Ministry of Economy and Sustainable Development of Georgia

Ministry of Environmental Protection and Agriculture of Georgia

Integrated National Energy and Climate Plan of Georgia

July 2023

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List of Abbreviations and Acronyms

AFD	Agence Française de Développement
BAU	Business as Usual
BOD	Biochemical oxygen demand
BP	British Petroleum
BSTP	Black Sea Transmission Planning Project
CCA	Climate Change Agreement
CCL	Climate change levy
CDM	Clean Development Mechanism
CDD	cooling degree days
CER	Certified Emission Reduction
CFL	Compact Fluorescent Light Bulb
CNG	Compressed Natural Gas
CPF	Carbon Price Floor
CPS	Carbon Price Support
CSAP	Climate Change Strategy and Action Plan
CSE	Consumer Support Estimate
CSE	Central Stockholding Entity
DANEP	Danish Eastern Neighborhood Programme
DANIDA	Danish International Development Agency
DCFTA	Deep and Comprehensive Free Trade Area
DOC	Dissolved organic carbon
EBRD	European Bank for Reconstruction and Development
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
ECS	Energy Community Secretariat
EF	Emission Factor
EIB	European Investment Bank
EKC	Energy Coordinating Center
EU	European Union

EUA	European Union Allowance
EU ETS	EU Emissions Trading System
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEL	Georgian Lari
GERD	Gross domestic expenditure on research and experimental development
GGTC	Georgian Gas Transportation Company
GHG	Greenhouse gas
GITA	Georgian Innovation and Technology Agency
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GNERC	Georgian National Energy and Water Supply Regulatory Commission
GOGC	Georgian Oil and Gas Corporation
GSE	Georgian State Electrosystem
HDD	Heating Degree Days
HVDC	A high-voltage, direct current
IICI	Increase institutional capacity for innovation
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
KfW	Kreditanstalt für Wiederaufbau
LED	Light-emitting diode
LEDS	Low Emissions Development Strategy
LNG	Liquified Natural Gas
LPG	Liquified Petroleum Gas
LULUCF	Land Use, Land Use Change, and Forestry
MCF	Methane correction factor
MEPA	Ministry of Environmental Protection and Agriculture
MES	Ministry of Education, Science, Culture and Sports
MoESD	Ministry of Economy and Sustainable Development

MRV	Measurement, Reporting, and Verification
MSWF	Municipal solid waste dissimilated under anaerobic conditions
NCP	National Contact Point
NDC	Nationally Determined Contribution
NECP	Integrated National Energy and Climate Plan (National Plan)
NEEAP	National Energy Efficiency Action Plan
NIF	Neighbourhood Investment Facility
NREAP	National Renewable Energy Action Plan
NWVTA	National Whole Vehicle Type-Approval
OECD	Organisation for Economic Co-operation and Development
OX	Oxidation factor
PCIs	Projects of common interest
PECIs	Projects of Energy Community Interest
PMIs	Projects of Mutual Interest
PSE	Producer Support Estimate
R&D	Research and Development
RDI	Research, Development, and Innovation
RES	Renewable Energy Sources
RSPR	Road Safety Performance Review
SAC	Special Area of Conservation
SAOG	State Agency of Oil and Gas of Georgia
SCP	South Caucasus Pipeline
SEAP	Sustainable Energy Action Plan
SME	Small and Medium Sized Enterprise
SOCAR	State Oil Company of Azerbaijan Republic
SRNSF	Shota Rustaveli National Science Foundation
STI	Science, Technology, and Innovation
TOW	Amount of organic compounds in wastewater
TPP	Thermal Power Plant
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
TSO	Transmission System Operator

TYNDP	Ten Year Network Development Plan
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USEA	United States Energy Association
WAMS	Wide Area Monitoring System
WB	World Bank
WEM	With existing measures
WIPO	World Intellectual Property Organization
WOM	Without Meaasures

Energy units and coefficients

Unit	English Abbreviation	Quantity	Value
watt	W	power	
kilowatt	Kw.	power	1000 W
Megawatt	MW	power	1,000,000 W
Kilovolt	KV.	Voltage	1,000 V
Kilowatt-hour	KWh	Energy Consumption/production	
Megawatt-hour	MWh	Energy Consumption/production	1,000 KWh 0.2777 GJ 0.859 Gcal
Gigawatt-hour	GWh	Energy Consumption/production	1,000,000 KWh
Terawatt- hour	TWh	Energy Consumption/production	1,000,000,000 KWh
kilotons of oil equivalent	Ktoe	nominal unit of energy	1000 Ktoe. 0.0859 MWh 0.0238 GJ
Cabic metre	M3	Volume	
gigagram	GG	Mass	mln kg.
kilogram	Kg	Mass	1,000 g.
Ton	T	Mass	1,000 kg.
Kiloton	Kt	Mass	1,000,000 kg.
megaton	Mt	Mass	1,000,000,000 Kg.
kilometer	Km.	Length	1,000 m.
tonne-kilometre	tKm	Transporting a mass over a distance of one kilometre	
Passenger-kilometres	PKm	transporting a passenger over a distance of one kilometre.	

Section A. National Plan

1 Overview and process for establishing the plan

1.1 Executive Summary

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

The Integrated National Energy and Climate Plan (NECP) for the period 2021-2030 builds on existing national strategies and plans. Most notably, it is developed on the basis of the Law on Energy and Water Supply (Article 7)[1]. It provides an overview of the current energy system and the energy and climate policy. It also provides an overview of the national targets for each of the five key dimensions of the Energy Union and the appropriate policies and measures to achieve those targets. In the NECP, particular attention is be paid to the targets to be achieved by 2030, including the **reduction in greenhouse gas emissions**, increase of energy produced from **renewable sources**, **energy efficiency promotion** and strengthening of **power system interconnectivity**, both within the country and with neighboring countries The NECP is consistent with and contributes to the Sustainable Development Goals. It addresses the 5 main dimensions of as laid out by the EU and Energy Community:

- **Dimension 1: Decarbonisation**
- **Dimension 2: Energy efficiency**
- **Dimension 3: Energy security**
- **Dimension 4: Internal energy market**
- **Dimension 5: Research, innovation, and competitiveness**

Note that the purpose of the NECP is to outline existing, planned, and possible investments and policies to be implemented in the coming years. The document's adoption does not in itself result in changes to tax policy, to allocated budgets, or to the regulatory framework described within the text.

1-1-1 Background information on the NECP, the EU, and the Energy Community

In June 2014, the EU and Georgia signed an Association Agreement[2], which entered into force on 1 July 2016[3]. This, along with the Deep and Comprehensive Free Trade Area (DCFTA) Agreement, builds a foundation for far-reaching Georgian political and economic integration with the EU. In 2017, Georgia joined as a Contracting Party in the Energy Community. An energy market transformation is underway as part of the Energy Community Treaty implementation including the adoption of numerous pieces of legislation in 2019 and 2020, which will have a strong direct and indirect impact on the NECP.

As a full member of the Energy Community Treaty, Georgia is in the process of following the provisions of the EU Directives and transposing the *acquis communautaire* according to the Energy Community work programme. On 18 November 2015, the European Commission adopted its first Communication on the

1 Available at https://matsne.gov.ge/en/document/view/4747785?publication=4

2 https://www.eeas.europa.eu/delegations/georgia/eugeorgia-association-agreement_en

3 https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2369

State of the Energy Union, stating that NECPs, addressing all five key dimensions of the Energy Union, are crucial tools for the implementation of the Energy Union Strategy and for the development of more strategic energy and climate policy planning.

As part of the 2015 State of the Energy Union, the European Commission issued Guidance to EU Member States on integrated NECPs. This guidance provides the basis for EU Member States to start developing national plans for the period 2021 to 2030 and sets out the main pillars of the governance process. NECPs will reduce the administrative burden, enhance transparency for Member States, and ensure investor certainty until the year 2030 and beyond[4]. Following up from this, the Energy Community Secretariat also issued Policy Guidelines for its Contracting Parties to follow related to NECPs in 2018[5].

The NECPs should cover the period from 2021 to 2030, setting the pathway to transitioning its economy and energy systems towards a more sustainable future. The plan builds upon what each Contracting Party should deliver in their policies for 2020 (as a baseline) and include a perspective until 2050. This will ensure consistency with long-term relevant policy objectives at EU, UNFCCC, and Energy Community level. The NECPs may be built upon Contracting Parties' existing national energy and climate policy strategies. They should take a holistic approach and address the five main dimensions of the Energy Union in an integrated way.

ii. The process of compiling NECP target indicators

The process of setting targets is a mandatory part of Georgia's Integrated National Energy and Climate Plan and is based on Georgia's commitments to the Energy Union Secretariat. In line with the above, the NECP should set a target for renewable energy, energy efficiency and greenhouse gas emissions for at least 2030 and with a vision of 2050.

To meet this requirement, through the joint efforts of the Ministry of Economy and Sustainable Development of Georgia and the Ministry of Environment and Agriculture, a license for the TIMES modeling program was procured under DANEP II and a consultant with relevant competencies was hired. In order to compile the baseline scenario within the model, it became necessary to compile relevant sectoral questionnaires and collect information.

TIMES (The Integrated MARKAL-EFOM System) is a modeling program used to compile long-term energy scenarios and is technically sophisticated and is a bottom-up model generator that uses linear programming to create a system of minimum cost-adjusted energy / time average for a long period.

The model includes all stages of transformation of primary resources into energy services: transformation, transportation, distribution, and transformation into energy services. On the energy supply side are considered: mineral extraction, primary and secondary production, and exogenous imports and exports.

4 Similar to the EU, Energy Community Contracting Parties committed to monitoring and reporting in the areas of renewables, energy efficiency, and greenhouse gas (GHG) emissions as well as other information relevant to climate change. The Paris Agreement further defines the climate change related reporting obligations for the period after 2020 by establishing an enhanced transparency framework for action and support. In this context, the Energy Community adopted the Recommendation 2018/01/MC-EnC and Policy Guidelines PG 03/2018 on preparing for the development of NECPs addressing the five dimensions of the Energy Union by the Contracting Parties of the Energy Community. The Recommendation aims at building the analytical, institutional and regulatory preconditions for the development of integrated NECPs. The Recommendation and the Policy Guidelines are not legally binding, therefore does not impose obligations on Contracting Parties, however, have a specific timeline of actions and sets the deadline of submission as no later than the end of 2020. Therefore, as indicated in Article 5 of the Recommendation, the preparation of national plans should be an iterative and dynamic process starting in 2018.

5 Energy Community Secretariat (June 2018) Policy Guidelines on the development of National Energy and Climate Plans under Recommendation 2018/01/MC-EnC - PG 03/2018. Available at https://www.energy-community.org/dam/jcr:c9886332-a1f5-43ee-b46c-31c637aedfa6/PC_03_2018_ECS_NECP.pdf

With the help of various energy carriers, energy is supplied as part of the demand, which is divided into: residential, commercial, agricultural, transport and industry sectors. This model for Georgia was developed by TIMES-Georgia through the initial platform.

iii. Strategy relating to the five dimensions

The strategy includes policies, action plans, and planned measures in all five dimensions.

Related to **Decarbonisation**, Georgia continues to make great progress in developing the legislative framework to encourage investment in renewable energy and other GHG reducing technologies. In its first Nationally Determined Contributions (NDC). Georgia has committed to unconditionally reduce GHGs by 15% below the Business As Usual (BAU) scenario by 2030; this reduction will increase to 25% in case of international assistance. Georgia updated its NDC in 2021. In 2019, Georgia adopted the **Law on encouraging the production and use of energy from renewable sources** and the first **Renewable Energy Action Plan**. Both the law and the Action Plan address decarbonisation of transport. Decarbonising the energy mix is a key pillar of the **Energy Strategy of Georgia 2020-2030**. It is also supported by the **Law on Energy and Water**. In the Land Use, Land Use Change, and Forestry (LULUCF) sector, the **Forest Code of Georgia** is the main policy document which governs forest along with the **National Forest Concept**. In waste, the **Waste Management Code** includes provisions for dealing with biodegradable waste – including reducing the amount going to landfill.

The law of Georgia on Promotion of the Production and Use of Energy from Renewable Energy Sources envisages the adoption of a ten-year renewable energy action plan setting out Georgia's national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2030. It should take into account the effects of other policy measures relating to energy efficiency on final consumption of energy. The plan will also set out adequate measures to be taken in order to achieve national overall targets, including:

- cooperation between local, authorities and central governmental
- planned statistical transfers or joint projects, and
- state policies to develop existing biomass resources and mobilize new biomass resources for different uses.

To meet the requirement of the law, MoESD with international donor assistance has elaborated a ten-year action plan NREAP 2020-2030 that covers the necessary information envisaged by the law. The new NREAP, elaborated in parallel with NECP, is integrated into this document.

Related to **Energy Efficiency**, Georgia is rapidly moving towards a legislative framework to encourage Energy Efficiency in various sectors. The already mentioned Energy Strategy includes significant portions dedicated to energy efficiency. In December 2019, Government adopted 1st National Energy Efficient Action Plan (NEEAP)[6] for the period 2019 – 2021. In 2020, Georgia also adopted a **Law on Energy Efficiency**, **Law on Efficiency of Buildings**, and **Law on Energy Labelling.** The law approximating the Ecodesign Directive (2009/125/EC) has not yet been drafted but this is expected in the near future.

Related to **Energy Security**, Georgia is heavily dependent on energy imports. The goal of energy security is to reduce the dependence on energy imports and to diversify energy import sources and routes. This includes encouraging exploration of domestic resources of oil and gas to a level appropriate within the

6 The new NEEAP, elaborated in parallel with NECP, is integrated into this document.

context of decarbonisation objectives, developing potential gas storage infrastructure, continuing to expand the use of renewable energy to meet domestic needs, and encouraging energy efficiency in transformation, transmission, and distribution of energy supplies. Georgia also plans to significantly increase interconnectivity of its power system by constructing new AC and DC lines to neighbouring countries, which will increase security of electricity supply and create new market opportunities in Georgia and in the region. The dimension of energy security has been elaborated within the framework of the National Security Concept, Energy Strategy 2020-2030, Ten-Year Network Development Plan of Georgia for 2021-2031 and Ten-Year Development Plan for Georgian Gas Transmission Network 2021-2030 and draft Directions and principles of Georgia's Energy Policy.

Related to the **Internal energy market**, Georgia has recently adopted a new **Law on Energy and Water Supply** which is a key piece of legislation establishing the legal framework for generation, transmission, distribution, supply, and trade of electricity and natural gas. The law also regulates issues related to natural gas storage and cross-border trade. The Law also establishes measures to safeguard an adequate security of supply and defines the framework for cooperation with neighbouring countries. Additionally, as part of the law, the **"Concept of the approval of electricity market model**" was developed which sets up a new model of the electricity market that ensures creation of attractive investment environment and opportunity for free choice for the customers, in way of transparent and competitive market development at the wholesale as well as on retail level. Similarly, the law includes development of a new **Natural Gas Market Concept Design** and will have related secondary legislation developed. As mentioned, Georgia has ambitious plans for the development of interconnectors which will also make possible the achievement of ambitious objectives for market integration in order to ensure optimal utilization of the existing and future interconnectors and ensuring system adequacy and flexibility also through the import of electricity – though these market partners will not be members of the EU given Georgia's geographic position.

Related to **Research, innovation, and competitiveness**, there are a number of different activities ongoing in Georgia. **The National Intellectual Property Centre of Georgia "Sakpatenti"** has been set up to support the legal enforcement of intellectual property laws – which are currently in full harmony with international standards. Georgia is a member of all the main conventions and agreements on intellectual property protection. From the period 2012 – 2016, Sakpatenti registered 28 patents in the category "Electrical machinery, apparatus, energy" and 20 patents on "Engines, pumps, turbines, thermal processes, and apparatus". **The Ministry of Education, Science, Culture and Sport** currently has a strategy for education and science and is working on its update. **The Georgian Innovation and Technology Agency (GITA)** (under the supervision of the MoESD) supports innovation projects through a number of programmes including the **Matching Grants Program** and **Innovation Matching Grants Program**. Currently, information on funding from the state budget is available only for Research and Development (R&D) in general and not specifically disaggregated for individual sectors such as energy. There is also the state-run programme "Produce in Georgia" to support local production in various sectors. The **Shota Rustaveli National Science Foundation** (SRNSF) also has funded research and development by universities.

iv. Alternative scenarios

Four scenarios were discussed in the Integrated National Energy and Climate Plan: NECP scenario, BAU scenario, the first alternative scenario - the scenario with the predominant use of wind energy instead of regulatory hydropower plants and the second alternative scenario - the construction of thermal plants instead of regulatory hydropower plants. All four scenarios involve the integration of the same power and generation facilities into the network, but using different energy sources. The pros and cons of each

scenario were considered during the plan preparation process. Based on the priorities and goals of the energy policy of the state, the NECP scenario was selected. In the discussion of alternative scenarios, the possibilities of integration of other sources of energy (except regulated hydropower plants) into the network, the main challenges and their real benefits for the energy sector of the country are presented.

iv.i The first alternative scenario

According to the first alternative scenario, the installed capacity of regulatory hydropower plants of 430 MW and generation of 1500 GW/h is replaced by wind power plants with similar parameters.

However, according to the NECP scenario, it is not possible to integrate more than 750 MW of wind farm capacity into the grid without providing a regulation system by 2030. In the case of utilization of the given capacity, the presence of energy saving technology with a capacity of 4 hours, at least 150 MW capacity, or the construction of a regulating hydropower station of the same capacity will arise.

With this alternative, it becomes possible to utilize local generation sources. The positive side of this alternative is also that the construction of wind power plants and the arrangement of storage technologies require much less time. Nevertheless, due to a number of factors, the proper operation of the system may face shortcomings, in particular, storage technologies are new systems, which will be a challenge for the energy system of Georgia. It should also be noted that during the construction of regulating hydro power stations without infrastructure development, the reliability of the transmission network will not be high, which will prevent the exploitation of storage technologies.

Cost and lifetime of storage technologies are also a challenge. Their operational life is defined as 10-15 years, 150 MW capacity and at least 4 hours are required for charging, which calls into question the cost-effectiveness of this technology.

It should also be noted here that the power plants of the given capacity will occupy quite a large area, therefore the impact on the environment will also increase.

The term of operation of regulatory hydropower stations reaches 100 years. Accordingly, this parameter is 4 times higher than the duration of operation of the wind power plant (25 years), and in the case of saving technologies - 7 times (10-15 years).

This scenario has both positive and negative sides. In particular, it is possible to replace the energy produced by the regulatory HPP with internal sources. Also, the construction of wind farms and batteries together requires much less time than regulating hydropower plants.

On the downside, it's worth noting that energy storage batteries are still a new technology, so there may be operational challenges.

Also, attention should be focused on their viability. The lifespan of batteries is 10-15 years, of wind power plants 25 years, while the lifespan of hydropower plants reaches 100 years. Therefore, one life period of a hydropower station is equal to approximately 4 periods of a wind farm and 7 periods of batteries. In addition, much more investment is required for wind farms and energy harvesters than for regulated hydropower plants.

Risks of impact on nature should also be taken into account. The 430 MW wind power plants will be spread over a large area, so the environmental impact could be much higher than a regulated power plant located in one location.

iv.ii The second alternative scenario

The second alternative, like the first one, is considered to be 430 MW. and 1500 GW/h generation in the form of thermal power plants.

Although it is much easier to regulate the power of thermal power plants, their efficiency also decreases as the load decreases. Their operation period does not exceed 25 years, which is also significantly lower than the rate of regulatory hydropower plants.

It should also be noted that in this case, the emission of harmful gases into the atmosphere increases significantly, which negatively affects air quality and ecology in general. In addition, the country does not have significant reserves of natural gas, which makes generation completely dependent on imported natural gas, which is a challenge for the country's energy security.

The mentioned scenario provides an opportunity to replace the energy generated by the regulatory HPP. Also, the construction of thermal power plants takes much less time than hydroelectric power stations.

However, thermal power plants are less flexible than hydropower plants, and efficiency decreases as generation decreases, so balancing the system can be challenging.

The term of operation of thermal power plants is 25 years, and at the same time, it requires much more investment than the regulatory HPP.

It is worth noting that CO_2 and other harmful gas emissions increase during the operation of thermal power plants, which causes great harm to nature, as well as serious risks to people's health. However, in the case of implementation of the alternative, the target rate determined by the plan - the share of renewable energy of 27.4% in the final energy consumption by 2030 will not be achieved.

Increasing the generation of thermal power plants, due to the lack of active gas deposits, directly increases energy dependence on other countries.

Finally, in case of interruption of imported gas or electricity import, it will not be possible to cover the consumption of the system even for a few hours, thus, there are serious risks for the security of the system.

1.2 Overview of current policy situation

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

Georgia is a transition economy, which is replacing the Soviet command economy with market based economic principles. The economic parameters have improved after the economic collapse of 1990's due to implementation of series of reforms. In 2000, the Parliament of Georgia ratified the protocol of World Trade Organization (WTO) membership, in 2014 Georgia and the EU signed an Association Agreement that includes membership in the Deep and Comprehensive Free Trade Area (AA/DCFTA). Consequently, many legislative acts have been improved and brought in compliance with European Union legislation.

In 2020, gross domestic product (GDP) in current prices and GDP per capita of Georgia were 49.3 billion GEL (15.8 million USD dollars) and 13,234 GEL (4,256 USD dollars) respectively[7]. From 2010 to 2017 the average growth rate of real GDP was 4.8%[8].

Georgia took important steps in terms of investment environment improvement. Georgia has moved from 16th to 9th place in doing-the business rating of the World Bank in 2018 and thus entered the top 10 list.

Georgia's energy system is in a state of active development and reforms are particularly influenced by the Association Agreement signed with the European Union and its Energy Community membership in 2017.

Under the Association Agreement and the Energy Community Treaty, Georgia took an obligation to transpose EU energy directives and will have to comply with the requirements of the third energy package. The priority of these reforms has been to enhance the legal and regulatory framework for doing business, along with deregulation, which has helped to trigger strong economic growth.

Based on energy balance data[9], in 2020, the total primary energy supply in Georgia was 57,472.5 GWh and final energy consumption around 52,182.3 GWh (including non-energy consumption)[10].

Fossil fuels accounted 70% of primary energy consumption in Georgia. Almost all fossil fuels (95%) are imported from neighbouring countries which means that energy security and independence are important for the country – especially since there are strained relationships within the region. Moreover, there is a trend of an increase in fossil fuels consumption in recent years. The largest increase can be seen in natural gas imports partly as a result of increased natural gas connections to households since 2015. In this context energy efficiency is an essential component of sustainable development of Georgia's energy sector. Energy efficiency in combination with promotion of use of local renewable energy sources is internationally recognized as the most cost-effective way of reducing dependency on fossil fuels and reducing energy usage in general. Figure 1-1 shows energy consumption according to type of fuel and Figure 1-2 shows the percentage of final energy demand according to the sector in 2020[11].

7 Geostat (2022) Gross Domestic Product (GDP). Available at https://www.geostat.ge/en/modules/categories/23/gross-domestic-product-gdp

8 Ministry of Environmental Protection and Agriculture of Georgia (2019) Georgia's 2nd Biennial Update Report under the United Nations Framework Convention on Climate Change

9 Geostat (2022) Energy Balance of Georgia

10 Importantly, there is additional analysis underway to estimate heating consumption which may result in revised figures.

11 Based on Energy Balances for each year from Geostat

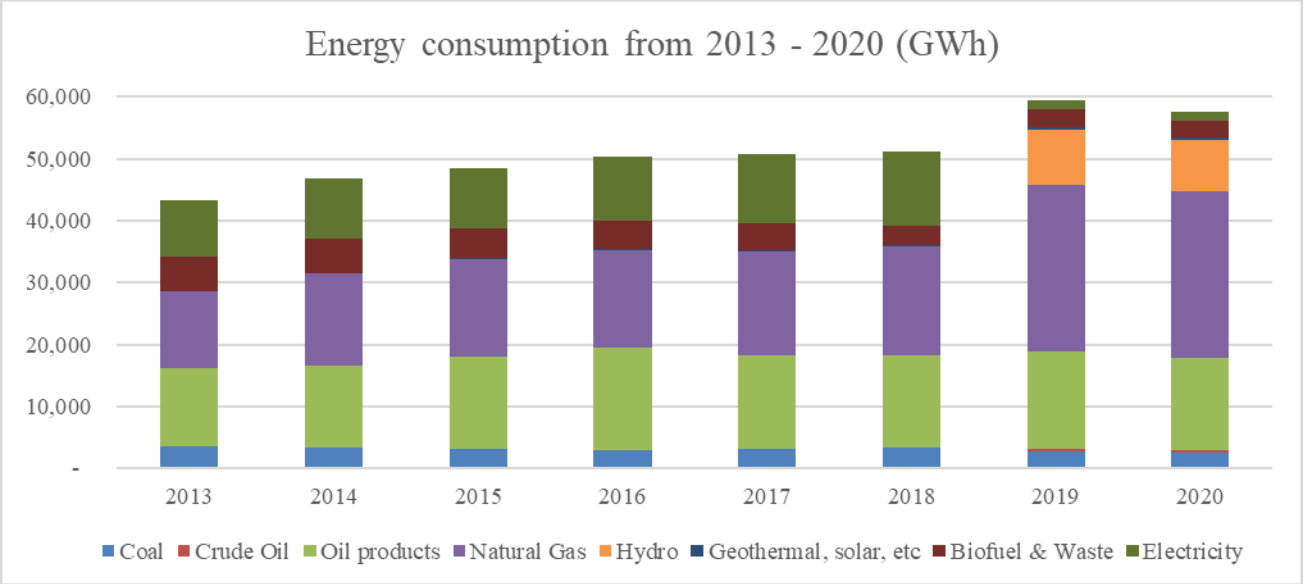


Figure 1-1: Graphical representation of final energy consumption according to fuel – 2013 and 2020

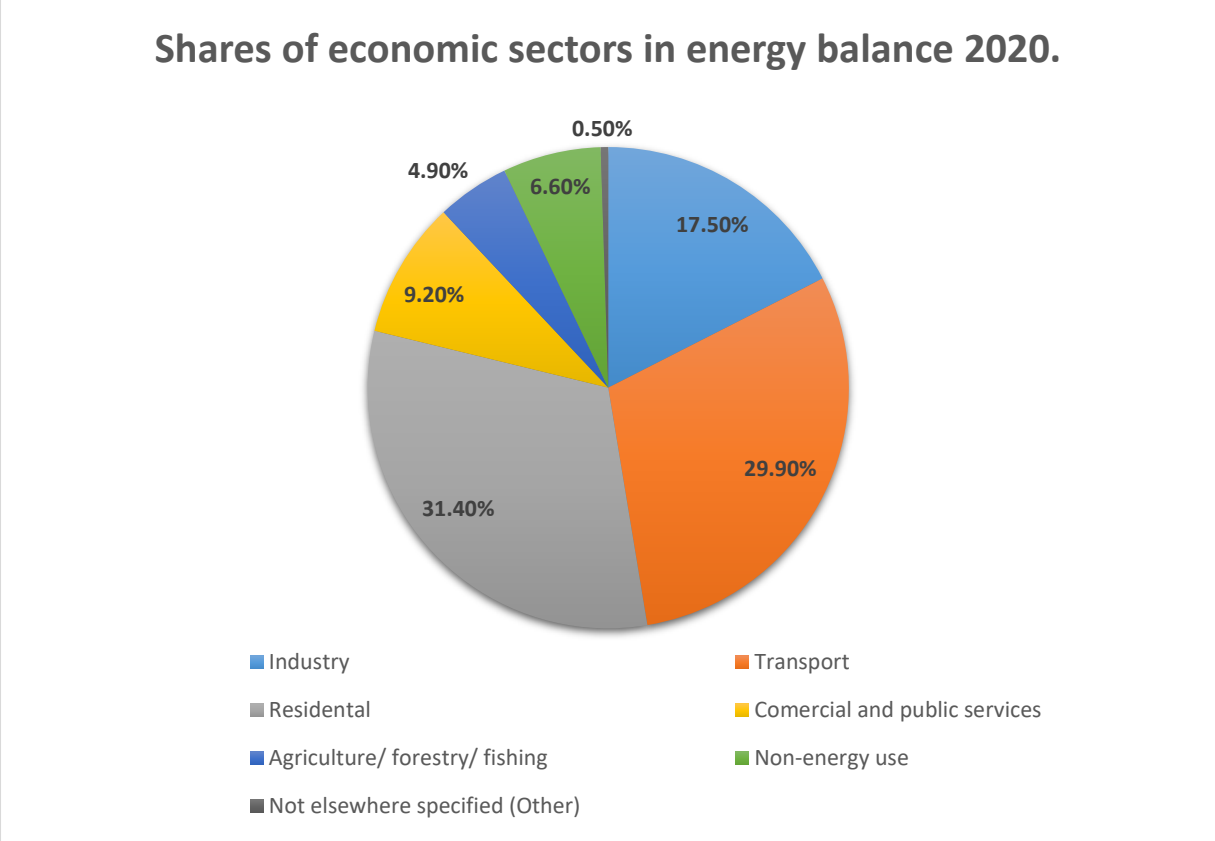


Figure 1-2: Shares of economic sectors' energy consumption in 2020

In 2019, the total electricity generation capacity of Georgia was 4 166 MW. The capacity of regulating hydropower plants was 2381 MW; the capacity of seasonal run-of-river hydropower plants - 939 MW;

Qartli wind farm - 21 MW; combined and coal-fired thermal plants: 815 and Natural gas turbine 110 Mw. the shear of hydropower plants in total energy capacity is 73%. The shear of regulatory hydro power plants is 52,2%[12]. The direction of Georgian energy policy was established by **"On the main directions of the state policy in the field of energy of Georgia"**[13] which came into force in Georgia in June 2015, the aim of which is to develop a long-term comprehensive state vision, with a special emphasis on the utilization of Georgia's renewable energy resources. The key priority of the energy policy is a full satisfaction of customer demand for electricity with the maximum possible utilization of local hydropower resources, initially alongside imports, and, eventually, by substituting imports with local generation. Additionally, the utilization of the country's local indigenous renewable energy sources such as wind, solar, and geothermal, became one of the major areas of Georgia's energy sector development[14]. This is linked with the energy security of Georgia – to decrease its dependence on foreign sources of energy (in particular fossil fuels).

In 2019, a new **Energy Strategy of Georgia** was developed and adopted. The Strategy was developed in compliance with "The Main Directions of the State Policy of Georgia in the Energy Sector" (described above). It reflects the current condition, visions, priorities, and challenges existing in the Georgian energy sector as well as their solutions. The strategy covers the years 2020-2030. The draft Energy Strategy covers the planned investments and policies to be implemented in the coming 10 years. These investments and policies are included in the relevant sections of this NECP as well.

The Government of Georgia has been working on improvement of self-sufficiency and security of supply via the utilization of local renewable energy sources. Another important direction is reduction of import dependency, which relates to improved interconnections – in particular for electricity grid connections – with neighboring countries. Reducing network losses will reduce imports to a negligible extent, it is necessary to utilize local energy sources and increase the reliability of the energy network.

In December 2019, a new Law on Energy and Water Supply[15] took effect which revises the legal framework of the national energy system for electricity and natural gas to become consistent with the EU's Third Energy Package – though with exemptions for gas interconnectors until the end of the Treaty in 2026.

In committing itself to transforming its electricity market to one similar to EU's internal electricity market, the Georgian Government has taken steps towards to implementing reforms with the goal of establishing an electricity market in compliance with EU's Third Energy Package, supported by a Policy Based Loan with KfW and AFD. This Project consists of 26 technical assistance measures (TAMs) which focus, on the one hand, on deploying energy efficiency within Georgia, and, on the other hand, on deploying an EU-style organised market as envisaged in the Third Energy Package in the context of the Georgian electricity sector. Accordingly, the Project is in the support of the ongoing Georgian Electricity Sector Reform Programme, as shown in the following table:

12 The plan and policy provide data for 2019 as modeling was done using data from that year. See link: https://www.gse.com.ge/sw/static/file/TYNDP_GE-2019-2029_GEO.pdf . According to the energy balance of 2023, the existing capacities of power plants are distributed as follows - regulatory hydroelectric plants: 2381 MW, seasonal hydroelectric plants: 995 MW, combined and coal-fired thermal plants: 1079 MW, air turbine: 110 MW and wind power plant: 21 MW. see Link: https://www.gse.com.ge/sw/static/file/TYNDP_GE-2023-2033_GEO.pdf

13 Available at: https://matsne.gov.ge/ka/document/view/2894951?publication=0

14 https://www.iea.org/countries/Georgia#policies

15 Available at https://matsne.gov.ge/ka/document/view/4747785?publication=8

Table 1-1: Technical Assistance Measures from KfW

Component	Element Budget	Technical Assistance Measure (TAM)	TAM No.
PMO		PMO Agent	1
Energy Efficiency Component 1: Introduction of minimum energy efficiency standards	EUR 742,500	Monitoring and support of the implementation of NEEAP I, Directive 2012/27/EU and Directive 2010/30/EU	2
		Support the development of the second-round energy efficiency plan and vision	3
		Support in the enforcement of legislative package EPBD	4
		Support in the establishment of an energy efficiency scheme	5
	EUR 297,000	Support the development of national calculation methodology for energy performance of buildings and methodology for calculating cost-optimal level of minimum energy performance	6
		Obtain software for calculation of energy performance and training to use it	7
Energy Efficiency Component 2: Certification & Inspection	EUR 1,949,664	Study on the governance and institutional set-up of the accreditation and certification schemes for energy efficiency	8
		Capacity development for energy auditing as well as certification and inspection of energy efficiency measures in compliance with international standards and quality requirements and support of the institutionalisation of auditing	9
		Support for implementing inspections	10
		Capacity building for certification and inspection of energy efficiency measures	11
Energy Efficiency Component 3: Training, Awareness & Studies	EUR 342,000	Support to the preparation of secondary acts on energy efficiency on, amongst others, institutional setting, financing instruments for energy efficiency, energy efficiency procurement procedures, mandatory certifications, standardise energy performance certificates, metering, informative billing and energy audits	12
		Support to energy efficiency act(s) that will focus on the construction sector including different energy efficiency requirements according to the various categories of buildings. In particular, the act(s) shall set out separate energy efficiency standards and targets for existing stock of buildings and new buildings	13
		Support for establishing a scheme for incentivising the investment into energy efficiency in buildings in all sectors, by assessing the different options for energy efficiency funding, including a study on options for financing schemes for energy efficiency in public sector	14
	EUR 90,914	Support through workshops, consultations, guidelines and capacity building to the Georgian construction sector in adapting and	15

Component	Element Budget	Technical Assistance Measure (TAM)	TAM No.
		applying energy efficiency standards into day-to-day business	
	EUR 826,495	Support of energy efficiency market development (studies, roadshows, clustering, technology transfer, Policy Impact Assessment etc.)	16
		National awareness raising campaign for all relevant sectors (public institutions staff, construction, private and finance sector, CSOs)	17
		Information and awareness raising campaigns for the general public designed to explain and illustrate the benefits of the legislation, measures and financing opportunities, as well as, training and capacity building of experts and key implementing institutions	18
Energy Efficiency: Component 4: Preparation for large scale energy efficiency related investments in buildings	EUR 297,000	Development and support for enhancing management capacities in selected institutions with relevance for the sector	19
	EUR 1,070,427	Develop a national public building renovation strategy, including project pipelines for all energy efficiency related investments as well as support to the Georgian Government in preparation of the energy efficiency investments in buildings	20
		Support the creation of an inventory of all public buildings to evaluate potential for energy efficiency	21
		Support to developing updated saving targets	22
		Elaboration of the lessons learned from elements of demonstrations to be considered in the residential/commercial sector (e.g. conducting audits, certification, inspections, inventories etc.)	23
Wider market reform to support commodity pricing and thus energy saving & conservation	EUR 1,710,000	Support for the establishment of renewable energy strategic framework	24
		Capacity building: Day-Ahead Market Operation, Market Participation, and Hydropower Optimisation, including software for market participants	25
Communication	EUR 270,000	Designing and implementation of a Communication and Visibility Plan	26

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

1.3 Dimensions

a) Decarbonisation

The decarbonization dimension has two key elements:

- Greenhouse gas (GHG) emissions and reduction of these emissions;

- Renewable Energy Sources (RES).

a.1. Greenhouse gases

The issue of climate change on a global scale is addressed by the UNFCCC. Related to the Paris Agreement, Georgia intends to participate in Emission trading system (referred to in Article 6 of Paris Agreement). On September 25, 2015, Georgia submitted its Intended Nationally Determined Contributions (NDC) to the Secretariat of the UNFCCC. Georgia has committed to unconditionally reduce greenhouse gases by 15%, compared to the Business As Usual (BAU – or baseline) scenario and this reduction will increase to 25% in case of international assistance. The 25% reduction below BAU scenario would also ensure that Georgian GHG emissions by 2030 will stay at 40% below the 1990 levels[16].

Through approval of the Paris Agreement on 7 June 2017, Georgia joined 197 countries with a joint effort to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

After the approval of Paris Agreement, Georgia announced that it would submit an updated, NDC document by 2020. The updated NDC was initially drafted in 2020 and, together with 2030 Climate Change Strategy and 2021-2023 Action Plan, has been approved by the GOG in April 2021. The targets of the updated NDC are as follows[17]:

1. Georgia is fully committed to an unconditional limiting target of 35% below 1990 level of its domestic total GHG emissions by 2030 (i.e., not exceed 29.25 million tonnes CO2eq – not including the Land Use, Land Use Changes and Forestry (LULUCF) sector);

2. Georgia is committed to a target of 50-57% of its total GHG emissions by 2030 compared to 1990, in case the global GHG emissions follow the 2 degrees or 1.5 degrees scenarios respectively, with international support;

3. The updated NDC of Georgia includes a Climate Change Strategy and Action Plan (CSAP) for the determination of mitigation measures contributing unconditional and conditional mitigation targets achievement;

4. Georgia is committed to study its adaptive capacity to climate change by mobilising domestic and international resources for the sectors particularly vulnerable to climate change.

As stated in the target 3 of the updated NDC, the CSAP is set as a tool for the determination of mitigation measures. In 2020 MEPA with technical assistance of GIZ developed Georgia's 2030 Climate Change Strategy and 2021-2023 Action Plan, which was approved on April 2021. The 2021-2030 CSAP identifies measures and actions that support the development of the Georgian economy and infrastructure in a way which sets Georgia on a pathway to meet its international obligations and national ambitions for climate change mitigation. It serves as an action plan for the implementation of Georgia's existing NDC, but also as an important orientation to inform the determination of an appropriate and realistic level of ambition when updating the NDC in future revision cycles. The action plan will be updated on a 2–3-year cycle, to be aligned with future revisions of the NDC and the NECP – ensuring coherence between sectoral policies, the NDC, and the NECP.

