be monitored.

Article 5 of the new Energy Efficiency Directive requires public entities to implement measures and save 1.9 % of energy each year. Public entities (public organisations) are currently managers of public buildings referred to in the list of 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 heated and/or cooled State institutions and bodies – public administration buildings with a total surface area of 250 square metres or more. After the entry into force of the new Energy Efficiency Directive and its transposition, the list of public entities will be revised.

In order to achieve the objective of Article 8 of the new Energy Efficiency Directive, which, calculated cumulatively, amounts to 39.3 TWh, Lithuania plans to introduce existing energy efficiency improvement measures and plans new energy efficiency measures to ensure the achievement of the energy efficiency target by 2030. As the information below (Table 3.2.1.) shows, this 2030 cumulative energy savings target will be achieved with 34.5 TWh savings from existing energy efficiency measures and a further 11.9 TWh of energy savings from planned energy efficiency measures. In total, 46.4 TWh of energy savings will be achieved by 2030.

It should be noted that the new EE Directive 2023/1791 will target vulnerable customers, including people affected by energy poverty, deprived persons and other vulnerable groups, as a priority in the implementation of energy efficiency improvement measures. Implementing measures such as those required by Article 8(3), 2 of the new EE Directive 2023/1791. Article 8(3) below the percentage of energy savings to be achieved by vulnerable customers (persons not in need) shall take into account the inability to adequately heat housing, public utility arrears, the total population living in a dwelling with a leaking roof, damp walls, floors or foundations, or rot in window frames or floors, and the at-risk-of-poverty rate. It should also be noted that point 4.4.1.2 of Commission Recommendation (EU) 2024/1590 of 28 May 2024 on the transposition into national law of Articles 8, 9 and 10 of Directive (EU) 2023/1791 of the European Parliament and of the Council on energy efficiency as regards the energy savings obligation specifies for Lithuania the minimum share of cumulative end-use energy savings required in the priority groups as follows:

3.2.1. Table. Minimum share of cumulative end-use energy savings required in priority groups, based on the indicators listed in Article 8(3) of the new EE Directive 2023/1791 for Lithuania, %

EU Member State	Indicator a, %	Indicator b, %	Rate (c), %	Indicator d, %	Average %
Lithuania	26,70	7,50	14,00	20,60	17,20

At the same time, point 4.4.2 of Commission Recommendation (EU) 2024/1590 specifies that the required energy savings are to be achieved for all target groups of vulnerable persons as a whole and not for each group.

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separately.

It should be noted that already at the moment of the implementation of the EE2-E measure (renovation/modernisation of multi-apartment buildings) referred to below, the State reimburses 100 % of the renovation credit and interest to the deprived persons (persons entitled to compensation for heating costs of the dwelling). A 100 % subsidy to compensate for the modernisation of heating and hot water systems for deprived persons is also planned for the implementation of measure EE8-E below. For each of these measures, vulnerable customers (persons without need) are expected to save at least 20 % of the total energy savings reported in each of these measures, which is higher than the minimum required by Commission Recommendation (EU) 2024/1590 in accordance with the table above.

In order to implement the provisions of the Law on Energy Efficiency Improvement, the Energy Efficiency Fund ('ENEF') was established by Treaty No 1S-12/2015/19-10/8-5 of 18 February 2015 establishing and financing the Energy Efficiency Fund. In the past, the ENEF financed 2 measures: (1) a financial instrument for concessional loans, which includes the refurbishment of publicly owned heated and/or cooled public buildings through energy efficiency improvements; (2) the Guarantee Financial Instrument, which includes the modernisation of urban street lighting through energy efficiency improvements. In accordance with the latest amendments to the above-mentioned Agreement and its Annexes which entered into force, the ENEF has been extended (supplemented) and other additional measures: (a) a financial instrument for renewable energy communities and citizen energy communities, which (in the form of concessional loans and grants) will finance communities in accordance with the basic principle of the operating model, whereby part of the capacity of a power plant built or purchased by the community will be transferred to people affected by energy poverty, thereby reducing the electricity bills of these persons; installation of energy efficiency measures in district heating plants; installation of renewable measures in district heating plants and independent heat producers. The use of ENEF for energy efficiency measures is also planned, as required by Article 30 of the new EE Directive 2023/1791, in order to meet the national energy efficiency contributions and indicative trajectories referred to in Article 4(2) of the Directive. The ENEF is also planned to cover as a priority the energy efficiency improvement measures used for vulnerable people and other vulnerable groups, including those affected by energy poverty. As foreseen in the new EE Directive 2023/1791, the ENEF also plans to finance energy efficiency measures for SMEs.

Table 3.2.2. Existing and planned policy measures in the energy efficiency sector until 2030

NO.	MEASURE	Energy savings TWh. 2021-2030
EXISTING POLICY INSTRUMENTS (EPF)		
EE1-E	Impact of higher excise duties and taxes on fuel consumption	8.66 TWh
EE2-E	Renovation/modernisation of multi-apartment buildings	5.29 TWh
EE3-E	Renovation of public buildings	0.41 TWh
EE4-E	Agreements with energy suppliers on consumer education and consulting	2.77 TWh
EE5-E	PIS relief for industry	4.23 TWh
EE6-E	Energy saving agreements with state-owned and municipally owned enterprises	3.75 TWh
EE7-E	Replacement of boilers with more efficient technologies	7.62 TWh
EE8-E	Modernisation of domestic heating and hot water systems in buildings (“small renovation”)	0.03 TWh
EE9-E	Implementation of energy efficiency measures by private legal entities according to energy audit reports	0.18 TWh
EE10-E	Refurbishment (modernisation) of one or two dwellings of natural persons	0.61 TWh
EE11-E	Modernisation of street lighting systems	0.17 TWh
EE15-E	Refurbishment (modernisation) of non-residential buildings of legal persons.	0.017 TWh
T1-E	Promoting the acquisition of electric cars	0.99 TWh
T2-E	Promoting the development of alternative fuels infrastructure and vehicles	0.47 TWh
T3-E	Electrification of railways and rolling stock	0.06 TWh
P2-E	Improving energy efficiency (EES)	2.32 TWh
P12-E	Improving Energy Efficiency (EES) in Enterprises	4.83 TWh
P17-E	Deployment of alternative fuels	0.35 TWh
P19-E	Decarbonisation of industry	1.19 TWh
P22-E	Fostering industrial change	4.57 TWh
Cumulative effect of measures		48.52 TWh

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POLICY MEASURES PLANNED		
EE2-P	Renovation/modernisation of multi-apartment buildings	3.2 TWh
EE3-P	Renovation of public buildings	0.28 TWh
EE7-P	Replacement of boilers with more efficient technologies	1.22 TWh
EE8-P	Modernisation of domestic heating and hot water systems in buildings (“small renovation”)	0.18 TWh
EE10-P	Refurbishment (modernisation) of one or two dwellings of natural persons	1.2 TWh
EE11-P	Modernisation of street lighting systems	0.1 TWh
EE12-P	Increase the technological and energy efficiency of industrial enterprises 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	0.26 TWh
EE14-P	Promoting the introduction of internal monitoring systems for energy efficiency in businesses and industry	0.215 TWh
EE15-P	Non-residential buildings of legal persons	0.53 TWh

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	update/modernisation.	
EE16-P	Implementation of integrated urban district renovation	*
T1-P	Promoting the acquisition of electric cars	0.34 TWh
T2-P	Promoting the development of alternative fuels infrastructure and vehicles	0.27 TWh
T3-P	Electrification of railways and rolling stock	0.11 TWh
T24-P	Promoting sustainable inland navigation	0.01 TWh
P19-P	Decarbonisation of industry	0.36 TWh
P20-P	Long-term hedge contracts	0.11 TWh
Cumulative effect of measures		8.43 TWh

**The impact of the measure overlaps with those of EE2-E and EE2-P and is assessed in the evaluation of measures EE2-E and EE2-P.*

EE1-E: The impact of higher excise duties and taxes on fuel consumption. Higher excise duties on fuel reduce fuel consumption, which increases energy efficiency in the transport sector. Lithuania has introduced higher excise duties and VAT on fuels, i.e. petrol, liquefied natural gas and diesel, to improve energy efficiency in the transport sector. Lithuania has a value added tax of 21 % on fuel, i.e. 6 percentage points higher than the EU 15 % minimum. Currently, motor petrol is subject to the following excise duties only with a fixed component: for unleaded petrol, the rate of excise duty on the product is EUR 466 per 1 000 litres and the rate of excise duty on lead is EUR 579,24 per 1 000 litres of product. Diesel is subject to an excise duty rate of EUR 410 per 1 000 litres of product. The rate of excise duty applicable to LPG is EUR 304,10 per tonne of product. Higher taxes and excise duties on fuels are projected to generate energy savings of 8.66 TWh in 2030. (2021-2030)

EE2-E – Renovation (modernisation) of multi-apartment buildings. Lithuania will continue to prioritise the renovation of multi-apartment buildings, reduce heating costs for consumers and improve living conditions in multi-apartment buildings. The programme for the renovation of multi-apartment buildings will continue to be implemented. This existing measure shall be implemented between 2021 and 2026. After the refurbishment of the building, class B or C should be achieved and 40 % of the building's energy consumption should be saved annually. This measure is expected to renovate around 2269 multi-apartment buildings and save 5.29 TWh of energy by the end of 2026. (2021-2026)

EE2-P: Renovation (modernisation) of multi-apartment buildings. The measure will be a continuation of measure EE2-E and will be implemented between 2024 and 2030. Under the measure, the multi-apartment building will have to be upgraded to class B with 40 % energy savings. By the end of 2030, 5042 multi-apartment buildings should be renovated, of which 860 multi-apartment buildings are planned to be renovated (modernised) using standardised modular construction products (liquids) produced in the plant from renewable organic natural resources. This measure is expected to deliver total energy savings of 3.20 TWh by 2030. (2024-2030)

EE3-E – Renovation of public buildings. The programme to improve the energy efficiency of public buildings sets targets for 2030 for the refurbishment of buildings owned by the State and municipalities. For central government buildings, the measure is being implemented between 2021 and 2028 and for municipal buildings in 20212024. It is planned to refurbish around 367 000 m² of central government public buildings and around 86 220 m² of municipal public buildings by 2030. Under the current legal framework, public buildings must reach the minimum class B or C after renovation. Annual energy savings of around 8 GWh will be achieved and overall this measure will save around 0.41 TWh of energy. 2021-2028: central government; 2021:

Section A:

2025 – municipalities)

EE3-P: Renovation of public buildings. The measure will be a continuation of measure EE3-E between 2024 and 2030. Under the measure, public buildings will have to be renovated to nearly zero emissions and around 143 thousand m² of public area of central government buildings and 363 780 m² of municipal public buildings will be refurbished by 2030. This measure is expected to deliver a total of 0.28 TWh of energy savings 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 of the measures provided for in agreements concluded between them or through other persons.

The measure is expected to lead to energy savings of 2.77 TWh by 2030 as a result of a change in consumer habits. (2021-2030)

EE5-E: PIS relief for industry. A support mechanism to finance the implementation of energy efficiency improvement measures in all major industrial plants in Lithuania that consume more than 1 GWh of electricity per year. Companies will receive compensation for the implementation of energy efficiency improvement measures – companies can recover 85 % of the public service price paid for electricity consumed in the previous calendar year in excess of 1 GWh, provided that the recovered funds are earmarked for investments in energy-saving measures. Energy efficiency measures are planned to be put in place annually, leading to annual energy savings of around 77 GWh and 4.23 TWh of energy savings by 2030. (2021-2028)

EE6-E. Agreements with State-owned and municipal-owned enterprises on energy savings. Energy companies will save energy according to the energy levels indicated in the energy savings agreements (on their own or through others) through cost-effective energy efficiency improvement measures in final energy consumer installations (installations, equipment, transport).This measure is expected to save around 68 GWh per year and to save around 3.75 TWh by 2030. (2021-2030)

EE7-E: Transforming Castes into more efficient technologies. The implementation of the measures in the plan will achieve the headline target of replacing 50000 boilers in households by 2030, with other heat-consuming energy efficiency improvement measures leading to savings of at least 139 GWh per year, or 7.62 TWh by 2030. 5,000 household boilers are planned to be refurbished each year.

This measure will compensate up to 50 % of the costs of replacing inefficient individual boilers to individual boilers using more efficient technologies for households not connected to a district heating system. (2021-2030)

EE7-P: Transforming Castes into more efficient technologies. By 2030, 11305 boilers will be replaced by heat pumps in households, leading to annual savings of around 58 GWh and 1.22 TWh by 2030. (2025-2030)

EE8-E – Modernisation of indoor heating and hot water systems in buildings ("small renovation"). A financial measure that will encourage building owners to refurbish old elevator heat points into a newer single-circuit heat point. This existing measure was implemented in 2021-2022. Reimbursement of up to 60-80 % of investment costs and the renewal of 158 heat points are planned. This would lead to energy savings of around 0.03 TWh by 2030 (2021-2022).

Section A:

EE8-P: Modernisation of indoor heating and hot water systems in buildings ("small renovation"). The measure will be a continuation of measure EE8-E and will be implemented between 2023 and 2030. Under the measure, 290 heat points are planned to be updated annually. This measure is expected to deliver a total of 0.18 TWh of energy savings by 2030. It should be noted that in multi-apartment buildings where heating points and other internal heating and hot water systems are not modernised, a significant proportion of the low-income and energy poor population live, who are therefore currently overpaid for heating and entitled to compensation for heating costs. The implementation of this measure will therefore contribute not only to higher energy savings, but also to the cost of the poor population and thus to the reduction of compensation and heat prices. (2023-2030)

EE9-E: Implementation of energy efficiency measures by private legal entities in accordance with 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 2030. A subsidy for the achievement of energy savings is planned for 44 projects, leading to energy savings of almost 0.18 TWh by 2030. (2021-2030)

EE10-E: Refurbishment (modernisation) of the dwellings of one or two apartments of natural persons. Financial incentive for owner-occupiers to renovate their individual homes. This existing measure was implemented in 2021-2022. It is mandatory to achieve at least the energy performance class of the house B and to reduce the calculated thermal energy consumption (kWh/(part of) the building's useful floor area per year) by at least 40 % compared to the calculated thermal energy consumption prior to the renovation (modernisation). 1.106 individual houses are planned to be renovated. Up to 30 % of investment costs are reimbursed. Total cumulative energy savings by 2030 equal to 0.61 TWh. (2021-2022)

EE10-P: Refurbishment (modernisation) of the dwellings of one or two apartments of natural persons. The measure will be a continuation of measure EE10-E implemented in 2023-2030. This is a financial incentive for individual homeowners to renovate their individual homes. It is mandatory to achieve the energy performance class of the house B or more and to reduce the calculated thermal energy consumption (kWh/m² of the useful floor area of the building (part thereof) per year) by at least 40 % compared to the calculated thermal energy consumption prior to the renovation (modernisation). In total, the measure plans to renovate 18000 individual homes, which will save 1.12 TWh of energy by 2030. (2024-2030)

EE11-E. Upgrading of street lighting systems. Financial support to encourage the modernisation of street lighting systems and encourage 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 0.17 TWh by 2030, or around 3 GWh per year. (2021-2023)

EE11-P. Upgrading of street lighting systems. The measure will be a continuation of measure EE11-E over the period 2024-2030. The total planned replacement of this measure is around 100 thousand luminaires, which will lead to energy savings of 0.1 TWh by 2030. (2024-2030)

EE12-P: Improve the technological and energy efficiency of industrial enterprises through the deployment of artificial intelligence and digital twin technologies. This is a completely new planned measure not included in the NECP currently in force. It is an investment instrument to be implemented between 2026 and 2030 to increase the level and efficiency of industry automation. Within the scope of the measure, subsidies will be awarded for the introduction of

digital twin or artificial intelligence solutions for the digitalisation of a company's process or part thereof. The measure combines fully real-time business-based solutions that lead to energy and cost savings; the automated optimisation of the production line enabled by IoT technology by comparing existing data (parameters) with historical and regularly informed of deviations in energy efficiency, and line-smart video-surveillance solutions report line errors, thus reducing human labour demand and increasing efficiency; an AI-based machine learning algorithm makes it possible to anticipate, contain and prevent potential increases in costs and energy consumption, as well as to identify and prevent potential energy quality problems in advance, as well as to analyse different energy consumption scenarios and implement Energy 4.0 solutions. The subsidy intensity will be up to 50 %. The measure is expected to save 0.04 TWh of energy by 2030, or around 0.7 GWh annually. (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, not in the NECP currently in force, which is planned to start in 2027. The scope of the measure will be complemented by an obligation for companies to put in place the measures recommended in the energy performance audit with an estimated payback period of up to 5 years. The measure is expected to deliver 0.26 TWh of energy savings by 2030. (2027-2030)

EE14-P: Fostering the deployment of internal monitoring systems for energy efficiency in businesses and industry. It is a financial instrument to reduce companies' energy costs. The measure is designed to encourage companies to start measuring and monitoring their energy waste. This makes it possible to monitor the evolution of their energy costs more effectively than through bills or meters. The measure will be implemented between 2025 and 2030 with a support intensity of up to 40 %. The measure is expected to save 0.215 TWh of energy by 2030. (2025-2030)

EE15-E. Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons). Financial incentive for legal persons to renovate non-residential buildings. It is mandatory to achieve at least the energy performance class B of the building and to reduce the calculated thermal energy consumption by at least 40 % compared to the calculated thermal energy consumption prior to the refurbishment (modernisation). The measure is expected to save 0.017 TWh of energy by 2030. (2021-2023)

EE15-P. Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons). Renovate non-residential buildings to class B and save 40 % of energy. The measure is expected to save 0.53 TWh of energy by 2030. (2024-2030)

EE16-P: Implementation of integrated district renovation of urban areas. The purpose of the measure is to develop and approve a cross-cutting district sustainable operating model and methodological material that will be used by Lithuanian municipalities to confirm a long-term urban renovation plan on the basis of the national and urban master plans. (2025-2030)

The savings of the following existing and planned energy efficiency measures and efficiency-impacting measures in the transport and industry sectors are summarised in the following graph:Section A
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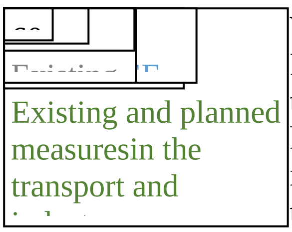

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Figure 3.2.1. Cumulative energy savings, without taking into account individual measures in the transport and industry
sector, TWh by 2030.

Energy efficiency measures in the transport sector

A more detailed description of the measures to be implemented in the transport sector, as set out in Table 3.2.2. (the number begins with the letter 'T') and which will contribute to the energy efficiency objectives, can be found in the section on the transport sector *(More information on measures in the transport sector)*.

Energy efficiency improvement measures in the industrial sector

A more detailed description of the measures to be implemented in the industry sector, as set out in Table 3.2.2. (the number begins with the letter 'P') and which will contribute to the energy efficiency objectives, is set out in the section on the industry sector. *(For more information on measures inthe industrial sector).*

Long-term building strategy

By decision of 31 March 2021 (Protocol No 18), the Government of the Republic of Lithuania approved Ilgalaikei's renovation strategy, according to which all public and private buildings and residential buildings in Lithuania will have to become fully decarbonised by 2050 and have a zero carbon footprint. By Order No D1-336 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 and create a financial and regulatory incentive for public buildings, district renovation, heritage management and restoration. This initiates the development of a catalogue of best practices for architectural solutions and environmental management, ensures effective advice on the design, implementation of investment plans, and the responsibility of project promoters with guarantees. At least 15 % of the total in 2030

Section A:

the contracted works will relate to the reconstruction of buildings. Targets for 2030 and 2040 are also specified and are planned to be updated between 2025 and 2026.

Publicity ofenergy efficiency measures

In order to increase the volume of energy efficiency improvements, the Energy Efficiency Improvement Act lays down 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, ILTE (formerly INVEGA) publicly disseminates and coordinates with financial institutions information on the refurbishment and financing of multi-apartment and public buildings, street lighting (further details www.ilte.lt) and, for example, the Public Investment Development Agency has coordinated separately with financial institutions before approving the financial instrument for street lighting.

Heating and cooling assessment

Results of the assessment of the potential for efficient heating

In order to assess the long-term objectives for the energy sector and the results of a comprehensive assessment of the national potential for heating and cooling, targets and targets are set for the heating sector (Table 3.2.3).

Table 3.2.3: Lithuania's heat sector targets for 2050

Sector	Purpose	Target indicators (2030)	Target indicators (2050)
Heating sector	T1. Final energy consumption (FEC)	26.3 TWh	18.8 TWh
	T2. Primary Energy Consumption (PEC)	28.4 TWh	20.6 TWh
	T3. GHG emissions	1 567 kt CO_2	0 kt CO_2
	T4. Share of RES in the DH sector	90 %	100 %

	T5. RES share in the decentralised sector	76 %	90 %

In the area of thermal energy efficiency, there are three main expectations:

1. Rational consumption: the main measure for reducing the intensity of FEC;
2. Efficient infrastructure: a key measure for reducing PEC intensity;
3. Sustainable fuel structure: key measure to reduce GHG emissions.

From the point of view of the energy supply chain, these expectations are grouped into two groups: improving the efficiency of heating demand and increasing heating supply efficiency (Figure 3.2.2) .

DEMAND EFFICIENCY

• Rational consumer behaviour

• Enerģētiskai efficient buildings

• Optimal heat supply infrastructure

• Minimised GHG emissions

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3.2.2. figure. Model for efficient heating options

1.1. Potential for enhancing heating demand efficiency

A detailed national assessment of the potential for heating and cooling showed that the majority of heat demand (~68 %) is for heating buildings (households and services sector), while the vast majority of buildings (~80 %) have low energy efficiency.

3.2.3. ypa:0.138889 in; Frame-width:2.126389 in; Frame-height:2.400000 in; xpos:1.649306 in; Frame-type:imageypos:0.138889 in; Frame-width:3.600000 in; Frame-height:2.559722 in; xpos:4.215972 in; image of Frame-type:image. Lithuania's heating UEC in 2020, GWh

Accordingly, it can be noted that the main potential for improving the efficiency of heating demand is to improve the energy efficiency of buildings (modernisation of buildings).

In the detailed assessment of the national potential for heating and cooling, the baseline scenario for the forecast of heating demand, taking into account all factors influencing heating demand (2020 demand characteristics, building modernisation, construction of new buildings, demolition of buildings, changes in climate change, industrial development and efficiency gains), projects a 14 % reduction in heating demand. (from 25.7 TWh in 2020 to 22.1 TWh in 2050)
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3.2.4. figure. Forecast of the change in heating demand in 2020-2050 (baseline scenario), UEC, TWh

1.2. Potential for enhancing heating supply efficiency

The long-term strategic objectives of the energy sector and the recommendations for a comprehensive assessment of the national potential of heating and cooling form two main strands for improving heating supply efficiency:

- efficient infrastructure is a key tool for reducing PEC intensity;
- a sustainable fuel structure is a key tool for increasing the share of RES and reducing GHG emissions.

In the detailed assessment of the national potential for heating and cooling, an analysis of the structure of the heating supply showed that when assessing the sustainability of fuels (the share of RES in the fuel mix in 2020):

- the best performance is in the district heating (DH) segment, where the share of RES is 79 %;
- lowest share of RES in industry, where the share of RES is 26 %.

In assessing the efficiency of manufacturing infrastructure:

- the best UEC/FEC ratio is also in the district heating segment (100 %);
- the lowest efficiency in the household segment (around 50 % of biomass boilers are estimated to beinefficient[92]).

Taking into account the comprehensive assessment of the national potential for heating and cooling, the targets set for the heating sector, the most likely scenarios for the evolution of the sectors concerned and the analysis of the current situation, priority directions for improving supply efficiency are developed (Table 3.2.4).

Table 3.2.4. Directions for improving efficiency of heating supply (summary).

Sector	Efficiency indicators (2020)		Strands of action for enhancing efficiency (2050)	
	Infrastructure efficiency	Fuel sustainability	Heating sector	Sectors concerned
District heating	high	high	• Rational development • Optimisation of the production structure • Reducing supply losses (4G network transformation)	• RES share in the electricity generation

92 Used Operational Ratio (UEL) less than 77 %
.

Section A:

			• Waste heat integration	structure (100 %) • RES share in the gas network (80 %)
Decentralised heating – Households	Low	Moderate	• Eliminating consumption of solid and liquid fossil fuels • Eliminating natural gas consumption • Eliminating inefficient biofuel production sources • Limiting biofuel consumption	
Decentralised heating –Service sector	Moderate	Moderate	• Eliminating consumption of solid and liquid fossil fuels • Eliminating natural gas consumption • Limiting biofuel consumption	
Decentralised heating – Industry	Moderate	Low	• Eliminating consumption of solid and liquid fossil fuels • Reducing natural gas consumption • Implementing the CCUS technology	

1.3. Results of the baseline scenario

Results of a comprehensive assessment of the national potential for heating and cooling in 2050:

- elimination of fossil solid and liquid fuel consumption (2.5 TWh in 2020);
  - significant reductions (from 6.7 TWh to 0.4 TWh) in natural gas consumption (both due to the reduction of gas consumption and the transformation of the gas sector);
- eliminating inefficient sources of biofuel production (2.3 TWh in 2020);
  - thanks to the spread of heat pumps and waste heat integration, the share of ambient energy increases almost 7-fold (from 0.8 TWh to 5.9 TWh).

The detailed change in the production structure by sector in the baseline scenario for 2050 is disclosed in Table 3.2.5.

3.2.5. table. Changes in the production structure in 2050 (summary)

Section A:

Fuel	Because 2020 (regardless of normalisation)	Change	BECAUSE 2050				
			Total	Households	Services	Industry	DHTS
Charcoal	1.221	—1.221	—	—	—	—	—
Solid fuels	347	—347	—	—	—	—	—
Petroleum products	904	—904	—	—	—	—	—
Natural gas	6.743	—6.328	415	—	—	415	—
Total FF	9.214	—8.799	415	—	—	415	—
RES gases	96	+ 1.600	1.697	—	38	1.659	—
Biofuel	9.933	—170	9.762	2.164	335	2.318	4.945
Biofuels (n.c.)	2.232	—2.232	—	—	—	—	—

Waste	597	+ 1.473	2.070	—	—	825	1.245
Waste heat	89	+ 350	441	—	—	—	441
Solar collectors	—	+ 251	251				251
Electricity (PP)	419	+ 2.122	2.541	1.439	367	133	602
Environment (PP)	712	+ 4.157	4.869	2.446	624	227	1.572
Total RES	14.079	+ 7.552	21.631	6.049	1.364	5.162	9.056
TOTAL	23.292	—1.247	22.046	6.049	1.364	5.577	9.056

The change in the production structure would allow for the achievement of the heating supply targets for 2050 (Figure 3.2.5).

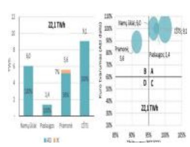

Figure 3.2.5. Heating supply efficiency indicators (2050)

For a comprehensive assessment of the national potential for heating and cooling in 2050:

- the fuel mix of sectors using space heating energy (Households, Services and DH systems) is dominated by RES fuel sources and the supply is in a relatively high-efficiency and sustainable fuel area (Division A);

the supply of the industry sector, due to the relatively lower use of heat pump technology, is in a less efficient zone (Division B)
;

-

Section A:

- whereas the vast majority of heating energy in the industrial sector is not used for space heating, but rather for the productionprocess[80], it is projected that ~11 % of the sector's fuel structure will be fossil fuels, while CCUS technology will be used to manage the remaining GHG emissions.

This transformation of the heat production structure would allow CO2 emissions to be reduced by more than 4 times (Figure 3.2.6.).

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3.2.6. figure. Change in CO2 emissions (2020-2050)

In the baseline scenario, once the potential for improving heating efficiency identified in the assessment of the potential for heating and cooling is fully realised, the indicators set out in Table 3.2.6. would be achieved.

3.2.6. table. Projected indicators for the heating sector for 2050

Sector	Objective for 2050	Target indicators	Baseline scenario indicators
Heat sector	T1. Decrease in FEC intensity	18.8 TWh	22.8 TWh
	T2. Decrease in PEC intensity	20.6 TWh	24.5 TWh
	T3. GHG emissions	0 ktCO2	578 ktCO2
	T4. Share of RES in the DH sector	100 %	100 %
	T5. RES share in the decentralised sector	90 %	97 %

As can be seen, under the baseline scenario, the target indicators for Targets T1 and T2 (FEC 18.8 TWh and PEC 20.6 TWh) are not fully met. This indicator is mainly influenced by the efficiency of heating demand

Section A:

measures. 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 while the target indicators for Targets T1 and T2 have not been fully met, their structure in 2050 shows a significant increase in the share of ambient energy.

Target T3 (0 kt CO2 emissions) is not fully met. The remaining share of the emissions comprises the following:

- Emissions from waste incineration plants (488 kt CO2/year). Emissions originate from three installations with high power and economic capacity participating in the ETS. Accordingly, it is assessed that with appropriate financial incentives (high price of emission allowances), the remaining damage from emissions can be managed with CCS support. As the share of RES in the waste structure increases, the need for CCS would decrease proportionally.
- Emissions from natural gas (91 kt CO2/year). The emissions come from the industry sector, which in the baseline scenario is projected to consume about 2 TWh of the gas mixture with low CO2 footprint, 20 % of which will be attributable to natural gas. As in the case of waste

80 A specific type of fuel may be relevant to the production process, e.g. when the process requires a specific heat temperature or a specific chemical element formed during combustion.

incineration plants, it is estimated that with appropriate financial incentives (high price of emission allowances), most of the remaining emissions can be managed with CCS aid.

In the baseline scenario, the remaining targets (T4 and T5) are projected to be fully achieved.

Results of the assessment of the potential forefficient cooling

The objectives and targets set out in Table 3.2.7 shall be set for the cooling sector, taking into account the long-term strategic objectives of the energy sector and the results of a comprehensive assessment of the national potential of heating and cooling.

3.2.7. table. Objectives for the cooling sector for 2050

Sector	Purpose	Target indicators (2050)
Cooling sector	T1. Decrease in FEC intensity	—
	T2. Decrease in PEC intensity	—
	T3. GHG emissions	0 kt CO2
	T4. Share of RES in the DH sector	100 %
	T5. RES share in the decentralised sector	100 %

The cooling sector is an emerging sector and constitutes an insignificant part of the energy sector. Accordingly, no targets are set to reduce FEC and PEC indicators as compared to 2017 levels. Like in the case of the heating sector, three main expectations are defined for the area of cooling energy efficiency:

- Rational consumption: key tool for FEC intensity management.
- Efficient infrastructure: key tool for managing PEC intensity.
- Sustainable fuel structure: key tool for managing GHG emissions.

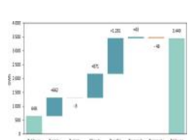
Section A:

As with the assessment of heating, these expectations are grouped in two groups from the perspective of the energy supply chain: improving cooling demand efficiency and cooling supply efficiency.

2.1. Potential for enhancing cooling demand efficiency

The detailed assessment of the national potential for heating and cooling found that cooling demand (UEC) amounted to 0.6 TWh in 2020. Unlike the heating sector, while heat during the cold season is an indispensable service to meet basic human needs, cooling in the climate zone concerned is still not an indispensable service. This is also confirmed by the assessment that a significant part of the need for cooling is unmet. Actual cooling consumption in the service sector is estimated at 10 % while the need for cooling in households is estimated at only 1 %.

It is the change in the level of meeting the need for cooling that constitutes the most significant part of the change in the projected cooling demand. The baseline scenario for projected cooling demand estimates that cooling demand will increase about fivefold in 2050 (from 0.6 TWh in 2020 to 3.4 TWh in 2050).



2.1.7. figure. Forecast of the change in cooling demand in 2020-2050 (baseline scenario), UEC, TWh

2.2. Potential for enhancing cooling supply efficiency

The long-term strategic objectives of the energy sector and the results of a comprehensive assessment of the national potential of heating and cooling shape two main directions for improving heating supply efficiency:

- Efficient infrastructure: key tool for managing PEC intensity.
- Sustainable fuel structure: key tool for managing GHG emissions.

A detailed national assessment of the potential for heating and cooling revealed that:
Cooling is produced in a decentralised way using high-efficiency technology (heat pumps)
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- ypa:0.000000 in; Frame-width:2.513194 in; Frame-height:0.600000 in; xpos:5.840972 in; Frame-type:imageThe technologies used will not generate GHG emissions in 2050 and will account for 100 % of emissions. In the production structure (in the most probable scenario for the development of the electricity sector).

Taking into account the objectives set for the cooling sector, the most likely scenarios for the evolution of the sectors concerned and an analysis of the current situation, the following, priority, supply efficiency pathways (Table 3.2.8).

Table 3.2.8. Summary of supply efficiency challenges.

Sector	Efficiency indicators in 2020		Strands of action for enhancing efficiency (2050)	
	Infrastructure efficiency	Fuel sustainability	Cooling sector	Sectors concerned
Centralised cooling	—	—	Rational development by increasing production efficiency	RES share in the electricity generation structure (100 %)
Decentralised cooling	High	Highs[81]	Maintaining the RES share in the production structure	

Following the implementation 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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81

background-color:FFFFFF; position-to:column-above-textwrap-mode:wrapped-both; Frame-height:12.pt; Frame-type:textbox; Frame-width:114.5pt; BG-style:1; background-color:FFFFFF; position-to:column-above-textypos:0.083333 in; Frame-width:2.479861 in; WRAP-mode:wrapped-to-left; Frame-height:2.253472 in; xpos:5.331250 in; Frame-type:imagewrap-mode:wrapped-both; Frame-height:12.pt; Frame-type:textbox; Frame-width:114.7pt; BG-style:1; background-color:FFFFFF; position-to:column-above-text

5 000
4 500
4 000
3 500
3 000
2 500
2 000
1 500
1 000
500

3.2.8. figure. Cooling demand and supply UEC in 2050

2.3. Results of thebaseline scenario

Baseline 2050:

- the need for cooling energy is increasing (from 5.1 to 9.1 TWh);
- a significant increase in demand response (from 13 % to 38 %) and correspondingly cooling demand
  (between 0.6 and 3.4 TWh);
- the RES share of 100 % Part RES:

Additionally, an assessment of the potential of district cooling was carried out, identifying the preliminary potential of district cooling in Vilnius and Kaunas cities of up to 1 TWh. Forecasts for the cooling sector in the baseline scenario for 2050 are presented below.

Table 3.2.9. Projected indicators for the cooling sector for 2050

Sector	Objective for 2050	Target indicators	Baseline scenario indicators
Cooling sector	T1. Decrease in FEC intensity	Not set	3.4 TWh
	T2. Decrease in PEC intensity	Not set	3.4 TWh
	T3. GHG emissions	0 kt CO2	0 kt CO2
	T4. Share of RES in the DH sector	100 %	100 %
	T5. RES share in the decentralised sector	100 %	100 %

In the baseline analysed in the comprehensive assessment of the national potential for heating and cooling, the indicators for all the set cooling targets (T3-T5) are fully achieved.

Improving energy efficiency in electricity and gas infrastructure

On 31 May 2024, a new 10-year investment plan covering the period 2024-2033 was approved for the BERT alignment of AB Energija Distribution Operator. It focuses on the modernisation of the electricity and natural gas network. One part of the plan relates to the application of smart technologies. The main measures identified in the plan are:

Implementation of smart meters. In accordance with the positive plan for the long-term costs and expected benefits of smart metering systems until 2030, approved by Resolution No O3E-428 of the VERT of 20 September 2019 on the coordination of the investment project 'Implementation of smart metering in Lithuania' of AB 'Energijos Distribution Operator'. The company will install 1.74 million smart meters. The Electricity Act provides that the deployment of smart metering is a long-term and global process that will be carried out without the customer's consent or request. The roll-out of smart metering in Lithuania takes place in two phases:

- Deployment phase I until 2026. This phase will include the roll-out of smart metering devices for consumers with the highest electricity consumption (1 000 kWh/year) or the end of metrological verification of existing metering devices. In order to meet the social policy objectives of the state, it will also be possible at this stage to introduce smart metering devices for disabled users.
- Deployment phase II from 2026 onwards. In this phase, smart metering devices will be installed for the remaining consumers once the metrological verification of existing meters has expired. At this stage, it will be possible to request AB Energy Distribution Operator to install a smart metering device before the legal metrological approval of the customer's existing metering device expires. To take advantage of this option, consumers will have to bear a share of the costs associated with the installation of a smart metering system, which shall not be less than 50 %. The exact share of these costs will be determined by the BERT. In cases where a request for the installation of smart metering

the device will be provided by a socially vulnerable consumer or person with disabilities (the latter may also apply in the first phase) and the smart metering device will be installed free of charge.

Installation of a smart metering system for metering management, reliable data collection, storage and analysis. In order to optimise the number of information systems required by the ESOs, their operation and maintenance costs, the systems are planned to be upgraded and upgraded.

Deployment of Big Data for decision-making in the management of the electricity grid. By increasing the number of equipment monitored and managed at distance, the ESOs will collect more network performance parameters. The information collected will enable data analysis, efficient network maintenance processes and the extension of the useful life of assets.

The main benefits of the programme are to enable customers to make decisions about more energy efficiency and reducing energy consumption with accurate data on their consumption.

Financingof planned measures in the energy efficiency sector

The sector with the highest additional investment requirements. The additional funds are mainly planned for the modernisation of buildings. (Table 3.2.10).

Table 3.2.10. Indicative financing needs for existing and planned measures in the energy efficiency sector.

Sector	Existing measures, EUR million	Available sources of funding	Planned measures in EUR million	Potential sources of financing

Energy efficiency	Total Funding	Public funds	Climate Change Programme, Modernisation Fund, EU funds investments (20142020) and (20212027), Recovery and Resilience Facility, EU Municipal Development Fund, State Budget.	Total Funding	Public funds	Climate change programme, Modernisation Fund, EU funds investments (2021-2027), loans back to energy efficiency or municipal development funds, State budget, other sources.
	3004,11	1152,89		6774,93	2038,82	

3.3 Energy security dimension

In order to adequately prepare for changes in the electricity system by decarbonising the country's energy sector, integrating markets and increasing energy production from RES, the transmission and exchange group "EPSO-G" has carried out a study on the transformation of the Lithuanian energy system, which will provide proposals for alternatives to the development and development of the energy system in the context of 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	MEASURE
	EXISTING POLICY INSTRUMENTS (EPF)
ES1-E	Lithuanian electricity system synchronisation project
EU2-E	Implementation of the construction project for unit 5 of Kruonis pumped storage power plant (KHAE)
ES3-E	Modernisation of electricity distribution networks through the deployment of advanced technologies
EU4-E	Build gas stocks in underground storage facilities, implementing EU Regulation 2017/1938 on backfilling of gas storage facilities
ES5E	Implement cross-border gas agreements for solidarity measures ensuring continuity of gas supply for protected domestic customers
	PLANNED POLICY MEASURES (PSD)
ES6-P	Implementation of the capacity mechanism

ES1-E. The Lithuanian electricity system synchronisation project. Synchronisation with continental European electricity networks is the last step towards Lithuania's energy independence. The Baltic States' electricity systems are preparing to operate in one synchronous area with those of other European countries. Historically, Lithuania's electricity system has so far operated synchronously with the electricity system of countries of the Commonwealth of Independent States (IPS/UPS system), connecting the systems of Belarus, Russia, Estonia, Latvia, Lithuania and other countries. Since the frequency of the Baltic States' electricity system is centrally managed and coordinated by a dispatch in Moscow, Lithuania, Latvia and Estonia are still 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 fully lifted when the electricity system becomes a fully-fledged player in the European electricity infrastructure, market and system, i.e. with 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)

Implementation of the construction project for unit 5 of the ES2-E. Kruonis Pumped Storage Power Plant (KHAE). The Kruonis HAE 5 aggregate will make a significant contribution to the region's energy independence, contribute to the development of the energy system from renewable energy sources and contribute to the smooth operation of the energy system. This measure will contribute to increasing the flexibility capacity of the electricity system (2020-2026).

ES3-E: Modernisation of electricity distribution networks through the deployment of advanced technologies. Deployment of digital management systems for smart energy systems, adapting electricity distribution grids for RES development. (2021-2030)

EU4-E – Accumulate gas stocks in underground storage facilities through the implementation of EU Regulation 2017/1938 on gas

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the filling of storage facilities. In accordance with Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard the security of gas supply, EU Member States that do not have gas storage facilities have to conclude agreements with market participants in Member States with underground gas storage facilities. The agreements shall provide for the use, by 1 November 2022, of storage volumes equivalent to at least 15 % of the average annual gas consumption of a Member State without underground gas storage facilities over the preceding five years. In order to comply with this requirement, the Latvian Inčukalnis underground natural gas storage facility stores Lithuania's gas reserves which, if necessary, can be used for commercialisation, 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 in Inčukalnis storage and in line with the filling trajectories specified in the Regulation. (2022-2025)

EU5-E – Implement cross-border gas agreements for solidarity measures to ensure continuity of gas supply for protected domestic customers. In accordance with Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard the security of gas supply, EU Member States, connected gas transmission infrastructure, must agree on the necessary technical, legal and financial arrangements to ensure gas supply to solidarity-protected household customers. In order to implement this requirement, the agreement with Latvia was signed on 10 March 2022, the same agreement is planned to be signed with Poland. Consequently, the measure will act as an additional commitment to finalise the agreements with Latvia and Poland and to implement regulatory and technical developments related to the agreements. (until 2030 (rolling measure)).

ES6-P – Implementation of the Capacity Ensuring Mechanism: In view of the particularly rapid expansion of generation capacity using RES and the increase in electricity demand, a capacity mechanism will have to be implemented by 2030 to maintain existing and develop new generation capacity, the reliable availability of which is essential for the secure operation of the Lithuanian electricity system. (2025-2030)

Kruonio HAE

When the load of the energy system is low and there is a lot of cheap excess energy (e.g. during the night), the units of the Kruonis Pumped Storage Power Plant (HAE), which are activated in pumping mode, move water from the Kaunas marinas to an artificial upper basin of 303 ha, 100 m above the water level of the

Kaunas marinas. On the day of the increase in energy demand, the HAE of Kruonio can operate as a normal hydroelectric power plant. For the prevention and response of systemic accidents, it is important that Kruonis HAE units can provide a rapid reserve power, with full capacity to enter the network in less than 2 minutes. KHAE units are ready to automatically release from the system's anti-emergency automation and compensate for power deficits. Other equally important KHAE functions are the levelling of system load variability, voltage-frequency control, the ability to escape from a systemic accident (black start).

Four hydro-aggies are currently installed at Kruonis HAE, but the original project of the power plant envisages the possibility of constructing four more plants. In order to maintain reliable local generation, it is envisaged to expand the fifth hydrogrid of 110 MW. The technical capabilities of the 5th Cruoni HAE will extend the power utilisation of the power plant in both the generator and pump modes, allow the power plant to participate more effectively in the overall Baltic balancing market and ensure greater competitiveness in the provision of ancillary services. In addition, the new assembly will help balance rapidly developing renewable energy sources.

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generation. The project is included in the list of Projects of Common Interest and is supported by CEF socio-economic and technical studies.

Market for balancing services

The common Baltic balancing energy market has been operational since 1 January 2018. AB Litgrid, AS Augstsprieguma tīkls and AS 'Elering' (the 'Baltic TSO') jointly organise trade in balancing energy in the Baltic States in accordance with the common Baltic balancing rules.

The electricity transmission system operators of the three Baltic States, Litgrid, Augstsprieguma tīkls and Elering ('Operators'), developed and applied common Baltic balancing market rules in implementation of 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 the European mFRR balancing energy exchange platform. Operators have harmonised the Baltic Balancing Region's (Baltic CoBa) Disbalance Accounting Rules ('the Rules') since 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 common market for balancing capacity, which will become operational as of 2025. Operators estimate that it will book up to 1 560 MW of balancing capacity. The new market is being developed in the run-up to synchronisation with continental European electricity grids, after which the Baltic States will act as a common frequency control block and will jointly subscribe to balancing capacity.

The Baltic States' synchronous planning with the continental European networks creates a significant need for balancing solutions, which will require technical possibilities both to increase and reduce electricity generation or consumption.

In addition to existing capacities, efficient provision of balancing services may be carried out by:

- battery systems that can use both energy and feed it into the grid as needed;
- existing and newly developed renewable power plants with management systems adapted to balancing down production;
- demand aggregators able to adjust electricity consumption.

Balancing capacity services in the common market in the Baltic States will be procured by auction on a daily basis, in periods of 15 minutes for tomorrow's day.

From 2025 onwards, automatic and manual frequency restoration reserve services (aFRR and mFRR) will be procured on the market and, after synchronisation with the continental European networks, the Frequency Maintenance Reserve (FCR) will be procured. These reserves differ in the speed and duration of their reaction, with the frequency reserve being activated within 30 seconds, the automatic frequency restoration reserve within 5 minutes and the manual reserve within 15 minutes.

Litgrid, AST and Elering made calculations of the need for these services. The total amount of balancing capacity required will be up to 1 560 MW in 2025, of which part will be provided by available capacity of operators, such as energy storage, but most of this demand will be purchased on the market. After synchronisation, the need for a frequency reserve of up to 36 MW will contribute to this amount. The breakthrough in renewable energy means that this demand will continue to grow rapidly by 2030.

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Preparation for the isolated 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 the integration of the electricity system into the European electricity systems, establish additional services, including non-frequency ancillary services, in order to ensure the preparation of the isolated operation of the electricity system, including the availability of electricity generation facilities and which are necessary for the implementation of the synchronisation of the electricity system.

European regulation on crisis prevention and management

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 on 5 June 2019. Regulation (EU) 2019/941 establishes a common framework of rules to prevent, prepare for and manage an electricity crisis, which enhances transparency and ensures coordinated and effective action in the preparedness phase and during the electricity crisis. Member States are obliged to develop risk-preparedness plans, as well as common principles for electricity crisis management provided for in Regulation (EU) 2019/941. The adoption of this Regulation and the assimilation of this system to the system in the natural gas sector will have a positive impact on the security of the Lithuanian electricity system and on crisis prevention. In implementation of the provisions of Regulation (EU) 2019/941, the Risk Preparedness Plan in the electricity sector was approved by Order No 1-203 of the Minister for Energy of the Republic of Lithuania of 12 July 2023.

Measures envisaged to ensure the security of natural gas supply

In line with the provisions of the Regulation concerning measures to safeguard the security of gas supply, a solidarity agreement on solidarity measures for 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 consumers in Lithuania and Latvia in cases where one of the parties is no longer able to supply its vulnerable customers with gas. In order to achieve this objective, both sides committed to define the conditions for gas exchanges and to agree on the necessary technical, legal and financial arrangements. The merger of Lithuania and Poland with the GIPL pipeline on 5 May 2022 resulted in a commitment to sign a similar intergovernmental agreement.

Following the amendments to the Regulation on measures to safeguard the security of gas supply adopted by the European Council on 1 July 2022, one of the main objectives was to ensure that gas storage facilities in the EU were filled by the beginning of the winter season and that Member States could share stocks in a spirit of solidarity. Lithuania has taken solidarity measures without its own gas storage and is building up the necessary gas reserves at the Inčukalnis gas storage facility in Latvia. These reserves are intended to meet vulnerable customers and the corresponding electricity generation needs in the case of isolated operation of the electricity system.

In Lithuania, in accordance with the Regulation on measures to safeguard the security of gas supply, a risk assessment is carried out and, on the basis of the results of that assessment, preventive action and emergency plans are established and approved by order of the Minister for Energy of the Republic of Lithuania. The summary of the risk assessment and the preventive action and emergency plans shall be made public by Lithuania

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The website of the Ministry of Energy of the Republicand[82] the registreof the legal acts[83]. These plans shall also establish a regional dimension where Member States assist each other in the event of a natural gas emergency by redirecting gas flows to protected customers in a neighbouring country affected by the emergency.

The Regulation on measures to safeguard the security of gas supply provides for an infrastructure standard (N-1) describing the technical capacity of the gas infrastructure to meet the total gas demand in a defined (N-1) calculated area in the event of a disruption of the single largest gas infrastructure during a day of exceptionally high gas demand occurring with a statistical probability of once every 20 years. According to the calculations of the N-1 criterion, the risk assessment found that this security of gas supply indicator in Lithuania is currently 127 % after the gas supply infrastructure unit has been eliminated from Belarus (taking into account that Lithuania does not import Russian gas), the construction of the pipeline into Poland and the increase of the capacity of the Lithuanian-Latvian gas interconnector mean that the value of the N-1 criterion is 127 %. It should be noted that Lithuania did not meet this standard at 37.1 % before the start of operations of the LNG terminal.[84]

It should be noted that the National Preventive Action Plan for the security of natural gas supply[85] includes obligations fornatural gas transmission and distribution system operators to prepare for an energy emergency. All natural gas undertakings have such plans.

The provision of energy and/or energy resources to consumers in the event of an energy emergencyregulates[86] the supply of energy and energy resources to consumers in the event of an energy emergency, as well as emergency preparedness and management. This procedure stipulates that the energy emergency preparedness plans shall include the following measures:

- ensuring the operation of companies in emergency situations;
- the best possible supply of energy and energy to consumers;
- use of alternative energy sources;
- reduction of energy resources and energy consumption in the enterprise;

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82 http://enmin.lrv.lt/lt/veiklos-sritys-3/gamtines-dujos/teises-aktai-lietuvos-gamtiniu-duju-sektorius

83 https://www.e-tar.lt/portal/lt/legalAct/TAR.6A808030EFF4/asr

84 Drawn up on the basis of the2018 study ‘Assessment ofrisks ofdisruption ofnatural gas supply in Lithuania andmodelling ofpossible scenarios’ commissioned by the Ministry of Energyand carried out by UAB Ekotermija.

85 TheNational ActionPlan forensuringthe security ofnatural gas supply was approved by Order No 1- 241 of the Minister for Energy of the Republic of Lithuania of28 November 2012 approvingpreventive action tosafeguard national security ofnatural gas supply and emergency plans for national natural gas supply.

86 Approvedby Resolution No12 of theGovernment of the Republic of Lithuania of 13 January 2003 approving theprocedure for thesupply of energy and/or energy resources to consumers in the event of an energy emergency.

- limiting the supply of energy sources and energy to consumers.

Stocks of natural gas shall be built up in such a way that they are sufficient in the following cases: 30 days during a period of exceptionally high gas demand (cold period); in case of extreme temperatures during a seven-day peak period with a statistical probability of once every 20 years; or for a period of at least 30 days in average winter conditions in the event of disruption of one of the largest gas infrastructures.

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Oil stocks

The storage, storage and refurbishment of reserve stocks of energy resources is provided for in Article 29 of the Energy Act. Under that provision, energy undertakings with more than 5 MW of heat and/or electricity generation and producing heat or electricity for sale must have reserve reserves of energy resources. They are pooled, held and renovated with funds from energy companies and other funds. They must not be less than 10 days of consumption. Stockpiling is the most common: biofuels, fuel oil, shale oil and diesel fuels. Natural gas is not foreseen as a reserve fuel in any of the reserve fuel storage plants. Reserve fuel stocks must be built up during the cold season. During the warm season (1 April to 31 October), the need and quantity of reserve reserves for energy sources is determined by the energy companies themselves.

In accordance with 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, the total amount of oil stocks allocated to them must be maintained permanently in an EU Member State at least 90 days of average daily net imports or 61 days of average daily domestic consumption, whichever is the greater. In Lithuania, special stocks of petroleum products are pooled and managed with public funds. These stocks shall be built up to a minimum of 30 days, calculated on the basis of the average daily domestic consumption in the previous calendar year. The remaining stockpiling shall be carried out by obligated undertakings.

The build-up of these stocks is ensured by the LEA, which also ensures that the quality of the petroleum products stored complies with the mandatory quality requirements for petroleum products. Stocks of petroleum products are held at the Sub-Autch Oil Terminal, which was built in 1964. The terminal has been continuously modernised following Lithuania’s restoration of independence and has been operated by AB KN Energies 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 requirements on cybersecurity and coordinates cybersecurity issues for 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 applicable to such infrastructure. In 2023 and 2024, both the Ministry of National 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, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive), adopted in 2022. The first objective 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 more stringent requirements on them. The full implementation of the NIS2 Directive should lead to a significant improvement in the cybersecurity situation for companies in the energy sector, especially those that have not previously been subject to such requirements.

Regional cooperation

In the Regulation on measures to safeguard the 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. Obliging States in one group to develop a common risk assessment and preventive action

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and the general regional chapters of the emergency plans. These chapters cover the main aspects of emergency cooperation between member countries connected through natural gas pipelines.

Another key aspect of regional cooperation is the 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 by the Joint Research Centre of the European Commission at the request of state authorities in cooperation with the NATO Energy Security Competence Centre in Lithuania. A test exercise on the solidarity mechanism for natural gas supplies took place in 2019 and a Baltic synchronisation exercise with continental European electricity networks in 2021. In 2023, an exercise took place during which states in the region jointly addressed the protection of maritime (including underwater) infrastructure.

Other forms of cooperation are described inSection 1.4 .

Financingof planned measures in the energy security sector

The Strategic Projects in which Lithuania participates are described in more detail in section 2.3. Table 3.3.2 shows the financing of the measures. The most costly project is the synchronisation of the Baltic energy system with continental European networks, funded by EU funds.

3.3.2. table. Indicative financing needs for existing and planned measures in the energy security sector.

Sector	Existing measures, EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Energy security	Total Funding	Public funds	Investment from EU funds (2014-2020), Connecting Europe Facility Connecting Europe Facility, CEF)	Total Funding	Public funds	Corporate funds
	1051,41	567,25		0,00	0,00[87]	

Internal Energy Market dimension

3.4.1. Electricity infrastructure

It should be noted that the connectivity aspect in Lithuania is satisfactory (see section 2.4.1.)andtherefore no specific measures are foreseen to improve it, but Lithuania is still not present in the synchronous area with the continental European networks, so one of the most important strategic objectives for Lithuania's

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electricity sector is the interconnection of the Lithuanian electricity system with the continental European networks.

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synchronous mode and full integration into the European electricity market. The main volumes and parameters of network development are therefore proposed in such a way as to ensure the implementation of existing strategic objectives and guidelines and avoid unnecessary investments. For details on the Synchronisation Project, see 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 planning and operation of electricity transmission networks shall be linked to the planning and operation of electricity distribution networks, new hydrogen infrastructure, energy storage, recharging infrastructure for light and heavy-duty electric transport, industry, heating and cooling production electrification and carbon infrastructure.

The future-proofing of electricity transmission networks requires a shift towards smarter integrated energy system planning, taking into account future electricity needs and the integration of power generation and electricity system flexibilities to meet future needs, ensure coordination of grid planning, exchange of data between actors in different sectors and involve stakeholders in this process. This will increase the electrification of individual sectors and provide clarity on future needs for grid and system integration.

According to projections for electricity generation and consumption up to 2050, Lithuania's electricity generation could grow around 20 times compared to 2022, consumption around 6-7 times and the power of electricity system flexibilities around 15 times. Changes in electricity generation and consumption and the flexibility options of the electricity system between 2022 and 2050 will have an impact on electricity grid upgrade solutions. It is important to develop electricity networks in line with the needs of producers and consumers, considering also the feasibility and location of flexibility measures in the electricity system.

Existing electricity transmission grids will need to be upgraded and expanded. The need for rapid upgrading and development of electricity transmission networks is linked to the high potential for RES generation (wind and solar power plants), the connection of electrolysis installations to the electricity transmission grids. The speed at which offshore wind generation is developed will determine the development needs of offshore electricity transmission networks and the volume of investments. RES potential is particularly high in western Lithuania and consumption in the east. This leads to the need to strengthen the interconnectivity of parts of the electricity system of the Republic of Lithuania in the east and west, thereby enhancing national energy security and ensuring faster RES development.

Internal electricity transmission grids in northern Lithuania are to be strengthened between 2030 and 2035. This will ensure better conditions for the transmission of electricity from RES power plants to consumption centres and the electricity needs of users of new technologies (hydrogen production by electrolysis, etc.). The strengthening of electricity transmission networks in northern Lithuania due to higher capacity will also allow further integration of the electricity market into the Latvian electricity transmission system (in both directions). With the increase in electricity production and consumption, as well as to ensure the further development of RES electricity generation and the security of the Lithuanian electricity system, the aim will be to expand cross-system electricity interconnections from an economic perspective. The main priority is additional electricity interconnections with Central Europe, strengthening new and existing electricity interconnections with the Baltic countries, without taking stock of projects already planned. By 2040, an additional 2 GW of electricity interconnections could be connected between Lithuania and Central Europe and electricity interconnections with the Baltic

the countries have increased to 1.5 GW. Another additional 2 GW electricity connection to Central Europe could be installed by 2050, while electricity interconnections with the Baltic countries have been extended to 4.75 GW. Final decisions on the construction of each electricity connection must be taken only after a full assessment of the socio-economic benefits for Lithuanian consumers and the impact on the Lithuanian energy system and strategic objectives.

In the context of the Synchronisation Project described in more detail in Section2.3, the Government of the Republic of Lithuania approved the following specific electricity projects as an integral part of this project:

- Extension of the LitPol Link interconnector, covering actions ranging from the ordering of the power line and the equipment necessary for the reconstruction (extension) of the 330 kV Alytus transformer substation until the completion of the construction works for the reconstruction/extension;
- Reconstruction of the 330 kV power line in Lithuania-Vilnius;
- optimisation and preparation of the electricity transmission network in north-east Lithuania for synchronous operation with the continental European energy system, including the dismantling of the part of the 750 kV cross-system transmission line LN705 (connection with the Republic of Belarus) in the territory of the Republic of Lithuania, the reconstruction of the 330 kV Utena transformer substation, the reconstruction of the 330 kV Ignalina NPP transformer substation and the transfer of the 330 kV Ignalina NPP transformer substation to the distribution facility of the Lithuanian power plant;
- Construction of the 110 kV power line Pagėgiai-Bitenai;
- Extension of 330 kV Bitten transformer substation;
- 330 kV electricity construction of the Vilnius-Neris transmission line;
- 330 kV electricity construction of the Kruonio HAE-Bittenna transmission line;
- 330 kV electricity construction of the transmission line between Darbean and Bittenna;
- 330 kV construction of the 'Future' distribution;
- Construction of Harmony Link interconnection with the Republic of Poland. The synchronisation will take place by 2025 using the existing connection between Lithuania and Poland (LitPol Link) and the subsequent construction of the second land connection between Lithuania and Poland, Harmony Link, which will increase reliability and ensure capacity for electricity trading with continental European countries. The construction of an AC 700 MW dry connection at 220 kV, as well as the reconstruction of the 110 kV Gijs transformer substation in the Vilkaviškis area to the 330/220/110 kV substation. In Lithuania, the project will cover the municipalities of Vilkaviškis, Marijampolė and Kalvarija districts. The Harmony Link land connection project is being implemented by the Lithuanian-Polish electricity transmission system operator Litgrid and PSE. This project received support from the CEF (the project is also on the list of Projects of Common Interest). The project is planned to be implemented in several stages, including studies on the implementation of the interconnection project, spatial planning on the side of the Republic of Lithuania, design of the interconnector, manufacture of equipment, construction works. The start of operation of the interconnector is planned at the end of the year 2030.
- Construction of the 330 kV Distribution 'Workers';
- Installation of new synchronous compensation devices;
- Installation of the Frequency Stability Assessment (FSAS) control system;

- Installation of an automatic generation control system;
- Installation of a system of electrical energy storage facilities;
- The introduction of an energy balance and ancillary services management system;
- Reconstruction of the 330 kV Neries transformer substation;
  - Refurbishment of the NordBalt High Voltage Direct Current Link control system for frequency control.

Gas sector

In the gas transmission infrastructure, the following national strategic initiatives shall be deployed between 2019 and 2024:

- proprietary purchase of an LNG-Storage Facility with Regasification Plant (FSRU);
- A gas interconnection between Poland and Lithuania was built in 2022 (GIPL project);
  - upgrade and develop the natural gas transmission system by deploying smart remote control system equipment and optimising system capacity;
- implement the EU gas network codes;
- the capacity of the connection between Latvia and Lithuania has been increased (ELLI project). Works completed in 2022 and

  increased capacity on the Lithuanian side, works completed in 2023 on the Latvian side;
  - upgrade and develop the natural gas transmission system by deploying smart remote control system equipment and optimising system capacity;
  - installing smart metering devices for natural gas customers only if the results of the cost-benefit analysis are positive.

For regional cooperation, see Section 1.4. For funding, see alsosections 3.3and 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 technologically neutral generation increase the share of local electricity generation every year, but also create additional challenges such as system balancing. By analysing the potential for interconnection/integration of the electricity and gas markets, all envisaged measures will increase market liquidity, increase the share of local generation, ensure security of supply, preserve national competitiveness and reduce the impact of the new energy transition for citizens and businesses.

Table 3.4.1 presents existing policies and planned policies for the internal market (market integration) sector.

Table 3.4.1. Existing and planned policy measures in the internal energy market sector until 2030
.