In addition to above mentioned agreements and strategies, as of December2022, 26 subnational authorities in Georgia have become signatories to the Covenant of Mayors, committing themselves to the

16 First NDC of Georgia

17 Georgia's Updated NDC

development of Sustainable Energy and Action Plans (SEAPs). The SEAPs include GHG emission reduction targets for municipalities, as well as targets and actions for reducing energy demand and increasing energy efficiency, over a period up to 2020 or 2030. Some SEAPs have a direct overlap with the plans identified in the CSAP and are reflected in the sector-specific chapters of this NECP in section 3. As part of the process of developing this NECP, various municipalities were consulted to ensure alignment with their plans.

a.2. Renewable Energy

Policies regulating various aspects of renewable energy are incorporated in primary and secondary energy legislation of Georgia. Most specifically, this relates to easing the regulatory burden for the access to the grid for renewable electricity producers. The legal framework has been updated as of 20 December 2019 with the adoption of a special **Law on encouraging the production and use of energy from renewable sources (Renewable Energy Law)**[18] which approximates the requirements of Directive 2009/28/EC. More information on the measures / aspects of the law are included in Section 3.1.2 of this report. The 1st **National Renewable Energy Action Plan (NREAP)** [19] was adopted in December 2019.

Georgia has also adopted a **new Law on Energy and Water Supply**[20]**.** This law is a key part of legislation regulating the energy sector. The Law governs natural gas and electricity markets and at the same time explicitly lays out potential support mechanisms for renewable energy and energy from highly efficient sources – such as priority of dispatch, licensing procedures, and other forms of support.

In terms of national main energy sector strategic document, as already mentioned above, in 2019 Georgia completed and adopted the **Energy Strategy of Georgia 2020-2030** where renewable energy represents one of the pillars of the development of Georgian energy sector. Additional information on the Strategy and related measures is included in Section 3.1.2.

In 2015, the Ministry of Energy approved and adopted the **"Ten-year network development plan of Georgia for 2015-2025"** which was prepared by the Transmission System Operator (Georgian State Electrosystem - GSE) and has since been updated for the period 2023-2033[21]. This is the time-bound program designed for reinforcement of national transmission system infrastructure, addressing the existing problems, responding to the future challenges, and implementing the opportunities. One of the core subjects identified in the document is the integration of renewable energy sources into the network, which still remains a major challenge for wind and solar based electricity generation.

b) Dimension – Energy Efficiency

As already mentioned, Georgia has adopted a new Energy Strategy which among others covers the energy efficiency. According to the Strategy, in Georgia, due to the highly inefficient thermal characteristics of buildings, with this sector comprising 40% of all energy consumption in Georgia in 2019. Most of the buildings in the country are built according to the Soviet-era norms, which resulted in a situation that 250-300 kWh / m2 is spent for heating per year. After the deregulation of the construction sector in the post-Soviet period, this parameter (in some cases) became significantly higher[22]. Analysis of the results of

18 Document 5652, available here: https://matsne.gov.ge/en/document/view/4737753?publication=1

19 The new NREAP, elaborated in parallel with NECP, is integrated into this document.

20 Document 5646 available at https://matsne.gov.ge/en/document/view/4747785?publication=4

21 Then year network development plan: https://www.gse.com.ge/sw/static/file/TYNDP_GE-2023-2033_ENG.pdf

22 In Europe for example, this figure varies between 60-100 kWh/m2 despite often harsher climates and higher levels of comfort.

different studies shows that the heating costs can be significantly reduced. In particular, in new energy-efficient buildings in Tbilisi, energy consumption per m^2 can be about 40% lower compared to the current parameter. It is worth noting that district heating systems existed in various cities in the past but were abandoned due to fuel shortages and lack of maintenance. Aside from buildings, the main sectors for energy consumption are transport (31%) and industry (19%).

The Energy Strategy envisages promotion of various measures and initiatives specified in the State Energy Efficiency Policy, which may include:

a) Identification of projects, technical assistance and grant allocation schemes;
b) Adoption of energy efficiency regulations for buildings, including the rules for certification of their energy efficiency parameters; improvement of professional qualification in the construction sector;
c) Deepening of knowledge among business sector representatives; adoption of rules for energy audit and energy management systems and raising the qualification of energy auditors and service providers;
d) Improvement of the level of knowledge and experience in the field energy efficiency among entrepreneurs working in industry and trade and among final consumers of energy in government organizations;
e) Introduction of energy-efficient practices in public procurement;
f) Improvement of efficiency in the transmission/ transformation/ distribution sectors, which includes reduction of electricity and/or natural gas losses in networks and increase of the efficiency of gas fired thermal power plants by switching to the combined-cycle;
g) Improvement of the efficiency of end-use equipment, including: introduction of efficient lighting and wood stoves; improvement of the efficiency of cars, pumps, engines and boilers;
h) Introduction of financial and tax incentives to promote energy efficiency measures;
i) Implementation of qualification, accreditation and certification schemes in industry, buildings and other relevant sectors.

The legislative framework is in the process of being fully developed for the implementation of the energy efficiency policy. Already, Georgia has adopted the following key laws related to energy efficiency:

The **Law on Energy Efficiency** came into force on 28 May 2020. The Law transposes the EU's Energy Efficiency Directive (EED - 2012/27/EU), to ensure that Georgia to meet its commitments under the Energy Community Treaty and the EU Association Agreement, and achieve the goals set out in the NEEAP[23].

Specific elements of the Law include:

- Establishes the NEEAP as the document for establishing EE targets at a national level
- Requirement of public bodies to purchase EE equipment where feasible
- Request of local Municipalities to develop annual energy efficiency plans
- Plan for establishment of a web-based Measurement, Reporting, and Verification (MRV) system
- Establishment of the legal basis for energy performance contracting

23 The new NEEAP, elaborated in parallel with NECP, is integrated into this document.

- Requirements for energy audits or energy management systems amongst non-Small and Medium Sized Enterprises (SMEs) and encouragement of energy audits / energy management systems amongst SMEs
- Establishment of a legal basis for voluntary agreements with industries for the improvement of energy efficiency
- Requirements of feasibility studies for possibilities of cogeneration for new installations with over 20 MW of thermal input
- Establishment of legal requirements for metering and billing for consumers of energy
- Requirement for setting up of certification programmes for energy auditors and for publication of information on them
- A requirement that 1% of central-government owned and occupied buildings with a total useful floor area over 500 m2 should be renovated each year to meet EE standards (the list would be published in secondary legislation and the EE standards would be part of Energy Performance in Building secondary legislation)
- Sections encouraging end-user energy efficiency amongst consumers via awareness raising, financial measures, and training.

To fully implement the law, a number of pieces of secondary legislation (such as defining the processes for energy audits and defining appropriate MRV systems) will be developed in the coming period (expected 2022).

Under requirements of the Energy Efficiency Directive (and in keeping with the requirements of the EE Law), Georgia has developed its 1st National Energy Efficient Action Plan (NEEAP)[24] for the period 2019 – 2021[25].

The **Law on Energy Efficiency of Buildings** (which came into force on 29 May 2020), developed according to the Energy Performance in Buildings Directive 2010/31/EU adjusted to Energy Community Contracting Parties circumstances. This adopted Law includes specific relevant provisions to:

- Require private buildings sold or rented and all public buildings with more than 500 m^2 (lowered to 250 m^2 on 30 June 2023) and visited often by the public and to have energy performance certificates;
- Set minimum energy performance standards for primary energy consumption for new buildings or buildings which undergo major renovations – to a cost-effective level;
- Require that all new buildings shall satisfy the requirements of Nearly Zero Energy Buildings unless it is not cost-effective to do so;
- Requires regular inspections of heating systems and air-conditioning systems;

24 The new NEEAP, elaborated in parallel with NECP, is integrated into this document.

25 The National Energy Efficiency Action Plan has been integrated into the Integrated National Energy and Climate Plan, therefore it is not considered as a separate strategic document.

- Encourages public education on the topic of EE in buildings and review of financing measures to encourage EE.

In order to fully approximate the Directive, in the coming period Georgia will develop various secondary legal acts including:

- The development of a national calculation methodology for energy performance of buildings with national annexes (default input values) – setting a National Standard and providing technical assistance in laying down the methodology for calculation of energy performance of buildings in line with requirements of Directive 2010/31/EU and new European standards;

- Providing support for the adoption of relevant supporting national standards which outline the methodologies for calculation of energy performance of buildings (within the national calculation methodology), compliant with relevant European (CEN) standards in force and provisions of Directive 2010/31/EU.

The Law on Energy Labelling[26] (which came into force on 31 December 2019) requires mandatory labelling standards for energy consumer products though secondary legislation must be developed for specific products.

The law approximating the **Ecodesign Directive (2009/125/EC)** has not yet been drafted but this is expected in 2022 along with secondary legislation (regulations) for both ecodesign and energy labelling.

In addition to above mentioned main laws related to energy efficiency there are other documents that target energy efficiency context in their aims such as the **Social-economic Development Strategy of Georgia 2020**. That strategy contains a principle related to energy efficiency. More specifically, it states that energy efficiency will be enhanced, and relevant legislative mechanisms will be drawn up in accordance with international and European norms in order to preserve the country's energy resources. The efficient use of energy is important as a means of increasing the country's energy independence and rational use of resources and can potentially decrease future costs.

Additional technical assistance programmes are currently being developed to help to fully approximate Georgia's legislative framework with that of the EU. This is most notably linked to a KfW policy-based loan linked with a large technical assistance programme and additional technical assistance from the Energy Community Secretariat.

c) Dimension – Energy Security

Georgia does not have significant oil and gas reserves. As a result, about 79% of country's primary energy supply is from external sources. Imported natural gas constitutes about 47% of total energy supply while imported oil products constitute about 28% of energy mix. Own hydro generation supplies a significant amount of internal demand (though does not cover all of electricity consumption) and constitutes 14% of total energy supply and the rest is fuel wood.

Virtually 80% dependence on imports can be critical for the country's limited energy security due to the limited number of suppliers. This can also negatively impact economic growth and welfare of many consumers. The main solution for neutralizing this threat is to diversify Georgia's supply sources and routes. The MoESD is responsible for energy security and is working with state-owned companies such as

26 Available at https://matsne.gov.ge/ka/document/view/4745123?publication=0

Georgian Gas Transportation Company (GGTC), Georgian Oil and Gas Corporation (GOGC), and Georgia Energy Development Fund (GEDF), in this direction. Specifically, the possibility of receiving natural gas from Turkmenistan and/or Iran on the basis of swap deals, with the participation of Azerbaijan or Armenia, is being discussed. However, due to the complexity of the corresponding gas transportation infrastructure, the complexity of the supply schemes and/or the disadvantageous value of gas, the possibility of receiving gas from these countries to the Georgian market is mainly considered as a long-term prospect[27]. One of the aims of the new Law on Energy and Water Supply (see the section below) is to align incentives in the market in a way to improve the possibility of investment in infrastructure to improve energy security.

The new **Energy Strategy** states that to mitigate dependence on imports to some extent and increase the country's energy security, more emphasis will be placed on increasing the exploration and extraction of local gas supplies. Even if 5% of the country's proven natural gas reserves are extracted annually, gas production could amount to about 200 million m^3, which increase the current share of local gas in the country's total consumption (about 0.3% in the current period) up to 7.5-8%.

Retail supply of natural gas transformation products to the country's distribution network, due to the minimal initial investment needs, is a more viable alternative compared to the construction of new pipelines and may serve as a basis for sustainable and secure energy supply in regions with minimal environmental impact[28]. There is also currently a plan to develop a large gas storage facility (500 million m^3) to improve the security of energy supply[29].

In 2020, Georgia consumed almost 11.5 TWh of electricity, of which 87% was locally generated. In order to guarantee stable supply of electricity, Georgia has partnered with its neighbours. Also in 2020, Georgia imported 13% of its electricity from Turkiye, Azerbaijan, Armenia, and Russia – its neighbouring electricity trade partners, of which Azerbaijan was the top exporter, followed by Russia[30].

In 2019, 75% of all local electricity generation came from hydropower plants[31]. The hydropower plants produce an excessive amount of energy during the summer seasons (when snow & ice are melting), while falling short of satisfying energy demands during the winter seasons (which is often the peak in consumption). To address this energy security problem, Georgia must build constructions of generation facilities, such as with new hydro-electric power stations, wind-power, solar power, and more flexible sources such as pumped storage hydro, and a large Combined Cycle Gas Turbine (CCGT) plant. Additional focus on energy efficiency will also contribute to energy security.

There has been a significant improvement in Georgia's energy security standing over the last several years. Together with development of Shahdeniz field in Azerbaijan more natural gas became available to Georgia both as in-kind fee for transit, and also for direct purchase from Azerbaijan. Georgia has reoriented its gas purchases and has concluded a long-term agreement with the company SOCAR to supply the gas at fixed

27 Energy Strategy 2020-2030

28 Energy Strategy 2020 - 2030

29 In addition, the possibility of transforming natural gas received from diversified sources into different products [e.g.: liquefied natural gas (LNG), compressed natural gas (CNG), and liquefied petroleum gas (LPG)] and delivering such products to the mountainous regions that are not covered by the main gas pipeline system, is being discussed. These products can also be effectively used as fuel for motor and maritime transport and towing. Replacing of diesel-powered engines with LNG (CNG) engines will significantly reduce both operating costs and adverse environmental impacts.

30 https://euneighbours.eu/

31 According to Georgia's Electricity Market Operator ESCO, the organisation responsible for the sale, purchase and balance of electricity

price as well as to supply gas in emergencies. Georgia has become more self-sufficient in electricity due to hydro-plant rehabilitation[32].

Georgia reaps the benefits of being a transit country for natural gas as it receives both an in-kind fee and monetary compensation for natural gas transit, and it benefits from foreign direct investment to the country provided by projects like the South Caucasus pipeline expansion.

Key legislation relevant for the dimension of energy security include:

- Law of Georgia on Energy and Water Supply[33] (20 Dec 2019), incorporating the following from the EU's *acquis communautaire*:
    - Directive 2009/72/EC
    - Regulation (EC) No 714/2009
    - Directive 2005/89/EC
    - Directive 2009/73/EC
    - Regulation (EC) No 715/2009
    - Directive 2004/67/EC
- The Law on Oil and Gas[34] (16 Apr 1999)

The most important policies currently being implemented for the purpose of ensuring energy security are shown in the table below.

32 http://weg.ge/sites/default/files/energy_security_georgia_perspective.pdf

33 Document 5646rs available at: https://matsne.gov.ge/en/document/view/4747785?publication=4

34 Document 1892 available at: https://matsne.gov.ge/en/document/view/18424?publication=25

Table 1-2: Key policies / measures related to energy security in Georgia

Policy/ Measure	Description
National Security Concept	In 2011 Georgia published its latest National Security Concept[35]. The National Security Council is updating the national security concept and will submit to the parliament of Georgia in the nearest future.
Security of Electricity Supply Rules[36]	Adopted on 2 Dec 2020. It incorporates main provisions of the Regulation (EU) 2019/941 on risk-preparedness in the electricity sector and includes 3 annexes: 1. Methodology of Identification of National Electricity Crisis Scenarios 2. Methodology of seasonal and short-term adequacy assessments 3. Methodology of medium and long-term adequacy assessment
The Risk Management Plan in electricity sector	Pursuant to Articles 7- 8 of SoS rules, the Ministry, in cooperation with IGES (Inter-institutional Group for Energy Security)[37], and in case of necessity other energy enterprises and organizations representing household and non-domestic consumer interests shall establish a risk management plan.The Energy Community has set January 5, 2025 as the deadline for approval of the mentioned plan.. Plan shall be updated at least every four years.
Security of Gas Supply Rules	These rules are currently under development
Monitoring report of Security of Supply (Electricity and Gas)	Pursuant to Article 167 of the Law of Georgia on Energy and Water Supply, the Ministry of Economy and Sustainable Development of Georgia, in cooperation with relevant agencies, has developed a Power Supply Security Report (2021), which is approved and available on the Ministry's website in both Georgian and English. The deadline for receiving the natural gas supply security report is determined by the same law, no later than March 31, 2022.
Electricity Network Rules[38]	Adopted on 17 Apr 2014. These govern the technical requirements for electricity connection.
Electricity Market Rules[39]	Adopted on 11 Aug 2020. These govern the rules for (amongst other things) day ahead and hour ahead trading.

35 Available at https://mod.gov.ge/uploads/2018/pdf/NSC-ENG.pdf

36 Document 1-1/520 available at: https://www.matsne.gov.ge/ka/document/view/5043284?publication=0

37 IGES shall be compiled with the representatives of the Ministry, the Commission, the transmission system operator, and other relevant stakeholders in the field of security of electricity supply. IGES shall serve as the inter-institutional co-ordination platform for energy security issues and its meetings are convened by the Ministry as needed. The Ministry shall be entitled to adopt detailed rules on the set-up and organization of IGES.

38 Available here: https://matsne.gov.ge/ka/document/view/2322689?publication=0

39 Available here: https://www.matsne.gov.ge/ka/document/view/4966631?publication=0

Gas Network Rules	Adopted in August 2018. It is planned to update the rules before June 2022.
Gas Market Rules[40]	Adopted 29 Dec 2006 and amended in the meantime. These govern the roles and responsibilities for actors in the natural gas market.
Ten Year Network Development Plan of Georgia 2021-2031 [41]	TSO (GSE) updates the plan every year. According to the Article 53 of the Energy Law, transmission system operators, each year, shall submit to the Commission a ten-year transmission network development plan based on existing and forecast supply and demand.
Ten-Year Development Plan for Georgian Gas Transmission Network 2021-2030 [42]	GOGC updates the plan every year which outlines the strategic direction and planned investments in the sector. It is planned to strengthen capacity of GGTC (the Transmission System Operator), which will be responsible for the TYNDP in the future.
GNERC Annual Reports[43]	Every year, GNERC publishes the report for the previous year, which includes information on reliability, security and efficiency of the transmission system, gas quality, quality of service, reliability of gas delivery, technical characteristics of the system, use of transmission system capacity, maintenance of system equipment and fulfilment of other duties and realization of the rights under this Act. Monitoring of investment implementation by licensee to guarantee security of supply. The Commission also monitors the implementation of investments by regulated enterprises within the framework of approved network development plans and investment plans agreed by it, as provided by the mentioned enterprises on 08/12/2021 N 1 / 08-3-9966 9966-1 / 08-3-2-202112080939 To ensure the fulfillment of obligations.
Law on maintaining mandatory stocks of crude oil and oil products	A bylaw has already been drafted; Its RIA has already been prepared. It is planned to present and approve it in the Parliament in the near future.

d) Internal energy market

As mentioned, on 20 December 2019 Georgia adopted a new **Law on Energy and Water Supply**[44]**.** This law is a key piece of legislation regulating the energy sector. The key objective of the law is to restructure

40 Available here: https://matsne.gov.ge/ka/document/view/68296?publication=0

41 Available here: https://gse.com.ge/komunikacia/publikaciebi/saqartvelos-gadamcemi-gselis-ganvitarebis-atwliani-gegma

42 Available here: https://www.gogc.ge/en/sustainability/development-strategy/12

43 Available here: https://gnerc.org/ge/commission/commission-reports/tsliuri-angarishebi

44 Document number 5646, available here: https://matsne.gov.ge/ka/document/view/4747785?publication=8

the energy market to unbundle the gas and electricity markets as well as create day ahead and hour-ahead wholesale electricity markets (see below). Most of these reforms are set to be carried out by the end of 2022.

This Law establishes a general legal framework for the generation, transmission, distribution, supply of, and trade in electricity, and for the transmission, distribution, supply, storage of and trade in natural gas with a view to the facilitated emergence, opening, development and integration of well-functioning, transparent and competitive electricity, and natural gas markets in Georgia.

This Law lays down the rules relating to:

- the governing, organisation, regulation, monitoring and supervision of electricity and natural gas sectors
- open access to electricity and natural gas markets
- cross-border exchanges in electricity and natural gas
- the criteria and procedures applicable to calls for tenders
- the granting of authorisation for energy activities, operation of and access to electricity and natural gas systems, public service obligations in electricity and natural gas sectors and
- and the rights of customers and their protection.

This Law also establishes measures to safeguard adequate security of supply so as to ensure the proper functioning of electricity and natural gas sectors. It establishes a legal framework within which security of supply policies are being defined, responsibilities of market participants set, and procedures to safeguard security of supply determined in compliance with the requirements of competitive electricity and natural gas markets.

As part of the Law the **"Concept of the approval of electricity market model**" was developed. The concept of the electricity market model sets the guiding principles for organizing and functioning of electricity wholesale market in Georgia that aims to:

a) Set up such a model of electricity market that ensures creation of attractive investment environment and opportunity for free choice for the customers, in way of transparent and competitive market development at the wholesale as well as on retail level;
b) Set up organized electricity markets including day-ahead, intraday, balancing and ancillary services, as well as set of for bilateral market;
c) Definition of the rights and responsibilities among the market subjects and distribution of the functions;
d) Formation of liquidity and competitive price on electricity organized markets, also implementation of financial mechanisms needed for effective and sustainable functioning of the market;
e) Supporting the establishment of supporting mechanisms (schemes) foreseen by Georgian law "On energy generation from renewable sources and utilization encouragement";
f) Identify activities and measures to be implemented in the transition period to the target model;
g) Fulfilment of the commitments undertaken by the protocol "On Accession of Georgia to the founder agreement of Energy Community".

Guiding principles of market concept are:

a) Competitive, free and transparent trade in energy markets;
b) Avoiding the conflict of interests and discrimination;

c) Electricity trade on the wholesale market through the competitive market mechanisms, namely, by bilateral agreements and/or on electricity-organized markets, including the day-ahead, intraday and balancing markets;
d) For electricity by producers benefiting from support schemes and for electricity produced by producers which have obligations for providing electricity for public service (i.e. are regulated plants such as Enguri or Gardabani) trading will only be allowed on organized markets;
e) Definition of generation and consumption hourly schedules, also determination of electricity generation/ consumption means and their load by the parties responsible for the planning (self-dispatching)
f) Hourly trade on organized markets and accordingly, the responsibility of each market participants for the imbalances caused by them in each hour;
g) Purchase of electricity only for the day ahead and intraday markets to cover losses by system operators;
h) Cross border capacity allocation based on transparent and fair rules.

The current task is to develop secondary legislation as needed for the completion of the legislative framework – then implementation of the various aspects described above. It is expected that in the coming 2–3-year period this will be carried out though some related investments will take longer.

Currently, the natural gas transmission network is owned by the Georgian Oil and Gas Corporation, a subsidiary of the Georgian Natural Gas Transmission Network Owner Ltd.

The South Caucasus Pipeline (SCP), which crosses Georgia from Azerbaijan to Turkiye, is not part of the domestic transmission system and is owned by a consortium led by BP and Azerbaijan's SOCAR. BP also acts as the pipeline's technical operator. SCP functions on the basis of an Intergovernmental Agreement and corresponding contracts and is exempt from the application of the national regulatory framework. The Accession Protocol exempts SCP from the implementation of Directive 2009/73/EC and Regulation (EC) No 715/2009 until 31 August 2026, the date of expiration of the Energy Community Treaty. Based on this exemption, the SCP's operator is also released from the unbundling obligation.

Out of 22 gas distribution companies licensed by GNERC, only three – SOCAR Georgia Gas, Tbilisi Energy and Sakorgas – exceed the threshold of 100,000 connected customers and are subject to mandatory legal and functional unbundling. All three companies are vertically integrated and are engaged in gas supply activities as well as in operation of gas distribution networks.

In 2019, Energy Community experts in close cooperation with GNERC and GOGC launched an EU4Energy technical assistance assignment aimed at developing a natural gas storage tariff methodology. The overall objective of the project is to enhance Georgia's energy security, ensure an uninterrupted supply of natural gas in case of any temporary disruption and to contribute to the improvement of legislative and regulatory environment of the Georgian natural gas market. The draft methodology compliant with the provisions of Directive 2009/73/EC and Regulation (EC) No 715/2009 and a tariff calculation tool was delivered with EU4Energy assistance in 2019.

Additional technical assistance programmes are currently being developed to help to approximate Georgia's legislative framework related to the energy market with that of the EU.

e) Dimension - Research, innovation, and competitiveness

Research and innovation are of strategic importance for sustainable development of the country. The Law of Georgia on Science, Technologies and their Development recognizes the development of science and research as a part of country's socio-economic policy. According to the same law, one of the goals of the state research and development management policy is "to set priorities for certain fields of science based on the forecasts of socio-economic development of Georgia". Accordingly, science, research, and development management as well as its funding in Georgia is carried out without proper reference to specific specialization and socio-economic development needs. In particular, there is no targeted funding for energy and climate change related research through which the government would be able to develop scientific potential and knowledge in this area.

Management of the Georgian science, technology, and innovation (STI) system is regulated by several laws:

1. The Law on Science, Technology and Their Development (1994)
2. The Law on Grants (1996)
3. The Law on Higher Education (2004)
4. The Law on Education Quality Improvement (2010)
5. The Law on Innovations (2016).

Policy directions and strategic decisions are made by parliament and government in consultation with academic and scientific research committees composed of relevant government and business representatives. Policy is prepared and implemented by the Ministries: The Ministry of Education and Science of Georgia (MES) implements the policy of research and science development, while the Ministry of Economy and Sustainable Development (MoESD) Is Responsible for innovation development policy.

A necessary precondition for innovations and R&D is comprehensive system of intellectual property rights protection. National Intellectual Property Centre of Georgia “Sakpatenti” is a governmental agency that determines the policy in the field of intellectual property. Since its establishment and with the direct participation of “Sakpatenti” up to 30 laws, by-laws, and numerous guidelines, regulating the legal mechanisms of accrual and enforcement of IP rights on different subject-matters were prepared and enacted. The current legislation is in full harmony with international standards, namely, it is in line with the requirements of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) administered by the World Trade Organization and is also compatible with the European Union legislation. At present Georgia is a member of all main conventions and agreements on intellectual property protection and is a party to a number of bilateral international treaties.

There is Department of Inventions, Designs and New Breeds and Varieties as a structural unit of Sakpatenti. Apart from other duties and competences the Department is responsible for preparation of patent certificate and registration of patents, transfer of registered materials for secondary publication and preparation of a list of registered patents.

There has also been an effort to develop a Low Emissions Development Strategy (LEDS) which would include measures on research, innovation, and competitiveness, though the LEDS has not yet been adopted. Over the course of 2020, the previously drafted LEDS is expected to be drafted which will include tasks and goals for 2030 and 2050 and support mechanisms for developing / using low-emission technologies.

Shota Rustaveli National Science Foundation (SRNSF) was established with the goal to support scientific research development in Georgia and integration of Georgian researchers in international research area. The Foundation organizes calls for proposals, targeted programs, and projects, and is involved in international scientific networks and joint projects. All programs of SRNSF are implemented through the calls for project proposals on a competitive basis. Local and international independent experts carry out the evaluations. Apart from supporting R&D the foundation is also supporting researchers' mobility and young scientists' development.

One of the main mechanisms for supporting research, innovation, and competitiveness is in the establishment of **Georgia's Innovation and Technology Agency (GITA)** under the supervision of the MoESD. GITA supports development of the capital market at various levels in diverse sectors including energy. GITA is finalizing its Strategy 2025 (Acceleration Plan), which includes the core activities of GITA, as a coordinator and mediator in the process of developing national innovation policy. It is currently involved in a number of relevant activities.

GITA supports innovation projects through grants or start-up support programmes such as: Co-financing Grants Program and Innovation Co-financing Grants Program. GITA in cooperation with the World Bank and EU is running a **TechTransfer Pilot Program**, identifying highly potential research projects with commercialization opportunity, and bringing them to the industry. As of June 2020, the programme received 74 project applications. Each application went through Technology and business readiness screening, only qualified projects moved to Due Diligence stage. However, out of selected projects for piloting, none is related to energy or climate change mitigation. The programme is funded by the World Bank – EU Trust Fund with a budget of EUR 2.7 million.

Within the General Innovation Framework, GITA provides access to funding for innovative projects and supports R&D commercialization and technology transfer. In this regard, in addition to awareness raising and training programs, GITA provides access to finance through various types of grant programmes. In this direction, the government provides funding for startups, covers risks and helps increase their skills for further investment opportunities. In 2016, the government signed a loan agreement with the World Bank to promote the development of an innovative ecosystem in the country. USD 23.5 million was allocated for next 5 years to provide:

a. access to finance – grants for SMEs and innovative projects;

b. scale up the infrastructure projects in the region;

c. enhance skills and capacity by providing trainings and mentorship programs for start-ups by providing different types of incentives.

The Innovation Financing component supports the provision of grants, selection of eligible entrepreneurs for providing of:

Co-Financing Grants programme for the grant up to USD 40,000. The main objective of the Project is to increase innovative activities of firms and individuals in Georgia and their participation in the digital economy.

Innovative Co-Financing Grants Programme with the amount of USD 250,000. This is a new mechanism for financing innovative projects. The grant is 1:1 co-investment in private equity financing (at least 51% privately owned) that further facilitates access to finance in the formation of globally scalable start-ups. The programme aims to stimulate innovation and creation of innovative enterprises in the Georgian economy. Through the Programme, Georgian micro, small and medium enterprises, which have the

potential to develop and present their innovations worldwide, will position an innovative product in the global market, which will be clearly associated with Georgia with the head office operating from Georgia.

GITA also provides **Small Grants,** of approximately USD 5,000, for Prototyping e-services, with the following objectives:

- Introduction, testing or improvement of innovations for their further commercialization;
- Integration of stakeholders in the International Ecosystem of Innovations and Technologies and to increase their commercial potential;
- Share the experience and knowledge in the field of Innovation and Technology;
- Strengthen the local innovation and technology ecosystem.

Under GITA's **Increasing Institutional Capacity for Innovation Project**, financed by the European Union, the Technology Transfer Pilot Program aims to support commercialization of Georgian scientific results that respond to market needs. The project duration is approximately three years, started in April 2019. The programme is implemented with technical support of the World Bank Group. The team works closely with Georgian research organizations to detect and select the most promising ideas. Research projects that have reached a Technology Readiness Level (TRL) level 4+ and above are eligible for evaluation. During the project, capacity building for scientists and the commercialization team will be delivered via on-the-job training while the commercialization cycle is deployed for the projects that are selected. Financial and technical resources will be made available to a small number of mature projects, before these projects are presented to potential customers in Georgia and abroad.

GITA has also hosted a big **Climate Launchpad Competition** that is the world's largest green business ideas competition. This was the start-up idea competition for the people who have great cleantech ideas and help them develop those ideas into start-ups making global impact. This competition was open for Georgian start-ups for tackling global climate challenges. **ClimateLaunchpad** consists of 2-day Boot Camp which is followed by a period of intensive coaching by international mentors. The winner teams go to the Global Grand Final in Amsterdam and have a chance to win prizes. Winners of the Grand Final get access to the Climate-KIC ClimateLaunchpad Accelerator that enables start-ups to grow their ideas into businesses. GITA also support capacity building of local staff in climate related technologies and for this purpose, the Head of the Department of Innovation and Commercialization was sent to ClimateLaunchpad Global Grand Final in Amsterdam as one of the judges of the competition. This allowed GITA to build capacity in evaluating green and climate related ideas.

The Ministry of Education and Science of Georgia also coordinates with the NGO World Experience for Georgia (WEG) as the Horizon 2020 National Contact Point (NCP) for secure, clean, and efficient energy. The work of NCP is not associated with policy making, but rather involvement in consultation process by the national policy making authorities. The NCP supports researchers that are interested in participation in Horizon 2020 projects through provision of information days, consultations, and other supportive activities. Additionally, Ilia State University and WEG have established an Institute of Energy and Sustainable Development within the university.

There are several Georgian participants that have received funding from 8 different projects (as of June 2020) under the **Horizon 2020 programme** via funding schemes of either innovation action or research and innovation action. On finance for SME innovation, there is also **InnovFin** – EU Finance for innovators initiative, also aimed to support innovative SMEs, including in Georgia through financial intermediaries to benefit from better access to finances.

There is also the state-run programme **"Produce in Georgia"** which provides support for entrepreneurs in general. Although programme does not focus primarily on R&D projects it supports local SMEs that operate in the energy field and produce modern energy efficient technologies. This directly contributes to technological development in the country.

Related to funding, there are currently no specific funding targets or objectives related to energy / climate change within the policy structure. R&D projects related to renewable energy, energy efficiency or environmental protection are supported by the government through SRNSF or GITA based on the same conditions as any other project related to any other field.

Energy related RDI projects are mainly financed by international programs or donors. Especially this is relevant for applied research projects. The share of national funding in energy RDI is quite small (please see Chapter 4.6). At the same time some energy companies are actively involved in international cooperation on expertise sharing. For instance, GSE is a member of CIGRE[45] The National Committee of CIGRE has been established in Georgia at the initiative and under the guidance of GSE. CIGRE Georgia is organized exclusively for scientific and educational purposes. It aims to facilitate and promote the interchange of technical knowledge and information exchanged by synthesizing state-of-the-art and world practices in Georgia as regards the field of electricity generation, transmission and distribution systems. Georgia NC consists of 44 equivalent members. Besides the experts of Georgian State Electrosystem, the representatives of ENERGOTRANS and Georgian Technical University have also joined the Committee.

i. Key issues of cross-border relevance

The key issues of cross-border relevance for Georgia include:

- The continued development of infrastructure to enhance the connection of electricity transmission systems with neighbouring countries to ensure security of supply.
- The continued development of the power generating capacity in Georgia (particularly of renewable energy) to reduce reliance on imports and increase exports to external markets.

The natural gas connections from suppliers (Russian Federation and Azerbaijan) which transit through Georgia on the way to neighbouring countries (Turkiye and Armenia in particular) and beyond to Europe. Additional cross-border cooperation at the expert level is ongoing with contracting parties of the Energy Community and various EU Member States.

ii. Administrative structure of implementing national energy and climate policies

The following table outlines the role of various authorities in dealing with aspects relevant for this document.

Name of institution	Responsibility / Comments
National climate change council	Oversight and coordination of climate-change related policy in Georgia
Ministry of Economy and Sustainable Development	Key state body responsible for the implementation of national energy efficiency policy in Georgia.

45 CIGRE is a global community committed to the collaborative development and sharing of power system expertise. The community features thousands of professionals from over 90 countries and 1250 member organisations, including some of the world's leading experts. At its center is the National Committee of 59 CIGRE countries, offering diverse technical perspectives and expertise from every corner of the globe - www.cigre.org

Name of institution	Responsibility / Comments
(MoESD) Energy Efficiency and Renewable Energy Policy and Sustainable Development Department	The Government of Georgia plans to develop its institutional capacity to faster implementation of successful energy efficiency programmes and promotion of investments.
MoESD Construction Policy Department	Responsible for building codes and the Energy Efficiency in Buildings.
Ministry of Economy and Sustainable Development of Georgia (MoESD) LTD "SPATIAL AND URBAN DEVELOPMENT AGENCY"	Urban development and spatial-territorial arrangement; Development of spatial-territorial arrangement and architectural-urban planning policy, methodical guidance, coordination, and management.
Ministry of Environmental Protection and Agriculture of Georgia (MEPA)	The MEPA of Georgia is mandated to coordinate the implementation of national climate change policy and Georgia's strategy for international climate change negotiations under the United Nations Framework Convention on Climate Change. The responsibility of MEPA is to carry out state environmental policy, state management of usage of natural resources, environmental pollution monitoring and carry out ecological analysis, evaluation of river basins and reservoirs for existing and expected hydro-meteorological and environmental conditions.
National Forest Agency	● The National Forestry Agency will directly engage in economic activity and will monitor the use of the forest for the purpose of economic activity. ● Long-term forestry licenses will not be issued. ● Social wood logging[46] will be suspended and replaced with a more efficient model. ● The National Forestry Agency will conduct forest harvesting (through its employees or contracting companies) to provide fuel wood to the population and organizations. . ● The National Forestry Agency will oversee the companies that provide timber production services to the National Forestry Agency and will respond to the illegal cutting.
Local Municipalities	Twenty-six Georgian cities are signatories of the Covenant of Mayors[47]. Eleven cities have developed Sustainable Energy Action Plans (SEAPs) defining various energy efficiency and renewable energy measures for the priority sectors: transport, infrastructure, building, street lighting, land-use changes, and waste management.

46 Docmuent #2124 https://www.matsne.gov.ge/en/document/view/16228?publication=28 PART I. Chapter I – General provisions article 5(Z)

47 http://www.covenantofmayors.eu/actions/sustainable-energy-action plans_en.html?city=Search+for+an+Action+Plan...&country_seap=ge&commitments=&date_of_approval=&accepted

Name of institution	Responsibility / Comments
	According to SEAPs, support for energy efficiency & renewable energy utilization at a local level in buildings in terms of implementation of energy efficient measures, developing heating & cooling of public buildings based on RES, introduction of solar thermal system, development of electric public transport, introduction of solar PVs for street lighting are major measures of the plans for decreasing CO_2 emissions.
Georgian National Energy and Water Supply Regulatory Commission (GNERC)	Execution of regulatory powers provided by law
Georgian State Electrosystem (GSE)	The transmission system operator is responsible for the operation of the transmission system and the implementation of the ten-year plan for the development of the transmission network, as well as for the maintenance and development of transmission system assets to fulfill the tasks provided by the Law of Georgia on Energy and Water Supply.
Electricity Market Operator - ESCO	Electricity System Commercial Operator "ESCO" is the Market Operator in the electricity sector and Wholesale Public Service Provider of Georgia.
Georgia Oil and Gas Company (GOGC)	The main incumbent company in the natural gas market and owner of the main gas pipeline system of Georgia
Georgian Gas Transportation Company (GGTC)	The Transmission System Operator for natural gas.
Georgian Accreditation Centre (GAC)	• The responsible body for accreditation of certification bodies which in their turn are responsible for issuing certificates of personnel qualification, is the. Accreditation services include: • Granting accreditation • Surveillance of accredited bodies This is relevant for building audits, industry energy audits, etc.

1.4 Consultations and involvement of national entities and their outcome

i. Involvement of the national parliament

All the important laws which have been adopted by Georgia have been approved by Parliament. The main laws are described in Section 1.2. and represent the key decisions made at a national level which feed into this NECP. Additionally, since the NECP itself is developed on the basis of the Law on Energy and Water Supply, it has also been approved in Parliament. To reach approval in Parliament, each law undergoes significant scrutiny and discussion – including the requirement of regulatory impact assessments. Parliament has not been directly involved in the drafting of this NECP.

ii. Involvement of local and regional authorities

Local and regional authorities have been consulted in the drafting of various strategies and action plans described within this NECP as well as for the NECP draft itself and the measures contained therein. This has included distributing the drafts of measures and receiving feedback about changes / additions to be made. Local and regional authorities[48] have also been involved in, for example, the National Energy Efficiency Action Plan and Renewable Action Plan. Furthermore, where applicable, local, and regional authorities are consulted during the development of investment programmes which they may benefit from.

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

After developing the initial working version of the National Integrated Energy and Climate Plan of Georgia, the documents were actively shared with the responsible agencies to receive their comments. The documents were shared several times and the Ministry of Economy and Sustainable Development (MoESD) reviewed each comment and made corrections to the document.

In cooperation with the Energy Community Secretatriat , from October 2021 to March 2022, 10 virtual working meetings were held on the draft NECP , attended by non-governmental organizations, civil society organizations and other interested parties. During first half of the meeting detailed presentation on specific topic related to the document was made, followed by the second panel of meetings which was held in Q&A format. Answers to the questions were also shared with the parties in written form after every meeting. Additional physical meetings were also held on the topics of hydropower plants and energy efficiency.

In 2022, the development of the draft version of the National Energy Policy was completed. The document was also shared with public agencies and other stakeholders. In July 2022, a working meeting was held with the interested parties, which also took place in the format used during NECP discussions (presentation followed by Q&A session).

In December 2022, the MoESD submitted scoping report of NECP and NEP to the National Environment Agency and the National Center for Disease Control and Public Health. Regarding the scoping report, additional working group meeting was also held initiated by MoESD to discuss details of the report.

Overall, the Ministry of Economy and Sustainable Development of Georgia held 14 working group meetings and discussed each comment and feedback provided by the interested parties. Written communication and meeting recordings were constantly being shared with the stakeholders.

iv. The deadline for approval of the document is the IV quarter of 2023.Consultations of other Contracting Parties

Other contracting parties have been engaged in dialogue regarding issues identified and lessons learned in the NECP development process. This has specifically included consultation with Energy Community observers regarding cross-border issues and plans identified in the NECP but has also included discussions of other issues where lessons from other Contracting Parties could be useful for Georgia's NECP. Other Contracting Parties are often engaged for consultation in an informal and formal setting. Formally, Georgia is a Contracting Party to the Energy Community and therefore participates in a number of working groups

48 State Trustee Administration or Autonomous Republic

on climate, energy efficiency, renewable energy, etc. These working groups discuss policy development in the various parts of the NECP – including those included in Georgia's case. Furthermore, consultations with Contracting Parties and EU Member States occurs on a regular basis – including when experts from these other countries are engaged in technical assistance activities in Georgia.

1.5 Regional cooperation in preparing the plan

i. Elements subject to joint or coordinated planning with other Contracting Parties

There are no aspects of the NECP which are subject to coordinated planning with other Contracting Parties. Aspects related to cross-border projects (such as electricity and natural gas trading) have been discussed with regional trading partners.

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

Regional cooperation is considered in the plan via specific measures to be undertaken and are described in Section 3 of this NECP. There are some investments (notably in electricity transmission) which are subject to coordinated planning with regional neighbours. Additionally, there is ongoing work on integration of the energy markets to promote energy security and reduce overall system costs.

2 National objectives and targets

2.1 Dimension Decarbonisation

2.1.1 GHG emissions and removals[49]

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

Through approval of the Paris Agreement on 7 June 2017, Georgia joined 197 countries with a joint effort to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. In 2020, Georgia drafted its Updated Nationally Determined Contribution. The targets laid out are as follows:

1. Georgia is fully committed to an unconditional limiting target of 35% below 1990 level of its domestic total greenhouse gas emissions by 2030 – equivalent to a maximum of 27.2 million tCO_2eq including the LULUCF sector;

2. Georgia is committed to a target of 50-57% of its total greenhouse gas emissions by 2030 compared to 1990, in case the global greenhouse gas emissions follow the 2 degrees or 1.5 degrees scenarios respectively, with the international support;

3. Based on the contribution defined by the updated NDC, a climate change strategy and action plan shall be prepared to identify mitigation measures, the implementation of which will help Georgia fulfil both its unconditional and conditional commitments and achieve the target indicators;

4. Georgia is committed to study its adaptive capacity to climate change by mobilising domestic and international resources for the sectors particularly vulnerable to climate change.

The timeframe for meeting the objectives set up by NDC is 2021 – 2030.

Taking into account that the average annual growth rate of the GHG emissions was around 4.3% within the last 18 years, the updated NDC of Georgia emphasizes a number of factors that affect the country's emissions, such as gross domestic product (GDP) real growth, demography, investments, energy prices, technological progress, energy consumption, behaviour and attitudes, and so forth. Real GDP and subsequently energy consumption are key drivers of GHG emissions in Georgia.

As already mentioned, Georgia has developed and approved of the CSAP for the period 2021-2030. The plan identifies measures and actions that support the development of the Georgian economy and infrastructure in a way which sets Georgia on a pathway to meet its international obligations and national ambitions for climate change mitigation. It serves as an action plan for the implementation of Georgia's existing NDC, but also as an important orientation to inform the determination of an appropriate and realistic level of ambition when updating the NDC in future revision cycles. The Climate Action Plan will be updated on a 2–3-year cycle, to be aligned with future revisions of the NDC and NECP.

49 Consistency to be ensured with long-term strategies pursuant to Article 15

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

National goals for climate change mitigation

As described in the section above, the Objective for climate change mitigation is as follows:

Objective 1: Reduce GHG emissions (target of 35% below 1990 level of its domestic total greenhouse gas emissions by 2030 – equivalent to a maximum of 29.25 million tCO2eq excluding the LULUCF sector)

Sub-Objectives for this dimension include:

- **Objective 1.1:** Reduce emissions from Industrial Processes and product use (IPPU) sector by 5% compared to reference levels
- **Objective 1.2:** Reduce emissions from agricultural production and support low-carbon development approaches in the agricultural sector
- **Objective 1.3:** Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%
- **Objective 1.4:** Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services

Another Sub-Objective for Renewable Energy is included in 2.1.2 below.

- **Objective 1.5:** Increase in the share of renewable energy sources in final energy consumption (target: 27.4% by 2030)

National goals related to climate change adaptation

Related to the Paris Agreement and adaptation, the NDC for Georgia identifies number of measures related to adaptation to climate change. Measures include:

- Assessment of the impact of climate change on the availability of ground water and surface water resources for sustainable use in agricultural (irrigation), energy production and dwelling purposes in a long-term perspective;
- Assessment of the climate change impact on the mountain ecosystems for the sustainable management of glaciers and mountain ranges;
- Encourage the conservation of endemic species through the projection of climate change impact on the appropriate ecosystems;
- Study the most vulnerable areas of forest lands at the preselected territories;
- Assessment of the level of vulnerability of the agricultural production with major contributions to the national GDP (e.g. grape, hazelnut) and/or domestically unique products, such as Georgian honey, related to the changes of climate parameters and spread of infections for the purpose of ensuring food security;
- The development of the adaptive capacity of the most vulnerable winter and coastal resorts;

- Assessment of the effects of climate change on human health through the interdisciplinary study of the relationships between social, economic, biological, ecological and physical systems;
- Facilitation of the measures supporting the reduction of losses and damages caused by extreme weather events.

2.1.2 Renewable Energy

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

The overall objective for Georgia related to renewable energy is as follows:

- **Objective 1.5:** Share of renewable energy sources in final energy balance is 27.4% by 2030.

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

The section presents targets for the share of energy from renewable sources in 2030 in the following sectors: heating and cooling, electricity, transport.

The approach taken for calculating the targets for other sectors was bottom-up using modelling software which captures the impact of the various measures described in Section 3. The bottom-up approach used the following key pieces of information:

- The Business As Usual energy consumption was growled using TIMES up to 2030 with linear interpolations and using 2014 through 2019 as the baseline years to which the model was calibrated[50].
- The exception for this calculation is that a separate transport energy model was developed using the same baseline assumptions as the TIMES model but with year-to-year changes in consumption due to switching to electric vehicles.
- Energy efficiency savings in particular types of energy (heating and cooling, pure electrical services, and transport) were calculated first based on measures included in Section 3, after which savings from distribution measures were and finally renewable energy / changes to the energy production mix were calculated.
- For each sub-sector bottom-up analysis was conducted to develop scenarios for:
    - Electricity production from renewable energy;
    - Heating and cooling from renewable energy;
    - Transport from renewable energy – focused mostly on switching to electric vehicles.

It is noteworthy that utilisation of biofuels is not a part of the sectoral targets.

50 The modelling for the NREAP used the same MARKAL run as was used in the NEEAP.

Table 2-1: National 2030 target and estimated trajectory to 2050 of energy from renewable sources (including electricity consumption of temporarily occupied Abkhazia region)

Parameters	2019	2030		2040		2050	
		baseline /WEM	NECP	baseline /WEM	NECP	baseline /WEM	NECP
Gross Final Energy Consumption (TJ)	186,112.2	303,389.0	216,649.4	390,909.8	273,390.3	496,057.7	323,103.7
Renewable Energy Sources (TJ)	45,205.63	61,854.4	59,361.90	75,982.1	72,866.6	89,413.0	95,164.2
Renewable energy share	**18.77%**	**20.4%**	**27.4%**	**19.4%**	**26.7%**	**18.0%**	**29.5%**

WEM = With existing measures NECP = With measures outlined in the NECP

Note that the table on year-to-year expected increases for 2017 – 2018 (and previous years) as defined in Annex I.B to the Directive 2009/28/EC is not applicable.

Table 2-2: Calculation table for the renewable energy contribution of each sector to final energy consumption (TJ)

			2030		2040		2050	
		2019	baseline / WEM	NECP	baseline / WEM	NECP	baseline / WEM	NECP
RES - Transport	RES	1,674	1,612	6,921	2,046	16,581	2,414	33,111
	Total consumption	58,785	106,982	66,232	142,797	81,145	187,106	97,064
	% RES	2.85%	1.51%	10.45%	1.43%	20.43%	1.29%	34.11%
RES - Electricity	RES	32,085	55,087	53,437	63,468	67,712	73,876	86,758
	Total generation	41,866	71,440	62,748	86,304	76,854	104,793	96,323
	% RES	77%	77%	85%	74%	88%	70%	90%
RES - Remaining energy	RES	10,960	9,687	6,613	14,871	4,895	17,128	4,819
	Total remaining energy consumption	81,687	116,967	94,248	153,809	107,391	196,159	121,717
	% RES	13%	8%	7%	10%	5%	9%	4%

Note: It is noteworthy that the RES utilization for remaining energy consumption (mostly heat) goes down over time – with the expectation that due to a combination of energy efficiency in end-use appliances (i.e. space heaters), increased efficiency in the residential sector building stock, and continued gasification of the residential and commercial sectors will lead to a reduction of biomass utilization.

Table 2-3: Calculation table for the renewable energy in transport share (TJ)

Parameters	2019	2030		2040		2050	
		baseline	NECP	baseline	NECP	baseline	NECP
Total final energy consumption in transport (TJ)	58,784.8	106,898.8	66,221.8	142,670.2	81,098.6	185,451.8	96,960.3
Electricity consumption in road transport	56.9	2.7	3,095.3	43.0	9,947.9	1,385.3	23,011.6
Electricity consumption in the railway	1,607.19	1,772.50	2,334.77	2,352.06	3,219.38	2,675.28	4,305.05
Consumption of biodiesel	9.90	-	1,045.25	-	2,829.85	-	5,462.13
Consumption of bioethanol	-	-	457.87	-	1,003.09	-	2,047.22
Total consumption of renewables	1,674.0	1,775.2	6,933.2	2,395.0	17,000.3	4,060.6	34,826.1
Share of renewable energy	**2.85%**	**1.66%**	**10.47%**	**1.68%**	**20.96%**	**2.19%**	**35.92%**

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

Estimations of projections of different renewable energy technologies to achieve sectoral renewable energy trajectories from 2021 to 2030, including expected total gross final energy consumption in TJ and total planned installed capacity in MW (divided by new capacity and repowering) per technology and sector.

The following table shows the trajectory of renewable energy by energy carrier and type of energy consumption projected through 2050 under the WEM and NECP scenarios.

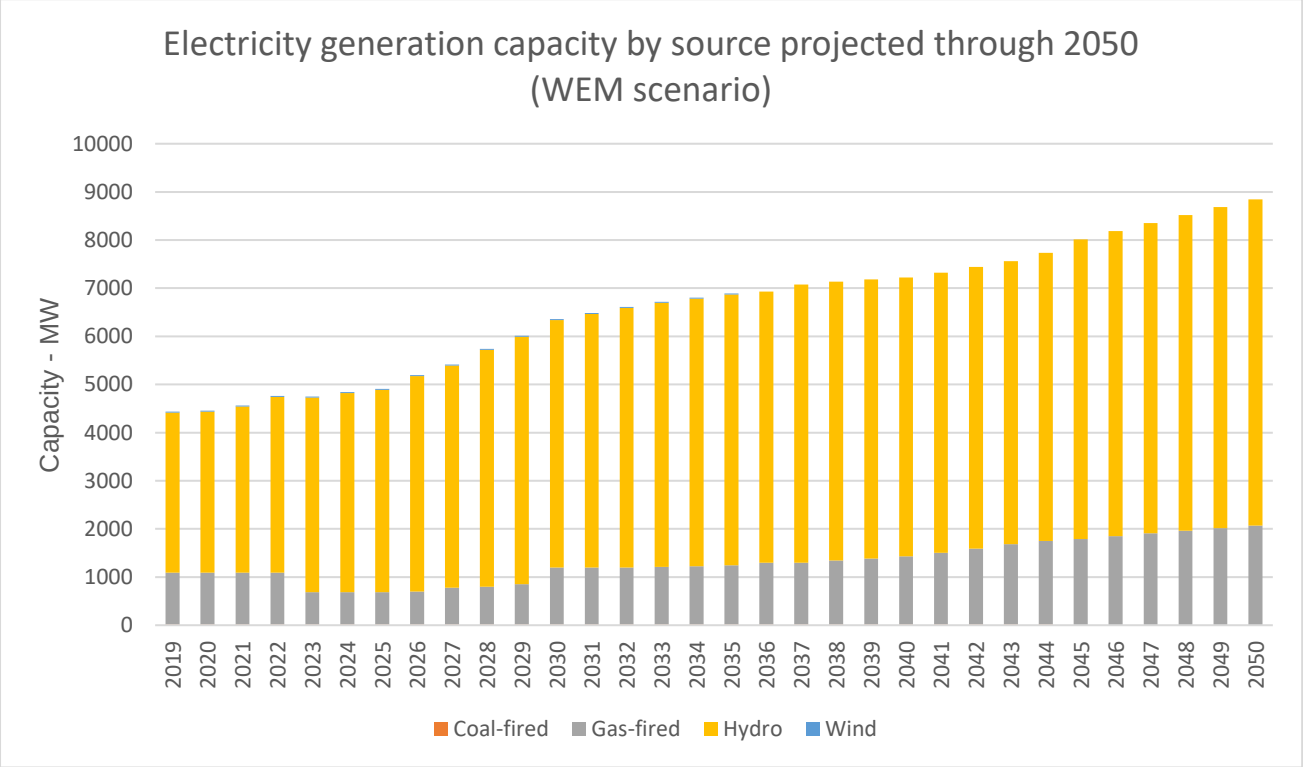
Table 2-4: RE production / utilisation by energy carrier through 2050 under WEM and NECP scenarios (TJ, %)

Parameters	2019	2030		2040		2050	
		baseline /WEM	NECP	baseline /WEM	NECP	baseline /WEM	NECP
Hydrogeneration	32,154.10	51,202.60	36,794.51	59,993.50	39,397.70	70,524.30	54,400.30
Hydrogeneration load factor	30.6%	33.8%	33.8%	33.8%	33.8%	33.8%	33.8%
The average 15-year hydrogen generation load factor	32.2%	33.8%	33.8%	33.8%	33.8%	33.8%	33.8%
Normalized Hydrogeneration, (TJ)	33,835.4	51,202.6	36,794.5	59,993.5	39,397.7	70,524.3	54,400.3
Wind Energy Generation (TJ)	304.9	308.1	9,176.03	-	16,983.7	-	20,987.7
Wind generation load factor	48.2%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%
5-year average wind generation load factor	48.2%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%
Normalized Wind Power Generation	304.9	308.1	9,176.03	-	16,983.7	-	20,987.7
Biomass*	**809.60**	**809.60**	5,778.9	14,145.7	3,876.9	16,402.2	3,585.7
Biofuels*	-	345.9	1,353.2	481.8	3,173.3	647.3	5,769.5
Geothermal energy	679.8	725.8	833.6	725.8	1,017.9	725.8	1,233.7

Solar energy	129.8	311.3	3,236.56	635.4	8,417.1	1,113.5	9,187.3

** Biomass / biofuel production and consumption assumed to be sustainable based on packages of policy measures to ensure sustainable certification of feedstocks (See section 3 and Annex I for more details on policy measures)*

The figures 2-1 show the projected electricity generation capacity by source in the WEM and NECP scenarios:



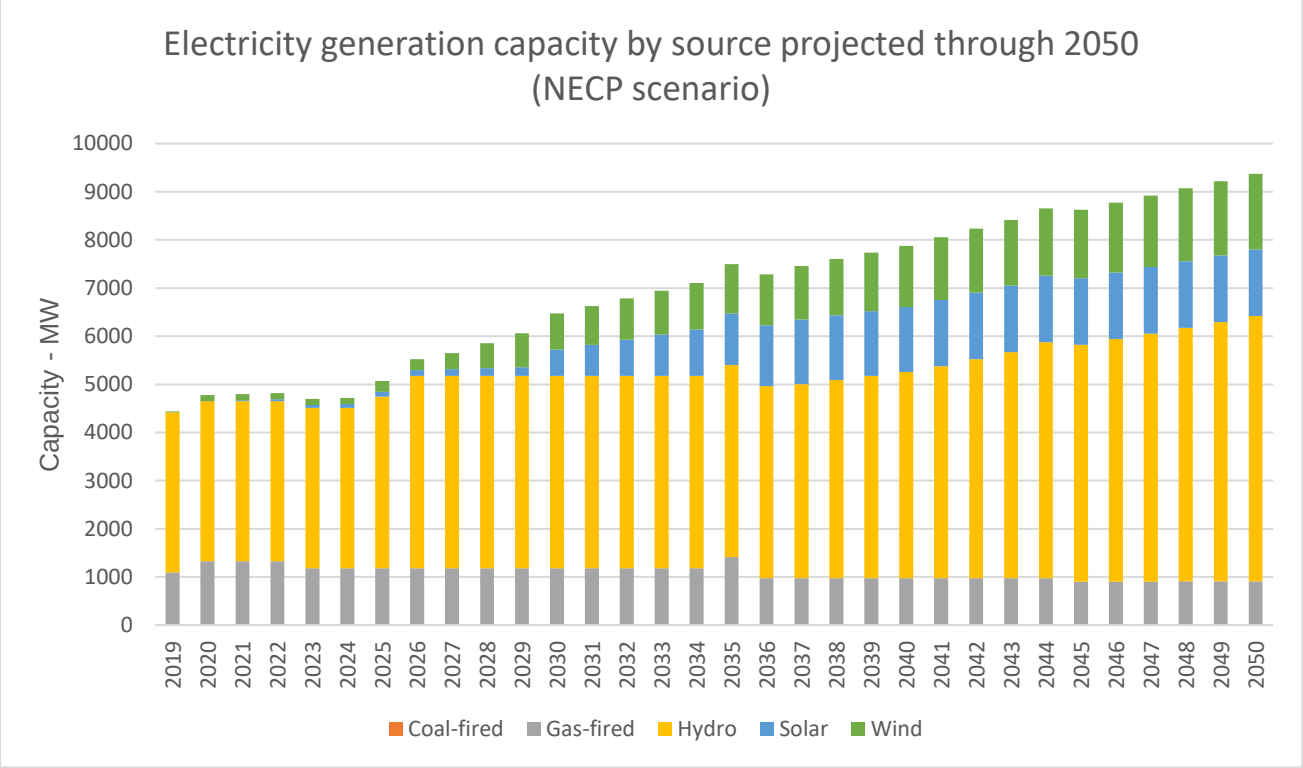


Figure 2-1: Electricity generation capacity by source projected through 2050 under the WEM and NECP scenarios

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

The table 2-5 shows the projected consumption of different types of biomass projected through 2050 under the WEM and NECP scenarios.

It can be noted that in the WEM scenario, the consumption of biomass for transport purposes (represented by biodiesel and bioethanol) remains close to zero, while the consumption of solid biofuels (for heating purposes) continues to rise.

In the NECP scenario, the consumption of biodiesel and bioethanol for transport represent significant portions of energy supply while the primary solid biofuels consumption (and therefore supply) is reduced drastically – due to a combination of energy efficiency in end-use appliances (i.e. space heaters), increased efficiency in the residential sector building stock, and continued gasification.

Table 2-5: Projection of biomass consumption according to type of energy carrier through 2050 in the WEM and NECP scenarios, TJ

	2019	2030	2040	2050
WEM scenario				
Biodiesel	-	-	-	-

Bioethanol	-	-	-	-
Charcoal	-	-	-	-
Other vegetal materials and residual	-	-	-	450
Primary Solid Biofuels	10,263	8,961	14,146	15,953
WEM total	**10,263**	**8,961**	**14,146**	**16,402**
NECP scenario				
Biodiesel	-	1,046	2,842	5,502
Bioethanol	-	0,458	1,003	2,047
Charcoal	-	-	-	-
Other vegetal materials and residual	-	2,659	0,757	0,466
Primary Solid Biofuels	10,263	3,120	3,120	3,120
NECP-2050 Total	**10,263**	**7,283**	**7,722**	**11,135**

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

Related to renewable energy amongst self-consumers, the installed capacity and production from micro-power producers has grown significantly in recent years and is projected to grow into the future – potentially up to 100 MW and beyond by 2030. More information on this trend and targets is included in Section 3.1.2 (vi).

Related to energy recovered through waste gas recovery and from energy recovered from sludge acquired through the treatment of wastewater (table 2-6), the following targets are relevant for the period through 2030. It can be expected that the values from 2030 would remain constant or grow through 2050.

Table 2-6: Projections and targets for methane / energy recovery from waste gas recovery and from energy recovered from sludge acquired through treatment of wastewater (2020-2030)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Solid Waste Disposal Sites (Gg)	0.78	0.78	1.96	2.80	6.26	11.06	11.46	11.46	12.68	12.68	13.08
Wastewater treatment plants (Gg)	-	-	12.52	12.52	12.52	12.52	12.52	12.52	12.52	12.52	12.52
Total (Gg)	0.78	0.78	14.48	15.31	18.78	23.58	23.98	23.98	25.20	25.20	25.60
Total (TJ)	**43.60**	**43.60**	**805.25**	**851.46**	**1,044.2**	**1,311.0**	**1,333.3**	**1,333.3**	**1,401.1**	**1,401.1**	**1,423.4**

2.2 Dimension Energy efficiency

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

The overall objective in energy efficiency is as follows:

Objective 2: Achieve primary energy consumption savings (target 15% under the BAU in 2030)

Sub-Objectives for this dimension include:

- **Objective 2.1:** Achieve primary energy consumption savings in the buildings sector
- **Objective 2.2:** Achieve primary energy consumption savings in the industry sector
- **Objective 2.3:** Achieve primary energy consumption savings in the transport sector
- **Objective 2.4:** Achieve primary energy consumption savings in gas and electricity infrastructure
- **Objective 2.5** Energy saving

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

Indicative national energy efficiency targets for 2030, 2040, and 2050 are laid out in Table 2-7. These targets are based on calculating the sum of the expected savings from all measures in the NECP (as described in section 3) and represent an indicative target based upon the NECP's full implementation – both on the demand and supply side.

Table 2-7: Georgia's indicative energy efficiency targets for 2030, 2040, and 2050 versus the Baseline / WEM scenario TJ, %)

Parameters	2019	2030		2040		2050	
		baseline /WEM	NECP	baseline /WEM	NECP	baseline /WEM	NECP
Total final energy consumption	167,454.9	272,026.7	202,335.5	356,852.9	243,132.9	458,523.8	290,943.6
EE reductions			26%		32%		37%
Electricity Energy Losses	3,305.5	4,905.6	2,906.3	6,007.4	3,566.4	7,307.2	4,426.4
Losses (heat)	3,211.3	4,860.9	4,776.9	5,999.8	5,450.8	7,638.2	6,254.5
Own Consumption (Electricity Setter)	944.5	1,371.7	886.7	1,764.1	911.9	2,248.4	1,103.2
Own Consumption (Heating Sector)	44.6	3.9	101.9	65.4	108.1	120.1	155.8
Gross Final Energy Consumption	192,259	295,389.0	223,227.5	382,909.8	265,390.3	488,057.7	315,103.7
EE reductions			24%		31%		35%

Note: Figures for energy consumption in 2019 come from Geostat's Energy Balance (published in 2020). The data are given without the volume of petroleum products consumed for non-energy use.

As can be seen from the table, energy efficiency measures described in this NECP would have a significant impact on Georgia's energy consumption.

Within the NEEAP[51] adopted in 2019, targets for Article 7 of the EED related to either Energy Efficiency Obligation Schemes or Alternative Policy Measures were calculated as follows:

- Annual average savings for 3-year period: 90,705 MWh
- NEEAP target for cumulative savings in the target year (2021): 3,766,712

Georgia is currently considering implementation of both alternative policy measures and energy efficiency obligation schemes for the coming 3-year period and will update these targets and monitor them accordingly.

Georgia has not yet adopted a building renovation strategy so does not have associated targets established. This is expected to be adopted in 2022.

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

There are no specific sectoral targets or objectives with respect to EE in the transport sector and with regard to heating and cooling. Longer-term measures to encourage EE in the transport sector and with regard to heating and cooling are included in Section 3.

2.3 Dimension Energy Security

i.	**The elements set out in point (c) of Article 4 - National objectives with regard to the increasing flexibility of energy system through developing local energy sources, demand side management and energy storage.**

a). ES-1: Construction of new power interconnectors with neighbouring countries

b). ES-2: Rehabilitation and upgrade of existing energy infrastructure

Sub-Objectives for this dimension include:

Objective 3:

- **Objective 3.1:** Deploying domestic energy sources
- **Objective 3.2:** Deploying domestic energy sources
- **Objective 3.3**: Increasing the diversification of energy sources, suppliers, and supply routes in electricity sector
- **Objective 3.4:** Reducing energy import dependency in electricity sector

51 The new NEEAP, elaborated in parallel with NECP, is integrated into this document.

- **Objective 3.5:** Increasing the diversification of energy sources, suppliers, and supply routes in gas sector
- **Objective 3.6:** - Reducing energy import dependency in the natural gas sector
- **Objective 3.7:** Increasing the diversification of energy sources, suppliers, and supply routes in the oil sector
- **Objective 3.8:** Demand response
- **Objective 3.9:** Rehabilitation and upgrade of existing energy infrastructure and increase their capacity
- **Objective 3.10:** Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines

The most important objective of energy security of Georgia is to ensure adequate and reliable supply of different types of high-quality energy to all consumers, at a fair price, while protecting the interests of national security and sustainable development, in the short and long term. The objectives of Georgia under energy security dimension are:

- Minimize the supply risks through diversification of energy sources and supply routes
- Reduce energy import dependency by developing domestic energy sources, which assumes maximum use of electricity in the transport and heat supply sector.
- Achieve optimal level of energy independence in electricity sector by 2030.
- Increase the flexibility and resilience of energy systems
- Protect critical infrastructure and mitigate risks related to cyber security and climate change.
- Develop demand side measures and establish sustainable power distribution over the whole territory of Georgia
- Stabilize and curb the energy security risks stemming from occupation of Georgia's territories

Due to the high degree of energy import dependence (79% in 2020), Georgia needs to assess and reduce the overall political and economic risks of energy dependence from various sources of imports. Optimization of external supply sources, putting them into transparent competitive environment and development new supply alternatives are important objectives of foreign and domestic energy policy.

Development of renewable energy and energy efficiency will be at the core of energy security improvements. Energy efficiency in both, energy supply and consumption areas, plays an important role for ensuring energy security and sustainable development, technological and economic advancement and addressing social problems. In the context of rapid technological development, the energy policy shall focus on introduction of modern advanced, efficient, and clean technologies, IT systems, smart grids, cyber security, methods of short- and long-term forecasting and applied research.

To improve the energy security, and reduce greenhouse gas emissions, the development of renewable energy sources will be optimized with respect to seasonality, diurnal variations, and full resource utilization requirement.

In Georgia, there is a seasonal asymmetry of generation and consumption, which can potentially be balanced by energy saving technologies, especially hydrogen. To address this challenge, new clean and alternative technologies, including green hydrogen need to be studied and deployed; optimal schemes for distributed generation, isolated micro grids and local small renewable facilities have to be developed. A high-tech modern energy system that uses advanced information and clean technologies (including liquefied natural gas, energy storage facilities, flexible AC systems (FACTS), hydrogen, smart networks, and information systems, etc.), ensures sustainable low-emission development of the sector, continuous and stable, full-fledged energy services.

Development and optimal use of own hydrocarbon reserves remains to be essential for improvement of energy security. Georgia currently produces small amounts of natural gas, oil, and coal, while a significant portion of these primary resources remains unutilized. It is necessary to maximize the exploration and rational utilization of existing and potential fossil reserves to gradually reduce country's import dependence.

To ensure the security of supply, balance seasonal variations of supply and consumption and to mitigate the impact of possible interruptions Georgia intends to construct the gas storage facility and establish strategic reserves of oil and oil products (in compliance with Directive 2009/119/EC). The possibilities of local use of own energy resources, including the planning for oil refining and coal processing are under discussion.

Improving energy security requires rapid development of infrastructure as well as energy efficiency to eliminate the gap between demand growth and domestic supply options.

Currently, Georgia faces the following energy security challenges:

- Dependence on imported electricity to meet seasonal demand, raises concerns over security of supply. As noted, the country's power consumption peaks in winter when hydropower generation is lowest. During winter, therefore, Georgia must rely substantially on imported electricity and domestic generation using thermal generation based on imported natural gas. The import dependence has beengradually increasing in recent years.

- The construction of large generation facilities, despite mitigation measures, still has had some impact on the environment and local residents, which sometimes provokes protests from part of the community. This often causes the postponement of projects, which has a negative impact on the development of the State's energy sector. The emergency shutdown of 500 kV OHL „Imereti" and Engurhesi HPP once again demonstrated the necessity of large generation facilities to strengthen country's energy security.

- Electricity and gas infrastructure require partial reconstruction, which will be achieved in parallel with the sector development.

- Insufficient cross border transmission capacity. The cross-border interconnections with Russia and Armenia do not have sufficient reserve lines thus reducing the reliability of transmission. The main cross-border 500 kV connection with Azerbaijan has a 330 kV reserve that can assure the reliability and safe parallel operation only at a limited load (300 MW and below). This can be eliminated from 2023 by strengthening the relevant substation on the Georgian side, which will allow to load the above mentioned 330 kV line with more capacity. In addition to this, due to the limitations of 500 kV OHL Imereti, Georgia cannot transit summer period excess power to Turkiye. It is also worth noting that shutdown of 400 kV OHL Meskheti led to unrealized exports and

restrictions of certain consumers to ensure the sustainability of the energy system. Construction of new power interconnectors depend on the decision of the respective neighbouring countries.

- Single source dependence on imported natural gas. The Georgian natural gas wholesale and retail markets are mostly dependent on one source of import.
- Absence of strategic gas storage in the face of this critical dependence seriously jeopardizes the country's ability to provide risk-free uninterrupted gas supply to consumers. The country consumes 3.5-4 times more natural gas in winter compared to summer and has no own means of balancing the demand and hedging the supply risks increased due to the high strain on exporting countries and their systems. This also impairs country's ability to independently balance the gas received through South Caucasus Pipeline contract.
- Expiration of "additional" gas agreement (500 mcm/year) from Shahdeniz Consortium in 2026 necessitates additional sources of natural gas during the winter to meet the "social" sector demand.
- Georgian government and energy companies cannot guarantee the gas supply to the temporarily occupied territories of the country. As a result, the heating demand causes inefficient use of electricity, overload of the power system, and a drop in the quality of supply.
- The country needs strategic reserves of oil and/or oil products to meet its own demand in an emergency or extreme situation for the period defined under the legislation.
- The country does not have adequate oil refining capacity for meeting its own demand.
- The major energy asset of Georgian power system the Enguri/Vardnili hydropower (HPP) cascade is partly in temporarily occupied region of Abkhazia; The location of Enguri HPP powerhouse and switchyard in Saberio as well as Vardnili 1 HPP in Gali region in temporarily occupied Abkhazia region creates a security hreat of losing operational control of the cascade.
- The growing unpaid and uncontrolled power consumption of temporarily occupied Abkhazia region consumes most of the Enguri/Vardnili HPP cascade output. The cheap electricity and the lack of control have encouraged the cryptocurrency mining in temporarily -occupied region ofAbkhazia which increases the consumption even further.
- Distribution network – the condition of the distribution networks and metering is in a poor state and requires financial resources in temporarily occupied Abkhazia region as well as in the highland Svaneti region. Network problems and related payment discipline issues compromise the quality of supply and cause energy poverty especially in winter periods.
- Physical risks related to the critical energy infrastructure (gas, oil pipelines and power transmission lines etc.) in the vicinity of the occupied territories.
- Cybersecurity – Introduction of smart technologies and automation of critical energy infrastructure increases the vulnerability and risks of cyber-attacks.
- Global Climate Change causes the risks of increased and irregular demand while also having a negative impact on energy supply. Expected extreme weather conditions, increased temperatures, natural disasters, hydrology, and wind pattern changes, as well as potential restrictions on regional trade need to be closely examined and taken into account in energy planning.

- Volatility in cryptocurrency prices causes drastic fluctuations in power consumption, complicating short- and long-term balancing of the power system.
- Devaluation of GEL increases the price of electricity and natural gas - the main fuel used by thermal power plants. This may affect the affordability of energy by residential consumers and businesses as payments for imported energy are mainly carried out in hard currency.
- Unsustainable use of fuel wood leads to deforestation, fuel deficiency and energy poverty in some regions of Georgia. Energy poverty is also caused by poor thermal performance of residential dwellings in cities as well as in rural regions.

A large share of energy inefficient buildings in the residential and public sectors increases demand for energy for heating and cooling.

There are no quantitative objectives for energy security though the modelling exercise conducted shows a decrease in imports from 79% in 2020 to 73% in 2030.

Specific planned measures related to this dimension are presented in Section 3 and Annex I. Overall, the Energy Strategy of Georgia has a multi-pronged approach to improving energy security including:

- Energy efficiency measures – including (electricity, natural gas etc.) generation, transmission, transformation, distribution.
- Related to electricity, consumption in the country is steadily increasing by 5-7% annually, while construction of generation facilities, especially strategic hydro power plants with reservoirs, is delayed, posing significant challenges. In order to improve the situation, in the short and medium term, it is planned to integrate into the system highly efficient combined cycle gas-fired thermal power plants and build solar and wind power stations. For the system reliability, in the long run, strategic hydro power plants with reservoirs will be integrated into the system.
- Development of additional cross-border transmission lines to neighbouring countries to improve electricity market integration.
- The oil and gas strategy includes a plan for the State Agency for Oil and Gas to explore for minerals in various locations and to increase the professional capacity of local experts to carry out these activities. It is critical to build a gas storage facility (500 million m3) to ensure supply security. In order to ensure security of supply, it is necessary to continue long-term agreements with neighboring countries, and if possible, sign new agreements and/or renew agreement on in-kind payment of natural gas transit fees;
- Transforming natural gas received from diversified sources into different products [e.g.: liquefied gas (LNG), compressed natural gas (CNG), and liquefied petroleum gas (LPG)] and delivering such products to the mountainous regions that are not covered by the main gas pipeline system.
- Production and utilisation of biogas (from biomass, and especially from waste).

Furthermore, the Renewable Energy Law lays out an objective of energy in the transport sector being provided by renewable energy by 2030 – much of which could be supplied by local renewable energy sources (including as part of the electricity sector).

2.4 Dimension internal energy market

2.4.1 Electricity interconnectivity

i.	**The level of electricity interconnectivity that the Member State aims for in 2030 in consideration of the electricity interconnection target for 2030 of at least 15% with a strategy with the level from 2021 onwards defined in close cooperation with affected Member States, taking into account the 2020 interconnection target of 10% and the following indicators of the urgency of action:**

1) **Price differential in the wholesale market exceeding an indicative threshold of EUR 2/MWh between Member States, regions, or bidding zones;**
2) **Nominal transmission capacity of interconnectors below 30% of peak load**
3) **Nominal transmission capacity of interconnectors below 30% of installed renewable generation**

Georgia has a number of investments which have been undertaken in recent years to increase connectivity with neighbours.

Given its geographic position, increasing the level of connectivity with EU Member States or Energy Community Contracting Parties is not feasible except through an undersea cable in the Black Sea (which is being considered but is not currently planned for implementation). Preparatory activities are ongoing and at the moment a pre-feasibility study is under preparation. The project was also a candidate for 2020's project of Projects of Energy Community Interest (PECIs) and Projects of Mutual Interest (PMIs) selection process.

The overall objective for electricity interconnectivity by 2030 is to have cross-border transmission capacity of 5550 MW which would represent well over 185% of peak load and Up to 85% installed capacity of renewable energy sources integrated in the Georgian energy system.

It is noteworthy that, due to the lack of connectivity with other Energy Community Contracting Parties or EU Member States, the indicator of differences in wholesale prices (i.e., indicative threshold of 2 EUR per MWh is not fully applicable. Real pricing will be available after 31 March 2023 (as the new market model is implemented) and the difference between Georgian and other European wholesale prices will only be apparent later. It is also noteworthy that the wholesale price of electricity is fluctuating due to the impact of the pandemic due to drops in consumption.