Section A:

NO	MEASURE
EXISTING MEASURES	
VR1-E	Ensure the adoption of nuclear safety and environmental decisions and recommendations of EU and international organisations in the interest of Lithuania regarding the nuclear power plant in the Republic of Belarus, Astravets district
VR2-E	Refurbishment and/or modernisation of heat points and/or heating systems in multi-apartment buildings, individual and/or public buildings
VR3-E	Discontinue the regulation of retail electricity prices for domestic consumers

VR4-E	Promote the development of smart grids
VR5-E	Promote the use of sustainably produced and supplied biofuels
VR6-E	Market for balancing capacity
VR7-E	Construction of the Harmony Link interconnector
VR8-E	Acquire ownership of a floating LNG storage facility with a gasification plant (FSRU) "Independence"
VR9-E	Establish a centralised data exchange platform – an information technology system for centrally and in a standardised way to store, exchange and store energy data and other information related to energy activities
VR10-E	Create a legal basis for the Data HUB database on the production, supply and consumption of the energy market with open access
MEASURES PLANNED	
VR11-P	Enshrine provisions related to the development of the hydrogen market and infrastructure in the Lithuanian legal framework
VR12-P	Increasing flexibility services
VR13-P	Sydler compressed air storage system
VR14-P	Assessment of the potential for the development of nuclear energy and development of a preliminary business model for a nuclear power plant with a low power modular nuclear reactor generation 4 (MBR)
VR15-P	Legal regulation is in place to enable undertakings operating electricity and natural gas infrastructure to meet GHG emission reduction targets

- R1-E. Ensure that decisions and recommendations on nuclear safety and environmental protection by EU and international organisations are adopted in the interest of Lithuania with regard to the nuclear power plant in the Republic of Belarus, Astravets district. Nuclear safety and environmental decisions and recommendations of EU and international organisations have been adopted in the interest of Lithuania with regard to the nuclear power plant in the Republic of Belarus, Astravets district. (2009-2030)
- R2-E: Renovate and/or modernise heat points and/or heating systems in multi-apartment buildings, individual and/or public buildings. Number of heat points/heating systems modernised – 2 000 units (2019-2022)
- R3-E: Refusal to regulate retail electricity prices for household customers. Phase out the regulation of electricity price caps and public electricity in phase III from 2020 to 2026

Section A:

supply. (2019-2026)

- R4-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 deployment of smart grid elements. The network is being modernised by creating the right conditions for prosumers connected to the network. (2022-2030)
- R5-E. Promote the use of 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 and sustainable throughout the biofuel production and supply

chain, with additional mobile application for actual data reporting) has been developed. (2022-2027)

- R6-E: Balancing capacity market. The Baltic electricity transmission system operators Litgrid, AST and Elering are developing a common market for balancing capacity, which will become operational as of 2025. Operators estimate that it will book up to 1512 MWtotal[88] balancing capacity (FCR, aFRR, mFRR). The new market is being developed in the run-up to synchronisation with continental European electricity grids, after which the Baltic States will act as a common frequency control block. (2018-2025)
- Construction of the interconnection between R7-E. Harmony Link. Second high-voltage connection of 700 MW, Harmony Link, between Lithuania and Poland. The measure aims to ensure full integration with the European Union's internal electricity market through synchronous operation of the electricity system with the continental European networks. (2019-2030)
- R8-E. Acquisition of a floating LNG storage facility with regasification plant (FSRU) "Independence" as a right of ownership. Project to ensure the long-term operation of the LNG import terminal, ownership takeover of the LNG-Independence Storage Facility. On 11 May 2022, the Government of the Republic of Lithuania approved the proposal by AB KN Energies (formerly Klaipėdos Nafta) that, at the end of 2024, when ownership was taken over, the LNG vessel Independence was registered in the Register of Seagoing Ships of the Republic of Lithuania. (2018-2024)
- R9-E: Establish a centralised data exchange platform, an information technology system for centralised and standardised storage, exchange and storage of energy data and other information related to energy activities. The objective of the measure is to implement a customer-driven energy market design and to facilitate the development of new innovative products. Within the scope of the measure, the Energy Market Data Exchange Platform, Data HUB, will be set up on the basis of an existing database. Data HUB will provide market participants with user-friendly and secure access to customer data, simplify the switching procedure and provide services as a one-stop shop, and include other functionalities. An open-access database for the production, supply and consumption of the energy market will be established. (2020-2025)
- R10-E. Create a legal framework for an open-access database for the production, supply and consumption of the energy market 'Data HUB'. The objective 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 Law on Energy of the Republic of Lithuania and the Law on Electricity of the Republic of Lithuania will be implemented. The laws will include definitions of key concepts, competences of the Ministry of Energy of the Republic of Lithuania, the purpose, management and service of Data HUB, and provisions on access, security and exchange of data used by Data HUB. (2024)

Section A:

VR11-P. Approve 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 Lithuania's legal base. The amendments will cover areas such as the tasks of hydrogen network, storage and terminal operators and provisions on 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 markets in

88 https://www.litgrid.eu/index.php/elektros-rinka/balansavimo-rinka/nauja-balansavimo-pajegumu-rinka/32171

renewable and natural gases and in hydrogen (COM(2021) 803) will be transposed into the Lithuanian legal framework. (2024-2025)

VR12-P: Enhancing flexibility services: The measure includes: (1) Establishing a legal framework for electricity-to-consumer trade and electricity sharing. The objective of the measure is 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 Law on Energy. (2024-2027) (2) Adopt regulation allowing for increased participation in the flexibility market. The objective of the measure is to enable and increase the participation of electricity consumers and other market players in the energy sectors (natural gas, heat, etc.) with standardised products/solutions in the provision of flexibility and ancillary services in the electricity system, including balancing the electricity system, managing energy consumption and billing. Assess the need for flexibility and additional services, including balancing the electricity system, in electricity transmission and distribution networks and identify the most cost-benefit measures to meet these needs. Develop X2P/P2X (X to Power to X) flexible tariff mechanism of the electricity transmission system operator enabling the operation of flexible electrolysis facilities. (2025-2027)

Table 3.4.2. Planned electricity system flexibility capacity of[102] *(including cross-border interconnections), MW*

		In 2022	By 2030.	In 2040	Total
Storage facilities	Batteries	0	1500	2000	4000
Storage facilities	Pumped-storage power plant	900	1010	1010	1010
Electrical connections	Cross-system electrical connections	2150	3150	5400	10650
Flexible generation	Biomass and waste cogeneration plants	169	292	292	292
Flexible generation	Natural gas plants (with CO2 capture or other sources of flexible generation)	1100	1100	1100	1100
Flexible generation	MBR	0	0	1000	1500
Flexible demand	Heat generation from electricity (DH and industrial sectors)	0	230	943	1118
Flexible demand	Hydrogen electrolysis (connected to the electricity transmission or distribution network)	0	1300	4000	6500
Flexible demand	Flexibility services provided by electric vehicles	0	170	730	1040
Flexible demand	Heat generation from electricity (heat pumps in households, services sector)	210	770	1750	2500
	Total:	4529	9522	18225	29710

102 Additionally, the potential of small hydropower plants in Lithuania, with a total installed capacity of 28 MW, to provide flexible generation services will also be assessed.

Section A:

- R13-P: Sydler compressed air storage system. The measure includes: (1) Change in legal regulation. The establishment of legal provisions on the development of compressed air storage systems to enable both pilot projects and the main project to be implemented. And to regulate the further implementation and operation of such systems, as well as the regulatory environment. (2024-2026) (2) Pilot project: In order to maintain investors' interest in the further development of electricity generation capacity from RES, the company managing the energy transmission system operator (or its affiliate) must carry out studies on the geological structure of Syder on its suitability for long-term energy storage and the deployment of measures to increase the flexibility of the electricity system, using new technological solutions, and subject to appropriate conditions to ensure the implementation of such a project. (2024-2027) (3) Main (implemented with positive starvation project results). After assessing the suitability of Syder's geological structure for long-term energy storage and the positive results of the pilot project, to create new energy storage capacity by installing a compressed air storage system, thereby increasing the flexibility capacity of the electricity system, creating the right conditions for the further development of RES in Lithuania and for long-term energy storage. (2027-2030)
- R14-P: Assessment of the feasibility of nuclear energy development and development of a preliminary business model nuclear power plant with a Generation 4 Low Power Modular Nuclear Reactor (MBR). The needs of the Lithuanian electricity sector that could be met by the MBR have been assessed. The company implementing the project has been designated. Create MoU with MBR technology developers. A report on the prospects for the development of MBRs in Lithuania has been prepared on the basis of which the draft legislation on the concept of nuclear energy development has been prepared and submitted to the Seimas. Adaptation of the legal environment, nuclear safety and regulatory infrastructure for the development of MBRs. Total appropriations
- R15-P: Legislation has been created to enable undertakings operating electricity and natural gas infrastructure to meet their GHG emission reduction targets. The measure is intended to create a legal framework to enable undertakings responsible for electricity and natural gas infrastructure to meet their GHG emission reduction targets. (2025-2028)

Financing of planned market sectormeasures[89]**.** The additional investment is mainly required for measure VR13-P, but the measure would be financed by private (corporate) funds. Measure VR14-P should also be financed in order to make future data- and research-based decisions on the development of nuclear energy. The total financing of measures in the internal market sector is shown in Table 3.4.4.

Internal Market Sector Policy

The electricity system in Lithuania is undergoing major changes. 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 is becoming increasingly important and enabled

Section A:

the conditions for participation in the market are motivating consumers to adapt their electricity consumption to real market prices and the situation in the system.

The expected rapid development of electric vehicles and renewable energy technologies will have a substantial impact on the functioning of the electricity systems. As a result, customers who can adapt to changing conditions will play an increasingly important role in ensuring sound management of electricity

89 Indicative need for funding.

systems and rational investment in distribution systems. Customers who are able to change consumption schedules flexibly and contribute to a more stable system work will benefit from incentives.

The Lithuanian DSO implements a promotion plan for prosumers' development, which removes bureaucratic obstacles for producing consumers to connect to the electricity grid. Consumers who have installed solar power plants generate electricity for their own use and are actively involved in the exchange process with DSOs.

A traditional customer becomes not only a consumer, but also a producer of energy. Renewable resources and self-generation are the future of energy, a trend which is emerging in all advanced countries where the decentralisation of infrastructure is gaining momentum.

The DSO proposal abandoned pre-conditions, development and production permits, in some cases abandoned the project, lowers the cost of connecting prosumers to the grids, allows companies to become prosumers, revised the power limitation requirements, modified financial incentives for solar power plants, abandoned control accounts, and investments needed for the sustainable integration of prosumers foreseen in the DSO investment plan. The aim is to create a sustainable prosumer ecosystem and ensure its sustainable development. The development of small energy, targeted at consumers who produce electricity themselves, is one of the priority activities of the Lithuanian Ministry of Energy.

Virtual power plants and demand side management are another important tool. Artificial intelligence and other innovations are changing this area, leaving consumers no longer passive and can become active players in the market. The use of technologies such as virtual power plants or demand-side control devices generates monetary benefits in certain cases. It is understood that a virtual power plant consists of a large number of different types of customers, be it home consumers, electric cars and businesses, who can change their consumption and production behaviour depending on their needs.

A study carried out by the international consultancy company E4tech in Lithuania has shown that a household consumer can potentially generate up to EUR 300-400 in additional revenue per year in Lithuania when providing virtual power plant services. The British market model was used for the calculations.[90]

Ignitis Group, the largest holding of state-owned energy companies, invested in the British company Moixa, a technology-creating company for batteries and virtual power plants. Another investment was also made to the Estonian start-up Fusebox, which is developing a platform to help businesses change their electricity consumption behaviour.

Theplan of measures for the implementation of Lithuania's National Strategy for the Development of Renewable Energy Sources[91] was intended to develop and implement support schemes that would facilitate the use of renewable energy sources, giving priority to projects with the lowest cost and enabling every potential investor.

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participation in renewable energy activities following transparent, simple, non-discriminatory and public selection procedures.

The Law on electricity of the Republic of Lithuaniaspecifies[92] that a vulnerable electricity consumer is a household electricity consumer who receives and/or has the right to receive financial social assistance in accordance with the Law on monetary social assistance for deprived persons and who, in accordance with

90 https://nlea.lt/data/public/uploads/2019/05/elektros-energijos-ir-gamtiniu-duju-rinku-apzvalga_2019-geguze.pdf

91 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.377162/asr

92 https://www.e-tar.lt/portal/lt/legalAct/TAR.F57794B7899F/asr

the procedure laid down in this Law and its implementing legislation, is entitled to additional guarantees imposed on 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 supplied, the electricity transmission service or other related services within the prescribed time limit, if the debt of those vulnerable customers with the supplier of security or supplier of electricity is or has not exceeded 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 transfer of electricity may not be interrupted by vulnerable customers on Fridays, Saturdays, Sundays, public holidays and public holidays or when the average daily air temperature is lower than + 15 °C or higher than + 30 °C, except in the cases provided for in Article 71 and Article 72(1) and (3) of this Law, without having to pay for the supply of electricity, the transmission of electricity or other related services within the prescribed time-limit. In such cases, the supply to the consumer may be interrupted on the day following the end of the circumstances set out in this paragraph, provided that the vulnerable consumer has been informed in accordance with the procedure laid down in the Rules on the supply and use of electricity and other legal acts implementing this Law;

3. vulnerable customers shall have the right to settle with the supplier of electricity of last resort by the last day of the month following the calendar month during which the transmission and/or supply of electricity or the provision of other related services to the customer takes place, unless longer payment terms are agreed upon at the request of the vulnerable customer;

4. when vulnerable customers are connected to the electricity networks managed by the distribution system operator, if the connection fee exceeds EUR 600, the 60 % part of the connection premium shall be paid within 10 calendar days of the signature of the customer's connection service contract and the other part within 10 calendar days of the completion of the works. The connection service starts with the payment of the first instalment of the connection service by the vulnerable customer. The distribution system operator shall notify the vulnerable customer of the completion of the works set out in the works contract and provide him with the documents required for payment in accordance with the procedure laid down in the connection service contract;

5. where vulnerable customers fail to pay any electricity, transmission or other related services within the specified time limit, no interest shall be charged for 3 months from the date on which the deadline is exceeded.

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Storage facilities

By 2030, the aim is to install electricity storage, thus achieving two objectives:

1. Store energy for longer periods, thus encouraging legal and natural entities to invest in electric vehicles, alternative facilities for space heating (e.g. air-to-air pumps, etc.) or self-consumption electricity;

2. Balancing the electricity system, i.e. by installing storage facilities at the source of electricity generation or by directly connecting to the distribution/transmission network).

In order to ensure the further rapid development of renewable energy sources (RES), to contribute to the creation of a competitive balancing market and to enhance national energy security in Lithuania and other

Baltic countries (Latvia and Estonia) in the region, financial incentives for the installation of new electricity storage facilities have been initiated.

In early 2024, the EIB approved the first application from the Modernisation Fund to finance investments in new grid balancing capacity. The application concerned an amount of EUR 48 million for electricity storage facilities built and connected at one point together with an existing or planned RES generation source. According to the application, EM committed to achieve the output indicator 'New grid balancing capacity connected to electricity generation from RES generation facilities'. The target value for 2026 is 100 MW or 400 MWh. Achieving the target has a direct impact on CO2 reduction, i.e. contributes to a reduction of 611 460 t CO2 per year. The CO2 reduction value has been calculated by comparing the situation in the electricity market where balancing storage devices are installed with the situation where balancing capacity is provided by gas-consuming power plants.

Another measure is also planned at the end of 2024 to promote investments in electricity storage facilities directly connected to the transmission grid, the main purpose of which would be to provide balancing services to Litgrid. Around EUR 100 million from the Modernisation Fund is planned for this measure. The aid under this measure is expected to create additional capacity of up to 800 MWh of electricity storage facilities.

Liberalisation of the electricity market

The liberalisation of the electricity market takes place in accordance with the requirements of European Union legislation. As of 1 January 2010, after the entry into force of the Lithuanian electricity market plan, consumers in Lithuania have been able to purchase electricity from independent electricity suppliers. Commercial customers have been obliged to purchase electricity from independent suppliers since 2013. Since 2021, household customers have been obliged to phase out monopolistic public supply services:

- As a first step, with effect from 1 January 2021, final electricity price regulation was waived for those 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 relevant communities and community-based organisations and associations. This was not the case for vulnerable customers (residents receiving social assistance). As of 01/01/2021, public supply is denied to household customers who consumed at least 5 000 kWh/year on the facility (201906-01 to 31 May 2020), as well as to consumers connected to medium-voltage grids (excluding communities and socially vulnerable customers).

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- As a second step, with effect from 1 July 2022, the regulation of final electricity prices was abandoned for all household customers with an actual electricity consumption of more than 1 000 kWh between 1 June 2020 and 31 May 2021, except for vulnerable customers. As of 1 July 2022, public supply shall be abandoned for household customers that have consumed at least 1 000 kWh/year (except for communities and socially vulnerable consumers) in the facility (between 1 June 2020 and 31 May 2021).
- As a third step, from 1 January 2026,final[93] electricity prices are no longer regulated for all household customers, who will have to choose an independent electricity supplier by 2025. From 1

93 This deadline was postponed from 1January 2023 to 1 January2026 due tothe energy crisis and high electricity prices in2022.

January 2026, public supply shall be phased out for all consumers, including communities and socially vulnerable consumers.[94]

Baltic-Nordic Joint Balancing Market – Baltic-Nordic Coordinated Balancing Area 2018. In 2016-2017, the Baltic Transmission System Operators developed a common Baltic balancing market for the frequency restoration reserve for manual activation and harmonised electricity balancing principles in the Baltic States, based on the Baltic States' market participant principles, and developed a common Baltic balancing market for the frequency restoration reserve for manual activation and an accounting model for electricity imbalances between the Baltic States. The Baltic States' single balancing market became operational as of January 2018. The barriers to access to the Baltic balancing market were reduced by reducing the minimum bid volume to 1 MW.

Agreement on the development of a regional gas market model in the Baltic States and a common entry-exit tariff regime. The Regional Gas Market Coordination Group (RGMCG) set up in 2015 under the BEMIP initiative consists of representatives of Ministries of Finland, Estonia, Latvia and Lithuania, national regulatory authorities, transmission system operators, LNG terminal operators, distribution system operators. RGMCG's involvement in the development of the regional gas market plays an important role in achieving the objectives of the BEMIP. Between January 2015 and now, the RGMCG has achieved a number of milestones in its work on short- and medium-term measures to improve the Eastern Baltic regional gas market.

A study was carried out on the creation of a regional gas market in Finland and the Baltic States. The results of this study were taken into account in the follow-up of the RGMCG. These actions were included in the Action Plan for the establishment of a Regional Gas Market, which set out the necessary measures to ensure the functioning of the Eastern Baltic regional gas market, namely:

- creation of a single tariff zone for Finland, Estonia and Latvia (FINESLAT) (from 2020);
- Estonia-Latvia Joint Balancing Zone (from 2020);
- before the Russian war in Ukraine, Lithuania's accession to the common zone until 2023 was planned. However, due to the energy price crisis, the emergence of additional infrastructure (LNG terminal in Finland) as well as the failure of the parties to reach an agreement on an inter-system compensation mechanism for operators (ITC) that would meet all the parties involved (the changed geopolitical situation in 2022 led to fundamental changes in the natural gas market that led to the ITC mechanism previously developed on the basis of others.

A SKIRSNIS

assumptions about the functioning of the market no longer corresponded to the current situation and could not benefit all participating countries), Lithuania's planned accession was postponed indefinitely (until RGMCG submits an updated action plan).

The countries of the region are currently not actively engaged in the development of a common gas market design.

94 For further information: https://www.vert.lt/Puslapiai/bendra/Elektros-energijos-tiekimas.aspx

3.4.4 Energy poverty

In order to achieve a holistic solution to energy poverty, existing and planned measures (Table 3.4.3) aim to reduce the share of households that contribute a significant share of their income to energy costs to 10 % in 2030. In order to achieve this, national efforts must focus on four dimensions: improving energy efficiency, affordability of energy resources, increasing incomes of small households and informing consumers. It is important to note that the RES29-P measure, financed by the RRF and which will create RES communities in municipalities, should contribute significantly to the objectives of reducing energy poverty and increasing RES levels, using revenues to compensate poor (energy poor) populations. Find out more about the measurein section 3.1.3 .

3.4.3. table. Existing and planned policy measures in the internal energy market (energy poverty) sector until 2030

NO	MEASURE
EXISTING MEASURES	
EN1-E	Compensation for the cost of heating the dwelling
EN2-E	Payment of credit taken out for the renovation (modernisation) of a multi-apartment building and interest for persons entitled to compensation for heating costs of the dwelling
EN3-E	Encourage deprived persons to purchase solar power plants and/or replace fossil fuel heat installations
REI6-E	Create energy resource communities in municipalities, with a share of built power plants being allocated to the poor (energy poor)
MEASURES PLANNED	
EN4-P	Information on compensation and energy savings for hard-to-reach consumers (not using information technology tools)
EN5-P	Create an information hub for information on energy savings, compensations and energy communities

EN1-E – Reimbursement of housing heating costs. For deprived residents, the part of the cost of housing heating is reimbursed in excess of 10 % of the difference between income and 2 State-supported income (EUR 314 in 2023 and EUR 352 in 2 024 in SRP 2) per family member or 3 State-supported income amounts (EUR 471 in 2023 and EUR 528 in SMP 3 in 2024) per person living. (since 1995 (permanent, continuous)).

EN2-E – Payment of credit taken for the renovation (modernisation) of a multi-apartment building and interest for

persons entitled to reimbursement of the heating costs of the dwelling. Payment of credit and interest to the owner of an apartment in a multi-apartment building who has implemented or is implementing a State- or municipality-sponsored project for the renovation (modernisation) of a multi-apartment building and is entitled to compensation for the costs of heating the dwelling. (since 2009 (permanent, continuous)).

EN3-E: Promote the purchase of solar power plants by deprived persons and/or the replacement of fossil fuel heat installations. Within the scope of the measure, the purchase of solar power plants and the replacement of fossil-fuel-based heat installations for deprived persons will be financed. Potential beneficiaries are natural persons and/or persons living with them who, in accordance with the procedure laid down in the Law of the Republic of Lithuania on monetary social assistance for deprived residents, received cash social assistance before 20 April 2022. 85 % of funding Fixed rate of 1 kW equipment. (2023-2030)

REI6-E. Create energy resource communities in municipalities by allocating some of the power plants built to the poor (energy poor). ***More information on the measure can be found*** in the ***Renewable Energy Sources section.***

EN4-P – Information for hard-to-reach (not using information technology) consumers on compensation and energy savings. The objective of the measure is to inform hard-to-reach consumers about possible compensations and ways to save electricity. When visiting consumers, social workers will inform consumers about the possibility to apply for compensation, mergers with the AEIB, energy efficiency, building renovation and energy savings. (2023-2030)

EN5-P. Establish an information hub for information on energy savings, compensation and energy communities. Experience shows that trust is a key element for the successful inclusion of people affected by energy poverty, both in identifying and reaching out to beneficiaries of support schemes. Effective communication and information sharing in a user-friendly way play a crucial role in addressing energy poverty. Households affected by energy poverty have different needs and opportunities to participate in these processes and all possible barriers to accessing relevant information must be removed. Within the scope of the measure, an information hub will be transferred to municipal service units. The information hub will provide information on compensation, connection to renewable energy communities, energy efficiency, building renovation and energy savings. On the basis of this information, municipal staff will be able to advise residents applying for compensation and energy savings. (2023-2030).

Energy efficiency

Over the last couple of decades, Lithuania has seen a significant difference between the new construction of energy-efficient households and the vast majority of households living in old construction housing. The distribution of heat in old multi-apartment buildings is inefficient and uneven, for technical reasons it is not possible to regulate heat in apartments, and in part of the floors (upper or lower) even during the heating season, temperatures are below the minimum hygiene standards. Energy efficiency can help alleviate energy poverty. The relevant measures are divided into the following groups: improving the energy efficiency of buildings and installations and changing consumer behaviour.

Measures in the field of efficiency of buildings and installations include renovation of buildings (EE2-E and EE10-E); and

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converting boilers into more efficient technologies (EE7-E). The modernisation of domestic heating and hot water systems in multi-apartment buildings (“small renovation”) (EE8-E) will be promoted to further progress. These and related measures are described in more detail in section 3.2. of energy efficiency.

Energy prices

High energy prices are another potential cause of energy poverty. In Lithuania, energy prices that meet consumers’ needs take into account the potential for technological progress and the promotion of a competitive market (more broadly in Sections 2.4.3 and3.4.3).

As a small open economy, Lithuania purchases all imported energy at global market prices, but wages are lower than in Western European countries, resulting in a significantly higher share of the population in various forms of energy poverty. The objective of the NENS is to phase out the regulation of retail electricity selling prices.

In the area of energy poverty, the OERT calculator related to market liberalisation is also relevant, allowing consumers to compare offers from different suppliers and to choose the best deal. 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 reducing energy poverty. Accordingly, a well-informed customer can access financial support more easily, take measures to improve energy efficiency or choose the most suitable independent energy supplier within the scope of market liberalisation.

In order to ensure that vulnerable groups in society receive compensation, it is also ensured that information on benefits is available to consumers. Currently, information on reimbursement of housing heating and water costs, including an interactive calculator, is available in the Family Social Assistance Information System (SPIS) incombination[95] with information on existing social assistance (social benefits and compensation, social assistance for pupils, social services, etc.).

Agreements with energy suppliers to inform consumers about the services they provide (EE6-E) are an additional measure to raise consumer awareness of energy efficiency. For the period 2017-2030, energy suppliers will ensure the implementation of the scope of consumer education and advice and of the measures provided for in agreements between them or through other persons.

Policy coherence

It is important to note that policies and measures on energy poverty aim at policy coherence and promote a cross-sectoral approach, which is most clearly visible through a combination of energy efficiency and financial support measures.

For example, persons reimbursed for heating have a duty of care to ensure that their costs are

minimise and contribute to increasing energy efficiency. TheLaw of the Republic of Lithuania on monetary social assistance for deprived residents[96] states that owners of apartments in a multi-apartment building who apply for reimbursement of the heating costs of a dwelling must participate in the deliberation and decision-making process at the meeting on the implementation of the 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 persons who fail to comply with these obligations, if the project to refurbish (modernisation) a multi-apartment building has not been launched as a result of their actions (failure to act), the right to compensation for the costs of heating the dwelling is limited.

An identical process is also visible when choosing which buildings should be refurbished. Where buildings have to be renovated and renovated if they score the same scores under other selection criteria, priority shall be given to buildings occupied by socially vulnerable people. Such processes improve the coherence of measures and provide mutual benefits in terms of energy efficiency and protection of vulnerable groups.

Financingof planned internal energy market measures

95 https://gyventojams.spis.lt/

96 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.215633/asr

3.4.4. the financing of the measures is presented in the table below. The most costly project is the takeover of the Klaipėda LNG ship Independence, financed by AB KN Energies.

3.4.4. table. Indicative financing needs for existing and planned measures in the internal energy market (including energy poverty).

Sector	Existing measures, EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
Internal Market	Total Funding	Public funds	Climate Change Programme, EU Funds Investment (2021-2027), Connecting Europe Facility Facility, CEF)	Total Funding	Public funds	State budget, other funds
	996,50	681,11		122,00	2,00[97]	

Research, innovation and competitiveness dimension

Section 2.5 ‘National challenges and objectives’ of this plan describes the strategic documents, objectives and actions defining national policy guidelines to promote research and experimental development and innovation in the field of energy: NENS, Smart Specialisation Concept, 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 offered by the Funds as planned and relevant in the strategic documents.

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3.5.1. table. Existing and planned policy measures in the research, innovation and competitiveness sector until 2030

NO	MEASURE
EXISTING MEASURES	
MT1-E	Attracting investors in battery manufacturing for electric vehicles
MT2-E	Enabling a pilot environment for energy innovation
MT3-E	Joint Nordic-Baltic Energy Research Programme
MT4-E	Ignitis Group Smart Energy Venture Capital Fund
MT5-E	Carrying out research by activating funds generated by the RES statistical surplus sold by Lithuania to Luxembourg
MT6-E	“Smart specialisation”
MT7-E	“Experiment”
MT8-E	“Intellectual”
MT9-E	“Pre-commercial purchases in LT”
MT10-E	Ensure the demand for professionals in the energy sector (heat energy, electricity, RES and others) and the promotion of the energy profession in Lithuania
MT11-E	Step up cooperation between the Lithuanian state, higher education institutions and energy companies in the training of professionals and their involvement in ongoing pilot projects.
MT12-E	Organise regular hackathons and innovation workshops in the energy sector according to the cleaned energy sector’s innovation needs/formulated challenges (national and international dimension).
MT13-E	Analyse the feasibility of an Open Innovation Testing Platform (e.g. Open Innovation Test Bed) tool in the field of energy and initiate its establishment in Lithuania as appropriate
MT14-E	Increase the indicators of the cumulative index of the Lithuanian Energy Innovation Ecosystem
MT15-E	Establishment of a Centre for the Development of Energy Technology
P6-E	Promoting technological eco-innovation: Eco-innovation LT and Eco-innovation LT+
MEASURES PLANNED	
MT16-P	Implement research on catalytic materials to assess the potential use of these materials to reduce CO2 emissions and/or produce hydrogen
MT17-P	Implement nuclear research to assess future use of nuclear energy and monitoring methodologies
MT18-P	Implement research on the use of hydrogen as fuel, gas and sector integration
MT19-P	Assess the feasibility of adapting the natural gas transport system to the transport of a mixture of green hydrogen and methane
MT20-P	Implement energy research in the field of digitalisation, in order to encourage digitalisation of the sector
MT21-P	CCS/CCUS deployment (purchase of biogenic CO2 capture and transport equipment)
MT22-P	Enhancing the expertise of Lithuanian institutions and technical support organisations in the field of MBR and training of specialists for nuclear energy

Section A:

MT1-E. Attracting investors in electric battery manufacturing. The measure plans actions to attract investment to build production capacity for batteries or their components in Lithuania. (2022-2025)

MT2-E – Empowering the pilot environment for energy innovation. The legalisation of the provisions of the pilot environment by preparing 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 the NERT the right to grant exemptions both to State-regulated undertakings operating in this environment and to other economic operators who do not hold the necessary permits or licences, thereby encouraging energy innovation. (2019-2030)

MT3-E – Joint Nordic-Baltic Energy Research Programme. Funding projects for energy research intra-Baltic and Baltic Nordic. Research topics identified: (a) decarbonisation of transport; (b) energy efficiency in buildings and industry; (C) analysis of energy systems; (D) challenges and opportunities for regional electricity interconnections/markets. (2018-2024)

MT4-E. Ignitis Group smart energy venture capital fund. The Smart Risk Capital Fund, managed by Contrarian Ventures, invests in start-ups developing new technologies in energy. (2017-2030)

MT5-E: Performance of research through the activation of funds generated by the RES statistical surplus sold by Lithuania to Luxembourg. The Facility will co-finance research and pilot projects in line with the themes of the Horizon Europe Clean Energy Transition Partnership. (2023-2028)

MT6-E. Smart Specialisation. For 2021-2027, 3 TEPI (smart specialisation) 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 has been coordinated with the social partners in Lithuania and with the European Commission. Between 2021 and 2027, smart specialisation will include health technologies and biotechnology; new production processes, materials and technologies; information Communication and Technology Priorities: Of these, the most relevant NECPs are 'New manufacturing processes, materials and technologies'. (2014-2023)

Table 3.5.2. Smart Specialisation R & TPI priority most relevant for NECPs

Priority for TEPI	Priority themes
New production processes, materials and technologies	1. Photonics and laser technologies. 2. Advanced materials and designs. 3. Flexible product design, production and process management, design technologies. 4. Energy efficiency, smartness. 5. Renewable energy sources:

In the Smart Specialisation, activities are planned in line with the lines of application of the concept of smart specialisation in Lithuania:

Section A:

- In the first application stream, the following activities are planned:
  - o strengthen the capacity of researchers, increase the attractiveness of researchers' careers;
  - o strengthen innovation capacity, develop the skills needed by SMEs for their workforce; to adapt to the technological change of the economy and industrial transformation.
- In the second application stream, the following activities are planned to be implemented:
  - o promote applied R & D and strengthen scientific management and commercialisation of knowledge

skills in higher education institutions;

- promote the operationalisation of the TEPI infrastructure and the knowledge transfer and commercialisation system;
- 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 application line, the following activities are planned:

- increasing the level of internationalisation of science;
- encourage the participation of SMEs in international R & I initiatives;
- encourage the attraction of foreign direct investment.

MT7-E "Experiment". The measure will encourage companies to invest in research and/or experimental development for the development of innovative products, services or processes, as well as stimulate the development of enterprises by investing in the creation and development of R & D and innovation infrastructure. (2018-2023)

MT8-E "Intellectual". The measure will encourage companies to invest in research and/or experimental development for the development of innovative products, services or processes, as well as 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 in LT. The measure will stimulate demand for innovation in all areas of public governance. The share of public sector investment in innovative procurement is expected to increase steadily until it accounts for at least 20 % of the public sector investment planned for each ministry's procurement in 2027. (2018-2023)

MT10-E. Ensure the need for professionals in the energy sector (heat energy, electricity, RES and others) and the promotion of the energy profession in Lithuania. The objective of the measure is to:

- Identify the need for specialists in conventional energy in the long term;
- Drawing up and communicating lists of new professions in the energy sector;
  - Establish a rolling programme for the promotion of energy studies involving enterprises and associated structures in the energy sector and other industries (energy company grants, paid apprenticeships in local enterprises, participation in study/career exhibitions);
- Increase the attractiveness and modernity of study programmes in the energy strand (renamed and

update study programmes or modules thereof);

- Establish a communication plan for the promotion of the energy profession (creation of a programme of energy ambassadors for students/pupils, visits to schools, visits by pupils to energy companies until the choice of profile in the last school classes, cooperation with STEAM centres);
- To ensure that student master's completion and doctoral research contribute to addressing the challenges of the state's energy sector. (2024-2030)

MT11-E: Enhance cooperation between the Lithuanian State, higher education institutions and energy companies in the training of professionals by involving them in ongoing pilot projects. The development of competences for the use of new clean energy technologies shall be pursued on a continuous basis.

Competence development should be linked to investment in training and research infrastructure (e.g. green hydrogen valleys). By developing competences, clean energy technology value chains can create new jobs in sectors where they will be produced, transported and used. Some should develop or change qualifications, acquire new competences that meet the development needs of clean energy technologies. (2024-2030)

MT12-E: Organisation of regular hackathons and innovation workshops in the energy sector according to the cleaned energy sector innovation needs/formed challenges (national and international dimension). The aim is to initiate the development of innovative products, services and solutions, ways to integrate the circular economy in the energy system, with a view to making the most efficient use of natural resources, energy end-use, as well as over and by-flows of energy. (2024-2030)

MT13-E. Examine the feasibility of an Open Innovation Testing Platform (e.g. Open Innovation Test Bed) tool in the field of energy and initiate its establishment as appropriate. The analysis of the feasibility of an Open Innovation Testing Platform (e.g. Open Innovation Test Bed) tool in the field of energy aims at initiating an energy-driven Open Innovation Testing Platform (e.g. Open Innovation Test Bed) in Lithuania. Total appropriations

MT14-E. Increase the indicators of the summary index of the Lithuanian Energy Innovation Ecosystem. The measure aims to improve the state of the Lithuanian energy innovation ecosystem. The cumulative index of the Lithuanian Energy Innovation Ecosystem is calculated on an annual basis, based on which proposals for regulatory interventions are made. (2024-2030)

MT15-E – Establishment of a Centre for the Development of Energy Technology. The main methodological axis of energy technology development centres is training plants integrating a wide range of renewable energy and energy efficiency technologies, deploying different energy sources, such as electricity storage facilities and fuel cells, and equipped with a complete system for monitoring and managing the energy performance of the building. The prototype of a product (process, service) developed in such a centre would be tested and demonstrated in an environment similar to the actual operation and subject to applied research when needed. (2024-2030)

P6-E. Fostering 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 introduce non-technolological eco-innovations, i.e. environmental management systems (EMS), production technological and/or environmental audits and product design

ecodesign principles. (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 introduce technological eco-innovations in order to reduce the negative effects of climate change and the greenhouse effect. (2018-2023)

MT16-P. Implement catalytic research to assess the potential use of these materials to reduce CO2 emissions and/or produce hydrogen. Within the scope of the measure, research on catalytic materials will be implemented to assess the potential use of these materials to reduce CO2 emissions and/or green hydrogen. Within the scope of the measure, the aim will also be to develop a prototype of a device that could act as a catalyst for CO2 reduction and/or hydrogen production. Continuous studies will be carried out by a single group of scientists throughout the lifetime of the measure. The Research Coordinating Authority is the Scientific Council of Lithuania. (2024-2029)

MT17-P. Implement nuclear research to assess future use of nuclear energy and monitoring methodologies. Within the scope of the measure, a research programme in the field of nuclear energy will be implemented. Scientists and think tanks will be invited to carry out research on the following topics:

- the safety of energy generation and the use of higher actinides and thorium for energy generation by small modular nuclear reactors;
- modification of new materials for batteries and radiation sources with ion-fibres and nuclear spectrometry tests;
- development of spectrometric and isotopic methodologies and instruments for the monitoring and verification of greenhouse gas emissions.

The coordinating authority of the programme is the Lithuanian Scientific Council. (2024-2026)

MT18-P. Implement research on the use of hydrogen as fuel, gas and sector integration. Within the scope of the measure, research will be implemented on the use of hydrogen for synthetic fuels, gas and the feasibility of smart integration technologies for sectors (heat, electricity, etc.) (Power-to-Gas, Power-to-X) in the Lithuanian energy sector. (2024-2030)

MT19-P: Assess the feasibility of adapting the natural gas transport system to the transport of green hydrogen and methane. The objective of the measure is to identify how to adapt the existing gas system to the transport of green hydrogen. Within the scope of the measure, a study programme will be carried out to assess the technical parameters for adapting the natural gas infrastructure for hydrogen transport. The market will also be explored and the possibilities of connecting local hydrogen customers and producers to natural gas networks will be explored. (2026-2028)

MT20-P: Implement research on the digitalisation of energy to boost the digitalisation of the sector. Within the scope of the measure, research on the digitalisation of the energy sector will be implemented on the use of open data for large energy companies, the creation of digital twins, etc. (2024-2029).

Deployment of MT21-P. CCS/CCUS technologies (acquisition of biogenic CO2 capture and transport equipment). The measure will stimulate the development of CO2 capture technologies in energy and industrial enterprises,

Section A:

CO2 transport infrastructure and enable the uptake of CO2 for the development and production of climate-neutral products (synthetic gases, synthetic methane, synthetic methanol, alternative fuels, polymers, etc.). The measure would reduce to 500 kt CO2eq by 2030 (2027-2030)

MT22-P: Enhancing the expertise of Lithuanian institutions and technical support organisations in the field of MBR and training of specialists for nuclear energy. A progress tool has been developed to enable the training of nuclear specialists and specialists in other specialisations with a nuclear orientation, the training methods and the quantities needed for the specialists envisaged. Activities are foreseen to carry out research to address problems related to the introduction of MBRs in Lithuania’s energy system. (2024-2030)

Measures to boostindustrial competitiveness

Section 2.5 of this plan describes the objectives formulated by the Ministry of Economy and Innovation to promote industrial transformation and competitiveness. The objectives are achieved through activities approved under Progress Measure No 05-001-01-04-02 ‘Incentivising the transition of enterprises towards a climate-neutral economy’. The industrial and industrial process measures listedin Section 3.1.1 also contribute to the promotion of industrial competitiveness.

Guidelines for the transition of Lithuania to a circular economy by 2035, endorsed by the Lithuanian Government meeting of 21 June 2023, integrated measures to promote industrial competitiveness:

- promote applied research and experimental development on the circular economy by providing for key investments in reuse, the substitution of fossil raw materials with bio-based and secondary raw materials, the production of long-lived products, the development of new curricula, and changes in consumer habits;
- include circular economy in mainstream education and vocational training programmes;
- carry out an analysis of potential investors that can contribute to the development of a circular and green economy in value chains of interest to Lithuania and the EU;
- establish requirements for the use of secondary raw materials and alternative materials, replacing fossil and non-metallic resources, minerals;
- promote the acquisition of digital and circular technologies and/or systems (e.g. digital-circular twins) supporting the development of the circular economy;
- promote the uptake of innovative environmentally friendly technologies, i.e. promoting the production of sustainable products, in companies operating in the S4 fields;
- promote the development and/or deployment of environmentally friendly products or technologies;
- promote the transition of businesses towards a circular economy.

To improve the competitiveness of clean energy technologies in the country, it is important to:

1. increasing cost competitiveness as a key factor, with a focus on reducing the cost of clean energy technologies through economies of scale, technological progress, manufacturing

Section A:

improving the efficiency of processes and facilities through research and experimental development, simplified supply chains and incentive policies to reduce costs;

2. implement policy and regulatory support measures to increase the deployment of clean energy technologies, including feed-in tariffs, energy networks (e.g. transmission, distribution) and other energy infrastructure that contribute to the development of clean energy technologies in the country and for which regulated prices, regulatory regime and/or pricing principles are set and/or planned, the introduction of new regulatory principles, mechanisms, tax breaks, grants, renewable portfolio standards to ensure clear and stable policy frameworks ensuring a predictable business environment and attracting investment;

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, and accelerate R & D;

4. promoting international cooperation and sharing of knowledge, good 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 financing opportunities;

6. ‘development of a skilled workforce’ means investing in training programmes and upskilling to prepare skilled workers for the clean energy industry, developing education and training programmes tailored to the needs of industry to meet the needs of specialised knowledge and competences;

7. financing and investment support: improve access to financing and investment for clean energy projects 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

SET-Plan (Strategic Energy Technology Plan) is the technological pillar of EU 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. Representatives of Lithuania participate in the following SET-Plan Implementation Working Groups:

- batteries;
- nuclear safety;
- high Voltage Direct Current (HVDC) technologies;
- Capture, storage and utilisation of CO2.

The information received in the SET-Plan format is used to prepare or update national energy strategy papers, identifying viable energy technologies for a country and research needs for their development.

Section A:

Clean Energy Transition Partnership (CETP) co-funded byFP Europe

The Ministry of Energy of the Republic of Lithuania has joined the Clean Energy Transition Partnership (CETP) co-funded by the FP Europe Horizon Europe. It is based on a joint programme agreed and implemented between the partners, and on the partners' commitments to provide financial and in-kind contributions. CETP brings together more than 50 research funding institutions (including LMT) and policy makers from 30 countries, mobilising national budgets and launching joint calls every year. As part of the partnership, the LMT advises Lithuanian applicants and finances Lithuanian participants involved in the implementation of the projects.

In 2022, the Ministry of Energy earmarked EUR 1.4 million for the following thematic calls for the Partnership:

- "Optimised integrated European energy system without greenhouse gas emissions";
  - "Ensuring climate neutrality through energy storage technologies, renewable fuels and carbon capture and utilisation/storage".

Financingof planned research, innovation and competitiveness measures

Table 3.5.3 shows the financing of the measures. The public investment of the planned measures will mainly focus on research into the use of hydrogen, nuclear energy and/or the digitalisation of the energy sector.

Table 3.5.3. Indicative funding needs for existing and planned measures in the research, innovation and competitiveness sector.

Sector	Existing measures, EUR million		Available sources of funding	Planned measures in EUR million		Potential sources of financing
	Total Funding	Public funds		Total Funding	Public funds	
Research, innovation and competitiveness	783,96*	552,43*	Investment from EU funds (2014-2020), Municipal funds, State budget.	76,30[98]	39,70**	The Modernisation Fund, Horizon Europe FP, Euratom, EU Innovation Fund, Cohesion Fund, Connecting Europe

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						Facility (CEF), other sources of the State budget.

* ‘smart specialisation’, ‘Experiment’, ‘Intellectual’, ‘Pre-commercial procurement in LT’, ‘Promoting technological eco-innovation’: Eco-innovation LT and promotion of technological eco-innovation: The ‘Eco-innovation LT+’ part is made up of horizontal funds, only part of which will be used for energy and climate-related projects (selected through joint tenders).SECTION B: ANALYTICAL BASIS

STATE OF PLAY AND FORECASTS EXISTING POLICIES; AND

MEASURES[99]

99 The state of play is that described by the latest available data on policies and measures at the time of the preparation of the NECPs. Existing policies and measures include policies and measures already in place or adopted and for which an implementing decision has been taken and there is a clear commitment to implement them within the intended scope, i.e. allocated funding, adopted legislation, etc. The implemented policies and measures are policies and measures that are already in place, i.e. directly applicable European Union or national legislation or for the implementation of the financial and/or human resources instrument and/or calls for proposals are in force.

CFPC?*3

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‘PERHAPS’ *GHG OF GDP

Figure 4.1.1 Lithuania’s GDP andGHG emissions indicators 1990-2022

Forecasted evolution of the main external factors influencing energy system and GHG emissions developments

This chapter describes the scenario for the implementation of existing policies and measures (PEMs): the impact of existing policies and measures on achieving GHG emission reduction targets, increasing RES use and energy efficiency. It also describes the impact aspects of energy security, the internal energy market and research, innovation and competitiveness.

Macro-economic factors are assessed by checking:

The two main indicators used in the modelling of energy and GHG indicators were GDP (gross domestic product, constant prices (circading)) and Lithuania's population development until 2040.

Gross domestic product. Lithuania's GDP grew steadily between 1994 and 2007, reaching its peak in 2007 (EUR 34.9 billion), but in 2008-2009 the country's economy was in recession due to the impact of the global financial crisis. After the recovery from the crisis, GDP started to grow again since 2010, reaching – EUR 43.4 billion in 2019. Due to the global COVID-19 pandemic and the related economic restrictions, Lithuania's GDP fell in 2020. However, already in 2021, GDP increased by 6 % compared to 2020 to EUR 46.0 billion. In 2022, growth was 2.2 % compared to 2021, reaching EUR 46.9 billion in GDP growth in manufacturing industry, as well as in professional, scientific and technical and information and communication activities. In addition, hospitality companies returned to pre-pandemic levels and exceeded it.

Lithuania has achieved strong economic growth and a decline in its GHG emissions. Between 1990 and 2022, GDP grew by 90 % and GHG emissions decreased by 61 %.

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While Lithuania's economy succeeded relatively successfully with the challenges posed by Russia's war in Ukraine in 2022, with an annual GDP change of 1.9 %, there were signs of a more challenging period at the end of the year: In the fourth quarter, value added generated by manufacturing economic activities decreased by 2 %, while in wholesale and retail trade, transport, accommodation and food services, the change in exports of goods and services slowed down to 1.3 % in the first three quarters of 2022, as foreign demand slowed down. In Q4, household expenditure on goods and services decreased by 2.8 % in Q4.

Unfavourable global trends, population precautions for consumption and a decline in stockpiles dampened Lithuania's economic activity in 2023. Lithuania's GDP decreased by 0.3 % in 2023 compared to 2022. At the beginning of the year, the impact of high energy prices and high inflation, which was still constrained by the economy, was weakened during the year, but the economy was negatively affected by the rise in interest rates, the global dampening of investment and consumption developments, dampening Lithuania's export demand.

Table 4.1.1. Forecast of key macroeconomic indicators (LR Ministry of Finance)

Name of the indicator	2023	2024	2025	2026	2027
1. % Change in gross domestic product at constant prices	—0.3	1,6	2,9	2,9	2,9
2. GDP at constant prices in EUR million	47142,0	47911,3	49296,1	50722,7	52194,9
3. % Change in GDP at current prices	6,9	5,0	5,2	5,2	5,2
4. GDP at current prices in EUR million	72047,8	75651,0	79573,1	83701,8	88055,8
5. % Change in labour productivity (GDP at constant prices per inhabitant)	—1,7	1,1	3,0	3,2	3,4

The EC recommends that GHG projections use their reported data up to 2040. After assessing that the Ministry of Finance's forecast for the current year is limited to the one recommended by the EC and the EC provides data up to 2040, it has been decided to use the GDP forecast data provided by the EC for Lithuania in the calculations.

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Recommended by EC (used in forecasting)

Figure 4.1.2 GDP forecast for 2022-2040

Changes in Lithuania's population. From 1992, when Lithuania's population reached a peak of 3 706 thousand, this rate decreased by 23 % in 2017. (on average 1.28 % each year) and on 1 January 2017 stood at 2 848 thousand. According to the State Data Agency, the average annual population in Lithuania in 2023 was 2 872 thousand. The depopulation was due to various factors: negative birth rates, mortality, emigration. As a result, the population is shrinking, the share of children and people of working age declines in the overall age structure, and the share of dependent older people is increasing.

Lithuania will continue to monitor depopulation and population ageing trends over the 2024-2040 period, based on projections made in 2023. Lithuania is expected to have a population of 2 million 742 thousand in 2030 and 2 million 522 thousand in 2040.

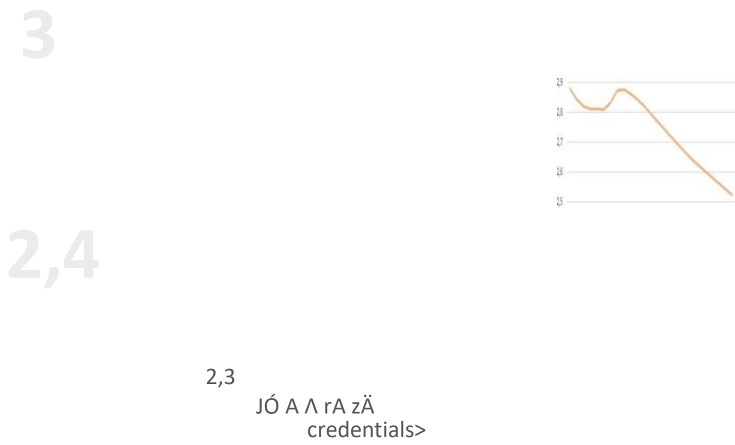

Figure 4.1.3. Population development 2016-2023 (average annual) and forecast 2024-2040 (ADA data)

Sectoral and technological developments

Technology will play a key role in achieving Lithuania’s energy and climate policy objectives. The main objectives of Lithuania in the development of new energy technologies are to promote and increase the use of RES and to facilitate energy efficiency so that Lithuanian industry remains innovative and competitive. Their implementation requires faster development of RES, such as: biofuel production technologies, wind and solar energy, as well as hydrogen production using RES. All this should be achieved through more efficient use of energy sources in energy production processes, buildings, industry and transport. Given the impact of existing policy measures on the energy sector by 2040, energy efficiency (EE) and RES promotion measures are planned to be deployed, most of the changes are expected in the energy production and transport sectors.

Energy sector

The energy sector will receive a particularly rapid development of RES technologies through the implementation of existing policy measures. Solar and wind turbines are projected to be the main electricity generation installations

2030. All electricity generating installations using RES will produce all the electricity needed in 2030 and the surplus will be exported. In addition to the accelerated development of conventional RES technologies through support schemes for energy production, RES enabled energy consumers to become prosumers in 2015. In May 2024, there were just over 104000 prosumers in Lithuania with a total installed capacity of around 1 200 MW. At the beginning of May 2024, Lithuania had a total of around 1 360 MW of solar and 1 300 MW of wind power plants. It is projected that there will be around 3 109 MW of solar power plants in 2 030.4514 MW of onshore wind power plants and 1 400 MW offshore.

Transport sector

In the transport sector, continuing existing policies and measures, the share of RES fuels in the overall energy consumption of the transport sector will continue to reach 29 % in 2030. the wider use of electricity, biogas and fuels of non-biological origin from RES vehicles will be promoted (with the multipliers provided for in Directive 2018/2001). The aim will be to significantly reduce the use of fossil fuels in the transport sector. Electricity, biomethane and hydrogen are visible in the heavy-duty transport sub-sector as an alternative to fossil fuels. The replacement of road vehicles into less polluting vehicles is closely linked to the development of recharging/refilling infrastructure, and measures will be taken to ensure the development of recharging/refilling infrastructure, taking into account the growing number of alternatively fuelled vehicles, the wider coverage at national level and the implementation of the requirements of the Alternative Fuels Infrastructure Deployment Regulation. Electrification is also planned and implemented in the rail, aviation and inland and maritime sub-sectors.

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 on crop farms, replacing fertilisers with other preparations developed with new technologies and safer for the environment; changes in the feeding ration of the animals; the use of more advanced techniques, equipment and techniques for manure storage and management, etc.

Industry sector

In the industry sector, existing policies and measures are designed to incentivise industry to transition to a climate-neutral economy. In the initial phase of the process, companies are encouraged to switch from the use of fossil fuels to RES use and energy efficiency improvements. This includes the possibility for electricity-intensive companies to benefit from the preferential payment for services of public interest in the electricity sector relating to the production of electricity from renewable energy sources, with a commitment to carry out an energy audit and to implement 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 measures to increase the EE with a payback period of up to 3 years, without further incentives. Technological progress in the industry sector is being promoted through measures to promote the digitalisation and automation of production processes, such as robotics technologies, artificial intelligence solutions, deployment of IoT systems, etc. In the industrial sector, subsector F-gas use in the EU countries is currently in place with a range of efficient GHG abatement technologies in commercial refrigeration and air-conditioning units. These technologies are expected to be used to further reduce the negative environmental impacts of the subsector.

Waste management sector

In the waste management sector, existing policy measures are aimed at reducing the amount of municipal waste going to landfills and promoting recycling of waste. For solid waste disposal, new landfills complying with EU environmental requirements have been set up, facilities for the mechanical-biological treatment of biodegradable waste have been set up, waste water treatment projects are underway, and waste incineration capacity is being developed. Landfill gas is used for energy generation or other purposes.

Households sector

The 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, resulting in energy savings of 2 982 GWh and 702 multi-apartment buildings were renovated in 2021-2022, resulting in 103 GWh savings in this period. As a continuation of the existing modernisation measure for multi-apartment buildings, it is planned to upgrade over 7311 multi-apartment buildings over the period 2021-2030. Energy efficiency in households is strongly influenced by the conversion of boilers into more efficient biofuel boilers or heat pumps. As a result of this measure, 61310 boilers are planned to be replaced by 2030.

Services sector

There are two existing policy instruments in the services sector, EE4-E "Contracts with energy suppliers on consumer education and advice" and EE6-E "Energy Saving Agreements with state-owned and municipal enterprises". The first measure is aimed 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 deliver energy savings of around 277 GWh per year. Under the second measure, energy companies have to deploy EE measures to final customers, thereby reducing energy consumption. The measures put in place are expected to save 68 GWh of energy each year. These measures have been in place since 2017. The most popular educational and advisory measures taken by energy suppliers include online and press advice and the provision of information with bills. Energy companies mostly use a tool to modernise lighting.

Global energy market trends

Global climate and energy trends reflect clear developments in energy production and consumption. The implementation of the long-term goals of the Paris Agreement commits states to contribute to the reduction of GHG emissions by providing a vision for the development of zero-emission energy production in the Parties' national strategies. Lithuania attaches great importance to energy security, integration and digitalisation of energy markets, diversification of energy sources and energy production, smart grid development, increasing EE and promoting RES consumption.

The price of EU ETS allowances is influenced by the total EU ETS quota. The steadily decreasing quantity of allowances, together with the entry into force of the Market Stability Reserve, will see the price of allowances rising to EUR 85/allowance by 2025 and EUR 99 by 2 030 in theshort[100] and medium term. This will mainly be influenced by the Market Stability Reserve,which[101] has been operational since January 2019. It is designed to address the long-term challenges of historical surpluses accumulated during the first phases of the EU Emissions Trading System, as well as to make the EU ETS more resilient to new sources of supply-demand imbalances.

The EU ETS is the cornerstone of the EU's climate change policy and is a key tool for cost-effective emission reductions. Since 2005, the ETS has demonstrated the effectiveness of carbon pricing and emissions trading. Emissions in the system are decreasing as planned, slightly more than 8 % compared to the start of phase 3 (2013-2020). On 27 June 2024, the price of allowances was EUR 65 per tonne of carbon dioxide equivalent (tCO2e). This forces companies in ETS sectors to take additional action to reduce GHG emissions.

From 2024 onwards, fuel 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, as well as anything outside the scope of the ETS) will start monitoring the carbon emissions of the fuels supplied. As of 2028, reporting fuel and fuel suppliers will have to account for allowances purchased on the market. As there will

100 https://www.statista.com/statistics/1334906/average-carbon-price-projections-worldwide-by-region/

101 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.264.01.0001.01.ENG

be no free allocation of allowances to participants in the scheme, the system will have an impact on the increase in fuel and fuel prices.

In line with the European Commission's assessment that the ETS2 price should range from EUR 30 to EUR 80 between 2027 and 2030. This price signal, together with the adopted amendment to the Excise Law, will promote a shift towards less polluting or zero-emission fuels and fuels (by converting to zero-emission alternatives such as biofuels, hydrogen, biomethane, biogas, the development of the electric vehicle network), reduce dependence on fossil fuels, ensure the development of innovative technologies, and mitigate environmental and climate change impacts. A Social Climate Fund will be set up to mitigate the negative effects of the partial auctioning of allowances.

Against this background, and taking into account Lithuania's objectives for increasing EE and RES promotion and the existing and planned measures to achieve them, Lithuania can be considered to be on track to meet the targets set for 2030. No additional factor analysis was carried out and the assumptions made were based on the current situation and assessments of past trends.

Technology cost developments

In many countries around the world, RES technologies are the cheapest option to deploy new energy generation technology. In 2022, despite rising raw material, labour and equipment prices, the global weighted average electricity price of new solar, onshore wind, concentrated solar, bioenergy and geothermal power plants decreased. The global weighted average electricity price of new onshore wind projects decreased by around 5 % between 2021 and 2022. — from EUR 32.5/MWh to EUR 30.7/MWh, and solar projects decreased by around 3 % in 2022 compared to 2021. — to EUR 45.6/MWh, offshore wind increased by around 2.5 % compared to 2021. — from EUR 73.5/MWh to EUR 75.3/MWh in 2022.

The global weighted average price of electricity produced by solar power plants and drained wind turbines was 30-50 % lower in 2022 than those using fossilfuels[115].

Due to the increase in the cost of fossil fuel-fired power generation, mainly due to the increase in fossil fuel prices in 2022, the competitiveness of RES electricity generation increased significantly in 2022, despite the increase in the cost of production of solar and onshore wind power in many markets. In 2022, around 86 % of newly developed commercial-scale RES electricity generation projects had a weighted average electricity price below the weighted average cost of fossil fuels.

In setting Lithuania's EE and RES targets, technological price developments were taken into account and optimal economic and technological measures were chosen. Modelling and forecasting for the period 2020-2040 did not further address the impact of technology prices. This shall only be taken into account when assessing the availability of individual technologies, the estimated budget of policies to increase EE or promote RES and average market prices.

Decarbonisation dimension

4.2.1. GHG emissions and removals

The chapter provides information on national trends in GHG emissions, i.e. aggregated information from the national emissions inventory covering the period 1990-2021. The most recent greenhouse gas inventory data are reported for 2021, as this year is used as a base year in the projections.

Lithuania's GHG emissions (excluding LNFN) amounted to 20252 ktCO2eq in2021. GHG emissions decreased by 58 % in 2021 compared to 1990 and by 10 % compared to 2005 excluding FNM. Table 4.2.1.1 shows the evolution of GHG emissions over the period 1990-2021.

Table 4.2.1.1. GHG emissions in the period 1990-2021

Greenhouse gas emissions per gas	1990	In 1995	In 2000	In 2005	In 2010	In 2015	2020:	2021:
	kt CO2eq							
Total GHG (excluding FNM)	48 135	22 486	19 494	22 440	20 742	20 155	20 166	20 252
Total GHG (incl. FNM)	42 787	17 885	10 014	18 287	10 376	12 202	13 530	14 161
Greenhouse gas emissions by sector	1990	In 1995	In 2000	In 2005	In 2010	In 2015	2020:	2021:
	kt CO2eq							
1. Energy (excluding indirect CO2)	33 145	14 187	10 945	13 173	13 133	11 288	11 847	12 274
2. Industry processes and products the use	4 300	2 097	2 849	3 504	2 007	3 179	2 878	2 756
3. Agriculture	9 001	4 502	4 012	4 146	4 191	4 538	4 508	4 328
4. Land use, land use change and forestry.	—5 348	—4 601	— 9 480	— 4 153	— 10 366	— 7 953	—6 636	— 6 091
5. Waste	1 689	1 701	1 688	1 492	1 411	1 150	933	894
Greenhouse gas emissions quantity in the EU ETS and in the EU Non-ETS sectors	1990 m.	1995 m.	2000 m.	2005 m.	2010 m.	2015 m.	2020 m.	2021 m.
	kt CO2eq							
EU ETS (from stationary installations)	NA	NA	NA	9 690	7 921	6 817	6 121	5 976
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	6 123	5 978
Non-ETS	NA	NA	NA	13 062	12 851	13 371	14 081	14 314
Greenhouse gas emissions quantity not participating in the EU ETS sectors (by sector)	1990 m.	1995 m.	2000 m.	2005 m.	2010 m.	2015 m.	2020 m.	2021 m.
	kt CO2eq							
1. Small energy	NA	NA	NA	2 248	2 050	1 807	1 831	2 188
2. Industry (processes, product use and combustion of fuels in industry and construction)	NA	NA	NA	897	905	1 123	1 077	1 170
3. Agriculture	NA	NA	NA	4 146	4 191	4 538	4 508	4 328
4. Transport	NA	NA	NA	4 279	4 382	5 085	6 138	6 125
5. Waste	NA	NA	NA	1 492	1 411	1 150	933	894

115 IRENA, Renewable Power Generation Costs in 2022

After a significant recession in 1992, caused by the collapse of the Soviet economy, there was a shift from a centralised planned to a market economy, transforming production, energy industries and agriculture. After 50 years of annexation of the Soviet Union in 1990, Lithuania inherited its energy-intensive economy. The USSR's resource blockade between 1991 and 1993 led to a sharp drop in economic activity, as evidenced by the drop in GDP in early 1990. The economic situation improved in the mid-1990s and GDP grew until 1999 (GDP depressed between 1999 and 2000 as a result of the Russian economic crisis) and continued to grow between 2001 and 2008.

At the beginning of 1990, manufacturing, energy industries and agriculture were mainly burning fossil fuels. The comparison of the annual overall fuel balances for the period 1990-2021 shows a significant decrease in final consumption of heavy fuel oil (e.g. from an annual volume of approximately 57 800 TJ in 1990-91 to 19 307 TJ in 1 992.13126 TJ in 1995 and less than 600 TJ since 2008), as well as a decline in the use of coal, petrol, natural gas, but an increase in wood consumption. The reduction in the use of fuel oil has been primarily affected by environmental requirements: since 1 January 2004, the use of sulphur fuel oil has been banned and more stringent requirements have entered into force since 2008. As it was not economically viable for companies to remove sulphur from fuel oil, these requirements resulted in a shift from fuel oil to other fuels (e.g. natural gas), resulting in a significant reduction in annual GHG emissions.

The last significant decrease in 2009 was linked to the economic crisis in Europe and after 2009 GHG emissions stabilised at around 20 MtCO2eq.

Total GHG emissions decreased by 0.4 % in 2021 compared to 2020. (excluding LFNM).

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Total GHG emissions (excluding FNM) Total GHG emissions (incl. FNM)

4.2.1.1. figure 2.1: GHG emission trends 1990-2021

The energy sector accounts for the largest share of GHG emissions, accounting for 61 % of total GHG emissions in 2021. The energy sector accounted for the largest share of CO2-84 % of total CO2 emissions and CH4-15 % of the total CH4, while N2O accounted for 6 % of total N2O.

Agriculture is the second largest emitter, accounting for 21 % of total GHG emissions. Agriculture accounted for the largest share of N2O in 2021, 86 % of total N2O gas and CH4-60 % of total CH4 gas, and low CO2 emissions to 1 % of total CO2 emissions.

GHG emissions from industrial processes and industrial products accounted for 14 % of total GHG emissions, of which CO2-15 % of total CO2 emissions and N2O 5 % of total N2O emissions. One of the main sources of GHG emissions in the industrial process and product use sector is the use of fluorinated GHGs, where GHG emissions accounted for 19 % of total industrial emissions in 2021.

The waste sector accounted for 4 % of total GHG emissions in 2021. The sector was mainly responsible for CH4 gas, accounting for 25 % of the total CH4, followed by small quantities of N2O – 2 % of total N2O.

4.2.1.2. thefigure shows the breakdown of GHG emissions by sector in 2021.

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4.2.1.3. figure 2.1: Breakdown of Lithuania’s GHG emissions by sector (excluding FNHR) in 2021

In Lithuania, GHG emissions from sectors not participating in the EU ETS account for a larger share than those of the sectors participating in the EU ETS. Between 2005 and 2021, this share increased from 57 % to 71 % of total GHG emissions (Figure 4.2.1.3).

GHG emissions from the sectors covered by the EU ETS amounted to 5976 ktCO2eq or 29 % of total GHG emissions in 2021, while the non-ETS sectors accounted for 14314 ktCO2eq or 71 % of the country-wide GHG emissions. GHG emissions from the sectors covered by the EU ETS decreased by 38 % in 2021 compared to 2005, while emissions from sectors not participating in the EU ETS in 2021 were below the established allocation by 11.2 %. It should be noted that since 2013 processes in the chemical industry with 3.1 million tonnes of CO2-eq from those not participating in the EU ETS have been allocated to the sectors participating in the EU ETS.

4.2.1.4. figure 2.1: Trends in total GHG emissions 2005-2021, broken down by sectors participating in the EU ETS and not covered by the EU ETS

The LSCM is the only greenhouse gas storage sector. In Lithuania, the highest removals are recorded in forests, where the highest removals were recorded in 2011 and amounted to 10.2 MtCO2-eq. However, they are exposed to biotic and abiotic factors that can reduce absorption potential sufficiently quickly.
s

or emissions. This trend was observed during the 1994-97 period, when forests were a source of emissions and in 1996, during peak periods, 0.5 Mt CO2-eq. were emitted. Unfortunately, the absorption potential of forests is decreasing and 6.5 Mt CO2-eq. is recorded in 2021, reflecting a 46 % reduction in removals since 2011. The largest change in GHG emissions is visible on cropland. There has been a reduction of 2.6 Mt CO2-eq since 1990 to 0.7 Mt CO2-eq in 2021, or even a 73 % reduction compared to 1990. This has been largely influenced by more and more sustainable tillage practices that conserve mineral soils and prevent the release of fixed organic carbon into the environment. Grasslands and pastures also show a decline in GHG removals. The largest number of removals took place in 2001, with -1.9 MtCO2-eq. In 2021, only -0.7 Mt CO2-eq or a 63 % reduction compared to 2001 were recorded. Emissions from wetlands, built-up areas and other land remain stable over the whole period, with one exception. In 2018, there was a fixed expansion of military polygons, resulting in emissions of 0.5 Mt CO2-eq. on other land. The total GHG balance of the LULUCF sector in 2021 was 6.1 MtCO2eq of removals.

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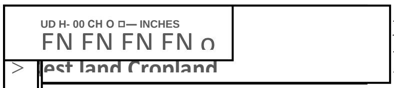

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4.2.1.5. figure 2.1: Changes in GHG emissions and removals in the land use, land use change and
forestry sector, by land use, 1990-2021

Projections of sectoral developments with existing policy measures

Projections of GHG emissions are provided in the energy, transport, industry, agriculture, waste and FNM sectors. These projections shall be calculated separately for each greenhouse gas including carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3). For the purpose of forecasting GHG emissions, the most recent data reported in the GHG inventory shall be taken as the base year. In this case, the year 2021 was chosen as the base year. Projections of activity data from relevant sectors have been used as a basis for projections, which help to identify the evolution of GHG emissions across different activities.

the table shows the resulting greenhouse gas emissions (2005, 2020 and 2021) and projected emissions every 5 years from 2025 to 2040.

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4.2.1.2.

Table 4.2.1.2. GHG emissions generated in 2005, 2020 and 2021 and projected GHG emissions from 2025 to 2040 (with existing policies and measures)

Greenhouse gas emissions per gas	2005	2020	2021	2025	2030	2035	2040
	kt CO2eq						
Total GHG (excluding FNM)	22 440	20 166	20 252	19 204	15 940	14 805	14 194
Total GHG (incl. FNM)	18 287	13 530	14 161	12 586	8 454	8 092	7 182
Greenhouse gas emissions by sector	2005	2020	2021	2025	2030	2035	2040
	kt CO2eq						
1. Energy (excluding transport)	8 978	5 709	6 149	5 685	4 882	4 894	4 864

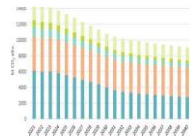
2. Transport	4 279	6 138	6 125	5 560	4 020	3 139	2 780
3. Industrial processes and product use	3 504	2 878	2 756	3 096	2 675	2 543	2 457
4. Agriculture	4 146	4 508	4 328	4 169	3 866	3 825	3 751
5. Land use change and forestry	—4 153	—6636	—6 091	—6 606	—7 474	—6 774	—7 070
6. Waste	1 492	933	894	696	498	405	342
Greenhouse gas emissions in sectors covered by the EU ETS and not covered by the EU ETS	2005	2020	2021	2025	2030	2035	2040
	kt CO2eq						
EU ETS (from stationary installations)	9 690	6 121	5 976	6 420	5 658	5 611	5 603
EU ETS (from domestic aviation)	2	1,9	2,2	2.2	2.2	2.3	2.4
EU ETS (total GHG emissions)	9 692	6 123	5 978	6 422	5 660	5 613	5 605
Non-ETS	13 062	14 081	14 314	13 275	10 771	9 681	9 076
Greenhouse gas emissions in the FNHR sector pursuant to Regulation (EU) 2018/841	2021-2025		2026-2030		2031-2035	2036-2040	
	kt CO2eq						
GHG emissions reported and forecasted (credits if negative):	—7 536		—2 311		N/A	N/A	

CO2 emissions in the transport sector decreased in 2022 as they were affected by the transit ban on Belarusian fertilisers and the war in Ukraine: fuel prices have risen and freight traffic has decreased. Greenhouse gas emissions in the transport sector are projected to continue to decrease due to planned policy measures and changes in in-service vehicles. Greenhouse gas emissions from road transport account for 96 % of transport’s total GHG emissions, of which 54 % come from passenger cars.

Industrial GHG emissions are driven by technological processes. The integration of electrolysis into the ammonia plant and the use of biomethane gas are expected to result in a gradual reduction of CO2 emissions in the chemical industry. In the industrial sector, GHG emissions will also decrease as a result of the reduction of fluorinated GHG emissions as a result of the implementation of Regulation (EU) 517/2014.

The dynamics of GHG emissions in the agricultural sector depend on the quantities of mineral and organic nitrogen fertilisers used, the number of livestock, crop yields and cropland. The distribution of GHGs in agriculture is projected to remain stable until 2030. Agricultural soils will account for 51 % and intestinal fermentation 41 % of total agricultural GHG emissions.

The projected decrease in GHG emissions in the waste sector is due to the improvement of the waste management system, promoting re-use and waste sorting by publicity companies. There are also ongoing projects to increase the provision of centralised waste water services to the population, which contributes significantly to the reduction of GHG emissions.



Transportas Π Agriculture -Industry Π Waste management Small energy

4.2.1.6. figure 2.1: GHG emissions by sectors not participating in the EU ETS

Greenhouse gas emissions from sectors not participating in 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 4.2.1.5 shows the projected greenhouse gas emissions by sectors not participating in the EU ETS.

The projected greenhouse gas emissions of the sectors participating in theEU ETS are presented in Table 4.2.1.2. The forecast did not take into account possible changes in the price of allowances

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Energy

The GHG projections of the energy sector with existing policies and measures (EPMs) have been made on the basis of the calculated fuel burning projections in individual sub-sectors, the same ones used for the calculation of the RES share. More details on these projections are described in section 4.7.2 'Energy from renewable sources'. The calculation of the volatile fuel emissions of natural gas in the natural gas transmission network is based on the projected releases of natural gas into the atmosphere provided by AB Amber grid, while for emissions in the natural gas distribution network the value for the whole period was chosen (in that year, the distribution operator changed the methodology for the calculation of natural gas releases), as we do not have a forecast of activity data for the distribution network. GHG emissions have been calculated on the basis of the methods[102] provided in the 2006 IPCC guidelinee).

Measure 2 of the new EU ETS (T28-E) assumed that the allowance price in this system would increase from EUR 25/tCO2 in 2021 to EUR 50/t CO2 in year 030. This price has been converted into a direct increase in the fuel price for each fuel and the effect of the measure has been calculated using price and fuel quantity elasticities.

Final electricity consumption is projected to increase by 29 % by 2030. thereafter, 51.8 % by 2040, reaching a total of 16 938 GWh in 2040, 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 sectors of the economy.

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102 2006 Guidelines for NationalGreenhouse Gas Inventories of theIntergovernmental Panel on Climate Change (IPCC).

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Total GHG, CO2 e Final electricity consumption, GWh

4.2.1.7. figure 2.1: Final electricity consumption and GHG emissions in the energy sector other than transport

The main sources of GHG emissions in the energy sector are expected to remain sub-sectors of district electricity and heat production, oil refining, industry and construction, and households, as well as a significant contribution from the sub-sector of fugitive emissions from fuels (flows from transport, storage, refining, etc.).

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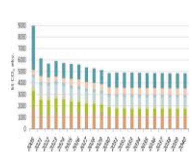

П Recycling of oil

—Industry and Construction
Households
Fugitive discharges from fuels
Π Centralised electricity and heat production

Production of solid fuels and other energy uses
—Services sector
Π Agriculture, forestry, fishing

Military

4.2.1.8. figure 2.1: GHG emissions in the energy sector other than transport

Overall, GHG emissions in all sub-sectors will decrease or remain stable compared to 2021, except for volatile fuel emissions, due to the projected higher volumes of hydrogen production at the refinery. Increased energy efficiency and the use of biomass in energy are projected to reduce the use of fossil fuels by 26 % and final energy consumption by 13.2 % in 2040, leading to lower GHG emissions in the sector.

Transport

GHG projections for the transport sector with existing policies and measures (EPP) are based on forecasts of the number of road vehicles, freight and passenger transport and fuel consumption (in domestic aviation and inland navigation). In the baseline scenario, projections of the number of passenger cars by fuel and energy are calculated using a regression analysis. The projections for the number of freight vehicles and buses in the baseline scenario were calculated using expected road freight and passenger transport data provided in the study 'Evaluation of the effectiveness of measures to reduce greenhouse gas (GHG) emissions from transport and modelling of projections'[103]. The activity data for domestic aviation as a low-emission sub-sector are set at the same level for the whole period as in 2021. Data on railway activities were provided by AB Lietuvos geležinkeliai. The fuel consumption for the transport of natural gas in the pipeline for 2023 has been calculated by adding together 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 from 2024 has been calculated on the basis of the simulated total consumption of natural gas in the energy sector. GHG emissions have been calculated on the basis of the methods[104] provided in the 2006 IPCC guidelinee).

The total number of internal combustion engine road vehicles is projected to decrease from 2023 onwards by 2030 as a result of the measures envisaged. As a result of the measures envisaged, Lithuania's demographic situation (population decline) and the development of electric vehicles also predict a decrease in the number of vehicles equipped with an internal combustion engine over the period 2030-2040, with an average annual decrease of 4.2 % (from 1.5 million road vehicles in 2030 to 0.98 million in 2040). This development will determine a corresponding trend in GHG emissions in the transport sector.

The policy measures in transport were assessed on the basis of the volumes of each measure submitted by the authorities responsible for the measures, such as the number of zero-emission cars planned to be supported, the expected shift of freight turnover to rail, etc., the implementation rates are set out in Annex 4. These are multiplied by average multipliers, estimated fossil fuel and energy savings, and by multiplying them by GHG emission factors, GHG savings. "Soft" and infrastructure improvement measures in transport have been assessed on the basis of studies or expert assumptions. Tax measures and incentives (T1-E: Relieved RES vehicles, T6-E Car Registration Tax, T8-E
"Electronic tolls in freight transport", T27-E "Act on Excise Duties" and T28-E "Implementation of ETS 2") have been calculated using price and fuel elasticities (including the new EU ETS 2). Measure 2 of the new EU ETS (T28-E) assumed that the allowance price in this system would increase from EUR 25/tCO2 in 2021 to EUR 50/t CO2 in year 030. This price has been converted into a direct increase in the price of fuel (EUR/1000 litres) for each fuel. Due to the wide variety of policy instruments available in the transport sector, the methodology for their assessment is also different, and some measures have been subject to a specific methodology developed for only one specific measure.

Historical and projected GHG emissions for transport sub-sectors from 2005 to 2040 (thousand tCO2eq) are shown in Figure 4.2.1.8.

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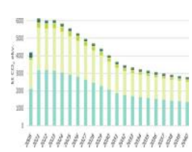

Π Purpose cars Trucks and buses – Light-duty vehicles

103 https://sumin.lrv.lt/uploads/sumin/documents/files/Transporto%20priemoniu%20SESD%20vertinimas%20202106
10.pdf

104 2006 Guidelines for NationalGreenhouse Gas Inventories of theIntergovernmental Panel on Climate Change (IPCC).

Motorcycles and mopeds Π Intra-civil aviation Π Rail transport

Π Inland Waterway Transport Π Transportation via pipes Other transport

4.2.1.9. figure 2.1: GHG emissions in the transport sector by category

Compared to 2005, GHG emissions in all transport sub-sectors will remain higher or similar in 2030, except for the rail sub-sector, where there is a significant drop in freight turnover and the current electrification of railways. As a result, the use of fossil fuels in rail is projected to decrease by 65.6 % in 2030, leading to lower greenhouse gas emissions in the sector.

The road transport sub-sector will remain the main source of GHG emissions from transport, accounting for 96.3 % of the transport sector's GHG emissions in 2021 and 95.3 %. Greenhouse gas emissions in 2040 are projected to be redistributed within the sub-sector of road transport in 2030 compared to 2005: the adopted policy measures will reduce GHG emissions from passenger cars, vans and buses, but will increase GHG emissions from cars and motorcycles and mopeds.

Industrial processes and product use

Projections of GHG emissions from the industrial process and product use sector with existing policies and measures (ESM) based on production levels (activity data) provided by major industrial plants (cement, glass, lime, ammonia and nitric acid). Projections for the years 2025, 2030, 2035 and 2040 have been provided by industrial manufacturing companies. The forecast of fluorinated greenhouse gas emissions is based on macroeconomic (GDP and population forecast) indicators, a forecast of the number of vehicles, including the limitations and prohibitions provided for in Regulation (EU) No 517/2014 and its amendment No 2024/573[105] and Directive 2006/40/EB,[106] and provides for support to public legal entities to promote the choice of air conditioning and ventilation equipment filled with alternatives to fluorinated greenhouse gases. The GHG emission projections were calculated using the methods[107] presented inthe2006 IPCC K.

The main sources of GHG emissions in the industrial process and product use sector are the chemical industry, the production of mineral products and the use of fluorinated greenhouse gases (Figure 4.2.1.9).

According to data provided by the chemical industry (ammonia and nitric acid production), GHG emissions trends between 2025 and 2028, without assessing changes in the price of allowances, will remain stable due to stable production capacity, while fuel consumption will slightly decrease in the same year. The chemical industry envisages steps towards zero emissions by 2050. In the first phase, the company plans to reconstruct one ammonia assembly in such a way that 30 % of green hydrogen is supplied to this ammonia

105 Regulation (EU) 2024/573 of the European Parliament and of the Council of7 February 2024 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014

106 Directive2006/40/EC of the European Parliament and of the Council of 17 May 2006 relating toemissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC

107 2006 Guidelines for NationalGreenhouse Gas Inventories of theIntergovernmental Panel on Climate Change (IPCC).

assembly. In this way, GHG savings will be achieved for outputs produced. One of the ammonia aggregates will significantly reduce CO2 emissions by up to 27 % at company level by 12 %. As a second step, the company envisages continuing the investment in ammonia assemblies and aiming to replace all hydrogen needed for production with green hydrogen (only green hydrogen would be used for ammonia production) which would equally be produced by electrolysis.

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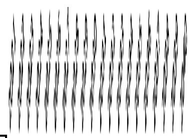

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4.2.1.10. figure 2.1: Greenhouse gas emissions from industry by category

Greenhouse gas emissions from the production of mineral products are based on forecasts by industry, taking into account the expected maximum production capacity and the best available techniques according to their environmental permits. The production of cement accounts for a significant share of GHG emissions in the minerals production category. According to data provided by the company, cement production will remain stable until 2040.

Emissions of fluorinated greenhouse gases are projected to decrease gradually as required by Regulation (EU) No 517/2014. Fluorinated GHGs have been in use in Lithuania since 1993 and their use has been gradually increasing. Fluorinated GHG emissions peaked between 2016 and 2017 and started to decrease since 2018. Fluorinated GHG emissions are projected to continue to decrease gradually. The main GHG savings are due to the replacement of HFC-134a in car-conditioning systems into alternative gases with GWP &150 and the replacement of the R-404A blend used in commercial refrigeration by 2022 for gases with GWP &2500 and from 2022 for GWP &150.

Assumptions for the assessment of existing policies and measures: The impact of the measure P1-E “Reduction of F-gases” on the reduction of fluorinated GHGs has been assessed in line with the requirements of Regulation (EU) No 517/2014. The measure P5-E “change in clean technologies” has been assessed on the basis of submitted applications from companies with GHG reduction targets. Measures P7-E, P8-E, P9-E, P10-E and P11-E were assessed on an expert basis and in the light of the applications submitted, it was assumed that the implementation of these measures could reduce the use of solvents, which would affect both the reduction of air pollutants and GHG emissions. P13-E ‘Hydrogen production and use’ is estimated on the basis of data provided by the chemical industry on the planned use of hydrogen for ammonia production. Measure P18-E ‘Reducing the use of fluorated GHG’ was assessed on the basis of the case study ‘Alternatives to lower global warming potential in commerce and transport’. The measure A5-E “Promoting Short Supply Chains” covers several sectors, its impact is assessed in terms of fuel reduction in the transport sector, while industry has accepted the expert assumption that, although not insignificant, GHG emissions will decrease in the refrigeration equipment category. REI10-E ‘Investment support for the installation of biomethane gas production and biogas treatment plants’ assumes that part of the natural gas used in the processes will be converted into biomethane. Measures affecting the combustion and energy efficiency of industrial fuels shall be included in the projections of the energy sector.

Compared to 2005, GHG emissions from industrial processes and product use are projected to decrease by 24 % by 2030 and by 30 % in 2040. The main GHG emissions from industrial processes and product use are generated by the chemical industry, a sector participating in the ETS, and this category is projected to remain the largest source of GHG for industry in the future.

Agriculture

Projections of GHG emissions from the agricultural sector with existing policies and measures (EPP) based on the number of livestock, productivity indicators of dairy cattle, distribution of manure management systems for the main livestock categories, mineral and organic N fertilisers used, main crop yields and harvested area used for soil liming. Activity data were provided by the Ministry of Agriculture of the Republic of Lithuania for GHG projections. GHG emissions have been calculated on the basis of the methods[108] provided in the 2006 IPCC guidelinee).

The evolution of the number of livestock over the forecast period has been estimated taking into account historical fluctuations in the number of animals, livestock productivity, prevailing market prices, demand and exports, and legislation adopted. The quantities of mineral and organic (compost and sewage sludge) N fertilisers and substances for soil liming are assessed taking into account changes in crop area, as well as the increasing use of bearic technologies will also reduce the need for mineral N fertilisers. Crop yield forecasts have been assessed on the basis of plant and soil fertility, the forecasted crop area and the promotion of plant production techniques. Crop area forecasts have been calculated on the basis of historical data, the situation in world markets and the development of agrobiotechnology. Crop yields are projected to increase and wheat, barley and rapeseed will remain the main crops grown.

Overall, the number of animals is projected to decrease by 9 % in 2030 compared to 2021. The largest declines in the dairy cattle population (19 %), poultry (10 %) and pigs (6 %) are expected, but a modest increase in livestock numbers (1 %) in 2040 compared to 2030 is projected to increase for goats (3 %), birds (2 %), horses (1 %). However, the decline in cattle and pig populations will continue to be monitored.

The consumption of mineral N-fertilisers will decrease by 5 % by 2030 compared to 2021 and the downward trend will continue until 2040, linked to the implementation of policy measures for more sustainable agriculture (organic farming, catch crops, etc.). The use of organic N-fertilisers will also decrease due to the decline in livestock production. Crop yields and area harvested are projected to grow by 6 % by 2030 compared to 2021, in particular with leguminous crops (28 %). One of the reasons for this growth will be to achieve the objective of reconstituting feed (in order to use local protein raw materials) and to master technologies for the use of leguminous crops as feed. And, through crop rotation of 5 and more plants, promote the reduction of wheat areas and the introduction of a wider range of agricultural crops to be used both in food production and in the technical industry, which will result in other cereals: buckwheat (19 %), triticale (18 %), oats (15 %). Underproductive agricultural land will expand the areas of permanent crops grown, including permanent grassland (22 %). As a result of the projected decline in arable land, grassland areas will increase by 5 % by 2030 and due to the measures put in place to promote restoration of eroded land and to protect organic soils.

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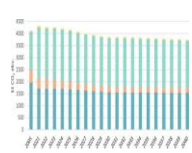
108 2006 Guidelines for NationalGreenhouse Gas Inventories of theIntergovernmental Panel on Climate Change (IPCC).

Assumptions for the assessment of existing policies and measures: For measure A1-E ‘Climate-friendly livestock farming (manure management)’, the assessment of biogas production was carried out on the basis of the capacity of the biogas plants planned to be built, an estimate of the amount of manure that could be used. The measure A1-E ‘Climate-friendly livestock farming (manure management)’ has been assessed for slurry acidification and slurry addition in relation to the amount of manure likely to be affected by the measures. Measures A2-E “Promoting the consumption of organic products”, A5-E “Promoting short supply chains” and A10-E “Promoting bio-businesses” will have no direct impact, but will strengthen the development of organic farming. For the assessment of measure A4-E “extensive grassland management”, the relative number of livestock in milking and beef cattle has been used. The effect of measure A5-E relates to fuel use and has been assessed in the transport sector. Measures A3-E ‘Development of targeted fertilisation’, A6-E ‘Development of protein crops’, A7-E ‘Development of non-arable technologies’, A12-E ‘Sustainable horticulture and horticulture’, A17-E ‘Information and consultancy’, A21-E ‘Sustainable fertilisation system’, L5-E ‘Promoting plant change’ and L4-E ‘Promotion of intermediate crops’ will have an impact on reducing the use of mineral N fertilisers. The assessment of these measures has been carried out taking into account the possible share of the reduction in the use of mineral N-fertilisers presented during the scientific consultation, as well as the area affected by the measure and/or the number of farms. The assessment of A8-E ‘Climate-friendly livestock farming (gut fermentation)’ was carried out on the basis of the result of a national study carried out.[109] The impact of measures A14-E ‘Reducing the use of fossil fuels’ and A15-E ‘Review of technological cards’ has been assessed in the energy sector. The GHG savings of existing policy measures have been assessed using the above assumptions in accordance with the 2006 IPCC Guidelines.

Compared to 2005, emissions from agriculture are projected to decrease by 7 % by 2030 and by 10 % in 2040 (compared to 2005). The largest GHG savings in livestock farming will be visible in the manure management category in 2030, when GHG generated will decrease by 48 % compared to 2021. This decrease is linked to the impact of measure A1-E ‘Climate-friendly livestock farming (manure management)’, in particular the implementation of the development of biogas plants. A further 8 % GHG reduction in this category will be achieved by 2040. GHG emissions from intestinal fermentation will decrease by 9 % in 2030 compared to 2021, partly linked to a decline in the livestock population, as well as to the implementation of measures related to the amendment of feed. GHG emissions from intestinal fermentation will be further reduced by 2 % by 2040. GHG reductions in crop-related categories will decrease by 5 % in 2030 compared to 2021 and are projected to be rooted in the decline in the use of mineral N-fertilisers as a result of existing policy measures that promote the use of sustainable farming methods (organic farming, non-arable technology, promotion of intermediate crops, precision fertilisation, etc.). GHG emissions from agricultural soils will be further reduced by 3 % by 2040.

The GHG emissions generated in the agricultural sector by agricultural category are shown in Figure 4.2.1.10.



Π Further fermentation of the mast Π Agricultural soils

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109 Institute for Economics and Rural Development of the Lithuanian Centre of Social Sciences. 2023 Study “Assessment of the feasibility of introducing improved animal welfare requirements, GHG reduction options for pig farms in Lithuania and prospects for pig farming in the 10- year period”, p. 126.

Π Soil liming using urea

4.2.1.11. figure 2.1: GHG 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 (NFI) publication 'Lithuanian National Forest Inventory 1998-2017. From measurements to solutions', the data on the use of forest productivity are corrected. Other basic data were used for forecasting: areas of land use categories, volume and change in volume of stands, volume of dead trees, areas of sustainable agricultural practices and areas of drained organic soils.

The ESP projections are based on the areas of land use categories and the changes between the categories, taking into account the data reported in Lithuania's national GHG inventory report for2021[110]. This scenario reflects the ambition to increase the area of forests in Lithuania, as the average annual increase in forest areas between 2023 and 2030 is estimated to be around 4000. Ha., most of them (around 70 %) will consist of non-forest land spontaneous forests recorded in forest land accounts. There is also a strong focus on sustainability in agriculture, with sustainable tillage practices expected to take place in about half of the cropland area by 2030. Finally, more than 10 thousand hectares of drained organic soils are expected to be restored by converting them into wetlands.

Assumptions for the assessment of existing policies and measures: measures L1-E "Rehabilitation of peatlands (restoration of hydrological regime on agricultural land)" and L6-E "Rehabilitation of peatlands (grazing)" accepted the assumption that organic soils on cropland would be converted into wetlands or grasslands due to their lower GHG emissions. Measures L2-E 'Preservation and restoration of grasslands' and L3-E 'Preservation of wetlands' provide for the avoidance of greenhouse gas emissions, i.e. that coal will not be removed from biomass and soils by converting one utilised land into another. Measures L4-E "Promotion of intermediate crops" and L5-E "Promotion of crop rotation" assumed that these areas would also be equipped with non-arguable technology from measure A7-E. The effects of these measures are calculated on the assumption that non-arable farming and other sustainable tillage techniques lead to a higher effect than only one measure. Therefore, part of the effect from measure A4-E is accounted for in measures L4-E and L5-E. Measure L7-E "Promoting the green cover" assumes that the whole area will be converted from cropland to grassland, i.e. an active change in land use rather than a preventive change. In measure L8-E 'Preservation of landscape features', the effect was calculated on the assumption that 'green' tree strips would be planted at the edges of the crop fields to protect against wind erosion. The effect has been calculated on the basis of the biomass produced by the trees on these grasslands. Measures L9-E 'Afforestation', L14-E 'Preservation of spontaneous trees' and L18-E 'Afforestation' assumed that land under cropland or grassland would be converted into forest land that would absorb carbon in biomass and increase carbon stocks in mineral soils. In measure L10-E, "young education" assumed that after these fellings, the remaining trees in the forest would grow at an average rate of 10 %, resulting in a positive GHG effect. Measure L15-E 'Improving the quality of forests' is unique in that it shows an increase in GHG emissions in this sector. This is due to the fact that it envisages the removal of biomass from currently inefficient stands, replacing them with new, productive stands. The effect was calculated by taking into account the substitution effect of removing already existing biomass with a potential increase to a new forest. However, it is a long-term measure that will already generate more carbon storage than it was before in the next decade. Measure L19-E "Promotion of Organic Construction" assumed that currently exported wood in the rough would be channelled to the local market to produce modular

110 https://am.lrv.lt/uploads/am/documents/files/Klimato_kaita/NIR_2021%2003%2015.pdf

structures and building renovation works. Part of the GHG savings effect in agricultural measure A4-E “extensive grassland maintenance” is calculated in the FNM sector. It was assumed here that grasslands would be improved through grazing and natural manure application.

The overall forecast of the volume, volume, felling and natural loss of trees in Lithuania is based on the evolution and utilisation of the volume of forest volume inventoryd by the NMI in the period 2002-2017. The forecast of these parameters is based on the forest productivity forecast reported in the NMI publication, applying a correction factor. According to the data obtained, the volume of living biomass stored in forests ranges from 4.49 million m³ to 5.49 million m³ of wood. The forecast for the whole period up to 2040 (see table 4.2.1.3) used the same forest use (degradation) of 10.4 million m³ of wood. In addition, the share of dead wood in the balance sheet of total forest volume growth ranges from 2.6 to 3.0 million m³.

Table 4.2.1.3. Total volume and structure of stands, in mcm

Indicator	NMI data				Forecasts			
	2007	2012	2017	2021	2025	2030	2035	2040
Gross increment	15,95	19,38	20,51	19,82	17,70	17,66	17,63	17,77
Volume of stems used	9,68	8,05	10,11	10,10	10,39	10,39	10,39	10,39
Tree fatalities	3,34	3,83	3,66	3,9	2,59	2,67	2,75	2,83
Annual accumulation of increments	2,93	7,50	6,74	5,76	4,72	4,6	4,49	4,55

Carbon removals in newly afforested forests have been calculated separately on an annual basis and added to the projected CO2 removals in permanent forests. CO2 removals in new forests have been calculated on the basis of volume change patterns derived from trends in volume change in newly afforested or self-forested areas measured by the NMI.

Removals in harvested wood products shall be projected in proportion to the volume removed by increasing the production of different timber products. Distribution of timber products

p

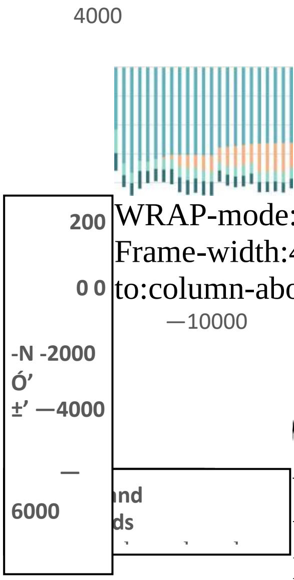
for different product groups (minced wood, wood-based panels and paper products), the forecast is the same as in the base year 2021.

Table 4.2.1.4. GHG emissions and removals in the FNM sector by land use category, kt CO2eq.

Categories of the FNM sector	2005	2020	2021	2025	2030	2035	2040
Forest land	—4 311	—7 300	—6 483	—6 068	—6 103	—5 313	—5 236
Productive land	1 500	647	677	—276	—1 156	—1 338	—1 746
Meadows and pastures	—1 652	—736	—708	—722	—670	—713	—740
Waters and wetlands	888	950	876	829	837	842	850
Built-up area	572	548	678	628	556	466	466
Other land	45	39	57	36	12	0	0
Harvested wood products	—1 210	—834	—1 209	—1 034	—950	—729	—665
Total GHG emissions generated	—4 153	—6 636	—6 090	—6 607	—7 474	—6 785	—7 070

Total GHG removals in the EFN sector are projected to amount to -7 474 ktCO2eq in 2030, with a relative increase of 27 % compared to 2019, compared to the projected increase of 79 % in 2005. Removals will increase by 70 % in 2040 compared to 2005. The most important contributor to the increase in removals in the LNM sector is the production land category, which is the increase in carbon removals in mineral soils.

Removals and emissions from the FNM sector by land use category are shown in Figure 4.2.1.11.



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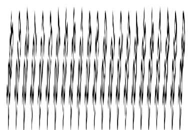

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4.2.1.12. figure 2.1: GHG emissions and removals in the FNM sector by category

Under the updated FNM Regulation (EU) 2018/841, two accounting periods are distinguished to meet the requirements of that Regulation for Lithuania. In the first period between 2021 and 2025, we need to reach a forest accounting level of -5 164 kt CO2-eq and includes emissions/absorption on managed forest land and harvested wood products. Reference levels for productive land, grassland and pasture shall also be distinguished, based on average emissions/absorbed emissions between 2005 and 2009. The preliminary values for these reference levels are 2078 ktCO2eq and -1 244 kt CO2eq respectively.

The target to be achieved in the second accounting period is a common objective for the whole LURM sector. It is part of the European Union's overall target of 310 Mt CO2-eq. GHG removal target. Currently, the 2030 target for Lithuania is -7 105 ktCO2eq. This is the result of adding Lithuania's 2030 target of additional removals of -661 kt CO2-eq to the average GHG balance of the base year (2016-2018). The binding period is also the years 2026-2 029, during which the GHG balance budget will have to be at least equal to the estimated trajectory of the target that we need to move towards the 2030 target. In the ESP scenario, Lithuania is on track to achieve the planned budget and target, with an GHG balance of -7 474 ktCO2eq in 2 030 in the LURC sector. For this reason, it can be predicted that for the period 2026-30.2311 kt of CO2-eq can be expected to partially cover the emission allocations of other sectors.

The accounting for the LURF sector is also regulated at European Union level in accordance with Regulation (EU) 2018/841, as last amended in 2023, when updates to this Regulation were adopted, which also replace and implement the accounting requirements and the provisions of Regulation (EU) 2018/1999. The updated requirements specify that, for the purpose of monitoring and reporting in the FNHR sector, Member States shall use detailed geographical land-use change data in accordance with the methods set out in the 2006 IPCC Guidelines. To achieve this, the State Forestry Authority commissioned a study: "Improving greenhouse gas accounting in the land use, land use change and forestry sector in preparation for changes in the EU legal environment".

The result of this study was the extension of the monitoring of land use changes in the LWF sector from 16 thousand observed points in Lithuania to 200-400 million points. This dense number of remote sensing points (Sentinel, etc.) will ensure the functioning of the land use change monitoring system with detailed geographical data. This system will allow the monitoring of land-use developments with higher precision, with lower costs. The results of the study will be presented at the end of 2024 and tested for the whole territory of the country in 2025.

Waste

'Greenhouse gas emission projections from the waste sector' means the ESP using existing policiesand[111]measures based on macroeconomic indicators (GDP and population forecast) and the development of municipal waste management infrastructure. GHG emissions have been calculated on the basis of the methods[112] provided in the 2006 IPCC guidelinee).

The generation of municipal waste is estimated by regression analysis based on national statistics (volume of municipal waste per capita), population and GDP. The amount of municipal waste generated is projected to decrease gradually to 1 308 kt in 2030 and 1 230 kt in 2040. It is planned that no more than 5 % of all waste generated will be landfilled in 2030, while the same percentage of waste disposed of will remain until 2040. The production of methane is assessedby[113] the FOD (First Order Decay) method as set out in the 2006 IPCC Guidelines. Biogas generation and landfill collection are projected to decrease gradually due to the decreasing amount of waste landfilled. Biogas collected from landfills is used to produce heat and electricity and is included in the energy sector projections.

Estimates 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 predicted home-based composting. Homet composting was assessed on the basis of the number of composting boxes distributed and the amount of composted waste (220 kg) per household.

GHG emissions from effluent management and discharges were projected on the basis of expected biooxygen consumption, population forecast and share of connected populations to the centralised water and wastewater collection system. The share of the connected population is projected by taking into account EU-funded infrastructure development projects, reluctance of the population to connect to centralised networks and other conditions, which assume 95 % of the connected population in 2030.

Incineration of waste without energy recovery represents only 0.1 % of total GHG emissions in the waste sector. Similar quantities of waste incineration are projected to continue in the future. In addition, in order to improve heat and energy efficiency, use local and renewable resources more efficiently in heat energy installations and reduce CO2 emissions. Vilnius and Kaunas combined heat and power plants started operating in 2020 and can use up to 360 t of biomass and municipal waste per year for energy production, which accounts for 30 % of all municipal waste.

The analysis of the sector projections showed that GHG emissions are gradually decreasing due to the planned development of the collection of sorted waste (biodegradable waste, food, textiles, etc.), the preparation of waste for recycling, the modernisation of waste incineration, re-use or other recovery capacities (sorting lines, other equipment) and the modernisation of the information system and monitoring of waste management. Compared to 2005, GHG emission reductions are projected to be significant in 2030 and 2040, of 67 % and 77 % respectively. The largest reduction in GHG emissions is expected from landfilled waste (72 % in 2030, 85 % in 2040 compared to 2005) and wastewater management and discharge (80 % in 2030, 82 % in 2040 compared to 2005).

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111 Themeasures adopted and implemented are set out in Chapter3.

112 2006 Guidelines for NationalGreenhouse Gas Inventories of theIntergovernmental Panel on Climate Change (IPCC).

113 The FOD method assumes that decomposition oforganic carbon in wasteis slowly degradable over several decades, resulting in CH_4. If the conditions are constant, the rate at which CH_4 isformed depends only on the carbon content of the waste. CH_4 emissions are the highest in the first few years after disposal, after which theyare graduallydecreasing.

Assumptions for the assessment of existing policies and measures: Measures K1-E ‘Waste management’, K2-E ‘Development of waste collection facilities’, K4-E ‘Sorting of waste’ and K5-E ‘Food waste prevention’ were assessed on the assumption that their implementation would reduce the generation of municipal waste and the introduction of biodegradable waste (food, kitchen waste, textiles, etc.) into landfills. The impact assessment of measure K3-E “Waste management” takes into account the projected share of the population covered by centralised waste water management services. It is assumed that the implementation of the REI17-E activity ‘Implementing local and RES CHP projects with priority for Vilnius and Kaunas’ will significantly reduce the landfilling of waste.

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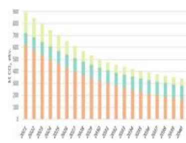

4.2.1.13. figure 2.1: GHG emissions in the waste sector by category

4.2. Z Energy from renewable sources

Projections of shares of renewable energy sources – ESP with existing policies and measures based on energy consumption forecasts, existing public support, private sector and business project development. The shares of renewable energy sources in gross final consumption of energy, final energy consumption for heating and cooling, final energy consumption in transport and gross electricity consumption have been calculated in accordance with Directive (EU) 2018/2001 of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, as amended.

The calculations below for the share of RES transport are presented with multipliers.

The current situation for defining the level of renewable energy use in different sectors is considered to be 2020 (in the tables and graphs, data for 2020-2022 (and earlier) are actual data taken from or calculated from publicly available data from the State Data Agency). The simulated period is 2023-2040. The specific values of the indicators are given in Table 4.2.2.1.

Table 4.2.2.1. Existing RES share in gross final energy consumption and sectors concerned

	2020:	In 2022
Total final energy consumption, ktoe	5339,3	5 478,7
Share of RES in gross final energy consumption, %	27,36	29,62
Share of RES in final energy consumption for heating and cooling, %	50,23	51,77
Share of RES in the DH sector, %	74,7	73,1
Share of RES production in local electricity production, %	47,18	59,9
Share of RES in total electricity consumption, %	20,17	25,50
Share of RES in final energy consumption in transport, %	5,50	6,28

The fuel balance of district heating production in 2020 and 2022 is shown in Table 4.2.2.2.

Table 4.2.2.2. Fuel balance from district heating production in 2020 and 2022

Fuel type	% (based on fuel consumption)	
	2020:	In 2022
Firewood, wood for fuel, agricultural and other waste and other RES	74,7	73,1
Natural gas	19,0	14,6
Municipal waste (not part of RES)	4,0	7,1
Fuel oil	0,6	3,6
Other fuels	1,7	1,6

The production of electricity from renewable energy sources and the technologies used are shown in Table 4.2.2.3. In 2020, the country imported the vast majority of electricity – around 66 % of total electricity consumption (final electricity consumption and losses in grids. 71 % in 2022. The remaining local electricity generation consists mainly of RES, where solar and onshore wind plants are dominated. Since 2017, the development of solar power plants has been particularly high. This process is linked to the development of the concept of prosumers and the increase in energy prices and subsidies in this area.

Table 4.2.2.3. Gross production of electricity from renewable energy sources in 2020 and 2022

Technology	2020:		In 2022	
	Quantity, ktoe	%	Quantity, ktoe	%
All installations for the generation of electricity from RES	221,4	100	260,2	100
Hydropower plants	25,8	11,7	39,9	15,4
Solar plants	11,1	5,0	29,4	11,3
Wind plants	133,4	60,3	130,1	50,0
Biofuel plants	27,3	12,3	27,1	10,4
Biogas plants	12,8	5,8	13,6	5,2
Cogeneration industrial and municipal waste plants	11,0	5,0	20,1	7,7

In 2030, around 3 100 MW of solar power plants are expected to be installed as part of existing RES promotion policies, around 1 400 MW (two wind farms each of 700 MW) offshore wind, around 5 900 MW of onshore wind, around 150 GWh of new biofuel production capacity, around 1 400 GWh of new biomethane production capacity, new and/or upgraded existing district heating installations of around 198 MW, and around 13 MW of heat pumps in the district heating sector.

The development of RES electricity generation capacity over the period 2010-2022 is shown in Figure 4.2.2.1.

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4.2.2.1. figure 2.1: Development of electricity generation from RES and technologies used, MW

The installed capacity of RES electricity generation capacity increased almost 3.4 times from 278 MW to 940 MW in 2020 between 2010 and 2020; as many as 6.3 times compared to 2022, up to 1 754 MW. The fastest increase in installed capacity of solar photovoltaic plants was observed, with installed capacity increasing to 572 MW in 2022 since its inception in 2012. The installed capacity of wind turbines increased 7 times between 2010 and 2022, almost 4 times for biofuels and almost tripling for biogas plants. The installed capacity of hydropower plants remained almost stable, while the capacity of CHP plants for industrial and municipal waste increased by 10 MW, reaching 20 MW in 2022. Onshore wind farms account for 53.9 % of the installed capacity of all turbines, 32.6 %. — solar power plants, 6.7 % — for hydropower plants.

Projections of developments with existing policies and measures

In the energy modelling of existing policy measures for 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 concerned.

- RES17-E: Promoting the use of RES in the district heating sector – Implement local and RES-based CHP projects, with priority given to Vilnius and Kaunas. The Kaunas CHP plant has an electrical capacity of 24 MW and a thermal capacity of approximately 70 MW. Vilnius CHP plant has an electrical capacity of 100 MW and a thermal capacity of approximately 240 MW. This measure will increase the share of RES in gross final energy consumption by 2.81 % in 2030.
- REI2-E. RES development Baltic Sea. With the installation of power plants, their electricity production will be as high as possible in 2030:
  approx. 5 500 GWh per year. This measure will increase the share of RES in the overall final energy consumption in 2030 2.45 %
- P22-E. Industry transformative. This promotional facility is intended for: firms
  investing towards “circularity”, decarbonisation of industry and energy consumer
  efficiency, uptake of environmentally friendly, low-waste and innovative and digital technologies, manufacturing of high value-added and low CO2 footprint products, defence and security

industries. The measure will increase the share of RES in gross final energy consumption by 1.68 % in 2030.

REI12-E: Mandatory blending of biofuels into mineral fuels. Fuel operating in the country EN

- suppliers are subject to mandatory biofuel blending requirements per litre of fuel. The minimum share of biofuels in petrol shall be at least 6.6 % and in diesel at least 6.2 % in terms of the total energy content of a blend of fuels and biofuels. This measure will increase the share of RES in gross final energy consumption by 1.49 % in 2030.
- REI10-E. The measure aims to build biomethane production capacity (1 400 GWh of biomethane gas) production volume in 2030). This measure will increase the share of RES in gross final energy consumption by 1.46 % in 2030.

These existing policies described above have the greatest impact on RES use and contribute most to increasing the share of RES in gross final energy consumption. The results of the impact modelling of all existing energy policy

160 %

measures are presented in Table 4.2.2.4 and Figure 4.2.2.2.

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Table 4.2.2.4. Share of RES in gross final energy consumption and relevant sectors (ESP)

	2020:	Year 2025	By 2030.	2035	In 2040
Total final energy consumption, ktoe	5339,5	5497	5154	4831	4829
Share of RES in gross final energy consumption, %	27,36	41,7	59,3	74,7	74,9
Share of RES in final energy consumption for heating and cooling, %	50,23	61,9	72,8	73,4	73,9
Share of RES in total electricity consumption, %	20,17	63,5	96,8	148,6	135,5
Share of RES in final energy consumption in transport, %	5,50	12,2	34,4	39,0	45,7

180 %

4.2.2.2. figure 2.1: Share of RES in gross final energy consumption and relevant sectors (ESP)

Electricity

In the ESP scenario, the increase in electricity generation capacity from RES between 2020 and 2040 is shown in Table 4.2.2.5. It is worth noting that the planned development of electricity production relies exclusively on RES technologies. Development of solar power plants and land and sea wind parks, to a lesser extent in biomass and biogas. The planned development of solar power plants is mainly linked to the development of prosumers, remote prosumers, remote solar parks and renewable energy communities. On the other hand, wind turbine power growth is expected to take place on a market-based basis.

Table 4.2.2.5: Development of electricity generation capacity in the EPP scenario

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Solar e-, MW	164	255	572	1108	2008	2740	3026	3055	3072	3090	3109
Wind e., total MW	540	623	946	1228	1561	2099	2809	3614	4015	4315	5915
Of which offshore, MW	—	—	—	—	—	—	—	—	—	—	1400
Biofuels cogeneration, MW	63	63	63	63	221	221	221	221	221	221	221
Waste cogeneration, MW	20	20	40	40	70	70	70	70	70	70	70
Total cogeneration, MW	83	83	103	103	291	291	291	291	291	291	291

District heating

In the district heating system, the ESP envisages several major changes in the period under consideration. Vilnius CHP plant will be fully operational in 2024. Its heat production capacity will be up to 244 MW (around 70 MWš for the waste unit and 175 MWš for biomass). New and refurbished existing district heating installations with a capacity of around 190 MW are planned to be installed by 2030.

The modelling results for the DH sector are shown in Figure 4.2.2.3.

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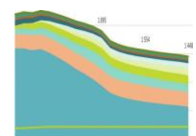
4.2.2.3. figure 2.1: The DH fuel balance forecast for ESP Centralised heat production will decrease. This concerns in particular energy efficiency measures (renovation of buildings, raising consumer awareness, digitalisation of accounting, etc.) and increasing the efficiency of energy production. In 2020, total fuel consumption in the DH sector followed 1029 ktoe. In 2030 and 2040, fuel demand will decrease to 864 ktoe and 809 ktoe respectively, i.e. 16 % and 21.4 % respectively.

Transport

The modelling results of the ESP scenario for the transport sector are presented in Figure 4.2.2.4 and the fuel and energy consumption forecasts in the transport sector are presented in Table 4.2.2.6.



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ПППi White reactor fuel Electricity Biogas
LPG Natural gas Other
☐Multaneously -All International marine bunkers

Figure 4.2.2.4 Results of the modelling of the ESP for the transport sector

Table 4.2.2.6. Projections of fuel and energy consumption in the transport sector in the ESP scenario, ktoe

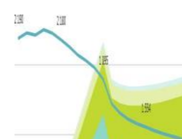
	2020	2021	2022	2023	2024	2025	2030	2035	2040
Diesel (without biofuel)	1 598	1 597	1 561	1 583	1 516	1 429	937	654	565
Petrol (without biofuel)	237	254	262	257	264	269	290	287	252
Biodiesel	87	106	98	125	133	142	229	160	141
Kerosene reactor fuel	64	71	112	97	109	115	147	153	159
Electricity	6	7	8	16	27	42	100	101	132
Biogas	—	—	—	12	26	34	77	81	84
LPG	97	92	93	86	80	74	44	43	43
Natural gas	29	31	29	32	23	23	23	25	23
Other	73	71	51	45	48	52	48	50	49
Total:	2 190	2 229	2 213	2 252	2 226	2 180	1 895	1 554	1 448
International marine bunkers	183	188	196	203	211	211	211	211	211

Other:									
Heating and other gas oils	57	54	31	26	28	30	23	22	22
Bioethanol	16	17	20	19	19	20	20	21	18
Hydrogen	—	—	—	—	1	1	2	6	8
Aviation gasoline	0	0	0	0	0	0	0	1	1

The results of the ESP scenario show a decline in diesel consumption, with a wider use of RES instead: 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 traffic congestion and tightening down GHG emissions.

In the ESP scenario, fuel consumption in the transport sector is projected to be around 13.5 % lower in 2030 compared to 2020. The scenario envisages a significant reduction in diesel consumption of around 41 % between 2020 and 2030, around 29.7 % of all non-renewable fuels and a rapidly growing share of RES, by 2030, the share of RES is expected to increase by about 3 fold (without taking into account the share of RES in electricity).

4.2.2.5. the figure shows the total final energy consumption in the transport sector (VISO used in transport; scale on the left, ktoe) and energy consumption of renewable fuels such as biogas, biodiesel, bioethanol and hydrogen (green) (Y scale to the right of the chart, ktoe). Electricity is shown in the graph in full (the specific share of RES in electricity depends on the RES-E target achieved in a given year).



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Biodiesel Electricity Biogas Bioethanol Hydrogen Total

Figure 4.2.2.5 RES transport sector in the ESP scenario, ktoe

4.3. Dimension energyefficiency

The current situation in terms of energy efficiency in sectors is considered to be 2020 (in the tables and graphs, data for the years 2020-2022 are actual data taken from or calculated from publicly available data from the State Data Agency). Simulated period: 2023-2040

The current levels of primary and final energy consumption shall be reflected in the actual consumption in 2020 and 2 022 in individual sectors of the economy. The Lithuanian economy is dominated by the transport sector in terms of energy consumption (41 % in the final energy consumption balance in 2020, 40.4 %. 2022), households use 26-28 %, industry 17-18 % and services around 11 %. 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

	2020:	%	In 2022	%
Primary energy consumption, ktoe	6442,6	—	6574,4	—
Final consumption, ktoe	5339,3	100	5 478,7	100
Industry, ktoe	981,3	18,4	920,7	16,8
Household sector, ktoe	1433,8	26,9	1558,7	28,5
Services sector, ktoe	576,0	10,8	613,2	11,2
Transport sector, ktoe	2190,3	41,0	2214,7	40,4
Other sectors, ktoe	157,9	3,0	171,4	3,1

Thedetailed assessment of the potential of high-efficiency cogeneration and efficient district heating[114] (hereinafter referred to as 'the Cogeneration Potential Assessment') of the Republic of Lithuania was drawn up on the basis of an integrated analysis of the development and functioning of electricity and district heating and fuel systems, using modern mathematical models, assessing end-users' behaviour in improving energy efficiency, requirements and environmental commitments made by the country and aspects of security of energy supply. The assessment of cogeneration potential included analyses of heat and power generation and supply technologies, heat and power generation capacity in 10 major cities and Elektrenai, fuel balances, changes in fuel and energy prices used, trends in heat supply system development, description of 9 analysed scenarios and economic calculations of CHP plants.

Forecasts ofprimary and final energy consumption in each sector

Projections for primary and final energy consumption are derived from systematic modelling of fuels and energy used in the sectors of the Lithuanian economy. The model is based on statistics that reflect the current energy consumption situation, specific assumptions affecting the evolution of energy consumption and the estimated impact of policy measures (such as direct energy efficiency measures, efficiency of energy production, fuel substitution, measures to promote changes in consumer behaviour, etc.). Where appropriate and possible, data from the reference scenario, such as the impact of technological improvements on energy efficiency, were used in energy consumption modelling. It should be noted that different models and assumptions lead to different outcomes. The main differences with the reference scenario were assumptions about GDP growth, the contribution of GDP to energy consumption, and population change.

Modelling activities rely very strongly on statistics on energy consumption and long-term trends in energy consumption, best peer reviews of how these trends could look in the future, concrete market plans for the expansion of generation capacity and future energy needs, specific impact assessments of existing policy measures. All of this allowed for a flexible and realistic model for the operation and development of the Lithuanian energy system.

114 https://ec.europa.eu/energy/sites/ener/files/documents/Lithuania_DOC_88658.pdf

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. To increase energy efficiency in the transport sector, Lithuania has higher excise duties and VAT taxes on fuel, and 21 % on fuel. VAT, i.e. 6 percentage points higher than the EU 15 % minimum. The evaluation of the measure assessed an estimate of the elasticity of the respective fuel type and is projected to generate energy savings of 8.66 TWh between 2021 and 2030 due to higher taxes and excise duties on fuels.
- EE2-E – Renovation (modernisation) of multi-apartment buildings. Continuation of multi-apartment buildings
refurbishment programme, expected savings of 5.29 TWh. The projected energy savings estimated the area of multi-apartment buildings to be renovated and the potential thermal energy savings achieved in kWh/m², based on the energy performance certificates of renovated multi-apartment buildings before and after the renovation.
- EE3-E – Renovation of public buildings. An assessment of the surface area of public buildings to be renovated; and
projected energy savings in kWh/m² for renovated public buildings have been identified on the basis of the energy performance certificates of renovated public buildings before and after the renovation. Annual energy savings are estimated at around 8 GWh and around 0.41 TWh by 2030.
- EE4-E. Agreements with energy suppliers on consumer education and consultation. Predicted:
that the implementation of education and advisory measures will result in energy savings of 277 GWh annually and 2.77 TWh by 2030 as a result of changing energy consumption patterns by consumers over the period 2021-2030. When forecasting energy savings, the average percentage of implementation of education and advisory measures and the projected energy sales are estimated, assuming 55 % electricity savings, 25 % heat savings and 20 % natural gas savings.
- EE5-E: PIS relief for industry. The implementation of this support is forecasted to:
the mechanism will save around 70 GWh annually and around 4.23 TWh by 2030. In the assessment of the impact of the measure, the potential energy savings, energy distribution, intensity of implementation and other assumptions were adopted on the basis of data from energy audits in installations and technological processes.
- EE6-E. Agreements with State-owned and municipal-owned enterprises on energy savings.
Over the period 2021-2030, the energy savings agreements are projected to deliver about 64 GWh annually and around 3.75 TWh by 2030. The annual reduction in energy consumption was projected on the basis of the energy savings agreed in the energy savings agreements between the Ministry of Energy and the energy companies, as well as the assessments and calculations of the 25 company energy savings agreements.
- EE7-E: Transforming Castes into more efficient technologies. It is forecast that for the period 2021-2030,
switching boilers to more efficient technologies in households will save 142 GWh per year and around 7.62 TWh by 2030. The expected impact of the measure estimated the reduction in biofuel consumption and the increase in electricity consumption due to newly installed heat pumps. In assessing the potential reduction in energy consumption, the energy characteristics of the heat generation installations replaced and newly installed during the implementation of the measure have been taken into account.
- EE8-E – Modernisation of indoor heating and hot water systems in buildings ("small renovation").
The renovation of old elevator heat points is projected to reduce thermal energy consumption on average by 8 % and save around 0.03 TWh of energy by 2030.
- EE9-E – Implementation of energy efficiency measures for private legal entities under
energy audit reports. The measure proposed in the energy audit for the period 2021-2026 is projected to save almost 0.18 TWh of energy by 2030. The impact assessment relied on data from

projects implemented and assumed annual energy savings of around 800 MWh per project, 60 % of natural gas and 40 % of electricity savings. (2021-2026).

- EE10-E: Refurbishment (modernisation) of the dwellings of one or two apartments of natural persons.
  Projected energy savings of 0.61 TWh by 2030. The projected energy savings estimate the planned renovation of one and two dwellings and the potential to achieve thermal energy savings in kWh/m², based on the data from the renovated residential energy performance certificates before and after the renovation.
- EE11-E. Upgrading of street lighting systems. Projected savings by 2030:
  0.17 TWh of electricity. When assessing the impact of the measure, based on the data of the measure implemented, the update of one luminaire leads to an average annual electricity saving of 295 kWh.
- EE15-E: Renovation (modernisation) of non-residential buildings for legal persons.
  Projected energy savings of 0.017 TWh by 2030. The projected energy savings estimated the area to be renovated and the potential thermal energy savings in kWh/m² of renovated non-residential buildings, based on data from the energy performance certificates of renovated non-residential buildings before and after the renovation.

These existing energy efficiency measures are projected to save 33.7 TWh between 2021 and 2030, as well as additional savings of 14.5 TWh from existing measures affecting energy efficiency in transport and industry. The graph for projections of energy savings is shown in Figure 4.3.1. Measures EE1-E and EE7-7 have the greatest impact on energy savings.

After assessing the impact of existing policy measures on energy consumption calculated in accordance with the requirements of the EE Directive 2023/1791 (among others excluding electricity consumption for hydrolysis of hydrogen and energy produced by heat pumps from modelling and forecasting), the projections for primary and final energy consumption in the ESP scenario for 2030 are presented in Table 4.3.2.

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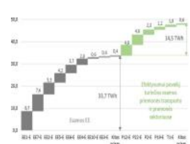

- Figure.3.1 Projections of energy savings from existing policy measures in 2030, TWh

Table 4.3.2. Projections for primary and final energy consumption (as per EE Directive 2023/1791) for 2030 (ESP):

	2030 Forecast	2030 goal
Primary energy consumption, ktoe	5 745	5 540
Final energy consumption, ktoe	4 761	4 384

Projections for primary and final energy consumption in the ESP scenario show that the 2030 targets will not be met. Primary energy consumption in the 2030 ESP scenario will be too high by 5.6 % and final energy consumption by 8.6 %.

For the purposes of assessing primary energy consumption, it is calculated by subtracting from gross inland consumption the fuel and energy consumption for non-energy purposes and transformed by other plants, i.e. primary energy does not include fuels (imported oil and oil products and natural gas) used as feedstock, also taking into account the amounts of electricity consumed for hydrolysis of hydrogen and energy produced by heat pumps.

Table 4.3.3. Energy consumption projections with existing energy efficiency policies, measures and programmes (ESP)

	2020	2025	2030	2035	2040
Primary energy consumption, ktoe	6 442,6	6 597	6 185	5 797	5 795
Final energy consumption, ktoe	5339,3	5 497	5 154	4 831	4 829
Household sector, ktoe	1433,8	1 601	1 672	1 654	1 625
Industry, ktoe	981,3	915	746	703	749
Services sector, ktoe	576,0	627	673	754	838
Transport sector, ktoe	2190,3	2 180	1 895	1 554	1 448
Other sectors, ktoe	157,9	174	168	166	169

The modelling of the ESP scenario shows that final energy consumption will be 3.5 % lower in 2030 and 9.5 % in 2040 compared to the actual level of 2020.

Transport

Other

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- Figure.3.2 Energy consumption after assessing the impact of existing measures (ESP), ktoe

The identification of primary energy consumption in individual sectors is very complex, as around 58 % of the total energy consumption. 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 Figure 4.3.3.

In the scenario of existing policy measures, the total energy consumption of the country for energy consumption will decrease and will be 9.5 % lower in 2040 than in 2020. Fuel and energy consumption in the ESP scenario is shown in Table 4.3.4.

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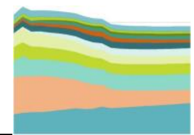

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- Figure.3.3 Total fuel consumption in ESP scenario, ktoe

Table 4.3.4. Fuel and energy consumption in ESP scenario, ktoe

	2020	2021	2022	2023	2024	2025	2030	2035	2040
Total	340	699	5525	5538	5529	5497	5154	4831	829
Electricity	891	959	987	988	024	071	238	265	392
Diesel	647	647	610	631	562	474	975	691	601
Thermal energy	737	893	741	741	739	740	708	707	706
Firewood, wood and waste	633	617	589	554	539	537	464	469	480
Natural gas	583	633	581	582	551	528	374	363	354
Ambient heat	30	63	84	110	136	167	310	313	317
Gasoline	238	255	263	258	265	270	291	288	252
Biodiesel	87	106	98	125	133	142	229	160	141
Kerosene reactor fuel	64	71	112	97	109	115	147	153	159
Biogas	9	11	11	28	53	58	100	104	107
LPG	142	134	143	133	127	121	91	89	88
Bioethanol	16	17	20	19	19	20	21	21	18
Remaining species:	263	293	287	274	272	254	206	210	213
Gas oil for heating	105	108	105	98	99	101	85	84	83
Coal	133	159	157	152	149	114	73	72	71
Waste	2	3	4	4	4	19	29	29	29
Peat for fuel and peat briquettes	15	17	21	19	18	17	12	16	21
Hydrogen	—	—	—	—	1	1	5	6	8
Fuel oil	7	5	1	1	1	1	1	1	1
Aviation gasoline	0	0	0	0	0	0	0	1	1
International marine bunkers	183	188	196	203	211	211	211	211	211

4.4. Energy security dimension

4.3.1. the table shows Lithuania’s projected energy mix (mixas) for 2030 and 2040. Final consumption of energy is estimated by subtracting from gross inland consumption energy transformed in other enterprises and energy used for non-energy purposes. That is, only the part of energy that is not used as a raw material for recycling was assessed.

Table 4.4.1. Existing energy mix and projections (ESP)

Type of fuel/energy	Consumption in ktoe			% Of total consumption		
	2020:	By 2030.	In 2040	2020:	By 2030.	In 2040
Wind	120	1301	1610	2,2	25,2	33,3
Firewood, wood and waste	1004	979	1001	18,8	19,0	20,7
Ambient heat	30	310	317	0,6	6,0	6,6
Solar	11	261	261	0,2	5,1	5,4
Biodiesel	87	229	141	1,6	4,4	2,9
Biogas	9	100	107	0,2	1,9	2,2
E-biomass	27	58	58	0,5	1,1	1,2
Hydropower plants	37	32	30	0,7	0,6	0,6
Other RES	31	69	68	0,6	1,3	1,4
Diesel	1647	975	601	30,8	18,9	12,5
Natural gas	950	567	539	17,8	11,0	11,2
Gasoline	238	291	252	4,5	5,7	5,2
Kerosene reactor fuel	64	147	159	1,2	2,8	3,3
LPG	142	91	88	2,7	1,8	1,8
Gas oil for heating	105	85	83	2,0	1,6	1,7
Other fossil fuels	155	87	93	2,9	1,7	1,9
Electricity (import)	682	—426	—579	12,8	—8,3	—12,0

Almost all energy production from indigenous energy sources in Lithuania comes from RES. Non-renewable indigenous energy sources (peaks) represent an insignificant part and are not further assessed. Wind (onshore and offshore) and solar power generation will be the most affected by 2030. It will increase dramatically, around 11 and 23 times respectively, and biofuel consumption will increase by about 3.

In 2020, the main sources of imported energy in the balance sheet were crude oil and other primary products for the oil refinery, natural gas and electricity. In the scenario of existing Sami policy measures, Lithuania will be a net exporter of electricity in 2030, with diesel consumption around 41 % lower and natural gas consumption around 40 %.

Almost all imports of crude oil and about half of the imported natural gas each year are used for the production of mineral fuels and fertilisers. A sharp increase in the price of crude oil and natural gas would directly affect the largest producers of mineral fuels and fertilisers, but would not have a significant impact on the Lithuanian energy sector. Thanks to the LNG terminal, LitPol Link and NordBalt, Lithuania’s ability to source energy from several different suppliers provides additional opportunities and flexibility to respond to energy price fluctuations and security of supply.