2.4.2 Energy transmission infrastructure

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

There are currently no electricity or gas infrastructure projects which are officially considered necessary for the achievement of objectives and targets under the five dimensions of the European Union Strategy which are classified as Projects of Common Interest (PCIs). As noted in the previous section, given its geographic position, increasing the level of connectivity with EU Member States or Energy Community Contracting Parties is not feasible except through an undersea cable in the Black Sea. This project was also

a candidate for 2020's project of Projects of Energy Community Interest (PECIs) and Projects of Mutual Interest (PMIs) selection process but was not chosen.

ii.	**Where applicable, main infrastructure projects envisaged other than Projects of Common Interest (PCIs)[52]**

Transmission network capacity (MW)

The dynamics of interconnector development are given in the Table 2-8 below where both the existing and future infrastructure are provided. The table is based on the Georgian TYNDP for 2021-2031. 2025 is a key year, when there is expected to be a significant increase in the capacity of interconnectors to Armenia direction. After 2025, the construction of significant cross-border lines and the installed capacity of interconnectors by 2030 is more than 85% of the installed capacity of renewable energy sources integrated in the Georgian energy system. The specific list of investments is included in Section 3.1.2.

Table 2-8: Planned interconnections for electricity with neighbouring countries (in MW)

	Turkiye	Armenia	Azerbaijan	Russian Federation	Total (MW)
2020	700	150	950	650	2450
2025	700	700	2200	650	4250
2030	1050	700	2200	1600	5550

2.4.3 Market integration

i.	**National objectives related to other aspects of the internal energy market such as increasing system flexibility, in particular related to the promotion of competitively determined electricity prices in line with relevant sectoral law, market integration and coupling, aimed at increasing the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, and real-time price signals, including a timeframe when the objectives shall be met.**

The reform conducted in Georgian power market transposes into national legislation the EU internal market principles and creates European type organized electricity market structure. On 16 April 2020, the Government of Georgia adopted the Electricity Market Model Concept. As for the Electricity Market Rules, the Commission (GNERC) adopted it on August 11, 2020 for all segments of the wholesale market. Market Concept sets the guiding principles for organizing and functioning of the segments of the electricity wholesale market - Day ahead market; Intraday market; Bilateral agreements' market; Balancing and ancillary services' market. The Concept establishes the participants (as well as their responsibilities) of the wholesale electricity markets: Electricity Market Operator; Transmission System Operator, Distribution System Operator; Electricity Producer; Trader; Supplier; Large Customer; Wholesale Public Service

52 In accordance with Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013. p. 39).

Organization. The start date of operation of the day-ahead, organized (hourly) balancing and ancillary services and intraday markets is July 1, 2024.

As noted in Section 1, Georgia has adopted primary legislation which transposes key EU Directives for market integration, including:

- increasing system flexibility, in particular related to the promotion of competitively determined electricity prices;
- Market integration and coupling, aimed at increasing the tradeable capacity of existing interconnectors;
- Demand response, storage;
- Distributed generation;
- Mechanisms for dispatching, re-dispatching and curtailment, and real-time price signals;
- Non-discriminatory participation of RE;
- Demand response and storage, including via aggregation;
- Participation of consumers in the energy system so they can benefit from self-generation and new technologies, including smart meters;
- Legal protections of energy consumers and improved the competitiveness of the retail energy sector.

The current task is to develop secondary legislation as needed for the completion of the legislative framework – then implementation of the various aspects described above. It is expected that in the coming 2–3-year period this will be carried out though some related investments will take longer.

One aspect of market integration is the improvement of the electricity transmission network, wherein the objective of a number of planned investments (see Section 3.4) can be encapsulated with the objective of "Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines".

2.4.4 Energy poverty

The Law of Georgia on Energy and Water Supply (Articles 3, 114) includes a general definition of a vulnerable user as "a domestic consumer who, due to his status or condition, has been granted the right to use the system and / or electricity and / or natural gas and / or water supply under preferential terms under the relevant legislation of Georgia". Georgia has a number of mechanisms in place to protect vulnerable citizens from high energy prices – mostly focused on electricity and natural gas. These are linked generally to mechanisms to assist families in poverty. A UNICEF study analysed the dynamics of poverty shows that in the period 2009-2017, 70% of Georgian families were below the poverty line at least

once[53]. Energy poverty appears to be widespread in Georgia, in particular related to availability of proper heating technology and adequate levels of energy.

According to the study of "Energy Consumption in Households"[54] carried out in 2017, during the cold season, much of the population heats only a small part of their homes – as described in the table 2-9 below. Given the information below, it can be estimated that approximately half of the population is living in conditions of some sort of energy / fuel poverty. Additionally, it is worth noting that:

- Energy poverty is more prevalent in rural areas where 50.5% of households in rural settlements heat less than 20 m^2.
- Even in urban settlements, 41.5% of the population heats 21-49 m^2 and 35.7% heat less than 20 m^2.
- Individual central heating system using natural gas is used by 10.5% of households national wide. The rate of central hearing is higher in urban areas (17.1%) compared to 1.6% in rural areas.
- The majority of dwellings (88.3%) have non-centralized heating sources (electricity, natural gas, firewood, etc.), while 1.2% of the houses are without heating at all.

Table 2-9: Information about energy consumption / energy poverty amongst the **population** in **Georgia**

Amount of household heated	% Of population	Number of people
No heating	1.20%	44,645
<20 m^2	42.10%	1,566,288
>20 m^2, non-central heating	46.20%	1,718,825
Central heating systems	10.50%	390,642

Source: Geostat (2017) "Energy consumption in households"

According to the survey for cooking:

- More than half (52.8%) of households use natural gas for cooking (77.8% of urban and 27.8% for rural areas)
- 24.6% of households use firewood and agricultural waste
- 16.7% use liquefied petroleum gas, and
- 5.7% use household waste.

One of the causes of energy poverty is the low energy efficiency of buildings. Most of the buildings in Georgia were built in the period 1950-1990 when heating requirements were not considered, which leads to low energy efficiency. The objective of the NECP with regards to energy poverty is as follows:

Objective 4: Reduce the percentage of the population in situations characterised by energy poverty (Target: reduced from an estimated 43% in 2017 to less than 15% in 2030.

Specific measures and policies to achieve this objective are included in Section 3.4.4.

53 Gugushvili D. and Le Nestour A (2019) A detailed analysis of targeted social assistance and child poverty and simulations of the poverty-reducing effects of social transfers; UNICEF

54 Geostat (2017) "Energy consumption in households"

2.5 Dimension Research, innovation, and competitiveness

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

Objective 5: Research, innovation, and Competitiveness (RIC)

National objectives related to RDI and energy are centered around two main strategic priorities:

Priority 1: Develop strong national Research, Development, and Innovation (RDI) system to support clean energy transition

- **Objective 5.1.1:** Increase public spending on R&I
- **Objective 5.1.2:** Capacity building for stimulating R&I
- **Objective 5.1.3**: Support and strengthen RDI related to sustainable energy.
- **Objective 5. 1.4**: Promote innovation in business and stimulate private investments in R&I

Priority 2: Strengthen international cooperation in RDI

- **Objective 5.2.1:** Support Georgian researchers and research organizations participation in large international RDI programs (e.g. COST, NATO SPS, other)
- **Objective 5.2.2:** Improve Georgian researchers and research organizations participation rate in EU framework program "Horizon Europe" and their integration in EU research community

No specific institution has been designed to support energy research and innovation in energy, so energy-related research and innovation (R&I) projects are implemented within the general R&I framework.

Research, Development, and Innovation (RDI) must play an essential role in the country's clean energy transition. Although the government put a lot of effort in the development of a favourable environment for the sustainable development of the RDI ecosystem, a number of persistent barriers and challenges are hampering the growth of RDI. The key challenges of energy RDI are:

Funding, regulatory and policy making

- **Absence of thematic priorities for national RDI.** This is one of the most crucial problems in the RDI field. The R&D Policy Efficiency Analysis report by State Audit Office stressed the importance of setting thematic priorities for national RDI. "Without setting state scientific priorities, the effectiveness of scientific activities decreases, which is reflected in the distribution of funding into a wide range of scientific research areas, which increases the risk of funding research in the areas that are not a priority for the country".
- **Low level of public and private spending on RDI in general and energy RDI in particular.** Low level of private spending resulted from lack of cooperation between business and research. This, together with lack of thematic priorities, represents the key obstacle towards effective development of RDI. The absence of strategic priorities of RDI activities in conditions when the total level of funding for RDI as a whole lags significantly behind the international index (both in

absolute terms and as a share of GDP), leads to inefficient spending of scarce funds. In addition to lack of funding for high quality scientific research this impacts the scientists' career decisions and the scientific potential of the country as a whole in a very negative way.

- **Lack of effective monitoring and evaluation of national R&D and energy related R&D in particular.** The existing system is scattered across various organizations and there is a lack of common centralized approach. For example, the SRNSF is monitoring only projects financed by the fund and mainly in terms of financial and funding program's objectives. Monitoring of the final result of the scientific research itself (Publication, implementation in practice, etc.) is not carried out.

Capacity and infrastructure

- **Lack of research institutes and qualified researchers and aging research personnel, lack of young researchers** resulting from continuous brain drain.

- **Lack of modern R&D infrastructure, existing infrastructure needs upgrading.** The R&D Policy Efficiency Analysis report by State Audit Office stated the poor condition of majority of research infrastructure (buildings, equipment, and other capital assets in the ownership of the research institutes). Although the report was prepared back in 2014, the situation has not been dramatically changed. Efforts of GITA in development of regional technical centres and labs with free access for research teams is very important for supporting RDI, however, the is need for a proper, modern R&D infrastructure in research institutes to ensure the quality of continuous R&D activities.

National objectives related to RDI and energy are centered around two main strategic priorities:

- **Development of a strong national RDI system to support clean energy transition;**

- **Strengthen international cooperation in RDI.** This will include further integration of Georgia into EU research community and access to EU research infrastructure is crucial for technology and knowledge transfer.

Objectives and measures linked to them are presented in Chapter 3.5 and Annex I.

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

Introduction of new technologies is considered as the main driver for a number of aspects of a low-emission pathway. Technological renovation is urgently needed in many areas of economy and Georgia intends to substitute outdated technologies with more efficient new ones, introducing them from abroad. The promotion of energy efficiency and renewable energy represents one of the main directions in the path of decarbonization by 2050.

In renewable energy generation, hydro resources are traditional type of renewables in Georgia are prevailing sources of electricity generation. However, due to the specific landscape and relatively small national area further construction of large HPPs is facing challenges and Georgia intends to diversify its renewable sources, actively involving solar and wind as well as biomass in the consumption mix. The

modelling for this NECP envisages construction of a number of new solar and wind PPs along with HPPs that will increase the existing power generation from renewable energy through by almost 60% while the new plants in consequent decades will increase it by additional 60% - with solar PV comprising about 13%, wind energy 15% and hydro with 55% of the total installed capacity by 2050. Georgia possesses other renewables sources as well like geothermal energy. However, their use is relatively limited. Geothermal energy resources are naturally limited, however, in long-term perspective, its use may become economically profitable and increase along with development of tourism and accommodation (hotels) including medical tourism (natural thermal waters). Biomass use is showing a decreasing trend in the country, however, along with ongoing reforms in forestry and waste sectors, and support to innovation in this area, biomass and municipal waste are expected to experience increasing use in industry (cement production) and composting in nearest decade and keep increasing by the mid-century. Energy-efficient wood stoves are also considered as a new technology to be implemented in upcoming years, keeping their relevance for highland areas for a long time.

A transition to cleaner energy is also envisaged in road transport sector, one of the key sources of GHG emissions in the country. In this field, support for hybrid and electric vehicles (and charging infrastructure) along with the introduction of restrictions for second-hand/aged cars and roadworthiness testing will further promote introduction of efficient vehicles that is already observed for recent decade.

Along with GDP growth and increased welfare the share of environment-friendly cars is expected to rise considerably by mid-century that will be significantly reflected in decrease of GHG emissions from the road transport.

It is envisaged that the team developing the NECP will collaborate with the team that developed the LEDS, and the goals have been reconciled and considered.

iii. Where applicable, national objectives with regard to competitiveness[55]

According to Global Competitiveness Report 2019[56] Georgia ranks 74th out of 141 countries assessed in Global Competitiveness Index. Global Competitiveness index measures the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity. The Index consists of 12 pillars and the 12th one measures innovation capability. Georgia received 32.7 points out of 100 in Innovation capability that puts the country 91st in the global rating. For specifically R&D Georgia gets just 23.8 points and is ranked as 75th, in commercialization of RDI – 53.1 points and 79th place in the global rating. In Business dynamism Georgia ranks 58th out of 141 with one of the lowest scores in growth of innovative companies' component – 108th out of 141.

Georgia developed and adopted an SME Development Strategy 2016-2020 with the objective to enhance competitiveness of SMEs in domestic and international markets and support modernization of technology

55 Competitiveness in the clean energy sector entails the capacity to produce and use affordable, reliable and accessible clean energy through clean energy technologies, and compete in energy technology markets, with the overall aim of bringing benefits to the EU economy and people. A competitive clean energy industry is therefore key in order to supply the technologies needed to transition. The competitiveness level of a specific industry is measured through a broad set of indicators, including the technology's status, like installed capacity, or levelised cost of energyvalue chain, as size of the market per value chain component with the value addedthe industry's position through trade balance, or as a top global player

56 http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

upgrading of SMEs. One of the 5 strategic direction is focused on facilitation of innovation and R&D in SMEs. Although the time horizon for the strategy ended in 2020 and new strategy has not been developed yet, increasing competitiveness of SME is still a priority for Georgia. The government continues implementation of the measures envisioned by the strategy:

- Increase awareness of innovative entrepreneurship;
- Elaboration of effective schemes of innovation and R&D financing. One of the primary objectives of GITA is provision of finance for innovative start-ups and businesses;
- Support to commercialization of innovations and R&D. With financial support from EU GITA started a new project Increasing Institutional Capacity for Innovation. One of the components of the project is Technology Transfer Pilot Program that aims to support commercialization of Georgian scientific results that respond to market needs;
- Improvement of ICT skills among businesses;
- Providing the infrastructure for innovation. GITA has established and continues establishment of FabLabs and TechParks with the free of charge access for research groups and interested entrepreneurs. It also actively supports innovative start-ups through trainings, grants and free access to various infrastructure.

The Government of Georgia has prioritized developing knowledge-based and innovation-driven economic development by institutionalizing the support schemes. This vision is reflected in the numerous state policy documents:

- The Association Agenda between the European Union and Georgia 2017-2020;
- SME Development Strategy of Georgia 2016-2020;
- Eastern Partnership 20 Deliverables for 2020: Bringing tangible results for citizens;
- Social-economic Development Strategy of Georgia “Georgia 2020”;
- Vocational Education Reform Strategy for 2013-2020;
- Unified Strategy of Education and Science 2017-2021;
- Open Government Partnership Georgia 2018-1029 etc.
- Goals, in terms of public/private research and innovation funding targets have not yet been set;

Targets for clean energy use by 2050 (including low-carbon technologies) are described in Section 2.1 on renewable energy targets and in Section 2.2 on energy efficiency targets.**Georgia aims to increase competitiveness of its economy through transition to sustainable energy and increasing the role of RDI.**

The work on Georgias vocational education strategy 2021-2025 and Unified strategy for education and science 2022-2032 is underway.

An international indicator used to monitor competitiveness is the Real Unit energy cost that measures the amount of money spent on energy sources needed to obtain one unit of value added for the manufacturing sector, excluding the refinery sector. To make this indicator more focused on the manufacturing sector energy generation, waste and wastewater treatment were excluded as well as refineries. The construction sector, that is not part of industry sector in business statistics produced by

Geostat, was added to the calculation. As the results, Real Unit energy cost in Georgia in 2018 was 14.4%, in 2019-14.6%.

Georgia will continue active development of domestic renewable energy resources such as hydro, wind and solar to increase domestic generation and reduce import dependency. This will also increase access to clean energy to industry and commercial sector as well. Additionally, Georgia in cooperation with international Donor institutions will continue its efforts in increasing resource efficiency of manufacture sector, to reduce energy intensity and increase its competitiveness. Detailed list of measures to support clean energy development and improving resource efficiency is presented in Chapters 3.1 and 3.2.

3 Policies and measures

3.1 Dimension decarbonisation

3.1.1 GHG emissions

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

The key laws relevant to the dimension of Decarbonisation (not related to renewable energy - which is addressed in Section 3.1.2) are described below.

Georgia's Law on Environmental Protection[57] is a national legal act covering climate change overarching governance principles and **Georgia's Law on Ambient Air Protection**[58] is a national legal act covering climate change governance matters.

Agricultural, forestry, and waste sector

The main strategic document related to agriculture is **Strategy for Agricultural development in Georgia 2021-2027.** The objective of the Strategy is fostering the competitiveness of agriculture; ensuring the sustainable management of natural resources, and climate action; and achieving a balanced territorial development of rural economies and communities including the creation and maintenance of employment.

Furthermore, Georgia has developed a **Rural Development Strategy of Georgia 2017-2020** which includes the objective of the improvement of the management of water, forest and other resources and the promotion of sustainable systems of waste management in rural areas.

Georgia has not developed any legislation related to decarbonisation of the agricultural sector.

The Forest Code of Georgia[59] is the main legal document covering the forestry sector in Georgia. One of the new aspects of the Code is the gradual restoration of forestry and the replacement of so-called "social cutting" with sustainable and multi-purpose benefits. This will help Georgia improve its production of sustainable bioenergy.

Georgia has developed **the 4rd National Environmental Action Programme (NEAP)** for the period of 2022 -2026. Some of measures within that plan include:

57 Document #519 first adopted in 1997 - Available here: https://matsne.gov.ge/en/document/view/33340?publication=21

58 Document # 2116 adopted in 1999 available here: https://matsne.gov.ge/en/document/view/16210?publication=14 and amended by document #5605 available here: https://matsne.gov.ge/ka/document/view/20218?publication=0

59 Document # 5949-ს available here: https://matsne.gov.ge/en/document/view/4874066?publication=0

- raising the quality of EIA/SEA documentation;
- Improvement of the mechanism of prevention and control of emissions from the industrial sector;
- Increasing the effectiveness of the environmental law enforcement and supervision system;
- improving access to environmental information;
- Implementation of integrated management system of water resources;
- Protection of Black Sea species and habitats;
- Provision of clean and safe air for human health throughout the territory of Georgia;
- promotion of sustainable management of land resources;
- reduction of environmental pollution caused by waste;
- Reducing the risk of impact on the environment and human health caused by chemical substances;
- protection of biodiversity, maintenance of ecosystem services and provision of sustainable use of biological resources;
- maintaining and improving the quantitative and qualitative indicators of the forest and increasing the benefits received from the forest, taking into account the ecosystem services of the forest;
- imporpovement of climate change policy;
- Improvement of natural hazards and risk management system;
- improvement of radiation protection, nuclear safety and security system;
- promotion of environmental education;

In 2013, the Parliament of Georgia adopted the **"National Forest Concept of Georgia"**. The aim of the concept is to establish a sustainable forest management system that provides:

- Improvement of the quantitative and qualitative characteristics of the forest of Georgia, protection of biodiversity
- Effective use of economic potential of forests, taking into account their ecological importance
- Public involvement in forest management issues and fair distribution of benefits.

To achieve these goals, the Georgian forest stock should be used in a way that does not endanger the ecological well-being and exploit their socio-economic potential.

Waste management in Georgia is covered by the **Waste Management Code**[60] which was enacted in late 2014. In broad terms the code outlines the responsibilities and legal requirements for waste management at the national and sub-national levels. It aims to facilitate waste prevention and its increased re-use as

60 Document 2994, available at https://matsne.gov.ge/en/document/view/2676416?publication=10

well as environmentally safe treatment of waste. A number of specific provisions are potentially relevant to climate change and energy including:

- The burning of waste outside permitted incinerators shall be prohibited.
- The Ministry shall develop a Strategy on management of biodegradable municipal waste including targets and measures for the reduction of the amount of biodegradable municipal waste going to landfill.
- Municipalities are required to develop 5-year waste management plans.
- The requirement that legal and natural persons that produce more than 200 tonnes of non-hazardous waste or 1,000 tonnes of inert waste or any amount of hazardous waste annually, shall prepare a company waste management plan and have an environmental manager.

Regarding decarbonisation and removals, there are a number of key policies and investment measures currently planned / under implementation including in three general areas:

- **Agricultural measures to reduce soil- and livestock-based emissions:** This especially involves an initial step of analysing the costs and benefits of measures before full introduction of measures.
- **Forest management measures to increase net GHG reductions: Includes reforestation efforts and implementation of an improved forest code. Also, as required, improving the efficiency of wood stoves (see subsection on energy efficiency).**
- **Waste management and waste-to-energy measures:** This includes a number of measures to reduce waste (particularly organic waste) going to landfill and to capture and use methane gases from existing landfills.

There are 33 specific policies and investment measures planned in the coming years covering these areas which are presented in Annex I.

iii.	**Where relevant, regional cooperation in this area**

A number of measures describe above can be strengthened with regional cooperation. In particular, sharing of lessons learned and harmonizing policy approaches could be highly relevant and will be carried out with Energy Community Contracting Parties. Currently, Georgia is engaged with various regional working groups including those convened within the Energy Community related to climate change, energy efficiency, renewable energy, and other topics.

3.1.2 Renewable energy

i.	**Policies and measures to achieve the national contribution to the binding 2030 Union target for renewable energy and trajectories as referred to in point (a)(2) Article 4, and, where applicable or available, the elements referred to in point 2.1.2 of this Annex, including sector- and technology-specific measures[61].**

As initially mentioned in Section 1.2.IIa, policies regulating various aspects of renewable energy are incorporated in primary and secondary energy legislation of Georgia including in the **Law on encouraging**

61 When planning those measures, Member States shall take into account the end of life of existing installations and the potential for repowering

the production and use of energy from renewable sources (Renewable Energy Law)[62] which approximates the requirements of Directive 2009/28/EC (see the box below).

Important provisions of the Renewable Energy Law:

The provisions of the adopted „Renewable Energy Law" relevant to the NECP include:

*Requirement that target indicators of renewable energy should be defined in the Integrated National Energy and Climate Plan of Georgia;;

* Promotion of the installation of renewable energy sourced for new buildings and settlements amongst local self-governing units;

* Definitions of what constitutes renewable energy[63] (including biomass[64]);

* For biomass stoves, the Government should promote those conversion technologies that ensure achievement of a conversion efficiency of at least 85% for residential and commercial applications and at least 70% for industrial applications[65];

* For solar hot water, the Government should promote the use of certified equipment and systems based on European standards where these exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies[66]

* The Government shall ensure that guidance is made available to planners and architects, as well as to all relevant actors, so that they are able to properly consider the optimal combination of renewable energy sources, high-efficiency technologies and district heating and cooling when planning, designing, building, and renovating industrial or residential areas[67];

* Sets up the legal basis for certificates of origin for renewable energy;

* Establishes the rules for joint projects with countries of the EU and third-party countries,as well as the rules of statistical transfer and joint projects between the Contracting Party of the Energy Union or the Member State of the European Union.

62 Document 5652-რს, available here: https://matsne.gov.ge/ka/document/view/4737753?publication=0

63 energy received from renewable sources – energy which is received from renewable non-fossil sources, in particular wind, solar thermal and solar photovoltaic, sun and tide, wave, and other ocean energy, aerothermal energy, geothermal energy, hydrothermal energy, hydro power, biomass, gas generated from the decomposition of organic matter at landfills, gas generated in a wastewater treatment facility, and biogas;

64 biomass – biodegradable elements in products, waste and residues of biological origin (including plant and animal substances from forestry and related industries, including waste from fish farming and fish processing enterprises and aquaculture, and biodegradable elements of waste, including in industrial and municipal waste of biological origin;

65 In the case of biomass, the Government of Georgia will promote its processing technologies, through which at least 85% efficiency rate of recycling will be achieved when used for domestic or commercial purposes and at least 70% efficiency rate when used for industrial purposes.

66 The Ministry ensures the implementation of such measures that, in the case of solar thermal energy, will promote the use of certified devices and systems in accordance with European standards, including environmental labeling, energy labeling and other standard technical systems that will be established by European standardization bodies.

67 The Government of Georgia, under the submission of the Ministry, ensures the availability of guidelines for designers, architects and other relevant parties, so that they have the opportunity to properly consider the combination of energy from renewable sources, high-efficiency technologies and central heating and central cooling during the planning, design, construction and reconstruction of industrial and domestic areas.

• The law additionally defines renewable energy support schemes;

• The law determines the principles of implementation of administrative procedures, regulatory norms and rules;

• Expands definitions of certificates of origin for electricity from renewable energy sources to include other forms of energy (including heating and cooling);

• Additionally determines the criteria for saving and sustainability of greenhouse emissions for biofuels, bioliquids and biomass fuels (Article 17), as well as updating technical information about the energy content of these fuels;

• Defines the rights of self-consumers and communities of renewable energy;

• Determines the main use of renewable energy in heating and cooling (Article 183);

• In addition, it defines the target indicators and obligations of fuel suppliers for the use of renewable energy in the transport sector.

The 1st **National Renewable Energy Action Plan (NREAP)** [68] was adopted in December 2019. The country did not have a binding target for renewable energy to 2020 due to its late accession to the Energy Community. According to Directive 2009/28/EC the preparation of the NREAP was mandatory prior to NECP[69].

As mentioned in Section 1.2.a, Georgia has also adopted a **new Law on Energy and Water Supply**[70]. This law is a key part of legislation regulating the energy sector which governs natural gas and electricity markets and at the same time explicitly lays out potential support mechanisms for renewable energy and energy from highly efficient sources – such as priority of dispatch, licensing procedures, and other forms of support.

The following topics are discussed in the strategy:

- Definition of the responsible body, necessary changes in the legal framework (RE legislation, Taxation, tax incentives for UBF business, waste management);
- Standardization (introduction of standards for biomass and fuels), as well as for appropriate manufacturing and consumption technologies;
- Stimulation of demand;
- Innovative and logistic support, awareness raising and enhancement of knowledge & skills;
- Seeking of financing from IFIs and climate funds;
- Creation of sustainable production processes.

This Strategy is currently under review.

68 The new NREAP, elaborated in parallel with NECP, is integrated into this document.

69 The 1st National Renewable Energy Action Plan has been integrated into the Integrated National Energy and Climate Plan, therefore it is not considered as a separate strategic document.

70 Document # 5646-რს available at https://matsne.gov.ge/en/document/view/4747785?publication=4

As previously mentioned, in 2019 Georgia completed and adopted the **Energy Strategy of Georgia 2020-2030**. Renewable energy represents one of the pillars of the development of Georgian energy sector in this document. The Strategy states that the use and integration of variable renewable energy sources, including mainly solar and wind resources, will contribute to the country's energy security and energy independence. According to current estimates, Georgia's wind energy resource is 4 billion kWh, of which only 2% is utilized. According to optimistic assessments, the solar energy resource is about 1 billion kWh, almost none of which is utilised[71]. Additional information is included in Annex I.

Furthermore, one of the strategic goals of the new Energy Strategy is integrating renewable energy sources and meeting the increased demand. The projects which serve this purpose[72] are:

- "Svaneti" and " Racha and Namakhvani" (connection of power plants from Svaneti and Racha regions to the network);
- "Guria" and "Strengthening the infrastructure of Kakheti" (integration of hydro power plants from these regions into the network).

Finally, in relation to renewable energy the Energy Strategy states that in order to develop the aforementioned support schemes, it is planned to conduct a feasibility study to determine which support scheme may be appropriate for different technologies and generation capacities, both in terms of technological development prospects and the impact on the electricity market. The financial impact of the support schemes on the expenditures of the state budget as well as on the particular market and its participants, will be assessed and analysed.

Prior to the development of the new Strategy, the State Programme – "**Renewable Energy 2008**" was adopted in 2008, which has been successfully implemented since then. In accordance with the current law in force, the following power plants are deregulated: Those built after 1 August 2008 which are not sources of guaranteed capacity, and power plants built before 1 August 2008 with installed capacity of up to 40 MW which do not constitute a source of guaranteed capacity. These plants are free to choose the buyer and set a price for produced electricity. This programme has since abolished and now other regulations are in force – Decree 515[73] on the Rules and Conditions for Submission to the MoESD of Georgia of Proposals about the Feasibility Study of Construction and/or Construction, Ownership and Operation of those Power Plants, which are not the Projects of Public and Private Partnership and Consideration of these Proposals, and the Public Private Partnership Law adopted in 2018[74].

Transport sector

The transport sector policies are described here while measures related to the sector are included in the Renewable Energy section as well as Energy Efficiency Section (Section 3.2) of the document. The transport sector in Georgia is experiencing a state of rapid growth off the back of growing road-based passenger transportation. Private vehicles, most of which are old and inefficient models, made up nearly

71 "The Energy Strategy of Georgia 2022-2032"

72 These projects are included in the current Ten Year Network Development Plan for the development of the Georgian transmission network for the years 2021-2031.

73 Resolution No. 515 of 2018 of the Government of Georgia "On approval of the rules and conditions for submission and review of proposals for the construction, ownership and operation of power plants that do not represent a public-private partnership project".

74 Available here: https://matsne.gov.ge/en/document/download/4193442/0/en/pdf

70% of passenger transport activity in 2015, while the shares of buses, minibuses and rail (including Tbilisi metro) accounted for an estimated 13%, 14% and 4%[75]. As Georgia is an important transit country, the government actively supports maritime, railway and aviation sector development by converging Georgian transport legislation with European directives. Road transport provides 42% of total transportation. In recent years, the number of cars working on natural gas was steadily increasing. In addition, hybrid and electric cars are becoming increasingly popular because of their fuel efficiency and state support. In 2016 the number of hybrid cars was increased four times compared to the previous year and amounted to 5.7% of total vehicle imports[76].

The Directive on the promotion of the use of biofuels or other renewable fuels for transport (2003/30/EC), as well as part of the **Directive on the promotion of the use of energy from renewable energy sources (2009/28/EC)** have now been transposed into the legal system of Georgia as part of the Law on Encouraging the Production and Use of Energy from Renewable Sources. However, secondary legislation is currently being drafted.

It is worth noting that the municipality of Tbilisi has prepared a sustainable urban transport strategy 2015-2030. The strategy covers the following main areas: (i) Urban master plan, (ii) Quality of life, competitiveness, economic growth and tourism attractiveness, (iii) Urban morphology, urban regeneration, mixed land use and local identity, (iv) Topography, natural and artificial barriers, (v) Universal accessibility, social and gender equity, (vi) Innovative financing mechanisms and increased private sector participation, (vii) Transit oriented development, increased density and mixed land-use along mass transit corridors and stations.

Georgia's National Road Safety Strategy . The Georgian Government's Resolution N353 of July 4, 2022 approved the National Road Safety Strategy of Georgia for 2022-2025 and its Action Plan for 2022-2023. The strategy includes the measures relevant to climate and energy related to decreasing speeds on the roadways which would therefore reduce emissions.

For effective implementation of the strategy and its action plan development of secondary legislation and regulations will be prepared in near future.

There are 9 specific policies and investment-related measures covering renewable energy which are presented in Annex I. Commentary is included in later sub-sections on how the specific measures are linked to these questions.

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

As mentioned in Section 2.4, there are current plans to increase the level of cross-border interconnections of electricity with neighboring countries before 2030 (was incrised from 2450 MW in 2020 to 3450 MW in 2025 and to 4750 MW in 2030). The specific cross-border interconnections planned include the following:

- "Ksani-Stepantsminda-Mozdok" transmission line and "Stepantsminda" substation (500 kV OHL, connection with Russia);

75 CSAP 2021-2030

76 Ministry of Environmental Protection and Agriculture of Georgia (2019) Georgia's 2nd Biennial Update Report under the United Nations Framework Convention on Climate Change

- "Akhaltsikhe-Tortum" transmission line and addition of a back-to-back station in Akhaltsikhe (400 kV OHL, connection with Turkiye);
- "Marneuli-Ayrum" connection with Armenia;
- "Gardabani-Aghstafa" construction of second circuit of 330 kV OHL;
- Georgia-Russia-Azerbaijan power system connection project (feasibility study).

This investment measure combined with policy measures to restructure the electricity market can be expected to lead to significant cross-border electricity trading (day ahead / hour ahead). This increase in trading would allow for increased use of renewable energy – including the use of excess renewable energy from Georgia to neighbouring countries and from neighbouring countries in Georgia. In particular, this is relevant to the hydropower sector at the current time and for the solar and wind sectors by the end of the decade.

There are no current plans to connect with Energy Community Contracting Parties or EU Member States with regard to transferring of renewable energy credits (or trading of energy). It is possible that some renewable energy used for transport (notably biodiesel) will be imported from Energy Community Contracting Parties or EU Member States, but no specific plans are in place currently.

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

Georgia benefits from significant levels of technical assistance (TA) and financial support (typically based on lending) for renewable energy production. This includes TA and linked investment finance from the EU, EIB, EBRD, KfW, DANIDA, the Energy Community Secretariat, and GIZ and other international financial institutions for:

- Development of appropriate policy frameworks, feasibility studies, etc. for the development of the market(s)
- Investments in electricity infrastructure (transmission and distribution infrastructure)
- Investments in power production including for wind, hydro, and solar energy
- Investments in building-level renewable energy via solar hot water heaters and (potentially) PV
- Development of sustainable forestry management and biomass energy production/ consumption.

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

The assessment of support for electricity from renewable sources has not yet been carried out in a systematic way which would fulfil Article 6(4) of Directive (EU) 2018/2001. However, an overall policy assessment has been conducted in 2019 / 2020 which has led to substantial changes in the legal framework for renewable energy – including the adoption of the Law on Renewable Energy. The support mechanisms will be re-evaluated as part of the next Renewable Energy Action Plan.

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

The regulatory framework for the administrative procedures of power plants and the issues of spatial planning and urban planning, as well as the creation of transmission and distribution networks related to them, fall into several policy areas. These areas govern authorization, certification, and licensing in the areas of energy, construction, and the environment.

The legislative framework governing procedures in the field of spatial planning and urban planning is governed by the following documents:

- Law on Energy and Water Supply
- Law on Licensees and Permits [77]

The legislative framework regulating authorization, certification, and licensing procedures in the field of spatial planning and construction is covered by:

- Code of Spatial Planning, Architectural and Construction Activities of Georgia[78]
- Law on Product Safety and Free Movement[79]
- Law on Construction Activity[80]
- Resolution №255 of the Government of Georgia of May 31, 2019, on the Rules and Conditions of Commissioning [81]
- Resolution №257 of the Government of Georgia of May 31, 2019, on the Rules and Permit Conditions for Issuance of Permits for the Construction of Facilities of Special Importance (Including Radiation or Nuclear Facilities)[82]
- Resolution №52 of the Government of Georgia of January 14, 2014, on recognition and enacting of technical standards in the territory of Georgia[83]
- Resolution №41 of January 28, 2016, of the Government of Georgia on approval of the "Technical Rules of Buildings and Construction Security"[84]
- Resolution № 366 of the Government of Georgia of December 24, 2013, on determining rule of protection of linear constructions of electrical networks and their protection zones[85]
- Resolution №260 of the Government of Georgia of June 3, 2019 "On the Rules for Spatial Planning and Urban Development Plans" Resolution №261 of the Government of Georgia of June 3, 2019 "On the Basic Provisions of Territorial Use and Development Regulation"[86]

77 Document #1775 available at https://matsne.gov.ge/en/document/view/26824?publication=62

78 Available at: https://matsne.gov.ge/en/document/download/32506/1/en/pdf

79 Document # 6157 available at https://matsne.gov.ge/en/document/view/1659419?publication=34

80 Document #577 avalable at https://www.matsne.gov.ge/en/document/view/17338?publication=7

81 Document # 255 avilable at https://matsne.gov.ge/en/document/view/4578072?publication=0

82 Document # 257 avilable at https://www.matsne.gov.ge/en/document/view/4578118?publication=0

83 Document # 52 avilable at https://matsne.gov.ge/en/document/view/2195713?publication=0

84 Document # 41 avilable at https://matsne.gov.ge/en/document/view/3176389?publication=0

85 Document # 366 avilable at https://matsne.gov.ge/en/document/view/2156434?publication=0

86 Document # 260 avilable at https://matsne.gov.ge/en/document/view/4579368?publication=0

The legislative framework regulating authorization, certification, and licensing procedures in the field of the environmental protection is covered by:

- Law on Water [87]
- Law on Environmental Protection [88]
- Order №28 of May 14, 2013 of the Minister of Environment and Natural Resources Protection of Georgia on approval of the rules of ecological expertise

Further legislation of relevance to authorization, certification and licensing procedures includes:

- Law on the Rule of Expropriation of Property for the Necessary Public Need [89]
- Law on State Property [90]
- Law on Agricultural Land Ownership [91]
- General Administrative Code of Georgia
- Civil Code of Georgia

Additionally, international standards are in the process of being adopted as relates to appliances which utilise renewable energy (e.g., biomass heaters, hybrid biomass heaters, heat pumps, etc).

Comprehensive information on authorization, certification and licensing applications and associated information is available from the relevant Government websites.

Availability of information on potential RES projects[92] as well as procedures and rules for expression of interest on feasibility study, authorization, and certification[93] is available on the website of the MoESD (www.economy.ge). All laws and by-laws related to authorization procedures can be downloaded from the MoESD website which also publishes a register of signed MoUs and a register of issued licenses. The website includes a list of potential RES energy projects which contains information about general feasibility of the project according to the type of plant, capacity, location, and general technical, meteorological, and financial information. The website also contains all required information on the procedures for issuance of necessary permits.

MEPA on its website (www.mepa.gov.ge) publishes all laws and by-laws related to procedures for obtaining necessary opinions and approvals regarding environmental impact assessments[94]. All issued approvals are also published this site.

87 Document #936 available at https://matsne.gov.ge/ka/document/view/33448?publication=26

88 Document # 519 avilable at https://matsne.gov.ge/en/document/view/33340?publication=21

89 Document #2349 available at https://matsne.gov.ge/ka/document/view/16480?publication=6

90 Document #3512 available at https://matsne.gov.ge/en/document/view/112588?publication=29

91 Document # 4848-II available at https://matsne.gov.ge/en/document/view/4596123?publication=0

92 https://www.economy.ge/?page=projects&s=49

93 https://www.economy.ge/?page=ecoleg&s=31

94 https://mepa.gov.ge/Ge/EiaAndSeaAnnouncements

The website of the Regulatory Energy Agency (www.gnerc.org) provides information regarding licensing and grid access regime[95] and other relevant information, including: standard application forms,[96] Commission's decisions, information on licenses issues, by-laws, standard contracts on transmission, distribution, supply etc. reporting forms for regulated companies etc. The website of the TSO (www.gse.com.ge) provides information about grid connection rules[97] and TYNDP[98] that contains certain information about RES development, potential and restrictions.

At present, there is no one-stop shop for coordinating all steps. The main counterparty for facilitation between different state authorities is the MoESD. The timetables for processing applications are defined by laws and sub-laws, and mostly they are communicated in advance.

Authorization of RES projects largely depend on the type and size of the generating facility. Construction that belongs to Class I does not require any permits or licenses and developer is free to build it without any procedures. There is also no commissioning obligation. After finishing construction, the owner of such plant applies to the DSO which is obliged to connect it within 20-40 days.

For larger RES projects, the average time for obtaining an approval (signing a Memorandum of Understanding - MoU) with ministry is very much dependent on the individual project and each investor undertaking a feasibility study. The timetables for such studies are defined in MoUs signed with the Government of Georgia and the investor is obliged to follow this MoU very strictly otherwise financial penalties might be imposed.

Large hydro projects must undergo a construction process in three phases which can take time, in part due to the involvement of the local population and other authorities. As per the rule for issuance of conclusion of exploitation (if it is relevant under the commissioning certificate) the power plant must be additionally checked based on the Government of Georgia's Resolution № 57 on construction permits. The permit issuing entity is authorized to increase administrative proceedings for up to 3 months for the different stages of construction permit consideration. Taking all these factors into account, an average estimated timeframe for issuance of construction permits is a minimum of a few months up to one year.

According to the electricity (capacity) market rules of Georgia, a power plant is authorized to operate without a license in testing mode for a maximum of 3 months. Within this period power the plant must undergo compliance testing from TSO and receive a commissioning certificate from the MoESD.

The organisation responsible for issuing a license for projects with an installed capacity larger than 15 MW is GNERC at the final stage, when the investor already has all documents obtained (including the commissioning certificate), within 1 month of the application.

The Law makes no distinction in the authorization procedure for the construction and use of production plants regarding specificities of the different renewable energy technologies, but there are some differences in terms of construction permit granting procedures regarding the type of RES and its scale, as described earlier.

95 https://gnerc.org/ge/user-page/useful-information-for-customers

96 https://gnerc.org/ge/user-page/useful-information-for-customers/gantskhadebis-formebi/57

97 https://www.gse.com.ge/for-customers/for-connection-to-our-grid/hv-grid-connection/

98 https://www.gse.com.ge/projects/ten-years-network-development-plan

According to the Government of Georgia Resolution №57 on construction permits:

- Hydropower plants up to 50 kW, solar panels, and biogas installations belong to the construction Class I which do not require a construction permit.
- Wind power plants belong to Class III of construction that is the subject of permission from local authorities.
- Larger hydropower plant construction permits are mostly approved by the central authorities as mostly they are construction projects with high risks due to the derivation pipes, penstocks, dams, and underground tunnels.

Related to geothermal energy, the usage of the geothermal water is regulated by the Resolution No 136 of the Government of Georgia On Approval of the Regulations on the Rules and Conditions of Granting Mineral License dated 11 August 2005[99], according to which the study of the minerals (including geothermal water) and/or usage of minerals is allowed only on the basis of the license; the license is issued by an auction organized by the National Environment Agency under the MENRP.

According to the Resolution No. 271 of the Government of Georgia of 4 April 2014 the licensees have to annually submit Statistical Observation Forms No.1-02: Data on the state exploration of underground water and non-fossil gases' deposits and No.1-03: Data on groundwater and fossil gases' hydrogeological observations[100], extraction and taxes paid.

There is a difference between ownership statuses of power plant whether it is state owned or private owned in terms of defining construction permit and commissioning certificate issuing authority. In case RES development is carried out by state owned entity (state funds) construction permit and commissioning certificate is issued by central authority.

vi. Summary of the policies and measures under the enabling framework Member States have to put in place pursuant to Article 21(6) and Article 22(5) of Directive (EU) 2018/2001 to promote and facilitate the development of self-consumption and renewable energy communities.

The specific measure considered here is listed as RE-4. The Law of Georgia on Energy and Water Supply stipulates the expansion of micro-power plants, according to which a micro-capacity power plant is an electricity generation facility owned by an end user or a group of end-users, using renewable energy sources with a capacity that GNERC has set the higher limit to not exceed 500 kW.

It is noteworthy that the micropower plant is not considered an entrepreneurial activity. Additionally, it is not mandatory for the power plant to be owned by the customer(s). The power plant can be used in case of rent, leasing, or other arrangements. The GNERC regulation on "Net metering" is currently in force to encourage micro power plants. It is used by small commercial and household users or a group of consumers as a support mechanism for their own consumption. The customer or a group of customers can deduct his / her energy production and consumption, and in case of excess, transfer it to the receipt of the next period for further deduction or for the purpose of financial settlement.

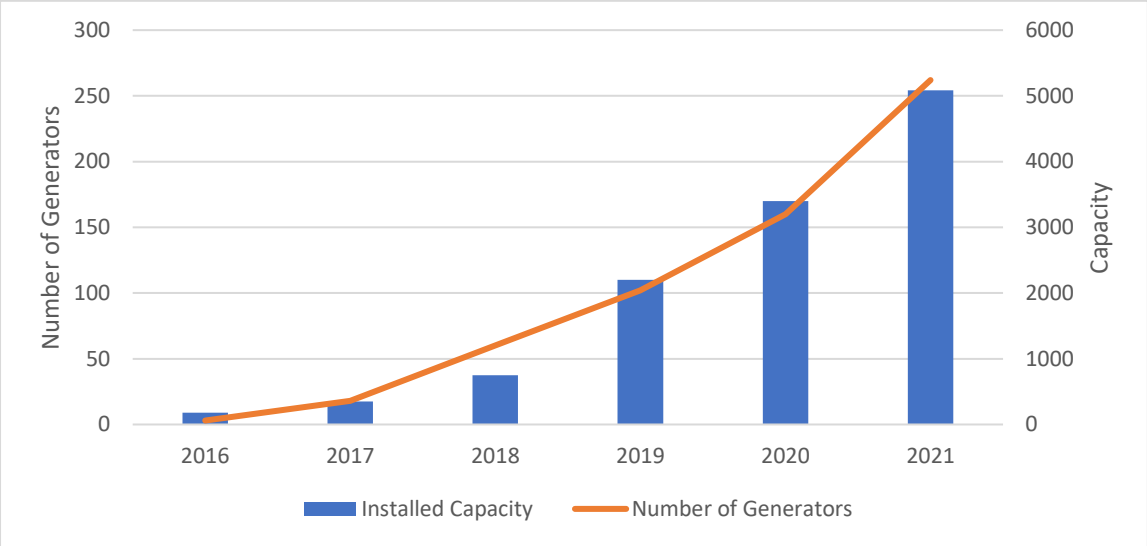
99 (in Georgian)
http://www.energy.gov.ge/projects/pdf/pages/Sakartvelos%20Kanoni%20Litsenziebisa%20Da%20Nebartvebis%20Shesakheb%20464%20geo.pdf

100 Daily discharge, temperature, underground water level

The potential for the development of micropower plants is high in Georgia, due to climatic conditions as well as the simple regulatory environment. Although this potential has not been fully assessed, according to one study, the solar energy potential on the roofs of buildings in Georgia has been analysed across 4 cities - Tbilisi, Rustavi, Kutaisi, and Batumi - and the total technical potential is between 822 and 1855 MW.

The figure 3-1- below shows the accumulated data on the development of micro-capacity power plants in Georgia during the period 2016-2020 (April). It is apparent that the introduction of net accounting had a positive impact on the growth rate of micro capacities. The vast majority of the statistics presented are solar photovoltaic panels, which make up 99.3% of the total, while the share of power plants up to 10 kW in relation to full power is 40%.

Figure 3-1: Installations of micro-power producers from 2016 – 2021 (*first quarter)



Despite the high potential of micropower plants, due to the complexity of network integration, GNERC has set a 2% limit in line with the peak load of the distribution network. According to the pessimistic scenario, this restriction will not be revised and will remain the same for the next 10 years. This is an undesirable scenario and may be a hindering factor. If we take into account the level of technology development and international experience, such administrative boundaries usually increase as the technical capabilities of integrating decentralized generation sources into the network (including protection, control and automation, allowing the distribution system operator to control this) are expanded and improved. It is possible to assume that from 2025 it will be necessary to revise the 2% limit and increase it with two possible scenarios:

- Scenario 1, from 2025 the limit increases to 4% and remains until 2030, which allows to absorb 100 MW of capacity by 2030[101].
- Scenario 2, from 2024 onwards, the 2% limit is increased to 4%, which lasts until 2028, and then increases to 6%.

101 It may be technically and financially feasible to go beyond this threshold, so this will be re-visited periodically in the coming years.

The plans of the distribution companies for 2021-2025 expect for peak load increases by an average of 5% per year. Based on these data, the absorbable capacities of micro power plants are calculated for different scenarios. The table 3-1 shows that the existing support scheme (so-called "net accounting") alone cannot ensure the high rate of development of micro power plants[102]. If the current dynamics are maintained, by 2030 it will not be possible to fully utilize the capacities, and for the purposes of the Action Plan, the target of the state should be to fully utilize these capacities, for which additional support schemes and / or pilot projects may be identified and implemented[103]. The development of micro-capacity power plants is a priority for the state, as the bulk of the investment costs are private investment, and the additional costs incurred for support are less than the costs incurred by the state to support large projects or during the support period.

Various schemes may be considered as possible support mechanisms, depending on the capacity of the micro-power plant development and the level of support that will be required to provide incentives for project development. According to international experience, for the sustainable development of decentralized generation sources, it is desirable that the payback period be within 5 years. Considering the economies of scale, as well as the analysis of international and local prices, it can be considered that the construction of large capacity micro-electric power plants (100 kW and more) will not require significant financial support from the state, but may require some support in the form of a partial subsidy, tax incentive, and / or providing cheap financing[104]. As for the development of small (1-10 kW) and medium (10-100 kW) generation sources, different levels of support will be required, which may be manifested by a combination of one or more measures:

- Ease of administrative permitting and networking procedures (or partial subsidy of connection fees);
- Implementation of pilot projects and awareness raising;
- Payment of a green tariff in parallel with net metering (with the amount and timeframe that provides a reduction of the payback period of up to 5 years);
- Increase the amount of electricity generated by micro power plants by a certain ratio and take this data into account for net accounting purposes (ratio size and timeframe of use should ensure that the payback period is maintained within 5 years);
- Providing cheap financing[105], which is one of the most effective forms of support.
- Tax relief;
- Strengthening the role of third parties or local energy associations, which also includes eliminating the requirement for the customer to own a micro-power plant (and its location) in one form or another;

102 According to this preliminary economic assessment, there is a small difference between the reduced costs of electricity generation and the retail tariff of electricity, which ultimately leads to an extension of the payback period of the investment to 10 years or more. Added to this is the lack of a cheap credit lines, which in turn weakens the incentive to implement micropower plants.

103 A pilot project might be the 1000-roof project, which has been widely tested to support the development of decentralized power plants in Europe, or other projects that help target groups develop their own generation sources for domestic or non-domestic use.

104 No specific incentive from the state is currently being discussed for this support, but this may be considered in the future.

105 Because of the small-scale of these projects, commercial banks do not make significant income to cover administrative and transaction costs (drafting contracts, hiring lawyers and loan officers, etc.) and are usually not interested in such projects. A separate fund may be set up for this purpose or for a cheap credit line for household and small commercial purposes. These could be established in cooperation with commercial banks.

- The so-called Development of "virtual net metering", which allows the accumulated kWh to be transferred from one subscriber card to another. This is an additional incentive for customers who own businesses or real estate in a variety of locations.

The support mechanism will be selected in close cooperation with the GNERC. According to Scenario 2, in case of utilization of the total allowable capacity of micro power plants[106] in the period 2021-2030, a total of 1.5 billion kWh will be generated, and CO_2 emissions will be reduced by 600,000 tonnes (these data depend on the real dynamics of peak load growth, capacity utilization for micro-capacity power plants and renewable energy technologies). In order to be able to accurately calculate the contribution of micro-capacity power plants to the target energy consumption / GHG reductions, it is necessary to provide a separate meter at the power plant network in accordance with the recommendations of the European Commission and the Energy Union.[107]

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

This assessment has not yet been carried out in Georgia. As of the time of the development of this report, there are no operating district heating or cooling facilities in the country – either from renewable sources or otherwise.

viii. Where applicable, specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account:

3.1.2.I.1 Biomass availability, including sustainable biomass: both domestic potential and imports from third countries

3.1.2.I.2 Other biomass uses by other sectors (agriculture and forest-based sectors); as well as measures for the sustainability of biomass production and use

Georgia faces an imminent crisis in supplying its regions with heating energy. The fuel wood that constitutes about 12% of country's total energy balance, and about 35% of domestic primary energy, is utilized in a highly unsustainable way. The Forestry Agency of MEPA estimates the annually available renewable wood resource at 600,000 m^3, while Geostat[108] estimated total consumption at 2.1 million m^3 in the period 5/2016 – 5/2017. It is noteworthy that in the time period between 2014 (the baseline year) and 2018 (the last year for which the energy balance was available, fuel wood production and consumption dropped by 2260 GWh (approximately 42%) or approximately 1.042 million m^3 to 2.1 million m^3.

There are significant volumes of solid woody biomass residues currently not utilized which can be used for heating through production of upgraded solid biofuels (briquettes, pellets, and chips) to satisfy heating needs – particularly outside the capital. This includes agricultural (theoretical potential 7-8 PJ equivalent annually) and forestry waste as well as waste from tree trimming in the cities, and from other underutilized sources. These sources can be summarised as follows:

106 It may not be possible to fully utilize the allowable capacity for the entire period in certain years, although the main assumption is that by 2030, 150 MW will be fully utilised.

107 Policy guidelines by the Energy Community Secretariat on the Grid Integration of Prosumers, 2018

108 Geostat (2017) Energy Consumption in Households

Biomass residues: The theoretical potential is approximately 1 million m^3 of biomass residues. There is approximately 3.03 million ha of agriculture land. Nearly 0.8 million ha of this is arable land and 0.26 million ha is used for perennial crops. Pasturelands (1.8 million ha), and meadows (0.14 million ha) make up the remainder of the agricultural lands[109].

Residential waste: Approximately 900,000 tonnes of waste per year accumulate in the main waste disposal sites according to municipal data. An estimated 80 million m^3 biogas (half of it is methane) could be obtained annually by re-treating these residues; this would equal 42 million m^3 of natural gas. Approximately 17 million m^3 of biogas (8.47 million m^3 methane) can be annually obtained from the sewage water cleaning station of Tbilisi (serving 1.2 million). The resulting biogas energy is estimated to be 760 GWh/year equaling 76 million m^3 of natural gas.

Therefore, the technical potential of the major biomass sources in Georgia amounts to 16,085 TJ/year (4.5 TWh/year). The achievable potential is likely much less than that. This estimate does not incorporate the potential of farming energy crops. For comparison, one can note that total annual electricity generation in Georgia is in the range of 12 TWh. Apart from firewood, which is used for cooking and heating, and a few donor-supported biogas initiatives, the biomass potential remains untapped.

In August 2018 a project has been approved by the Green Climate Fund which would support the improved sustainability of biomass utilisation in Georgia for energy and otherwise. This is reflected in measures under Section 3.1.1.

3.2 Dimension energy efficiency

Existing and planned policies, measures, and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2, including planned measures and instruments (also of a financial nature) to promote the energy performance of buildings, in particular with regard to the following:

i.	**Energy efficiency obligation schemes and alternative policy measures under Articles 7a and 7b and Article 20(6) of Directive 2012/27/EU and to be prepared in accordance with Annex III to Regulation 2018/1999**

Georgia has included the option of an Energy Efficiency Obligation Scheme within the Law on Energy Efficiency. However, at the time of writing of this NECP, Georgia plans in the short term to utilise alternative policy measures to achieve the Article 7 targets. This will be re-evaluated during the course of 2022 and reported upon if the situation changes. Specific alternative policy measures which are expected to be implemented (and which are underway) include:

- EE-14: Tax incentives for electric and hybrid vehicle (already adopted)
- EE-3: Energy efficiency retrofits in schools and other central government-owned buildings (underway)
- EE-8: Development of standards, norms, and labelling schemes for appliances (i.e., Energy labelling and ecodesign beyond what is required bu the EU agreements) (underway)
- EE-10: Incentivising / mandating energy efficiency in industry (planned)

109 Current land policy issues in Georgia - J. Ebanoidze, Association for the Protection of Landowners' Rights, Tbilisi, Georgia

These are included in the tables under Section 3.2.iv. Further elaboration of these measures is included in Annex I of this report to be consistent with Annex III of Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action.

Related to EE-10, there are a number of different scenarios that Georgia could model to reduce GHG emissions in Industry

ii. Long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private[110], including policies, measures and actions to stimulate cost-effective dep renovation and policies and actions to target the worst performing segments of the national building stock, in accordance with Article 4 of Directive 2012/27/EU as amended by MC Decision

In Georgia there is not yet an inventory of public buildings and their energy performance – nor have minimum energy performance requirements been established. However, on July 13, 2021, "Minimum requirements for energy efficiency of buildings, parts of buildings or elements of buildings" was approved by resolution No. 354 of the Government of Georgia, the NEEAP[111] envisaged the establishment of minimum energy performance requirements as part of the measure "EPBD Transposition and Enforcement: Standards and norms and energy performance certification schemes in buildings" which is also reflected in EE-9 in the table in Section 3.2. iv.

Information on public buildings is only partially available and based mostly upon the Sustainable Energy Action Plans (SEAPs) developed by specific Georgian Covenant of Mayors municipalities. Measures included in specific municipal plans are incorporated into this NECP[112]. Notably, information on administrative buildings is not available for analysis.

Additionally, an assignment has been carried out with the assistance of EBRD which has documented at least 4000 publicly owned and operated buildings throughout Georgia along with significant amounts of information on their energy consumption. This initial effort will be expanded as part of EE-4 listed in the table in Section 3.2.iv.

iii. Description of policy and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models[113]

Energy services in the public sector – including a focus on energy performance contracting – is included explicitly within the EE Law and secondary legislation is currently being developed (including model contracts) to facilitate its uptake in Georgia. A major barrier is related to the costs of energy consumption and suppressed demand within the public buildings sector. This means that many Energy Performance Contracts are not viable with straightforward contracts.

The following two measures are also relevant and described in the table in Annex I and Annex II:

EE-3: Energy efficiency retrofit in schools and other central-government owned buildings - The EE Law (Article 17) explicitly requires the renovation of buildings owned and operated by the Central Government. The minimum target is 1% of the total useful floor area of heated and/or cooled buildings owned and occupied by public bodies is renovated each year to meet the minimum energy performance requirements.

110 In accordance with Article 2a of Directive 2010/31/EU

111 The new NEEAP, elaborated in parallel with NECP, is integrated into this document.

112 Many of these municipalities are updating their action plans. Other municipalities such as Kobuleti, are developing action plans.

113 In accordance with Article 18 of Directive 2012/27/EU

EE-4: Establish energy efficiency information systems for public buildings - There is also a requirement in the law of the introduction of energy management systems in the buildings and other premises owned and occupied by public bodies.

These two measures are planned to be implemented in the coming period with financial and technical assistance from the EU as well as investment from the Georgian Government (through lending and direct investment).

iv.	**Other planned policies, measures, and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2. (For example, measures to promote the exemplary role of public buildings and energy-efficient public procurement, measures to promote energy audits and energy management systems[114], consumer information and training measures[115], and other measures to promote energy efficiency[116]**

Annex I and Annex II outline the existing and planned policies, measures, and programmes to achieve the indicative national energy efficiency contributions for 2030. The tables include the measures previously referenced in this chapter as well as related to energy efficient public procurement, measures to promote energy audits and energy management systems, and consumer information and training measures. These are separated into tables on:

- Measures of a horizontal measure and related to buildings and consumer information and training measures – of which there are 9 measures
- Measures related to energy efficiency in industry – of which there are 3 measures and
- Measures related to energy efficiency in transport – of which there are 10 measures.

These measures are described briefly in Annex I and in detail in Annex II.

The action plan for the implementation of the transport-related policy the UN 1958 Agreement is in the box below.

Action Plan for the efficient implementation of the UN 1958 Agreement in Georgia

In 2010 UN the General Assembly (GA) proclaimed the current 2011-2020 decade as the United Nations Decade of Action for Road Safety. The envisaged goal is to stabilize and reduce the forecasted level of road traffic fatalities worldwide through increasing the number of road safety activities conducted at the national, regional, and global levels.

In line with the requirements of the Decade of Action for Road Safety 2011-2020 and the 2030 Agenda for Sustainable Development, UNECE Sustainable Transport Division alongside the Economic Commission for Latin America and the Caribbean (ECLAC) and the Economic and Social Commission for Asia and the Pacific (ESCAP) have initiated the "Strengthening the national road safety management capacities of selected developing countries and countries with economies in transition" project.

The project was designed to help governments strengthen the road safety management capacities and effectively address and improve national road safety records. The most critical road safety aspects and

114 In accordance with Article 8 of Directive 2012/27/EU

115 In accordance with Articles 12 and 17 of Directive 2012/27/EU

116 In accordance with Article 19 of Directive 2012/27/EU

priority needs in the beneficiary country were identified by preparing the Road Safety Performance Reviews (RSPR).

The RSPR of Georgia analysed among others: the national and supranational legislative framework governing road traffic in the country, Georgian institutional setup, road infrastructure, the status of the car fleet and road safety trends in the last decade. The Georgian National Road Safety Action Plans for 2017 and 2018 were adopted based on the findings and recommendations of the RSPR. The RSPR supported the reintroduction of periodic technical inspections for passenger vehicles and the adoption of amendments on road safety legislation.

In 2015, Georgia signed the UN 1958 Agreement, which stipulates the requirements for type approval and recognition of such approvals for vehicles and their equipment and parts, as well as safety, environmental and anti-theft requirements. In 2016, following the decree №944 of the Government of Georgia - an interagency working group has been established with the aim to prepare the draft for the technical Regulation for the introduction of the Type Approval System. At this stage preparatory activities are being undertaken by the Land Transport Agency (LEPL) of the Ministry of Economy and Sustainable Development of Georgia to elaborate on the plans that will ultimately translate into a national draft Technical Regulation (implementation legislation). In order to fulfill this goal, the Georgian Working Group, together with the UN consultant, have prioritized the necessary item actions based on the potential technical risks/threats stemming from the introduction of the system. According to the specific economic and social characteristics of the Georgian automotive market, the working group has defined four phases of the Action Plan for an efficient implementation process of the 1958 Agreement:

A. **First phase** - Recognition and granting of UN type approvals Prepare the Type approval Authority (TAA) and designate a Technical Service (TS) to grant type approval certificates according to the UN Regulations annexed to the 1958 Agreement. The recognition of the approvals principle is also included in this phase of the legislation. Expected implementation time 1 year. The following action items are foreseen in their chronological order:

1. Prepare the legislation and the procedures (Annex 5 and Annex 6 - draft amendment of the Law on Motor Transport and the Technical Regulation in English version); LEPL Land Transport Agency (LTA) is designated as TAA for Georgia;

2. Start the official process to adopt the legislation;

3. Define and dimension the LTA internal structure to act as TAA (The Safety department must have 2-3 approval coordinators, 1-2 auditors, 1 lawyer, 1 technical secretariat);

4. Perform the LTA auditors training to assess the TS and the manufacturers (ISO 17020, ISO 17025, ISO 17021 and ISO 9000);

5. Perform the LTA coordinators training using a “training on the job” method;

6. Start a continuous participation in the WP29 Working Parties;

7. Search for and identify an international TS, already notified as category A and/or B by other Contracting Party;

8. The implementation legislation, the Law on Motor Transport and the Technical Regulation is adopted;

9. Notify the LTA as TAA to the UN Secretariat;

10. Assess and designate the chosen TS;

11. Notify the designated TS to the UN Secretariat;

12. Ndentify of the first customers and perform the first approval process;

B. **Second phase** – National vehicle individual approval system implementation Deployment of a national vehicle individual approval system. Expected implementation time 2 years following the foreseen steps and their order:

1. update the vehicle approval and traffic legislation (level 1) by introducing the individual approval certificate as mandatory for the registration of vehicles from M, N and O categories; Designate the LTA as Individual Approval Authority (IAA); designate the existing Periodical Technical Inspection Centers (PTI) as TS's; transitional period required;

2. update the vehicle approval legislation regulation (level 2) by introducing the technical requirements and administrative provisions for individual approvals (predefined in Annex 3 and 4); define the document flow between PTI Stations, IAA, Registration Authority and the customer;

3. update the LTA structure and dimension in order to handle the individual approval process at national level (2 individual approval coordinators, 2 ISO17020 auditors for the PTI stations designation, 2 computer software engineers);

4. establish an agreement with the Vehicle Registration Authority to define and clarify mutual procedures;

5. perform the training on the job for the LTA coordinators;

6. perform the PTI inspectors training using a "train the trainee" process;

7. define, design and create the IT tools and databases to be used for the management and monitoring of the system at national level.

C. **Third phase** – National whole vehicle type approval (NWVTA) system implementation This process will apply to all new vehicles manufactured or imported in Georgia and will increase the level of safety and environmental protection of the future national fleet. Expected implementation time 3-4 years. The action items for this phase are:

1. update the vehicle approval and traffic legislation (level 1) by introducing the national certificate of conformity as mandatory for the registration of vehicles from M, N and O categories; Designate the LTA as Type Approval Authority (TAA) for NWVTA; transitional period required; recognition of the EU Certificate of Conformity and of the UN Declaration of Conformity must be included;

2. update the vehicle approval legislation regulation (level 2) to introduce the technical requirements and administrative provisions for national whole vehicle type approvals (predefined in Annex 2); define the document flow between the TS, TAA, Registration Authority and the customer;

3. identification of a Georgian Technical Service; can be created as a part of the TAA or it can be selected among the PTI Centers accredited by the national accreditation body;

4. update and dimension the TAA structure in order to handle the type approval process at national level (1-2 approval coordinators, 1-2 COP and initial assessment auditors);

5. establish an agreement with the Vehicle Registration Authority to define the mutual procedures, including the information exchange;

6. perform the training on the job for the LTA coordinators;

7. perform the TS inspectors training using a "train the trainee" process;

8. define, design, and create the IT tools and databases to be used for the management and monitoring of the system at national level.

D. **Fourth phase** – Placement on the market of new equipment and parts used on or with the vehicles - New equipment and parts covered by the UN regulations will be placed on the Georgian market only after there have been type approved. Expected implementation time 5-7 years using the following steps:

1. update the vehicle approval and traffic legislation (level 1) by introducing the compulsory use of type approved equipment and parts for vehicles; define the Enforcement and Surveillance Authority (ESA); ESA functions can be carried out by the LTA and the PTI Centers or by the LTA and/or the Traffic Police); transitional period required;

2. update the vehicle approval legislation regulation (level 2) to introduce the technical requirements and enforcement measures (predefined in Annex 1) and to define the document flow between the ESA and the customer;

3. update and dimension of the ESA structure in order to handle the enforcement and surveillance process at national level (4-5 inspectors, 1-2 IT engineers);

4. establish an agreement between TAA and ESA to define the mutual procedures, including the information exchange;

5. perform the training of the ESA inspectors according to ISO 17020 and ISO 9000;

6. define, design, and create the IT tools and databases to be used for the management and monitoring of the system at national level.

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

There are currently no policies or measures to support local renewable energy communities in an explicit way – though the support to small producers can be supportive in this regard (see section 3.1.2.vi.)

vi. Description of measures to develop measures to utilise energy efficiency potentials of gas and electricity infrastructure[117]

A number of policies are in place to encourage energy efficiency of the gas and electricity infrastructure. Specifically, 5 key measures included in the national planning document (CSAP) and existing policies are described in Annex I and in detail in Annex II.

Specifically related to the measure "reduction of losses in electricity transmission networks and grid integration of new generation", this measure involves energy savings through measures to develop Georgia's transmission networks to accommodate for larger energy production and consumption.

GSE is owned by the MoESD. GSE provides transmission and exclusive dispatch services to about 60 eligible companies in Georgia. Cross-border electricity trade opportunities, high electricity demand growth, and the need for evacuation of the energy generated by the planned power plants will mean a need for investments in the transmission infrastructure for ensuring adequate development of the network. GSE owns lines of 500-400-330-220-110-35 kV with the total length of 4454.05 km, including:

- 500kV transmission line length – 937 km
- 400kV transmission line length – 32.6 km
- 330kV transmission line length – 37 km
- 220kV transmission line length – 1943.3 km
- 110kV transmission line length – 955.7 km
- 35kV transmission line length – 548.45 km

In 2015, GSE – in cooperation with the MoESD, GNERC, electricity transmission licensees, and other agencies developed Georgia's 10-year Network Development Plan 2015-2025. This Network development plan is adopted annually. The updated 10-year Network Development Plan for 2021-2031 includes the following activities / investments with associated reductions in energy losses:

- Jvari-Khorga (2022); reduction of losses 12.55 GWh / year;
- Batumi-Akhaltsikhe (2023-2024); reduction of losses 15.03 GWh / year;
- Ksani-Stepantsminda-Mozdok (2030); reduction of losses 3.24 GWh / year;
- Marneuli-Ayrum (2025); reduction of losses 4.3 GWh / year;
- Rehabilitation of Kolkhida-I (2023) reduction of losses 4.3 GWh/year;
- Jvari-Tskaltubo-Akhaltsikhe (2023-2025); reduction of losses 27.48 GWh / year;
- Svaneti 2021-2030 reduction of losses 12.7 GWh / year;
- Ratcha and Namakhvani (2023-2030), reduction of losses 8.04 GWh / year;
- Guria (2023-2024); reduction of losses 14.27 GWh / year;
- Akhaltsikhe - Tortum (2024-2030); reduction of losses 31 GWh / year;

117 In accordance with Article 15(2) of Directive 2012/27/EU

- Rehabilitation of Imereti (2026); reduction of losses 42 GWh / year;
- Renovation of substations (2022-2028); reduction of losses 4.3 GWh / year;
- Reinforcement of Kakheti infrastructure (2023-2027); reduction of losses 2.82 GWh / year;
- Reactive power source (capacitor battery) (2023-2028); reduction of losses 38.7 GWh / year;
- Safe electricity supply of Tbilisi region (2023-2027); reduction of losses 18.86 GWh / year;
- Reinforcement of 220 KV kartli transmission line (2025-2028), reduction of losses 3.45 GWh / year;
- Rehabilitation of 330 kV OHL Gardabani-Aghstapa (2022); reduction of losses 0.2 GWh / year;

These values can be changed through years, in the case of delay in commissioning of network elements, especially power plants in Georgian power system.

vii. Regional cooperation in this area

Regional cooperation related to energy efficiency is related to 3 areas:

- Development of transmission infrastructure and cross-border connections to allow for increasing efficiency of the entire system.
- Cooperation and discussions with other Energy Community Contracting Parties, EU Member States, and regional neighbours regarding best practices.
- Technical assistance and investment from the international community – including EU Member States, the EU itself and Energy Community Secretariat, GIZ, Green Climate Fund, UNIDO, UNDP, and other UN Agencies, etc.

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

The EU and EU Member States have been active in supporting energy efficiency within Georgia. Current planned investments and technical assistance programmes include:

- EU / EBRD / KfW loans
- Energy Community Secretariat
- DANIDA technical assistance
- ADB and World Bank
- EBRD and the Green Climate Fund (GCF) via EBRD Green Cities
- GEF and UN agencies and organisations

3.3 Dimension energy security[118]

i.	**Policies and measures related to the elements set out in point 2.3[119]**

Over the last decade, infrastructure development has been complemented by energy reforms to move Georgia toward energy security, more rational use of energy resources, promotion of renewable energy, and energy efficient, environmentally friendly clean technologies in all sectors of the economy.

Electricity Sector

according to the modeling, With the additional capacities, it will be possible to reduce the share of imported energy (Electricity Imports and Generation from TPP) in electricity consumption from 30% (2016-2019 avg.) to 15% (in 2030), which will significantly improve the security of electricity supply of the country. This improvement will be more apparent in low-water flow periods (October-March), when the dependency on important fuel will decrease from 45% (2016-2019 avg.) to 25% (2030). The increased share of RE, will allow for increased electricity exports during spring-summer, and capacities from TPPs, despite reduced generation will act as reserves, during emergencies and in exceptionally dry hydrological years. Electricity Imports can be envisaged, in preferential conditions for the country, however for long-term planning, dependency on electricity imports is not recommended. It must be noted that capacities above, do not limit the technical capabilities presented in the TYNDP[120].

As a result of the implementation of projects envisaged by TYNDP, the total nameplate capacity of 500/400/330/220/110 kV auto-transformers installed in Georgian transmission network will increase by about 5000 MV, and the total length of 500/400/330/220/110 KV transmission lines will increase by 1500 km. This will ensure improved reliability of the network and satisfy the (N-1) reliability criterion at each development stage. This will allow Georgia to undertake a transit hub function, provide for more than 1000 MW of exchange in both east-west and north-south directions, and the integration of an additional 3500-4000 MW hydropower into the network. According to the preliminary forecasts, the total investment value of the planned projects amounts to about EUR 800 million. A more detailed information on the power network development is provided in the 3-1 table below[121].

Improvements in the distribution systems are especially needed in the Svaneti region. The network requires investment in power lines and metering systems as well as associated improvement in billing and collection mechanisms.

Georgia's energy security is compromised by unpaid and growing electricity consumption in temporarily -occupied region of Abkhazia. The Georgian government and consumers are bearing the costs of operation and maintenance of the Enguri/Vardnili cascade and even the informal agreement of power output split in proportion of 40/60 (monthly) is not being observed. Metering of consumed energy, billing and fee

118 Policies and measures shall reflect the energy efficiency first principle.

119 Consistency shall be ensured with the preventive action and emergency plans under Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 (OJ L280, 28.10.2017, p. 1) as well as the risk preparedness plans under Regulation (EU) 2018/2001 [as proposed by COM (2016) 862 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC].

120 According to TYNDP 2021-2031, GSE. For 2030, the total installed capacity available in Georgian power system will grow to 9740 MW. From this, 4097 MW will be attributed to regulated HPPs, 2438 MW to seasonal HPPs, 1330 MW to Wind Power Plants, 520 MW to Solar Power Plants, 110 MW to Gas turbines and 1245 MW to high efficiency combined cycle as well as coal thermal power plants, which will replace the older Gardabani TPP's Units

121 TYNDP 2021-2031, GSE 2021.

collection are nonexistent in temporarily -occupied region of Abkhazia and require significant investment and political will for improvement.

Georgia will seek to extend the sound commercial practices in power distribution over its whole territory, by promoting complex solutions including the provision of metering and billing systems, rehabilitation and construction of hydropower facilities, gas supply and other measures.

Besides improving energy security, these actions will help to improve social and economic conditions of the population in temporarily -occupied region of Abkhazia. The establishment of viable commercial relations can open up a window of economic and technical opportunities which may include:

- As a first step achieving the strict observance of the Enguri power output distribution between temporarily -occupied region of Abkhazia and the rest of Georgia (as per informal agreement to a 40/60 monthly split) and agreement on payment for the share of consumed electricity.
- Conduct a power distribution pilot project on metering and network rehabilitation in a district of Sokhumi with UNDP support (the project cost is USD 8 mln).
- Initiate a reconstruction of the 110 km gas pipeline Zugdidi-Sokhumi of 500 mm diameter with branches to Gali (D=325 mm, L=3.4 km) Ochamchire (D-529mm, L=1.5km) and Sokhumi (D=529mm L=0.5 km) for partial replacement of electricity from Enguri HPP especially during the heating season[122]
- Consider the reconstruction of Vardnili cascade hydropower plants
- Supporting development of the hydropower potential of temporarily occupied region of Abkhazia.

Part of the existing hydro power plants is outdated and needs modernization. Measures must be taken to ensure that these hydro power plants operate close to their design parameters and regain the capacity to accumulate water for the periods of deficit.

The installed capacity of 6 thermal power plants (TPP) operating in Georgia is 1166 MW - approximately 24% of the country's total installed capacity. 3 out 6 units have low efficiency and reliability and high cost of generation. By 2025 the Ministry envisages to construct 2 new natural gas fired combined cycle TPPs with a total installed capacity of 500 MW and to decommission the inefficient TPPs. This will provide reliable base power and is expected to save at least 76 mcm of imported gas annually [123].

For enhanced system stability and reliability in the short-term and long-term, the TSO – Georgian State Electrosystem (GSE) – plans to upgrade Supervisory Control and Data Acquisition (SCADA) and Wide-area monitoring systems (WAMS). Smart network and metering technology is also included in the TYNDP for 2021-2031.

Natural Gas Sector

Introducing a clearly defined market structure and regulatory system and ensuring non-discriminatory access to transportation and distribution networks is expected to contribute to further development of

122 Ten-year plan for the development of the natural gas transport network of Georgia 2019-2028 https://www.gogc.ge/uploads/tinymce/documents/Ten-Year%20Plan%202019-2028.pdf

123 Energy Strategy 2020-2030.

the Georgian gas sector and its integration into the regional systems, which is one of the key preconditions for enhancing the country's energy security.

It is planned to carry out gradual transition to a competitive market. The launch of the new market structure and completion of the natural gas trading platform is planned by 2023. At the same time, an affordable price for natural gas for customers of the so-called "vulnerable" segment will be preserved under a Public Service Obligation (PSO); this will be one of the obligations of the “public supplier” and will be supplied by relatively cheap natural gas from Shah Deniz.

The development of competitive gas market is complicated by market domination of single supplier. The options for increasing the transparency and competition in the gas market including development of optimal balance between suppliers and mandatory gas release shall be examined and implemented. The concrete timeframes for establishing the competitive natural gas market and implementing related organizational, structural, technical, and legal changes and innovations will be set out in an action plan approved by the government.

The MoESD is actively working to **diversify Georgia's gas supply sources and routes**. Specifically, receiving gas from Turkiye or any EU countries through the SCP and receiving natural gas from Turkmenistan and/or Iran based on swap deals, with the participation of Azerbaijan or Armenia, are being discussed. However, due to the complexity of the corresponding gas transportation infrastructure and supply schemes this is mainly considered as a long-term prospect. The negotiations are continuing through bilateral and multilateral cooperation channels.