4.5. Internal energy market dimension

4.3.2. Degree ofelectricity interconnectivity

Lithuania's electricity system connectivity level is already above the EU target of 15 % connectivity in 2030. As the connectivity target has been achieved, the level of connectivity of Lithuania's electricity system in 2023 was72.35%[129], for which no measures are foreseen. However, given that the Lithuanian electricity system is not operating in synchronous mode with TC, the main objective in the electricity sector is the integration of Lithuania and the Baltic States into the TEC in synchronous mode. This is described in more detail in Section 4.5.2. The maximum capacity is projected to be 3 385 MW in 2030. Table 4.5.1.1 shows the projected installed power for 2030 expected for 2030.

4.3.1.1. table. Projected installed capacity in 2030, expected in2030.[130]

Generation		Installed capacity, MW
Thermal power plants:	Fuel	1381
Lithuanian	Natural gas	1055
Vilnius E3	Natural gas	0
Kaunas	Natural gas	0
Panevėžys	Natural gas	35
Other NPPs	Oil, natural gas	291
Pumped-storage power plant	Fuel	1010
Kruonio HAE	Pumped storage	1010
Renewable:		10128
Kaunas HE	Hydro	101
Low HE	Hydro	27
Onshore wind E	Wind	4500
Marine VE	Wind	1400
Sunlight	Sunlight	4100
Biomass:		192
Vilnius E2	Biomass	29
Vilnius CHP plant (biomass burning unit)	Biomass	79
Šiauliai E	Biomass	11
Small biomass	Biomass	73
Biogas:	Biogas	50
Waste incineration:		70
Vilnius CHP plant (firing unit)	Waste	22
Klaipėda, Fortum (pipe TP)	Waste	21
Fortum CHP plant (Kaunas, Biruliškių TP)	Waste	26
Small waste incineration	Waste	1

129 https://energy.ec.europa.eu/document/download/f0664df1-84c6-4978-b53c-98e816e96c59_en?filename=LT_Soeur%20Fiche%202023.pdf
130 Source AB LITGRID.

The main connections with EU countries in 2030 are shown in Table 4.5.1.2.

Table 4.5.1.2. Main connections 2030[131]

Connectors		Maximum capacity in MW	Market capacity
NordBalt	HVDC	700	700
Harmony Link	HVAC	700	700

LitPol Link	HVDC	70[0132]	up to 150[115,116,117]
LV-LT	AC OHL	1234	950, 800[118]

4.5.Z Energy transmission infrastructure

Directions for the development oftransmission infrastructure

Lithuania's electricity transmission network at 400-330-110 kV includes substations and distributors for 241 transformers and 7 298.9 km of transmission lines and cables. 400 kV transformers have installed capacity of 1 800 MW, 330 kV transformers have an installed capacity of 4 850 MW and 110 kV transformers have an installed capacity of 92.6 MW.

Existing electricity transmission grids will need to be upgraded and expanded. The need for rapid upgrading and development of electricity transmission networks is linked to the high potential for RES generation (wind and solar power plants), the connection of electrolysis installations to the electricity transmission grids. The speed at which offshore wind generation is developed will determine the development needs of offshore electricity transmission networks and the volume of investments. RES potential is particularly high in western Lithuania and consumption in the east. This leads to the need to strengthen the interconnectivity of parts of the electricity system of the Republic of Lithuania in the east and west, thereby enhancing national energy security and ensuring faster RES development.

The strengthening of electricity transmission networks in northern Lithuania due to higher capacity will also allow further integration of the electricity market into the Latvian electricity transmission system (in both directions). With the increase in electricity production and consumption, as well as to ensure the further development of RES electricity generation and the security of the Lithuanian electricity system, the aim will be to expand cross-system electricity interconnections from an economic perspective. The main priority is additional electricity interconnections with Central Europe, strengthening new and existing electricity interconnections with the Baltic countries. The electricity transmission scheme of the Republic of Lithuania with neighbouring countries and the data are shown in Figure 4.5.2.1.

Figure 4.5.2.1 Electrical transmission diagram and *datasets*[135]

135 Source: AB LITGRID, reference: https://www.litgrid.eu/index.php/energetikos-sistema/elektros-energetikos- system-information/transmission-network-schema-and-data/501

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 Lithuanian gas distribution operators' systems (see Chart: 4.5.2.2.).

The development of the pipeline network in Lithuania started in 1961. The most commonly used gas pipelines have a diameter of 700 mm and the maximum diameter of gas pipelines in Lithuania is 1 220 mm.

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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 for the needs of Lithuania and the Baltic countries passes through it.

In total, in 2023 Amber Grid supplied Lithuanian gas customers with 14.9 terawatt-hour (TWh) gas, or 4 % less than in 2022. Lithuania's gas transmission system was transported by 61.2 TWh of natural gas.[119] Of these, 19.1 TWh of gas were transported via Latvia to the Baltic States and Finland, and 3.2 TWh were transported in the direction of Poland. The main source of gas imports to Lithuania and the other Baltic countries, the Klaipėda LNG terminal, was 85 % supplied in 2023. (31.9 TWh) of all gas transported to the system. The flow from Latvia was close to 7 %. (2.5 TWh), Poland 9 % (3.3 TWh)

Following the connection of the first biomethane plant to the gas transmission system in 2 023.47 gigawatt-hours (GWh) of green gas produced in Lithuania for which guarantees of origin were issued was injected into the system during the second half of the year. Since the start of importing sustainability-compliant biomethane produced in European Union countries into Lithuania since the end of 2022, a total of 40 GWh of biomethane with guarantees of origin recognised in Lithuania was imported into Lithuania during 2023. Following the cessation of imports of Russian gas by Lithuania in 2022, only gas destined for Kaliningrad (Karaliaučius) in the Russian Federation is transported through the Lithuanian-Belarusian interconnection. Gas transit to the Karachus area amounted to 23.9 TWh in 2023 (23.4 TWh in 2022).

Technical capacity for interconnection of gas pipelines with cross-border transmission systems and LNG terminal:

- at the point of entry through Kotlovka DAS 325.4 GWh/day (This point is used only for the transit of natural gas to the Kaliningrad Oblast of the Russian Federation);
- at entry point through Klaipėda DAS (transmission system connection point to LNG terminal system): 122.4 GWh/day;
- 65.1 GWh/day at the point of entry through the Kiemenian DAS to Lithuania;
- 73.3 GWh/day at the point of entry through Santaka DAS to Lithuania;
- 67.6 GWh/day at the Kiemenian DAS from Lithuania;
- at the exit point through the Shakiai DAS: 114.2 GWh/day;
- 58 GWh/day at the point of exit through the Santaka DAS.

Figure 4.5.2.2. Lithuanian natural gas transmission system[137]

The main completed project is the gas interconnection between Poland and Lithuania (GIPL), described in more detail in section 2.4.2., which became operational on 1 May 2022. As well as the project to increase the capacity of the pipeline interconnection between Latvia and Lithuania (ELLI) completed in 2023. The

119 Source: AB Amber Grid, reference: https://ambergrid.lt/ziniasklaidai/naujienos/2023-metais-lietuvoje- used-almost-15-TWh-gas/979#

project is also further described in section 2.4.2. Other projects of local interest are described in the natural gas transmission system operator's 10-year network development plan[120 121].

4.5.3 Electricity and gas markets, energy prices

Electricity

At the end of 2023, 2643 operators (natural and legal persons) had permits for the production of electricity (no prosumers) issued by the BERT, while 386 operators (natural and legal persons) had permits for the development of electricity generation capacity issued by BERT. In 2023, the BERC granted the first 7 statuses of Citizens' Energy Communities. Similarly, the first 3 statuses of renewable energy communities were granted.[122]

In 2023, the amount of electricity imported in Lithuania's electricity system decreased by 9.6 % compared to 2022, reaching 77.9 % of the country's total electricity demand in 2023 (12.6 TWh demand). In 2023, the country produced 5.66 TWh of electricity, 9.79 TWh of imports and 2.87 TWh of exports. The country's electricity consumption in 2023 amounted to 11.83 TWh. Total installed capacity in power plants increased in 2023 to 5 259 MW (4 279 MW in 2022).

In 2023, the investments implemented by the electricity sector amounted to EUR -508.84 million, an increase of 83.5 % compared to 2022. In the distribution system, investments amounted to EUR 340.07 million (41.1 % growth), EUR 163.43 million for transmission (3.8 times growth) and EUR 5.34 (1.4 times growth) for ancillary services.

The maximum hourly electricity demand (net) in Lithuania in 2023 was 2 100 MWh (1.7 % less than 2 136 MWh in 2022) and 1 873 MWh in the distribution system (0.5 % below 1 883 MWh in 2022).

In 2023, the NERC applied regulation to 3218 economic operators in the electricity sector. This includes activities of independent supply and aggregation, transmission, distribution, public supply and generation of electricity, licensed or regulated by permits, as well as permits for the development of generation capacity. At the end of 2023, the licences issued by the VERT were: AB Litgrid – Electricity Transmission System Operator, AB Energy Distribution Operator, AB Achema, UAB DainavosElektro and AB Akmenės cementas – Electricity Distribution System Operators, UAB Ignitis – Public electricity supplier.

The forecast of developments in the electricity market, including prices, was not assessed with existing policies and measures at least until 2040 (including 2030) in Lithuania.

Gas

In 2023, imports of natural gas amounted to 38 175 GWh, which was 6.9 % lower than in 2022 (41 006 GWh). In 2023, sales in the natural gas sector decreased by 31.91 % compared to 2022, from 35 523 GWh to 24 188 GWh.

In the natural gas sector, BERT regulated 63 operators in 2023. In the natural gas sector, the activities of transmission, distribution, storage, liquefied natural gas (LNG) regasification, supply and market operator are licensed or regulated. 56 undertakings held permits for the supply of natural gas, 35 of which were active.

120 Source: AB Amber Grid, https://www.ambergrid.lt/lt/perdavimo-sistema/Lietuvos-perdavimo-sistema

121 Link: https://www.ambergrid.lt/lt/perdavimo-sistema/perdavimo-sistemos-pletra/perdavimo-sistemos- pletter-plan

122 Source: BERT, link: https://www.regula.lt/Puslapiai/naujienos/2024-metai/2024-07-26/Pateikta-Elektros- Energy-and-natural-gas-market-annual report-European-Commission.aspx

In 2 023.9099862 MWh of natural gas was traded on the GET Baltic natural gas exchange. The volume of natural gas sold by UAB GET Baltic on the natural gas exchange was 31 % higher than in 2022. In 2 023.22728 GWh of natural gas was sold and/or consumed on the wholesale natural gas market, a decrease of 35.5 % compared to 35 236 GWh of natural gas sold and/or consumed in 2022.

The revenues of the natural gas sector (transmission, distribution, LNG regasification, supply) amounted to EUR 1 569 million in 2023, almost 2.7 times lower than in 2022 (EUR 4 186 million) due to the decrease in the price of the natural gas product. In 2023, revenues from regulated activities of distribution, transmission and LNG system operators were higher than in 2022, while the revenues of supply undertakings were lower than in 2022. The decline in revenues of natural gas supply undertakings was due to a decrease in the price of imported natural gas (product) purchased through bilateral transactions and exchanges in 2023.

In the natural gas sector, the number of household and non-domestic consumers has been steadily increasing since 2010: In 2018, there were 595 thousand natural gas consumers in Lithuania, of which 587.6 thousand household and 7.4 thousand non-domestic consumers. The weighted average import price of natural gas imported into the Lithuanian market for the supply of natural gas (EUR/MWh), where the calculations include 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 Kauno cogeneration Power Plant and the purchase costs of natural gas incurred for own use and the quantities of natural gas and the costs of supply from storage facilities located in the EU Member States

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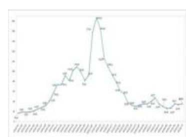

Figure 4.5.3.3. Weighted average import price of natural gas placed on the Lithuanian market for the supply of natural gas, EUR/MWh. Source: EERT[140]

The forecast of developments in the natural gas market, including prices, was not assessed with existing policies and measures at least until 2040 (including 2030) in Lithuania.

Heating and cooling

Over the last 10 years, there has been a steady increase in the use of biofuels in heat generation and district heating systems. In 2023, the trade in biofuels on the Baltpool energy exchange increased by 19.6 % compared to 2022. — Almost 8.1 TWh were traded in 2023. Figure 4.5.3.4 shows the change in biofuel turnover from 2013 to 2022 for Baltpool. Since the start of operation of the Vilnius CHP plant in 2023, the share of biofuels in heat production in Lithuania has increased by over 80 %. It is important to note that the raw material for the production of biofuels is 100 % sourced from Lithuanian resources.

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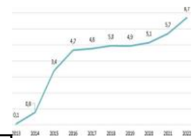

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140 http://www.regula.lt/dujos/Puslapiai/duju-kainos/importo-kainos.aspx Average price dynamics of district heating (excluding VAT) in Lithuania, 1997-2022, available at:

Figure 4.5.3.5. In 2022, the price of central heating increased significantly as a result of the energy crisis caused by Russia.

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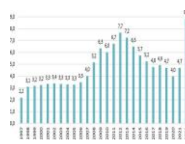

Figure 4.5.3.5 Average price dynamics for district heating in Lithuania (excluding VAT)

The forecast of developments in the heat and cooling market, including prices, was not assessed with existing policies and measures at least until 2040 (including 2030) in Lithuania.

4.6 Research, innovation and competitiveness dimension

State ofplay in the low-carbon sector

The recent lack of renewable energy technologies, the digitalisation of the economy and the emergence of new technologies for batteries, heat pumps, electric vehicles or hydrogen offer opportunities to accelerate fundamental changes in our energy system and its architecture 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.

The economic lifetime of innovation-driven investments in energy infrastructure is typically between 20 and 60 years. Action over the next five to ten years will determine whether we will build an energy system that will help Lithuania and Europe to reach climate neutrality by 2050.

Innovation can lead to more efficient use of energy resources, thus reducing energy demand and its associated climate and environmental impacts. Some end-use applications are likely to require new or energy-intensive fuels. Such are, for example, hydrogen or synthetic fuels.

The development of the solar and biomass industries, the use of competence technologies for energy production, accelerates the transition to RES that is economically, socially and 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 enterprises 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 companies and research institutions; highly qualified professionals are also trained. In Lithuania, research is ongoing in the fields of solar energy, optimisation of combustion processes, energy-efficient materials, energy-efficient lighting, biotechnology industry, biofuel production, hydrogen technologies and other relevant research.

UAB Solitek R&D, together with scientific institutions, universities and research centres from all over the world, conducts continuous research into solar technologies, helping to develop increasingly energy-efficient solar modules and exploring new ways to make more efficient use of solar energy. Since 2019, Solitek R&D has been focusing on studies on solar module efficiency technologies, solar module processing and solar power applications in various areas and other design activities.

Creation of clusters

Clusters to boost innovation are being set up in Lithuania. In addition to the Bioelectric Development Cluster (the development of modern, innovative biofuel equipment and technologies for the efficient use of biomass) and the Photoelectric Technology Cluster (development of environmental energy technologies), several new ones have been set up. These include the Smart Green City (promote 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 become 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 their resource efficiency.

Science, technology and innovation policy

The Ministry of Education, Science and Sport formulates the country's study and science policy. Studies and TEPIs are closely linked to all areas of development in the country. High-quality research contributes to tackling global challenges, including climate change, encourages the involvement of Lithuanian researchers in the FP Horizon Europe and other international science programmes, and in international R & I infrastructures such as CERN, the European Nuclear Research Organisation.

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 State Progress Strategy "Lithuania's vision for the future "Lithuania 2050"", in the context of the Lithuanian Government's programme.

European innovation dashboard

According to the European Commission's 2023 edition of the European Innovation Scoreboard, 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) and, overall, in this light, Lithuania has maintained its position and ranks 19th. Among the five most advanced indicators in Lithuania are brand applications (+ 70.9 points), venture capital expenditure (+ 62.7 points), companies introducing product innovation (+ 59.4 points), enterprises introducing process innovation (+ 47.3 points).

National funding to TEPI

Table 4.6.1 shows the sources of funding for R & D activities by sector and by year. It can be noted that funding increased in 2020 by EUR 78.87 million compared to the previous year and by EUR 60.92 million in 2021.

4.6.1. table. 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:	485,998	564,868	625,788	—

Number of researchers: The number of researchers participating in R & D activities increased to 19 609 in 2021 (Table 4.6.2) in 2018 for 19198 researchers.

4.6.2. table. Researchers involved in R & D activities

Staff involved in R & D				
Year	2018	2019	2020	2021
Investigators	19198	18811	19431	19609

Number of patents: According to 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

Until 2021, all domestic consumers purchased electricity from a public supplier, the price of which was set by BERT. In the context of the liberalisation of the electricity market, from 2021 onwards, domestic electricity consumers were obliged to phase out monopolistic public supply services. Since 2021, household customers with an annual electricity consumption of more than 5 000 kWh have had to purchase electricity from a selected independent supplier whose prices are no longer regulated by BERT. With effect from 1 July 2022, public supply shall be abandoned to household customers that have consumed at least 1 000 kWh per year at the facility (except for communities and socially vulnerable customers) and consumers with lower electricity consumption will be able to gradually enter the 'free market' by 2026 and until then benefit from public electricity tariffs. When consumers choose their electricity supplier, BERT will only regulate about half of the price per kWh of electricity (price components for infrastructure and system services provided by TSOs Litgrid and DSO ESOs). The other half of the price will be determined by the price of the electricity exchange and competition between suppliers. The LI approves differentiated public electricity tariffs for household customers with an annual consumption of less than 1 000 kWh. This rate is 28 ct/kWh plus VAT, setting lower public electricity price caps for household consumers for the second half of 2023, i.e. 22.264 ct/kWh (including VAT) for electricity from the LV networks, which is 18.84 % lower than in the 3-6 months of 2023.

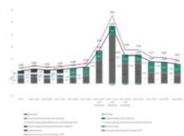

Figure 4.6.1. Public electricity price cap for household customers purchasing electricity from LV networks dynamics between 2019 and the second half of 2024. The price caps are indicated with:
compensation for additional components for supply activities and for technological purposes.[123] [124]

In the electricity sector, regulated transmission and distribution activities which affect prices to the final customer accordingly. The price caps for regulated services are given in Table 4.6.3.

Table 4.6.3. Price caps for electricity transmission and distribution services, 2019-2024 (ct/kWh)[142]

Name of the regulated service	Regulated Service Provider	Regulated service cap (ct/kWh)					
		2019	2020	2021	2022	2023	2024
Electricity transmission	WHO LITGRID	0,658	0,814	0,721	0,684	0,654	1,329
Distribution of electricity via medium-voltage grids	DSO ESO	0,862	1,076	1,167	0,892	1,609	1,235
Distribution of electricity via low-voltage grids	DSO ESO	1,871	2,092	2,171	1,959	2,905	2,817

Natural gas tariffs for domestic customers are regulated by BERT and, under the legal framework in force between 2022 and 2024, they were recalculated twice a year. The amendments to the Law on Energy and Natural Gas of the Republic of Lithuania entered into force on 24 May 2022, which provided for the inclusion of compensation rates for a part of the price of natural gas in the natural gas tariffs for household consumers and thus made it possible to reduce the impact of the increase in the price of natural gas imports on household consumers from 1 July 2023 onwards, with effect from 1 July 2023 on the following natural gas tariffs for household consumers: Gr III – EUR 1.36/m^3 plus VAT; Gr. II – EUR -0.87/m^3, plus VAT, and the amount fixed by the Government Resolution for the part of the company's natural gas supply price in relation to the cost of purchasing natural gas to be EUR 0.63/m^3.

In the event of a drop in natural gas prices on international markets, no government compensation has been applied since 2024. Amendments to the Law on natural gas entered into force on 25 June 2024, which provided for more flexibility for the Council to recalculate the regulated natural gas tariffs for household customers once per quarter of the calendar year. Accordingly, as of 1 July 2024, the VERT approved lower

123 Source: https://www.regula.lt/Puslapiai/naujienos/2023-metai/2023-05-15/mazeja-visuomenines-elektros- Energy-price-virsutas-ribose-consumers.aspx
124 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

new rates for natural gas for household consumers, i.e. EUR 1.55/m³ plus VAT for Gr III, EUR 0.59/m³ for Gr. II including VAT, and EUR 0.55/m³ including VAT for Gr I.

Description of energy subsidies, including for fossil fuels

Lithuania will aim to gradually reduce polluting and depleting energy consumption by 2030, as well as the introduction of tax incentives for fossil fuels that foster market distortions. In order to implement the gradual reduction or withdrawal of tax benefits, the Law on Excise Duties was amended on 9 May 2023,which[125] entered into force on 1 January 2024 and increased excise duties, as well as the introduction of the carbon dioxide component of the excise rate from 2025. On 20 June 2024, Lithuania again amended the Law on Excise Duties to increase its defence funding, which will accelerate the increase of existing CO2 components for 2025-2030. The safety component will also apply to gas oils intended to be used for agricultural production by operators in agricultural activities, including aquaculture or commercial fishing activities in inland waters (EUR 25/1000 l in 2025, EUR 50/1000 l in 2026 and thereafter). In total, thirteen energy subsidies to be phased out by 2026 were identified in Lithuania and described in detail insection 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 for energy security are agreed with the European Commission. They currently include annual fixed operating costs of the LNG terminal,[126] its infrastructure and interconnector, which are not included in other state-regulated prices, and reasonable costs of supplying the LNG terminal's minimum volume are included in the additional component of the security of natural gas supply to the natural gas transmission price.

125 Lawof the Republic of Lithuania on Excise Duties, https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/81998ea9efef11edb649a2a873fdbdfd

126 Lithuanian Liquefied Natural Gas Terminal Law, https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.427221/asr?positionInSearchResults=4&searchModelUUID=48884f0c-894d- 4f31-9989-d6a5d881996f

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SECTIONB: ANALYTICAL BASIS

PLANNED POLICIES; AND

MEASURE IMPACT ASSESSMENTS

5.1. Impact ofplanned policies and measures on the energy system and GHG emissions

This chapter describes the scenario for the implementation of the planned policies and measures (PSD): what effect the planned policies and measures will have on the achievement of GHG emission reduction and removal targets, on increasing RES use and on energy efficiency. It shall also describe the need for funding needed for the implementation of the planned policies and the potential sources and implications for macroeconomic, social and regional cooperation.

5.1.1. GHG emissions and removals

Pursuant to Regulation (EU) 2018/84 of the European Parliament and of the Council2[127], Member States are committed to their minimum greenhouse gas reduction contributions for the period from 2021 to 2030 to meet the EU's greenhouse gas reduction commitments under the Paris Agreement in the sectors not covered by the EU ETS. Lithuania will be required to reduce GHG emissions by 21 % in non-ETS sectors (small energy, transport, industry, agriculture, waste) compared to 2005. GHG emission reductions are to be achieved by at least 14 % in transport, 19 % in industry, 11 % in agriculture, 65 % in waste and 26 % in the small energy sector by 2030. A number of additional measures are envisaged to achieve the objectives in individual sectors, which are described in detail in section 3.1.1 . With all planned policies and measures, almost all sectors will achieve the GHG reduction targets of the NCPD (Table 5.1.1.1), except for the transport sector, which will reach a 10 % reduction. GHG emissions targets for industry (-20 %), waste (-67 %) and small energy (-32 %) will be exceeded and agriculture will meet its target (-11 %).

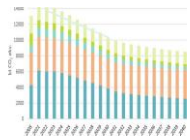
Table 5.1.1.1. % Change in GHG emissions from non-ETS sectors compared to 2005

	2021, %	2022, %	2023, %	2024, %	2025, %	2026, %	2027, %	2028, %	2029 %	2030, %	Target, %
Transport as	43	41	41	36	29	22	14	7	—1	—10	—14
Agriculture	4	3	2	0	—2	—4	—6	—8	—10	—11	—11
Industry	30	30	23	18	13	8	3	—6	—12	—20	—19
Waste management	—40	—43	—47	—50	—54	—57	—60	—62	—65	—67	—65
Small energy only a	—3	—14	—14	—17	—18	—20	—23	—26	—29	—32	—26
Total	13	9	8	4	1	—4	—8	—12	—16	—21	—21

The following flexibilities have been introduced to facilitate the achievement of the GHG reduction targets131:

- Borrowing of annual emission allocation units from the following year: 7.5 % in 2021-2025 and 5 % in 2026-2030;
- Carry-over of excess emission allocation units to the following year: 75 % in 2021 and only 25 % after 2021;
- Transfers (purchase missing/excess sales) annual emission allocation units between Member States: 10 % for 2021-2025 and 15 % for 2026-2030. As it is currently unclear how countries will meet their GHG emission reduction targets for 2030, it is not possible to foresee how much one unit of the emission allocation will cost;
- The general flexibility of the FNM, provided that it is ensured that the GHG emissions of the FNM sector are covered by 'no debit rule'. LT will be able to use 3.25 million tonnes of CO2NHR sinks over the 2021-2025 and 2026-2030 commitment periods.

127 https://eur-lex.europa.eu/legal-content/LT/TXT/?uri=CELEX%3A32018R0842



5.1.1.1. figure 2.1: GHG emissions in sectors not participating in the EU ETS (ESI)

With additional policies and measures, GHG emissions from sectors not participating in the EU ETS will be reduced by 5 % compared to the ESP scenario in 2030 and the GHG reduction target for Lithuania will be met. Overall GHG emissions will decrease by 1 % over the whole 2021-2030 period and by 6 % between 2031 and 2040 compared to the ESP scenario.

Table 5.1.1.2. GHG emissions generated in 2005, 2020,2021 and projected GHG emissions from 2025 to 2040 (with planned policies and measures)

Total greenhouse effect amount of Causing Gas	2005	2020	2021	2025	2030	2035	2040
	kt CO2eq						
Total GHG (excluding FNM)	22 440	20 166	20 252	18 972	14 444	13 293	12 664
Total GHG (incl. FNM)	18 287	13 530	14 161	12 332	6 783	6 427	5 579
	2005	2020	2021	2025	2030	2035	2040

Greenhouse gas emissions by sector	kt CO2eq						
1.Energy (excluding transport)	8 978	5 709	6 149	5 596	3 918	3 930	3 900
2. Transport	4 279	6 138	6 125	5 512	3 847	2 949	2 572
3.Industrial processes and use of products	3 504	2 878	2 756	3 095	2492	2360	2275
4. Agriculture	4 146	4 508	4 328	4 080	3 700	3 661	3 587
5.Land use change and forestry	—4 153	—6636	—6 091	—6 587	—7 604	—6 757	—6 973
6. Waste	1 492	933	894	689	487	393	331
Greenhouse gas emissions in sectors covered by the EU ETS and not covered by the EU ETS	2005	2020	2021	2025	2030	2035	2040
	kt CO2-eq.						
EU ETS (from stationary installations)	9 690	6 121	5 976	6 349	4 666	4 684	4 676
EU ETS (from domestic aviation)	2	1,9	2,2	2.2	2.2	2.2	2.3
EU ETS (total GHG	9 692	6 123	5 978	6 351	4 668	4 686	4 678

emissions)							
Non-ETS	13 062	14 081	14 314	13 128	10 281	9 110	8 487
Greenhouse gas emissions in the FNM sector pursuant to Regulation (EU) 2018/841	2021-2025		2026-2030		2031-2035		2036-2040
	kt CO2eq						
GHG emissions monitored and forecasted by the FNIF (credits if negative)	—8 139		—2 659		N/A		N/A

However, it should be noted that, in accordance with Regulation (EU) 2018/842, the verification of greenhouse gas emissions will be carried out on an annual basis, so it is essential that each year's emissions do not exceed the established allocation and compliance with the GHG reduction targets is assessed every five years. Based on projections for GHG emissions in non-EU ETS sectors, GHG emissions in the period 2022-2029 will be higher than the expected annual emission allocations, while in 2030 GHG emissions are projected to be close to the established allocation. Forecasts show that the annual targets will not be met and will be covered by flexibilities. The FNM flexibility is described in more detail in section 4.1.1. below forthe FNM sector.

Table 5.1.1.3. GHG emissions from sectors not participating in the EU ETS and their change compared to the established allocation.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
GHG Allocation Units	16 112	13718	13293	12868	12443	12018	11593	11169	10744	10319
GHG emissions of the ESP	14697	14213	14130	13717	13283	12784	12267	11788	11305	10779
GHG emissions from PPPs	14696	14213	14079	13627	13134	12597	12024	11460	10914	10287
Shortage of quota units/surplus ESP	1874*	—495	—837	—849	—840	—766	—674	—619	—561	—460
Shortage of quota units/surplus PPP	1874*	—495	—786	—759	—691	—579	—431	—291	—170	32
% Of total	13	9	8	4	1	—4	—8	—12	—16	—21

** Possible carry-over of 75 % of excess 2021 GHG allocation units*

With existing policies and measures, greenhouse gas emissions from sectors not participating in the EU ETS will amount to a shortfall of 6101 ktCO2eq over the allocated allocation for the whole period 2021-2030. The planned policies and measures reduce the gap to 4 168 kt CO2-eq. This shortfall will be covered by flexibilities in the form of the carry-over of excess GHG quota units to the following years from 2021 and the general flexibility of the FNHR. In 2021, Lithuania's quota was higher due to the previous positive target, which allowed emissions to be increased to 15 % by 2020 compared to 2005 levels. Comparing the actual 2021 data with the quota, a reserve of 1 874 kt CO2-eq is available in 2021, of which 75 % can be used to cover the quota gap. The remaining shortfall could be covered by the general flexibility of the FNHR at 3250 ktCO2eq for the 2021-2025 and 2026-2030 periods. If all ESP and PPP measures are implemented and their intended effect and savings are achieved, flexibilities quota units of 3737 ktCO2eq could be sold to other countries.

TheOECD expert opinion,[128]the current level of ambition in Lithuania's 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 in all sectors of the economy. Carbon pricing in Lithuania is still less than necessary. They noted that phasing out fossil fuel subsidies and linking excise duties to individual fossil fuel emissions would provide a clear direction for industry and consumers and would compensate for the ambition gap to reach the 2030 targets.

The sectors of Lithuania's economy and their drivers of change in GHG emissions are described below.

Energy (ETS and non-ETS, excluding transport)

The planned policies and measures in the energy sector will focus on RES development (including the production of green hydrogen), increasing energy efficiency and improving the internal energy market. Electrification processes in transport in this scenario further accelerate the growth of electricity consumption. These planned measures are included in the scenario with planned policy measures. Additionally, based on a declaration by the natural gas transmission operator, it was assumed that 2 % hydrogen would be blended in the natural gas network from 2028 onwards.

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

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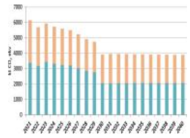

Π ETS Π Non-ETS

5.1.1.2. figure 2.1: Greenhouse gas emissions in the energy sector, with the exception of the transport sector (ESI), the list of measures and the cumulative GHG reduction effect for the period 2021-2030 through planned policies and measures are set out*in Chapter 3 'Policies and measures'.*

Compared to 2005, greenhouse gas emissions in the energy sector are projected to decrease by 56 % in 2030 with planned policies and measures and remain similar to 2030 by 2040.

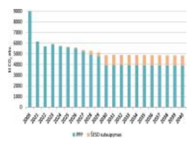

Figure 5.1.1.3 Greenhouse gas emissions in the energy sector (ETS)

Energy sectors not participating in theEU ETS (Low energy)

The UCCPD aims to reduce GHG emissions by 26 % in the small energy sector by 2030. With the implementation of existing policies and measures, the sector will reach a 28 % reduction compared to 2 005 in 2030 and reach its target. However, in order to achieve the overall target for non-ETS sectors, additional measures are planned in small energy – residential refurbishment, biomethane production and cleaning, and limiting the use of fossil solid fuels. Complementary
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policies and measures will allow GHG emissions generated in the small energy sector to be reduced to 32 % in 2030 compared to 2005.

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□ PPP -GHG GHG savings

5.1.1.4. figure 2.1: GHG emissions in the small energy sector (SES)

Transport

The planned policies and measures in the transport sector will focus on promoting the substitution of road transport vehicles into alternative energy sources (electricity, biomethane, hydrogen) and improving the efficiency of passenger and freight transport (public transport, further promotion of intermodal transport, optimisation of freight flows, promotion of inland navigation, etc.). The promotion of alternative fuel vehicles, intermodal transport, acquisition of electric vehicles and sustainable inland navigation (T1-P, T2-P, T4-P and T24-P) will have the greatest impact on GHG reduction. These measures were included in the scenario with additional policy measures and their fuel savings effects were included in the projection of fuel consumption in transport in the PPP scenario.

Assumptions for the assessment of the planned policy measures: T1-P "Promotion of the acquisition of electric cars", T2-P "Fostering the development of TA for alternative fuels", T22-P "P P P P Promotion of the acquisition of bicycles and motor bicycles" and T24-P "Promotion of sustainable inland navigation" were assessed in terms of the number of replaceable vehicles and the average fuel consumption of one vehicle to be surrendered, and T2-P "Establishment/development of alternative fuels/hydrogen refuelling infrastructure" in terms of the number of hydrogen recharging points to be built and survey data, the share of the population driving car changeover is driven solely by infrastructure development, T2-P "Digital solutions to optimise freight flows and reduce empty mileage" is measured by the number of digital subscriptions, the average empty mileage share of trucks and its savings after subscriptions; T3-P "Electrification of railways and rolling stock" and T4-P

T25-P "Development of electricity supply at a seaport" was assessed on the basis of the annual mooring time and the hourly consumption of diesel fuel for different types of ships, while T26-P "Development of sustainable airport infrastructure" is measured by the amount of fuel used in domestic aviation and its share to be replaced by sustainable aviation fuels.

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The main objective of the planned policies and measures is to promote green procurement, home composting and focus on circularity studies.

Energy sector: Looking at the planned EE measures, the modernisation measures for individual and multi-apartment dwellings are projected to have the greatest impact on energy savings. These measures will be implemented in the context of the continuation of the programme for the renovation (modernisation) of multi-apartment buildings and in order to achieve the objectives of Lithuania's long-term renovation strategy. Energy savings will reduce the impact of existing measures to promote RES development, as energy savings will result in reduced energy from RES.

Energy sector: renewable energy and energy efficiency

Energy efficiency dimension

The main planned measures to increase the EE, which will reduce energy consumption over the period 2020-2040, are: the use of more efficient products and techniques in the context of technological developments, the transition to low-temperature DH, the modernisation of heat induction points, measures to promote the industrial sector, electrification and decarbonisation, the deployment of smart metering and the use of waste heat. The planned measures and their impact are briefly described below.

- EE2-P: Renovation (modernisation) of multi-apartment buildings. After the implementation of this measure:
  projected energy savings of 3.20 TWh by 2030. The projected energy savings estimated the area of multi-apartment buildings to be renovated and the potential thermal energy savings achieved in kWh/m², based on the energy performance certificates of renovated multi-apartment buildings before and after the renovation.
  - EE3-P: Renovation of public buildings. Taking into account the planned renovation of public buildings and the potential thermal energy savings in kWh/m², projected energy savings were

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130 https://eur-lex.europa.eu/legal-content/LT/TXT/PDF/?uri=CELEX:32018L0850&from=LT

estimated on the basis of the energy performance certificates of renovated public buildings before and after the renovation. Projected energy savings of 0.28 TWh by 2030.

- EE7-P: Transforming Castes into more efficient technologies. Households are forecasted to change heat pump boilers will save 58 GWh each year and around 1.22 TWh by 2030. The expected impact of the measure estimated the reduction in biofuel consumption and the increase in electricity consumption due to newly installed heat pumps. In assessing the potential reduction in energy consumption, the energy characteristics of the heat generation installations replaced and newly installed during the implementation of the measure have been taken into account.
- EE8-P: Modernisation of indoor heating and hot water systems in buildings ("small renovation").

  Annual upgrades of old elevator heat points are projected to reduce thermal energy consumption in multi-apartment buildings by 8 % on average and to save around 0.18 TWh of energy by 2030.
- EE10-P: Refurbishment (modernisation) of the dwellings of one or two apartments of natural persons.
  Projected energy savings of 1.2 TWh by 2030. The projected energy savings estimate the planned renovation of one and two dwellings and the potential to achieve thermal energy savings in kWh/m², based on the data from the renovated residential energy performance certificates before and after the renovation.
- EE11-P. Upgrading of street lighting systems. Predicted by upgrading streets
  lighting saves about 0.1 TWh of electricity between 2024 and 2030. When assessing the impact of the measure, based on the data of the measure implemented, the update of one luminaire leads to an average annual electricity saving of 295 kWh.
- EE12-P – Improve the technological and energy efficiency of industrial enterprises by introducing artificial
  intelligence and digital twin technologies. When assessing the impact of the deployment of artificial intelligence and digital twin technologies between 2026 and 2030, it is assumed that companies deploying such solutions (around 60 companies) each year will deploy two projects generating at least 0.02 GWh energy savings per project. The measure is expected to save 0.04 TWh of energy or 2.5 GWh annually by 2030.
- EE13-P. Create a legal requirement for companies to implement energy efficiency
  the measures recommended in the audits. The implementation of this measure and the implementation of the measures recommended by the energy efficiency audit in enterprises are projected to result in energy savings of 0.26 TWh by 2030. The impact assessment assumed that the implementation of the energy efficiency audit recommendations leads to energy savings of at least 0.02 GWh in a medium-sized enterprise and 0.12 GWh in a large enterprise.
- EE14-P: Fostering the deployment of internal monitoring systems for energy efficiency in businesses; and
  application. Internal monitoring systems are projected to achieve 0.215 TWh of energy savings by 2030. The impact assessment assumed that the deployment of internal energy efficiency monitoring systems is carried out in small and medium-sized enterprises that save at least 0.02 GWh per system.
- EE15-P: Renovation (modernisation) of non-residential buildings for legal persons.
  Projected energy savings of 0.53 TWh by 2030. The projected energy savings estimated the area to be renovated and the potential thermal energy savings in kWh/m² of renovated non-residential buildings, based on data from the energy performance certificates of renovated non-residential buildings before and after the renovation.

The planned energy efficiency measures are projected to deliver additional savings of 7.22 TWh by 2030 and 1.53 TWh of energy savings from additional energy efficiency measures in industry and transport. The energy forecasts are graphed below. The EE2-P measure has the greatest impact on savings when assessing planned measures.

Existing and plannedmeasures affecting efficiency

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5.1.2.1. figure 2.1: Projections of energy savings from existing and planned policy measures in 2030, TW

When assessing the transformation of the energy sector, the expected impact of the planned policy measures and the impact of the development assumptions in the PPP scenario, a simulated forecast of the evolution of fuel and energy needs. The PPP fuel and energy consumption scenario model is based on the previously modelled EEP scenario, complemented and extended by planned policy measures, additional assumptions on sectoral development and energy needs.

After assessing the impact of the planned policy measures on energy consumption calculated in accordance with the requirements of the EE Directive 2023/1791 (among others excluding electricity consumed for hydrolysis of hydrogen and energy produced by heat pumps from modelling and projections), the projections for 2030 for primary and final energy consumption, PPP scenario, are presented in Table 5.1.2.1.

Table 5.1.2.1. Projections for primary and final energy consumption (according to the requirements of the EE Directive 2023/1791) for 2030 (PPP):

	2030 Forecast	2030 goal	Difference
Primary energy consumption, ktoe	5 598	5 540	58
Final energy consumption, ktoe	4 430	4 384	46

The projections for primary and final energy consumption in the PPP scenario show that the 2030 targets will be met within the limits of a possible deviation. Primary and final energy consumption in 2030 will be around 1 % higher than the 2030 targets.

It should be noted that the underlying assumptions of the PPP scenario on fuel and energy consumption and developments in the sectors are very similar to the ESP scenario with one significant difference. In the PPP scenario, electricity generation is similar, but electricity demand and consumption are much higher than in the ESP scenario

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The reason for higher electricity consumption is the production of 'green' hydrogen by electrolysis. In order to achieve the GHG reduction targets, there will be around 1 300 MW of green hydrogen production facilities in 2030, which will consume around 6 TWh of electricity (around half of the total electricity consumed in Lithuania in 2023). The final energy consumption in 2030 will be around 4430 ktoe without taking into account the amount of energy produced by hydrogen electrolysis and heat pumps.

Information on projected changes in energy demand in 2020, 2025, 2030, 2035 and 2040 is provided below.

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Table 5.1.2.2. Energy consumption projections with planned energy efficiency policies, measures and programmes (ESP)

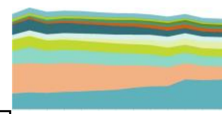
	2020:	Year 2025	By 2030.	2035	In 2040
Primary energy consumption, ktoe	6 442,6	6 528	6 411	6 075	6 138
Final consumption, ktoe	5 339,3	5 440	5 342	5 063	5 115
Household sector, ktoe	1 433,8	1 614	1 659	1 644	1 647
Industry, ktoe	981,3	896	1 080	1 047	1 107
Services sector, ktoe	576,0	608	610	691	774
Transport sector, ktoe	2 190,3	2 150	1 828	1 517	1 419
Other sectors, ktoe	157,9	172	165	165	168

5.1.2.2. figure 2.1: Energy consumption forecast for PPP

The modelling of the PPP scenario shows that final energy consumption will be almost identical in 2030 and 4.2 % in 2040 compared to the actual level of 2020. The total fuel and energy consumption in the PPP scenario is shown below Figure 5.1.2.3. By 2030, the largest changes are expected in diesel and electricity consumption.

Diesel consumption will be around 44 % lower in 2030 compared to 2020. This will be driven by an increase in the number of more efficient vehicles (especially in road transport), rail electrification, an increase in the number of electric vehicles, sustainable mobility measures and tighter limits on GHG emissions.

Final electricity consumption will almost double (around 89 %) in 2030 to 1686 ktoe (19.6 TWh). The installation of heat pumps, the growth of electric vehicles, the electrification of industry and, most importantly, the electrolysis capacity of 'green' hydrogen will contribute to this high growth in electricity consumption.



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5.1.2.3. figure 2.1: Total fuel and energy consumption in PPP scenario, ktoe

Table 5.1.2.3. Fuel and energy consumption in PPP scenario, ktoe

	2020	2021	2022	2023	2024	2025	2030	2035	2040
Total	5 340	5 699	5 467	5 534	5 504	5 440	5 342	5 063	5 115
Electricity	891	959	930	985	1 017	1 062	1 686	1 754	1 893
Diesel	1 647	1 647	1 610	1 631	1 558	1 461	922	637	555
Thermal energy	737	893	741	741	729	719	583	551	551
Firewood, wood and waste	633	617	588	554	539	537	437	442	452
Ambient heat	30	63	84	115	147	185	360	395	432
Gasoline	238	255	263	258	265	270	288	285	250
Natural gas	583	633	582	582	550	514	286	276	272
Biodiesel	87	106	98	125	132	141	224	155	134
Kerosene reactor fuel	64	71	112	96	107	111	119	119	119
Biogas	9	11	11	21	41	49	112	116	120
LPG	142	134	143	133	127	121	87	86	84
Bioethanol	16	17	20	19	19	20	29	29	26
Remaining species	263	293	287	274	272	252	209	218	228
Gas oil for heating	105	108	105	98	99	98	80	76	71
Coal	133	159	157	152	149	114	68	66	65
Waste	2	3	4	4	4	19	33	33	33

Hydrogen	—	—	—	—	1	2	15	16	17
Peat for fuel and peat briquettes	15	17	21	19	18	17	12	21	30
Fuel oil	7	5	1	1	1	1	1	6	11
Aviation gasoline	0	0	0	0	0	0	0	1	1
International maritime bunkering	183	188	196	203	210	209	205	202	198

In the scenario of planned policy measures, the total energy consumption of the country for energy consumption will decrease and will be 4.2 % lower in 2040 than in 2020.

5.1.2.4. the table shows Lithuania's projected energy mix (mixas) for 2030 and 2 040 in the PPP scenario. Final consumption of energy is estimated by subtracting from gross inland consumption energy transformed in other enterprises and energy used for non-energy purposes. That is, only the part of energy that is not used as a raw material for recycling was assessed.

Table 5.1.2.4. Fuel/energy mix and forecasts (FPP)

Type of fuel/energy	Consumption in ktoe			% Of total consumption		
	2020:	By 2030.	In 2040	2020:	By 2030.	In 2040
Wind (normalised)	120	1 301	1618	2,2	24,3	31,6
Firewood, wood and waste	1 004	905	922	18,8	16,9	18,0
Ambient heat	30	360	432	0,6	6,7	8,4
Solar	11	340	365	0,2	6,4	7,1
Biodiesel	87	224	134	1,6	4,2	2,6
Biogas	9	112	120	0,2	2,1	2,3
E-biomass	38	50	81	0,7	0,9	1,6
Hydropower plants (normalised)	37	38	40	0,7	0,7	0,8
Waste	2	33	33	0,0	0,6	0,6
Other RES	29	58	57	0,5	1,1	1,1
Diesel	1 647	922	555	30,8	17,3	10,8
Natural gas	950	401	352	17,8	7,5	6,9
Gasoline	238	288	250	4,5	5,4	4,9
Kerosene reactor fuel	64	119	119	1,2	2,2	2,3
LPG	142	87	84	2,7	1,6	1,6
Other fossil fuels	155	81	106	2,9	1,5	2,1
Gas oil for heating	105	80	71	2,0	1,5	1,4
Total	5 340	5 342	5 115	—	—	—

Renewable energy

'Projections of shares of renewable energy sources' means the PPP with existing and planned policies and measures based on energy consumption forecasts, planned public support, expected development of private sector and business projects. The shares of renewable energy sources in gross final consumption of energy, final energy consumption for heating and cooling, final energy consumption in transport and gross electricity consumption have been calculated in accordance with Directive (EU) 2018/200 of the European Parliament and of the Council1[131] on the promotion of the use of energy from renewable sources, as amended.

Below the share of RES in the transport sector, calculations are reported with multipliers.

The current situation for defining the level of renewable energy use in different sectors is considered to be 2020 (in the tables and graphs, data for 2020-2022 (and earlier) are actual data taken from or calculated from publicly available data from the State Data Agency). The simulated period is 2023-2040. The specific values of the indicators are given in Table 4.2.2.1.

Production of electricity

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, while the planned contribution only marginally contributes to the RES objectives. This is due to the fact that most of the measures that were “new, planned” between 2019 and 2023 have become existing. How, for example, the development of wind turbines at sea

131 Directive (EU) 2018/2001 of the European Parliament and of theCouncil

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Among the planned policy measures, 3 have the most significant impact, namely: (1) REI15-P – Development of green hydrogen production; (2) REI7-E – Solar and wind turbines in the business sector; (3) P19-P – Decarbonisation of industry.

- REI15-P – Development of green hydrogen production. This measure aims to ensure a flexible development of green hydrogen production, using produced hydrogen to reduce GHG emissions, balancing the electricity system and producing derived hydrogen products. This measure will increase the share of RES in gross final energy consumption by around 4.7 % in 2030.
- REI7-E – Solar and wind power plants in the business sector. The installed solar and wind capacity under this measure is planned to reach around 460 MW in 2030. This measure will increase the share of RES in gross final energy consumption by 0.90 % in 2030.
- P19-P – Decarbonisation of industry. The objective of the measure is to encourage companies to invest in energy
improving efficiency and replacing polluting technologies with less polluting ones. Industrial companies will increase the share of RES in gross final energy consumption by 0.75 % in 2030 by reducing the use of fossil fuels, deploying RES technologies and meeting part of electricity demand through RES.

A significant shift from the use of fossil fuels to energy generation to the use of RES is envisaged, following the assessment of the planned measures to boost the use of EE and RES by 2040. Figure 5.1.2.4 below provides a comparison of the ESP and PPP scenarios for the assessment of the penetration of electricity produ
ced
from RES (RES-E indicator).

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5.1.2.4. figure 2.1: Penetration of electricity produced from RES in ESP and PPP

Modelling results show that the ESP scenario envisages a much higher penetration of RES production capacity. This is due to the fact that the final energy consumption in the ESP scenario is much lower than in the PPP scenario (due to almost no “green” hydrogen electrolysis). In the PPP scenario, the production of electricity using RES is higher than in the case of the ESP and can cover the full electricity demand. In the case of the ESP scenario, the significantly lower electricity demand leads to a very large surplus of electricity, which may lead to imbalances in the electricity system. The ESP scenario is inconceivable and should be assessed accordingly.

In the PPP scenario, higher than 100 % of the electricity produced using RES indicates that electricity production will exceed electricity consumption. This means that local production of electricity from RES will be able to meet, and will exceed, the demand for electricity. The main reasons for the increasing demand for electricity are: increased use of heat pumps for heating and cooling, electrification of road and rail transport, growing demand for electricity for hydrogen production (green hydrogen electrolysis), industrial modernisation and digitalisation.

5.1.2.5. the table shows the new RES capacities for PPPs envisaged in the assessment. The expansion will take place through the installation of solar and wind turbines.

Table 5.1.2.5. Development of electricity generation capacity from RES CDP

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Solar e-, MW	164	255	572	1108	2290	3164	3591	3761	3919	4031	4100
Wind e., total MW	540	623	946	1228	1561	2099	2809	3614	4015	4315	5915
Of which offshore, MW	—	—	—	—	—	—	—	—	—	—	1400
Biofuels cogeneration, MW	63	63	63	63	221	221	221	221	221	221	221
Waste cogeneration, MW	20	20	40	40	70	70	70	70	70	70	70
Total cogeneration, MW	83	83	103	103	291	291	291	291	291	291	291

The PPP scenario does not foresee additional incentives or support for wind turbine development (the wind power capacity is the same as in the ESP scenario). It is envisaged to promote the development of on-shore wind turbines by reducing administrative barriers by establishing fast-track wind farm development areas. This is assessed in the ESP scenario. The development of solar power plants will continue to be encouraged. The PPP scenario envisages an additional expansion of 991 MW of solar power plants by 2030.

The emergence of new electricity generation capacity in the Lithuanian electricity system will improve local generation performance and contribute accordingly to ensuring the reliability and security of the system (parallel development of system balancing measures). At present, it is 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 provided by the Kruonis Pumped Storage Power Plant, existing 200 MW electricity storage and gas firing plants, while in the long term more innovative energy storage systems can be expected to enter the balancing market and new connections with neighbouring countries of the European Union.

Heat sector

The heat sector will also undergo significant changes, with the aim of increasing the share of RES in the district heating production balance to 90 %. This will be largely driven by Vilnius and Kaunas CHP projects, the impact of which will be enhanced by the ongoing support to small-scale cogeneration plants, the use of waste heat DH and the refurbishment of existing heat production capacities.

This share of RES would not be achieved without the continued implementation of EE measures such as the refurbishment of multi-apartment buildings and public buildings, the refurbishment of individual dwellings, the replacement of boilers with more efficient or RES technologies, the increase of EE in industrial plants and the modernisation of street lighting systems. The fuel balance of district heating systems in the PPP scenario is shown in Figure 5.1.2.5.

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5.1.2.5. figure 2.1: DH balance sheet, ktoe

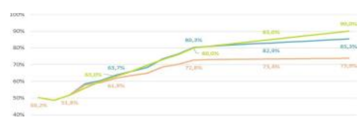
Once all existing and planned energy policy measures in the district heating sector are implemented, renewable energy sources are projected to be at least 90 % in 2030. The expected fuel/energy balance of the district heating system is given in Table 5.1.2.6.

Table 5.1.2.6. Fuel balance of district heating systems in PPP scenario, ktoe

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total	1029	964	947	996	952	940	888	870	870	870	870
Firewood, wood and waste	634	634	634	704	717	717	717	717	717	717	717
Biogas	17	17	17	17	17	17	17	17	17	17	17
Municipal waste (RES)	49	54	54	54	54	54	45	39	39	39	39
Natural gas	201	126	109	109	61	61	30	30	30	30	30
Municipal waste (non-RES)	50	55	55	55	55	55	46	39	39	39	39
Other:	78	78	78	57	48	37	32	28	28	28	28
Sludge gas	7	7	7	7	7	7	6	6	6	6	6
Industrial waste (RES)	13	13	13	13	13	13	11	9	9	9	9
Sewage sludge biogas	3	3	3	3	3	3	3	3	3	3	3
Industrial waste (non-RES)	14	14	14	14	14	14	12	10	10	10	10

Peat and peat briquettes	9	9	9	9	0	0	0	0	0	0	0
Heating and other gas oils	21	21	21	0	0	0	0	0	0	0	0
Liquefied gas oils and other gas oils	2	2	2	2	2	0	0	0	0	0	0
LPG	8	8	8	8	8	0	0	0	0	0	0
Coal	2	2	2	2	2	0	0	0	0	0	0

It is worth mentioning that natural gas consumption has been reduced to the minimum necessary to meet peak needs and balance systems during the simulation. This assumption and the monitoring of a further reduction in heat demand have led to biofuels becoming a balancing line in the fuel balance. This can be observed since 2027, when the minimum amount of natural gas is recorded and the further balancing of production and demand has taken place by reducing the consumption of biofuels.



5.1.2.6. figure 2.1: ESP and PPP scenarios for the RES heating and cooling sector

EE measures and the switch to electric heating systems – the use of heat pumps – play a major role in the assessment of RES EPP and PPP scenarios in the heat sector.

Transport sector

The projections for the evolution of the RES share of the transport sector in the PPP scenario have been identified as most affected by the mandatory incorporation of a certain proportion of bio-fuels into fuels and by fiscal measures: higher excise duties on petrol and diesel and introduction of pollution taxes. The use of alternative fuels – biogas and electricity – and the promotion of sustainable mobility also have a significant impact. The largest change is projected in the decline in diesel consumption. Between 2020 and 2040, diesel consumption is planned to decrease almost 3-fold.

The projected fuel balance structure of the PPP scenario for the transport sector is presented in Figure 5.1.2.7.

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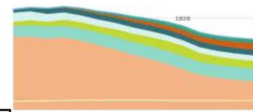

Diesel (without biofuel)
Biodiesel
Kerosene type jet fuel

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5.1.2.7. figure 2.1: Fuel balance in the transport sector PPP

Projections of total fuel and energy demand in the transport sector are based on the results of the NECP modelling. The need for individual fuels and energy has been calculated on the basis of an assessment of the dynamics of the evolution of the road vehicle fleet, existing and planned support measures and taking into account existing EU legislation on the transport sector. The fuel and energy demand from 2030 to 2040 has been calculated taking into account fuel and energy consumption trends between 2025 and 2030.

Fuel and energy consumption in the transport sector is shown in Table 5.1.2.7. The demand for diesel (fossil fuels) in domestic transport will decrease by around 38 % in 2030. compared to 2021, the consumption of biodiesel and advanced biodiesel will almost double in the same period. Petrol consumption in the country will only grow by around 13 % between 2021 and 2030. The share of fossil fuels in petrol should remain similar (around 93 %) until 2030. The consumption of advanced biofuels is projected to grow by 2030, with advanced biofuels accounting for about half of all biofuels in petrol by 2030.

The changing car fleet – electric vehicle growth, changing population and business mobility, the development of public transport – petrol and diesel (fossil) consumption in road transport will decrease to 1183 ktoe in 2030, while the share of liquid RES fuels in petrol and diesel will increase to 238 ktoe. The share of RES liquid fuels in the consumption of petrol and diesel (fossil fuels) in road transport will be around 18 % in 2030. (following the application of the multipliers provided for in Directive 2023/2413). The distribution between different types of biofuels will depend on the market situation and the individual choices made by fuel suppliers, therefore such analysis is not reflected in the NECP modelling.

A major breakthrough by 2030 is expected in the electrification of surface transport: electricity consumption in transport is expected to grow around 15 times (compared to 2021), contributing significantly to Lithuania’s obligations in the transport sector, with electricity produced using RES accounting for around 16 % of the share of RES consumed in transport (with multipliers).

Natural gas is also combusted in transport for pipeline transport (compressor)
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at stations). GIPL's connection with Poland has even led to an increase in natural gas consumption. The significant substitution of natural gas into biomethane has not been predicted in this category and therefore the consumption of natural gas in transport in the PPP scenario does not decrease from 2024 onwards.

Table 5.1.2.7. Fuel and energy consumption in vehicles PPP scenario, ktoe

	2020	2021	2022	2023	2024	2025	2030	2035	2040
Diesel (without biofuel)	1598	1597	1596	1593	1521	1426	895	604	522
Biofuels	87	106	100	124	130	138	210	142	116
Advanced biofuels	—	—	—	1	2	3	8	13	18
Petrol (without biofuel)	237	254	262	257	264	269	288	284	249
Biofuels	16	17	20	17	17	16	10	9	6
Advanced biofuels	—	—	—	1	3	4	10	20	20
Kerosene type jet fuel	64	71	75	87	98	102	103	106	99
RES fuels	—	—	—	—	—	—	6	13	20
Electricity	6	7	8	13	20	31	105	147	189
Liquefied petroleum gas	97	92	93	86	80	74	43	42	42
Natural gas	29	31	29	32	23	23	22	25	23
Biogas	—	—	—	12	26	34	83	87	91
Heating and other gas oils	57	54	31	26	28	28	18	15	11
Aviation gasoline	0	0	0	0	0	0	0	1	1
Hydrogen	—	—	—	—	1	2	8	9	11
Total	2190	2229	2213	2248	2214	2150	1828	1517	1419
Oil products consumption % change compared to 2019 (excluding international aviation)	—3	—3	—5	—5	—8	—13	—39	—54	—60
Oil products consumption % change compared to 2021 (excluding international aviation)	—	—	—2	—2	—5	—10	—38	—52	—58
International marine bunkers	183	188	196	203	210	209	189	181	171
RES fuels	—	—	—	—	—	—	16	21	27

The PPP scenario envisages an even faster reduction in diesel fuel consumption in the transport sector than in the ESP. The aim is to replace diesel with biofuels, hydrogen and electrification. The growth in biogas (biomethane) consumption is based on incentives for alternative fuel vehicles, the implementation of green procurement, the development of infrastructure, the creation of the EU ETS2 and the growing production of biomethane in Lithuania

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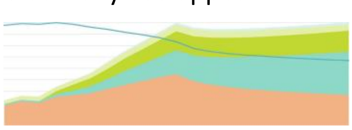
considering that existing natural gas vehicles can also use biomethane. As the forecasts for RES and electricity use appear in the overall balance sheet, see Figure 5.1.2.8.



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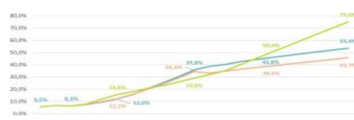
2500 5.1.2.8. figure 2.1: Assessment of the use of RES fuels in transport PPPs, ktoe

2000 In the transport sector, the PPP scenario achieves RES penetration as shown in Figure 5.1.2.9. We note that forecasts were made using multipliers for bio-fuels and RES-generated electricity.



2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040

“The WITH WITH WITH BDMBAEI Transport within the framework of the ECS RES transport target

figure 2.1: RES penetration in the transport sector under the ESP and PPP scenarios (with multipliers)
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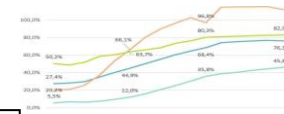
5.1.2.9. Table 5.1.2.8 shows the share of RES in gross energy consumption and in the sectors concerned, after assessing the impact of the planned measures.

Table 5.1.2.8. Share of RES in gross final energy consumption and sectors concerned

	2020:	Year 2025	By 2030.	2035	In 2040
Total final energy consumption, ktoe	5 339,5	5 440	5 342	5 063	5 115
Share of RES in gross final energy consumption, %	27,4	44,9	68,4	76,3	76,2
Share of RES in final energy consumption for heating and cooling, %	52,4	63,7	80,3	82,9	85,3
Share of RES in gross electricity consumption, %	20,2	66,1	96,8	112,2	105,1
Share of RES in final energy consumption in transport (with multipliers), %	5,5	12,0	35,8	45,8	53,4

140.0 %



120.0 % 112.2 %

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5.1.2.10. figure 2.1: Share of RES in gross final energy consumption and relevant sectors (SPP)

Modelling data (see Figure 5.1.2.10.) show that the PPP scenario would achieve the RES targets in 2 030 in heating and cooling, transport, gross final energy consumption. The share of RES in total electricity consumption is projected to be 96.8 %. — will be very close to the 100 % target.

5.1.2.11. Impact ofplanned policies and measures on macroeconomic indicators

5.2.1. Impactof planned policy measures on macroeconomic indicators

An assessment of the macroeconomic, skills and social impact of the planned policy measures on the draft updated NECP was carried out on behalf of the Ministry of Energy between May and June 2023. Following the public consultation carried out in 2023 and the European Commission’s recommendations, the basket of measures has evolved significantly. For this reason, the Ministry of Energy initiated a new assessment of the impact of the measures on macroeconomic indicators, which resulted in this part of the NECP.

Macroeconomic modelling assessed the macroeconomic, skills and social impacts of the planned policies and measures in the NECPs. The assessment was carried out by comparing the planned policies and measures (PCPs) in the NECPs with the baseline scenario (EEP), which includes the application of existing policies and measures presented in the NECPs, as presented in Section B of the current draft NECP, and a comparison of planned and existing policies and measures with a “zero” scenario (in addition to existing and planned measures). The results of the evaluation reveal the impact of the measures in 2022-2040.

The simulation assumes that the analysis of the data at the level of the measures assessed the source of investment for each measure by dividing it into enterprises, households and the public sector, i.e. by analysing who will incur costs (investments). On the other hand, it was analysed who would generate revenue from these investments, taking into account the assumptions made on the macroeconomic impact of policies and measures.

Based on the results of the macroeconomic modelling, the implementation of the measures envisaged in the NECP shows that Lithuania's real gross domestic product (GDP) and investment would increase. In the baseline (EPP) scenario, real GDP will increase by 27.9 % by 2040. Real GDP will increase by 14.2 % between 2022 and 2030 and by 10.9 % from 2031 to 2040. In the PPP scenario, real GDP will increase by 30.7 % by 2040. Between 2022 and 2030, real GDP will grow by 19.6 %, with a slightly lower increase in real GDP by 2030 (by 0.6 pps) from 2031 to 2040 compared to the PPP scenario. This is due to the distribution of planned investments by instrument and their implementation period. The growth rate of 10.9 % between 2031 and 2040 is projected to be the same in both scenarios. The relative impact of NECP policies and measures on real GDP ranges from 2.48 % to 0.18 % per year.

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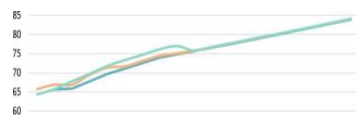

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Zero scenario Base case PPP scenario

figure 2.1: Projection of real GDP in the baseline (EPP) scenario and the PPP scenario
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5.2.1.1.

It should be noted that the impact on real GDP is positive for all years of the period under review. The PPP scenario envisages a slight drop in GDP in the first year, but a positive impact on real GDP is observed as of 2023. This effect ranges from 0.15 % to 3.10 %. Its fluctuation depends on the period of implementation of the measures and the distribution of planned investments over these periods.

Import-export balance

Imports will exceed exports in all years of the period analysed. This trend is due to the fact that a large part of the measures envisage activities which require the acquisition of equipment, vehicles, etc. on foreign markets, as this demand cannot be met on the local market. In the PPP scenario, Lithuania's imports will increase by 32.1 % or 1.5 %/year and exports by 30 % or 1.5 %/year between 2022 and 2040. Between 2022 and 2030, imports are projected to grow by 1.9 %/year and by 1.2 %/year between 2031 and 2040. Exports are projected to grow by 1.5 %/year between 2022 and 2030 and by 1.2 %/year between 2031 and 2040. Imports in the PPP scenario will exceed exports in all years of the period considered. This will lead to the same reasons as in the baseline scenario: meeting a large part of the demand foreseen in the measures on foreign markets.

Impact on the development of economic sectors and their gross added value

The macroeconomic model reveals different responses from different sectors of the economy to the impact of measures. Each sector responds differently to the costs of NECPs affecting the economy.

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Figure 5.2.1.3 Impact on the value added of individual sectors (difference between zero and PPP)

For PPPs, the agricultural sector will grow by 0.37 % on average, with a maximum of 3 %. The manufacturing sector will decrease by -1.11 % on average and will be characterised by stability from 2031 onwards. The energy sector will grow steadily by 0.95 % on average, with the highest growth of up to 2 %. The construction sector will have a particularly strong growth rate of 20.84 % on average, with a peak of 67 %. In 2024, but

in the following years, this growth will fall sharply, reaching as much as -3 %. The market services sector will decrease by -0.37 % on average, but stabilise at -1 % as of 2024; from 2031 onwards, there will be stability. The transport sector will remain stable. This is linked to the fact that, despite the measures referred to as transport, this will have an impact on the decrease in fuel consumption, the increase in imports and other areas, thus not reflected in the evolution of the value added of the transport sector. The financial and insurance sector will decrease by -0.26 % on average, with a minimum of -1 %. Other sectors will show an average decrease of -3.21 % with a minimum of -6 %. The public sector will grow by 1.16 % on average, with the highest growth of 4 %. Growth will decrease in 2027, but in subsequent years.

Impacts on employment

The model makes it possible to assess changes in demand for labour in the context of the PPP scenario. The model assumes that labour supply will not differ between zero and simulated baseline (EPP) and PPP scenarios, but that demand will vary across sectors. Higher demand in one sector reduces demand in the other in relative terms. Labour force increases are observed mainly in the construction and public sectors. In the construction sector, an increase in turnover and value added is expected, leading to an increase in demand for labour. The sector is labour-intensive and planned policies and measures foresee an increase in construction due to renovations, infrastructure expansion, etc. As labour demand in some sectors grows, demand in other sectors decreases accordingly in case of simulations. In the manufacturing, market services and transport sectors, the decline in demand for labour can also be attributed to the introduction of new technologies. Demand for labour has been stabilising since 2031, with small fluctuations across all sectors. The LDP scenario monitors the most significant developments between 2024 and 2030 and is linked to the implementation period of the NECPs’ policies and measures. The largest change in labour demand was observed in 2024, while demand for labour continues to be characterised by declining growth, i.e. by 2030.

Impact on the social dimension

The ESP will have a positive impact on the disposable income of all income groups. Average disposable income growth for the least wealthy households (Quantile I) will be 0.46 % between 2022 and 2040, with a maximum growth rate of 1.7 %. The average growth in disposable income of households in the second quintile will be 0.63 % between 2022 and 2040, with a maximum growth rate of 2.3 %. The third quintile has an average disposable income growth of 0.77 % between 2022 and 2040 and a maximum growth rate of 2.9 %, reflecting a significant increase in income. The fourth quintile has an average disposable income growth of 0.8 % and a maximum of 3.1 % between 2022 and 2040. The wealthiest households (V-quintile) will have the highest average disposable income growth of 0.92 %, with a maximum growth rate of 3.5 %. These results show that while growth is forecast for all household income groups, richer household groups will grow faster, especially in the period up to 2030. In the PPP scenario, the least wealthy households (Quantile I Quantile) will have an average disposable income growth of 0.77 %, with a maximum growth rate of 2.1 %. Average disposable income growth for second quintile households will be slightly higher, reaching 0.91 % and a maximum growth rate of 2.6 %. The third quintile will grow on average by 1.02 %, with a maximum growth of 3 %. The fourth quintile average disposable income growth of 1.07 % and a maximum of 3.2 %, indicating that this group will face higher growth than previously discussed. The wealthiest households (V-quintile) will have the highest average disposable income growth of 1.13 %, with a maximum growth rate of 3.1 %. Taking into account the above data, the implementation of the NECPs will have a positive impact on the population of all income groups, but the least impact on the lowest income population. On the other hand, higher income growth for the lowest income groups will reduce the risk of poverty, increase household consumption (expenditure) at appropriate levels and improve the population’s access to basic services.

The transition of markets towards greening will not have an overall negative quantitative impact on employment, the impact will be neutral or even slightly positive, even if some individual sectors may be more negatively affected. At the same time, the available evidence suggests that the greening of the economy will lead to some significant structural changes in the labour market and shifts between sectors or occupations. This will lead to the need to rethink zero-emission energy generation and supply in economics, industry, production and consumption, large infrastructure, transport, food and agriculture, and construction. Information and communication technologies, modern motion sensors, big data and artificial intelligence and the Internet of Things (IoT) are only part of the technologies that can play a key role in finding innovative energy uses and solutions to reduce CO2 emissions from current energy systems. In the future, more attention will be paid to energy efficiency and energy efficiency and greener production across all sectors of the economy.

Energy poverty issues become important in the context of households. This issue is addressed in the NECPs with measures. The level of energy poverty is projected to be on a declining trend, but these trends are very similar to those observed in the run-up to the implementation of the NECPs. The share of families unable to keep home adequately warm is projected to be around 17.4 % in 2040.

A more detailed report on the macroeconomic assessment can be found on the website of the Ministry of Energy.[132]

Employment and skills policies

132 https://enmin.lrv.lt/lt/veiklos-sritys-3/neksvp-atnaujinimas/

The Law of the Republic of Lithuania on Employment lays down the legal framework for the employment support system for jobseekers, the functions of the entities implementing employment support policies, the organisation and financing of the provision of labour market services and the implementation of employment support measures. The objective of the employment support scheme is to achieve full employment, reduce social exclusion and strengthen social cohesion, by balancing labour supply and demand in order to maintain labour market balance and increase employment opportunities for jobseekers.

In the context of the transition to climate change and energy transition, labour market services provided by the Employment Service under the Ministry of Social Security and Labour of the Republic of Lithuania to jobseekers and the organisation of employment support measures will mitigate the social consequences by helping the population acquire the necessary skills and contribute to increasing their employment.

Labour market services: information services shall be provided in order to help jobseekers to find a job or to acquire the skills or competences required for employment on the labour market and employers to find suitable workers; 'advice services' means to increase the motivation of jobseekers to take up employment or training, to advise on job transitions, to assist them in their career choices or career planning, taking into account their personal characteristics and the needs of the labour market; placement intermediation services to help jobseekers find suitable jobs and employers to find suitable workers.

One of the groups of employment support measures are active labour market policies to help jobseekers increase their employment opportunities and match labour supply and demand.

Learning support measures aimed at helping the unemployed and employed people to acquire or develop qualifications and/or competences within formal and non-formal vocational training programmes or non-formal adult education programmes, where this is necessary for access to job vacancies or self-employment, contribute most to meeting labour market needs and matching labour supply and demand.

Learning support measures: 'vocational training' means the acquisition of qualifications, the upgrading of existing qualifications and the acquisition of competences by employed persons who are identified as requiring the acquisition of qualifications, the upgrading of their qualifications and the acquisition of competences as a result of company reorganisation, restructuring and modernisation, and vocational training for unemployed persons in formal and non-formal vocational training programmes; 'apprenticeship employment' means an apprenticeship placement organised for persons who take part in vocational training or non-formal adult education as part of an apprenticeship; 'traineeship' means a period of unpaid work experience with an employer, during which work skills or professional qualifications can be upgraded, restored or improved; recognition of competences acquired through non-formal and informal learning – to test the knowledge, skills and competences of unemployed persons and employed persons with a view to obtaining a diploma or certificate of competence for the relevant professional qualifications; non-formal adult education – organised for unemployed and employed persons to improve qualifications or acquire competences; the acquisition of high value-added qualifications and competences is organised for the unemployed and employed persons who intend to learn and acquire qualifications and/or competences included in the list of high value-added qualifications and competences approved by the Director of the Employment Service.

The Lithuanian Ministry of Social Security and Labour's 2021-2030 development programme contains activity 2 'Increasing the scope and diversity of measures supporting employment, contributing to the achievement of the objectives of the digital and green transformation and the promotion of the circular economy' of the inclusive labour market development programme No 09-001-02-03-02 'Increase employment of vulnerable groups'.

This measure aims to increase the scope and diversity of employment support measures, targeting high value-added jobs, as well as the digital and green transformation. It includes two pilot schemes for training and employment support. The first one is dedicated to the entrepreneurship and shall support job creation in the areas of twin transition and circular economy, coupled with upskilling of public employment service employees in the areas of twin transition, circular economy and general business management. The second scheme aims at supporting employed and unemployed seeking to obtain qualifications and/or competences for high value-added jobs. A part of these education and training programmes shall be specifically focused on digital skills. The measure shall be implemented in synergy with measures planned under education component related to development of education and training programmes and creation of individual learning accounts. It shall provide more opportunities for employed people and shall also include higher education modules. The implementation of this measure will be completed by 30 June 2026.

Impact of planned policy measures on air pollution

The planned policies and measures will have a positive impact on Lithuania's air pollutant emissions and contribute to the acceleration of the country's air pollution reduction targets set out in Directive (EU) 2016/2284 (in particular nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), ammonia (NH3)).

The impact of the NECP measures on emissions of ambient air pollutants has been assessed by identifying (using assumptions) the potential impact of each measure on fuel consumption, product consumption, etc., and by applying the emission factors of the Tier1 methodology of the EMEP/EEA Emissions Accounting Technical Manual. To ensure coherence

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the same assumptions and activity data were used (where possible) to assess the impact of the measures on GHG and ambient air pollutant emissions. Air pollution and GHG projections are aligned using the same activity data for transport, energy, industry and agriculture. Around 60 % The measures planned in the NOTMP are transferred from the NECPs.

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 heat and power generation in cogeneration plants will lead to an increase in NOx emissions. However, the cumulative effect of all NECPs measures on the emissions of this pollutant over the 2022-2030 period is positive.

Table 5.2.2.1. Change in nitrogen oxides (NOx) emissions to ambient air, thousand tonnes

Area of the farm	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (EPP scenario)								
Transport sector	0,37	0,88	2,41	3,27	5,70	7,48	7,72	7,90	8,14
Power sector	0,82	0,60	0,77	0,96	1,00	0,97	1,03	1,01	2,15
Agricultural sector	0,46	0,62	0,86	1,10	1,32	1,55	1,76	0,93	2,68
Industry sector	0,00	0,02	0,02	0,04	0,07	0,07	0,22	0,20	0,17
Total:	1,65	2,12	4,07	5,37	8,08	10,06	10,74	10,04	13,14
	Additional measures (PSD scenario)								
Transport sector	0,00	0,00	0,19	1,05	1,43	1,88	2,33	2,82	3,29
Power sector	0,01	0,03	0,05	0,06	0,07	0,13	0,15	0,16	0,17
Agricultural sector	0,00	0,00	0,01	0,02	0,05	0,08	0,11	0,16	0,21
Industry sector	0,00	0,00	0,01	0,01	0,02	0,02	0,03	0,03	0,03
Total:	0,00	1,13	1,57	2,32	2,68	3,91	3,86	3,85	3,89

The reduction of NMVOC emissions to ambient air (Table 5.2.2.2) will be mainly driven by NECP measures in the transport sectors (e.g. rail electrification or sustainable mobility) and industry.

Table 5.2.2.2. Change in non-methane volatile organic compounds (NMVOC) emissions to ambient air,

thousand tonnes

Area of the farm	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (EPP scenario)								
Transport sector	0,16	0,20	0,39	0,50	0,71	1,07	1,11	1,13	1,19
Power sector	0,18	0,18	0,20	0,21	0,21	0,21	0,21	0,21	0,21
Agricultural sector	0,04	0,07	0,09	0,12	0,14	0,17	0,20	0,07	0,46
Industry sector	0,00	0,63	0,63	0,63	0,63	0,64	0,65	0,65	0,65
Total:	0,39	1,08	1,32	1,47	1,69	2,09	2,17	2,06	2,52
	Additional measures (PSD scenario)								
Transport sector	0,00	0,00	0,08	0,13	0,22	0,27	0,35	0,45	0,54
Power sector	0,07	0,18	0,25	0,32	0,40	0,47	0,54	0,62	0,69
Agricultural sector	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01
Industry sector	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Total:	0,07	0,18	0,33	0,45	0,62	0,74	0,90	1,08	1,24

The application of measures in the agricultural sector will reduce the use of inorganic nitrogen fertilisers and replace manure management technologies with more efficient and less polluting techniques. For these reasons, NH3 emissions are expected to decrease significantly from this sector (Table 5.2.2.3).

Table 5.2.2.3. Change in ammonia (NH3) emissions to ambient air, thousand tonnes

Area of the farm	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (ESP scenario) (US)								
Power sector	0,00	0,01	0,01	0,01	0,01	0,00	0,00	0,00	0,00
Agricultural sector	0,29	1,80	2,52	3,30	4,09	4,68	4,82	5,02	5,78
Industry sector	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01	0,00
Total:	0,29	1,81	2,52	3,32	4,11	4,70	4,83	5,04	5,78
	Additional measures (PSD scenario)								
Agricultural sector	0,00	0,07	0,08	0,11	0,12	0,13	0,07	0,08	0,10
Total:	0,00	0,07	0,08	0,11	0,12	0,13	0,07	0,08	0,10

The reduction of PM2.5 emissions to ambient air (Table 5.2.2.4) will be affected by NECP measures in the transport, energy production and agriculture sectors.

Table 5.2.2.4. Change in particulate matter (PM2.5) emissions to ambient air, thousand tonnes

Area of the farm	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (ESP scenario) (US)								
Transport sector	0,01	0,03	0,10	0,13	0,22	0,30	0,30	0,30	0,30
Power sector	0,09	0,09	0,10	0,09	0,09	0,09	0,09	0,09	0,09
Agricultural sector	0,02	0,03	0,06	0,07	0,07	0,09	0,11	0,04	0,25
Total:	0,13	0,16	0,26	0,28	0,37	0,47	0,48	0,41	0,64
	Additional measures (PSD scenario)								
Transport sector	0,00	0,00	0,00	0,03	0,03	0,05	0,07	0,08	0,10
Power sector	0,06	0,12	0,17	0,23	0,28	0,35	0,40	0,46	0,51
Agricultural sector	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01	0,01
Total:	0,06	0,12	0,18	0,26	0,32	0,40	0,48	0,55	0,63

The reduction of SO2 emissions to ambient air (Table 5.2.2.5) will be affected by the implementation of measures in the transport and energy production sectors.

Table 5.2.2.5. Change in sulphur dioxide (SO2) emissions to ambient air, thousand tonnes

Area of the farm	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing instruments (ESP scenario)						(US)		
Transport sector	0,00	0,00	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Power sector	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
TOTAL	0,02	0,01	0,06	0,06	0,07	0,06	0,06	0,06	0,06
	Additional measures (PSD scenario)								
Power sector	0,02	0,05	0,07	0,09	0,11	0,14	0,16	0,18	0,20
Total:	0,02	0,05	0,07	0,09	0,11	0,14	0,16	0,18	0,20

5.3. Overviewof investment needs

For the period 2021-2030, the total investment planned to implement the existing policy measures described inChapter 3 of the NECP amounts to around EUR 17.64 billion, of which the share of public funds is estimated at around EUR 10.05 billion (see Table 5.3.1).

Table 5.3.1. Planned funding to implement existing policies from 2021 to 2030

Sector	Total funds in EUR million	Public funds in EUR million
Transport	4 055,28	1 576,06
Industry	2951,31	1 760,04
Agriculture	887,30	823,13
CO2 storage	598,19	561,83
Waste	830,38	549,24
Renewable energy resources	2 417,67	1 806,05
Energy efficiency	3 004,11	1 152,89
Internal Market	996,50	681,11
Energy security	1 056,11	567,25
R & D	783,96	552,43
Total:	17576,09	10030,01

The ministries in charge of the measures assessed their planned public investment against available funding sources (see Table 5.3.2), the planned financing intensity of the measures and determined the share of private investment.

Table 5.3.2. Sources of planned funding for 2021-2030

Financing sources	Public funds in EUR million
Climate Change Programme	284,1
Modernisation Fund	575
Lithuania's Strategic Plan for Agriculture and Rural Development 2023-2027	1196,8

2014-2020 Lithuanian Rural Development Programme	3,2
Recovery and Resilience Facility	2311,2
Investments from EU funds (2014-2020)	1713,5
Investments from EU funds (2021-2027)	1799,2
Just Transition Fund	128
Programme for the Lithuanian fisheries sector 2021-2027	37
Waste prevention and management programme	7,2
State budget	649,7
EU CEF	1179,9
EU Regional Development Fund	18,6
PIS relief	6,9
ReactEU	10,73
REPowerEU	73,80
Municipal funds	0,5
Other	34,6
Total:	10 030, 01

This is a preliminary assessment of the financing of existing policies, which will be revised by transferring NECPs measures into strategic planning documents.

Table 5.3.3. Indicative need for funds for the implementation of the planned policy measures from 2021 to 2030

Sector	Total funds in EUR million	Public funds in EUR million
Transport	2796,32	480,53
Industry	235,47	96,94
Agriculture	204,40	119,05
CO2 storage	21,80	21,80
Waste	3,00	3,00
Renewable energy resources	3237,40	1047,40
Energy efficiency	6774,93	2038,82
Internal Market	122,00	2,00
Energy security	0,00	0,00
R & D	76,30	39,70
Total:	13471,62	3849,23

The planned policy measures presented in the NECPs will be assessed against financial, economic, social and environmental benefits, with a view to ensuring that the most efficient and effective measures receive funding first. It should be noted that the implementation costs of the NECPs can be significantly reduced by early and strengthening the economic signals to reduce GHG emissions for sectoral market participants, including but not limited to the early phase-out of fossil fuel subsidies, the extension of the scope 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 focused mainly on improving energy efficiency, increasing the use of RES in various sectors in the country and the necessary improvements in the smartness, reliability and security of energy networks. The energy efficiency sector is the most needed in the PPP package, even > 50 % of the total public money.

In order to achieve the 2030 climate and energy targets, the main sources of public funds between 2021 and 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, ETS2, the Life Programme and others.

To a lesser extent, sources of public funds will also be attracted, such as funds received for services of public interest (PSI funds), statistical transfers, loans from the European Investment Bank.

Assessment of the cost-benefit ratio

In accordance with the provisions of Lithuanian national legislation, decisions on the implementation of progress activities must be taken after an assessment of their economic viability. An assessment of the NECPs' planned measures (NECPs) was carried out to include effective and recoverable measures in the NECPs and to align the strategic planning framework with the NECPs' processes. The assessment of the partial cost-benefit ratio and the establishment of a list of priorities for the implementation of the activities (or sets of activities) being assessed will allow sectoral ministries not only to take more efficient decisions when choosing to implement better indicators, but also to record them more quickly in national planning documents and start implementation.

The evaluation was carried out by creating a cost-benefit analysis model for each of the measures analysed, i.e. its set of activities, if the measure consists of several activities, and/or for individual activities if the measure is limited to a single activity. Only those activities that have an economic valuation basis, i.e. investment, financial and infrastructure development activities, were assessed. Accordingly, regulatory, research and fiscal activities were excluded from the evaluation sample. The assessment shall cover the reporting period of activities up to 2030. Economic analysis models have been developed in which only CO2 (GHG) reduction benefits were included in the economic benefits, i.e. the assessment is focused only on the mitigation of climate change.

For each selected measure, a partial cost-benefit ratio was calculated, assuming that carbon reduction is the only component of the cost-benefit analysis. The partial ranking of the measures was carried out by the ENIS and the economic viability was assessed. From a methodological point of view, the implementation of a measure/activities is recoupable from a socio-economic point of view when the value of ENIS is greater than 1. However, it should be noted that, in the present case, only the only component, namely the reduction of CO2 emissions, was used to calculate the economic benefit of the measure.

The list of 5 best activities includes two measures/sets of activities/sets of activities from the transport sector (T2-P(4) and T4-P), two measures from the FNCM (L1-P and L14-P) and one of the industrial (P20-P) sectors. It should be noted that the partial ENIS for the 6th and 7th locations is the same at 1.33. This indicates that these measures are equally effective for the partial ENIS indicator and their ranking can be based on another
s
criteria such as implementation costs or practical implementation. Measure T21-P (Modernisation of trains) in 6th position and EE11-P (Modernisation of street lighting systems) in 7th position.

When ranking measures/activities/sets of activities on the basis of an efficiency indicator, we can see that they follow a different order from a partial ENIS. A full comparison of the ranking with the partial ENIS and the efficiency indicator can be made in the table in Annex 6. For 3 measures/activities/sets of activities, it was not possible to calculate the efficiency indicator as they are only planned from private investments (public investment is equal to 0: T3-P (Electrification of railways and rolling stock); T21-P (Train modernisation); A3-P (Target fertilisation system) and EE15-P (renovation of non-residential buildings (renovation/modernisation of non-residential legal persons).

Table 5.3.4. Values of partial ENIS and efficiency indicator in measures/activities

Order No	Code	Measure	Partial ENIS	kt CO2/million EUR	No. in order of efficiency kt CO2/million EUR
1.	L14-P	Conservation and inclusion of tree spontaneous trees in forest land accounts	7,06	42,68	1
2.	L1-P	Restoration of peatland (re-establishment of hydrological regime on agricultural land)	5,19	27,00	2
3.	P20-P	Long-term hedge contracts	3,07	1,20	14
4.	T2-P(4)	Promoting the development of alternative fuels infrastructure and TA (Digital solutions to optimise freight flows and reduce empty mileage)	2,27	16,08	3
5.	T4-P	Promotion of intermodal transport	2,24	6,02	6
6.	T21-P	Upgrading of trains	1,33	0	23
7.	EE11-P	Modernisation of street lighting systems	1,33	0,13	19
8.	EE14-P	Promoting the introduction of internal monitoring systems for energy efficiency in businesses and industry	1,32	0,82	15
9.	REI10-E REI10-P	Investment support for the installation of biomethane production and treatment plants	1,17	2,86	9
10.	A3-P	Precision fertilisation system	1,15	0	24
11.	T2-P(1)	Promoting the development of alternative fuels infrastructure and TA (renewal of urban and suburban public transport fleet)	1,09	0,34	16
12.	A1-P	Climate-friendly livestock farming (manure management)	1,05	6,34	5
13.	A13-P	Ad-powered machinery	0,95	3,77	7
14.	L20-P	Restoration of peatlands (re-establishment of hydrological regime in forests)	0,92	8,00	4
15.	T1-P	Promoting the acquisition of electric cars	0,90	1,97	12
16.	T22-P	Promoting the purchase of bicycles and motor bicycles	0,89	3,14	8
17.	EE8-P	Modernisation of domestic heating and hot water systems in buildings ("small renovation")	0,87	0,29	17
18.	EE10-P	Refurbishment (modernisation) of one or two dwellings of natural persons	0,87	0,18	18
19.	P19-P	Decarbonisation of industry	0,84	2,80	10
20.	EE2-P	Renovation/modernisation of multi-apartment buildings	0,76	0,08	20
21.	T2-P (2+ 3)	Promoting the development of alternative fuels infrastructure and TA (Establishment/extension of alternative fuels/hydrogen refuelling infrastructure; Promotion of the use of heavy-duty vehicles of categories N2,M2,N3 and M3 fuelled with alternative fuels)	0,73	2,01	11

22.	EE7-P	Replacement of boilers with more efficient technologies	0,71	1,26	13
23.	T3-P	Electrification of railways and rolling stock	0,58	0	25
24.	EE3-P	Refurbishment of public buildings (central government) Refurbishment of public buildings (municipalities)	0,40	0,04	21
25.	EE15-P	Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons)	0,34	0	26
26.	EE12-P	Increase the technological and energy efficiency of industrial enterprises through the deployment of artificial intelligence and digital twin technologies	0,28	0,04	22

5.4. Impact ofplanned policies and measures on other Member States and on regional cooperation

Projects and initiatives in the field of energy that have or will have a regional impact:

Synchronisation with continental European networks

The objective is the development of infrastructure with a view to further integration of the electricity market and the interconnection of the Baltic States' electricity systems for synchronous operation with the continental European networks (hereinafter referred to as "Synchronisation with TEC").

Importance of synchronisation with traffic for the Baltic States:

- The Baltic States will finally address the geopolitical risks of the electricity system;
  - Lithuania, Latvia and Estonia will take over essential power system frequency management rights and obligations from Moscow.
- The Baltic States' electricity systems will be governed by unified and transparent European rules;
- shift from centralised management of e-transmission to decentralised (diversification of system security risks).

Natural gas market

Cooperation with the Baltic region's regulatory authorities and transmission system operators shall harmonise the legal and regulatory environment for the gas sector, provide sufficient gas infrastructure for the gas market and promote the connection of biomethane producers. The Klaipėda LNG terminal, which started operations in December 2014, is capable of providing the entire region with natural gas supplies; created the conditions for competition on the Lithuanian natural gas market for imports of natural gas from all over the world. Natural gas may be supplied to customers from different suppliers at market prices.

In addition, the pipeline interconnection project between Poland and Lithuania (GIPL) integrated the gas markets of the Baltic States and Finland into the EU's single gas market, created access to alternative gas supply sources and roads and increased the competitiveness of the gas market, increased security and security of gas supply in the region through both the creation of additional gas transmission capacities and the possibility of EU countries' emergency solidarity mechanisms, increased the liquidity of gas trade in the trading zones of Poland and the Baltic countries, strengthened their regional role and facilitated the integration of energy produced from RES.

The project to increase the capacity of the pipeline interconnection between Latvia and Lithuania (ELLI) in 2023 ensured sufficient capacity between the Baltic and other European countries, increased the security of gas supply in the region, improved the integration of the gas markets in the Baltic region and improved the functioning of the gas market in the region.

Promoting the use of LNG fuels

We promote the use of liquefied natural gas (LNG) as clean fuel for heavy and ship transport in Lithuania and the region as a whole.

1. Use of LNG in heavy transport (synergies between RES and LNG)

The use of LNG as a fuel is the only current clean and available technology in heavy transport. Compared to light transport, there are no other alternative technologies for heavy transport, and solutions to reduce emissions have 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. Compared to conventional diesel fuels, LNG can reduce carbon dioxide emissions by 20 %. (note: the use of biomethane can even result in CO2 savings of more than 85 %). It is important to recall that CO2 is the largest contributor to greenhouse gas emissions. Other emissions, such as SOx, NOx, are reduced by 99 % and 80 % respectively in LNG transport and by half of noise pollution.

We note that synergies between renewable energy sources and LNG are one of the forward-looking strands.

Increasing energy efficiency in public infrastructure and reducing polluting energy intensity in transport through synergies between RES and LNG would result in a significant reduction of GHG.

2. Use of LNG in ship transport

The development and importance of the liquefied natural gas market in the region is evident. LNG fuels used on board ships significantly reduce pollution and AB KN Energies proposes to promote the cargo of LNG-powered ships in the port of Klaipėda.

The issue of reducing air pollution is currently particularly relevant at global level. Ambient air pollution is one of the most significant determinants of health and environmental problems and requires special attention to be paid to reducing pollution. Progress must be made both in Lithuania and in Klaipėda State Seaport to reduce emissions. In assessing the negative effects of pollutants, certain prevention measures with the highest added value and targeted reduction of air pollution must be considered and envisaged. Particular attention must inevitably be paid to the reduction of emissions in the maritime transport sector.

It should be noted that the reduction of air pollution from ships is currently particularly relevant due to the entry into force of 0.1 % in January 2015. SOx fuel restriction in ECA zones to which the Baltic Sea region is also designated. For the time being, this restriction only applies to vessels operating in ECA areas, but since 2020 the restrictions also apply at a global level of 0.5 %. SOx concentrations in fuel. Stricter requirements have influenced the development of new technologies contributing to the reduction of emissions and the choice of these technologies in the maritime sector. It should be noted that one of the most promising approaches to reducing the toxicity of emissions from ships is to use liquefied natural gas as a less polluting alternative to conventional fuels. The use of LNG ensures compliance of the ship with both the SOx requirements and the tightening of NOx requirements.

The use of LNG as an alternative to less polluting fuels contributes to the reduction of greenhouse gas and other pollutant emissions.

It should be noted that the use of LNG as a fuel throughout the life cycle of a ship contributes to significant GHG savings. Compared to fuels commonly used in the maritime sector, GHG emissions from LNG, including CO2, can be reduced by more than 20 %. It should be stressed that the use of LNG also contributes to reducing emissions of other pollutants into the environment. Compared to fuel oil, NOx emissions, such as SO2, are close to zero, i.e. SO2 and NOx emissions are reduced by 99 % and 90 % respectively. LNG also reduces air pollution by 50 %.

It is important to note that for one typical cargo ship operating in the Baltic Sea using LNG as a fuel, annual SOx emissions are about 50 tonnes, more than 150 tonnes of NOx and about 2 000 tonnes of CO2.

Renewable energy

In implementing policies and measures to increase the share of energy produced from RES in the energy and transport sectors, the designated body of Lithuania (the natural gas transmission system operator) authorised to issue, transfer and withdraw guarantees of origin for gases produced from RES, in cooperation with the designated bodies of other Member States and RES gas sector organisations, shall 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 scheme for Guarantees of Origin Registry activities, 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 development of RES energy production and the significant increase in the share of RES in the overall energy balance, the problems of integration into the electricity transport system and balancing of the electricity grid (both at national and regional level) will be addressed through Power to Gas technologies, the transformation of excess electricity into a gaseous form of energy (hydrogen and methane) and the transport of gas through transmission/distribution networks to storage and consumption areas in cooperation with gas and electricity transmission system operators in neighbouring countries.

Lithuania is also interested in cooperating on offshore wind projects and harmonising the blending of biofuels in transport fuels in the region.

Biofuel exchange

With the establishment of the Biofuel Exchange Platform, Member States across the region:

- the establishment of a regional platform for an unrestricted range of biofuel suppliers;
- standardised biofuel products facilitate trade between individual Member States;
  - active trade between Member States helps to make the entire EU biofuel market more liquid and accessible;
  - the establishment of a virtual biofuel supply system with the most economically advantageous transactions with the nearest biofuel buyer as an alternative to a gas pipeline or oil pipeline;
- security of supply is ensured by all suppliers of biofuels in the region;
- low barriers to new entrants and a more attractive market for new investors;
- ensure the sharing and dissemination of information on the biofuel market;
- the sustainability and CO2 neutrality of the biofuels supplied shall be ensured.

All these circumstances contribute to ensuring the objectives set out in the RES Directive and a competitive alternative to the supply of sustainable and CO2-neutral biofuels to existing fossil fuel (gas or oil) transmission networks.

The biofuel exchange platform standardises 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 for all members on the platform without paying additional charges 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, based on the location of the supplier, the GPS aid determines the distance to each buyer (the seller of the biofuel may even limit the geographical area of activity). Therefore, once biofuel suppliers set the exact transport costs of 1 km, the system itself accurately calculates 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 locations of the buyer) and the most economically advantageous transaction between the closest suppliers and buyers of biofuels. This reduces the CO2 footprint of biofuel transport and ensures its sustainability.

The biofuel exchange platform has increased market transparency and efficiency in Lithuania, which in turn has almost eliminated the differences in biofuel prices between neighbouring municipalities. The establishment of a common biofuel exchange platform in the region, with the result that the price of biofuels does not vary by more than 15 % between the neighbouring Member States of the region, reduces the transport of biofuels from one Member State to another, thereby ensuring the sustainability of biofuels by further reducing the CO2 footprint of biomass transport.

The biofuel exchange platform, by standardising biofuel products, also ensures their specifications and compliance, and therefore the growth of trade in biofuel products certified or recognised under national schemes is expected. By 2030, the objective is that all biofuels sold in the region are certified, ensuring that the biofuels sold are CO2 neutral, i.e. sustainable. Standardisation of biofuel products also contributes to the sustainability of biofuels, since the worst-performing biofuel product promotes the use of all the biomass produced (forestry residues, industrial by-products, etc.). As of 28 April 2022, Baltpool has been appointed to implement a voluntary national scheme for assessing the compliance of biomass fuels with the sustainability and greenhouse gas (GHG) emissions saving criteria.

Impact on energy prices

The Biofuel Exchange Platform ensures competition between biofuel producers, establishes clear conditions and simplifies trade, not only by reducing administrative costs for existing biofuel producers, but also by facilitating the entry of new ones across the region. At the same time, the biofuel exchange platform determines the real market price for biofuels, which helps market players to identify the current market situation. All these conditions result in decreasing margins for biofuel producers or resellers, i.e. falling energy prices, and increasing the attractiveness of biofuels as a renewable energy source.

The standardised biofuel products of the biofuel exchange platform in the region contribute to the vertical integration of the individual sectors of the biofuel industry, since the production of the lowest quality of the biofuel product marketed on the platform allows the use of all residues from the wood industry (forestry 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 the district heating sector, heat prices are regulated by the national regulator and not by competition from a reasonable market. As a result, purchasers of biofuels who produce heat do not have a strong interest in finding an optimal price for energy sources for consumers. For Member States, the Biofuel Exchange Platform helps to ensure reasonable heat prices for district heating consumers, who are usually the lowest earners.

Regional cooperation

The full functioning of the biofuel exchange platform requires compliance with the legislation of individual Member States, timely exchange of information and a rapid solution to emerging problems in individual Member States (e.g. easier prediction and resolution of ash removal problems) and 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

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Annex No 1. Public consultation

1. Working Party onDecarbonisation

The draft updated NECP has been prepared with the involvement of ministries, institutions, in close consultation with socio-economic partners, associations and the public. The Ministry of Energy and the Environment initiated an update process in autumn 2021, striving to make 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) were set up. The members of the working groups were representatives of different ministries and institutions (designated according to their remit) and socio-economic partners. The meetings were held remotely, in public, and recorded on the social media of the Ministries of Environment and Energy.

Representatives from interested societal groups (public institutions, science, measures, NGOs, etc.) proposed around 600 measures, from which the most effective external experts were selected, which were already assessed by agencies and ministries – the most effective and in line with the strategic objectives – were selected in the updated NECPs.

Table 1. Meetings of the Decarbonisation Working Groups

Date	Workgroup name	Result
22/10/2021	Joint meeting	Kick-off meeting to discuss the process
07/12/2021	Waste and the 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 Party discussed issues related to the accounting of GHG emissions and the assessment of the proposed measures, as well as the further organisation of the work of the Working Group.
14/12/2021	Transport (I)	During the kick-off meeting objectives presented: the transport sector will strive to reduce GHG and move towards more sustainable and environmentally friendly mobility.
21/12/2021	Industry (I)	During the kick-off meeting, the members of the Working Party discussed issues related to the accounting of GHG emissions and the assessment of the proposed measures, as well as the further organisation of the work of the Working Group.
06/01/2022	Energy (including buildings) (I)	Key targets for the renewable energy sector for 2030,

		covering transport, electricity, cooling and heating and ETS energy plants, were presented. Areas on which to focus and step up efforts were also identified.
20/01/2022	Agriculture and forestry (II)	The meeting presented national greenhouse gas (GHG) inventories in agriculture and forestry and discussed the future instrument of GHG inventories on farms.

25 JANUARY 2022	Industry (II)	The consultants of the Ministry of the Environment presented the assessment of existing measures in the industry sector in the NECPs: which measures are already being implemented, how much they contribute to the country's socio-economic indicators, whether they have an impact on the circular economy, etc. Experts from the Organisation for Economic Co-operation and Development (OECD) presented a project with the European Commission entitled "Reforming all sectors of the Lithuanian economy towards climate neutrality by 2050" m', and the initial findings of the industry sector inquiry shared good practices from other countries.
27/01/2022	Agriculture and forestry (III)	The assessment of existing GHG reduction measures was presented to the members of the working group and the sources of funding were discussed by consultants from the Ministry of the Environment. OECD experts presented the launch of the new project "All Lithuania economic sectoral reform climate towards neutrality by 2050', presented the initial results of the study on the agricultural and forestry sector, but also shared good practices from other countries.
01/02/2022	Energy (including buildings) (II)	The buildings strategy was presented. OECD experts presented the launch of a new project entitled 'Reforming all sectors of Lithuania's economy towards climate neutrality by 2050', presented the initial results of the energy sector inquiry, but also shared good practices from other countries.
03/02/2022	Transport (II)	The consultants of the Ministry of the Environment presented the assessment of existing measures in the transport sector in the NECP. OECD experts presented a project with the European Commission entitled "Reforming all sectors of Lithuania's economy towards climate neutrality by 2050" m' and primary the results of the study on the transport sector shared good practices from other countries.
04/02/2022	Waste and circular economy (II)	The consultants of the Ministry of the Environment

		presented the assessment of the existing measures in the waste sector in the NECPs: which measures are already being implemented, their contribution to the country's socio-economic indicators, whether they have an impact on the circular economy, etc. Presentation of national greenhouse gas (GHG) inventories in the waste sector.
22/02/2022	Transport (III)	Presentation of national greenhouse gas (GHG) inventories in the transport sector. Discussion of proposals for possible measures in the NECPs related to water and air transport.
24/02/2022	Agriculture and forestry (IV)	No-till technologies, measures in Lithuania's 2023-2027 Strategic Plan for Agriculture and Rural Development, Recovery and Resilience Measures (RRF) and Carbon farming

		presentation and discussion of proposals made by social partners (soil part).
25/02/2022	Waste and circular economy (III)	GHG generation from wastewater management; funding for wastewater and waste management; presentation of ongoing measures in the waste sector in the NECPs and discussion of social partners' proposals for possible NECPs measures (sorting of waste)
03/03/2022	Industry (III)	Presentation of national greenhouse gas (GHG) inventories in industry. Discussion of proposals for measures for the industrial sector.
10/03/2022	Agriculture and forestry (V)	Presentation of emissions and targets from the livestock sector and report on "The application of nitrogen-preserving technologies to livestock farming" on-farms. Discussed investments animal husbandry sector, biomethane production capacity, existing NECPs measures and proposals made (livestock farming).
15/03/2022	Transport (IV)	Delivered transport sectoral GHG emissions, strategic short- and long-term objectives for the rail and heavy-duty road transport sectors. Social Partners and Transport ministries proposals rail transport and heavy road (N2 and N3) sectors.
24/03/2022	Joint Meeting of the Waste and Circular Economy and Industry Groups	Presentation and discussion of the measures proposed by the Ministry of Economy and Innovation in the field of the circular economy. Presentation of the Lithuanian Innovation Centre on circular industry. Presentation and discussion of the measures proposed by the Ministry of the Environment in the field of the circular economy and discussion of the proposals of the social partners.
29/03/2022	Transport (V)	GHG emissions from transport, strategic short-term and long-term objectives for light road transport 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) sectors.
31/03/2022	Agriculture and forestry (VI)	Protection of organic soils, extensive livestock farming, agroforestry, sequestration objectives, intestinal fermentation, organic farming – measures proposed by the social partners to reduce emissions and increase absorptions were discussed.
06/04/2022	Energy (including buildings) (III)	The consultants of the Ministry of the Environment presented the assessment of the existing measures in the energy sector in the NECPs. Presentation of national GHG inventories in the energy sector. Debate on proposed RES measures in the transport sector.
08/04/2022	Joint meeting of DG Waste and Circular Economy and Transport	Presentations on: circular transport; the application of green procurement opportunities decarbonisation and flowering brassica economic in the context; flowering brassica economic
		implementation from the manufacturer's perspective. Discussion of the proposed measures.
12/04/2022	Transport	Delivered transport sectoral GHG emissions, strategic short- and long-term objectives for public and non-motorised transport, existing NECP measures for public and non-motorised transport in the field; Ministry of Social country proposals for the public and non-motorised transport sectors and for public and non-motorised transport by the Ministry of Transport and Communications.
14/04/2022	Agriculture and forestry (VII)	Sixth IPCC Reports; Republic of Lithuania an overview of the strategic objectives and the measures proposed by the social partners. Presentations: NutiriBiomass4LIFE Project "Circular Economy Model for Large Cities – Water Sludge and Biomass Ash to Biomass – Biomass to Renewable Energy" 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; the vision of the circular economy in the construction sector; studies on the evaluation of the recovery of construction waste; presentation of the measures proposed by the social partners and discussion of the proposals.
18/04/2022	Joint AM/Working/MoA Meeting	Presentations on circular transport; the application of green procurement opportunities decarbonisation and

		flowering brassica in the economic context; Presentation of the Lithuanian Association of Autopartite Producers and Exporters on the implementation of the circular economy from the perspective of producers. Discussion of the proposed measures.
21/04/2022	Industry	Presentations: R & D & I (smart specialisation) priorities implementing concepts design; Digital Innovation Hubs. Links with 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, concept, tools and good practices; The contribution of sociology to promoting sustainable consumption; How to empower sustainable consumption? TEXTALE: circular fashion/re-sale platform model and discussion between social partners.
26/04/2022	Agriculture and forestry	The role of forests in the FNHR sector: accounting and climate mitigation presentation: Proposals for NECPS renewal and discussion.
28/04/2022	Joint meeting	Presentations: Short food supply chains in the context of regional development; The initiative of the community garden of the “ideo-speaking” community 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 Ministry of Energy of the Republic of Lithuania of the Provergic Package and discussion of proposals for the inclusion of new measures.
12/05/2022	Energy (including buildings) (V)	The transformation of the Centralised Heat Supply, the Government’s priorities and the proposals of the social partners in this area were discussed.
19/05/2022	Agriculture and forestry	Forecasts and effects of existing policies (EPFs), list of candidate measures and the follow-up process presentation of the steps. 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	Projections of GHG emissions from the waste sector through existing policy measures; presentation of the list of candidates for waste and circular economy measures and the next steps in the process.
25/05/2022	Industry	Presentation of projections of GHG emissions from the industry sector as part of existing policies, list of measures

		and further 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 projections of GHG emissions from the energy sector as part of existing policies, list of candidate measures and further steps in the process.
8 SEPTEMBER 2022	Agriculture and forestry	Presentation of the list of measures planned to be implemented in the NECPs.
15/09/2022	Agriculture and forestry	Planned implement NECPS forestry presentation of the list of measures.
16/09/2022	Waste and the circular economy	Presentation of an indicative list of measures for the decarbonisation of waste and the circular economy sector and a list of measures planned to be implemented in the NECPs, as well as the effectiveness and potential for 2030 and the draft Circular Economy Action Plan.
11/10/2022	Energy (including buildings)/OECD	Working group members participated OECD and EC organisation of a sectoral seminar presenting 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	Working group members participated OECD and EC organisation of a sectoral seminar to present the project "Lithuanian Economic Sector

		reforming the transition to a climate-neutral economy by 2050'.
18/10/2022	Industry/OECD	Working group members participated OECD and EC organisation of a sectoral seminar presenting the results of the project "Reforming the transition of Lithuanian economic sectors towards a climate-neutral economy by 2050".
20/10/2022	Transport/OECD	Working group members participated OECD and EC organisation of a sectoral seminar presenting the results of the project "Reforming the transition of Lithuanian economic sectors towards a climate-neutral economy by 2050".
19/06/2023	Transport/EUKI	The measures in the transport sector in the updated NECP were presented and how these measures could/should be implemented. The EUKI project "Application of Best Practices in the Development of Passenger Transport Policy" was also presented during the event.
26 JULY 2023	Agriculture and forestry	Presentation of updated NECPs and next steps
7 AUGUST 2023	Waste and the circular economy	Presentation of updated NECPs and next steps and circular economy guidelines
10 AUGUST	Energy (including buildings)	Presentation of updated NECPs and next steps

2023		
10 AUGUST 2023	Industry	Presentation of updated NECPs and next steps
25/10/2023	Agriculture and forestry	State Forest Service Seminar "Decarbonisation measures in the land use and forestry sector and assessment of their effects", where practitioners shared insights on carbon storage in the land use, land use change and forestry sector and on States' ability to meet their commitments and calculations in their NECPs.
24/07/2024	Joint Meeting on Transport, Industry, Waste and Circular Economy	Presentation of updated NECPs and next steps
25 JULY 2024	Agriculture and forestry	Presentation of updated NECPs and next steps

2. Energy Working Party

At the time of the update of the NECP, 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 updated NECP measures.

Table 2. Meetings of the Energy Working Groups

Date	Workgroup name	Result
05/05/2022 13	Energy efficiency (I)	The meeting presented objectives in the building sector, discusses existing NECPs measures, presents proposed additional measures, comments, comments and suggestions for measures in the building sector.
05/05/2022 18	Energy efficiency (II)	The meeting presented industry sector objectives, discusses existing NECPs measures, presents proposed additional measures, comments, comments and suggestions for industry measures.
05/05/2022 18	Research, innovation and competitiveness (I)	During the meeting, present the innovation and competitiveness sector objectives; for discussion existing NECPS the measures to be delivered proposed additional tools, comments, comments and suggestions for measures in the innovation and competitiveness sector.
05/05/2022 25	Energy efficiency (III)	The meeting presented objectives for the transport sector, discusses existing NECPs measures, presents proposed additional measures, comments, comments and suggestions on measures in the transport sector.
06/06/2022 02	Research, innovation and competitiveness (II)	Meeting at the time deliver scientific research and funding objectives, discussing existing measures in the NECPs, to be delivered proposed additional tools, comments, comments and suggestions on research

		and funding instruments.
06/06/2022 14	Internal Energy Market (I)	The objectives of the energy poverty sector were presented during the meeting; for discussion existing NECPS the measures presentation of the proposed accompanying measures, comments, comments and suggestions on measures in the energy poverty sector.
06/06/2022 16	Internal Energy Market (II)	The meeting presented targets for the district heating (CHP) sector and discusses existing NECPs measures; to be delivered proposed additional measures, comments, comments and suggestions for measures in the DH sector.
06/06/2022 21	Internal Energy Market (III)	The objectives of the electricity/gas sector were presented during the meeting; for discussion existing NECPS the measures presentation of proposed additional measures, comments, comments and suggestions for measures in the electricity/gas sector.
08/08/2023 10	Joint meeting of all energy groups	Presentation of updated NECPs and next steps

3. Public consultation

In order to develop an integrated National Energy and Climate Plan (in line with the requirements of Articles 3 and 10 of EU Regulation 1999/2018), the Ministry of Energy and the Environment carried out a public consultation of the draft NECP between 14 July and 22 September 2023. The document resulting from this consultation was placed on the e-citizen platform and letters of formal notice were sent to 44 authorities.

The aim of the public consultation was to give all interested persons and organisations access to the content of a coherent document and to submit their comments and suggestions. This is the aim of a
ensure that the final document submitted to the European Commission meets the expectations and needs of all interest groups.

During the consultation, 225 comments were received from 31 institutions and 7 ministries. There were also 64 new proposals for measures. The table below shows the breakdown of comments by sector, with the most comments in the area of energy:

Table 3. Comments received in the 2023 public consultation

Sector	Number of comments
General comment/gramme	20
General remark (Objectives)	41
Waste	4
Energy	109
Transport	25
Industry	11
Agriculture	8

Horizontal measures	1
Forestry	4
Adaptation	2

Public consultation of the final document of the NECP and of the Strategic Environmental Assessment (SEA) took place between 5 July and 5 August 2024. The document resulting from this consultation was placed on the e-citizen platform and letters of formal notice were sent to 44 authorities. A public presentation of the SEA report and the NECP took place on 22 July.

During the consultation, 329 comments were received, of which 320 were addressed to NECPs and 9 to SEA. The table below shows the breakdown of comments by sector, with the most comments in the area of energy:

Table 4. Comments received in the 2024 public consultation

Sector	Number of comments
General comment	22
General remark (Objectives)	1
General comment/gramme	6
Waste	1
Energy	195
Climate	7
Transport	49
Industry	4
Agriculture	11
FNM	9
Adaptation	15

4. Other public-inclusive measures/events

Climate Change Week

Every year since 2019, the Ministry of the Environment organises a Climate Week to raise the attention of the public, business and other stakeholders on the most pressing issues of climate change. Every year, an increasing number of bodies, institutions, businesses, non-governmental organisations and communities are involved in events.

The 2021 Climate Week closing event “Code Red | is the climate crisis moving from the parachutes to the centre?” was dedicated to the launch of the update of the NECPs and the decarbonisation working groups dedicated to the meeting.

The 2022 Climate Week hosted a national climate change conference on 24 October entitled ‘Climate change and cities: will flowering meadows help scattered streets?’, where representatives of municipalities, scientific and research institutions, social partners and others interested in this topic were involved.

The conference found interesting facts about the impact of climate change on cities, how Lithuania’s climate will change in the future, and what measures will help to adapt and implement climate-neutral lifestyles and reduce the negative impacts of climate change.

The 2023 Climate Week hosted a regional consultation event on 27 October entitled ‘Green transformation: a challenge and opportunity: what lessons can we learn from each other?’, during which representatives from Lithuania, Poland, Latvia and Estonia presented to the public their country's commitments, the steps in the processes for updating the National Energy and Climate Plans, the sectoral GHG reduction targets and measures.

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) survey on "Reforming the transition of Lithuanian economic sectors to a climate-neutral economy by 2050".

At the conference, OECD experts provided guidance on the path and measures that Lithuania should choose to achieve its decarbonisation objectives, how this will affect our country and what opportunities Lithuania is developing for a climate-neutral economic model.

The event also included a debate with representatives of the public sector, business, society, economists. In the light of the OECD's assessment of climate neutrality by 2050 and the recommendations made, Lithuania's progress already made and the challenges ahead were discussed. The topic of the discussion is "CO2 taxation in the context of current prices".

Event "Renewal of the NECPs: presentation of the analysis of existing tools for energy components".

On 23 March 2022, an analysis of the existing measures of the energy components of the NECPs (energy efficiency, energy security, internal market and research, innovation and competitiveness) was presented at the event. Social partners, consultants, members of the energy sub-groups of the NECPs, representatives of the Ministry of Energy and the Lithuanian Energy Agency participated in this event.

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ANNEX2:

List of parameters and variables to be included in section B of the national plan: S										
All green parameters and variables are already required by existing legislation (MMR, RES Di										
All energy-related parameters and variables highlighted in red may need to rely on additional mea										
All orange variables correspond to the characteristics to be (a)				calculated on the basis of parameters and variable						
	2005	2010	2015	2020	2021	2022	2023	2024	2025	2
1. General parameters and variables [units]										
Population [million]	3322528	3097282	2904910	2796025	2788725	2777864	2760875	2737607	2707915	26
GDP [million EUR]	29247	31006	37346	43362	46017	46897	48778	49847	50759	
Sectoral gross value added (including main industrial, construction, services, and agriculture sectors) [euro million]										
Agriculture										
Build										

Services										
Energy										
Industry										
Number of households [thousands]				1290264	1287448	1284711	1281964	1279187	1276370	12
Household size [inhabitants/households]				2,16	2,16	2,16	2,16	2,16	2,16	
Household disposable income [EUR] (substantive)										
Number of kilometres of passenger transport: all modes, i.e. split between road (cars and buses separated if possible), rail, aviation and domestic navigation (when relevant) [million pkm]										
Public road transport	3691	2694	2746	1631	1454	2327	2584	2612	2639	
Private cars	34793	32569	24865	28239	29004	30398	30649	30869	30917	
Motorcycles										
Rail transport	428	373	361	234	287	381	384	NO	NO	
Aviation	1099	1967	1469	250	1161	1601	1563	NO	NO	NO
Inland navigation	3	4	3	68	5	5	6	6	6	
Freight transport in tonne-kilometres										
Trucks	2137	2292	2913	3995	3862	3182	4178	4306	4434	
Rail transport	12457	13431	14036	15865	14566	7375	6307	NO	8856	

	Inland navigation	1	4	1	1	4	11	13	13	13
9	International oil, gas and coal fuel import prices [EUR/GJ or euro/toe] based on the Commission’s recommendations									
	Oil									
	Gas									
	Charcoal									
10	EU-ETS carbon price [EUR/EUA] based on the Commission’s recommendations	NO	14	8	29	65	86	86	86	86
11	Exchange rates to EUR and to USD (where applicable) assumptions [euro/currency and USD/currency]									
12	Number of Heating Degree Days (HDD)				3885	3882	3878	3875	3872	3869
13	Number of Cooling Degree Days (CDD)									
14	Technology cost assumptions used in modelling for main relevant technologies									
2. Energy balances and indicators										
2.1. Energy supply										

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	20
	Indigenous Production by fuel type (all														

	energy products that are produced in significant quantities) [ktoe]														
	Solid substances				14,5	17,3	20,5	19,1	18,3	17,2	16,3	15,1	14,1	13,0	1
	Oil														
	Of natural gas				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	
	Renewable energy sources				1520,6	1639,9	1767,8	1927,7	2154,4	2370,2	2597,7	2852,3	3083,8	3211,9	27,
	(2) Net imports by type of fuel (including electricity; net imports from EU countries and net imports from non-EU countries are reported separately) [in ktoe:														
	Solid substances														
	Oil														
	Natural gas														
	Electricity														
	Import dependency from third countries [%]														
	Main sources of imports of energy carriers														
	Main Purchase Country (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 domestic consumption by fuel type source (including solid fuels, all energy products: coal, crude oil and petroleum products, natural gas, nuclear energy, electricity, secondary heat, renewable resources, waste [ktoe]													
	Solid substances													
	Oil													
	Of natural gas	2477	2492	2068	1972	1877	1282	0	0	0	0	0	0	0
	Nuclear													
	Electricity													
	Forms of renewable energy													
	Other													
2.2. Electricity and heat														

	Gross electricity generation [GWh]				485,0	473,0	518,0	687,0	817,0	1013,0	1215,0	1420,0	1522,0	1598,0	51,
	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	
	Solid substances														
	Oil (including refinery gas)														
	Gases (including derived gases)														
	Biomass waste														
	Hydro (excluding pumping)				25,8	33,0	29,7	29,7	29,7	29,7	29,7	29,7	29,7	29,7	2
	Wind				133,4	117,1	117,1	217,1	278,8	413,8	591,1	793,8	894,1	969,4	19,
	Sunlight				11,1	16,4	61,3	54,4	168,4	229,8	253,8	256,2	257,6	259,1	26
	Geothermal and other renewable energy				51,1	58,8	58,3	86,2	88,5	88,5	88,5	88,5	88,5	88,5	8
	Other fuels (hydrogen, methanol)														
	Share of combined heat and power generation in total electricity and heat generation [%]														
	Share of heat from combined heat and power (CHP heat share divided by combined heat produced for district heating)														

	Capacity electricity generation by source, including retirements and new investment [MW]													
	Atomic energy				0	0	0	0	0	0	0	0	0	0
	Solid substances													
	Oil (including refinery gas)													
	Gases (including derived gases)													
	Biomass waste													
	Hydro (excluding pumping)				8 77	8 77	8 77	8 77	877	877	877	877	877	877
	Wind				5 40	6 23	9 46	1 228	15 61	20 99	28 09	3 614	4 015	4 315	5

		2005	2010	2015	2020	2021	2022	2023	202 4	2025	2026	2027	2 8
	Sunlight				1 64	2 55	5 72	1 108	2008	2740	3026	3 055	072
	Geothermal and other renewable energy				5 1	5 9	58	86	89	90	92	93	
	Other fuels (hydrogen, methanol)												
	Heat generation from thermal power generation												
	Heat produced by cogeneration plants, including waste heat from industrial plants												
	Cross-border interconnection capacities for gas and electricity [Definition for electricity in line with outcome of ongoing discussions on basis for 15 % interconnection target] and their projected usage rates												

2.3. Transformation Sector												
Fuel inputs to thermal power generation (including solids, oil, gas) [ktoe]				11 87,7	13 73,0	12 04,5	12 24,8	12 22,7	12 21,8	12 20,5	12 19,6	18,
Solid substances				72 3,1	90 8,1	81 7,1	91 2,0	92 7,8	92 7,8	94 3,3	94 7,1	3,0
Oil				1 6,7	1 7,6	16,7	1 6,7	16,7	16,7	1 6,7	1 6,7	6,7
Gas				39 2,2	38 7,3	21 5,7	24 6,3	23 0,1	22 1,3	21 6,9	21 2,4	4,1
Fuel inputs to other conversion processes [ktoe]				5 5,7	6 0,0	15 4,9	4 9,8	48,1	56,1	4 3,7	4 3,3	4,4
2.4. Energy consumption												
Primary and final energy consumption [ktoe]				64 42,6	69 08,5	69 66,6	69 53,8	69 77,9	69 45,4	69 19,6	68 99,5	74,
Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and freight transport, when available)) [ktoe]			4 863	53 40,0	56 99,0	55 25,0	55 38,0	55 29,0	54 97,0	54 60,0	54 02,0	71,(
Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and freight transport, when available)) [ktoe]												
Industry				98 1,0	10 67,0	97 9,0	93 9,0	93 0,0	91 5,0	90 4,0	88 9,0	8,0
Residential				14 34,0	16 00,0	15 39,0	15 58,0	15 79,0	16 01,0	16 18,0	16 27,0	42,(
Tertiary				57 6,0	63 8,0	61 9,0	61 4,0	61 8,0	62 7,0	63 6,0	64 4,0	3,0
Transport	1 438	1551	1 844	21 90,0	22 29,0	22 13,0	22 52,0	22 26,0	21 80,0	21 29,0	20 70,0	28,(
Other				15 8,0	16 6,0	17 5,0	17 6,0	17 5,0	17 4,0	17 3,0	17 2,0	1,0
By transport activity, where possible												
Passengers					NO	NO	NO	NO	NO	NO	NO	NO

	Freight transportation					NO	NO	NO	NO	NO	NO	NO	NO
	Final energy consumption by fuel (all energy products) [ktoe]												
	Solid substances				14 7,8	17 5,9	17 7,1	17 1,0	16 7,2	13 0,8	11 4,4	10 9,0	6,0
	Oil				23 06,2	23 43,3	23 51,4	23 73,5	23 41,9	22 77,8	22 11,3	21 36,0	80,
	Gas				58 3,0	63 3,4	58 1,0	58 1,6	55 1,2	51 5,0	48 6,9	46 4,7	0,5
	Electricity				99 4,3	10 62,1	10 97,8	10 98,6	11 37,9	11 89,7	12 34,6	12 85,9	50,
	Heat				84 7,5	10 06,6	83 3,7	83 3,3	83 0,4	83 2,1	83 1,6	82 1,0	1,8
	Forms of renewable energy				80 4,0	87 2,3	88 6,6	91 6,3	97 4,5	10 23,6	10 80,7	11 30,5	77,
	Other				12 9,7	13 3,9	10 1,7	9 8,7	10 0,3	11 7,7	11 7,1	11 7,6	8,1
	Final non-energy consumption [ktoe]	7 32	664	1 117	1 146	1 104	6 39	672	1 206	1268	1 260	1 260	260
	Primary energy intensity of the overall economy (primary energy consumption per GDP [toe/euro]												
	Final energy intensity by sector (including industry, residential, tertiary and transport (including split between passenger and freight transport, when available))												
	Industry												
	Residential												
	Tertiary												
	Passengers												
	Freight transportation												
2.5. Price													
	Electricity prices by type of using sector (residential, industry, tertiary)												
	Residential												
	Industry												

	Tertiary											
	National retail fuel prices (including taxes, per source and sector) [euro/ktoe]											
	Diesel											

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2
	Industry										
	Households										
	Private transport										
	Transport public										
	Gasoline										
	Private transport										
	Transport public										
	Natural gas										
	Industry										
	Households										
2.6. Investments											
	Total energy costs for the economy										
	Energy-related investment in industry										
2.7. Renewable energy											
	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 in gross final energy consumption			27.36 %	28.10 %	29.62 %	33.58 %	37.61 %	41.71 %	%
	RES-Silum part			22.06 %	22.63 %	30.49 %	36.93 %	52.23 %	63.50 %	%
	Part RES-E			50.46 %	48.52 %	54.97 %	57.79 %	59.29 %	61.88 %	%
	Part RES-T			5.27 %	6.16 %	6.04 %	7.79 %	9.28 %	10.77 %	%
	(final consumption of renewable energy in transport as a contribution to the overall target)									
	Contribution of biofuels and biogas produced from feedstock listed in Part A of Annex IX and used for transport									
	Contribution of biofuels and biogas produced from feedstock listed in Part B of Annex IX and used for transport									
	Contribution of other biofuels consumed in transport									
	Total final RES consumption for heating and cooling			1187,7	1373,0	1123,2	1268,8	1268,3	1259,5	0
	Gross final electricity consumption			218,2	239,1	314,7	380,0	554,8	701,7	

	from RES										
	Gross final consumption of energy from renewable sources in transport				104,1	123,9	119,4	159,1	186,4	211,0	
	Total final consumption of RES				1520,6	1639,9	1767,8	1927,7	2154,4	2370,2	7
	Total consumption for heating and cooling				2375,1	2631,5	2426,1	2402,8	2383,7	2355,4	4
	Share of unwasted heat and cold in total final consumption for heating and cooling										
	Total final RES consumption from district heating and cooling										
	RES share of district heating and cooling in total final heating and cooling consumption										
	Total consumption of waste from district heating and cooling										
	Share of heat and cold used in district heating and cooling in gross final consumption for heating and cooling										
	Electricity and heat generation from renewable energy in buildings; 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 systems)										
	Where applicable, other national trajectories, including long-term and sectoral trajectories, share of food-based biofuels and advanced biofuels, share of renewable energy in district heating as well as renewable energy produced by cities and energy communities										
3. GHG											

emissions and removals related indicators										
GHG emissions by policy sector (EU ETS, effort sharing and LULUCF)	22477911	20774148	20190045	20203496	20291777	19698305	19977270	19551407	19213303	1… 19
ETS sector emissions (since 2013 ETS + EMS aviation coverage, including departing flights)	9689595	7921274	6872794	6128505	5992562	5895113	6302046	6318699	6443440	64…
Total greenhouse gas emissions in the sector (scope valid for 2021-30)	13062124	12851223	13371184	14081070	14313569	14219668	14122003	13708643	13274953	1… 18