Underground natural gas storage

Underground natural gas storage is the most effective way of ensuring strategic stock and managing the supply and consumption seasonal imbalances. As has been noted, it is planned to build an underground gas storage facility at Samgori South Dome. The gas storage facility was planned to be operational by 2024, when supply of significantly increased volumes of natural gas from the second phase of Shah-Deniz gas field operation begins. However, construction has been postponed for several years, due to financial problems caused by the COVID-19 pandemic[124]. The technical parameters of the gas storage facility will satisfy the requirements of European Energy Community Regulation # 994/2010 (on Security Measures of Gas Supply). This requires ensuring guaranteed natural gas supply to protected customers. In addition to creating strategic reserves, the gas storage will also manage commercial gas flows as an important source of revenue for the operator company.

A **Ten-Year Development Plan for Georgian Gas Transmission Network 2021-2030** will be updated annually in accordance with the requirements of EC Directive 2009/73 “Concerning Common Rules for the Internal Market in Natural Gas”. The document covers infrastructural projects, with the short- medium- and long-term timeframes of their implementation and investment opportunities. Cost-benefit analysis has been conducted for all infrastructural projects.

Rehabilitation and modernization of key sections of the main pipeline system and distribution networks is planned to enhance the **operational flexibility and reliability** of the internal gas network and ensure smooth and efficient distribution of gas throughout the country is also planned.

124 TYNDP 2021-2030 pp. 81

The planned rehabilitation strategy of the Main East-West Main Pipeline system envisages gradual **replacement of existing 500/700-mm pipeline sections (about 40 years old) with new 700-mm pipelines**. The focus will be on the use of high-pressure pipes, which will increase the system throughput and allow pressure build-up with minor costs in the best international pipeline requirements.

The rehabilitation of **critical sections of the East-West direction of the main gas pipeline is a priority short and medium-term project**. This includes arrangement of the back-up infrastructure for the critical sections in hardly accessible mountainous regions. The most critical sections are: Akhaldaba-Bakuriani section of the Gomi-Khashuri-Bakuriani Branch, and the existing Adjara Branch.

The medium and long-term infrastructure development plans mainly envisage construction of several interconnectors. The purpose of these projects is to replace the radial gas supply systems with reliable interconnected circular gas supply system. This will make it possible to divert gas flows from any supplier to any large customer and distribution company in emergencies. Final decision on the implementation of these projects is pending.

Several important gas pressure regulating, and metering stations are identified for priority rehabilitation. It is planned to start the design and implementation of major rehabilitation projects of other priority gas pressure regulating and metering stations (Kaspi, Gori, Navtlugi, Gardabani, Gldani, Zestafoni, etc.).

It is planned to equip gas pipelines with the modern **SCADA system**, the system design and installation is planned for 2021-2022[125].

Regional Gas Infrastructure Development

It is planned to implement infrastructure projects aimed at increasing the capacity of interconnections with neighbouring countries or reversing the gas flow in emergencies. The increasing dependence on monopolistic natural gas supply from state companies of foreign countries is raising concerns of energy security and complicates the formation of a transparent competitive market. This calls for initiatives to develop options including gas swaps and potential LNG alternatives[126].

The swap of regasified LNG landing at a terminal in Turkiye, Greece or Italy with piped gas delivered to Georgia through its offtake from SCP could provide Georgia with indirect access to LNG. This option requires interest by the involved parties, the availability of LNG at affordable prices, and resolving contractual barriers that could obstruct an access to the SCP. This option could be quickly initiated, as it does not require development of new infrastructure.

125 TYNDP 2021-2031 https://www.gse.com.ge/sw/static/file/TYNDP_GE-2021-2031_GEO_NEW.pdf

126 Report: Prospects of LNG Market Development in Eastern Partner Countries, Stantec, January 2020 (project funded by the European Union)

Longer-term development options include:

- **Development of an LNG receiving terminal** in Georgia is pending due to restrictions imposed by Turkiye on international LNG shipments through the Bosphorus Strait. Dialogue will be maintained on this option with Turkiye and other interested Black Sea littoral states.
- **Liquefaction and export terminal in Georgia**, receiving gas from Azerbaijan and potentially Central Asia, and export to Eastern Europe, particularly Ukraine and Moldova. This is dependent on availability of gas from Central Asia and Ukraine's decision to develop a regasification facility.
- **The development of Small Scale (SS) Liquefaction Facility** for internal use of LNG as a truck fuel or for seasonal consumption peak shaving.
- **The technology efficiency and price development** as well as changes in geopolitical and economic attitudes of partner countries will be monitored to assess the feasibility of these options.

Hydrocarbon exploration

Discovery of new deposits and effective utilization of existing reserves are of great importance for ensuring energy security. The use of modern methods and technologies for utilization of current deposits and for exploration of the new ones through deep drilling and qualified production. Extracting only 5% annually at validated deposits of oil would increase production by 2.5 – 3 times and increase production of natural gas by more than 10 times compared to 2018.

Exploration activities (2D and 3D seismic exploration on individual wells) in different regions of the country indicate a great possibility of discovering new hydrocarbon reserves. Promising structures have been identified and studied in relative detail in both terrestrial and marine parts of the country that are first-class drilling sites. A reserve of 16 bcm has been identified by a production company and horizontal drilling operation is planned for its extraction.

Particularly promising is Georgia's Black Sea shelf. Several large sites (Gudauta, Ochamchire, Kulevi) have been studied in the north during the Soviet times by seismic exploration; in the south, in the shelf zone of Adjara and Guria, in the first half of 2000s American company "Anadarko" studied highly prospective large anticlines (Iberia, Colchis, Lazika, Egrisi), however, drilling on the Georgian shelf has not been carried out so far. **The Energy Strategy 2020-2030** considers the feasibility of intensive and costly work to increase local oil and gas production.

On 15 January 2020, State Agency of Oil and Gas of Georgia (SAOG) announced an international tender for general license on oil and gas exploration and production on Black Sea shelf (license blocks II, III). OMV Petrom S.A has been identified as the winner. A Production Sharing agreement has been negotiated with the company and approved by the government on March 10, 2021.

Oil Refinery and Mandatory Reserves

Part of locally extracted oil is exported through Batumi and Poti terminals, while a part is processed in local small oil refineries Veli Ltd. and Zd Oil Company Ltd, with the capacity of 80,000 tonnes and 130,000 tonnes of crude oil per year, respectively. To determine the feasibility of new larger scale oil-refining capacity, Georgia plans to invite potential investors to one of the industrial zones.

As an Energy Community member state Georgia must fulfill the requirements of the *acquis* on oil – Directive 2009/119/EC imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products. The implementation deadline is 1 of January 2023.

The draft Law on Maintaining Mandatory Stocks of Crude Oil and Oil Products establishes rules for the creation, management, and use of **mandatory reserves to ensure continuous supply of petroleum products**. The required volume of supplies is calculated for at least 90 days of average daily imports or 61 days of consumption — whichever is the higher, by the following products:

- Motor gasoline
- Jet fuel
- Kerosene
- Diesel fuel
- light fuel and
- Heavy fuel oil

SAOG is defined as the Central Stockholding Entity (CSE). The emergency stockholding obligation will apply to any economic operator, who imports crude oil or oil products and bituminous minerals on a commercial basis or produces it in Georgia. From January 1, 2023, every compulsory stockholder will be required to hold emergency stocks equal to 25% of their annual imports.

Coal Sector

The total economic potential of Georgia's **coal deposits** is estimated at about 200 million tonnes, including 180 million tonnes of sub-bituminous coal and 20 million tonnes of brown coal.

The prospects of rehabilitation and intensive development of the local coal industry are related power generation. According to the Energy Strategy 2020-2030, the option of rehabilitation of Tkibuli shafts and building a powerful modern thermal power plant with the help of foreign investors has been developed. Georgian local coal will be used solely for the purposes of reducing the energy security risks and addressing social and economic problems of local communities.

Georgia plans 18 policies and investment measures regarding energy security dimension, provided in the Annex I and in detail in Annex II.

ii. Regional cooperation in this area

3.3.1 Regional cooperation

Georgia sees the equitable and mutually beneficial regional cooperation in energy sector as the strong factor for reducing the supply risks increase in energy security. Cooperating with the Energy Community member states is based on European energy legislation, the Energy Charter and international best practices. Exploring and promoting the opportunities for regional exchange will be the important part of Georgia’s energy policy in the coming decade.

Georgia is an important transit country. As a corridor connecting Europe and Asia, Georgia has the potential to increase its role in the implementation of the East-West and North-South transit projects with

the prospect of becoming a regional hub for energy trade. Effective use of geopolitical location will contribute to improving the country's energy security and economic development.

Georgia will continue to support international transit projects and energy flows through proper security measures and early warning mechanisms. Georgia is making efforts in the international arena to create a favourable environment for the development and implementation of new transit routes, including from Central Asia and the Caspian region as well as to the North-South direction. Establishing links with the EU and Energy Community countries, including the development of transit projects of regional importance, is crucial.

Georgia does not have direct energy connection with other countries of the Energy Community, operating in an internal energy market and enjoying mutual assistance mechanisms. There are no uniform rules in the region and there are no common framework agreements that would provide for the joint action in emergencies. Therefore, certain provisions of the Energy Community Acquis (e.g. dealing with market integration) are only partly relevant to Georgia's reality.

Occupation of the part of territory poses a threat to East-West transit potential. Georgia will take all necessary measures to involve the international community and regional partners to curb the risk to energy transit over its territory.

The Law on Energy and Water Supply ensures establishment of common rules for the organization and functioning of the electricity market, subject to future interconnections with Energy Community Parties, their pan-European integration; adequate conditions for investment in interconnections with neighbouring systems and in other facilities enhancing the security of supply; international cooperation of system and market operators, the Regulatory Commission and other state authorities.

Energy Law (Article 133 - Regional solidarity)

To safeguard the security of supply on internal energy markets, the competent national authorities of Georgia shall cooperate with respective competent authorities of other Energy Community Parties to promote regional and bilateral solidarity. The cooperation shall also cover situations resulting or likely to result in the short term in a severe disruption of supply of electricity or natural gas in a short term (when more than 20% of the total volume of natural gas supply is under threat and managing this situation at the national level is less possible), which affects both Georgia and another party to the energy union. In such a case, cooperation shall involve, coordination of measures related to the security of electricity and gas supply; identification and, where necessary, development and upgrading, of electricity and/or natural gas interconnectors, including, enabling bi-directional capacities in natural gas interconnectors; and conditions and practical modalities for mutual assistance.

3.3.2 Financing measures in this area at national level, including Union support and the use of Union funds

The table 3-1 outlines the expected contributions to investments in energy security according to current plans.

Table 3-1: Measures in energy security and sources of finance related to the EU

Measure	Cost of the measure	Source of finance
Gas storage	150 mln EUR (2018-2023)	Government loan from KfW
Georgia Power Transmission Network Expansion Program	68 mln EUR (2013-2022)	35 mln EUR – KfW 25 mln EUR – EBRD 8 mln EUR – EC (NiF)
Georgia Power Transmission Network Expansion Program-2	224.9 mln EUR (2021-2028)	125 mln EUR loan from KfW 90 mln EUR EBRD 9.9 mln EUR grant from EC (NiF)
Electricity transmission company financial enhancement, and Electricity Supply reliability improvement project	62 mln EUR (2020-2024)	62 mln EUR - WB
Energy Sector Open Program JSC "Georgian State Electrosystem"	101 mln EUR (2019-2025)	100 mln EUR loan from KfW 1 mln grant from KfW
Electricity Transmission and Cross border network development	About 700 mln EUR is needed during 2021-2030	National Budget Loan and Grant from: EBRD, WB, KfW, EC (NiF)
Two combined cycle thermal power plants (in total 500 MW)	170 mln. USD (Gardabani-3)	GOGC
The rehabilitation of the largest Enguri and Vardnili HPPs	35 mln EUR (2018-2021)	28 mln EUR government loan from EBRD 7 mln EUR grant from EU
The Georgian State Electrosystem is fully upgrading SCADA	3.3 mln EUR	Own budget Loan from World Bank
Smart metering of electricity consumers	TBD	TBD
Construction of pumped-storage power plant	700-800 mln USD	TBD
Develop hydrogen technologies as a storage	TBD	TBD
Construction of coal power plant	TBD	TBD
Hydropower Construction	1250 mln. USD	Energy developers
Wind Power Construction	950 mln. USD	Energy developers
Solar Power Construction	385 mln. USD	Energy developers
Financial rejuvenation of the transmission grid company and	62 mln. EUR (2020-2024)	62 mln. EUR - WB

strengthening the reliability of electricity supply		

3.4 Dimension Internal energy market

3.4.1 Electricity infrastructure

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

One of the main documents related to ensuring interconnectivity is the already mentioned TYNDP of Georgia and its latest edition valid for the period 2021-2031. This plan has been defined by the Article 53 of the Law of Georgia on Energy and Water Supply, Paragraph 2. According to it, the Plan include information on the basic infrastructure of the transmission network which needs to be built or improved over the next 10 years.

The Plan defines number of projects to be implemented within the transmission network and are divided into three groups.

1. Projects of systemic importance that affect energy transit and reliability between energy regions.

2. Projects of inter-systemic importance. These include projects that connect Georgia's transmission network to neighbouring power grids.

3. Projects containing local, dead-end 220, 110 kV and lower rated voltage transmission lines.

Seventeen (17) inter-system and systemic projects of Georgian transmission network have been identified, the construction of which will address existing and future challenges. These projects incorporate elements of the transmission network infrastructure. However, these projects consist of several sub-projects and / or nominal voltage lines and substations of one or more stages.

- 16 of them are AC power lines, substation, or autotransformer, and 1 are DC power supplies and AC power lines together.
- 41% of the projects will be put into operation in 2022-2024. These belong to the "short-term planning" period.
- 29% of the projects will be put into operation in 2025-2026. These belong to the "medium-term planning" period. The main characteristics of these projects and the estimated technical and economic data are approximated.
- 20% of the projects will also be put into operation in 2027-2032. These belong to the "long-term planning" period.

The total length of transmission lines to be built in 2022-2032 is about 1600 km, and the total capacity of the substations is 5000 MW. It should be noted that 4 projects serve to strengthen inter-system ties, including 2 with Turkiye with a permanent power supply, 1 with Armenia, 1 with Russia and 1 with Azerbaijan. Seven projects serve to increase internal system reliability.

The following table presents the list of investment projects listed from the plan.

Name of the project	Main aims	Implementation period	Investment size in million GEL
ES-1-1: Ksani-Stepantsminda-Mozdok	• Secure reliable Russia-Georgia-Armenia-Iran transit potential • Back-up for the existing 500 kV voltage line "Kavkasioni" (Georgia-Russia)	2030	74 861 478
ES-1-2: Akhaltsikhe-Totrumi	• Increasing the volume and reliability of electrical energy exchange between Georgia and Turkiye; • 400 Kv OHL “Meskheti” (Akhaltiske-Borchkha) reservation.	2025	495 009 805
ES-1-4: Marneuli-Airumi	Increasing the possibility of electricity transit from Russia to Armenia-Iran	2025	56 000 000
ES-1-5: 330 kV Gardabani-Aghstafa Ringing	• Ensuring the exchange of capacity of 700-1000 MW between Georgia and Azerbaijan in compliance with the N-1 criterion; • Increase the capacity and reliability of power exchange in the Azerbaijan-Georgia-Turkiye direction; • Improving the reliability of Georgia-Russia-Azerbaijan synchronous ring operation.	2023	30 395 674
ES-2-1: Jvari-Tskaltubo-Akhaltsikhe	• Improving the sustainability and security of the Georgian energy system – back-up of the Enguri-Zestaponi-Akhaltsikhe 500 kV line ("Imereti" and "Zekari"); • Reducing the risks of accidents, the number of breakdowns and the unavailability of electricity; Improving transit capability and reliability from Russia and Enguri to Turkiye / Armenia.	2025	292 569 805
ES-2-2: Jvari-Khorga	• Increase reliability of electricity supply to temporarily occupied region of Abkhazia, and Samegrelo, Adjara and Guria • Strengthening the 220 kV network of Western Georgia;	2022	63 226 790
ES-2-3: Batumi - Akhaltsikhe	• Increase the reliability of Adjara-Guria electricity supply • Increase export potential to Turkiye; • Integration of Shuakhevi HPP, Skhalta HPP and other promising HPPs in the	2026	93 100 000

Name of the project	Main aims	Implementation period	Investment size in million GEL
ES-1-1: Ksani-Stepantsminda-Mozdok	• Secure reliable Russia-Georgia-Armenia-Iran transit potential • Back-up for the existing 500 kV voltage line "Kavkasioni" (Georgia-Russia)	2030	74 861 478
	network with high quality and high reliability; • Improving the reliability of the western part of the transmission network.		
ES-2-4: Rehabilitation of 220 kV "Kolkhida-1"	• Improving the sustainability and security of the Georgian energy system – back up for 500 kV "Imereti". Reduce the risks of accidents, the number of emergency shutdowns and the unavailability of electricity.	2023	10 542 000
ES-2-5: Svaneti	• Improving the capacity output and reliability of hydropower plants in: promising hydropower plants in the - Svanetiregion; - Nenskra river tributary; - Nenskra HPP - Khudoni HPP Integration into the network and Increasing the reliability of the network of the region.	2030	266 057 078
ES-2-6: Guria	• Integration into the network of promising hydropower plants in the Guria region • Improving reliable consumption in the Guria region;	2024	77 158 850
ES-2-7: Racha and Namakhvani	• Oni HPP cascade • Namakhvani Hpp cascade • Kheledula HPP; • Tskhenistskali Cascade HPPs Integration into the network and Increasing the reliability of the network of the region.	2030	289 247 938
ES-2-8: Rehabilitation of 500 kV Imereti	• Improving the Sustainability and Security of Georgia's Energy System -Back-up of 500 kV Jvari-Tskaltubo-Akhaltsikhe; • Security of power from Khudoni-Enguri junction to Turkiye and to the eastern region of Georgia (and Armenia)	2028	63 000 000
ES-2-9: Renovation of substations	• Improving the sustainability of the Georgian energy system and the security of customer supply.	2028	65 564 000

Name of the project	Main aims	Implementation period	Investment size in million GEL
ES-1-1: Ksani-Stepantsminda-Mozdok	• Secure reliable Russia-Georgia-Armenia-Iran transit potential • Back-up for the existing 500 kV voltage line "Kavkasioni" (Georgia-Russia)	2030	74 861 478
ES-2-10: Extending the infrastructure of Kakheti	• Integration into the network of promising HPPs in Kakheti region • Improving the reliability of Supply in the Kakheti region and Dusheti municipality regions	2027	194 401 500
ES-2-11: Reactive power source (capacitors Battery)	• Maintaining voltage levels within the permissible limits of the Georgian power system in normal and N-1 mode	2029	33 600 000
ES-2-12: Safe electricity supply of Tbilisi region	• Ensuring the reliability of supplies to Tbilisi; • Connection to Gardabani Thermal Power Plant 2 and reliable power output; • Strengthen the Marneuli-Gardabani junction.	2027	71 716 400
ES-2-13: Rehabilitation of 220 kV Kartli Network	• Strengthening the network of Eastern Georgia and reliable output in the capacity network of Combined Heat and Power Plant 1; • Reliable supply to the increased consumption of Eastern Georgia; • Possibility of integration of Mtkvari basin with hydropower plants and renewable energy sources; • Back-up of 500 kV Kartli-2 and Vardzia	2028	117 600 000

ii. Regional cooperation in this area

As part of the implementation of the above investment programmes, regional cooperation is continually carried out with other regional transmission system operators and electricity regulators.

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

The Georgian Government and various state-owned companies are a recipients of technical assistance as well as investment loans and grants from various sources from the EU. These are updated on an ongoing basis by the Ministry of Economy and Sustainable Development.

- Georgia-Armenia transboundary connection project, which includes the construction of 500 kV OHL Marneuli-Airum and 500/400 kV 350 MWA converter substation in northern part of the

Armenian system. The agreement for the transboundary connection project was signed in 2010. Project has been completed on the Georgian side, 500/220 kV substation Marneuli was built and connected with 500 kV substations Gardabani, Ksani and Akhaltsikhe. Necessary equipment to connect the station to OHL Marneuli-Airum has been installed. At this stage, only 40 km transmission line is left to be constructed by Georgian side in the Georgian Territory. Project was delayed in Armenia several times. A virtual meeting was held on 9-10 March 2021 between the representatives of Georgian and Armenian energy companies, where it was noted that the earlier agreed deadline for the project (Construction of 500 kV transmission line as well as HVDC with at least 1 energy block with a capacity of 350 MW in late 2022) could not be realized due to the COVID-19 pandemic. Project is currently in pre-construction stage, with the necessary documentation being submitted to KfW, which approved the renewal of the project measures, including hiring the main contractor, tendering process, etc, for the construction of a 500 kV OHL to the Georgian border from the 400 kV OHL Mashen-Airum and Airum Substation, Including a single 350 MW HVDC in the Substation itself. Construction will begin, after the selection of the main contractor, requiring 36 months to be completed. On the meeting held on 9-10 March 2021 Changes for the construction agreement were agreed upon, with new deadlines for project completion and the approval of technical annexes.

- Another important project for regional cooperation is the BSTP (Black Sea Transmission Planning), which aims to strengthen electricity trade potential between Black Sea countries, regional cooperation, and improved market operation studies. Project participants include TSO representatives of Georgia, Ukraine, Moldova, Bulgaria, and Turkiye. Project was developed with the organizational and financial assistance from USEA (United States Energy Association) and USAID, with consultancy from Energy Coordination Center EKC (Serbia). Project includes various areas of transmission system planning, with an important sub-regional transmission planning project between Georgia and Armenia, with the main direction of evaluating cost-benefit of promising HVDC between the 2 countries. Study includes Technical and Economic Assessments for intersystem connection, which is conducted via an electricity market and economic analysis. In February 2020, EKC has presented an initial economic analysis report for Georgia-Armenia Transboundary connections, while the base scenario results were presented In May of the same year, The final report was submitted in September 2020. In the scope BSTP, Sub-group including TSOs from Romania and Georgia was created, with the goal of realizing 2 phases of Technical Study of the Georgia-Romania submarine cable: 1. HVDC Technology overview, 2. Stationary mode analysis. First Phase of the project was presented to the TSOs in February 2021. Second phase is incomplete, currently works on the final report is ongoing.

3.4.2 Energy transmission infrastructure

i.	**Policies and measures related to the elements set out in point 2.4.2, including, where applicable, specific measures to enable the delivery of Projects of Common Interest (PCIs) and other key infrastructure projects**
ii.	**Regional cooperation in this area[127]**
iii.	**Where applicable, financing measures in this area at national level, including Union support and the use of Union funds**

Key investments and policies in this area are included in Section 3.4.1 above related to electricity infrastructure, and 3.3. related to natural gas infrastructure as well as power connectors at a regional level.

3.4.3 Market integration

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

As noted above, TYNDP, aside from infrastructural projects for integrating potential generation facilities and improving domestic grid capabilities, also includes transboundary projects for strengthening connections to neighboring countries.

Project	Main Objectives	Project Deadlines	Investments (million GEL)
ES-1-1: Ksani-Stepantsminda-Mozdok	• Secure reliable Russia-Georgia-Armenia-Iran transit potential • Back-up for the existing 500 kV voltage line "kavkasioni" (Georgia-Russia)	2030	74 861 478
ES-1-2: Akhaltsikhe - Tortum	• Increase the capacity and reliability of power exchange between Georgia and Turkiye • Back-up of the Akhaltsikhe-Borchkha transmission line.	2025	495 009 805
ES-1-3: Marneuli-Airumi	• Increasing the possibility of electricity transit from Russia to Armenia-Iran • Ensuring the exchange of capacity with Armenia	2025	56 000 000
ES-1-4: 330 kV Gardabani-Aghstafa Ringing	• Ensuring the exchange of capacity of 700-1000 MW between Georgia and Azerbaijan in compliance with the N-1 criterion; • Increase the capacity and reliability of power exchange in the Azerbaijan-Georgia-Turkiye direction;	2023	30 395 674

127 Other than the PCI Regional Groups established under Regulation (EU) No 347/2013

	• Improving the reliability of Georgia-Russia-Azerbaijan synchronous ring operation.		

3.4.4 Energy poverty

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

There is one key measure to address energy poverty which is described in Annex I and in detail in Annex II.

The Social Service Agency develops and uses a unified database of socially vulnerable families in order to register the population which is in poverty and provide targeted social assistance to them. There is an indirect method of assessing household well-being where well-being is measured by the ratio of households' actual consumption to existing needs. A rating points system is used for ranking according to the well-being of families. 100,000 rating points corresponds to the threshold where the family meets the minimum basic needs. It should be noted that the rating system is in line with the recommendation of the Energy Community, according to which "all existing assets, except cash income, should be taken into account in determining income[128].

Cash assistance is provided only to households with a rating score of less than 65,000, which means that the state cannot help the population in the category of 65,000 to 100,000 points, even in meeting the basic needs.

The social assistance system and the unified database of the Social Services Agency are also used for energy and utility purposes. The amount of assistance depends on the existing practice and the allocation of funds by the central or municipal budgets.

Related to electricity prices, the primary mechanism is the differentiated tariff bands: the consumers are divided into three categories depending on how much electricity they consume per month:

Tbilisi Electricity Supply Company LTD. Tariffs for electricity consumption including VAT is designated as follows

- Those consuming 101 kWh or less pay about little over 0.18 GEL per kWh;
- Those who consume between 101 and 301 kWh about 0.22 GEL per kWh;
- Those with consumption above 301 kWh pay about 0.265 GEL per kWh[129]

For JSC "Energo-Pro Georgia" tariffs inculiding VAT:

- Those consuming 101 kWh or less pay about little over 0.177 GEL per kWh;

128 ICRB treatment of the Vulnerable Customers in the Energy Community - 2013

129 Based on information from GNERC as compiled by AFD (2019) Modelling policy options to protect vulnerable Georgian households from rising electricity prices

- Those who consume between 101 and 301 kWh about 0.217 GEL per kWh;
- Those with consumption above 301 kWh pay about 0.262 GEL per kWh[130]

This reflects the assumption that low-income households consume less electricity than the rest and thus will be concentrated in the lowest tariff band. Analysis shows that households are indeed more likely to be in the lowest tariff band than the non-poor, but a large share of them also falls into the medium user category. Perhaps for this reason, estimates show that the overall effect of the different tariff bands is quite limited: if all consumers paid a single tariff (0.185 GEL per kWh)[131], absolute poverty rate at household level would increase only by 0.3%.

According to estimates from a recent AFD study, an average Georgian household consumes 1666 kWh and spends 307 GEL per year on electricity bill, corresponding to 4% of its total expenditure. This is comparable to the average of EU countries.[132] Most of the socially vulnerable groups spend well below the national average on electricity.

Related to natural gas prices, an important characteristic of the system is that natural gas is supplied to the entire residential sector at a non-market based, preferential "social" price due to gas imports received without payment as a "transfer fee". This reduced overall price in natural gas is also partially reflected in the prices of electricity. Supplying subsidized gas to households and thermal power plants costs hundreds of millions of GEL for the government (state-owned companies).

There are also several types of **direct energy subsidies** in Georgia today.

- **Electricity subsidy:** Socially vulnerable families in Tbilisi with scores below 70,000 rating points receive a utility subsidy of 106 GEL per month for 5 months, which is about 530 GEL per year (including electricity, water and cleaning costs). From 70,000 points to 200,000 points - 20 GEL. For the socially vulnerable population in the regions below 70,000 rating points, the state subsidizes the tariff in the amount of 3.95 tetri per kWh consumed (about 50 GEL per year).[133] According to the data of 2018, electricity consumption in the main categories of low-income consumers (<100,000) varies significantly in Tbilisi and the regions. Despite the same tariffs, the consumption of electricity by the population receiving vouchers in Tbilisi is almost twice as high as the consumption of electricity by the population receiving subsidized electricity tariffs in the regions.[134]
- **Mountainous Settlements:** The Law of Georgia on the "Development of Mountainous Regions stipulates" 135that from 1 January 2017, household customers will be reimbursed 50% of the monthly electricity bill in the mountainous settlement, for not more than 100 kWh consumed.[136]

130 Information is updated based on GNERC information on new tariffs, Based on information from GNERC as compiled by AFD (2019) Modelling policy options to protect vulnerable Georgian households from rising electricity prices

131 We estimate the average single tariff by dividing total expenditure on electricity by total consumption of electricity.

132 See for example, Trinomics (2018) Study on Energy Prices, Costs and Subsidies and their Impact on Industry and Households. Rotterdam: European Commission - DG Energy.

133 Ordinance of the Government of Georgia on "Partial Subsidization of the Costs of Electricity Consumed by Socially Vulnerable Population" Available at: https://matsne.gov.ge/ka/document/view/4475736?publication=0

134 Based on the data from the Social Service Agency as compiled for the Regulatory Impact Assessment of the Law on Energy and Water (2019)

135 https://www.matsne.gov.ge/en/document/view/2924386?publication=0

136 Document 2015/4036 available at: https://matsne.gov.ge/en/document/view/2924386?publication=0

- **Assistance to families living in the conflict zone**: During the winter, GEL 200 assistance will be provided to provide gas heating to the affected population living in the villages adjacent to the demarcation line.
- **Gas subsidy**: from 15 October to 15 May, 700 m3 of gas per month are to be supplied free of charge to the population (5700 families) living in Kazbegi and Dusheti municipalities, representing GEL 7,363,300 from the budget in 2018.
- **Assistance for large families** - From 2019, families with less than 300,000 rating points in the database and with 4 children are to receive electricity assistance in the amount of 20 GEL, and for each subsequent child - an additional 10 GEL[137].

It should be noted that the main motivation of some of these schemes is not so much the low-income energy assistance as addressing regional, demographic, or political issues.

According to a recent Regulatory Impact Assessment for the Law on Energy and Water, in total, the volume of financial assistance issued in 2019 amounted to GEL 319.5 million (approximately EUR 88.7 million), while the annual budget for energy subsidies was GEL 21 million (EUR 5.83 million). The cost of subsidizing the natural gas tariff was estimated at 220-250 million USD (EUR 187 – 213 million).

Under the new Law on Energy and Water Supplies (Article 112), it is the responsibility of the central government and local municipalities to define the categories of vulnerable consumers and to develop appropriate assistance schemes.

A Regulatory Impact Assessment conducted which analysed the law found that the new law is expected to have the following direct effects on consumers:

- Delivery quality and reliability will be gradually improved. Therefore, no additional measures are needed in this regard.
- Compared to the Business As Usual Scenario (BAU), energy prices will decrease slightly. However, this decrease is insignificant compared to the required investments and the increase caused by imports in the conditions of growing consumption;
- Market liberalisation will allow customers to get better delivery-payment terms by being more active in the market. At this time, those with disabilities and / or less access to information may find themselves at a disadvantage.

There have been some concerns raised in another study[138] that the liberalization of the market may lead to an increase in electricity prices.

137 Ordinance of the Government of Georgia #517 issued on 31 October 2018 on "Determining the Rules and Conditions for Provision of Social Protection for Parents with Many Children". Available at: https://matsne.gov.ge/ka/document/view/4356707?publication=0

138 AFD (2019) Modelling policy options to protect vulnerable Georgian households from rising electricity prices

Based on data from Geostat, GNERC and the Social Services Agency for 2009-2019, the analysis of energy prices, revenues and social assistance shows that:

- The average real income of the population has increased by 48% in the last decade, while the sum of declared income and social assistance of users registered in the socially vulnerable database has increased by 86% on average, although the growth rate of income has slowed in recent years.
- During the same period, the real energy tariffs decreased (taking into account inflation). In 2009 prices, the electricity tariff has been reduced by 14.4%, and the natural gas tariff by 20%.
- Access to natural gas for the average Georgian household increased by 79%, and access to electricity by 65%; Access to natural gas for vulnerable households increased by an average of 133% and electricity by 116%.

The share of electricity costs in the incomes of socially vulnerable consumers is decreasing and is approaching 4%; The share of natural gas costs is growing moderately and is approaching 6%. This figure is probably lower for the middle-income family in Georgia.

In addition to the existing measures to address energy poverty, the Government of Georgia is also considering adopting various legal acts and measures to support vulnerable populations including:

- More specific direct subsidies for natural gas and electricity to vulnerable populations as defined by the Social Service Agency[139]
- Supporting energy efficiency measures such as high efficiency light bulbs and other energy consuming products (see EE-10).

3.5 Dimension Research, innovation, and competitiveness

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

In addition to the strategic objectives described in Section 2 of this report, there are 14 main measures being planned for implementation related to research, innovation, and competitiveness. These are outlined in detail Annex I and in more detail in Annex II.

The list of measures is as follows:

1. Increase public spending on R&I to 1% of GDP and public spending on sustainable energy and climate change R&I to 0.1% of GDP by 2030;
2. Develop national thematic priorities for national RDI and define Energy RDI as one of the priority;
3. Initiate the review and improvement of sustainable energy and climate change educational programs;

139 According to the definition in the current draft, vulnerable households are either:

a) households registered in the Database of Socially Vulnerable Families (DSVF), as administered by the Social Services Agency, whose socio-economic status indicator score (the welfare score) equals or does not exceed [insert score], and/or

b) persons with serious health conditions where disconnection of electricity supply may represent a threat to their health. This is if the vulnerable customer requires medical equipment necessary for maintaining health, for which the operation requires a constant power supply from the distribution network.

4. Provide national scholarships for Georgian students pursuing their education in the leading universities abroad in the field of sustainable development;
5. Funding national research and development projects aligned with the National Energy Policy priorities:
    - Research the solutions for resource efficiency in energy production and consumption;
    - Support innovative and research projects to support sustainable utilization of domestic renewable energy (e.g. biomass, hydro, solar, wind, geothermal): potential and deployment options;
    - Support the research of potential for green hydrogen in Georgia;
    - Research on climate change and its impact on energy system;
    - Research related to integration of variable renewable energy sources into the system and the capacities of energy storage (including hydro-accumulating power stations, batteries, etc.);
    - Social Studies and Humanities (SSH) in energy, policy research and energy security risk analysis;
    - Research smart systems and ICT/AI solutions for optimization of energy sector.
6. Develop the monitoring indicators for energy R&DI related to country's security and development priorities;
7. Promote certification of new products and technologies through innovation award;
8. Support Research2Business fellowship programs for knowledge and technology transfer from science to private sector (industry) with focus on low carbon technologies;
9. Create B2B type platform to connect PhD and experienced researchers to businesses and business research and innovation needs;
10. Nominate NCP or NCPs for Cluster 5 of Horizon Europe program;
11. Ensure proper representation of energy and climate change issues in Georgia's Horizon Europe Programme committee delegation;
12. Conduct regular info days to increase awareness of Georgian research community on large international energy and climate change RDI programs (e.g. COST, NATO SPS, other);
13. Work on bilateral and multilateral initiatives- cooperation with international organizations and partner countries.

Additionally, there are two activities worth noting related to electricity system upgrades as follows:

SCADA/EMS Upgrade Project

This investment measure has the aim of upgrading the Central SCADA/EMS System Software and Server. Upgrade Project is to ensure that hardware and software responds to modern system requirements, the new system will be compatible with ENTSO-E standards. The new high-level architecture of SCADA/EMS (Energy Management System) includes upgraded, transmission network management, monitoring and

intellectual features of SCADA, also the Operator Simulator and Dynamic Stability Analysis (SIGUARD DSA) Module. The upgraded hardware will improve the safe and reliable management process of the energy system.

The project is financed by World Bank Loan. The supervision of the project implementation is held by consulting company PwC Georgia LLC.

The SCADA Upgrade Project has several phases:

- Design phase;
- Hardware Procurement and configuration;
- Data Migration;
- Preparation for Factory Acceptance Test;
- Factory Acceptance Test (FAT);
- Shipment of system, System Installations /Commissioning;
- Point to point tests;
- Trainings;
- Preparation for Site Acceptance Test;
- Site Acceptance Test (SAT);
- Preparation for Availability Test;
- Availability Test (AT);
- System Switch-Over;

At this point project is in preparation of Availability testing phase.

It is being implemented by GSE with assistance from the World Bank via PwC Georgia LLC.

GSE network backbone upgrade project

This investment measure has the aim of upgrading the central network backbone to create a unified data transport network that would replace the existing system, which will ensure modern, reliable, fast and uninterruptable network with significantly increased bandwidth and security in order to deliver SCADA and IT services (which include but are not limited to: SCADA information exchange, power system management, gas analysers information network, electricity quality measurement system and telephone and other OT and IT services) in continuous mode.

The main planned actions are to create a unified data transport network using modern DWDM/MPLS technologies to replace the existing, outdated SDH network infrastructure. The expected benefits of the project include:

- Ensuring the smooth functioning of the data transport system;
- Increasing the quality and reliability of power system management and IT services;
- Increasing the level of information security of data transmission infrastructure;
- Increasing the capacity of the data transport network from 26 Mb/s to 10 GB/s;
- Increasing the quality of telecommunication communication;
- Introduction of new services;
- Increase network security.

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

Georgia is not a part of SET Plan, so other means for international cooperation are described.

The Ministry of Education, Science, Culture and Sport signed an association agreement with the European Union's Research and Innovation framework programme Horizon 2020 in April 2016, in 2021, Georgia is participating in Horizon Europe as an associated country. Becoming an Associated Country to Horizon 2020 means that Georgian research organizations can participate in Horizon Europe's calls for projects with the same rights as organizations from EU member states. However, due to Georgia's lack of experience, the high level of competition, a lack of qualified research institutions and other country-specific reasons, the participation rate of Georgian organizations is quite low. Although there are still some ongoing projects financed by Horizon 2020, the program itself is going to be closed soon. The Ministry is planning to enter into a new agreement with the EU on participation in the next stage of the program. To ensure successful participation of Georgian research community in Horizon Europe the Ministry is planning to improve its National Contact Points as well as programme committee members system. For details on measures please refer to Annex I and II

As a Near Neighbour Country (NNC), Georgia is also eligible to participate in the European Cooperation in Science and Technology (COST) programme. In 2019 Georgian research organizations were involved in 16 COST Action projects, in 2020 - in 26.