		2005	2010	2015	2020	2021	2022	2023	2024	2025	
	LULUCF (accounting according to the requirements of EU legislation)	NA	NA	NA	NA	—5523565,7	—6076208,76	—6092873,57	—6436008,32	—6595388,3	—
	GHG emissions by IPCC sector and by gas (where relevant, split into EU ETS and effort sharing sectors) [tCO2eq]	GHG emissions per IPCC sector and gas are reported in the Excel template (a separate file) that wa… (EU) 2018/1999 (latest submission in 2…									
	Carbon Intensity of the overall economy [tCO2eq/GDP]	769	670	541	466	441	414	410	392	379	
	CO2 emission indicators										
	GHG intensity of domestic	NO	NO	NO	0,09	0,09	0,08	0,09	NO	NO	

	power and heat generation [tCO2eq/MWh]									
	GHG intensity of final energy consumption by sector [tCO2eq/toe]	NO	NO	1,56	1,64	1,58	1,59	1,58	1,53	1,46
	Industry	NO	NO	1,21	1,20	1,19	1,24	1,29	1,27	1,15
	Residential	NO	NO	0,56	0,61	0,63	0,62	0,60	0,58	0,57
	Tertiary	NO	NO	0,50	0,48	0,48	0,47	0,44	0,41	0,38
	Passengers	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Freight transportation	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Parameters for emissions of other (non-CO2) pollutants									
	Livestock: dairy cattle [1000 heads], non-dairy cattle [1000 heads], sheep [1000 heads], pig [1000 heads], poultry [1000 heads]									
	dairy cattle	425	367	307	237	229	225	224	222	217
	non-dairy cattle	395	406	434	408	411	411	410	410	410
	pigs	1094	929	701	566	578	578	578	575	571
	ewes	31	66	154	161	152	152	152	152	152
	domestic poultry	8349	10577	9687	10435	9666	8853	8685	8744	8761
	Nitrogen input from application of synthetic fertilisers [kt	119	143	168	199	175	175	176	176	176

	nitrogen]									
	Nitrogen input from application of manure [kt nitrogen]	33	32	34	31	31	31	30	30	30
	Nitrogen holding plants [kt nitrogen] 21.12.2018 L 328/56 Official Journal of the European Union LT	IE	IE	IE	IE	IE	IE	IE	IE	IE
	Nitrogen in crop residues returned to soils [kt nitrogen]	36	41	79	87	70	74	76	74	75
	Area of cultivated organic soils [hectares]	117950	125163	125996	132830	134198	130473	131001	130369	129525
	Municipal solid waste (MSW) generation	1287370	1252620	1299998	1349947	1345010	1349600	1350790	1350000	1347120
	Municipal solid waste (MSW) going to landfills	109874	1085163	702127	220428	206582	187444	172601	157500	142196
	Share of CH4 recovery in total CH4 generation from landfills [%]	0,00	2.9 %	15.0 %	16.4 %	13.8 %	12.0 %	11.9 %	11.8 %	11.6 %

List of parameters and variables to be included in section B of the national plan: Scenario of planned policies and measures

All green parameters and variables are already required by existing legislation (MMR, RES Directi									
All energy-related parameters and variables highlighted in red may need to rely on additional measure									
All orange	the variables indicated correspond to the characteristics to be calculated on the basis of parameters and variables,								in
	2005	2010	2015	2020	2021	2022	2023	2024	2025
1. General parameters and variables [units]									

1	Population [million]	3322 528	3097 282	29 04910	2796 025	2788 725	2777 864	2760 875	2737 607	2707 915	73
2	GDP [million EUR]	2924 7	3100 6	3 7346	4336 2	4601 7	4689 7	4877 8	498 47	5075 9	5
3	Sectoral gross value added (including main industrial, construction, services, and agriculture sectors) [euro million]										
	Agriculture										
	Build										
	Services										
	Energy										
	Industry										
4	Number of households [thousands]				1290 264	1287 448	1284 711	1281 964	1279 187	1276 370	49
5	Household size [inhabitants/households]				2,16	2,16	2,16	2,16	2,1 6	2,16	
6	Household disposable income [EUR] (substantive)										
7	Number of kilometres of passenger transport: all modes, i.e. split between road (cars and buses separated if possible), rail, aviation and domestic navigation (when relevant) [million pkm]										
	Public road transport	369 1	269 4	2 746	163 1	145 4	232 7	258 4	NO	NO	NC
	Private cars	3479 3	3256 9	2 4865	2823 9	2900 4	3039 8	3064 9	308 69	3091 5	0

	Motorcycles										
	Rail transport	428	373	361	234	287	381	384	NO	NO	
	Aviation	1099	1967	1469	250	1161	1601	NO	NO	NO	NO
	Inland navigation	3	4	3	68	5	5	6	6	6	
8	Freight transport in tonne-kilometres										
	Trucks	2137	2292	2913	3995	3862	3182	4178	NO	NO	NO
	Rail transport	12457	13431	14036	15865	14566	7375	6307	NO	NO	NO
	Inland navigation	1	4	1	1	4	4	11	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										
	Charcoal										
10	EU-ETS carbon price [EUR/EUA] based on the Commission's recommendations	NO	14	8	29	65	86	86	86	86	
11	Exchange rates to EUR and to USD (where applicable) assumptions [euro/currency and USD/currency]										
12	Number of Heating Degree Days (HDD)				3885	3882	3878	3875	3872	3869	
13	Number of Cooling Degree Days (CDD)										

14	Technology cost assumptions used in modelling for main relevant technologies										
2. Energy balances and indicators											
2.1. Energy supply											
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	
	Oil										
	Of natural gas				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	
	Renewable energy sources				1520,6	1857,8	2016,5	2267,8	2568,7	2947,0	3
2	Net imports by fuel type (including electricity; net imports from EU countries and net imports from non-EU countries are reported separately) [in ktoe:										
	Solid substances										

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035
	Oil															
	Natural gas															
	Electricity															
	Import															

	dependency from third countries [%]															
	Main sources of imports of energy carriers															
	Main Purchase Country (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															
	Gross domestic consumption by fuel type source (including															

	solid fuels, all energy products: coal, crude oil and petroleum products, natural gas, nuclear energy, electricity, secondary heat, renewable resources, waste [ktoe]															
	Solid substances															
	Oil															
	Of natural gas	2477	2 492	068	1 972	1 877	1282	0	0	0	0	0	0	0	0	0
	Nuclear															
	Electricity															
	Forms of renewable energy															
	Other															
2.2. Electricity and heat																
	Gross electricity generation [GWh]				4 85,0	4 54,0	4 29,0	542,0	744,0	952,0	1165,0	1382,0	1495,0	1580,0	2133,0	225 5,0
	Gross electricity generation by fuel (all energy products)															

	[GWh]															
	Atomic energy															
	Solid substances															
	Oil (including refinery gas)															
	Gases (including derived gases)															
	Biomass waste															
	Hydro (excluding pumping)				26	33	40	40	40	40	40	40	40	40	40	40
	Wind				133	117	130	217	279	414	591	794	894	969	1520	1601
	Sunlight				11	16	19	24	5	192	265	301	315	329	338	340	351
	Geothermal and other renewable energy				51	59	58	56	8	89	90	92	93	94	96	97	97
	Other fuels (hydrogen, methanol)															
	Share of combined heat and power generation in total electricity and heat generation [%]															
	Share of heat from combined heat and power (CHP heat share divided by															

	combined heat produced for district heating)															
	Capacity electricity generation by source, including retirements and new investment [MW]															
	Atomic energy				0	0	0	0	0	0	0	0	0	0	0	0
	Solid substances															
	Oil (including refinery gas)															
	Gases (including derived gases)															
	Biomass waste															
	Hydro (excluding pumping)				877	877	877	877	877	877	877	877	877	877	877	877
	Wind				540	623	946	1228	1561	2099	2809	3614	4015	4315	5915	5915
	Sunlight				164	255	572	1108	2008	2740	3026	3055	3072	3090	3109	3109
	Geothermal and other renewable energy				51	59	58	86	89	90	92	93	94	96	97	97
	Other fuels (hydrogen, methanol)															
	Heat generation from thermal power															

	generation															
	Heat produced by cogeneration plants, including waste heat from industrial plants															

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	20
	Cross-border interconnection capacities for gas and electricity [Definition for electricity in line with outcome of ongoing discussions on basis for 15 % interconnection target] and their projected usage rates														
2.3. Transformation Sector															
	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	45
	Solid substances				741,8	930,3	835,8	930,7	946,5	955,4	975,4	983,8	994,1	1004,4	12
	Oil				16,7	17,6	16,7	16,7	16,7	16,7	16,7	16,7	16,7	16,7	,7

	Gas				392,2	387,3	215,7	246,3	229,8	213,6	205,4	193,7	127,6	116,4	,8
	Fuel inputs to other conversion processes [ktoe]				61,0	63,2	160,2	55,1	53,4	62,1	50,0	53,4	108,9	109,5	4,
2.4. Energy consumption															
	Primary and final energy consumption [ktoe]				6442,6	6908,5	6955,9	6951,7	6913,8	6821,0	6731,3	6617,7	6579,8	6509,7	52
	Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split between passenger and freight transport, when available)) [ktoe]				5340,0	5699,0	5467,0	5534,0	5504,0	5440,0	5392,0	5379,0	5315,0	5195,0	42
	Final energy consumption by sector (including industry, residential, tertiary, agriculture and transport (including split														

between passenger and freight transport, when available)) [ktoe]														
Industry				98 1,0	10 67,0	922 ,0	934 ,0	9 21,0	896 ,0	87 8,0	93 0,0	90 8,0	84 7,0	80
Residential				14 34,0	16 00,0	153 9,0	156 3,0	15 89,0	161 4,0	1633,0	16 35,0	16 45,0	16 53,0	59
Tertiary				57 6,0	63 8,0	619 ,0	613 ,0	6 08,0	608 ,0	60 8,0	60 7,0	60 8,0	60 7,0	0,
Transport	1 438	1 551	844	21 90,0	22 29,0	221 3,0	224 8,0	22 14,0	215 0,0	2102,0	20 39,0	19 85,0	19 21,0	28
Other				15 8,0	16 6,0	175 ,0	175 ,0	1 72,0	172 ,0	17 1,0	16 9,0	16 8,0	16 7,0	5,
By transport activity, where possible														
Passengers					NO	NO	NO	NO	NO	NO	NO	NO	NO	N
Freight transportation					NO	NO	NO	NO	NO	NO	NO	NO	NO	N
Final energy consumption by fuel (all energy products) [ktoe]														
Solid substances				14 7,8	17 5,9	177 ,1	171 ,0	1 67,2	130 ,8	11 4,4	10 9,0	96 ,0	89,6	,4
Oil				23 06,2	23 43,3	235 1,4	237 3,3	23 36,2	225 9,5	2197,5	21 11,1	20 42,7	19 62,5	42
Gas				58 3,0	63 3,4	582 ,0	581 ,8	5 50,2	513 ,9	48 5,8	46 1,9	37 4,6	34 1,5	5,
Electricity				99 4,3	10 62,0	102 4,6	109 5,3	11 30,6	117 9,2	1223,4	13 49,2	14 31,7	14 47,9	59
Heat				84 7,5	10 06,6	833 ,7	833 ,3	8 19,6	807 ,6	79 3,0	75 6,9	72 2,1	68 8,4	6,
Forms of renewable energy				80 4,0	87 2,3	886 ,6	923 ,2	9 67,6	101 5,9	1067,4	11 15,6	11 62,0	12 10,3	50
Other				12	13	101	98,	1	115	11	10	10	10	

					9,7	3,9	,7	7	00,1	,0	1,3	7,2	8,2	8,6	6,
	Final non-energy consumption [ktoe]	732	664	117	1146	1104	639	672	1206	1268	1260	1250	1241	1110	
	Primary energy intensity of the overall economy (primary energy consumption per GDP [toe/euro]														
	Final energy intensity by sector (including industry, residential, tertiary and transport (including split between passenger and freight transport, when available))														
	Industry														
	Residential														
	Tertiary														
	Passengers														
	Freight transportation														
2.5. Price															
	Electricity prices by type of using sector (residential,														

	industry, tertiary)														
	Residential														
	Industry														
	Tertiary														
	National retail fuel prices (including taxes, per source and sector) [euro/ktoe]														
	Diesel														
	Industry														
	Households														
	Private transport														
	Transport public														
	Gasoline														

		2005	2010	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	20
	Private transport													
	Transport public													
	Natural gas													
	Industry													
	Households													
2.6. Investments														
	Total energy costs for the economy													
	Energy-related investment in industry													
2.7. Renewable energy														

	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 in gross final energy consumption			27.36 %	28.10 %	29.62 %	34.95 %	40.14 %	44.94 %	50.11 %	55.16 %	60.42 %	64.54
	RES-Silum part			20.17 %	20.92 %	25.50 %	37.14 %	53.50 %	66.09 %	80.14 %	89.63 %	96.40 %	102.7
	Part RES-E			50.23 %	48.62 %	51.77 %	58.52 %	60.43 %	63.70 %	65.94 %	68.32 %	73.43 %	76.31
	Part RES-T			5.50 %	6.69 %	6.28 %	7.38 %	9.48 %	11.97 %	15.74 %	20.45 %	25.33 %	30.31
	(final consumption of renewable energy in transport as a contribution to the overall target)												
	Contribution of biofuels and biogas produced from												

	feedstock listed in Part A of Annex IX and used for transport													
	Contribution of biofuels and biogas produced from feedstock listed in Part B of Annex IX and used for transport													
	Contribution of other biofuels consumed in transport													
	Total final RES consumption for heating and cooling				1198,4	1276,9	1265,0	1408,0	1437,9	1493,2	1524,9	1546,3	1598,1	16
	Gross final electricity consumption from RES				218,1	239,8	286,8	359,2	562,0	719,0	897,8	1099,4	1250,4	13
	Gross final consumption of energy from renewable sources in transport				104,2	220,8	198,4	218,0	264,3	290,4	340,5	387,0	428,4	4
	Total final consumption of RES				1520,6	1737,4	1750,2	2005,3	2291,5	2537,4	2806,6	3085,3	3337,1	34
	Total consumption for heating				2375,1	2631,5	2425,1	2406,0	2379,6	2344,0	2312,6	2263,5	2176,5	21

	and cooling													
	Share of unwasted heat and cold in total final consumption for heating and cooling													
	Total final RES consumption from district heating and cooling													
	RES share of district heating and cooling in total final heating and cooling consumption													
	Total consumption of waste from district heating and cooling													
	Share of heat and cold used in district heating and cooling in gross final consumption for heating and cooling													
	Electricity and heat generation													

	from renewable energy in buildings; disaggregated data, where available, on the amount of energy produced and consumed by solar photovoltaic systems, solar thermal systems, biomass systems, heat pumps, geothermal systems and any other decentralised renewable energy systems; and													
	Where applicable, other national trajectories, including long-term and sectoral trajectories, share of food-based biofuels and advanced biofuels, share of renewable													

	energy in district heating as well as renewable energy produced by cities and energy communities												

		2005	2010	2015	2020	2021	2022	2023	2024
3. GHG emissions indicators; and									
	GHG emissions by policy sector (EU ETS, effort sharing and FNHR)	22477911	20774148	20190045	20203496	20291777	19698304	19926208	19443058
	ETS sector emissions (since 2013 ETS + EMS aviation coverage, including departing flights)	9689595	7921274	6928287	6128505	5992561	5895113	6302624	6300788
	Total greenhouse gas emissions in the sector (scope valid for 2021-30)	13062124	12851223	13371184	14081070	14313569	14219663	14070363	13618222
	LULUCF (accounting according to the requirements of EU legislation)	NA	NA	NA	NA	—5576515	—6129249	—6127069	—6470452

	GHG emissions by IPCC sector and by gas (where relevant, split into EU ETS and effort sharing sectors) [tCO2eq]	GHG emissions per IPCC sector and gas are reported in the Excel template (a separate fil								
	Carbon Intensity of the overall economy [tCO2eq/GDP]	769	670	541	466	441	414	409	390	
	CO2 emission indicators									
	GHG intensity of domestic power and heat generation [tCO2eq/MWh]	NO	NO	NO	0,09	0,09	0,08	0,09	NO	N
	GHG intensity of final energy consumption by sector [tCO2eq/toe]	NO	NO	1,56	1,64	1,58	1,61	1,58	1,54	
	Industry	NO	NO	1,21	1,20	1,19	1,32	1,30	1,28	
	Residential	NO	NO	0,56	0,61	0,63	0,62	0,60	0,58	
	Tertiary	NO	NO	0,50	0,48	0,48	0,47	0,44	0,42	
	Passengers	NO	NO	NO	NO	NO	NO	NO	NO	N
	Freight transportation	NO	NO	NO	NO	NO	NO	NO	NO	N
	Parameters for emissions of other (non-									

	CO2) pollutants									
	Livestock: dairy cattle [1000 heads], non-dairy cattle [1000 heads], sheep [1000 heads], pig [1000 heads], poultry [1000 heads]									
	dairy cattle	425	367	307	237	229	225	224	222	
	non-dairy cattle	395	406	434	408	411	411	410	410	
	pigs	1094	929	701	566	578	578	578	575	
	ewes	31	66	154	161	152	152	152	152	
	domestic poultry	8349	10577	9687	10435	9666	8853	8685	8744	
	Nitrogen input from application of synthetic fertilisers [kt nitrogen]	119	143	168	199	175	175	176	174	
	Nitrogen input from application of manure [kt nitrogen]	33	32	34	31	31	31	30	30	
	Nitrogen holding plants [kt nitrogen] 21.12.2018 L 328/56 Official Journal of the European	IE	IE	IE	IE	IE	IE	IE	IE	I

	Union LT									
	Nitrogen in crop residues returned to soils [kt nitrogen]	36	41	7 9	87	70	74	76	74	
	Area of cultivated organic soils [hectares]	11795 0	12516 3	125996	13283 0	134198	130473	131001	1303 69	
	Municipal solid waste (MSW) generation	128737 0	125262 0	129 9998	13499 47	1345010	1349600	135079 0	13500 00	
	Municipal solid waste (MSW) going to landfills	10987 4	108516 3	702 127	22042 8	206582	168700	155341	141750	
	Share of CH4 recovery in total CH4 generation from landfills [%]	0,00	2.9 %	15.0 %	16.4 %	#############	#############	11.8 %	11.6 %	#

Annex 3

Description of energy efficiency policy measures and methodologies for calculating energy savings implementing Article 8 of the Energy Efficiency Directive (EU) 2023/1791

As part of the energy savings requirement of Article 8 of Directive (EU) 2023/1791, Lithuania's binding target for 2030 is to achieve cumulative end-use energy savings of at least 39.3 TWh (3383,9 ktoe). According to Eurostat, final energy consumption was 5099 ktoe in 2016, 5344 ktoe in 2017 and 5568 KT e in 2018.[133] The average final energy consumption in Lithuania for the 3 years preceding 1 January 2019 is 5337 ktoe. The energy efficiency improvement target will be implemented through the energy efficiency policy measures outlined in section 3.2 of the NECP.

1. Impact of higher excise duties and taxes on fuel consumption (EE1-E)

133 This year's data estimates theenergy savings target of39.3 TWh in2030. The latest data show that thefinal energyconsumption was 5557 ktoe in2019,5308 ktoe in 2020 and 5662 ktoe in2021. In 2021, thefinal energy savings were6.4 TWh.

Type of policy measure: fiscal measure:

Brief description of the measure: The measure promotes the reduction of petrol, diesel and LPG consumption through higher excise duties and taxes than those set by the European Union, which improves energy efficiency.

Duration of thepolicy measure: by 2030 at least

Cumulative and annual forecasted energy savings:

This is a tax measure that imposes higher taxes on motor fuels in the transport sector in Lithuania than the minimum levels of such taxes set in the European Union. Through higher taxation, such a policy measure reduces demand for motor fuels in the transport sector and has a positive impact on the country’s final energy consumption. The rates of taxation applicable to motor fuels in Lithuania are laid down in the Law on excise duties of the Republic of Lithuania and the Law of the Republic of Lithuania on Value Added Tax. Minimum European Union estimates of such taxes are laid down in Council Directive 2006/112/EC and Council Directive 2003/96/EC.
This policy measure expects annual energy savings of -0.788 TWh and cumulative energy savings of -8.66 TWh by 2030.

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 set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. Savings will be calculated in accordance with the following methodology, where the practical calculation of energy tax savings is based on a common balancing model. The first stage estimates the difference (change) in the price of the unit of energy resulting from different amounts of taxes:

ЕтаПР ПEUminTaxP
ПEUminTaxP

where:

The price per unit of energy (transport fuel) plus the corresponding values in Lithuania;
EEUminTaxP – calculated average price of a unit of energy (transport fuels) with minimum threshold corresponding tax values in the European Union;

Δ p is the tax difference (tax effect) on the unit price of energy (transport fuel).

In the second stage, the projected energy consumption (transport fuel) is calculated if the appropriate tax estimates had not been applied. The elasticity estimate forms part of this second stage:

П ‘1,·
ActualCons X 1 -|- Δ pП = = -Cons w/o tax

where:

EActuaicons = actual energy consumption (transport fuel);
elaccepted = short-term elasticities estimates from the 2020 study ‘Assessing the impact of taxes applied in Lithuania on the consumption of energy and energy resources’;

ECONS w/o tax – estimated consumption of energy (transport fuels) in the absence of respective taxes.

The third stage calculates energy savings from taxes:
ECONS w/o tax ActualCons —Savings

where:

Esavings – Energy savings from fiscal measure.
Monitoring and verification: The monitoring and verification will be carried out by the Lithuanian Energy Agency, which will check a statistically significant and representative sample of the data.

2. Renovation/modernisation of multi-apartment buildings (EE2-E and EE2-P)

Type of policy measure: financial instrument:

Brief description of the measure: The measure promotes the refurbishment (modernisation) of multi-apartment buildings by owners of multi-apartment buildings built in accordance with the technical standards applicable up to 1 993 in order to improve the energy performance of buildings. The programme for the renovation of multi-apartment buildings provides preferential credits and other statutory public support to owners of apartments and other premises and encourages the implementation of energy-saving measures at the initiative of owners of apartments and other premises.

Cumulative and annual forecasted energy savings: For the 2021-2026 measure, 2269 multi-apartment buildings are expected to be refurbished by the end of 2026 with annual savings of around 96 GWh and 5.29 TWh by 2030. A total of 5042 multi-apartment buildings are planned to be renovated in the 2024-2030 measure, with annual energy savings of around 53 GWh and 2.94 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 buildings).

Measure implementation actions (works): The programme for the renovation of multi-apartment buildings includes the following main energy efficiency improvement measures: refurbishment/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; incinerating the roof or cover; incinerating external walls, caps; glazing of balconies or loci; replacement of windows; incinerating the cellar overlay; refurbishment of lifts; general use electrical engineering system/lighting system upgrade.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. 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 energy consumption savings per square meter will be calculated from the certificate data. The responsible authorities will calculate the savings for each project and submit the final savings to the authority responsible for checking the data.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

3. Renovation ofpublic buildings (EE3-E and EE3-P)

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 (CO_2) emissions into the atmosphere and the compliance of public building infrastructure with hygiene standards. The Public Buildings Programme sets the main requirement for the refurbishment of buildings, i.e. the building must achieve 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 by funds 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 in 2021-2028, is planned to refurbish around 367 000 m² of central government public buildings by 2030 and the municipal public buildings measure implemented in 2021-2025 will refurbish around 86 220 m² of municipal public buildings by 2030. The measure for the renovation of public buildings between 2024 and 2030 will renovate around 143 thousand m² of central government public buildings and 363 780 m² of municipal public buildings between 2026 and 2030. Under the current legal framework, public buildings have to reach the minimum class B or C after renovation, with nearly zero emissions under the 2024-2030 measure. The measure for the renovation of public buildings of the central government for the period 2021-2028 and the renovation measure for municipal public buildings for the period 2021-2025 will save around 7 GWh of energy each year, leading to overall energy savings of around 0.41 TWh by 2030. The measure for the renovation of public buildings for the period 2024-2030 will deliver energy savings of around 5 GWh annually and will lead to cumulative energy savings of around 0.28 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).

Targeted sectors: service sector, municipal and central government public buildings.

Measure implementation actions (works): The programme to improve the energy efficiency of public buildings includes the following energy efficiency measures: modernisation of engineering systems for heating/cooling and hot water; modernisation or installation of ventilation and/or recuperation systems; roof insulation, building external walls and caps; insulation of overlays, entrances, outdoor and tamper doors; replacement of windows with lower heat capacity windows; insulation of the cellar overlay and/or floor on the ground, the modernisation of the lighting system, the modernisation of the boiler plant installed in the building and the installation of renewable energy sources, the refurbishment of general-use engineering systems.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. 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 energy consumption savings per square meter will be calculated from the certificate data. The responsible authorities will calculate the savings for each project and submit the final savings to the authority responsible for checking the data.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

4. Agreements with energy suppliers on consumer education and advice (EE4-E)

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 behaviour by improving energy efficiency. Energy suppliers will ensure the implementation of the scope of consumer education and advice and of the measures provided for in agreements or agreements concluded through other persons.

Cumulative and annual forecasted energy savings: estimated savings – average annual savings of around 277 GWh; 2.77 TWh by 2030.

Targeted sectors: natural and legal persons, heat, electricity and gas sectors.

Measure implementation actions (works): Education and consultancy agreements provide that energy suppliers may apply specified educational and advisory measures, i.e. publication of information on a website, publicity events for projects, consultations by e-mail, direct internet or telephone consultations at the consumer's request, consultations after arrival at the consumer's premises, lending of electricity meters or other measuring equipment, efficient operation of ventilation systems and other training on the rational use of energy, and publication of information in press or print media.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. Savings will be calculated on the basis of an estimation of the estimated savings through a survey that identifies consumer responses to recommendations, information campaigns, labelling or certification schemes or the use of smart meters. In particular, the estimated energy savings shall be determined on the basis of the average annual energy consumption of consumers in the target group and by assessing the type of education and advisory measure. The savings shall be equal to the product of the average annual target energy consumption of both education and the assumed energy savings factor for the advisory measure. The implicit energy savings coefficients for education and advice have been adopted in accordance with the procedure laid down by law. At a later stage, an estimate of the estimated savings is carried out by means of a survey to determine the consumer's reaction to the education and counselling measures taken.

Implementing authorities: 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 check a statistically significant and representative sample of the data.

5. PIS relief for industry (EE5-E)

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 – companies can recover 85 % of the public service price paid for electricity consumed in the previous calendar year in excess of 1 GWh, 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 the savings achieved by energy efficiency improvement measures. Annual average savings are estimated at 77 GWh and 4.23 TWh by 2030.

Implementing authorities: Ministry of Energy and UAB Balticpool.

Targeted sectors: Industry:

Measure implementation actions (works): The measure will require the deployment of all measures identified in the energy audits in transport, technological processes and buildings (introduction of regulatory equipment, modernisation of lighting, installation and upgrade of compressed air systems, renewal 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 set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. Energy savings will be calculated on the basis of the savings 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 check a statistically significant and representative sample of the data.

6. Energy saving agreements with state-owned and municipally owned enterprises (EE6-E)

Type ofpolicy measure: Voluntary agreements, regulatory.

Brief description of the measure: Companies will save energy according to the energy levels indicated in the energy savings agreements (on their own or through other persons) through cost-effective energy efficiency improvement measures at final energy customers' facilities (installations, equipment, transport).

Cumulative and annual forecasted energy savings: Legal entities that have signed the agreements are expected to save 64 GWh each year, with a total energy savings of around 3.75 TWh by 2030.

Implementing authorities: The Ministry of Energy and state-owned and municipal enterprises.

Targeted sectors: industry, heat, water management, transport, services, utilities, etc.

Measure implementation actions (works): The measure shall implement energy efficiency improvement measures in transport, technological processes and buildings identified in the energy audit, i.e. upgraded lighting, heating and cooling, transport, automation, route optimisation and other technological measures, as well as other energy efficiency improvement measures.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. 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 that uses engineering estimates of energy savings or measurement of savings, or an estimate of presumed energy savings.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

7. Converting boilers into more efficient technologies (EE7-E and EE7-P)

Type of policy measure: financial instrument:

Brief description of the measure: A financial measure to encourage residents to switch existing inefficient heat generation technologies into more efficient heat generation 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 and of Commission Delegated Regulation (EU) 2019/826 of 4 March 2019, Lithuania's comprehensive assessment of the feasibility of applying high-efficiency cogeneration and efficient district heating and cooling, which is also in line with the provisions of Directive (EU) 2023/1791, has been identified as a high priority measure in the decentralised household sector in order to achieve the objectives of energy efficiency, renewable energy sources and climate neutrality by transforming the supply of low-efficiency and high-emission fuels. The measure will promote the deployment of heat pumps, representative biofuel boilers meeting pollution and energy efficiency requirements and the adaptation of other measures to improve thermal energy efficiency.

Cumulative and annual forecasted energy savings: Under the measure implemented between 2021 and 2030, 5000 inefficient heat generation installations (technologies) used in households are planned to be refurbished each year, with an estimated annual energy savings of 139 GWh of final energy and a cumulative energy savings of 7.62 TWh of final energy by 2030. Under a measure between 2025 and 2030, 11305 boilers are planned to be replaced by heat pumps in households by 2030. As a result, annual final energy savings are estimated at 58 GWh and cumulative energy savings of 1.22 TWh by 2030.

Implementing authorities: Ministry of Energy, VšĮ Lietuvos Energy Agency.

Targeted sectors: household sector:

Measure implementation actions (works): The financial instrument will encourage households to switch existing inefficient and polluting heat generation technologies to more efficient renewable energy technologies for heat production. Such technologies are biofuel boilers and heat pumps in class 5 according to EU standard EN 303-5:2012 that meet representative energy efficiency and pollution requirements. The class of biofuel boilers and the energy efficiency parameters of heat pumps shall be specified in the technical documentation of the equipment in accordance with EU EN 303-5:2012 and 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 set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. Energy savings will be calculated by applying modulation of savings to each heat generation installation in accordance with the methodologies described below and approved by national legislation, taking into account the precise technical parameters of each installation.

Methodology for calculating energy efficiency gains in the event of a change in the biofuel heat production plant: The demand for primary fuel or energy of every heat generation installation, old and new separately, expressed in energy equivalent (kgoe), is calculated according to the formula:

$$SC = \frac{COR}{NF\ X}\ PKK\ X$$

where:

BIP – Primary fuel/energy demand (kgoe);

RKK – heat to be produced per household per year (kWh). Calculated according to the formula RCF = GkW× Hv £, where:

‘GRW’ means the rated heat output of the installation (Prated, kW) as 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 area of the household (a building for which the heat generation unit produces heat), by accepting the need for a 1 kW rated heat output unit for a total area of 10 m²;

HV £ is the annual equivalent number of operating hours per year of an installation as recommended in Commission Decision 2013/114/EU of 1 March 2013 establishing guidelines for Member States to calculate, in accordance with Article 5 of Directive 2009/28/EC of the European Parliament and of the Council, the share of renewable energy from heat pumps produced by different technologies. In view of the climate conditions in Lithuania, they are as follows:

Table 1. Is the equivalent number of operating hours per year for heat pumps, hour.

Device	Equivalent installation operational number of hours per year, Val.
Heat pump air-water, biofuel boiler	1 710
Heat pump land-water, water-to-water	2 470

Ð – Net calorific value of fuels, equivalent to those 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 2. Is the 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

NK – coefficient of performance of a heat generation installation. The efficiency of the new installation is indicated in the technical documentation of the installation. The efficiency of the old inefficient unit is indicated in the technical documentation of the installation or accepted as DF = 0,65.
PKK is the conversion factor of primary fuel or energy into an equivalent unit of energy, as specified 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, for the values specified 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. Is the conversion factor of the primary fuel or energy to the equivalent unit of energy by type of fuel or energy, kgoe.

Primary fuel or energy type	PKK, kgno
Wood (standard 25 % humidity), kg	0,33
Pellets (standard 10 % humidity), kg	0,401
Electricity, kWh	0,086

Methodology for calculating energy efficiency gains after replacement of fossil fuel heat generation installation:

The demand for primary fuel or energy of every heat generation installation, old and new separately, expressed in energy equivalent (kgoe), is calculated according to the formula:

COR

BIP = –

x PKK

where:

BIP – Primary fuel/energy demand (kgoe);
RKK – heat to be produced per household per year (kWh). Calculated according to the formula RCF = GkW× Hv £, where:
‘GRW’ means the rated heat output of the installation (Prated, kW) as 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 area of a household (building), accepting that a rated heat output unit of 10 m² is required to produce the total heat demand;

HV £- annual equivalent number of operating hours per installation recommended in Commission Decision 2013/114/EU of 1 March 2013 establishing guidelines for Member States to calculate different technologies in accordance with Article 5 of Directive 2009/28/EC of the European Parliament and of the Council

EN

share of renewable energy from heat pumps. In view of the climate conditions in Lithuania, they are as follows:

Table 4. Is the equivalent number of operating hours per year for heat pumps, hour.

Device	Equivalent installation number of operating hours per year, Val.
Air-to-water heat pump, biofuel boiler, fossil fuel boiler	1 710
Heat pump land-water, water-to-water	2 470

Đ – Net calorific value (calorific value) of a fuel for which the equivalent value specified 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, the mean value of which is accepted at the maximum and minimum limits:

Table 5. Is the 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
Natural gas	13,10
Wood (standard 25 % humidity), kg	3,833
Pellets (standard 10 % humidity), kg	4,667
Electricity, kWh	1

NK – coefficient of performance of a heat generation installation. 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, DF = 0,65 and DF = 0,9 for other fossil fuel heat generation installations.
PKK = conversion factor of primary fuel or energy into equivalent unit of energy, as 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 (middle value accepted at maximum and minimum limits):

Table 6. Is the conversion factor of the primary fuel or energy to the equivalent unit of energy by type of fuel or energy, kgoe.

Primary fuel or energy type	PKK, kgno
Coal	0,411-0,733
Peat	0,186-0,330
Peat briquettes	0,382-0,401
Domestic fuel oil	1,010
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 check a statistically significant and representative sample of the data.

8. Modernisation of domestic heating and hot water systems in buildings ("mini renovation") (EE8-E and EE8-P)

Type ofpolicy measure: financial instrument:

Brief description of the measure: The measure encourages owners of old multi-apartment buildings to refurbish (modernise) domestic heating and hot water systems.

Cumulative and annual forecasted energy savings: The estimated savings of the measure in 2021-2022 are to update 158 heat points and save 0.55 GWh annually and 0.03 TWh by 2030. The estimated savings of the measure from 2023 to 2030 are updated on average by around 290 heat points annually and saved by 3.3 GWh each year and 0.18 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 those of customers in energy poverty, for which 100 % of the eligible costs are planned to be reimbursed.

Measure implementation actions (works): The measure provides for the renovation 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 set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. Energy savings will be calculated on the basis of estimated energy savings, using an estimate of the estimated savings at a later stage.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

9. Implementation of energy efficiency measures by private legal entities according to energy audit reports (EE9-E)

Type ofpolicy measure: financial instrument:

Brief description of the measure: It is a financial instrument that will encourage companies to implement the 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 the savings achieved by energy efficiency improvement measures. The average annual savings expected from 2021 to 2030 are around 4 GWh and 0.215 TWh by 2030.

Implementing authorities: Ministry of the Environment, Environmental Project Management Agency of the Ministry of the Environment of the Republic of Lithuania.

Targeted sectors: Service sector.

Measure implementation actions (works): The measure promotes the introduction of the measures identified in the energy audits in transport, technological processes and buildings (the installation of a wide range of technological equipment that improves energy efficiency. E.g. control equipment, modernisation of lighting, installation and renewal of compressed air systems, renewal of cooling systems, installation of efficient electric motors and other technologies).

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. Energy savings will be calculated on the basis of the savings 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 check a statistically significant and representative sample of the data.

10. Renovation (modernisation) of one or two dwellings of natural persons (EE10-E and EE11-P)

Type ofpolicy measure: financial instrument:

Brief description of the measure: This is a financial incentive for individual homeowners to renovate their individual homes. The energy performance class of the house must be at least B.

Cumulative and annual forecasted energy savings: A total of 1106 individual homes are planned to be renovated in 2021-2022 and a total of 21000 individual homes are planned for the 2024-2030 measure. The measure implemented in 2021-2022 estimated savings of around 11 GWh each year and 0.61 TWh by 2030. The measure implemented in 20242030 estimated savings of around 20 GWh each year and 1.12 TWh by 2030.

Implementing authorities: Ministry of Environment.

Target sector: households.

Measure implementation actions (works): The measure includes the following key energy efficiency measures: refurbishment/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; incinerating the roof or cover; incinerating external walls, caps; glazing of balconies or loci; replacement of windows; incinerating the cellar overlay; upgrade 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 set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. 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 energy consumption savings per square meter will be calculated from the certificate data.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

11. Modernisation ofstreet lighting systems (EE11-E and EE11-P)

Type of policy measure: financial instrument:

Measure description: This financial instrument promotes the modernisation of street lighting infrastructure and thus reduces electricity consumption in public infrastructure. . The measure implemented in 2021-2023 aims to replace and upgrade around 65 thousand luminaires in total, while a total of around 100 thousand luminaires are planned for 2024-2030. Municipalities can implement projects both on their own and through energy saving service providers (ESCOs).

Cumulative and annual forecasted energy savings: The measure is planned to deliver around 3 GWh annually in 2021-2023 and cumulative electricity savings of around 0.17 TWh by 2030. The measure is planned to save around 2 GWh annually over the period 2024-2030, with cumulative electricity savings of around 0.1 TWh by 2030.

Implementing authorities: Ministry of Energy, VŠĮ Innovation Agency, UAB "Public Investment Development Agency".

Targeted sectors: Public street lighting infrastructure, electricity sector.

Measure implementation actions (works): The measure will update inefficient lamps, old luminaires, cables, control cabinets, 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 set out in Directive (EU) 2023/1791 and Commission Recommendations (EU) 2019/1658 and 2024/1590. Energy savings will be calculated on the basis of the calculation of energy savings in street lighting renewal projects. The energy consumption difference will be calculated before and after the luminaire refurbishment per 1 kilowatt power.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

12. Improving the technological and energy efficiency of industrial enterprises through the deployment of artificial intelligence and digital twin technologies (E12-P)

Type ofpolicy measure: financial instrument:

Brief description of the measure: The measure will be implemented between 2026 and 2030 and aims to increase the level of automation and efficiency of industry. Within the scope of the measure, subsidies will be granted for the deployment of digital twin or artificial intelligence solutions for the digitalisation of the company's process or part thereof. The measure combines fully real-time business-based solutions that lead to energy and cost savings; the automated optimisation of the production line enabled by IoT technology by comparing existing data (parameters) with historical and regularly informed of deviations in energy efficiency, and line-smart video-surveillance solutions report line errors, thus reducing human labour demand and increasing efficiency; an AI-based machine learning algorithm makes it possible to anticipate, contain and prevent potential increases in costs and energy consumption, as well as to identify and prevent potential energy quality problems in advance, as well as to analyse different energy consumption scenarios and implement Energy 4.0 solutions. The subsidy intensity will be up to 50 %.

Cumulative and annual forecasted energy savings: the measure is expected to save around 0.8 GWh per year and to save 0.04 TWh by 2030.

Implementing authorities: Ministry of Energy and Ministry of Economy and Innovation.

Targeted sectors: industry:

Measure implementation actions (works): The measure will provide support to industry to deploy artificial intelligence and digital technologies that will improve the energy efficiency of industrial enterprises.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

13. Creation of a legal requirement for companies to implement the measures recommended in energy efficiency audits (EE13-P)

Type of policy measure: regulatory measure:

Brief description of the measure: Within the scope of the measure, the Energy Efficiency Improvement Act and, where necessary, by-laws, will be complemented by an obligation for companies to put in place the measures recommended in the energy efficiency audit with an estimated payback period of up to 5 years.

Cumulative and annual forecasted energy savings: the measure plans annual energy savings of around 4.7 GWh and is planned to save 0.26 TWh by 2030.

Implementing authorities: Ministry of Energy.

Targeted sectors: industry, services.

Measure implementation actions (works): the amended Energy Efficiency Improvement Act and, where necessary, the by-laws, will be complemented by an obligation for companies to put in place the measures recommended in the energy efficiency audit with an estimated 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 set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

14. Promoting the introduction of internalenergy efficiency monitoring systems in business and industry (EE14-P)

Type ofpolicy measure: financial instrument:

Brief description of the measure: It is a financial instrument to reduce companies' energy costs. The measure is designed to encourage companies to start measuring and monitoring their energy waste. This makes it possible to monitor the evolution of their energy costs more effectively than through bills or meters. The measure will be implemented between 2025 and 2030 with a support intensity of up to 40 %.

Cumulative and annual forecasted energy savings: The measure plans annual energy savings of around 4 GWh and is planned to save 0.215 TWh by 2030.

Implementing authorities: Ministry of Energy and Ministry of Economy and Innovation.

Targeted sectors: industry, services.

Measure implementation actions (works): companies are installing internal monitoring systems that will allow for more efficient monitoring of the evolution of their energy consumption than through bills or meters.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency, which will have to check a statistically significant and representative sample of the data.

15. Promoting the development of alternative fuels infrastructure and vehicles (T2-E and T2-P)

Type of policy measure: financial instrument:

Brief description of the measure:

1. Activity "Promotion of clean public transport vehicles": Financial incentives to encourage the take-up of alternatively fuelled (electrical or natural gas) M2 or M3 buses. In Lithuania, 189 public transport vehicles were purchased, including 90 trolleybuses, 51 electric buses and 48 buses powered by compressed natural gas, as part of investments from EU funds and nationally funded projects. The activities are being implemented in 2017-2023.
2. Activity "Development of zero-emission urban and suburban public transport and necessary recharging/refilling infrastructure": Financial incentives to encourage the take-up of zero-emission (electrical or hydrogen-powered) M2 or M3 buses and the development of the necessary recharging/refilling infrastructure. Measures GNG

– municipal undertakings. The activities shall be implemented between 2024 and 2029.

3. Activities: "Promoting the production/remanufacturing of electric vehicles powered by public vehicles": Financial incentives for the production of zero-emission (electric) buses of category M2 or M3; Financial incentives for converting polluting, fossil fuel, buses into zero-emission (electric) M2 or M3 grades. The activities shall be implemented between 2024 and 2026.
4. Activities: 'Renewal of the urban and suburban public transport fleet by promoting the use of vehicles powered by alternative fuels (electricity and hydrogen)': Refurbishment of the public transport fleet with alternative fuels and electric vehicles. And alternative fuels, such as LNG and electricity infrastructure, such as fixed stops, in the areas of bus fleets. The activities shall be implemented between 2027 and 2030.

Cumulative and annual forecasted energy savings: A total of 1) and 2) operational savings are planned for 2030 of 0.47 TWh, 3) 4 GWh and 4) 0.27 TWh of energy.

Implementing authorities: The Ministry of Transport and Communications and municipalities.

Target sector: transport sector (public transport)

Measure implementation actions (works): Low-emission public transport vehicles purchased by municipalities.

Methodology for the calculation of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of a new vehicle per 100 km and multiplied by the average annual distance.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

16. Electrification of railways and rolling stock. (T3-E and T3-P)

Type of policy measure: financial instrument:

Brief description of the measure:

1. Activity "Electrification of railways": The activities financed are the renewal, upgrading and development of the 1 520 mm gauge railway infrastructure (including the construction and electrification of the second tracks) on transport corridor IX B. Upgrading railway infrastructure – 731 kilometres of rail will electrify and transport 70 % of rail freight. Lithuania currently electrified about 8 % of the LT/BY border lines Kaunas and Lentvario Trakai (149 km). By 2023, Lietuvos geležinkeliai intends to electrify the Vilnius node and the Kaišiadorys-Radviliškis and Radiviliškis-Klaipėda sections. In total, ~ 420 kilometres of road will be electrified (21.97 %). It is planned to build an electrified Rail Baltica railway line with a length of 394 km in

Lithuania by 2026. Lithuania will then electrify ~ 731 kilometres of lines. Following the construction of the Rail Baltica railway line, Vilnius and Kaunas intermodal terminals will be connected to the Riga (Salaspils) and Tallinn intermodal terminals. The activities shall be implemented between 2016 and 2027.

2. Activity 'Acquisition of alternative energy-powered trains for public services (Acquisition of electric trains)': The measure aims to replace non-compliant diesel trains with modern, environmentally friendly electric and battery trains for passenger transport. The activities shall be implemented between 2024 and 2028.
3. Activity 'Infrastructure installation for charging stations of battery trains (BEMUs)': In order to ensure the proper use of BEMUs on non-electrified sections, charging stations need to be installed on part of the routes. The activities shall be implemented between 2023 and 2026.
4. Activity "Acquisition of electric locomotives": Electric locomotives will be used on an electrified railway section to transport goods instead of diesel traction. The activities shall be implemented between 2024 and 2028.

Cumulative and annual forecasted energy savings: A total of (1) operational savings of 0.69 TWh are planned for 2030, (2) and (3) operational savings of 0.062 TWh and (4) operational savings of 0.11 TWh.

Implementing authorities: Ministry of Transport and Communications, AB Lietuvos geležinkeliai.

Target sector: transport sector (railways)

Measure implementation actions (works): Electrified railways, new electric and battery trains and electric vehicles (trains).

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of a new vehicle per 100 km and multiplied by the average annual distance.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

17. Promoting sustainable inland navigation (T24-P)

Type of policy measure: financial instrument:

Brief description of the measure:

1. Activity "Acquisition of new cargo vessels and barges": The measure would prepare/build TA for the transport of cargo. If implemented, part of the freight would be shifted from polluting car transport to less polluting inland waterway transport. GNG = Legal Entities. The activities shall be implemented between 2024 and 2030.
2. Activity 'Low polluting Klaipėda – Curonian Neria ferries': The objective of the measure is to replace the fuel used by ferries using Klaipėda-Curonian Neria with less polluting fuels. It would also upgrade ferry infrastructure to the needs of electric ferries. The measure takes the form of a

subsidy. Measure GNG – Smiltynė transfer AB. The activities shall be implemented between 2024 and 2030.

Cumulative and annual forecasted energy savings: It is planned that (1) the activity will deliver annual savings of around 13 GWh, with around 0.37 TWh of energy savings by 2030; (2) the activity will save around 1 GWh per year and will save around 14 GWh by 2030.

Implementing authorities: Ministry of Transport and Communications, Ministry of the Environment, VĮ Vyvaus Roads Directorate, AB Smiltynė transferla.

Target sector: transport sector (inland waterways).

Measure implementation actions (works): new cargo ships and barges and less polluting ferries have been acquired, and ferry infrastructure has been upgraded.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and energy savings will be calculated: (1) an activity by comparing the average annual fuel consumption of a new vehicle with its annual turnover (tonne-kilometre) multiplied by the energy consumption per tonne-kilometre of road transport, and (2) by comparing the average annual fuel consumption of the old vehicle with that of the new vehicle.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

18. Promotion of the acquisition of electric cars (T1-E and T1-P)

Type of policy measure: financial instrument:

Brief description of the measure:

1. Activity “Promoting the acquisition of pure electric vehicles”: Activities financed for natural persons: purchase of pure M1 new electric vehicles and purchase of pure M1 used electric vehicles (up to 4 years). Natural persons for the purchase of a second-hand electric vehicle in the amount of EUR 2500, for the purchase of a new electric vehicle of EUR 5000. Activities financed for legal persons: purchased M1, N1 pure electric vehicles where the power for mechanical motion is supplied exclusively from the electrical energy storage device. The CO2 emissions of the pure electric vehicle shall be 0 g/km. There is no limitation on the number of applications per applicant. A vehicle with the same identification number (VIN) may be reimbursed only once. The activities shall be implemented between 2022 and 2027.
2. Activity “Promoting zero-emission passenger car acquisition in the public sector”: Activities financed for the public sector: purchase of pure new electric vehicles of class M1/N1 and purchase of pure second-hand electric vehicles of class M1/N1 (up to 4 years). EUR 2500 for the purchase of a second-hand electric vehicle, EUR 5000 for the purchase of a new electric vehicle. Operationally procured M1, N1 pure electric vehicles, where the power for mechanical motion is supplied exclusively from the electrical energy storage device. The CO2 emissions of the pure electric vehicle shall be 0 g/km. There is no limitation on the number of applications per applicant. A vehicle with the same identification number (VIN) may be reimbursed only once. The activities shall be implemented between 2023 and 2026.
3. Activity “Promoting the acquisition of electric vehicles (implemented)”: Promotion of the purchase of pure electric vehicles through financial instruments (and legal regulation). The activities shall be implemented in 2021-2022.
4. Activity “inclusion of VAT on electric vehicles”: Law No XIV-1484 amending Article 62 of Law No IX-751 of 3 November 2022 on value added tax. Under the amendment to the law, natural and legal persons liable for value added tax (VAT) have been able to use up to 50 thousand electric

vehicles from 1 January 2023. VAT on acquisitions of EUR (including VAT) is included in the VAT deduction. The activities shall be implemented between 2023 and 2030.

5. Activity “Promoting the purchase of zero-emission passenger cars (BEV and H2)”: Financial support measures for the purchase of electric vehicles and/or the installation or upgrading of infrastructure necessary for charging them shall continue to apply until M1 and N1 electric vehicles account for at least 10 % of the total number of passenger cars. Promotion of acquisition by natural, legal persons and the public sector (new and second-hand pure electric vehicles or hydrogen-powered cars). The activities shall be implemented between 2026 and 2030.

Cumulative and annual forecasted energy savings: It is estimated that (1) (2) and (3) will deliver annual savings of around 25.5 GWh and around 1 TWh of energy savings by 2030; (4) The activity will save around 28 GWh per year and around 1 TWh by 2030; (5) The activity will save around 23 GWh annually and around 0.35 TWh of energy savings by 2030.

Implementing authorities: Ministry of Transport and Communications, Ministry of Environment, Ministry of Finance.

Target sector: transport sector (passenger cars).

Measure implementation actions (works): Promotion of the purchase of electric vehicles, inclusion of VAT on electric vehicles.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of a new vehicle per 100 km and multiplied by the average annual distance.

Monitoring and verification:

Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

19. Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons) (EE15-P)

Type ofpolicy measure: financial instrument:

Brief description of the measure: Financial incentive for legal persons to update non-residential buildings. It is mandatory to achieve at least the energy performance class B of the building and to reduce the calculated thermal energy consumption by at least 40 % compared to the calculated thermal energy consumption prior to the refurbishment (modernisation). The measure shall be implemented from 2021 to 2030.

Cumulative and annual forecasted energy savings: The measure is planned to save around 27 TWh per year and to save around 1.136 TWh by 2030.

Implementing authorities: Ministry of Environment.

Target sector: buildings sector:

Measure implementation actions (works): Refurbishment of buildings.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791 and energy savings will be calculated by comparing the average fuel consumption of an old vehicle per 100 km with the consumption of a new vehicle per 100 km and multiplied by the average annual distance.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

20. Improving energy efficiency (EE) (P2-E)

Type of policy measure: economic instrument:

Brief description of the measure: The support scheme promotes investments in large and medium-sized manufacturing enterprises participating in the European Union Emissions Trading System (ECER Rev. 2: Section C) digitalisation, modernisation, optimisation and automation of production processes that increase the efficient use of energy and/or raw materials resources and contribute to the reduction of GHG emissions. The measure shall be implemented between 2023 and 2030.

Cumulative and annual forecasted energy savings: It is planned to deliver annual savings of around 0.46 TWh and around 2.32 TWh of energy savings by 2030.

Implementing authorities: Ministry of Economy and Innovation.

Target sector: industry:

Measure implementation actions (works): introduction of measures to improve energy efficiency.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

21. Improving energy efficiency in enterprises (P12-E)

Type of policy measure: economic instrument:

Brief description of the measure: The measure will promote energy efficiency audits in industry. According to the results of the audits, investments are envisaged in improving energy efficiency and reducing its intensity, enabling industry to invest in the adaptation of state-of-the-art and environmentally friendly equipment and technological solutions to manufacturing processes, ensuring the continuity of these production processes, i.e. upgrading the necessary technological equipment and infrastructure for existing technological processes. The action is implemented in the AL and Capital regions. Support is granted to industrial enterprises which, according to the classification of economic activities of the Department of Statistics (Rev. 2) fall under Section B 'Mining and quarrying' (with the exception of the following economic activities: Section B, Section 06 'Extraction of crude oil and natural gas', Section B, Class 08.92 'Extraction of peat' and Section B, Group 09.1 'Support activities for the extraction of petroleum and natural gas'), and Section C 'Manufacturing' (excluding the economic activities of Division 19 'Manufacture of coke and refined petroleum products' of Section C) and which account for at least 51 % of the total activities of the enterprise. The Facility shall be implemented between 2022 and 2027.

Cumulative and annual forecasted energy savings: This measure is planned to deliver energy savings of around 4.83 TWh by 2030.

Implementing authorities: Ministry of Economy and Innovation.

Target sector: industry:

Measure implementation actions (works): energy efficiency audits in industrial enterprises.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

22. Deployment ofalternative fuels (P17-E)

Type of policy measure: economic instrument:

Brief description of the measure: For the success of industrial transformation and decarbonisation of industrial processes, investments are envisaged for the deployment of alternative fuels, e.g. replacing fossil fuel boilers with renewable heat pumps (air-water, ground-to-water, water-to-water, air-to-air), replacement of fossil fuels used in the production process by RES/electricity, etc., non-EU ETS industrial plants operating in the Kaunas, Šiauliai and Telšiai regions. These activities would also make a significant contribution to the reduction of fossil fuel consumption and would also have an impact on the reduction of GHG in the region. This activity will also enable the creation of sustainable jobs, both in the municipalities most affected by the transition and in the target regions, by fostering the sustainable development of all regions, enabling the transformation of businesses operating in the regions, decarbonisation and reducing dependency on a single employer. The Facility shall be implemented between 2023 and 2026.

Cumulative and annual forecasted energy savings: The measure is planned to save around 27 TWh per year and to save around 0.35 TWh by 2030.

Implementing authorities: Ministry of Economy and Innovation.

Target sector: industry:

Measure implementation actions (works): replacing fossil fuels with low-volume fuels.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

23. Industrial decarbonisation (P19-E and P19-P)

Type of policy measure: economic instrument:

Brief description of the measure: The measures implemented from 2025 to 2030 and from 2027 to 2030 shall support investments in tangible assets (installations, technologies) that increase energy efficiency and reduce negative environmental impacts of economic activities and ensure continued environmental effects, namely investments in cleaner production innovation (introduction), digitalisation, modernisation, optimisation and automation of production processes that increase the efficient use of energy and/or raw materials resources and contribute to the reduction of GHG emissions.

Cumulative and annual forecasted energy savings: The planned measure will lead to annual savings of around 0.39 TWh over the period 2025-2030 and around 1.19 TWh by 2030. and the 2027-2030 measure is 0.36 TWh by 2030

Implementing authorities: Ministry of Economy and Innovation.

Target sector: industry:

Measure implementation actions (works): support for tangible assets to improve energy efficiency in industrial enterprises.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

24. Promotingindustrial change (P22-E)

Type of policy measure: economic instrument:

Brief description of the measure: In the context of the European Green Deal, the provision of debt finance (subordinated loans, syndicated loans, direct loans) to improve access to finance for companies investing in transformation (changes) by increasing circularity, investing in decarbonisation and energy efficiency, the deployment of environmentally friendly, low-waste and innovative and digital technologies, manufacturing of high value-added and low-CO2 footprint products, defence and security industries. Large projects by enterprises or groups of enterprises, without duplicating measures to advance the economic transformation and competitiveness development programme for 2022-2030. The Facility shall be implemented between 2024 and 2026.

Cumulative and annual forecasted energy savings: This measure is planned to deliver energy savings of around 4.57 TWh by 2030.

Implementing authorities: Ministry of Economy and Innovation.

Target sector: industry:

Measure implementation actions (works): provision of debt financing.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

25. Long-term hedzg contracts (P20-P)

Type of policy measure: economic instrument:

Brief description of the measure: The objective of the measure is to buy in advance the result of the GHG reduction from companies (heidise principle). Offer long-term contracts with companies, initiating and ensuring long-term GHG reduction. Such contracts would provide companies with fixed public support per tonne of GHG that could be saved on the basis of the best technological measures at the highest level of the day, and the price of CO2e t saved is determined on the basis of a forecast of a possible longer-term price. For example, a contract is signed with a company for 10 years, setting a fixed price per tonne of CO2e reduced, taking into account state-of-the-art technology and based on the EU ETS average market price. A technological audit is carried out to assess CO2 emissions, the company receives an advance payment and has working capital to apply measures to reduce emissions. The undertaking shall submit a report at certain intervals (monitoring). At the end of the period, an audit is carried out again on the extent to which the company has saved/reduced GHG emissions and whether it has fulfilled its obligations (recovery mechanism should be provided for in case of non-fulfilment of contractual conditions). Measure GNG – legal persons not involved in the trading of allowances.

Cumulative and annual forecasted energy savings: This measure is planned to deliver energy savings of around 0.11 TWh by 2030.

Implementing authorities: Ministry of Economy and Innovation.

Target sector: industry:

Measure implementation actions (works): long-term contracts with companies with advance purchase of the GHG reduction result.

Methodology for calculating the energy savings of the measure: Energy savings will be calculated in accordance with the requirements set out in Directive (EU) 2023/1791.

Monitoring and verification: Monitoring and verification will be carried out by the Lithuanian Energy Agency and the Environmental Protection Agency, which will have to check a statistically significant and representative sample of data.

Other measures such as EE16-P "Implementation of integrated renovation of urban districts" also contribute to increasing energy efficiency targets, but were not calculated due to the specificity of the measures (presented under other measures)

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Annex No. 4. Existing and planned policy measures in the NECPs

TRANSPORT SECTOR					
Measure	Name at activity level	Responsible entity	Type	Activity indicator, units of measurement	Sc imple (targe
Existing policy instruments					
T1-E. Promotion of the acquisition of electric cars*	Promotion of the purchase of pure electric vehicles	SUMIN	Economic	Number of electric vehicles, units	M1: 13 37
	Promoting the purchase of zero-emission passenger cars in the public sector	SUMIN	Economic	Number of electric vehicles, units	M1 1 1 2
	Replacement of polluting public transport by electric vehicles in rural areas where needed	Lazdijai District Municipality	Economic	Number of electric vehicles and charging stations, units	3 elect 2
	Promoting the acquisition of electric cars	AM	Economic	Number of electric vehicles, units	2 6
	Ban on registration of cars with internal combustion engines	SUMIN	Regulatory	N1 number of purchases/sales in annual transactions, unit	15 000
	Incentives for RES vehicles	SUMIN	Regulatory	Tax relief for N1 class electric vehicles until the end of 2025, EUR/year	
	Inclusion of VAT on electric vehicles	FINMIN	Regulatory	% Of cars owned by legal entities that will be replaced under the measure	

T2-E. Promoting alternative fuels infrastructure and TA*	Promoting the purchase of clean public transport vehicles	SUMIN	Economic	Number of AD-powered (public) vehicles, units	
	Development of zero-emission urban and suburban public transport infrastructure and necessary recharging/refuelling infrastructure	SUMIN, municipalities	Economic	Number of AD-powered (public) vehicles, units	
	Promotion of electric production/remanufacturing of public transport vehicles	SUMIN	Economic	Number of AD-powered (public) vehicles, units	P : conve
	Establishment/extension of charging/refuelling infrastructure for alternative fuels (electricity, biogas and hydrogen).	SUMIN	Economic	Public compressed biogas (adapted to biomethane); number of hydrogen refuelling points and number of publicly accessible recharging points for heavy electric transport, units.	30 hydr elect 3
	Promotion of the acquisition of RES-ready vehicles of categories N2,M2,N3 and M3	SUMIN, AM, municipalities	Economic	Is the number of zero-emission TAs purchased, units.	
	Legal and regulatory incentives for the development of alternative fuels infrastructure	SUMIN	Regulatory	Is the number of zero-emission TAs purchased, units.	84 % T dome (4
	EU legal and regulatory obligations for the development of alternative fuels infrastructure	SUMIN	Regulatory	Is the number of zero-emission TAs purchased, units.	

T3-E – electrification of railways and rolling stock*	Railway electrification	SUMIN	Economic	The planned length of the railway section for electrification is the length of the reconstructed or modernised railway: TEN-T, km.	
	Railway electrification	SUMIN	Economic	% Of turnover of freight transported by electrified rail	
	Purchase of trains powered by alternative energy sources for public services	SUMIN, AB LTG	Economic	Trains, unit	

	Installation of infrastructure for charging stations for battery trains (BEMUs)	SUMIN, AB LTG	Economic	Charging stations, units	
T4-E. Promotion of intermodal transport*	Increasing intermodal traffic volumes and revenues by diversifying the service portfolio within the 1 520 mm network	SUMIN, AB LTG	Economic	Adaptation of platform wagons of model 13-935A-04 for the manufacture and installation of reusable semi-trailer anchorages, units.	
T5-E – Promotion of less polluting means of mobility*	Financial incentives to choose cleaner means of mobility	AM, SUMIN	Economic	Number of less polluting L or M1 vehicles purchased, units.	
	Financial incentives to choose cleaner means of mobility	AM, SUMIN	Economic	Number of alternative tickets purchased (bicycles, e-scooters, e-bikes, e-tricycles, e-ketbooks) or public transport tickets, sharing services, units.	

	Financial incentives to choose cleaner means of mobility	AM, SUMIN	Economic	Purchase of less polluting TAs by deprived persons.	
T6-E – Car registration tax*	Differentiation of vehicle registration (re-registration) tax according to pollution level	Am, finmin, SUMIN, VĮ Regitra	Fiscal	Percentage of polluting passenger cars to be surrendered due to registration tax	
T7-E – Abolition of pollution tax relief*	Abolition of the pollution tax advantage for individual operators	AM, FINMIN	Fiscal	% Reduction in GHG emissions per year	
T8-E – Electronic tolls in freight transport*	Implementation of eTolling in freight transport	SUMIN, AB VIA LT	Economic	Electronic toll system in place, unit	
	Road charging by vehicle Euro classes and incentives for the least polluting vehicles	FINMIN, SUMIN, AM, AB VIA LT	Fiscal	Amount of electronic toll, ct/km	Fro
T9-E. Reducing traffic congestion*	Reduction of traffic congestion through traffic organisation solutions.	Municipalities, SUMIN	Regulatory	% Reduction in fuel consumption	
	Reducing traffic congestion through spatial planning solutions	Am, SUMIN, municipalities	Regulatory	Percentage of fuel likely to be affected by implemented measures to reduce congestion in 2030	
	Promoting flexible working hours and teleworking	SADM, VDI, public authorities, municipalities	Educational	% Of employees able to determine the start and end of their working time	

T10-E. Information to the public*	Wide social dissemination, public awareness, behavioural development, pilot projects to reduce fossil fuel consumption	SUMIN, AM, enmin, SAM, NVSC, HI ŠMSM (Article 31 AD), municipalities	Educational	% Reduction in fuel consumption due to measures	
	Funding for hackathons and winning initiatives that influence the behaviour of groups in society	APVA, Vilnius Tech Zity	Economic	Hackathons and funded initiatives, units	
	Market research and publicity campaigns on e-mobility	SUMIN	No education/economic	Accessibility of the public (auditor)	
T11-E. Refurbishment of vehicles with green purchases*	Vehicle refurbishment with green procurement	SUMIN, ENMIN, VPT, MOI	Regulatory	Share of zero-emission M1, M2, N1, N2, N3 and M3 vehicles in public procurement, %	—10 of ca M 16 f cate
T12-E. Determination of low pollution zones in cities*	Designation of low emission zones in cities	Municipalities, SUMIN	Regulatory	% Reduction in the number of VLV vehicles in cities	
T13-E. Charging infrastructure for electric vehicles*	Development of public charging infrastructure for electric vehicles	SUMIN	Economic	Publicly accessible (public and semi-public) recharging points for electric vehicles installed,	
	Development of publicly accessible charging infrastructure	SUMIN	Economic	Publicly accessible recharging points for electric vehicles installed, unit.	
	Development of primary public charging infrastructure for electric vehicles	SUMIN	Economic	Publicly accessible (public and semi-public) recharging points for electric vehicles installed,	
	Developing the private recharging infrastructure for electric vehicles	SUMIN	Economic	Private recharging points for electric vehicles installed	
	Action plan for the development of electro-mobility with measures	SUMIN, ENMIN	Regulatory	Number of studies and plans developed	
	Development along roads of national significance	SUMIN	Regulatory	Number of legal acts amended, units.	
	Changes to road traffic rules	SUMIN,	Regulatory	Number of amended	

	making the use of electric vehicles more attractive	municipalities		rules, units.	
	Compensation for connection of charging infrastructure	ENMIN	Regulatory	Number of electric vehicles replaced due to provision	
	Facilitating access to electricity grids	ENMIN	Regulatory	Number of legal acts amended, units.	
	Participation in the DAEI unit of account system	ENMIN	Regulatory	Number of legal acts amended, units.	
	EU legal and regulatory obligations for the development of charging infrastructure	SUMIN, ENMIN	Regulatory	Number of electric vehicles replaced due to provision	
T14-E. Eco-driving*	Developing and promoting economic and eco-driving skills	SUMIN	Educational	Percentage of drivers gaining economic and eco-driving skills	

T15-E. Implementation of sustainable mobility measures*	Implementation of sustainable urban mobility plans	Municipalities	Economic	Sustainable mobility measures implemented, p.	
		Municipalities	Economic	Number of sustainable mobility plans, units	
		Municipalities	Economic	% Of reduced car journeys	
	Reducing the attractiveness of urban car use	Municipalities	Regulatory	Reduced use of own car in the city (units or %)	
T16-E – Sustainable Mobility Fund	Establishing a sustainable mobility fund	SUMIN	Fiscal	Created fund, unit.	
T17-E. Rail development and infrastructure improvement projects	Adaptation of maintenance activities and infrastructure to new electric passenger trains	SUMIN, AB LTG	Economic	An updated and adapted repair base for new EMU and BEMU passenger rolling stock (Industry g. 78 Vilnius), unit.	
T18-E – Development of bicycle transport infrastructure*	Construction, refurbishment and repair of infrastructure for cycling, as well as adaptation of existing road transport infrastructure to cycling	SUMIN, AM, municipalities	Economic	Length of cycling infrastructure network, km	
T19-E – Vehicle emissions monitoring system*	Application of a remote monitoring system for vehicle emissions	AA, SUMIN, and its regulatory bodies and companies, municipalities	Regulatory/Econo-floor	Legislative changes that eliminate vehicles that are technically unsuitable, polluting from traffic, units.	

T23-E: Promoting sustainable mobility*	Coordination of timetables for passenger trains and public road passenger transport	SUMIN, AB LTG, municipalities	Regulatory	% Growth in VC use	
	Smart ticketing system	SUMIN, AB LTG	Economic	% Of ticket sales without human intervention	93 % 10
	Making public transport more attractive	Municipalities, SUMIN	Fiscal	% Growth in VC use	
	Promoting sustainable mobility at national and municipal level	Municipalities, SUMIN	Economic	% Growth in VC use	
	Implementation of priority solutions for public transport in traffic	Municipalities, SUMIN	Regulatory	% Growth in VC use	
	Revision of ticket prices for public transport (cascade or time free public transport)	Municipalities, SUMIN	Economic	% Growth in VC use	
	Harmonisation of timetables for all public transport	Municipalities, SUMIN	Regulatory	% Growth in VC use	
T26-E – Development of sustainable airport infrastructure*	Electrification of aircraft parking areas at Vilnius, Kaunas and Palanga airports	JSC LOU	Economic	Number of mobile electric generators/number of electrified aircraft parking areas, units	
	Installation of electric loading stations in the aerodrome areas of Vilnius and Kaunas airports	JSC LOU	Economic	Number of electric charging stations installed, units.	

T27-E. Excise Act*	Excise duty and CO2 component on fuel price	FINMIN	Fiscal	Legislative package, pcs.	
Implementation of T28-E ETS2*	Establishment and publicity of the ETS2 system	AM	No fiscal/regulatory	Legislative package, pcs.	
T29-E. KVJUD fleet renewal	Purchase of a waste collection vessel with an electric power plant	JSC KVJUD	Economic	Number of vessels purchased, units	
	Hybrid pilot boats	JSC KVJUD	Economic	Number of boats purchased, unit.	
T30-E. Use of alternative fuels in Klaipėda port*	Installation of publicly accessible hydrogen refuelling points	JSC KVJUD	Economic	Number of items installed, units.	
T31-E. Development of electricity supply in the maritime port*	Installation of an electricity supply system for ro-ro and ROPAX vessels at berth in the port of Klaipėda	JSC KVJUD	Economic	4th ro-ro and ro-pax ferry mooring quays will be equipped with electrical connections, %	100 RO moo
T32-E – Promoting sustainable inland navigation*	Implementation of the services provided for the maintenance of the inland	SUMIN, AB VVKD	Economic	Purchased Inland Waterway Equipment Units, unit	1 ele pushe pro

	waterway				and 1
T33-E. Calculation of GHG and air pollution emissions	Assessment of emissions to ambient air from Klaipėda port activities and shipping	JSC KVJUD	Regulatory	Report with inventory of port issuances for the year 2022.	
T34-E Port environmental management system PERS	Implementation of the Environmental Assessment and Environmental Management Standard (PERS) for Klaipėda Port Activities	JSC KVJUD	Regulatory	PERS certificate, unit.	

	with regard to ESPO requirements				
*Meas **The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, b ***The scope of the measure implements renewable energy solutions that do not directly contribute to fue technologies ****The measure has an impact on GHG or fuel/energy savings also in other sectors, so that part of th *****The overall effect shall be reported including the effects of measures in this sector also for other sectors, but savings. The effect of including the impact of measures in other sectors and excluding savings from measures in othe					
Policy measures planned					
T1-P. Promotion of the acquisition of electric cars*	Promoting the purchase of zero-emission passenger cars (BEV and H2)	SUMIN	Economic	% Of electric and hydrogen-powered cars in the total passenger car fleet	
T2-P. Promoting alternative fuels infrastructure and TA*	Renewal of the urban and suburban public transport fleet by promoting the use of vehicles powered by alternative fuels (electricity and hydrogen)	SUMIN, municipalities	Economic	Total number of buses to be replaced, units	
	Establishment/development of alternative fuels/hydrogen refuelling infrastructure.	SUMIN	Economic	Number of recharging stations for heavy hydrogen transport, units	
	Promotion of heavy-duty vehicles of categories N2,M2,N3 and M3 fuelled with alternative fuels	SUMIN	Economic	Is the number of zero-emission TAs purchased, units.	

	Digital solutions to optimise freight flows and reduce	SUMIN	Economic	Number of digital subscriptions purchased	

	empty mileage			per year, units.	
	Assessment of the technical feasibility of connecting recharging infrastructure to the electricity transmission grid and review of pricing of the electricity transfer service in relation to recharging infrastructure	ENMIN, INVERT	Regulatory	Change in the legal framework, pc.	
T3-P – electrification of railways and rolling stock*	Purchase of electric locomotives	SUMIN, AB LTG	Economic	Electric vehicles, unit	
T4-P. Promotion of intermodal transport*	Increasing intermodal transport volumes and revenues through diversification of the service portfolio	SUMIN, AB LTG	Economic	Number of wagons for transport of semi-trailers for hire	
	Increasing intermodal transport volumes and revenues through diversification of the service portfolio	SUMIN, AB LTG	Economic	Purchase of zero-emission traction units, units/Freight turnover in million km	
	Technical development of Vilnius and Kaunas intermodal terminals	SUMIN, AB LTG	Economic	Number of containers and semi-trailers transported, units	
	Promoting the transport of goods by less polluting transport	SUMIN, AB LTG	Regulatory	Change in the legal framework, pc.	

	Feasibility study on the transfer of goods transported through Lithuania to the railways of heavy-duty vehicles	SUMIN, AB LTG	Scientific	Feasibility study, pc.	
T20-P. restrictions on polluting vehicles*	Legislative framework promoting the acquisition and registration of low-emission road transport vehicles	Am, SUMIN, MoI, Regitra	Regulatory	Legislation has been evaluated and improved, etc.	
T21-P. Upgrading of trains	Modernisation of Shkoda EJ575 trains in Dviwagons into electric-battery trains	SUMIN, AB LTG	Economic	Number of battery systems installed on electric Shkoda EJ575 trains, units	
T22-P: Promoting the purchase of bicycles and motor bicycles*	Promoting the purchase of bicycles and motor bicycles	SUMIN, AM	Economic	Number of vehicles purchased, units	
T23-P: Promoting	Lecture cycle on sustainable	SUMIN,	Educational	Population affected, units	

sustainable mobility*	mobility	AMSM, AM			
	Financial incentives for the development and deployment of integrated public transport ticketing schemes	SUMIN, municipalities	Fiscal	—	
	Creating a mobile application for sustainable mobility	SUMIN, AM	Educational	Reduction in CO2 emissions per kilometre travelled by the app user, %	
T24-P: Promoting sustainable inland navigation	Purchase of new cargo vessels and barges	SUMIN, VVKD	Economic	New barges/vessels – pushers, unit	
	Less polluting Klaipėda – Curonian ferries	SUMIN, AM, municipalities, transfer AB Smiltynė	Economic	Less polluting/clean chipped,	
	Replacement of existing power plants for inland freight vessels, passenger vessels, fishing vessels and other inland waterway vessels, renewal of other machinery related to their replacement	SUMIN, VVKD	Economic	Number of power units replaced.	
	Acquisition of new passenger ships	SUMIN, VVKD	Economic	Number of passenger ships purchased, units	
	Development and/or upgrading of inland waterway infrastructure, including ports and berths	SUMIN, VVKD	Economic	Modernised inland waterway infrastructure units, units	
T25-P – Developing electricity supply in the maritime port*	Installation of an electricity supply system for vessels at berth in the port of Klaipėda	SUMIN, ENMIN, AB KVJUD	Economic	Installed capacity, MW	
	Ensuring a maritime port's minimum electricity supply infrastructure for maritime containers and passenger ships	SUMIN, ENMIN, AB KVJUD	Economic	Installation of OTF stops,	
T26-P – Development of sustainable airport infrastructure*	Deployment of infrastructure for the supply of sustainable aviation fuels	JSC LOU	Economic	Share of sustainable fuels in total aviation fuel consumption, %	
	Upgrading/equipment of airport infrastructure to service hydrogen-powered and electric aircraft	JSC LOU	Economic	Space reserved for sustainable aircraft, units.	
T27-P. Excise Act	Amendment to the Law on	AM	Fiscal	Legislative amendment,	

	Excise Duties introducing a reduction for biogas			pc.	

*Meas

**The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, b

***The scope of the measure implements renewable energy solutions that do not directly contribute to fue technologies ****The measure has an impact on GHG or fuel/energy savings also in other sectors, so that part of th

*****The overall effect shall be reported including the effects of measures in this sector also for other sectors, but savings. The effect of including the impact of measures in other sectors and excluding savings from measures in othe

INDUSTRY SECTOR					
Measure	Name at activity level	Responsible entity	Type	Activity indicator, units of measurement	Sco implem (tar 2
Existing policy instruments					
P1-E. Reduction of F-gases	Implementation of the F-gases Regulation	AM	Regulatory	% Decrease in HFC consumption	
	Implementation of Kigali Amendment	AM	Regulatory		
P2-E – Increasing energy efficiency (EVE)*	PIS relief for industry (EE5)	Enmin, Baltpool	Economic	Total energy savings due to audit measures implemented, GWh	Eve e ef mea put i sav
					100 e
	Deployment of ETS EVE technologies in industries	EIMIN	Economic	Cumulative GHG reduction effect in industries participating in the EU ETS following the introduction of energy	8

				efficiency measures, tCO_2e	
				Energy savings in industrial plants participating in the EU ETS following the introduction of energy efficiency measures, MWh	2
P3-E: Investment & Innovation Relief	Corporate tax relief for small start-ups	FINMIN	Fiscal	Number of enterprises affected, units.	
	Triple deduction of R & D expenses	FINMIN	Fiscal	Number of enterprises affected, units.	
	Accelerated depreciation of R & D assets	FINMIN	Fiscal	Number of enterprises affected, units.	
	Reduced corporate tax rate for the commercialisation of R & D	FINMIN	Fiscal	Number of enterprises affected, units.	
P4-E – Industrial use of RES*	Renewable energy sources for industry LT+ (No 04.2.1-LVPA-K-836)	ENMIN, ESSENCE	Economic	Additional RES capacity, MW	
	Audit for industry LT (No 04.2.1-LVPA-K-804)	AM, ESSENTIAL	Economic	—	

	Promote RES deployment in industry	EIMIN	Economic	Total RES produced (of which: electricity, thermal energy), MWh/year	
P5-E. Change in polluting technologies*	Promoting the replacement of polluting technologies by companies participating in the EU ETS	EIMIN	Economic	GHG reduction effect, %	
	Use of renewable energy sources in industries participating in the EU ETS	EIMIN	Economic	Cumulative GHG reduction effect for industries participating in the EU ETS with RES solutions, tCO_2e	1
P6-E. Fostering technological eco-innovation	Eco-innovation LT+ (No 03.3.2-LVPA-K-837)	EIMIN	Economic	Number of enterprises affected, units.	
	Sustainable transformation of industrial SMEs	EIMIN	Economic	—	
	Eco-innovation LT (No 03.3.2-LVPA-K-832)	EIMIN	Economic	Number of enterprises affected, units.	
	ECO-Consultant (No 03.3.2-IVG-T-829)	EIMIN	Economic	Number of enterprises affected, units.	
P7-E – Deployment of modern	KETs industry LT+ (No 03.3.1-LVPA-K-841)	EIMIN	Economic	Number of enterprises affected, units.	

technologies*	REGIO Invest LT+ (No 03.3.1-LVPA- K-803)	EIMIN	Economic	Number of enterprises affected, units.	
	Regional potential LT (No 03.3.1-LVPA-K-850)	EIMIN	Economic	Number of enterprises affected, units.	
P8-E. Non-technological	Design LT (No 03.3.1-LVPA-K—838)	EIMIN	Economic	Number of enterprises affected, units.	

promoting eco-innovation					
P9-E. Development of non-technological innovation	Promoting investment in product/packaging/service design solutions	EIMIN	Economic	Number of enterprises affected, units.	
P10-E – Fostering traditional industrial transformation	Promoting the transformation of traditional industries	EIMIN	Economic	Creation of the platform, pcs.	
P11-E: Promoting the digitalisation of industry	Digitisation of industry LT (No 03.3.1-LVPA-K-854)	EIMIN	Economic	Number of enterprises affected, units.	
	Promote the automation of industrial production processes and the uptake of digitalisation technologies (digitalisation of industry)	EIMIN	Economic	Number of enterprises affected, units.	
	Promote the digitalisation of business processes of high value-added industries	EIMIN	Economic	Number of enterprises affected, units.	
P12-E – Increasing Energy Efficiency (EED) in Enterprises	Increase energy efficiency in industrial enterprises	EIMIN	Economic	Annual primary energy consumption, MWh/year	
	Energy efficiency training in industry	LPK	Educational	Estimated greenhouse gas emissions, tCO2/year	
P13-E. Hydrogen production and use* (For AB Achema in 2024	Integration of electrolysis into the ammonia assembly (30 % H2 amendment)	EIMIN	Economic	% Of hydrogen produced by electrolysis in the ammonia production process	

if the project is abandoned or delayed, the project can only be implemented by private funds)					
Feasibility study for P14-E. CO2 capture	Potential for CO2 capture and storage, hydrogen and other	EIMIN	Research	Feasibility study, pc.	

and storage	innovative technologies (feasibility study)				
P15-E – Innovative green products and services*	Industry 4.0 Zero Plan – Delivering the supply of innovation against climate change – Increasing demand	EIMIN	Economic	Number of innovative projects implemented, units	
P16-E – Buildings Databank	Creation and implementation of a PDB containing data on the building stock	VšĮ SSVA, AM, State Inspectorate for Spatial Planning and Construction, VĮ ŽŪDC	Economic	Building Databank Information System, unit	
P17-E – Deployment of alternative fuels*	Deployment of alternative fuels in industrial plants in Kaunas, Šiauliai and Telšiai regions	EIMIN	Economic	GHG savings, kt CO2	
P18-E. Reduction of F-gases	Promoting the replacement and deployment of F-gas-charged cooling and conditioning equipment, increasing the climate adaptation of public buildings	AM	Economic	Number of public buildings that received funding, units	

P19-E. Decarbonisation of industry*	Encouraging companies to invest in energy efficiency and replace polluting technologies with less polluting ones	EIMIN	Economic	Number of enterprises that received funding, units	
P21-E – Building life cycle modelling methodology	Development of a Building Life Cycle (LCC) modelling system	SSVA, AM	Regulatory	Development of life cycle modelling methodology for construction works, unit.	
P22-E: Fostering industrial change	Promoting green industrial technologies	EIMIN	Economic	Number of projects by enterprises that received funding, units	≥
*Mea **The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, ***The scope of the measure implements renewable energy solutions that do not directly contribute to fu technologies ****The measure has an impact on GHG or fuel/energy savings also in other sectors, so that part of the *****The overall effect shall be reported including the effects of measures in this sector also for other sectors, but ex savings. The effect of including the effects of measures in other sectors and excluding savings which savings from measures in this se					
Policy measures planned					
P17-P – Deployment	Deployment of alternative fuels	EIMIN	Economic	GHG savings, kt CO2	

of alternative fuels	in industrial plants				
P19-P – Decarbonisation of industry*	Encouraging companies to invest in energy efficiency and replace polluting technologies with less polluting ones	EIMIN	Economic	Number of enterprises that received funding, units	
P20-P: Long-term hedžing contracts*	GHG reduction on the basis of long-term hedge contracts	EIMIN	Economic	Number of enterprises affected, units.	
*Measure included in the National Air Pollution Reduction Plan **The overall effect shall be provided by including the effects of measures in this sector also for other sectors, but savings. The effect of including the impact of measures in other sectors and excluding savings from measures in othe NECP.					

AGRICULTURAL SECTOR

Measure	Name at activity level	Responsible entity	Type	Activity indicator, units of measurement	Sc imple (ta
			Existing policy instruments		
A1-E – Climat-friendly livestock farming (manure management)*	Investment support for the introduction of climate-friendly farming methods in livestock farms (biogas production for on-farm consumption)	MOA	Economic	Quantities of pigs, poultry manure used in biogas production and cattle manure used in biogas production, m³	4
	Investment support for the introduction of climate-friendly farming practices in livestock farms (slurry acidification)	MOA	Economic	Quantity of germinated slurry, t	4
	Investment support for the introduction of climate-friendly farming practices in livestock farms (inserting of slurry)	MOA	Economic	Quantity of slurry directly inserted into the ground, m³	1
A2-E. Promotion of organic products	Promotion of organic and national food quality system products in pre-school education	MOA	Economic	% Of early childhood education institutions supported to promote the consumption of food produced under quality schemes in pre-school education	by 10 by 15
A3-E. Expansion of targeted fertilisation*	Development of precision fertilisation technologies	MOA	Economic	Area of land affected, ha	Up

A4-E. extensive grassland maintenance*	Extensive management of grasslands through grazing	MOA	Economic	Area affected by the measure, ha	
A5-E – Promotion of short supply chains*	Short supply chain and promotion of agriculture in urbanised areas	MOA	Economic	Support for cooperation between agricultural operators through the creation of outlets, units.	
A6-E. Development of protein crops*	Increase of protein crop areas	MOA	Economic	Modified to leguminous herbs, ha	
A7-E – Development of non-arbitrary technologies*	Development of non-arable technologies, in particular direct sowing	MOA	Economic	Area of utilised agricultural area of the farm under Nearminia, ha	1
A8-E. Climat-friendly livestock farming (gut fermentation)	Feed reformulation studies to reduce methane and nitrogen emissions	MOA	Research	Number of research/studies analysing feed balance, units.	
	Genetic testing of cattle to reduce the release of methane and nitrogen compounds during intestinal fermentation	MOA	Research	Number of bovine genomic tests carried out (per year)	
A9-E. Promotion of organic farming*	Promotion of organic farming	MOA	Economic	Area under organic farming of the holding, ha	
A10-E. Promoting bioeconomy businesses	Investing in bioeconomy businesses	MOA, AM, ESSENTIAL	Economic	Number of projects supported, units	
A11-E. Nature-friendly orchards; and berry management*	Nature-friendly management of orchards and berry	MOA	Economic	Area of land affected by the measure, ha	
A12-E – Sustainable horticulture*	Sustainable fruit and vegetable scheme	MOA	Economic	Area affected, ha	
A13-E. Alternative fuel machinery*	Promotion of second-generation biofuels and electric agricultural machinery	MOA, FINMIN	Economic	Number of special-purpose second-generation biofuel machines, units.	
A14-E: Reducing the use of fossil fuels*	Reduction of the use of fossil fuels in agriculture, forestry	MOA	Regulatory	% Of labelled diesel fuel	

	and fisheries (regulatory)			
	Reducing the use of fossil fuels in agriculture, forestry and fisheries (investment)	MOA	Economic	
	Promotion of the sharing model of agricultural machinery	MOA	Educational	Number of research/studies exploring the feasibility of a model for sharing agricultural machinery, units.
A15-E. Review of technology cards*	Revision of technological cards for agricultural works to reduce fuel consumption	MOA	Fiscal	% Of labelled diesel fuel
A16-E. Promotion of research	R & D to find the most energy efficient and	MOA	Research	Study on the most efficient and sustainable agricultural practices, pcs.

	the most climate-friendly farming practices			
A17-E. Information and consultation*	Information and advice on the use of sustainable farming methods	MOA	Educational	Number of holdings larger than 50 ha affected, units.
A21-E. Balanced fertilisation system*	Sustainable use of mineral fertilisers (including the establishment of a fertiliser accounting system)	MOA	Regulatory/economic	Total reduction in N fertiliser use, %

*Mea

**The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings,

*** Implements renewable energy solutions within the scope of the
savings but ensure the deployment of clean technologies

**** The measure has an impact on GHG or fuel/ene
another sector, which is precisely presented in Part 3

*****The overall effect shall be reported including the effects of measures in this sector also for other sectors, bu
savings. The effect of including the impact of measures in other sectors and excluding savings from measures in oth

Policy measures planned

A1-P. Climat-friendly livestock farming (manure management)*	Investment support for the introduction of climate-friendly farming methods in	MOA	Economic	Amount of pig manure used in biogas production and amount of cattle manure used in biogas production, m^3

	livestock farms (biogas production)				
	Investment support for the introduction of climate-friendly farming practices in livestock farms (slurry acidification)	MOA	Economic	Quantity of germinated slurry, t	1
	Investment support for the installation of livestock farms for climate	MOA	Economic	Quantity of slurry directly inserted into the ground, t	

	favourable farming methods (addition of slurry)				
A2-P – Promotion of the consumption of organic products	Promoting the consumption of organic products in public service bodies	MOA, AM	Economic/Regulatory	Share of organically and environmentally friendly production in public institutions, %	
A3-P. Extension of targeted fertilisation*	Development of precision fertilisation technologies	MOA	Economic	Area of land affected, ha	
A13-P. AD powered machinery*	Promotion of second-generation biofuels and electric agricultural machinery	MOA, AM	Economic	Number of special-purpose second-generation biofuel machines, units.	
A18-P. Environmentally friendly diet	Public education campaigns on healthy and environmentally friendly diets	SAM, NVSC, HI	Communication	% Of affected population	
A19-P: Sustainable use of state-owned land	Sustainable use of public land to improve soil quality and health	MOA	Regulatory	Area of land affected, ha	
A20-P. GHG on-farm accounting	Develop and implement a GHG accounting system at farm level to reduce GHG emissions on farms	MOA	Research	Creation of a unified accounting system for GHGs, units.	

*Mea

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***The scope of the measure implements renewable energy solutions that do not directly contribute to fu
technologies ****The measure has an impact on GHG or fuel/energy savings also in other sectors, so that part of the

*****The overall effect shall be reported including the effects of measures in this sector also for other sectors, bu
savings. The effect of including the impact of measures in other sectors and excluding savings from measures in oth

WASTE SECTOR

Measure	Name at activity level	Responsible entity	Type	Activity indicator, units of measurement
Existing policy instruments				
K1-E – Waste management	Development of bio-waste treatment infrastructure	AM, EPMA	Economic	Food/kitchen waste treatment capacity created/improved, tonnes/year
	REI10-E – Investment support for the installation of biomethane production and biogas treatment plants	AM, EPMA	Economic	REI10-E. The measure is available a
	Increase in landfill tax	AM	Fiscal	Share of municipal waste landfilled 2030, %
K2-E – Development of waste collection facilities	Improving population waste sorting skills	AM	Educational	Number of projects carried out, un
	Development of infrastructure for separate collection of municipal waste	AM	Economic	Created/improved separate collecti capacity of municipal waste, tonnes/year
	Subsidies and grants for the purchase of individual collection containers for secondary raw materials (glass)	AM, EPMA	Economic	Number of individual containers purchased for glass, units
	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, un
	Subsidies and grants for the purchase of textile waste collection containers	AM, EPMA	Economic	Number of textile waste containe purchased, units
	Subsidies and grants for the purchase of bio-waste collection tools	AM, EPMA	Economic	Number of households supplied wi bio-waste collection facilities, unit

K3-E – Waste water management	Improving drinking water supply and waste water management	AM, EPMA	Economic	Population receiving waste wate treatment services in newly built/reconstructed waste water treatment plants, units
	Renovation and development of drinking water supply and wastewater management systems, improvement of corporate governance	AM, EPMA	Economic	Population receiving waste wate treatment services in newly built/reconstructed waste water treatment plants, units
	Improving drinking water supply and wastewater management	AM, EPMA	Economic	Newly constructed sewage sludg treatment plants, units
	Improve access to drinking water	MA,	Economic	% Of the population covered by

	supply and wastewater treatment services	Municipalities		centralised waste water manageme services
K4-E – Waste sorting	Promote separate collection of waste	AM	Economic	Separately sorted waste collectec tonnes/year
	Promoting waste recycling and the use of secondary raw materials	AM	Economic	Additional waste recycling capacit tonnes/year
	Publicity campaigns to promote separate collection of waste in households	AM	Educational	At regional level, organisation of various publicity campaigns to encourage households to sort.
K5-E. Food waste prevention	Publicity campaigns to promote the reuse of objects and food waste	AM, MOA	Educational	A long-term strategy for the publi information campaign on food was prevention has been developed ar implemented,
*The overall effect shall be provided by including the effects of measures in this sector also for other sectors, bu savings. The effect of including the impact of measures in other sectors and excluding savings from measures in oth				
Policy measures planned				
K6-P.	Applying the principle of circularity in public procurement	AM	Regulatory	Definition and criteria for circular procurement, legislative package

Circularity in public procurement				
K7-P – Research and experimental development	Funding research and applied research on circular economy	AM, NMSM, LMT	Educational	Implementation of circular econon research, pcs.
K8-P – Household composting	Regulatory changes for the development of domestic composting	AM	Regulatory	Legislative amendments prepared a adopted, etc.
*The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, but is esser **The overall effect shall be provided by including the effects of measures in this sector also for other sectors, bu savings. The effect of including the impact of measures in other sectors and excluding savings from measures in oth				

FNM					
Measure	Name at activity level	Responsible entity	Type	Activity indicator, units of measurement	Sc imple (ta 2
Existing policy instruments					
Restoration of L1-E peatlands (re-	Restoration of wetlands on arable peatlands, protection of permanent	MOA	Economic	Area affected, ha	6

establishment of hydrological regime on agricultural land)*	herbaceous cover and promotion of wetlands				
L2-E. Conservation and restoration of grasslands	Management of natural grasslands and species habitats	MOA	Economic	Area affected by the measure, ha	5
	Maintenance and maintenance of permanent grassland	MOA	Economic	Area affected by the measure, ha	12
	Conversion of arable land to permanent grassland	MOA	Economic	Area affected by the measure, ha	2

L3-E. Preservation of wetlands	Management of natural wetlands	MOA	Economic	Wetland area affected by the measure, ha	
L4-E. Promotion of catch crops*	Promotion of catch crops	MOA	Economic	Area affected, ha	3
L5-E. Promoting plant change*	Promoting plant change	MOA	Economic	Area affected by the measure, ha	5
Restoration of L6-E. peatlands (grazing)*	Conversion of arable peatlands to grassland	MOA	Economic	Area affected, ha	
L7-E – Promotion of the green cover*	Promotion of green land on agricultural land	MOA	Economic	Area affected, ha	1
L8-E. Preservation of landscape features	Preservation and maintenance of landscape features	MOA	Economic	Area affected, ha	4
L9-E. afforestation*	Afforestation on private land	AM	Economic	Area affected, ha	
L10-E-young education	Young people's education	AM	Economic	Area affected, ha	1
L11-E. Development of agroforestry and agro-horticulture	Assessing and promoting the potential of agroforestry and agro-cultivation on agricultural land	MOA	Research	Scientific studies, pcs.	
L15-P: Improving the quality of forests	Improving the quality of forests	AM	Economic	Additional area of better quality forests, ha	
L19-E – Promotion of organic construction	Ensure the implementation of pilot building refurbishment (modernisation) projects using standardised modular structures of organic materials and, on the basis thereof, draw up recommendations for the mass application of these solutions	AM	Economic	Demonstration green renovation projects implemented, pcs.	

	Support measures to incentivise the deployment in Lithuania of standardised production capacity of modular structures based on organic materials required to meet the objectives of the Long-Term	AM	Economic	Construction of modular structures from an organic material factory, unit	

	Renovation Strategy				
L14-E. Conservation of spontaneous trees	Conservation and inclusion of tree spontaneous trees in forest land accounts	AM	Economic	Area of newly formed forests, ha	
L16-E. Determination of GHG indicators	Setting national GHG emission indicators and carbon stock change indicators	AM	Research	List of indicators, units.	
L18-P. afforestation*	Afforestation on state lands	AM	Economic	Area affected, ha	
*Mea					
**The impact of the measure is not assessed as it does not directly reduce GHG or fuel and energy savings, but this other envisaged measures ****EFCR measure that has an impact on GHG or fuel/energy savings in other sect					
****Overall effect excluding measures from other sectors on savings. The effect of including the impact of measu in other sectors in this sector is presented here:					
				Policy measures planned	
L1-P. restoration of peatlands (re-establishment of hydrological regime on agricultural land)	Restoration of wetlands on arable peatlands, protection of permanent herbaceous cover and promotion of wetlands	MOA	Economic	Area affected, ha	
L12-P: Promotion of organic construction	Refurbishment (modernisation) of multi-apartment buildings with standardised modular structures of organic materials	AM	Economic	Renovated multi-apartment buildings	
L13-P. Carbon storage farming	A cross-cutting measure to promote the storage of organic carbon in soils	MOA	Regulatory	Medium humusity areas	

promotion (on agricultural land)				share of utilised agricultural area in the representative territory of the country, %	
L14-P. Conservation of spontaneous trees	Conservation and inclusion of tree spontaneous trees in forest land accounts	AM	Economic	Area of newly formed forests, ha	
L17-P: Promotion of carbon storage farming (in forest)	Promoting carbon farming in forests	AM	Economic	Area affected, ha	
L20-P. Restoration of peatlands (rehabilitation of hydrological regime in forests)	Conversion of forests where it is appropriate to restore the hydrological regime	AM	Economic	Area affected, ha	
*Mea					
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***Overall effect excluding measures from other sectors on savings. The effect of including the impact of measure other sec

RENEWABLE ENERGY SOURCES (RES)				
Measure	Responsible entity	Type	Activity indicator, units of measurement	Scope of implementation (target for 2030)
Existing policy instruments				
Electricity sector				
REI1-E – Financial support to prosumers	ENMIN	Economic	Installed solar capacity, MW	477

1 Some measures assessed at 0 or not affecting the RES target as set out in the calculation methodology (but relevant for other objectives) or the effect is very small and close to zero .

RES2-E – RES development in the Baltic Sea*	ENMIN, LEA	Research, economic	Installed offshore capacity, MW	1400
RES3-E – Use of RES in public and residential buildings*	AM	Economic	Installed solar capacity, MW	46
RES4-E – Deployment of RES power plants and storage facilities for legal persons and RES communities	ENMIN	Economic	Installed RES electricity generation capacity, MW	298,12
REI5-E – Fostering the deployment of energy storage facilities in households	ENMIN	Economic	Storage capacity, MWh	15
REI6-E. Create energy resource communities in municipalities by classifying part of the built-up power plants as poor (energy poor)	ENMIN	Economic	Installed capacity, MW	144
REI7-E – solar and wind power plants in the business sector	ENMIN	Economic	Installed capacity, MW	460
REI8-E – Establishment of electricity storage facilities	ENMIN	Economic	Installed electrical energy storage capacity, MW Installed capacity of electrical energy storage facilities, MWh	250 1000
REI9-E – Reduce CO2 emissions from the LNG terminal	ENMIN	Economic	Electrical connector, unit.	1
Transport (and fuel) sector				
REI10-E – Investment support for the installation of biomethane production and biogas treatment plants	ENMIN, MOA, AM	Economic	Planned biomethane production, GWh	950

REI11-E – Obligation on the use of RES by operators of natural gas refuelling points supplying natural gas to the transport sector	EM, TRANSLATED	Regulatory	Share of RES gas in the balance sheet of natural gas supplied to the transport sector by each natural gas supplier, %	> 16.8 %
REI12-E – Mandatory blending of biofuels into mineral fuels	ENMIN	Regulatory	share of biofuels in the total energy content of petrol and diesel, %	> 6.6 % (petric), > 6.2 % (diesel)
REI13-E – Investment support for second-generation biofuel production facilities	ENMIN	Economic	Annual production of second generation biofuels, ktoe	12,4
REI14-E – Integration of charging point operators into the system of DAEI units of account.	ENMIN	Regulatory	Creation of integration into the system of DAEI units of account, unit of account.	1
REI15-E – Development of green hydrogen production* — Creating green hydrogen production capacity in the transport sector	ENMIN	Economic	Hydrogen produced, m³	1,680,000
Creation of production capacity for green hydrogen (I)	ENMIN	Economic	Installed electrolysis capacity, MW Production per year, t GHG savings per year, t	65 8400 27 60
Creation of production capacity for green hydrogen (II)	ENMIN	Economic	Installed electrolysis capacity, MW	21
Heating and cooling sector				
REI16-E. Update and/or upgrade the heat transmission network and its installations/elements	ENMIN	Economic	District heating networks modernised, km	211
REI17-E: Promoting the use of RES in district heating — Promotion of small-scale biofuel cogeneration	Enmin, municipalities	Economic	Electrical installed capacity of cogeneration units, MW	3,75
Installation of small-scale biofuel cogeneration plants for combustion of logging residues	ENMIN	Regulatory	Additional RES production capacity, MW	43 (36 MWh and 7 MWel)
Implement local and RES CHP projects with priority for Vilnius and Kaunas	ENMIN	Economic	Electricity, heat produced, annual increase	0.4 TWh by 2023

	Use of residual heat in DH systems	ENMIN	Economic	Total power of recovered energy streams, MW	13
	Installation of thermal storage tanks	ENMIN	Economic	Heat generated by newly installed and/or refurbished heat storage tanks, MWh	2480
	Installation of heat pumps	ENMIN	Economic	Installed heat pump capacity in district heating systems, MW	13
	Construction of solar collector systems for district heating activities	ENMIN	Economic	Installed capacity, MW	66
	Construction of biofuel boilers produced from logging residues	ENMIN	Economic	Capacity of installed SM3 combustion systems, MW	26,5
REI18-E. Modernisation of the heat accounting system		ENMIN	Regulatory, economic	Number of heat metering devices and remote reading systems installed, units.	10514
REI19-E. Transition of DH networks to Generation IV heat supply systems		ENMIN	Economic	Newly built or upgraded pipelines for district heating and cooling networks, km	34

*Mea

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*** Implements renewable energy solutions within the scope of the measure that do not directly contribute to fu

**** The measure has an impact on GHG or fuel/energy savings also in other sectors, so a share of the effect is in

*****The overall effect shall be reported including the effects of measures in this sector also for other sectors, bu savings. The effect of including the impact of measures in other sectors and excluding savings from measures in oth

Policy measures planned				
Electricity sector				
REI20-P: Encouraging electricity consumers to choose energy generated from RES	ENMIN	Educational	Education/information campaign reached people, units	119395
REI21-P. Recommendations on the development of Citizen Energy Communities (PEC) in Lithuania (Policy Guidelines and Methodological Guide)	ENMIN	Research	Recommendations issued, units.	1
REI22-P: Targeted and equitable education for pupils and students on the possibility of extracting energy from RES and its benefits	ENMIN, NMSM	Educational	% Of target audience affected	5
Transport (and fuel) sector				
REI10-P: Investment support for the installation of biomethane	ENMIN, MOA, AM	Economic	Biomethane produced, GWh	600

production and treatment plants.					
REI23-P. Dissemination of information on biofuels traded at petrol stations.		ENMIN	Regulatory	% Of petrol station operators publishing information on the feedstocks used for the production of biofuels in the fuel structure of the petrol stations and their origin	100
REI24-P. Regulatory developments for the establishment of a system of biomethane gas access points		ENMIN	Regulatory	Legislation adopted, pc.	1
REI15-P – Development of green hydrogen production	Creation of production capacity for green hydrogen (III)	ENMIN	Economic	Installed electrolysis capacity, MW	996
	Assessment of the development of hydrogen infrastructure	AB Amber grid	Planning	Feasibility study carried out, pcs.	1
REI25-P. Deployment of CCS/CCUS technologies	Deployment of carbon capture technologies, prioritising biogenic carbon capture	EIMIN, ENMIN	Economic	Million tonnes of CO2	3,5
	Construction of carbon dioxide transport infrastructure	Enmin, KN Energies, Akmenė cementas, Orlen Lithuania	Infrastructure	Million tonnes of CO2	1,6
	Creating a market for carbon utilisation and developing its potential	EIMIN, ENMIN, AM, MOA	Regulatory	Standards developed, units.	1
	Establishment of a CO2 monitoring system	AM, MOA	Regulatory	Monitoring system, unit	1
	Establish support mechanisms for carbon capture, transport and carbon utilisation in the production of synthetic green fuels	ENMIN, EIMIN, SUMIN	Regulatory	Support mechanism, units.	1
				Heating and cooling sector	
REI27-P: Limiting the use of fossil solid fuels by location*		Am, municipalities	Regulatory	Particulate matter, unit	67964

*Mea

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*** Implements renewable energy solutions within the scope of the
energy savings but ensure the deployment of clean technologies

**** The measure has an impact on GHG or fuel/ene
another sector, which is precisely presented in Part 3

*****The overall effect shall be reported including the effects of measures in this sector also for other sectors, but excluding the impact of measures from other sectors on savings. The effect of including the impact of measures in other sectors and excluding savings from measures in other sectors in this sector is presented in paragraph 3 of the NECP.

ENERGY EFFICIENCY					
Measure	Responsible entity	Type	Activity indicator, units of measurement	Scope of implementation for 2030)	
Existing policy instruments					
EE1-E – Impact of higher excise duties and taxes on fuel consumption*	ENMIN, FINMIN, AM	Regulatory (price regulation)	Energy savings, TWh	8,66	
EE2-E – Renovation/modernisation of multi-apartment buildings*	AM, EPMA	Infrastructure	Energy savings, TWh	5,29 (2269 multi-apartment bu	
EE3-E – Renovation of public buildings (central government)*	ENMIN	Infrastructure	Energy savings, TWh	0,41	367 tho m² of ce govern public bu
EE3-E – Renovation of public buildings (municipalities)*	AM	Infrastructure	Energy savings, TWh		86 220 municipa buildi
EE4-E – Agreements with energy suppliers on consumer education and consultation*	Energy suppliers, enmin	Regulatory	Energy savings, TWh	2,77	
EE5-E – PIS relief for industrial establishments*	Enmin, Baltpool	Regulatory	Energy savings, TWh	4,23 (Annual implementatio energy efficiency measure will save around 100 GV energy)	

EE6-E. Agreements with state-owned and municipal-owned enterprises on energy savings*	Enmin, state-owned and municipal-owned enterprises	Regulatory	Energy savings, TWh	3,75 (Agreements with 50 sta municipal enterprises on savings)
EE7-E – Transforming Castes into	ENMIN, APVA,	Financial	Energy savings,	7,62

more efficient technologies*	LEA		TWh	(Replaced 50000 boilers heat-consuming energy ef measures, including heat
EE8-E – Upgrading of inland heating and hot water systems in buildings (“small renovation”)*	ENMIN, APVA	Financial	Energy savings, TWh	0,03 (Upgraded 158 heat poi multi-apartment build
EE9-E – Implementation of energy efficiency measures by private legal entities according to energy audit reports	ENMIN, APVA	Financial	Energy savings, TWh	0,18 (Number of 44 proje
EE10-E – Refurbishment (modernisation) of one or two dwellings of natural persons	AM	Financial	Energy savings, TWh	0.61 (Updated 1 106 ur single homes)
EE11-E – Modernisation of street lighting systems	ENMIN, VIPA	Infrastructure	Energy savings, TWh	0,17 (69353 replacement lum
EE15-E. Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons)	AM	Financial	Energy savings, TWh	0,017 (19 units of build

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Policy measures planned					
EE2-P – Renovation/modernisation of multi-apartment buildings*****	AM, EPMA	Infrastructure	Energy savings, TWh	3,2 (5042 blocks of multi-apa buildings)	
EE3-P – Renovation of public buildings (central government)*	ENMIN	Infrastructure	Energy savings, TWh	0,28	143 tho m² of c goverr build
EE3-P – Renovation of public buildings (municipalities) *	AM	Infrastructure	Energy savings, TWh		363 780 municipa build
EE7-P: Transforming Castes into more efficient technologies	ENMIN, APVA, LEA	Financial	Energy savings, TWh	1,22 (Replaced 11 305 u boilers to heat pump	
EE8-P – Upgrading of inland heating and hot water systems in buildings (“small renovation”)*	ENMIN, APVA, LEA	Financial	Energy savings, TWh	0,18 (290 heat points per y	
EE10-P: Refurbishment (modernisation) of one or two dwellings of natural persons*	AM	Financial	Energy savings, TWh	1,2 (21 000 units of single h	

EE11-P – Upgrading of street lighting systems	ENMIN, VIPA	Infrastructure	Energy savings, TWh	0,1 (100 thousand Replacem luminaires)
EE12-P – Improve the technological and energy efficiency of industrial enterprises through the deployment of artificial intelligence and digital twin technologies	ENMIN, ESSENCE	Investment	Energy savings, TWh	0,04 (Implementation of twin or artificial intellig solutions)
EE13-P – Create a legal requirement for companies to implement the measures recommended in energy efficiency audits	ENMIN	Regulatory	Energy savings, TWh	0,26 (Amendment of th Act/Description of the Pro for Enhancing Energy Effi

EE14-P: Fostering the deployment of internal monitoring systems for energy efficiency in businesses and industry	ENMIN, ESSENCE	Financial	Energy savings, TWh	0,215 (Number of small and me sized enterprises in manufacturing, units 2
EE15-P. Renovation of non-residential buildings (renovation/modernisation of non-residential legal persons)	AM	Financial	Energy savings, TWh	0,53 (Updated area: 700 000
EE16-P: Implementation of integrated district renovation in urban areas	AM	Regulatory	Energy savings, TWh	0,11 (Confirmed complex qu sustainable business mod methodological mate

*Mea

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*****The overall effect shall be reported including the effects of measures in this sector also for other sectors, bu savings. The effect of including the impact of measures in other sectors and excluding savings from measures in oth

ENERGY SECURITY			
Measure	Responsible entity	Type	Activity indicator, units of measu
Existing policy instruments			
ES1-E – Lithuanian electricity system synchronisation project	LITGRID AB, ENMIN	Infrastructure	Lithuanian electricity system desynch from IPS/UPS and connected to con European electricity grids for synch operation
Implementation of the construction project for unit 5 of the ES2-E. Kruonis Pumped	Enmin, finmin, Ignitis Group	Infrastructure	Fifth hydro-aggine installed, MW

Storage Power Plant (KHAE)			

ES3-E – Modernisation of electricity distribution networks through the deployment of smart technologies	ENMIN, ESO, IN TRANSLATION	Infrastructure	Digital management systems for s energy systems, pcs.
			Consumers who have improved the of electricity supplied as a result c introduction of digital managem
EU4-E – Accumulate gas stocks in underground storage facilities through the implementation of EU Regulation 2017/1938 on the filling of gas storage facilities	Production of AB Ignitis	Regulatory	NA
EU5-E – Implement cross-border gas agreements for solidarity measures ensuring continuity of gas supply for protected domestic customers	ENMIN	Regulatory	NA
Policy measures planned			
ES4-P – Implementation of the Capacity Ensuring Mechanism	ENMIN, LITGRID AB	Regulatory	Expected Load Loss Probability (L hour/year

INTERNAL MARKET				
Measure	Responsible entity	Type	Activity Indicator, Measurement units	Sco
Existing policy instruments				
VR1-E. Ensure the adoption of nuclear safety and environmental decisions and recommendations of EU and international organisations in the interest of Lithuania with regard to nuclear power plants in the Republic of Belarus, Astravets district	MFA, ENMIN, AM	Regulatory	Decisions taken, units.	
VR2-E – Renovate and/or modernise heat points and/or heating systems in multi-apartment buildings, individual and/or public buildings	AM, ENMIN	Infrastructure	Number of heat points/heating systems modernised, units	
VR3-E – Refusal to regulate retail electricity prices for household customers	ENMIN	Regulatory	Number of household customers choosing an independent supplier of electricity, households	
VR4-E: Promote the development of smart grids	ENMIN, ESO	Infrastructure	Smart metering devices installed for household consumers.	
VR5-E: Promote the use of sustainably	Enmin,	Regulatory	A National Biofuel	

produced and supplied biofuels	Baltpool, LHAT		Sustainability Scheme for biofuels used in the DH sector has been developed, adding a mobile application for the actual declaration of data.	
VR6-E – Balancing capacity market	LITGRID AB	Regulatory	Amount of balancing capacity, MW	
Construction of VR7-E. Harmony Link	LITGRID AB, ENMIN	Infrastructure	Capacity of the high voltage connection, MW	
VR8-E. Acquisition of a floating LNG storage facility with regasification plant (FSRU) 'Independence'.	ENMIN	Infrastructure	Acquisition of ownership of FSRU Independence	
VR9-E – Establish a centralised data exchange platform – an information technology system for centralised and standardised storage, exchange and storage of energy data and other information related to energy activities	ENMIN, ESO	Investment	Updating the database of production, supply and consumption of the open-access energy market, unit.	
VR10-E – Create a legal framework for an open-access database for the production, supply and consumption of the energy market 'Data HUB'	ENMIN	Regulatory	Legislative amendment, pc.	
			Energy poverty	
EN1-E – Reimbursement of housing heating costs	SADM	Financial	Persons receiving compensation for heating costs, thousands of persons	Indic rece pric
EN2-E – Payment of credit taken for the renovation (modernisation) of a multi-apartment building and interest for persons entitled to compensation for heating costs	AM, SADM	Financial	Persons with credit and interest payments for the renovation (modernisation) of a multi-apartment building, thousands of persons	Indi the e ben hea rece price
EN3-E. Promote the purchase of solar power plants by deprived persons and/or the replacement of fossil fuel heat installations	ENMIN, AM	Investment	1. Number of persons who have benefited from support 2. Installed capacity, kW	
			Policy measures planned	
VR11-P – Adop the provisions relating to the development of the hydrogen market and infrastructure in the Lithuanian legal framework	ENMIN	Regulatory	Legislative amendment, pc.	
VR12-P: Enhancing flexibility services				
Create a legal framework for	ENMIN	Regulatory	Legislative amendment, pc.	

	electricity-to-consumer trade and electricity sharing.			
	Establish a regulatory framework for increased participation in the flexibility market	ENMIN	Regulatory	Legislative amendment, pc.
VR13-P: Sydler compressed air storage system	Legal provisions on the development of the compressed air storage system are in place	ENMIN	Regulatory	Change in the legal framework, pc.
	Pilot project	ENMIN, EPSO-G	Research	Pilot project carried out, unit

	Main (implemented with a positive outcome of the pilot project)	ENMIN, EPSO-G	Infrastructure	Installed compressed air storage System, MW and GWh
VR14-P – Assessment of the feasibility of nuclear energy development and development of a preliminary business model nuclear power plant with a Generation 4 Low Power Modular Nuclear Reactor (MBR)		Enmin, Ignalina NPP, VATESI	Investment, regulatory	Draft legislation on the concept of nuclear energy development has been prepared and submitted to the Lithuanian Parliament.
VR15-P – Legislation put in place to enable undertakings operating electricity and natural gas infrastructure to meet GHG emission reduction targets		ENMIN, EPSO-G, INVERT	Regulatory	Amendment of legislation,
Energy poverty				
EN4-P – Information for hard-to-reach (not using information technology) consumers on compensation and energy savings		Enmin, SADM, AM, municipalities	Other	NA
EN5-P. Create an information hub for information on energy savings, compensation and energy communities		ENMIN	Education/Information	Municipalities with access to the information hub

RESEARCH, INNOVATION AND COMPETITIVENESS			
Measure	Responsible entity	Type	Activity indicator measurement
Existing policy instruments			

MT1-E. Attracting investors in the manufacture of electric batteries	Eimin, VšĮ Investuok in Lithuania, SUMIN	Planning	Attracted
MT2-E – Empowering the pilot environment for energy innovation	ENMIN, INVERT	Regulatory	Number of legal
MT3-E – Joint Nordic-Baltic Energy Research Programme	ENMIN	Financial	Intra-Baltic and research proje mill
MT4-E. Ignitis Group Smart Energy Venture Capital Fund	‘Contrarian Ventures”, Ignitis Group	Financial	Not a
MT5-E – Performance of research in activating funds generated by the RES statistical surplus sold by Lithuania to Luxembourg	ENMIN	Research	Number of res fund
MT6-E. “Smart specialisation”	EIMIN, STRATA	Technological	Not a
MT7-E. Experimentation	Eimin, Innovation Agency	Economic	Number of en subsi
MT8-E. “Intellectual”	Eimin, Innovation Agency	Economic	Number of en subsi
MT9-E. Pre-commercial purchases in LT	Eimin, Innovation Agency	Economic	Number of innov solutions im
MT10-E. Ensure the need for professionals in the energy sector (heat energy, electricity, RES and others) to promote the energy profession in Lithuania	Enmin, LEA, VERT, energy companies, associations, NMSM, LMT, higher education institutions	Planning	Stabilising the nu in energy profes steady increas p
MT11-E: Enhance cooperation between the Lithuanian State, higher education institutions and energy companies in the training of professionals by involving them in ongoing pilot projects.	Enmin, LEA, VERT, energy companies, associations, NMSM, LMT, higher education institutions	Planning	Number of

MT12-E: Organisation of regular hackathons and innovation workshops in the energy sector according to the cleaned energy sector innovation needs/formed challenges (national and international dimension).	Enmin, AM, Energy Companies, VERT	Planning	Number of hac u
MT13-E. Examine the feasibility of adapting the tool of the Open Innovation Testing Platform (e.g. Open Innovation Test Bed) in the field of energy and, as appropriate, initiate its establishment in Lithuania	Enmin, LMT, LIC, higher education institutions	Research	Proposa
MT14-E – Increase the indicators of the summary index of the Lithuanian Energy Innovation Ecosystem	ENMIN, LEA	Regulatory	Proposa
MT15-E – Establishment of a Centre for the Development of Energy Technology	EM, NMSM, LMT	Research	Energy Techno Ce
Policy measures planned			

MT16-P. Implement catalytic research to assess the potential use of these materials to reduce CO2 emissions and/or produce hydrogen	ENMIN, LMT	Research	Number of res fund
MT17-P – Implement nuclear research to assess future use of nuclear energy and monitoring methodologies	ENMIN, LMT	Research	Number of res fund
MT18-P. Implement research on the use of hydrogen as fuel, gas and sector integration	ENMIN, LMT	Research	Number of res fund
MT19-P: Assess the feasibility of adapting the natural gas transport system to the transport of green hydrogen and methane	Enmin, AB Amber Grid	Research	Adapted infras max.
MT20-P – Implement research on the digitalisation of energy to boost the digitalisation of the sector	ENMIN, EPSO-G	Research	Number of res fund
Deployment of MT21-P. CCS/CCUS technologies (acquisition of biogenic CO2 capture and transport equipment).	ENMIN	Economic	Amount of C
MT22-P: Enhancing the expertise of Lithuanian institutions and technical support organisations in the field of MBR and training of specialists for nuclear energy.	Enmin, NMSM, LEI, FTMC, KTU, IAEA, Litgrid	Planning, Research	1. Joint pro nuclear engin bet unive 2. Er
			~~nuclear engine~~ deploymen (3) The develo

ABBREVIATIONS

AAA	Environmental protection agency
AB VIA LT	VIa Lithuania
AM	Ministry of the Environment
APVA	Environmental Projects Management Agency
EIMIN	Ministry of Economy and Innovation
ENMIN	Ministry of Energy
ESO	Energy distribution operator
FINMIN	Finance Ministry
FTMC	National Centre for Physical and Technology Sciences
HI	Institute of hygiene
INVEGA	Investment and business guarantees
KTU	Kaunas University of Technology
KVJUD	Klaipeda State Seaport Authority
LEA	Lithuanian Energy Agency
LEI	Lithuanian Energy Institute
LMT	Science Council of Lithuania
LPK	Lithuanian Confederation of Industrialists
LTG	Lithuanian Railways
LTG	Lithuanian Railways
LTOU	Lithuanian airports
LTSA	Lithuanian transport safety administration

LEWS	Lithuanian District Heating Association
NVSC	National Public Health Centre
SADM	Ministry of Social Security and Labour
SAM	The Ministry of Health
SSVA	Agency for the Development of the Construction Sector
STRATA	Government Centre for Strategic Analysis
SUMIN	Ministry of Communications

IAEA	International Atomic Energy Agency
TM	Ministry of Justice
MFA	Ministry of Foreign Affairs
VDI	State Labour Inspectorate
VDI	State Labour Inspectorate
VERT	National Energy Regulatory Council
VPT	Procurement Office
MOI	Interior Ministry
VCCD	Inland Waterways Directorate
NMSM	Ministry of Education, Science and Sport
ŽŪDC	Agricultural Data Centre
MOA	The Ministry of Agriculture

Annex No 6

Descriptions of models used

Article 38 Reporting on national projections

Annex XXV – Table 4: Model Factsheets

Field	Description
Model 1	
Model name (abbreviation)	Energy system model
Full model name	Model of fuel and energy consumption in the sect Lithuanian economy
Model version and status	Not applicable
Latest date of revision	03/06/2024
URL to model description	Not applicable
Model type	Spreadsheet-based calculator
Summary	Energy model is based on statistical data and assu regarding certain macroeconomic factors with var existing and planned policy measures taken into a Used to evaluate and PREDICT achievement of nat targets in energy efficiency and renewable energy use. Results of Energy model are used to assess GHG e
Intended field of application	Primary and final energy consumption projections National energy and climate plan, Renewable Ene calculations and tracking of targets and indicative

	trajectories.
Description of main input data categories and data sources	Statistical data reflecting the current energy consu situation and specific assumptions influencing the consumption projections. Information on existing planned energy efficiency, renewable energy sour promotion and green-house-gas emission reductio measures.
Validation and evaluation	General quality control procedures where applied Energy projections: analysis of projected activity d consistency check of activity data sources, comple check and etc.
Output quantities	Primary and final energy consumption by fuel and type

GHG covered	Not applicable
Sectoral coverage	Energy sector
Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 050 year per year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	Data input from Transport model and output to Er emissions tool (fuel and energy consumption)
Input from other models	Fuel and energy consumption in transport
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable

Model 2

Model name (abbreviation)	Energy GHG calculator
Full model name	Energy emissions calculator
Model version and status	Not applicable
Latest date of revision	13/06/2024
URL to model description	Not applicable
Model type	Spreadsheet-based calculator
Summary	The obtained fuel consumption data in energy sec multiplied by emission factors of every fuel in orde estimate projected GHG emissions. So, GHG proje correspond to the methodology used for preparat national GHG inventory.
Intended field of application	Projections of emissions from the energy sector
Description of main input data categories and data sources	Consumption of different fuel types in each subse energy. Projected activity data are provided by sev

	companies (petroleum refining, other energy indu fugitive emissions) and the Energy system model.
Validation and evaluation	General quality control procedures where applied Energy projections: analysis of projected activity d consistency check of projected emissions in the Er emissions calculator and projected emissions in th GovReg_Proj_T1a_T5a_T5b template, consistency activity data sources, completeness check and etc
Output quantities	GHG emissions
GHG covered	Energy sector GHG emissions (CO2, CH4 and N2O)
Sectoral coverage	Energy sector excluding transport

Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 050 year per year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	Data input form Energy system model (fuel consu
Input from other models	Consumption of different fuel types in each subse energy
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable

Model 3

Model name (abbreviation)	Transport model
Full model name	Transport emissions calculator
Model version and status	Not applicable
Latest date of revision	13/06/2024
URL to model description	Not applicable
Model type	Spreadsheet-based calculator
Summary	The determined fuel consumption of each fuel typ activity data for every transport sub-sector is mult emission factors of every fuel in order to estimate GHG emissions. So, GHG projections fully correspo methodology used for preparation of national GH
Intended field of application	Projections of emissions from transport sector
Description of main input data categories and data sources	Consumption of different fuel types and other act each subsector of transport, vehicle fleet and mile from state enterprise “Regitra” and association of inspection firms “Transeksta”.
Validation and evaluation	General quality control procedures where applied transport projections: analysis of projected activit trends, consistency check of the projected emissio

	GovReg_Proj_T1a_T5a_T5b template, consistency activity data sources, completeness check and etc
Output quantities	GHG emissions
GHG covered	Transport sector GHG emissions (CO2, CH4 and N2
Sectoral coverage	Transport sector
Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 050 year per year

Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	Data output to Energy system model (fuel and ene consumption)
Input from other models	Not applicable
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable

Model 4

Model name (abbreviation)	Industrial emission calculator
Full model name	Ms Excel based on industrial emissions calculator
Model version and status	Not applicable
Latest date of revision	2024
URL to model description	Not applicable
Model type	Ms Excel based calculator
Summary	Projections of GHG emissions from IPPU sector is projected data provided by the main emitters in IP clinker, lime, glass, ammonia and nitric acid, mine producing companies. The projection of fluorinate greenhouse gases is based on the prohibitions out Regulation (EU) 2024/573
Intended field of application	IPPU GHG emission projections
Description of main input data categories and data sources	Projected production data provided by the main e IPPU sector: clinker, lime, glass, ammonia and nitr mineralwool producing companies wich provide in about projected amount of ammonia production, consumption, nitric acid production, clinker produ production, glass production, mineralwool produc other subcategories historical data and population
Validation and evaluation	General quality control procedures where applied IPPU projections: analysis of projected activity dat consistency check of projected emissions in the IP emissions accounting tool and projected emission GovReg_Proj_T1a_T5a_T5b template, consistency activity data sources, completeness check and etc

Output quantities	CO2 emissions from cement, lime, glass productio ceramics, other uses of soda ash, mineral wool pro ammonia production, cast iron production, lubrica wax, solvents use, urea-based Catalyst, from asph road paving with asphalt. N2O emissions from nitr production, from propellant for pressure and aero products and medical applications. HFCs emission product uses as substitutes for ozone depleting su (ODS), SF6 emissions from semiconductor manufa electrical equipment and NF3 emisissions from
GHG covered	IPPU sector GHG emissions (CO2, N2O, HFCs, SF6,
Sectoral coverage	Mineral, Chemical, Metal industry, Non-energy pr from fuels and solvent use, Electronics industry, P as substitutes for ODS, Other product manufactur
Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 050 year per year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	Not applicable
Input from other models	Not applicable
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable
Model 5	
Model name (abbreviation)	Agriculture emissions calculator
Full model name	Ms Excel based on agriculture calculator
Model version and status	Not applicable
Latest date of revision	2024
URL to model description	Not applicable
Model type	Ms Excel based calculator
Summary	Projections of GHG emissions from agriculture sec on projected livestock population, milk productior and the share of manure management systems fo livestock categories (dairy cattle, nondairy cattle a GHG projections of agricultural soils category are projected consumption of inorganic and organic N main harvested crops and area harvested, applica and consumption of Liming materials (Limestone a dolomite) used for soils.