The SRNSF cooperates with Dutch publishing house "Elsevier", which provides access to the electronic journals and data of 21 independent public research institutes and research universities, and the SRNSF pays Georgia's annual membership fees for the European Organization for Nuclear Research (CERN) and the Dubna Joint Institute for Nuclear Research. Georgia is also eligible to apply for the North Atlantic Treaty Organization (NATO) Science for Peace and Security programme. Georgia has been actively engaged within the framework of the NATO Science for Peace and Security (SPS) Programme since 1994. Leading areas for cooperation include Advanced Technologies, Counterterrorism, and Women, Peace, and Security. With NATO SPS financial support Georgian research organizations together with EU researchers led organisation of several Advanced Research Workshops in the areas of energy security, innovative energy solutions for military applications, security of critical energy infrastructure and other. Additionally, the program supported research of critical energy security issues such as Geohazards to the Enguri Hydropower Infrastructure[140] and Black Swan Scenarios in the Black Sea and Balkans[141].

The international programs mentioned above will support implementation of R&I support measures through diversification of funding, access for Georgian research community to EU research infrastructure and EU relevant research expertise. This is a great tool for building national research capacity through strengthening international R&I networking links, expertise and experience sharing.

Apart from that, the existing international cooperation mechanisms, such as Georgia's membership in CIGRE, will play an important role in strengthening national research capacity. The government will continue work on bilateral and multilateral international programs to support R&I developments in the country.

In addition to EU-supported projects via Horizon 2020 and other funding windows, there was a twinning project on Smart Meter Development involving GNERC and relevant regulatory authorities from France,

140 This project was led by experts from Georgia, Italy, the United States, United Kingdom, Azerbaijan and Kazakhstan

141 This project was led by World Experience for Georgia and New Strategy Center (Romania)

Austria and the Hellenic republic. The main purpose of the project was to develop a cost benefit analysis and the regulatory strategy for supporting the smart-metering roll-out. A Time-of-Use (ToU)-Tariff-Model was developed for the household and service sectors, which showed potential cost savings for both sectors: the effects are not significant at the beginning of the model but increase steadily over time. A Cost-Benefit analysis was also performed, modelling four different scenarios plus business-as-usual through 2040. The project has shown positive results in all four scenarios compared to business-as-usual, which implies that the country would have an indirect obligation to implement smart metering. GNERC has chosen an implementation strategy (Scenario 3: Smooth and Slow) from the cost-benefit analysis which has the least influence on tariffs. The chosen scenario considers that after 10 years from the decision made by the state 80% of users should have smart metering. This puts the deadline of an 80% roll-out beyond 2030. The target for 2030 is a 60% roll-out of smart meters. The government will continue cooperation with key international organisations and Donors to develop twinning projects and other types of bilateral support.

Georgian organisations are currently involved in the current relevant EU / Energy Community project related to Dimension 5.

SINCERE project (Spurring INnovations for forest eCosystem sERvices in Europe) – a Horizon 2020 funded project which aims to strengthen the delivery of the Joint Project of Interest (JPI) Climate Strategic Research and Innovation Agenda (SRIA), building on existing collaborations, such as with other JPIs, the business sector and global financial institutions, and other key international research, policy, and societal actors. The overall goal of the project is to widen international cooperation on climate change mitigation and adaptation. The local NGO World Experience for Georgia (WEG) is active in this project.

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

GITA was established under the structure of Ministry of Economy and Sustainable Development with the aim to support development of the capital market at various levels in diverse sectors including energy. The main mandate of GITA is to:

- Create sectoral ecosystem and coordinate its development process;
- Stimulate innovation, modern technologies and R&D, facilitate commercialization and usage of R&D;
- Support innovative start-ups;
- Facilitate cooperation between the representatives of scientists and businesses.

GITA in cooperation with the World Bank and EU is running TechTransfer Pilot Program, identifying high potential research projects with commercialization opportunity, and bringing them to the industry. As of June 2020, the programme received 74 project applications. Each application went through Technology and business readiness screening, only qualified projects moved to Due Diligence stage.

Shota Rustaveli National Science Foundation (SRNSF) was established with the goal to support scientific research development in Georgia and integration of Georgian researchers in international research area. The Foundation organizes calls for proposals, targeted programs, and projects, and is involved in international scientific networks and joint projects. All programs of SRNSF are implemented through the calls for project proposals on a competitive basis. Local and international independent experts carry out the evaluations. Apart from supporting R&D the foundation is also supporting researchers' mobility and young scientists' development.

Start-up Georgia is an innovative program that offers support to all entrepreneurs with interesting, new business ideas. The program was officially launched in 2016. Initially the Government allocated $5 million to the program, but this will gradually be increased to $16 million. The project is being implemented in two parts: High-tech, globally scalable innovative start-ups are financed by GITA and innovative start-ups for Georgian market – by the Partnership Fund.

Apart from the national funding programs mentioned above, that provide mainly project based funding, some of the measures defined above will be implemented using administrative resources. This means that implementation of such measures is envisaged by using existing capital and human resources without additional investments.

Georgia doesn't have access to Union funds, however, in many cases international support, especially international expertise (technical) support is needed for effective implementation of measures. This support will be obtained through negotiation with international donor agencies represented in Georgia as well as through relevant bilateral and multilateral programs. MoESD is leading the process.

Section B. Analytical Basis[142]

4 Current situation and projections with existing policies and measures[143][144]

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

i. Macroeconomic forecasts (GDP and population growth)

Population growth

Table **4-1** shows the of average annual population in Georgia. It shows that overall population numbers have decreased in Georgia from 2010 to 2019 with average annual reduction rate of 0.2%.

There is slight intermittent growth from 2014 when last official census has been performed. Since the population numbers had to be corrected before 2014 due to the census, it was decided to use 5-year growth rates for population in TIMES-Georgia, which equals to annual growth of 0.004%.

Table 4-1: Population numbers in Georgia (2010-2019)

Year	Population (thousand)	Annual Growth (%)
2010	3786.7	
2011	3756.4	-0.80%
2012	3728.9	-0.73%
2013	3717.7	-0.30%
2014	3719.4	0.05%
2015	3725.3	0.16%
2016	3727.5	0.09%
2017	3728.0	-0.02%
2018	3726.5	-0.04%
2019	3720.2	-0.17%

142 See Part 2 for a detailed list of parameters and variables to be reported in Section B of the Plan

143 Current situation shall reflect the date of submission of the national plan (or latest available date). Existing policies and measures encompass implemented and adopted policies and measures. Adopted policies and measures are those for which an official government decision has been made by the date of submission of the national plan and there is a clear commitment to proceed with implementation. Implemented policies and measures are those for which one or more of the following applies at the date of submission of the integrated national energy and climate plan or the integrated national energy and climate progress report: directly applicable European legislation or national legislation is in force, one or more voluntary agreements have been established, financial resources have been allocated, human resources have been mobilised.

144 The selection of exogenous factors may be based on the assumptions made in the EU Reference Scenario 2016 or other subsequent policy scenarios for the same variables. Besides, Member States specific results of the EU Reference Scenario 2016 as well as results of subsequent policy scenarios may also be a useful source of information when developing national projections with existing policies and measures and impact assessments.

Average 9-year growth (2010-2019)	**-0.20%**
Average 5-year growth (2014-2019)	**0.004%**

Although there is a decrease of population, the number of households is increasing because the number of persons per household is decreasing.

Geostat doesn't give the person per household numbers for different year, however the statistical yearbooks provide the information on incomes per household and income per person which enable us to calculate the person per household data.

Table 4-2 below shows the calculation of the person per household numbers and the average annual change in this parameter which equals to 0.47% per year.

Table 4-2: Calculation of the person per household parameter

Year	Income per household	Income per person	Persons per household
2009	541,989,601	141,5	3,829,006.
2018	1,061,973,002	284,7	3,729,633.
Average 10-year change			**-0.47%**

GDP Growth

The table 4-3 below shows the annual GDP values in Georgia in 2010-2019.

It shows that average annual GDP growth has been 4.71% - the same value has been used in TIMES-Georgia to project the economic growth in future years.

Table 4-3: Georgia's GDP in constant and current prices (2010-2019)

Year	GDP at	GDP at
	Constant prices (2010 GEL)	Current Prices
	mln GEL	mln GEL
2010	26640.7	21821.6
2011	28601.6	25478.7
2012	30436.9	27227.3
2013	31537.4	28593.0
2014	32938.1	31124.1
2015	33935.0	33935.0
2016	34921.1	35836.0
2017	36612.5	40761.7
2018	38385.5	44599.3
2019	40298.0	49252.7
Average 10-year growth	**4.71%**	**9.47%**

Table 4-4 shows the table from VT_Georgia_DEM template's "Demand Drivers" sheet which shows the related calculations for demand drivers. As it is shown, The GDP increases almost 5 folds to 168.14 bln. GEL, whereas population remains almost constant. The household numbers however increase from 1036 thousand in 2016 to 1230 thousand in 2050.

Table 4-4: Demand drivers for Georgia through 2050

Demand Drivers										
		2016	2018	2020	2025	2030	2035	2040	2045	2050
Driver			2016 - 2018	2018 - 2020	2020 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2040 - 2045	2045 - 2050
GDP	mln GEL	34,921	38,386	42,098	53,027	66,793	84,133	105,974	133,486	168,139
Population	1000 persons	3,729	3,727	3,727	3,728	3,728	3,729	3,730	3,731	3,731
Number of persons per household		3.60	3.53	3.50	3.42	3.34	3.26	3.18	3.11	3.03
Number of Households	1000 hh	1,036	1,056	1,066	1,091	1,118	1,145	1,172	1,201	1,230
GDP growth				**4.72%**	**4.72%**	**4.72%**	**4.72%**	**4.72%**	**4.72%**	**4.72%**
Population growth				0.004%	0.004%	0.004%	0.004%	0.004%	0.004%	0.004%
GDP per capita growth				4.72%	4.72%	4.72%	4.72%	4.72%	4.72%	4.72%
Number of persons per household				-0.47%	-0.47%	-0.47%	-0.47%	-0.47%	-0.47%	-0.47%

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

Sectoral changes impacting energy

Table 4-5 shows the annual GDP values in Georgia for agriculture, industry, and commercial sectors in 2010-2019 and calculation of average growth rates and elasticities towards national growth rates. It shows Agriculture growth with 0.38% elasticity with national GDP, Industry – with 1.13% and commercial – with 1.05%.

Table 4-5: Georgia's sectoral GDP for agriculture, industry, and commercial sectors (2010-2019)

Year	GDP		
	Agriculture, Forestry and Fisheries	Industry (all) and buildings	Commercial and Services
	Constant prices		
	mln GEL		mln GEL
2010	2284.1	4638.3	16779.9
2011	2489.0	5099.4	17801.2
2012	2364.4	5682.4	18931.1
2013	2679.3	5895.0	19550.1
2014	2655.0	6333.5	20251.4
2015	2651.6	6499.4	21015.2
2016	2578.4	6932.8	21595.1
2017	2380.2	7236.6	22969.4
2018	2708.7	7198.1	24309.1
2019	2726.3	7392.8	25785.7
Average 9-year growth	1.99%	5.32%	4.89%
Elasticity towards GDP (constant prices)	0.38	1.13	1.05

Table 4-66 shows the annual value added for industry sub-sectors in Georgia in 2010-2019 and calculation of average growth rates and elasticities towards national growth rates.

It shows food, beverage, and tobacco growth rates with 1.83 elasticity with national GDP, Iron & steel – with 0, non-metallic minerals with 3.22, chemical with 0.33 and other – with 0.82.

Table 4-6: Georgia's sub-sectoral value-added growth for industry sub-sectors (2010-2019)

Year	Food, Beverages, and Tobacco	Iron and Steel	Non-Metallic Minerals	Chemical	Other
	Constant prices	Constant prices	Constant prices	Constant prices	Constant prices
	mln GEL	mln GEL	mln GEL	mln GEL	%
2010	469.54	367.72	92.30	96.32	1,335.48
2011	547.36	271.10	172.43	188.48	1,363.70
2012	641.44	340.51	225.81	156.39	1,366.16
2013	826.90	215.96	196.55	156.40	1,404.53
2014	974.89	154.58	226.83	149.07	1,398.51
2015	813.24	295.04	237.81	157.21	1,562.85
2016	925.31	160.38	311.33	85.10	1,797.81
2017	995.21	378.24	256.98	141.11	1,800.82
2018	952.16	446.52	271.37	137.45	1,954.68
2019	990.11	365.98	330.63	110.59	1,878.67
Average 9-year growth	**8.64%**	**-0.05%**	**15.23%**	**1.55%**	**3.86%**
Elasticity towards GDP (constant prices)	**1.83**	**0.01**	**3.22**	**0.33**	**0.82**

Table 4-7 shows the screenshot from VT_Georgia_DEM template's "Demand Drivers" sheet which shows the related calculations for GDP and value added in various sectors. It shows highest growth rates in non-metallic minerals industry and Food, Beverages, and Tobacco industry.

Table 4-7: Demand drivers summary for various sectors

Elasticities towards National GDP Growth			2016 - 2018	2018 - 2020	2020 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2040 - 2045	2045 - 2050
Agriculture growth rate (%)				0.38	0.38	0.38	0.38	0.38	0.38	0.38
Commercial Secor growth rate (%)				1.05	1.05	1.05	1.05	1.05	1.05	1.05
Industry										
Iron and steel industry				-	-	-	-	-	-	-
Chemical industry				0.33	0.33	0.33	0.33	0.33	0.33	0.33
Non-metallic minerals industry				3.22	3.22	3.22	3.22	3.22	3.22	3.22
Food, Beverages and Tobaco industry				1.83	1.83	1.83	1.83	1.83	1.83	1.83
Other manufacturing industry				0.82	0.82	0.82	0.82	0.82	0.82	0.82
Sectoral GDP Growth rates			2016 - 2018	2018 - 2020	2020 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2040 - 2045	2045 - 2050
Agriculture growth rate (%)			2.49%	1.79%	1.79%	1.79%	1.79%	1.79%	1.79%	1.79%
Commercial Secor growth rate (%)			6.10%	4.94%	4.94%	4.94%	4.94%	4.94%	4.94%	4.94%
Industry										
Iron and steel industry			66.86%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Chemical industry			27.09%	1.55%	1.55%	1.55%	1.55%	1.55%	1.55%	1.55%
Non-metallic minerals industry			-6.64%	15.23%	15.23%	15.23%	15.23%	15.23%	15.23%	15.23%
Food, Beverages and Tobaco industry			1.44%	8.64%	8.64%	8.64%	8.64%	8.64%	8.64%	8.64%
Other manufacturing industry			4.27%	3.86%	3.86%	3.86%	3.86%	3.86%	3.86%	3.86%
Sectoral GDP Growth rates		**2016**	**2018**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Agriculture growth rate (%)		2,578.41	2,708.66	2,806.56	3,067.07	3,351.75	3,662.87	4,002.86	4,374.41	4,780.45
Commercial Secor growth rate (%)		21,595.12	24,309.13	26,771.01	34,072.44	43,365.23	55,192.50	70,245.51	89,404.01	113,787.73
Industry				-	-	-	-	-	-	-
Iron and steel industry		160.38	446.52	446.52	446.52	446.52	446.52	446.52	446.52	446.52
Chemical industry		85.10	137.45	141.73	153.03	165.23	178.41	192.63	207.99	224.57
Non-metallic minerals industry		311.33	271.37	360.34	732.11	1,487.44	3,022.07	6,140.03	12,474.86	25,345.51
Food, Beverages and Tobaco industry		925.31	952.16	1,123.87	1,701.07	2,574.72	3,897.06	5,898.53	8,927.94	13,513.21
Other manufacturing industry		1,797.81	1,954.68	2,108.68	2,548.89	3,081.00	3,724.20	4,501.67	5,441.44	6,577.40

Waste sectoral changes

In waste, the key demand drivers are the population (outlined above) and the following key parameters:

- Default values were mostly used for fraction of methane in generated landfill gas (F), Oxidation factor (OX), the portion of municipal solid waste which dissimilates under anaerobic conditions (MSWf) and, Methane Correction Factor (MCF). For the cities of Tbilisi, Kutaisi, Batumi, and Rustavi, some specific data / parameters were used.
- Waste generated per capita per year: 0.85 kg of waste per day in 1990, 1.04 in 2000-2015, and interpolated between these two data in 1991-1999, as well as 1.1 kg of waste / day in 2016-2017, based on data measured in the regions

- 54 landfills operating under the management of LLC "Solid Waste Management Company of Georgia". By 2030, it is planned to build 6 new regional non-hazardous waste disposal facilities and gradually close all existing landfills under the management of LLC "Georgian Solid Waste Management Company".

Standard values for Waste composition (percentages for different fractions), Degradable Organic Carbon (DOC) and the part of DOCf that dissimilates under anaerobic conditions (DOCf), were used as per the Georgian National Emissions Inventory for most cities with the exception of Tbilisi, Kutaisi, Batumi, and Rustavi. The Table below shows the values for waste composition.

Table 4-8: Solid Waste Composition in percentage terms

Component / Landfill	Tbilisi	Rustavi	Batumi	Kutaisi	Other
Food waste	71	42	41.2	47	30.1
Paper/cardboards	5.6	17	17.4	10	21.8
Textiles	3.2		3.3		4.7
Wood	2.6		0.5		7.5
Rubber/leather					1.4
Other	17.6	41	37.6	43	34.5

Wastewater sectoral changes

Wastewater sectoral changes mostly are linked to population growth, with standard values for Biological Oxygen Demand used (44.735 grams / (capita-day) and different coefficients used for industrial wastewater (1.25) and domestic wastewater (1). The number of connected population is expected to remain unchanged from 2019 for existing wastewater treatment plants, while additional plants would be expected to come on line in the coming years (see the tables below).

From the Tbilisi station the number of liters per capita (connected to the station) was calculated based on inflows versus population (480,000 m^3 / 1,233,820 people = 0.389 m3 / person / day was calculated.

For Batumi, the indicator of BOD was available at 115 mg / litre-person = 0.115 kg / (m^3-person)

The potential range of methane emitted from the wastewater of new plants is then based on a Methane correction factor (MCF) of 0.3 (for plants with aerobic reactors, centralized, with poor purification) to an MCF of 0.8 (in the case of anaerobic reactor or anaerobic lagoon) per year, depending on the population. The tables 4-9 and 4-10 below show the resulting emissions in these cases.

Table 4-9: Existing and new wastewater plants and associated methane production – with Methane Correction Factor of 0.3 (Data is given according to the 2014 general census)

City	BOD g/cap/d	Population	kg TOW/y	EF (0.6*0.8)	Coef. (1 for domestic, 1.25 for industrial)	Start Year	kg CH4/y	kgCH4 to 2030
Existing plants								
Tbilisi **	44.735	1,233,820	20,146,152	0.48	1	1984/2020	12,087,691	120,876,914
Batumi **	44.735	152,839	2,495,597	0.48	1	2012/2020	1,497,358	14,973,583
Kobuleti *	44.735	16,546	270,168	0.48	1	2017/2020	129,680	1,296,805
Total (existing)							**13,714,730**	**137,147,302**
New plants								
Zugdidi	44.735	42,998	702,083	0.48	1	2020	337,000	3,369,999
Poti	44.735	41,465	677,052	0.48	1.25	2020	406,231	4,062,312
Gudauri	44.735	89	1,453	0.48	1	2021	698	6,278
Telavi	44.735	19,629	320,508	0.48	1	2019	153,844	1,692,281
Tskaltubo	44.735	11,281	184,199	0.48	1	2019	88,416	972,572
Ureki	44.735	1,166	19,039	0.48	1	2019	9,139	100,525
Anaklia	44.735	1,368*	22,337	0.48	1.25	2019	13,402	147,425
Pasanauri	44.735	1,148	18,745	0.48	1	2022	8,998	71,980
Kvareli	44.735	2,491	40,674	0.48	11	2022	19,523	156,187
Khashuri	44.735	26,135	426,739	0.48	1	2022	204,835	1,638,680
Simple	44.735	4,425	72,253	0.48	11	2021	34,681	312,131
Tkibuli	44.735	9,770	159,527	0.48	1.25	2022	95,716	765,731

City	BOD g/cap/d	Population	kg TOW/y	EF (0.6*0.8)	Coef. (1 for domestic, 1.25 for industrial)	Start Year	kg CH4/y	kgCH4 to 2030
Bakhmaro	44.735	0	-	0.48	1	2022	-	-
Abastumani	44.735	0	-	0.48	1	2019	-	-
Mukhrani	44.735	7,735**	126,299	0.48	1	2021	60,624	545,613
Marneuli / Bolnisi	44.735	29178	476,426	0.48	1.25	2021	285,856	2,572,703
Mestia	44.735	1,973	32,216	0.48		2021	15,464	139,172
Chiatura	44.735	12,803	209,051	0.48	1.25	2022	125,431	1,003,444
Kutaisi	44.735	147,635	2,410,625	0.48	1.25	2020	1,446,375	14,463,749
Dusheti	44.735	6,167	100,696	0.48	1	2022	48,334	386,674
Zhinvali	44.735	1,828	29,848	0.48	1	2022	14,327	114,617
Total (new)							**3,368,892**	**32,522,072**

** Cleaning type unknown. The coefficient of deep anaerobic lagoon is taken, like Batumi;*

*** Relevant coefficients of their type are taken for Batumi and Tbilisi.*

Table 4-10: New wastewater plants and associated methane production – with Methane Correction Factor of 0.8 (data are given according to the 2014 general census)

City	BOD g/cap/d	Population	kg TOW/y	EF (0.6*0.3)	Coefficient (1 for domestic, 1.25 for industrial)	Start Year	kg CH4/y	kgCH4 to 2030
Zugdidi	44.735	42,998	702,083	0.18	1	2020	126,375	1,263,750
Poti	44.735	41,465	677,052	0.18	1.25	2020	152,337	1,523,367
Gudauri	44.735	89	1,453	0.18	1	2021	262	2,354
Telavi	44.735	19,629	320,508	0.18	1	2019	57,691	634,605
Tskaltubo	44.735	11,281	184,199	0.18	1	2019	33,156	364,715
Ureki	44.735	1,166	19,039	0.18	1	2019	3,427	37,697
Anaklia	44.735	1,368	22,337	0.18	1.25	2019	5,026	55,284
Pasanauri	44.735	1,148	18,745	0.18	1	2022	3,374	26,993
Kvareli	44.735	2,491	40,674	0.18	11	2022	7,321	58,570
Khashuri	44.735	26,135	426,739	0.18	1	2022	76,813	614,505
Simple	44.735	4,425	72,253	0.18	11	2021	13,005	117,049
Tkibuli	44.735	9,770	159,527	0.18	1.25	2022	35,894	287,149
Bakhmaro	44.735	0	-	0.18	1	2022	-	-
Abastumani	44.735	0.690	-	0.18	1	2019	-	-
Mukhrani	44.735	7,735	126,299	0.18	1	2021	22,734	204,605
Marneuli / Bolnisi	44.735	29178	476,426	0.18	1.25	2021	107,196	964,763
Mestia	44.735	1,973	32,216	0.18		2021	5,799	52,189

Chiatura	44.735	12,803	209,051	0.18	1.25	2022	47,036	376,292
Kutaisi	44.735	147,635	2,410,625	0.18	1.25	2020	542,391	5,423,906
Dusheti	44.735	6,167	100,696	0.18	1	2022	18,125	145,003
Zhinvali	44.735	1,828	29,848		1	2022	5,373	42,981
Total (new)							**1,263,335**	**12,195,777**

AFOLU sectoral changes

The AFOLU sector is mostly influenced by changes in:

- Crop and livestock composition in the agricultural sector – wherein there have been steady increases in production in the last 10 years.
- Wood consumption changes – which has been recently decreasing due to increased gasification

promotion of natural forest restoration;According to the Georgian Climate Strategy 2030 and Action Plan 2021-2023 by 2030, according to the baseline scenario, compared to 2015, emissions in the Georgian agricultural sector are expected to increase by about 40% to 4,624 Gg CO_2 eq, of which 36.8% to intestinal fermentation, 47% from agricultural soils (direct and indirect emissions), 14.7% comes from manure management. The main sources of emissions from agricultural soils are pastures, synthetic fertilizers (direct emissions from agricultural soils) and nitrogen leakage and runoff (indirect emissions from agricultural soils).

Detailed information on these trends can be found in the 4th National Communication to the UNFCCC. Those aspects which influenced the targets and measures outlined in the NECP are described under specific measures in Annex II.

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

The evolution of prices for coal and oil products is based on IEA WEO2020 projections for "stated Policies scenario". These projections, converted to USD 2019/GJ are shown in Table 4-11.

Table 4-11: IEA WEO2020 energy prices projections

Fuel	Unit	2010	2019	2025	2030	2035	2040
Crude oil	(USD 2019/GJ)	19.40	13.43	15.14	16.20	17.27	18.12
Natural Gas	(USD 2019/GJ)	8.25	6.35	6.35	7.11	7.49	7.87
Coal	(USD 2019/GJ)	4.32	2.44	2.64	2.84	2.80	2.76

Local import prices for fossil fuels are shown in **Error! Reference source not found.**. They are based on information collected by the Ministry of energy in 2016 for the MARKAL Georgia model, where main data source is Geostat. Table 4-13 shows the forecast of imported natural gas prices for social gas until 2030, and for commercial gas until 2020, provided by the Georgian Oil and Gas Corporation (GOGC). The forecast is based on the information collected for MARKAL-Georgia in 2016 and the evolution of gas prices from IEA WEO2020.

Table 4-122: Price projections for locally produced energy carriers

Fuel	Price (USD 2016/GJ)								
	2016	2018	2020	2025	2030	2035	2040	2045	2050
Biomass (USD/ m^3)	6.05	6.11	6.17	6.33	6.49	6.65	6.82	6.99	7.17
Lignite Coal (USD/ Tonne)	3.80	3.28	3.06	3.27	3.52	3.47	3.42	3.37	3.32
Natural Gas (USD/ 1000 m^3	7.14	7.14	7.14	7.14	7.52	7.93	7.03	7.37	7.71
Crude Oil (USD/ tonne)	14.12	12.90	12.56	13.86	14.83	15.81	16.59	17.37	18.15

Table 4-13: Price projections for imported energy carriers in TIMES-Georgia

Fuel	Price (USD 2016/GJ)								
	2016	2018	2020	2025	2030	2035	2040	2045	2050
Anthracite	8.64	7.47	6.97	7.44	8.00	7.89	7.78	7.67	7.55
Other Bituminous Coal	4.01	3.46	3.23	3.45	3.71	3.66	3.61	3.56	3.51
Coke Oven coke	7.16	6.18	5.77	6.16	6.63	6.54	6.44	6.35	6.26
crude oil	11.93	10.90	10.61	11.71	12.53	13.36	14.02	14.68	15.34
Natural gas liquids	18.31	16.73	16.28	17.97	19.23	20.50	21.51	22.53	23.54
Gasoline	21.18	19.36	18.84	20.79	22.25	23.72	24.89	26.06	27.23
Jet Fuel	21.02	19.21	18.69	20.63	22.08	23.53	24.70	25.86	27.02
kerosene	40.53	37.05	36.05	39.79	42.59	45.39	47.63	49.87	52.12
Diesel	19.77	18.07	17.58	19.41	20.77	22.14	23.23	24.33	25.42
Fuel Oil	10.55	9.64	9.38	10.36	11.09	11.82	12.40	12.98	13.57
lubricants	56.22	51.38	50.00	55.18	59.07	62.95	66.06	69.17	72.28
Bitumen	22.62	20.67	20.12	22.20	23.77	25.33	26.58	27.83	29.08
Other Oil Products (including non-energy use)	93.59	85.54	83.24	91.86	98.33	104.80	109.98	115.15	120.33

The costs of biofuels are projected according to the OECD-FAO Agricultural Outlook[145] and is shown in Figure 4-1. Influenced by developments on the vegetable oil markets, nominal biodiesel prices are projected to increase at a slower pace (1.5% p.a.) than ethanol prices (2.5%). Expressed in real terms, biodiesel prices are expected to decrease after 2023 and ethanol prices to resume a decreasing trend after 2026. The main reason for nominal ethanol prices performing more strongly than biodiesel is that ethanol prices are currently at historical lows and the recovery expected in the first years of the projection period will start from this low base.

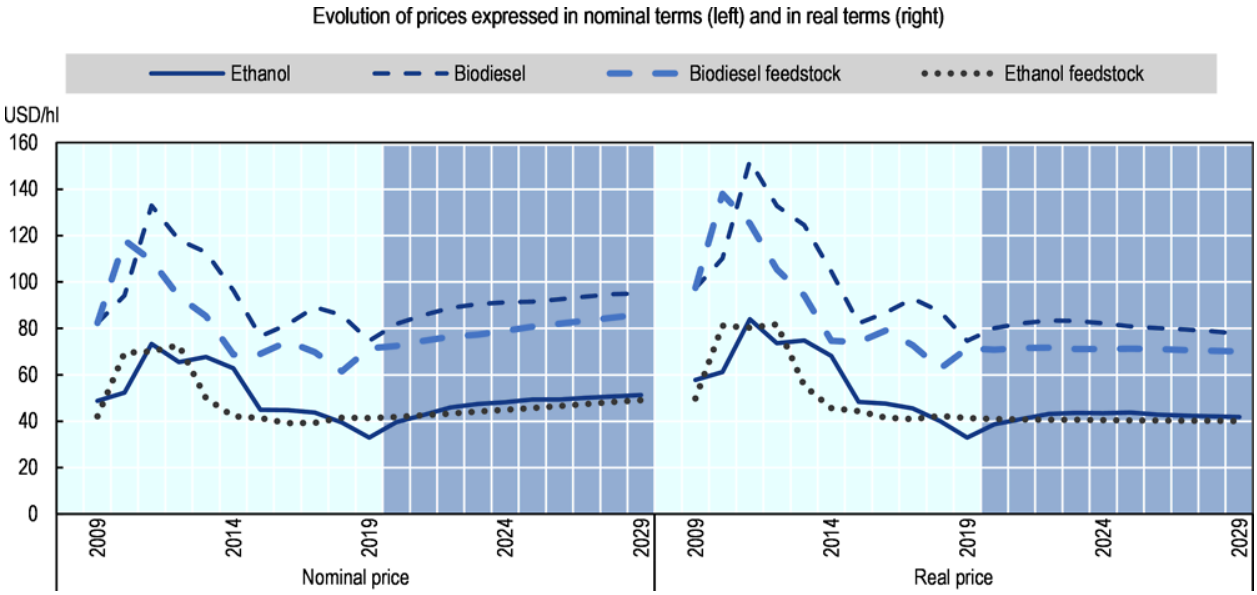


Figure 4-1. The evolution of biofuel prices and biofuel feedstock prices

IEA data for 2017[146] have been used to set the 2016 biofuel prices for 1st generation biofuels, and then, based on Figure 4-1 it was assumed that ethanol price decreases until 2019 then increases back until 2026 to reach 2016 levels again, after which it decreases with the rate of 0.5% per year. Similarly, for biodiesel it is assumed price decreases until 2019 then increases back until 2023 to reach 2016 levels again, after which it decreases with the rate of 0.5% per year. The resulting price projections are shown in Table 4-4.

It is assumed that 2nd generation fuels are about 20% more expensive than 1st generation fuels.

Table 4-14: Assumptions on the evolution of biofuel prices (2016-2050)

Fuel	Price (USD/litre)	Price (USD 2016/GJ)

145 Source: OECD/FAO (2020), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), https://www.oecd-ilibrary.org/agriculture-and-food/data/oecd-agriculture-statistics_agr-data-en

146 https://www.iea.org/data-and-statistics/charts/biofuel-and-fossil-based-transport-fuel-production-cost-comparison-2017

	2016	2016	2018	2020	2025	2030	2035	2040	2045	2050
Ethanol - 1st generation	0.5825	17.62	16.11	15.67	17.30	17.30	16.87	16.45	16.04	15.65
Ethanol - 2nd generation	0.70	21.15	19.33	18.81	20.76	20.76	20.24	19.74	19.25	18.78
Biodiesel - 1st generation	0.8175	20.92	19.12	18.61	18.61	17.70	17.26	16.83	16.41	16.01
Biodiesel - 2nd generation	0.98	25.11	22.95	22.33	22.33	21.23	20.71	20.20	19.70	19.21

iv. Technology cost developments

The TIMES-Georgia contains a large suite of new technology options for each service demand that represent Standard, Improved, Better and Advanced options based on USDOE and IEA data. Better and Advanced options are restricted in the baseline scenario, then loosened for mitigation measures that incentivise them.

4.2 Dimension Decarbonisation

4.2.1 GHG emissions and removals

i. Trends in current GHG emissions and removals in the EU ETS, effort sharing and Land Use, Land Use Change, and Forestry (LULUCF) sectors and different energy sectors

Georgia is not a part of the EU ETS and is not undergoing any effort sharing activities related to GHG emissions and removals.

The 4th National Communication Georgia (submitted in 2021) provides an overview of GHG emission trends for the period 1990-2017. The data provided shows that 1990 level emissions were 45.606 Mt of CO_2eq. Due to the breakup of the economic system of the Soviet period, emissions started to fall sharply. In 2017, GHG emissions amounted 17,766 Gg (excluding LULUCF). However, the trend of emission is increasing on a yearly basis which is shown on the figures 4-2 and 4-3 below. The table 4-15 presents the GHG emission trends disaggregated by sector for the period 1990-2017.It is noteworthy that LULUCF emissions have been consistently negative (i.e. it is a sink), and that emissions associated with energy have risen steeply since 2009.

Table 4-13: GHG emission trends per sector excluding and including LULUCF in the period 1990-2017 (tCO_2eq)

Sector	Energy	IPPU	Agriculture	Waste	LULUCF (Net removals)	Total (exluding LULUCF)	Total (including LULUCF)
1990	36,698	3,879	4,102	1,135	-6,353	45,813	39,460
1991	28,529	3,038	3,713	1,106	-6,416	36,385	29,970
1992	24,224	1,705	3,079	1,110	-6,312	30,118	23,805
1993	19,678	776	2,831	1,112	-6,548	24,397	17,849
1994	11,558	414	2,683	1,091	-6,625	15,745	9,120

Sector	Energy	IPPU	Agriculture	Waste	LULUCF (Net removals)	Total (exluding LULUCF)	Total (including LULUCF)
1995	8,319	447	2,805	1,125	-6,273	12,696	6,423
1996	7,931	535	3,344	1,153	-6,022	12,963	6,941
1997	6,783	504	3,526	1,180	-5,965	11,993	6,028
1998	6,125	502	3,184	1,208	-5,521	11,019	5,498
1999	4,849	710	3,560	1,237	-5,324	10,356	5,032
2000	5,612	725	3,317	1,269	-5,031	10,923	5,892
2001	4,391	439	3,474	1,288	-4,889	9,592	4,703
2002	5,139	591	3,719	1,305	-4,778	10,754	5,976
2003	5,763	699	3,833	1,321	-4,407	11,616	7,209
2004	6,086	846	3,436	1,339	-4,145	11,707	7,562
2005	5,396	957	3,461	1,354	-4,163	11,168	7,006
2006	7,258	1,136	3,329	1,376	-4,257	13,099	8,843
2007	7,888	1,314	3,022	1,400	-4,362	13,624	9,263
2008	6,267	1,383	3,132	1,421	-4,357	12,203	7,846
2009	6,580	1,106	3,061	1,456	-4,727	12,203	7,476
2010	7,707	1,443	3,055	1,483	-4,537	13,688	9,151
2011	9,743	1,794	2,981	1,509	-4,864	16,027	11,163
2012	10,294	1,872	3,223	1,538	-4,750	16,927	12,178
2013	8,949	1,892	3,582	1,542	-4,834	15,964	11,130
2014	9,642	2,035	3,633	1,551	-4,609	16,861	12,252
2015	10,849	2,058	3,745	1,562	-4,617	18,214	13,597
2016	11,355	1,822	3,798	1,559	-4,797	18,534	13,738
2017	10,726	1,990	3,488	1,562	-4,924	17,766	12,842

Source: Based on the data from Georgia's Fourth National Communication to the UNFCCC

ii. Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

Georgia has developed the TIMES model in order to forecast future GHG emissions from the energy sector. Additionally, emission projections from other sectors have been incorporated to provide the following table outlining projected emissions in the WEM scenario versus the NECP scenario. Projections for non-energy related sectors for 2030 were established as part of the Climate Strategy and Action Plan of

Georgia. 2050 projections are a result of extension of trends through 2030 for non-energy sectors. For the energy sector, modelling using TIMES was carried out through 2050 using assumptions as described in Section 4.1 and in measure descriptions in Annex II.