Intended field of application	Agriculture GHG emission projections
Description of main input data categories and data sources	Main livestock population data, Main harvest of cr area harvested, Inorganic N fertilifer, Amount of L materials consumed, Application of urea All projected activity data are provided by Ministr Agriculture
Validation and evaluation	General quality control procedures where applied Agriculture projections: analysis of projected activ trends, consistency check of projected emissions i Agriculture emissions calculator and projected em the GovReg_Proj_T1a_T5a_T5b template, consiste of activity data sources, completeness check and e
Output quantities	Methane (CH4) emissions from enteric Fermentat livestock; CH4 and nitrous oxide (N2O) (direct and emissions from manure management; direct and i N2O emissions from managed soils; carbon dioxide (CO2) emissions from soil Liming a application of urea
GHG covered	Agriculture sector GHG emissions (N2O, CH4, CO2
Sectoral coverage	Agriculture sector (Enteric Fermentation, Manure management, Agriculture Soils, Liming, urea appli
Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 050 year per year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	1. Data input from LULUCF model (data of or and GL area and average annual soil carbo change in mineral soil) 2. Data output to IPPU model (CO2 emission urea)
Input from other models	data of organic CL and GL area and average annua carbon stock change in mineral soil from LULUCF
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable

Model 6

Model name (abbreviation)	IPCC Waste Model
Full model name	IPCC Waste Model
Model version and status	Not applicable
Latest date of revision	2024
URL to model description	https://www.ipcc-nggip.iges.or.jp/public/2006gl/v

Model type
Ms Excel based

Summary	Projections of GHG emissions from Solid waste dis land is based on the generated amount of municip waste, amount of waste disposed of in the landfils amount of CH4 recovered. Projections of waste ge are based on historical as well as projected data o population, GDP and amount of generated waste
Intended field of application	Projections of GHG emissions from solid waste dis land
Description of main input data categories and data sources	Data on municipal waste disposed of in the landfil recovery. Other parameters (DOC, DOCf, OX and e default, provided in the model.
Validation and evaluation	General quality control procedures where applied Waste sector projections: analysis of projected act trends, consistency check of projected emissions i Waste sector emissions calculator and projected e the GovReg_Proj_T1a_T5a_T5b template, consiste of activity data sources, completeness check and e
Output quantities	Methane (CH4) emissions from solid waste dispos
GHG covered	Methane (CH4)
Sectoral coverage	SOLID waste disposal on land
Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 050 year per year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	Not applicable
Input from other models	Not applicable
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable
Model 7	
Model name (abbreviation)	Waste tool
Full model name	Ms Excel based waste calculator
Model version and status	Not applicable
Latest date of revision	2024
URL to model description	Not applicable
Model type	Ms Excel based calculator

Summary	Projections of GHG emissions from Biological trea waste is based on the amount of waste composte from Regional Waste Management Centers); proje GHG emissions from waste incinration is based on data; projections of GHG emissions from Wastewa treatment and discharge is based on the historical

	organically degradable material in wastewater, pc conected to wastewater collecting system (projec Ministry of Environment).
Intended field of application	Projections of GHG emissions from biological trea waste, waste incineration and wastewater treatm discharge.
Description of main input data categories and data sources	Data on biodegradable waste composted, incinera (without energy recovery), amount of organically material in the wastewater (TOW), population cor wastewater collecting system, protein consumptic capita, emission factors (IPCC default), population
Validation and evaluation	General quality control procedures where applied Waste sector projections: analysis of projected ac trends, consistency check of projected emissions i Waste sector emissions calculator and projected e the GovReg_Proj_T1a_T5a_T5b template, consiste of activity data sources, completeness check and e
Output quantities	Methane (CH4) and nitrous oxide (N2O) emissions Biological treatment ofwaste; CO2, CH4 and N2O from waste incineration; CH4, N2O emissions fron wastewater treatment and discharge
GHG covered	CO2, CH4, N2O
Sectoral coverage	Biological treatment of waste, Incineration of was Wastewater treatment and discharge
Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 050 year per year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	Not applicable
Input from other models	Not applicable
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable

Model 8

Model name (abbreviation)	LULUCF calculator
Full model name	Ms Excel based on LULUCF calculator
Model version and status	Not applicable
Latest date of revision	2024
URL to model description	Not applicable
Model type	Ms Excel based calculator
Summary	Projections of GHG emissions and Removals in LU

	is based on projected areas of land remaining in la category and land converted to other land categor areas of different cropland management practices addition to this, projected growing stock volume c harvested volume, natural mortality (dead wood v forest land; Volume of peat extracted for horticult peat extraction remaining peat extraction subcate necessary for projection of GHG emissions and Re LULUCF
Intended field of application	GHG emissions and Removals in LULUCF sector
Description of main input data categories and data sources	Growing stock volume changes, harvested wood v dead wood volume, land use area and land use are for all categories (forest land, cropland, grassland, settlements, other land) Projected activity data is a combination of data pr the Ministry of Agriculture (MoA) and State Forest (SFS)
Validation and evaluation	General quality control procedures where applied LULUCF sector GHG projections: analysis of projec data trends, consistency check of projected emiss LULUCF GHG emissions and Removals calculator a projected emissions in the GovReg_Proj_T1a_T5a_ template, consistency check of activity data sourc completeness check and etc.
Output quantities	Carbon stock changes in biomass, dead organic ma soils (both mineral and organic) in all land use cate (forest land, cropland, grassland, wetlands, settlem other land); CH4 emissions due to wildfires in fore cropland and grassland categories; direct N2O em to drainage and N mineralisation/immobilisation i land, cropland, grassland, wetlands, settlements a land; indirect N2O emissions due to Nitrogen leac run-off (in all land use i
GHG covered	CO_2, CH_4, N_2O
Sectoral coverage	LULUCF sector (forest land, cropland, grassland, w settlements, other land)
Geographical coverage	Lithuania

Temporal coverage (e.g. time steps, time span)	2 040 year/year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	1. Data input from other calculators of grow volume change, harvested volume, dead v volume;

	2. Data output to Agriculture sector model (a cropland and grassland organic soils and r carbon stock changes in cropland remainin cropland);
Input from other models	Data of growing stock volume change, harvested v volume, dead wood volume
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable
Model 9	
Model name (abbreviation)	Forest land calculator
Full model name	Ms Excel based on Forest land increment structure
Model version and status	Not applicable
Latest date of revision	2024
URL to model description	Not applicable
Model type	Ms Excel based calculator
Summary	Projections of forest land increment structure Cor growing stock volume increment, harvested wood and dead volume, which are projected taking into historical data obtained from National Forest Inve measurements of 2002-2017 (data of growing sto increment and its use of age class structure)
Intended field of application	GHG emissions and Removals in LULUCF sector
Description of main input data categories and data sources	Historical data of growing stock volume increment use (growing stock volume increment, harvested v volume and dead volume) as well as age class stru obtained from National Forest Inventory (NFI) me of 2002-2017 Projected activity data is provided by State Forest (SFS)
Validation and evaluation	General quality control procedures where applied LULUCF sector GHG projections: analysis of projec data trends, consistency check of projected emiss LULUCF GHG emissions and Removals calculator a projected emissions in the GovReg_Proj_T1a_T5a template, consistency check of activity data sourc completeness check and etc.
Output quantities	Growing stock volume changes, harvested wood v dead wood volume in cubic meters
Sectoral coverage	LULUCF sector forest land category
Geographical coverage	Lithuania

Temporal coverage (e.g. time steps, time span)	2 040 year, 10 year time steps
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	1. Data output to LULUCF model (growing st changes, harvested wood volume, dead w volume); 2. Data output to IPCC HWP Worksheet (har wood volume)
Input from other models	Actual date of the IFI
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable
Model 10	
Model name (abbreviation)	IPCC HWP Worksheet
Full model name	IPCC HWP Worksheet
Model version and status	Not applicable
Latest date of revision	2024
URL to model description	https://www.ipcc-nggip.iges.or.jp/public/2006gl/v
Model type	Ms Excel based calculator
Summary	Projections of GHG Removals in harvested wood p related to projected total harvested wood volume historical volume share between sawnwood, woo panels, paper and paper board and proportion of wood products produced from total harvested wo
Intended field of application	GHG emissions and Removals in LULUCF sector
Description of main input data categories and data sources	Main input data is provided from Forest land calcu (harvested wood volume) and actual activity data harvested wood products subcategories are subdi according to historical share of volume between s wood-based panels, paper and paper board and p of harvested wood products produced from total wood volume.
Validation and evaluation	General quality control procedures where applied LULUCF sector GHG projections: analysis of projec data trends, consistency check of projected emiss LULUCF GHG emissions and Removals calculator a projected emissions in the GovReg_Proj_T1a_T5a template, consistency check of activity data sourc completeness check and etc.

GHG covered

CO2

Output quantities	GHG Removals (CO2) in harvested wood products sawnwood, wood-based panels and paper and pa
GHG covered	CO2

Sectoral coverage	Forest land harvested wood products category
Geographical coverage	Lithuania
Temporal coverage (e.g. time steps, time span)	2 040 year/year
Other models which interact with this model, and type of interaction (e.g. data input to this model, use of data output from this model)	1. Data input from Forest land calculator (harveste volume)
Input from other models	Forest land calculator
References to the assessment and the technical reports that underpin the projections and the models used	Policies & Measures and Projections of Greenhous Emissions in Lithuania
Model structure (if diagram please attach to your submission in Reportnet)	Not applicable
Comments or other relevant information	Not applicable

NATIONAL

ADAPTATION PLAN 2024-2030

ANNEX 5: NATIONAL ADAPTATION PLAN 2024-2030

1. Chapter 4.2. General provisions

1. Lithuania, like the European Union as a whole and the world, faces the challenge of adapting to climate change. The consequences of climate change can be felt in almost all spheres of our lives and activities. According to the European Environment Agency, Lithuania suffered EUR 243 million in damages and losses due to extreme events related to climate change in 2022 alone. Adaptation is therefore an essential condition for the security and well-being of the country's citizens.
2. National adaptation policies are implemented in response to the reality of the effects of climate change and the need for urgent action. The average global air temperature in the 12-month period between February 2023 and January 2024 was 1.5 °C above pre-industrial levels, with 2023 being the warmest year in more than 100 000 years worldwide. Europe is the fastest warmest continent, with warming around twice as fast as the whole of the world since1980[134]. Economic losses from more frequent climate-related extreme events are increasing. The European Union's (EU) losses already exceed EUR 12 billion per year on average and a global temperature rise of 3 °C above pre-

134 European Environment Agency. European Climate Risk Assessment (EUCRA), 2024

industrial levels would lead to losses of at least EUR 170 billion per year for the current EU economy (corresponding to 1.36 %. EU GDP)[135]

3. The national climate change management policy objectives and objectives for 2030, 2040 and 2 050 in the areas of climate change mitigation and adaptation are set out in the National Climate Change Management Agenda (NCCMD), which was approved by Resolution No XIV-490 of the Seimas of the Republic of Lithuania on 30 June 2021. The Agenda shall be updated every 10 years or as a result of changes in legal regulation, assessing adaptation and GHG emission reduction potential in all sectors of the economy, taking into account the technological and economic feasibility of R & T & I.
4. Lithuania's adaptation management policy is designed and implemented in accordance with both national and EU strategic documents and legislation. The NCCVD was drawn up in accordance with the Law on Climate Change Management of the Republic of Lithuania and the implementation is based both on documents relating to the development programmes or short-term planning of specific economic sectors and on cross-sectoral policy documents such as the National Progress Plan 2021-2030, the National Sustainable Development Strategy, the concept of the General Plan for the Territory of the Republic of Lithuania, contributing to the objectives and objectives of the National Energy Independence Strategy and the national security interests enshrined in the National Security Strategy. Adaptation objectives and targets shall also be implemented in accordance with the EU climate and energy targets for 2030, the EU Green Deal initiatives, the EU Strategy on Adaptation to Climate Change and long-term climate change policy planning documents, and implement the Regulation of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action and the Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee on Climate Risks: Protecting people and well-being'.
5. Following the adoption of the NCPD, the National Climate Change Management Policy Strategy, which was developed and approved by the Seimas of the Republic of Lithuania in 2012, was repealed. It set short-term (until 2020), indicative medium-term (by 2030 and 2040) and long-term (by 2050) objectives and targets in the areas of climate change mitigation and adaptation.
6. The policy coordinator for adaptation to climate change is the Ministry of the Environment of the Republic of Lithuania. The sectoral objectives and objectives set out in the NCCVD shall be implemented in accordance with their competences by the Ministry of the Environment, the Ministry of the Economy and Innovation of the Republic of Lithuania, the Ministry of Energy of the Republic of Lithuania, the Ministry of Finance of the Republic of Lithuania, the Ministry of Culture of the Republic of Lithuania, the Ministry of Social Security and Labour of the Republic of Lithuania, the Ministry of Health of the Republic of Lithuania, the Ministry of Education, Science and Sport of the Republic of Lithuania, the Ministry of Foreign Affairs of the Republic of Lithuania, the Ministry of the Interior of the Republic of Lithuania and the Ministry of Agriculture of the Republic of Lithuania.
7. The implementation of climate change adaptation policy measures in Lithuania is carried out by a wide range of actors, including public authorities such as ministries and municipalities, the business sector, including energy producers, industry and the transport sector, scientific and academic entities that carry out research and advice, non-governmental organisations promoting public awareness and political participation, and the general public, including residents and communities that contribute to sustainability through day-to-day solutions. Cooperation and active involvement

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135 Communication fromthe Commission to the European Parliament, the Council, the European Economic andSocial Committee and the Committee of theRegions of 25 February 2021. Forging a Climate-Resilient *Europe. New EU strategy on adaptation to climate change* of these actors is essential for the successful implementation of the NCPD and for the achievement of the objectives set.

8. Regional cooperation and the active involvement of municipal authorities and local communities in planning and implementing adaptation measures are essential. Local authorities are encouraged to take ownership and leadership in developing adaptation strategies and plans to achieve their adaptation objectives. Adaptation plans will help municipalities plan timely measures to increase their resilience and reduce the damage caused by extreme hydrometeorological events.
9. Lithuanian economic operators active in the energy, transport, industry and agriculture sectors already have measures in place to adapt to the effects of climate change. In addition, the involvement of businesses in adaptation actions is essential for the successful implementation of adaptation measures. Firstly, business is one of the main economic players that directly or indirectly affects climate change through its activities and production processes. As a result, businesses bear a share of the responsibility for the consequences of climate change and its decisions.

The National Climate Change Adaptation Plan (hereinafter 'the Plan') is designed to ensure that Lithuania is ready to respond effectively to the challenges posed by climate change, protect natural ecosystems, reduce economic losses and ensure the well-being of society through innovative solutions and effective inter-institutional cooperation. UAC D

10. the implementation of the National Energy and Climate Plan (NECP) makes the Plan part of the NECP, which provides measures to meet the climate change adaptation objectives and targets of the NCPD.

2. Chapter 4.2. Lithuania's climate projections and impacts

11. The climate projections for Lithuania for 2023 were prepared up to 2100. They are based on data from standard scenarios RCP4.5 and RCP8.5 of the Global Climate Research Programme's Fifth Climate Model Comparison Project (CMIP5) (Table 1).

*Table 1. Climate change in Lithuania by 2 100 in different scenarios*s[3]

Climate indicator	Current significance	Forecast (2071-2100)	
		RCP4.5	RCP8.5
Annual average temperature in °C	7,3	8,5	10,1
Average January temperature, °C	—3,1	—1,7	1,3
Average January temperature, °C	18,3	18,7	20,4
Maximum daily temperature, °C	11,3	12,5	14,1
Minimum daily temperature, °C	3,5	4,9	6,7
Duration of heat waves, days	2,1	3,5	7,0
Tropical nights, cases	0,5	1,5	6,9
Cold days (t & -15 °C), number of cases	9,5	6,5	4,7
Duration of the growing season, days	206	222	243
Heating days	207	193	175
Cooling days	78	92	111
Frost, number of cases	1,1	0,9	0,9
Solar radiation, W/m²	115	111	108
Solar emitter time, h.	1854	1790	1751
Annual precipitation in mm	684	726	782
Average rainfall in January, mm	50	54	64
Average July rainfall, mm	85	92	83
Days with abundant precipitation	16,0	17,5	20,5
Days without precipitation	193	190	190

Drought, number of days	4,4	4,0	6,3
Number of days with snow cover	54	33	8
Average wind speed, m/s	3,0	2,9	3,0
Maximum wind gusts, m/s	15,7	15,7	15,8
Increase in sea level, cm	—	22	35

Climate change projections up to 2100 – Introductory report: https://klimatokaita.lt/media/17396/ivadine-ataskaita-elle_3f-1.pdf

12. The most important expected changes in climate indicators that have a direct negative impact in the 21st century are:
    12.1. Rising summer temperatures and heat extremists will lead to an increase in the duration of the cooling season and a significant increase in the energy demand for cooling;
    12.2. Maintaining the likelihood of extreme colds against the background of a warming climate can cause significant damage to infrastructure and human health;
    12.3. By mid-century there will be a relatively high probability of air temperature transitions over 0 °C, which can have an impact on infrastructure and human health;
    12.4. As the rainfall regime changes, the likelihood of street flooding will increase, and the instability of the ground (the probability of landslides) may also increase. This is due to the increasing frequency of flash wetlands in winter and the growing recurrence of extreme rainfall during the summer;
    12.5. Decreasing moisture levels in the soil during the growing season may have a negative impact on vegetation in urbanised areas;
    12.6. Arid conditions threatening agriculture will increasingly develop, especially at the beginning of the growing season;
    12.7. The growing duration of the vegetation period may lead to major changes in the seasonal presence of pollen and infectious disease vectors;
    12.8. If the wind speed does not increase and the air temperature increases, air quality may deteriorate during the warm season;
    12.9. As air and water temperatures increase, water quality in recreational water bodies is highly likely to deteriorate.
13. The main possible indirect effects are the following:
    12.10. Budgetary impact. Climate extremes will continue to grow (heat waves, rainfall, storms, floods, etc.) and will require an increasing share of the budget to be spent on disaster management and to compensate for the losses caused by them.
    12.11. Increase in the number of climate migrants. There is a need to be prepared to welcome climate migrants when needed.
    12.12. Breaking supply chains: Climate change in other regions of the world can affect both imports and exports. Production or transport disruptions can lead to a lack of vital products or resources.
    12.13. Power supply disruptions. Wind speeds are likely to be weak in the future in large parts of the Baltic Sea region. Meanwhile, Lithuania will fully switch to renewable electricity sources (mainly wind and solar) in the coming decades. In the absence of sufficient balancing

measures, temporary electricity disruptions may occur, which may lead to sudden price fluctuations and restrictions on energy use. Renewable energy infrastructure can also be highly vulnerable to extreme weather events (storms, hail, etc.).

12.14. Legislative and policy developments. The rise of climate change and its consequences can lead to the adoption of new legislation or regulations at international or national level, as well as new climate policy measures. These measures may have an impact on industry, urban planning, strengthening the regulation of people's daily activities, etc. Consequently, many areas will face transit risks resulting from changes in the legal environment linked to climate change policies.

12.15. Insurance and finance. Climate change can affect insurance markets and financial systems. Insurance premiums for properties in climate sensitive areas may increase. Banks tend to treat climate change as a risk, which can increase the cost of credit in activities affected by climate change, and financial institutions may review or abandon investments in areas most affected by physical and transit risks.

Chapter3: Climate change risks and sensitivities

14. Climate sensitivity and vulnerability of Lithuanian municipalities in 2023

the study, the results of which provided information on the identification of climate change risks, facilitated their understanding and assessment, thus contributing to the effectiveness of adaptation measures across the economy.

15. The climate change risk and vulnerability assessment was carried out not only on the basis of changes in meteorological indicators, but also on the sensitivity and distribution and density of different groups in society and economic sectors. According to the Intergovernmental Panel on Climate Change (IPCC) recommendations,[136]the level of climate risk has been estimated using three main variables: climate risks, exposure risks and sensitivities. Different sectors are sensitive to different meteorological indicators and the overall impact of climate change on the sector is obtained by using the average risk of all relevant indicators. After calculating the total risk of climate events for the sector (1-5 points), the resulting level of risk is multiplied by normalised socio-economic indicators to assess the risk and sensitivities of the impact.

16. *The most sensitive sectors for climate change in Lithuania are: public health, agriculture, forestry, ecosystems and biodiversity, water resources, energy, buildings and infrastructure, and cultural heritage and tourism (Table 2). The risks posed by climate change to the different most sensitive sectors are presented in more detail below.Table 2: Summary of the assessment of the risks posed by climate change to different sectors. The overall level of both sectorial and individual risks is provided. The risk level for 2050 and 2100 is estimated in scenario RCP8.5.*

Sectors and risks		Risk level		
			Year	Total
1. Public health		Low	Moderate	Moderate
1.1	Effects of extreme weather events	Low	Moderate	High
1.2	Variations in air quality	Low	Moderate	Moderate
1.3	Spread of emerging diseases and their vectors	Very low	Low	Low
1.4	Food safety and water supply issues	Very low	Low	Moderate
2. Agriculture		Very low	Low	Moderate
2.1	Frequency of heatwaves and arid periods	Low	Moderate	High

136 6th IPCC Assessment Report, 2023: https://www.ipcc.ch/report/ar6/syr/

2.2	Heavy rainfall and storms	Low	Low	High
2.3	Increase in growing season, spread of crop diseases and pests	Very low	Low	Moderate
3. Forestry, ecosystems and biodiversity		Low	Low	Moderate
3.1	Changes in species composition of trees and other plants	Low	Low	Moderate
3.2	Increase in the number of diseases and pests	Low	Low	Moderate
3.3	Forest fires	Low	Moderate	High
4. Status of water bodies and water resources		Low	Moderate	Moderate
4.1	Changes in floods and floods	Low	Low	Moderate
4.2	Eutrophication of water bodies and water quality	Low	Moderate	Moderate
5. Energy infrastructure and energy demand		Low	Low	Moderate
5.1	Damage to electricity generation and transmission facilities and infrastructure	Low	Low	Moderate
5.2	Change in heating and cooling demand	Low	Moderate	High
6. Buildings and other infrastructure		Low	Low	Moderate
6.1	Road infrastructure infringements	Low	Low	Moderate
6.2	Damage to buildings, digital and other infrastructure	Low	Low	Moderate
7. Cultural heritage and tourism		Very low	Low	Moderate

Public health

17. Climate change can have a wide impact on people's physical and psychological well-being and requires action to reduce the consequences of climate change and adapt to changing conditions. Risks to public health can be grouped into the following main groups:
    12.16. Effects of extreme weather events: the frequency and intensification of heat waves (with a maximum daily temperature > 30 °C for more than 3 consecutive days) is one of the main threats to climate change during the warm time of the year. Heat waves can have a significant direct impact on society due to the increase in mortality and hospitalisation. The effects can be either direct (heat shock, dehydration, weakness/heat fatigue) or indirect – to increase symptoms of pre-existing chronic diseases, affect human productivity and cognitive activity (e.g. prolonged periods of high temperature may lead to mental behaviour or condition). Human health is also adversely affected by very low temperatures, which can lead to frost and other health disruptions. The number of days very cold (& -15 °C) has already decreased in Lithuania as a result of climate changes that have already taken place and this downward trend will continue in the future. Storms, as well as squalls and vies, cause significant damage: electricity, communications lines and buildings that are being demolished in settlements are severely affected. The following hazardous phenomena have a direct health impact: people are killed and injured, but also indirectly when people are exposed to psychological effects.
    12.17. Variations in air quality: variations in air quality are strongly influenced by both local microclimatic conditions and long-range air-carriage. Dry, calm weather facilitates the accumulation of air pollution and has negative health consequences, especially for those suffering from chronic respiratory diseases or allergic to pollen. Even in healthy people, long episodes of high air pollution can cause respiratory irritation and the formation of chronic respiratory diseases. Forest fires, often accompanied by heat waves and droughts, release large quantities of particulate matter and other toxic substances into the atmosphere. The impact of fires on people can last whole days or even months. Extremely high temperatures and inhaled smoke can pose a risk to the cardiovascular system, eyes and the mental state of the human being.

12.18. Food safety and water supply issues: the increase in average and maximum temperatures can have an impact on food safety, both in terms of direct impacts on agriculture and food storage conditions, and indirect effects on supply chains. Food shortages and reduced quality can lead to dietary problems and social tensions due to higher product prices. Changes in rainfall and an increase in drought may affect the availability of drinking water resources and increase surface and groundwater pollution. The effects of extreme weather events are first felt in surface water bodies, but in the longer term (up to 2100), groundwater may also be affected (e.g.: drinking water wells and water sites).

12.19. Spread of emerging diseases and vectors: the rise in average air temperatures due to climate change, the easing of winters and weter summers allow for the spread of new diseases and disease vectors. Certain disease-borne insects (such as mites and mosquitoes) can more easily survive and thrive as climatic conditions change. Their abundance leads to the spread of diseases transmitted by these insects, such as Lyme disease and encephalitis, to new areas.

Parks, green zones and biodiversity

18. Changes in average temperature and rainfall, the increase in arid periods and storms will have the greatest impact on parks and urban biodiversity.

12.20. Changes in species composition of trees and other plants: due to changing climatic conditions, Lithuania is expected to increasingly favour broadleaved tree species. In general, spruces are considered to be the most sensitive to climate change and their distribution range is northerly, and conditions are becoming increasingly favourable for trees such as hornbeams and beechs. In the future, not only the species composition of the trees will change, but also the phenological seasons (plant flowering, ripening of fruit and seeds, etc.).

12.21. Increase in the number of diseases and pests: changing thermal and humidity conditions in Europe are witnessing an increase in forest diseases and pests. For example, in recent decades, the European spruce bark beetle has been witnessed by warmer and drier spring and summer periods, which may even result in several generations during the season. Drought periods also lead to a slower growth of plants, and the frequent recurrence of drought prevents plants and trees from recovering and making them more vulnerable to diseases.

Status of water bodies and water resources

19. Due to climate change, the water levels of surface and deeper groundwaters, the seasonality of floods and the associated infiltration and leaching of pollutants are changing as the average meteorological conditions change.

12.22. Changes in floods and floods: as climatic conditions change, changes in the seasonality of river floods are observed throughout Lithuania. More and more floods occur during the winter period due to flash tears, and the spring flood peaks have advanced from April to March. More often there are more frequent floods of large spring floods, but several flood peaks spread over both the winter and spring periods. These processes are the result of rising average winter temperatures and more frequent slippings, during which the entire snow cover can be dissolved.

12.23. Eutrophication of water bodies and water quality: rising water temperatures due to climate change can increase the flowering and eutrophication of phytoplankton. Arid periods occurring during the warm time of the year may lead to more frequent cases of shortages of drinking water in wells and shallow armour wells. Dry air and high temperatures can also lead to an increase in the concentration of bacteria that cause gastrointestinal and intestinal infections in public bathing sites.

Energy infrastructure and energy demand

20. Changes in temperature, extreme weather events affect energy infrastructure, both directly and indirectly, as a result of changing energy needs. Climate change can affect all parts of the energy sector: energy generation, energy demand, energy conversion, energy supply infrastructure.
    12.24. Damage to generation and transmission facilities and infrastructure: more frequent extreme weather events such as squall, lightning, windbreaks, lijundra or wet snow can damage power lines, solar power plants. Older, above-ground power lines are particularly vulnerable. Disruptions to electricity supply infrastructure can have a negative impact on citizens and businesses very quickly and the level of risk increases rapidly in the event of long-term disruptions.
    12.25. Change in heating and cooling demand: The rise in average air temperature in Lithuania will reduce heating days and increase the number of cooling days. The need for cooling will increase especially in densely populated central urban areas, where the urban heat island effect is emerging. The increase in the number of cooling days will also have a direct impact on the growth of electricity demand during the summer period. Although the need for conditioning will increase, not all citizens will be able to install such systems and the level of risk will be higher among the poorer. The energy demand for heating will decrease in the future, but the heating infrastructure must be maintained to ensure adequate conditions in residential and public buildings during cold times. With climate change, seasonal energy needs will change and it will be necessary to combine different forms of energy production to ensure energy supply at peak times.

Buildings and other infrastructure

21. The increasing number of hot days and heavy rainfall affects buildings, roads, digital and other infrastructure. Extreme weather events can lead to deformation, washing and flooding of road surfaces, while frequent temperature fluctuations of around 0 °C can accelerate the deterioration of streets and buildings.
    12.26. Road infrastructure infringements: heavy rainfall, changes in frozen-temperature cycles and heat waves can cause road surface damage, vehicle/tyre damage due to overheating, accidents due to reduced surface friction, reduced visibility, difficult driving conditions, road obstacles, etc. The sensitive and vulnerable part of road infrastructure is bridges and water throughputs. Inadequately installed or worn water through water can lead to street and road dyke washing during heavy rainfall or spring floods. Bridges have a design life of 50-100 years, but previously built bridges have not been designed for future climatic conditions. Rail and train traffic are most at risk due to heat-free rails, and this risk of deflection is considered to occur at temperatures above 27 °C. This risk can be mitigated by regular inspections of the railway infrastructure and the fixing and levelling (stamping) of tracks and dykes. Transport infrastructure infringements and traffic disruption can have a domino effect affecting many other sectors and activities, the daily activities of urban residents and vital public services (e.g. first aid, food supply chains, etc.).
    12.27. Damage to buildings, digital and other infrastructure: buildings and other engineering infrastructure are affected by increased air temperatures, extreme weather events, changes in transition cycles within 0 °C, etc. The ongoing climate change changes the operational conditions of buildings and infrastructure and may exceed the limits of its resilience. This poses a direct threat to property and can have significant consequences for the population. Different types of infrastructure (e.g. water supply, sewerage, transport, telecommunications) have different sensitivity to climate change risks. Damage to infrastructure caused by extreme weather events can disrupt the functions of services of public interest such as hospitals, drinking water and sanitation, maintenance of public order, fire protection, education and other public bodies. The greatest impact will be felt where population density is high and civil engineering infrastructure is already under maximum load. The increasing digitalisation and

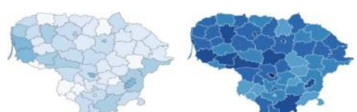
integration of IT and telecommunications technologies into everyday life in many areas increases the risk that disruptions to society and services will pose challenges to smooth working and rapid reaction. In order to prevent breaches of digital infrastructure from causing direct and indirect risks, it is important to provide back-up sources of energy supply and communication channels in key services and institutions.

Cultural heritage and tourism

22. Climate change poses a direct and indirect threat to real cultural heritage. Immediate immediate damage can be caused by extreme weather events and the slow deterioration of a site can be caused by rising annual average air temperatures and increasing rainfall. Changes in climate conditions can have positive and negative effects on tourism. Due to rising annual average air temperatures, decreasing relative humidity and decreasing average wind speed, the climate tourism index is projected to increase across Lithuania. However, the adverse effects of climate change on green areas and water bodies may lead to the disappearance or loss of valuable properties of some natural tourist sites.

Overview of sensitivity of municipalities

23. The sensitivity and vulnerability study of Lithuanian municipalities revealed that the most vulnerable municipality differs from one climate change sector to another. After summing up the risk scores for 2050 and 2100 for all sectors, the most sensitive municipality in 2050 is Klaipėda City Municipality, but in 2100 the most sensitive municipality is Kaunas. It is important to note that the conclusion is the sum of the results of all threats, which does not mean that the municipality of Klaipėda or Kaunas is the most sensitive to all risks. Lithuania’s overall risk level is lower in 2050, but significantly increases in 2100 (Figure 1).



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Level of risk:

239-305 337-364 405-547 1063-1202 П

1317-1469

306-336 П

365-404 П

548-1062 П

1203-1316 П

1470-1887

1. figure 2.1: Spatial distribution of risk in Lithuanian municipalities: cumulative risk scores (Source: Study on the sensitivity and vulnerability of Lithuanian municipalities to climate change)

Chapter4: Progress assessment

When planning adaptation to climate change, it must be ensured that all interested groups have sufficient information. All up-to-date information on Lithuania’s progress in developing and implementing climate change mitigation and adaptation policies is available on the Climatekaita.lt. In addition, Lithuania provides every 2 years updated information to the European Commission on the implementation of national adaptation activities, strategies and plans in the European Environment Information and Observation Network (EIONET) database, the materials contained in the reports being published on the Climate-ADAPT website.

24. In 2020, the Ministry of Finance of the Republic of Lithuania prepared the first fiscal risks theoverview[137] is a document on the potential impact of risks on government finances and on planned medium-term fiscal targets. The good practices of the International Monetary Fund and foreign countries have been used to compile the review. The review was prepared in a context of high uncertainty due to the evolution of the COVID-19 pandemic and its impact on Lithuania's economy, health and social environment, and assessed the impact of climate change as an extreme natural phenomenon on society, industry and the economy. The costs of implementing all climate change-related agreements are said to put pressure on government finances, but the real risk is non-compliance with the envisaged agreements. This impact would take the form of more extreme natural factors, changes in the labour market and working conditions caused by climate change, as well as fines that increase government spending if international commitments are not met.

25. When planning the state's preparedness to implement the challenges of the civil protection system during emergencies, the 2021 updateof[138] the National Risk Analysis assessed the emergency events that may require unexpected government expenditure. This analysis identifies groups of disasters, each of them assessing the impact of climate change. Natural, catastrophic hydrological and meteorological events have been assigned a very high level of risk and are included among the 19 potential hazards that may lead to a state-level emergency. In all cases, cooperation and coordination will be needed at vertical level, between the companies handling the consequences and the responsible authority, at horizontal level between the responsible and supporting authorities, as well as with other civil protection actors. In the event of a regional or cross-border crisis, the need for cooperation between the competent authorities of neighbouring States in the region shall be identified. While the political impact will be limited, the social consequences can be significant, causing anxiety, a feeling of insecurity and public outrage on the insurance system and the work of the services.

In order to avoid identified risks and to effectively adapt to and mitigate the impacts of climate change, it is necessary to integrate the efforts of different sectors. In this context, it is necessary to take into account the contribution of each sector (Figure 2) to climate change and their role in shaping climate change management policies, and to clearly define priority objectives, vision and strategic direction.

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137 *Overview offiscal risks, 2020:* https://finmin.lrv.lt/uploads/finmin/documents/files/Fiskaliniu_riziku_apzvalga_2020.pdf

138 *2021 National risk analysis:* https://pagd.lrv.lt/uploads/pagd/documents/files/Civilin%C4%97%20sauga/Nacionalin%C4%97%20analiz%C4%97/NRA_2021-30.docx

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26.

Water and energy savings

Nature-based solutions – Energy Storage Facilities

Reducing impacts

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Figure 2 Breakdown of sectors in terms of their contribution to climate change and climate change management policy
-making

Chapter5. Vision and strategic orientations

28. Lithuania's climate change management policy vision for 2050: Lithuania's economy is circular and climate neutral. The country's economic sectors and regions are resilient to climate change environmental change, are characterised by modern, resource-efficient, socially responsible and competitive, innovative technologies and research-based development, and decoupled economic growth from resource use. Becoming a climate-resilient society adapted to the unavoidable consequences of climate change. Contain negative impacts on the health and well-being of citizens, environmental factors and risks, reduce societal vulnerability to climate change and enhance well-being by keeping planetary boundaries within reach.

The strategic objective of Lithuania's policy on adaptation to climate change environmental change is to reduce existing and foreseeable potential vulnerabilities of natural ecosystems and sectors of the country's economy, to enhance adaptive capacity, to reduce risks and damage in a cost-effective manner, and to maintain and increase resilience to climate change change, in order to ensure favourable living conditions for society and sustainable economic activities so as not to threaten food production.

29. As part of the strategic objective on adaptation, the objective will be that by 2030:
    - 28.1. flood protection measures are applied to the entire population in the Flood Hazard Areas;
    - 28.2. the annual share of climate-related economic losses in a country's GDP does not exceed 0.08 %;
    - 28.3. the proportion of anticipated adverse, natural and catastrophic weather events is at least 90 % of the actual events.
30. The adaptation objective 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 the main short-term pathways up to 2030:
    - 28.4. more systematic adaptation: coherence and synergies between mitigation and adaptation measures;
    - 28.5. data-based solutions: enhance knowledge and research on the impacts of climate change, vulnerability and adaptive capacity, promote R & T & I;

28.6. open data: compiling and disseminating information on ongoing climate change, resulting damage and levels of damage, providing information to interested parties and the public, and sharing good practices and examples.

31. The main long-term orientations for adaptation to climate change up to 2050 are:

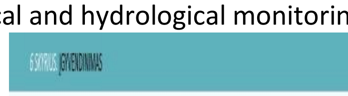
28.7. continuous monitoring of the effects and impacts of climate change and the introduction of cost-effective measures to mitigate the consequences of climate change;

28.8. ensure the resilience of engineering infrastructure to climate change 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 enhance the resilience of the living environment), other nature-based solutions;

28.9. increase public and public authorities' awareness, resilience, preparedness for hazards and emergencies related to climate change;

28.10. ensure the planning of measures to manage disaster risks and natural events that may arise from emergencies;

28.11. improve the meteorological and hydrological monitoring, forecasting and warning



system.

Chapter6: Implementation

32. Lithuania's climate change adaptation policy design and implementation is coordinated by the Ministry of the Environment. Cross-sectoral policies, such as the National Progress Plan 2021-2030, the National Sustainable Development Strategy and the economic sector-specific development programmes or short-term planning documents, also implement the objectives and targets of the NCPD.
33. Municipalities, together with the relevant authorities at national level, are responsible for implementing national adaptation objectives, targets and targets and certain adaptation measures. Guidelines for municipalities on climate change mitigation and adaptation were developed in 2017. The publication provides information on possible adaptation measures, recommendations for municipal spatial planning and funding opportunities for adaptation projects. In the period 2023-2024, the ClimateAdaPT-LT project developed climate change adaptation plans and recommendations for emergency management plans for 8 municipalities in Lithuania: Klaipėda District Municipality, Birštno District Municipality, Panevėžys District Municipality, Tauragė District Municipality, Ukmergė District Municipality, Utena District Municipality, Varėna District Municipality, Vilnius Municipality.
34. Municipal adaptation plans are the first municipal planning documents for climate challenges. They provide a detailed assessment of each municipality's risks and vulnerable sectors, define municipal adaptation objectives/objectives and strategic adaptation pathways, provide for adaptation actions and/or measures and the mechanisms for their implementation. Other Lithuanian municipalities are expected to initiate adaptation plans, following the good example.
35. The adaptation objective will be implemented through adaptation measures in climate-sensitive areas: emergency management, infrastructure, forestry, ecosystems, biodiversity, transport, urbanised areas, water resources, public health, agriculture, etc., in line with the main short-term pathways up to 2030 (Tables 3, 4). Priorities shall be set taking into account the vulnerability and strategic importance of the sectors.

Table 3. Existing[7] adaptation policies

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR1-E – Strengthen alerting, information and	MOI	Emergency management	Development of infrastructure for alerting and	2023-2029

self-protection of the population			informing the population	
PR2-E – Modernise the meteorological warning system on hazardous events	AM (LHMT)	Emergency management	Modernise the weather forecasting and warning system by 2025, introduce impact-based warnings by 2029	2024-2029

7 Existing policy measures – measures that already exist in legislation and have clear implementation mechanisms and/or secured funding
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Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR3-E – Improvement and development of alert and information infrastructure	MOI	Emergency management	Updating and strengthening the capacity to respond to the consequences of extreme natural events due to climate change	2021-2022
PR4-E – Strengthening fire rescue forces	MOI	Emergency management	Equipment and equipment for fire rescue forces	2021-2023
PR5-E – Development of the Lithuanian Early Warning System for Nuclear Risks	MOI	Emergency management	A unified system of alerting and informing the population has been set up	2020-2024
PR6-E: Improving the climate and environmental resilience of electricity distribution infrastructure, including conversion of overhead lines into underground cable lines	Enmin, economic operators	Infrastructure	Underground conversion of overhead power lines, prioritising the replacement of unreliable and emergency lines, wooded areas and solutions to improve the quality of voltage, increasing their resilience to climate change	2021-2030
PR7-E. Implementation of coastal management measures in the coastal zone	AM	Forestry, ecosystems, biodiversity, landscape	Implement sea lane management projects, increasing the resilience of coastal coasts to the consequences of climate change	2021-2030
PR8-E – Introduction of a unified forest fire monitoring system	AM, MOA	Forestry, ecosystems, biodiversity, landscape	Adapting forest fire protection to climate change by introducing advanced forest fire detection and rapid response tools and technologies	2022-2030
PR9-E – Forest research	VMT, LAMMC, AM	Forestry, ecosystems, biodiversity, landscape	Research and experimental work on forests to increase forest resilience to climate change, selection and	2021-2030

			selection of resistant genotypes of tree species, dissemination and exploitation of research results in practical forestry	
PR10-E: Enhancing forest resilience	AM	Forestry, ecosystems, biodiversity, landscape	Promote the development of young slopings, the formation of stands and rough harvesting, with a view to creating more climate-resilient, heterogeneous and heterogeneous stands	2021-2030
PR11-E: Enhancement of the natural frame and creation of green infrastructure in degraded agricultural areas	AA (VSTT), MoA, municipalities	Forestry, ecosystems, biodiversity, landscape	Ensure a good state of the natural frame (stable geoecological potential) in intensive farming areas, promote restoration of natural landscapes and ecosystems, enhance landscape and biodiversity, and ensure quality provision of ecosystem services in these areas in order to enhance the resilience of these areas	2021-2030

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR12-E: Reduce the impact of extreme weather events on transport infrastructure elements and road surfaces	SUMIN, AB Via Lietuva	Transport	Improving road infrastructure by 2030	2021-2030
PR13-E – Ensure continuous improvement of the road weather information system	SUMIN, AB Via Lietuva	Transport	Regular improvement and updating of the road weather information system	2021-2030
PR14-E – Establishment of tools to identify procedural road sections	SUMIN, AB Via Lietuva, municipalities	Transport	Develop a single model for assessing the most vulnerable roads and sections of rainfall in order to identify where floods and floods occurred in recent years (or other periods) and to identify critical points where floods have occurred several times	2021-2022
PR15-E – Adaptation of several technical regulatory documents to climate change	Am, SUMIN, AB Via Lietuva, LTSA, AB KVJUD, AB LTG,	Transport	Review the provisions of the technical regulatory documents for transport infrastructure (roads, bridges,	2021-2022

	VĮ Lithuanian airports		earthworks, cableways, railways, ports, etc.) and update them to the changing climate and the increasing frequency of extreme natural phenomena and the need to adapt to ongoing changes	
PR16-E: Preparation of adaptation plans in municipalities and regular updates of plans	Municipalitie s	Urbanised areas	Preparation and update of adaptation plans for individual municipalities every 5 years	2021-2030
PR17-E: Assess the sensitivity of Lithuania's territories to climate change by municipalities	AM	Urbanised areas	Assess and categorise the sensitivity of Lithuania's territory to climate change by individual municipalities and the necessary adaptation measures	2021-2023
PR18-E Overview of existing disease agents monitoring measures in aquatic facilities	Klaipėda University, Environmental Health Unit, Institute of Hygiene	Water resources	Overview of existing surveillance measures for pathogens in water facilities	2021-2030
PR19-E – Ensure the functioning of the flood risk management system	AM (AAA, LHMT, APVA)	Water resources	Regular update of flood risk management plans	2021-2030
PR20-E – Implement flood risk management projects	Am, municipalities	Water resources	Implement preventive measures in risk management plans for flood protection (including green infrastructure measures)	2021-2030

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR21-E – Implement water management and conservation projects	AM (LGT, EPA)	Water resources	Regular updates and studies of the monitoring system for surface waters and groundwater resources to assess the impact of climate change and the resilience of water bodies to climate change.	2021-2030
PR22-E: Establishment and operationalisation of an interinstitutional task force to tackle the impact of climate change on public health	SAM and its subordinate bodies, AM and its relevant authorities, municipalities	Public health	Inter-institutional working group aimed at increasing the resilience of the Lithuanian population to the various consequences of climate change, drawing up plans of measures, proposing legislation or various studies	2021-2030
PR23-E – Increasing awareness among health professionals on the	SAM and its subordinate bodies	Public health	Organise seminars, lectures, training to inform health professionals on climate	2021-2030

impact of climate change on human health			change developments and health consequences	
PR24-E: Reduce the impact of heat through water (phonnes, street irrigation, water spraying, water stops)	Municipalities (Klaipėda City Municipality, Birštnas District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Public health	Installation of fountains and other water installations where water can be cooled and replenished in the most heat sensitive areas	2024-2030
PR25-E: To provide the public, especially the most vulnerable groups, with information on the health effects of heat and recommendations on how to deal with heat waves (including reports)	Public Health Office of Klaipėda City Municipality	Public health	Provide the public, especially the most vulnerable groups, with information on the health effects of heat and recommendations on how to deal with heat waves (including reports)	2024-2026
PR26-E. Vehicles for wet street cleaning	Klaipėda City Municipality (UAB Klaipėda Services)	Public health	Purchase at least one additional vehicle for wet street cleaning	2024-2026
PR27-E: Promote vaccination against tick-borne disease – tick encephalitis by providing access to the first dose of the vaccine	SAM and its subordinate bodies, municipalities	Public health	Promote vaccination against tick-borne disease – tick encephalitis by providing access to the first dose of the vaccine	2021-2030

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR28-E: Development of green infrastructure in an urbanised environment	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Public health	Create high-quality and multifunctional (providing multiple ecosystem services) green spaces, other elements of green infrastructure in the most vulnerable areas of cities and towns due to the consequences of climate change, as well as in the areas of inpatient health care facilities, early childhood and school education, and old people's care facilities. Develop green infrastructure elements at different scales, from building to urban part level, depending on the needs and benefits	2021-2030
PR29-E: Fostering the	MOA	Agriculture	Support the insurance of farm	2021-2030

development of livestock insurance			animals so that the insurance scheme covers the vast majority of farmers keeping farm animals and contributes to effective risk management and minimisation of losses caused by risk factors for farm animal health	
PR30-E: Promoting the development of crop and plant insurance	MOA	Agriculture	Support crop and plant insurance to ensure that the insurance system ensures efficient management of risks and losses associated with the consequences of adverse climatic events on agriculture	2021-2030
PR31-E: Fostering the development of new tools to manage risks in agricultural production	MOA	Agriculture	Create the legal environment and develop support measures to promote the development of new tools for managing risks in agricultural production (such as agricultural risk management funds, income stabilisation tools, mutual funds, etc.)	2021-2030
PR32-E – Development of advanced mobility systems	MOA	Agriculture	Identify utilised agricultural areas where it is appropriate to install smart delioration instead of the current system of reclamation. Support, in designated areas, the installation of modern commemorative systems that make it possible to drain excess moisture during the wet period and to store moisture during the dry period.	2021-2029

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR33-E. Analysis and evaluation of multicultural/multicultural farming opportunities	MOA	Agriculture	Identify the criteria of the utilised agricultural area (if any, and areas) where it is appropriate to expand multicultural/multicultural farming. Identify the range of different plant species to be grown (including those planted with permanent plantations) to be grown in strips of rational width, with a view to achieving the best symbiosis enabling them to	2021

			achieve better production results in sustainable ways. Identify the economic-ecosystemic benefits of the cultivation of such plants for agricultural production;	
PR34-E Agricultural advice on adaptation to climate change	MOA	Agriculture	Develop information and advisory infrastructure for farmers and municipal professionals on how to adapt to climate change by 2027	2021-2030
PR35-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 observation and forecasting of plant diseases and pests.	2021-2030
PR36-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	Agriculture	As part of the implementation of the Procedure for the Organisation of Children's Feeding, to expand the volume of organic products supplied to children and produced under the national agricultural and food quality scheme. Encourage the use of at least 60 % of organic and NGA products for children in pre-school education.	2021-2030
PR37-E – Development of organic farming (including aquaculture)	MOA	Agriculture	Increase areas and production under organic farming	2021-2029
PR38-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, based on them, review and update of adaptation measures	2021-2030
PR39-E – Advice to business actors on adaptation to climate change	EIMIN, SUMIN, AM, ENMIN, SAM, MOA	Cross-sectoral objective	Develop information and advisory services for businesses by 2030 to help them adapt to climate change	2022-2030

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR40-E: Ensure continuous improvement of the hydrometeorological observation network and	AM (LHMT)	Cross-sectoral objective	Regular update of the hydrometeorological observation system and improvement of forecasts	—

forecasts				
PR41-E – Participation in international cooperation	AM, LHMT	Cross-sectoral objective	Continuously participate in international cooperation on adaptation to climate change and in international policy-making on adaptation to climate change;	—
PR42-E: Fostering research to identify the impacts of climate change	AM	Cross-sectoral objective	Carry out research to assess the impact of climate change	—

Abbreviations: Responsible actors: EPA – Environmental Protection Agency, AM – Ministry of Environment, APVA – Environmental Project Management Agency, eimin – Ministry of Economy and Innovation, enmin – Ministry of Energy, KVJUD – Klaipėda State Seaport Authority, LAMMC – Lithuanian Centre of Agricultural and Forestry Sciences, LGT – Lithuanian Geological Service, LHMT – Lithuanian Hydrometeorological Service, LTG – Lithuanian Railways, LTSA – Lithuanian Transport Safety Administration, SAM – Ministry of Health, SUMIN – Ministry of Transport and Forestry, VMT – State Forestry Service, Ministry of Interior, VSTT – State Service of Protected Areas, Ministry of Agriculture.

Table 4. *Planned*[139] adaptation measures

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR1-P: Adopt technological interactive solutions to reduce risks from extreme events	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Emergency management	Adapting the functioning of the Early Warning System to the needs of the municipality, using regularly updated interactive maps and databases to assess climate change-related emergency risks and resilience of municipalities	2025-2030
PR2-P: Establish a reserve of essential medical and civil protection equipment to be used in the event of an on-site emergency or interruption of supply chains	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Emergency management	Annual review and replenishment of the reserve	2025-2030

139 ***Planned policy measures*** *are measures proposed as a complement to* the*existing policy package to achieve* the*targets set for2030, but are currently not enshrined in legislation or strategic planning documents and/or their implementation depends on ensuringdifferent sources offunding.*

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR3-P: Develop a plan to reduce energy costs in the event of a disruption of energy supply or a sudden surge in electricity prices in the market	Municipalities (Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Emergency management	1 plan developed in municipalities	2026
PR4-P: Renovation of waste infrastructure	AM	Infrastructure	Upgrading waste infrastructure to increase its resilience to climate change	2024-2030
PR5-P: Identify cultural heritage sites most vulnerable to climate change (e.g. floods, storms) and develop a list of actions to increase their resilience	Klaipėda City Municipality	Infrastructure	Identify cultural heritage sites that are most vulnerable to climate change (e.g. floods, storms) and develop a list of actions to increase their resilience	2024-2026
PR6-P: Ensure the functioning of infrastructure and specific structures in changing climate conditions	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Infrastructure	Adapted rainwater system to increase rainfall extremes by approving/removing/changing infrastructure that may be damaged during storms, changing overhead power lines to underground cable lines in the most vulnerable sections, managing storm water collection infrastructure	2025-2030
PR7-P: Promote the connection of residential housing to centralised water supply and wastewater management (which do not have one)	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Infrastructure	Residents connected to a centralised drinking water supply system (from those not connected and able to connect)	2025-2030
PR8-P: Adap different “blue” solutions to climate resilience	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna	Infrastructure	Coastal infrastructure for water bodies is planned for possible flooding, green areas for surface water run-off infiltration, unasphalted, watertight coverings	2025-2030

	District, Vilnius)			
PR9-P – Plan new urban spaces taking into account natural frame, green spaces, relief, local microclimate	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Infrastructure	80 % of newly planned spaces according to requirements	2025-2030

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR10-P: Protect protected species and habitats	AM (MST)	Forestry, ecosystems, biodiversity, landscape	Develop and implement by 2030 documents on the protection and management of protected species and habitats, the abundance of invasive species. Encourage land managers to eradicate invasive species and reduce their prevalence in the most sensitive ecosystems. Continue research and monitoring of the condition of protected species and habitats.	2024-2030
PR11-P: Conservation and sustainable use of biodiversity and ecosystems through the 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 the loss of natural benefits due to climate change-related changes.	2024-2030
PR12-P: Establishment of a sea lane management programme	AM	Forestry, ecosystems, biodiversity, landscape	Develop a sea lane management programme	2024-2030
PR13-P: Restoration and protection of wetlands, ensuring their resilience and the provision of their services relevant for adaptation	AM	Forestry, ecosystems, biodiversity, landscape	Restoration and conservation of damaged wetlands (not used for agriculture and without potential for agricultural use) through the restoration of an appropriate hydrological regime, with a view to increasing their resilience to climate change-induced changes and ensuring the provision of their ecosystem services necessary for climate change adaptation.	2024-2030
PR14-P: Promoting	AM, MOA	Forestry,	Provide advice, information and	2024-2030

sustainable forestry activities in the context of climate change in private forests		ecosystems, biodiversity, landscape	training to private forest owners on sustainable forestry in the context of climate change, promote cooperation and cooperation.	
PR15-P: Establishment or updating of protected spatial planning documents and their implementation	AM (MST)	Forestry, ecosystems, biodiversity, landscape	By 2030, develop or update and implement spatial planning documents for protected areas of importance for species and habitats where the most vulnerable and vulnerable species and natural habitats of EU interest can be identified. Regularly carry out a spatial planning process for the review of the protection and use regime of protected areas, the adjustment of boundaries, compensation and land grabbing.	2024-2030
PR16-P: Helofite removal in surface water bodies	Klaipėda City Municipality	Forestry, ecosystems, biodiversity, landscape	Removal of Helofites in surface water bodies	2024-2030

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR17-P: Regularly assess the condition of trees, forests and parks in municipalities	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Forestry, ecosystems, biodiversity, landscape	Carry out an evaluation every year: detect and remove trees likely to develop during storms in a timely manner, prevent the spread of pests and diseases	2025-2030
PR18-P: Reduce the impact of extreme weather events on airport infrastructure	SUMIN, VĮ Lithuanian airports	Transport	Improving airport infrastructure by 2030	2024-2030
PR19-P: Reducing vulnerabilities in the energy sector	Enmin, economic operators	Energy	Conduct studies and assess the vulnerability of the energy sector to climate change, assess risks and identify the most vulnerable areas	2024-2030
PR20-P. Amendment of normative documents	AM	Transport	The normative documents must be amended by 2030, taking into account that building projects must meet current and future climate conditions.	2024-2030
PR21-P: Renovate public buildings and	Municipalities (Klaipėda City	Urbanised areas	Apart from energy savings, buildings are designed for cooling:	2025-2030

design new buildings with adaptation measures	Municipality, Birštnas District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)		equipped air-conditioning systems, cool roofs, double façades	
PR22-P: Implementation of rainwater management projects	Am, municipalities	Water resources	Modernise and improve surface (rain) wastewater infrastructure in urbanised areas (including through green infrastructure measures) by 2030 to protect these areas from the risk of excess rainfall and snow melting and to prevent the spread of pollutants into the environment (surface waters)	2024-2030
PR23-P: Reduce the negative impact of rising water levels and extreme weather events on surface and groundwater quality	AM (AAA)	Water resources	Regular improvement of water resource management to improve the status of water bodies. Surveys on the status of surface water and groundwater bodies, identification of measures needed to improve status, improvement of regulation, monitoring and control	2024-2030
PR24-P: Improve the resilience of wastewater management infrastructure to rainfall and climate change	AM (AAA)	Water resources	Reconstruction of waste water infrastructure due to excessive rainfall water infiltration into waste water networks	2024-2030

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR25-P: Rehabilitation/strengthening of sea dunes and river banks to protect urban infrastructure (including the use of sand excavated as a result of port dredging in the port of Klaipėda)	Klaipėda City Municipality (AB KVJUD, AM, AAA)	Water resources	Rehabilitation/strengthening of seaside dunes and river banks to protect urban infrastructure (including the use of sand excavated as a result of port dredging in the port of Klaipėda)	2024-2030
PR26-P: Improving the monitoring of physiological observations, air pollen monitoring and forecasting systems	AM (LHMT), SAM, VU	Public health	Update the phenological observation network, pollen monitoring and forecasting system by 2030	2024-2030

PR27-P – Increasing public understanding of climate change and the threats it poses to human health	SAM, AM, municipalities	Public health	The development of short digital animated social advertising on climate change developments and the health threats it poses, for television broadcasting and for distribution on websites, social media; short advertising texts to be broadcast on television on public transport and on urban video screens in public spaces; develop large format information-advertising posters to be distributed in transport waiting pavilions (bus or trolleybus waiting stops)	2025-2030
PR28-P – Developing legislation on reducing the impact of climate change threats on public health	SAM, AM, scientific institutions, municipalities	Public health	Develop a programme on adaptation to the public health impacts of climate change	2024-2030
PR29-P: Preparation of updates to the Hygiene Norms, adapting them to changing climate conditions and protecting human health	SAM and its subordinate bodies	Public health	Assess the need to develop changes to hygiene standards for the most vulnerable groups of people in order to reduce the impact of climate change threats	2024-2030
PR30-P: Establishment and implementation of internal action plans of relevant municipal institutions (health facilities, ambulance services, hospitals, nursing homes, etc.) in the event of heat waves	PAGD (LHMT, Klaipėda City Municipality)	Public health	Preparation and implementation of internal action plans in case of heat waves of relevant municipal authorities (health facilities, ambulance services, hospitals, nursing homes, etc.)	2024-2026

Measure	Responsible entity	Sector	Scope and results/effect envisaged	Implementation deadline
PR31-P: Introduction of public cooling centres ensuring 24 hours a day, 7 days a week	Klaipėda City Municipality	Public health	Introduction of public cooling centres to ensure cooling 24 hours a day, 7 days a week	2026-2030
PR32-P: Selection and breeding of varieties of agricultural plant species resistant to climate change	MOA	Agriculture	Continuous selection and promotion of climate-resilient agricultural plant varieties	2024-2030
PR33-P: Promoting multicultural/multicultural farming	MOA	Agriculture	Encourage farmers to develop multicultural (multi-species) farming. Prioritise operators using multi-modal farming and/or other promotion measures in RDP investment measures	2022-2030

PR34-P: Efficiency of water use for irrigation in agriculture	MOA	Agriculture	Promote the introduction of efficient irrigation systems (e.g. drip irrigation) in the agricultural sector, thereby preserving water resources	2024-2029
PR38-P: Ensure the presence of climate specialists in the municipality	Municipalities (Klaipėda City Municipality, Birštnas District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Cross-sectoral objective	At least 1 expert working on climate change solutions	2025
PR39-P: Organisation of adaptation training for employees of the municipality and its subordinate bodies	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Cross-sectoral objective	At least one training organised per year for municipal staff	2025-2030
PR40-P: Promote the dissemination of adaptation knowledge and behavioural change in municipalities	Municipalities (Birštno District, Tauragė District, Ukmergė District, Utena District, Varėna District, Vilnius)	Cross-sectoral objective	Provision of regular information to residents on good adaptation practices through municipal channels (websites and social media) and events, activities in real spaces and STEAM projects and artistic practices for children and young people; global municipal citizens' forum for dialogue on climate change issues	2025-2030

Abbreviations: Responsible actors: EPA – Environmental Protection Agency, AM – Ministry of Environment, enmin – Ministry of Energy, KVJUD – Klaipėda State Seaport Authority, LHMT – Lithuanian Hydrometeorological Service, PAGD – Fire and Rescue Department, SAM – Ministry of Health, SUMIN – Ministry of Transport and Communications, VSTT – State Service for Protected Areas, VU ŠA = Šiauliai Academy of Vilnius University, Ministry of Agriculture
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IMPLEMENTATION

37. A total of EUR 2.263 billion is planned for adaptation measures, of which EUR 46.9 million for emergency management, EUR 612.0 million for infrastructure, EUR 199.2 million for forestry,

ecosystems, biodiversity and landscapes, EUR 850.0 million for transport, EUR 54.0 million for water resources, EUR 39.4 million for public health, EUR 458.5 million for agriculture and EUR 3.2 million for cross-sectoral objectives.

38. The main sources of public funds up to 2030 are:

- Investments from EU funds (European Regional Development and Cohesion Funds) 2021-2027;
- TheEuropean Agricultural Guarantee Fund (EAGF);
- European Agricultural Fund for Rural Development (EAFRD);
- Lithuania’s Rural Development Programme 2014-2020;
- The European Maritime and Fisheries Fund (EMFF);
- Recovery and resilience facility (RRF)
- The “Environment, Energy, Climate Change” programme of the Norwegian Financial Mechanism;
- Road Maintenance Development Programme (RDDP);
- Electricity and heat tariffs;
- Climate Change Programme;
- Waste management programme;
- State and municipal budgets;
- Interreg funds:

39. If we want to be confident that the adaptation process is efficient and sustainable, it is necessary to continuously assess the implementation of planned actions, their impact and analyse the results obtained. Monitoring not only helps to assess the effectiveness of the measures in place, but also allows them to be adjusted, as well as to remove or change those that have proven to be less effective. In Lithuania, progress and monitoring of adaptation to climate change are coordinated by the Ministry of the Environment together with the authorities responsible for the measures. Municipalities are responsible for planning and implementing adaptation measures at local level. They shall cooperate with national authorities in the preparation and implementation of specific plans.

40. The implementation of adaptation measures may be modified for the following reasons:

37.1. Up-to-date scientific data on climate change and its impacts;

37.2. Extreme hydrometeorological phenomena and their consequences requiring urgent action;

37.3. Legislative changes at EU and national level;

37.4. Changes in funding sources and conditions;

37.5. The needs of local communities.

Changes would be made through regular reviews which assess the results achieved and identify new priorities and actions. The 8 Lithuanian municipalities’ adaptation plans set out monitoring indicators to measure the effectiveness of the selected measures (Table 5). Indicators will be monitored at least once a year

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Table 5. Monitoring indicators to improve the effectiveness of the measures selected in the adaptation plan

No.	Indicator	Possible source of data
1.	Number of patients contacting healthcare facilities (in cases per 100000 inhabitants) who are diagnosed with direct or indirect effects of extreme weather events (e.g. heatwaves) or air pollution. And the number of deaths attributable to these causes. Diseases or lesions caused by circulatory and respiratory diseases, injuries caused by extreme events, direct heat and cold effects	Health institutions, Health Information Centre of the Ministry of Health of the Republic of Lithuania, Institute of Hygiene
2.	Financial losses due to the impact of extreme climate events (in EUR)	Municipalities
3.	Number of fires attributable to extreme climate events	Fire rescue services

	(drought, storm)	
4.	Number of infrastructures affected by storms	Municipalities
5.	Number of trees cooked during storms	Municipalities
6.	Urban areas flooded due to insufficient surface water collection infrastructure, ha	Municipalities and public limited companies operating water sites
7.	Number of hydrotechnical accidents caused by extreme weather events	Municipalities
8.	Transport infrastructure damaged/destructed by flooding or other climate extremes	Municipalities
9.	Ecological status of surface water bodies	Environmental protection agency
10.	Number of exceedances of air pollution limit values per year	Municipalities
11.	Number of air or water pollution incidents due to extreme weather events	Municipalities
12.	Pest damaged forest or forest stands in urban area (ha/year)	State Forests