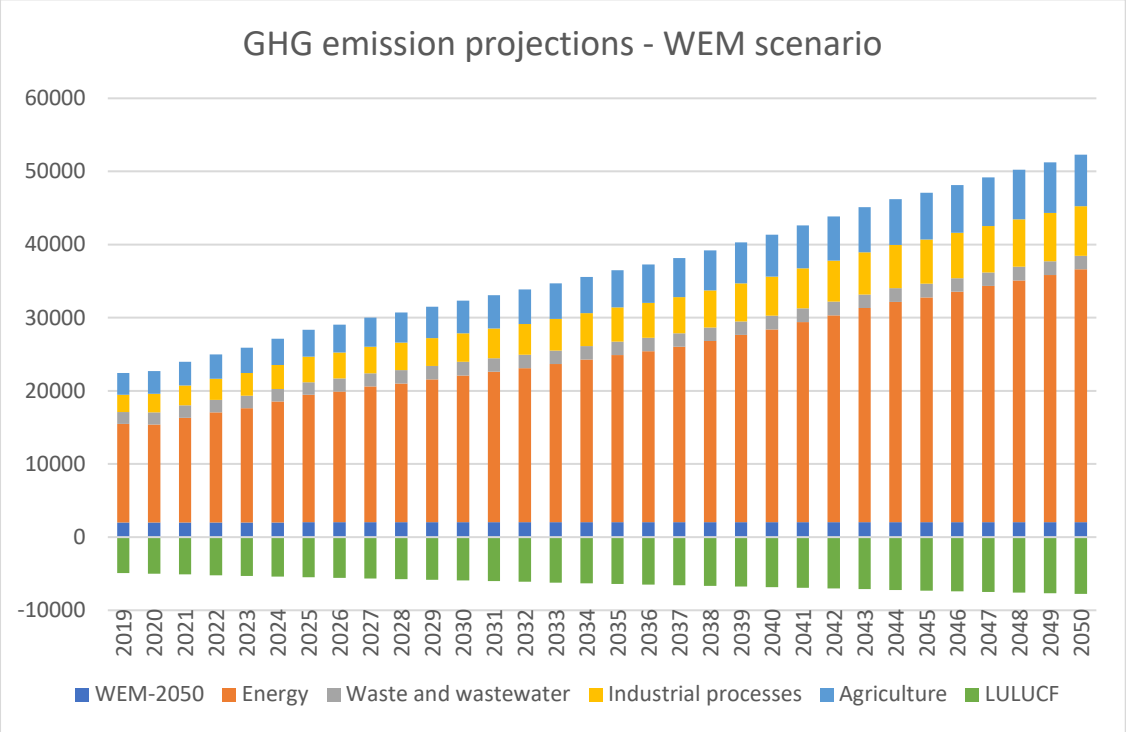


Figure 4-2: GHG emissions in the WEM scenario (kt CO_2eq)

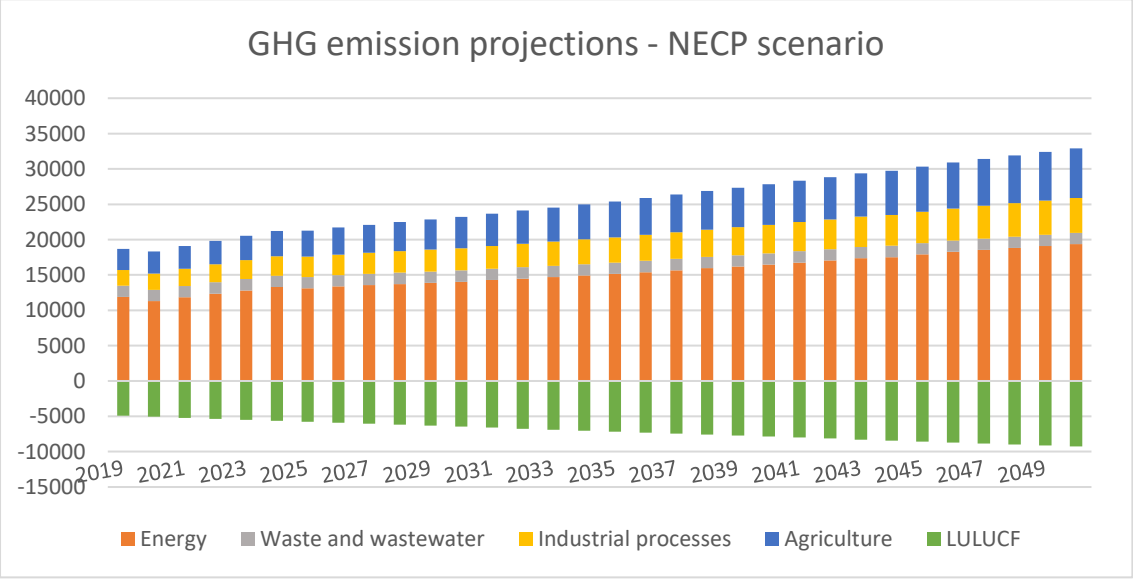


Figure 4-3: GHG emissions in the NECP scenario (kt CO_2eq)

The absolute and relative values of projected GHG emissions both with and without LULUCF are included in the table 4-16 below.

Table 4-14: GHG emissions from 1990 and projected in the baseline (WEM) scenario and NECP scenario

		2030		2040		2050	
	1990	baseline / WEM	NECP	baseline / WEM	NECP	baseline / WEM	NECP
GHG emissions (tCO_2eq) - excluding LULUCF	45,813	30,301	23,224	39,326	27,817	50,240	32,895
% against 1990 levels	N/A	-34%	-49%	-14%	-39%	10%	-28%
GHG emissions (tCO_2eq) - including LULUCF	39,460	24,371	17,070	32,480	19,953	42,479	23,631
% against 1990 levels	N/A	-38%	-57%	-18%	-49%	8%	-40%

4.2.2 Renewable energy

i. Current share of renewable energy in gross final energy consumption and in different sectors (heating and cooling, electricity and transport) as well as per technology in each of these sectors

According to the latest Geostat data from 2019, renewable energy sources have share of 20.5% in overall national final energy consumption. The breakdown according to sectors is provided in the table 4-17 below for transport and electricity, and where heating and cooling represents all other final energy consumption that is not for transport or electricity. Table 4-18 includes RES technologies and their production.

Table 4-15: Share of RES in transport, electricity, and heating and cooling (TJ)

RES - Transport	RES	1,674
	Total consumption	58,785
	% RES	2.85%
RES - Electricity	RES	32,085
	Total consumption	41,866
	% RES	77%
RES - Remaining energy balance (predominantly heating and cooling)	RES	10,960
	Total consumption	77,886
	% RES	14%

Table 4-18: RES technologies and their production in 2019 (TJ)

Hydrogenation	31,780
Wind energy	305
Biomass (for heat)	10,263
Biofuels	-
Geothermal	680
Solar	130

Total	**43,158**

ii. Indicative projections of development with existing policies for the year 2030 (with an outlook to the year 2040)

The table 4-19 below shows the indicative projections development of the electricity production sector for various technologies through 2030, 2040, and 2050 in the WEM scenario and the NECP scenario. Note that the 20 MW of wind power is projected to be shut down after 20 years of operation in the WEM scenario based on TIMES modelling – though this of course may not occur. Note also that there is less capacity of hydro plants developed in the NECP scenario due to development of solar and wind resources.

Table 4-19: Projections of development of electricity capacity (MW) in the WEM and NECP scenarios

		2030		2040		2050	
	2019	**baseline / WEM**	**NECP**	**baseline / WEM**	**NECP**	**baseline / WEM**	**NECP**
Hydro	3,325	5,139	3,992	5,791	4,284	6,775	5,510
Solar	-	-	547	-	1,345	-	1,383
Wind	20	20	750	-	1,273	-	1,573
Total	**3,345**	**5,159**	**5,288**	**5,791**	**6,902**	**6,775**	**8,465**

4.3 Dimension energy efficiency

i. Current primary and final energy consumption in the economy and per sector (including industry, residential, service, and transport)

According to Geostat, the latest data are from the year 2019 when the primary energy consumption in Georgia was 213,583 TJ and final energy consumption of 174,871 TJ (not including non-energy use). The disaggregation of primary energy consumed in Georgia is presented in the table 4-20 below.

Table 4-20 Final energy consumption disaggregated by sector in 2020 (TJ)

Sector	Solid fossil fuels (GWh)	Natural gas (GWh)	Oil and petroleum fuels (GWh)	Renewables and biofuels (GWh)	Electricity (GWh)	Total (GWh)
Industry sector	8,914	8,705	3,885	39	11,225	**32,798**
Transport sector	-	10,965	44,297	5	852	**56,119**
Commercial & public services	-	6,375	9	411	10,494	**17,289**
Residential	3	39,562	405	9,754	9,234	**58,975**
Agriculture & forestry	3	372	311	49	302	**1,037**
Other	-	-	-	-	9,189	**9,189**
Non-energy use	0	6,389	6,078			**12,467**
Total	**8,919**	**72,369**	**54,985**	**10,257**	**41,325**	**187,856**

Source: Geostat (2022)

ii. Current potential for the application of high-efficiency cogeneration and efficient district heating and cooling[147]

The potential for high-efficiency cogeneration and efficient district heating and cooling has not yet been estimated in Georgia.

iii. Projections considering existing energy efficiency policies, measures, and programmes as described in point 1.2.(ii) for primary and final energy consumption for each sector at least until 2040 (including for the year 2030)[148]

The projections of primary and final energy consumption in the baseline scenario for 2030, 2050, and 2050 are shown in the table 4-21 below

Table 4-16: Projections of energy consumption considering existing energy efficiency policies (WEM Scenario) TJ

Year / Sector	2030	2040	2050
Residential	74,900	86,884	98,637
Commercial	38,157	52,350	67,854
Industry	50,680	73,227	102,941
Transportation	106,989	142,805	187,116
Other	12,220	12,220	12,220
Agriculture	1,301	1,587	1,976
Total	**284,247**	**369,073**	**470,744**

iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, in accordance with Article 5 of Directive 2010/31/EU

Cost-optimal levels of minimum energy performance requirements have not yet been adopted in Georgia. Drafts have been developed in cooperation with international technical assistance and they are expected to be adopted in the coming year.

4.4 Dimension energy security

i. Current energy mix, domestic energy resources, import dependency, including relevant risks

The most important risks related to energy security relate to:

- The high degree of import dependence for critical fuels (natural gas and oil products).
- The seasonality of hydroelectric production (high level of production in the summer and low level in the winter) creates a dependency on either imported electricity or imported fuels to power thermal power plants during months of low production.

147 In accordance with Article 14(1) of Directive 2012/27/EU

148 This reference business as usual projection shall be the basis for the 2030 final and primary energy consumption target which is described in 2.3 and conversion factors.

- The growing unpaid and uncontrolled power consumption of temporarily occupied Abkhazia region consumes most of the Enguri/Vardnili HPP cascade output.

Additional challenges are detailed in Section 2.3 (i) of this report.

The primary characteristics of the current energy mix in Georgia is as follows (based on Geostat energy balance from 2020).

- 207 PJ -Total primary energy supply (2020)
- 42 PJ -Total domestic energy production (2020)
- 154 PJ -Net-import of energy (import-export-int. bunkers), (2020)
- 79% -Net-import energy dependence (2020)
- 188 PJ -Total final energy consumption (2020)
- Crude oil produced in Georgia accounts for only 2.4% of the domestic supply of oil product (2020).

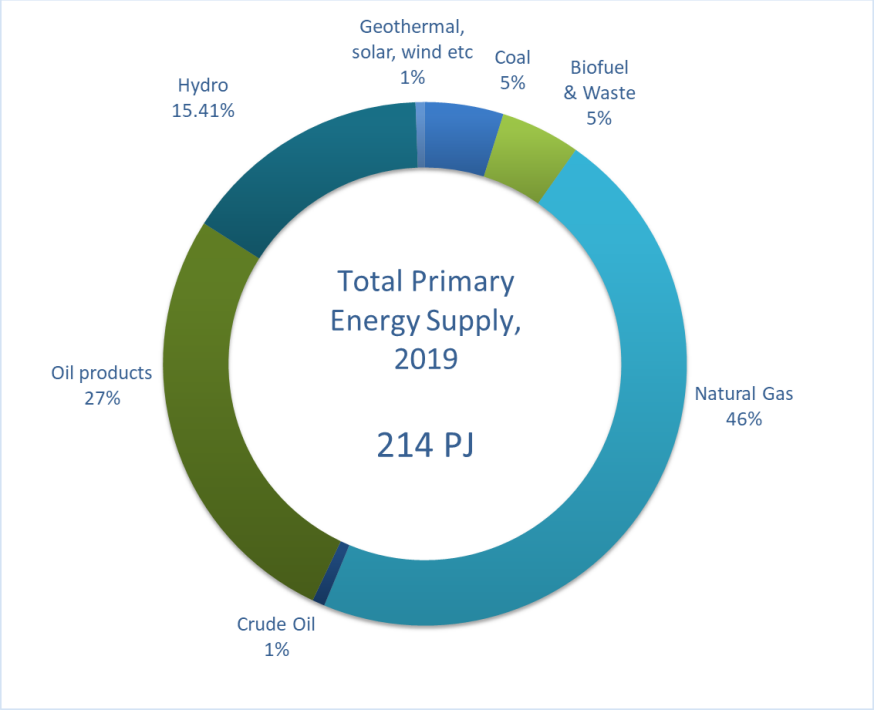


Figure 4-4: Shares of energy carriers in TPES (2019)

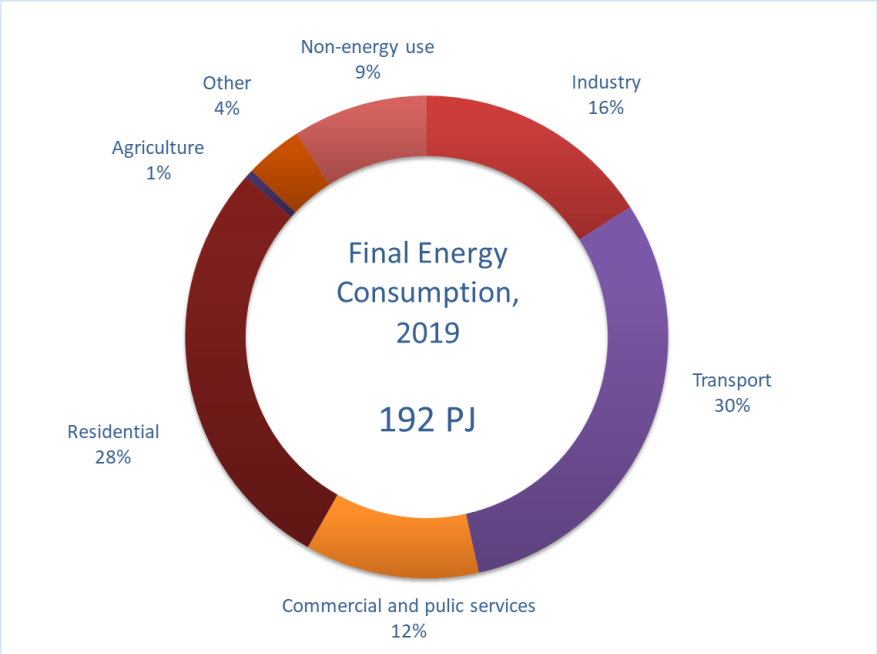
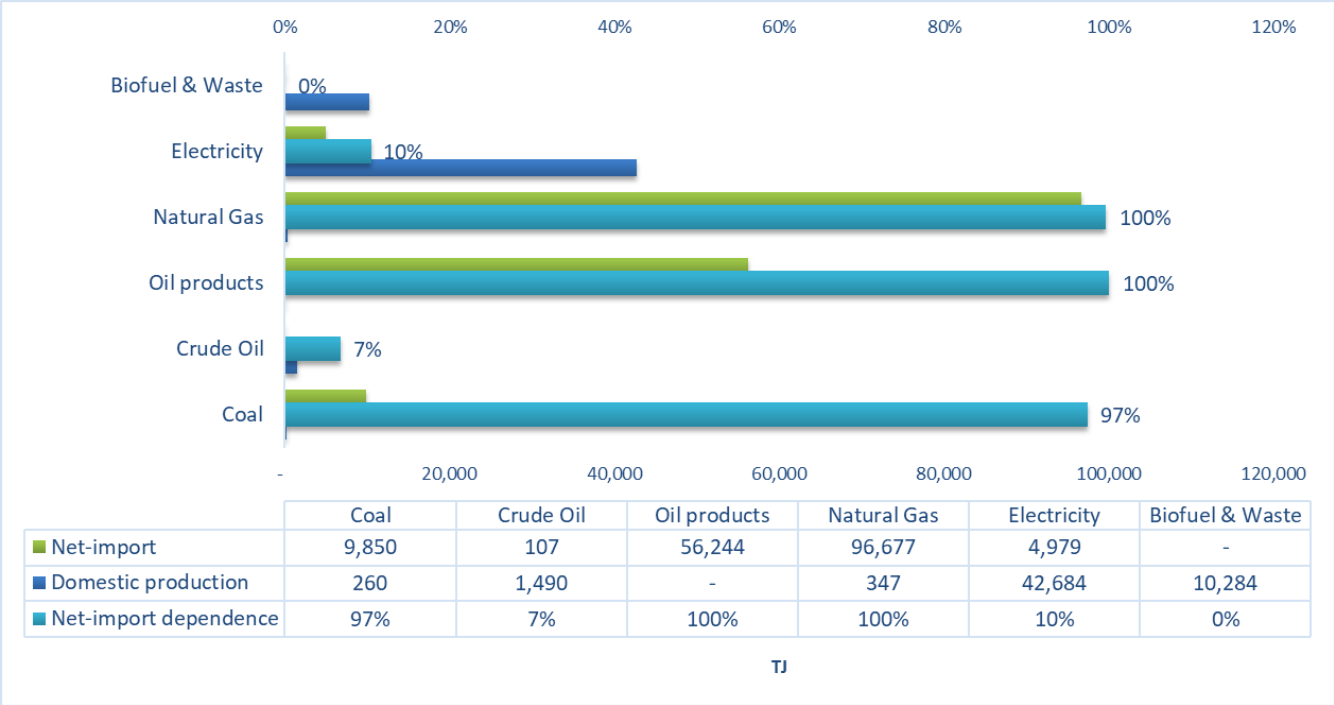
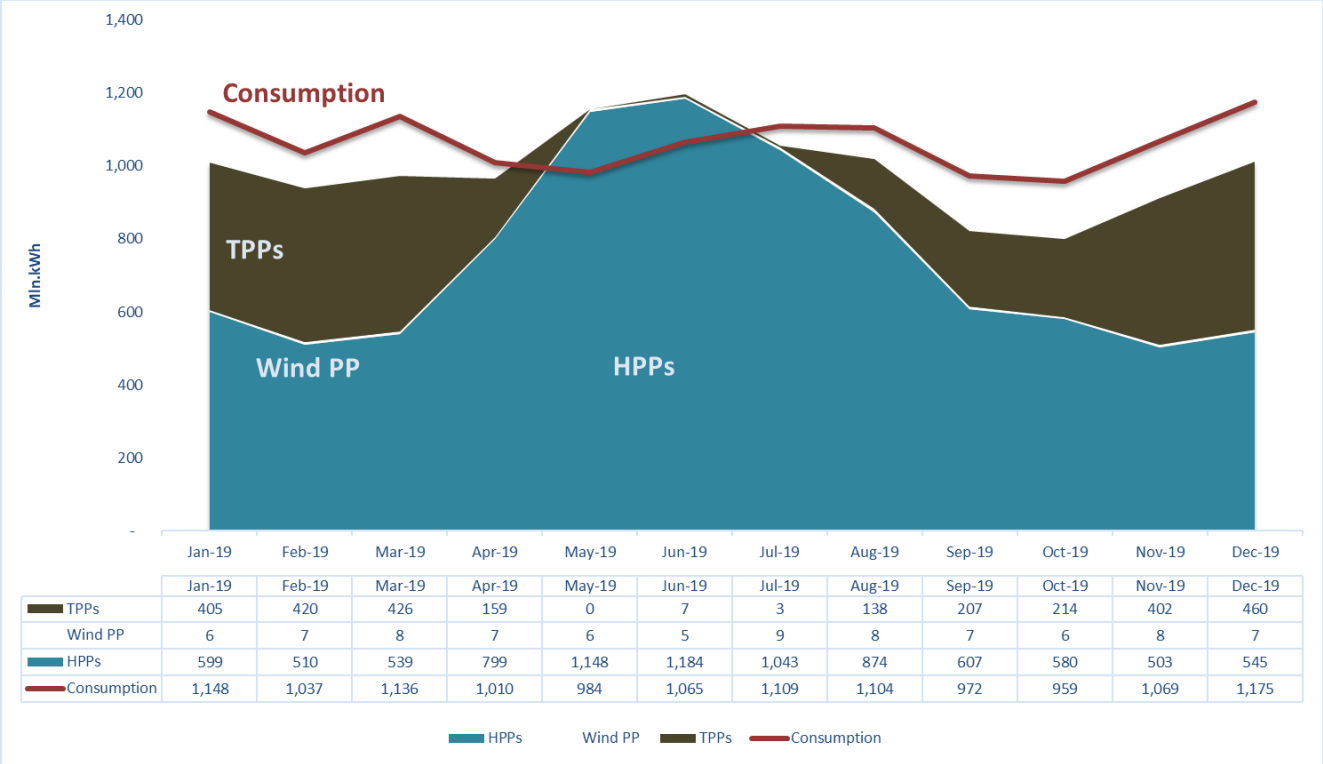


Figure 4-5: Total final energy consumption by sectors (2019)



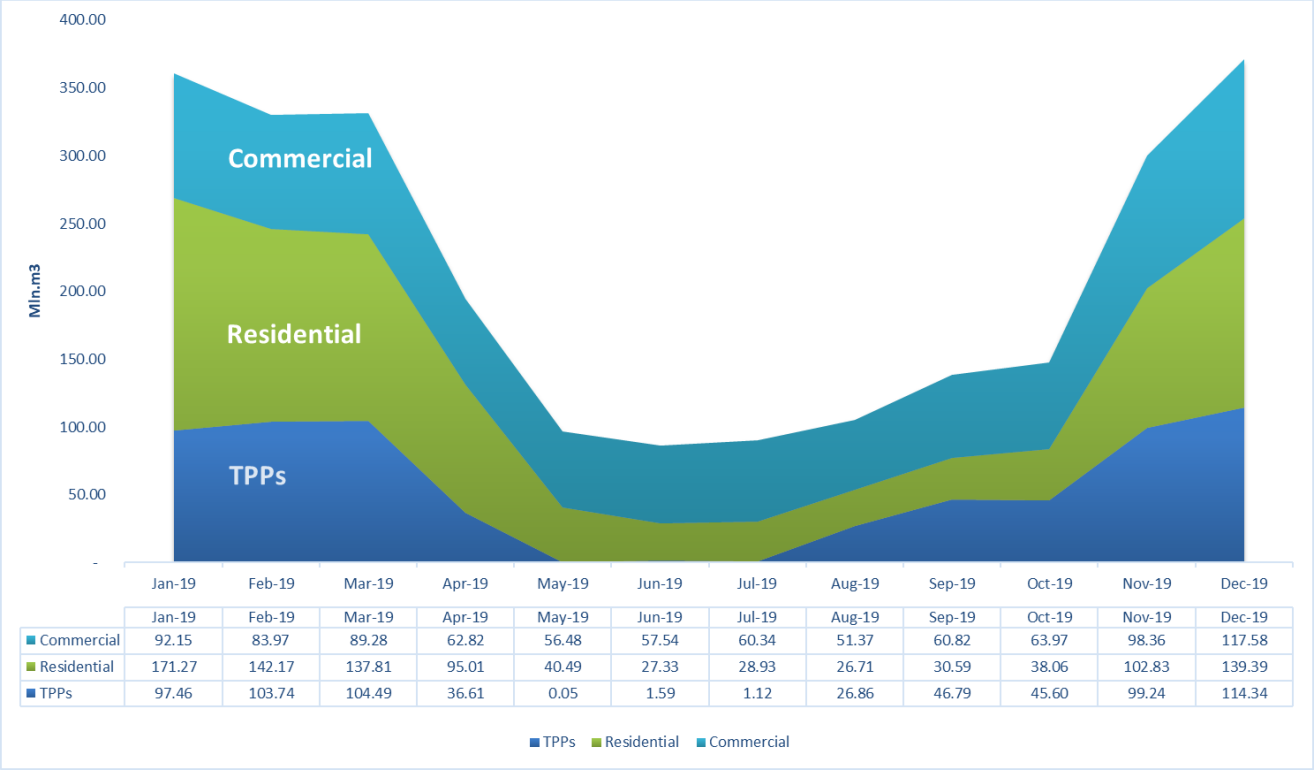
	Coal	Crude Oil	Oil products	Natural Gas	Electricity	Biofuel & Waste
Net-import	9,850	107	56,244	96,677	4,979	-
Domestic production	260	1,490	-	347	42,684	10,284
Net-import dependence	97%	7%	100%	100%	10%	0%

Figure 4-6: Import dependence by type of energy (2020)



	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
TPPs	405	420	426	159	0	7	3	138	207	214	402	460
Wind PP	6	7	8	7	6	5	9	8	7	6	8	7
HPPs	599	510	539	799	1,148	1,184	1,043	874	607	580	503	545
Consumption	1,148	1,037	1,136	1,010	984	1,065	1,109	1,104	972	959	1,069	1,175

Figure 4-7: Seasonality of electricity production and consumption (2019)



	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Commercial	92.15	83.97	89.28	62.82	56.48	57.54	60.34	51.37	60.82	63.97	98.36	117.58
Residential	171.27	142.17	137.81	95.01	40.49	27.33	28.93	26.71	30.59	38.06	102.83	139.39
TPPs	97.46	103.74	104.49	36.61	0.05	1.59	1.12	26.86	46.79	45.60	99.24	114.34

Figure 4-8: Seasonality of gas consumption (2019)

Security of energy supply - indicators[149]

- 99.64 – Supplier Concentration Index (SCI) for Natural Gas (2019);
- 80.09 – Supplier Concentration Index (SCI) for Coal (2019);
- 12.94 – Supplier Concentration Index (SCI) for Gasoline (2019);
- 4.57 - Supplier Concentration Index (SCI) for Road Diesel (2019);

ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

The following table shows the projection of energy import dependence through 2050 in the WEM scenario as projected through the TIMES model.

Table 4-17: Projected Energy Import Dependence through 2050 in the WEM scenario (TJ)

	2019	2030	2040	2050
Share of imports in primary energy consumption	78.4%	74.8%	74.7%	75.9%
Import of fuel for energy purposes	157,343	204,238	258,133	332,224

4.5 Dimension internal energy market

4.5.1 Electricity interconnectivity

i. Current interconnection level and main interconnectors[150]

Georgia can play an important rule in solving issues related to the energy integration of the Caucasus and Black Sea region countries, which includes Electricity transmission and the realization of hydropotential of the country.

Transboundary Electricity interconnections are accomplished via 500,400,330,220 kV OHLs. Electricity exchange is accomplished from Georgia to Turkiye, Azerbaijan, Armenia, Russian Federation and vice versa, also from the Russian Federation to Turkiye, from Azerbaijan to Turkiye. Transit lines are utilized to solve aforementioned issues, however their conductivity is limited by modal parameters of the energy system and conductivity of power lines, which is presented below:

Country	Cross-border line, conductor	Nom. Voltage (kV)	TTC Summer (MW)	TTC Winter (MW)	Mode
Russia	,,Kavkasioni“	500	570	650	S
			570	650	S
	,,Salkhino“	220	50	50	I

149 https://ec.europa.eu/commission/sites/beta-political/files/swd-energy-union-key-indicators_en.pdf

150 With reference to overviews of existing transmission infrastructure by Transmission System Operators (TSOs)

			150	150	I
Azerbaijan	,,Mukhranis Veli“	500	1300	1500	S
			1300	1500	S
	,,Gardabani“	330	300	300	S
			300	300	S
Armenia	,,Alaverdi“	220	140 / 100	150 / 100	S / I
			140 / 100	150 / 100	S / I
Turkiye	,,Meskheti“	400	700	700	B
			700	700	B

S - synchronous mode;
I - isolated mode;
B - operation with Back-to-back station;
R - in the reserve

As of today, the capacity of each chain of the "Gardabni" line is 700 MW, although this capacity is limited by the amount of active power allowed for the 330/220 kV autotransformer in the Gardabni substation (300 MW).

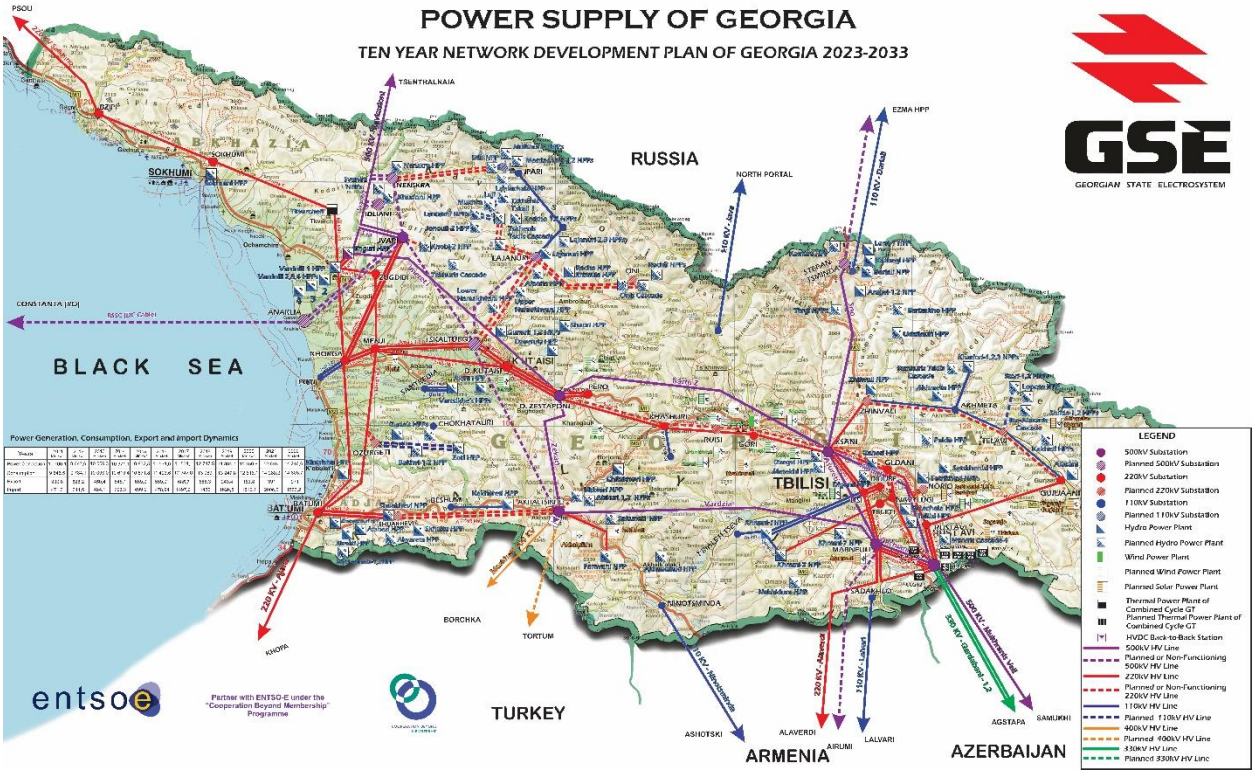


Figure 4-9: Current and planned electricity interconnectors in Georgia

4.5.2 Energy transmission infrastructure

i. Key characteristics of the existing transmission infrastructure for electricity and gas[151]

Electricity

Georgian power transmission network was designed for parallel operation with the North Caucasus and Armenia/Azerbaijan power systems. Specifically, generation of the HPPs located in the West Georgia was transmitted to Russia, while the power plants located in the East Georgia were supplied with fuel from Azerbaijan. After Georgia re-gained independence, prices for fuel supply for thermal units of Georgia grew much, and currently eastern part of Georgia is supplied with power from the HPPs located at the west. Therefore, the power transmission network is predominantly oriented from west to east. Most of the energy is generated in the west part of the country, with the main consumption in the east part. Due to its geographical location, Georgian transmission network may be used for energy transit between 1) Russia and Armenia/Iran, 2) Azerbaijan and Turkiye, 3) Russia and Turkiye, and 4) Armenia/Iran and Turkiye.

Georgian power system endures acute shortage of operating reserves resulting in law power quality in isolated regimes. In addition, when any large power unit fails, emergency control system initiates load shedding. The problem is faced in the west part of the system (500/220 kV mains along Enguri-Zestaponi route) during tripping of 500 kV OHL Imereti, because 220 kV mains are unable to transfer full load flow. Cross border lines of Georgian transmission network are not basically backed-up and their outages create risk of emergency. Furthermore, there are several 220 kV dead-end lines trip of which is some threat for system stability. In the recent years, following the power consumption, the peak loading of substations has increased sharply, especially in Tbilisi and Batumi nodes. N-1 criteria is not fulfilled in some substations, which means the restriction of the consumers will be necessary in case of outage of one of the transformers.

For dealing with such situation, sufficient operating reserves shall be provided by both construction of regulated hydro power plants (with water storage) and Thermal power plants as well as rehabilitation of the existing generation facilities.

Natural Gas

Georgia's internal market is supplied with gas through the East-West and North-South Main Gas Pipeline Systems consisting of Kazbegi, Kakheti, Southern, Ajara and Poti branches. The gas pipeline system is connected to Russia with the North-South Main Gas Pipeline System at Georgia-Russia border; South Caucasus Pipeline, pipeline entering from Azerbaijan at the Georgian-Azeri border, and pipeline connecting to Armenia near the Georgian-Armenian border. The aim of the current pipeline construction-rehabilitation and development works is basically to increase system's transmission capacity, operational flexibility and reliability by using new, high conductivity sections and interconnectors.

Significant difficulties exist due to impossibility of rational management of gas flows and the seasonal balancing, in terms of comparable stability of gas consumption with inequality and imports. Gas consumption in Georgia is characterized by sharp imbalance in winter and summer periods: in winter months the country consumes 2,5-3,5 times more natural gas than in summer. The construction of the

151 With reference to overviews of existing transmission infrastructure by TSOs.

underground gas storage facility represents one of the most significant strategic projects for the country, which will resolve the issues related to the receipt of scheduled and increasing volumes of natural gas, their distribution according to the seasons and rational consumption. It is important to note that Georgia is one of the countries in the region that has no underground gas storage.

ii. Projections of network expansion requirements at least until 2040 (including for the year 2030)[152]

As mentioned in Section 2.4, the following major expansions in connectivity of the electricity system with neighbours are planned up to 2030.

	Turkiye	Armenia	Azerbaijan	Russian Federation	Total (MW)
2020	700	150	950	650	2450
2025	1,510	940	2,450	3,210	7,910
2030	1050	700	2200	1600	5550

Below are the planned interconnectors through 2030. Plans for beyond 2030 for infrastructure are not yet developed.

Table 4-23: Existing and planned interconnector lines

Existing lines						
Voltage level (kV)	**Bus 1 (domestic**	**Bus 2 (non-domestic)**	**From Georgia to**	**I_{max} (A)**	**S_n (MVA)**	**P_n (MW)**
500	jvari	Centralnaina	Russia	1965	1700	1530
500	Gardabani	Samukh	Azerbaijan	1830	1667	1500
330*	Gardabani	Aghstafa	Azerbaijan	1950	778	700
400 (HVDC)	Akhaltsikhe	Borchkha	Turkiye	0	0	700
Radially operated lines						
220 (1)	Gardabani	Alaverdi	Armenia	700	266	240
220 (1)	Bzipi	Psou	Russia	0	0	150
All (existing situation, without radially operated lines)					0	4430
Planned lines						
400 (HVDC) (2)	Akhaltsikhe	Tortum	Turkiye	0	0	350
400 (HVDC) (3)	Marneuli	Ayrum	Armenia	0	0	700
All new (short time-frame, without radially operated lines)					0	1060
Existing + planned (short time-frame, without radially operated lines					**6046**	**5030**
500 (4)	Stepantsminda	Mozdok	Russia	1965	1700	1530
Existing + planned (medium timeframe, without radially operated lines					**6046**	**6910**
500 (HVDC) (5)	Anaklia	Constanta	Romania	0	0	1000
Existing + planned (long timeframe, without radially operated lines					**6046**	**7910**

Note:
(1) Isolated operation

152 With reference to national network development plans and regional investment plans of TSOs.

(2) Expected to be in operation from 2030
(3) Expected to be in operation from 2025
(4) Expected to be in operation from 2030
(5) Expected to be in operation from 2030

Each chain of „Gardabani -Agstafa" can carry 700 MW, although today the maximum power transmitted by this line is limited by the capacity of the 330/220 kV autotransformer in Gardabani substation and it is 300 MW.

4.5.3 Electricity and gas markets, energy prices

i.	**Current situation of electricity and gas markets, including energy prices**

Information on energy prices and their decomposition is presented in Chapter "Research, innovation, and competitiveness section "iii Breakdown of current price elements that make up the main three price components (energy, network, taxes/levies)".

ii.	**Projections of development with existing policies and measures at least until 2040 (including for the year 2030)**

The projections of prices for natural gas and other energy carriers are detailed in Section 4.1.iii. Electricity prices are not projected given the dynamic nature of the market.

4.6 Dimension Research, innovation, and competitiveness

i.	**Current situation of the low-carbon-technologies sector and, to the extent possible, its position on the global market (that analysis is to be carried out at Union or global level)**

Domestic production of low carbon technologies and their export is low. Mainly domestic production is oriented on the local market, however, there are some relatively big enterprises with export potential. Although Georgia's credit rating is still below "Investment" grade (BB with negative outlook by Fitch rating) the government introduced a lot of regulatory and financial incentives to attract investments and boost domestic production. This is especially important for low carbon technologies sector, since foreign investments bring not only financial resources, but also technology and knowledge transfer. The main factors attracting foreign companies in the field are: free economic zones with favourable tax regimes, relatively low energy tariffs, high rating in Doing Business (7th rank in 2020), etc.

The German brand AE Solar[153] has successfully operates in Georgia since 2019 and produces solar PV panels. The plant is located in free economic zone in Kutaisi and its capacity is 500 MW/year. The PV panels produced in Georgia are exported to 70+ countries, mainly in EU. PV modules are also delivered to local market through PV Georgia[154] . Company, which is an official dealer of AE Solar in Georgia and Armenia.

153 Available at: https://ae-solar.com/

154 https://pvg.ge

Georgian industrial holding AiGroup in cooperation with Chinese state-owned vehicle manufacturer Changan are constructing an electric vehicles factory in Kutaisi. The plant was supposed to start operation in 2020, however, due to pandemic the process is delayed. The factory plans to produce 40,000 vehicles a year for both domestic and international markets.

Another large plant that operates in Georgia is AG Microelectronics[155], which is specialized in the production of the various electronic equipment including LED lighting system and LED TVs. AG Microelectronics is the only plant of its kind in the Caucasus region.

There are other factories producing low carbon technologies in Georgia, but their size is quite small as well as export volumes. For instance, there are several producers of biomass briquettes and charcoal with relatively small volumes of production and limited volumes of export, as well as number of efficient wood stoves. However, due to the absence of national standardization and certification and other barriers the production volumes are mainly realized on domestic market only.

The government is supporting the local producers of green technologies though various programs and support to development of green economy remains of the top priority of the sectoral policy. GITA hosted a large **ClimateLaunchpad** Competition that is the world's largest green business ideas competition. This was the start-up idea competition for the people who have new clean technology ideas to help them develop those ideas into start-ups with global impact potential. This competition was open for Georgian start-ups for tackling global climate challenges. ClimateLaunchpad consists of 2-day Boot Camp which is followed by a period of intensive coaching by international mentors. The winner teams go to the Global Grand Final in Amsterdam and have a chance to win prizes. Winners of the Grand Final get an access to the Climate-KIC ClimateLaunchpad Accelerator that enable start-ups to grow their ideas into business.

Produce in Georgia is a government program which is directed towards the entrepreneurship development through establishing new enterprises and advancing existing ones. Although the program is not directly focused on research and innovation support, it provides access to finance for enterprises based in Georgia and producing in Georgia. The program is well suitable for any innovative Georgian business as well. The program provides access to finance, access to infrastructure and consulting. Terms of financial support are as follows: The 11% co-financing of bank loan interest rate for the first 36 months; minimum loan amount is GEL 50,000 and the maximum is GEL 10,000,000.

Although the state program "Produce in Georgia" is not focusing primarily on R&D projects it supports local SMEs that operate in energy field and produce modern energy efficient technologies. This directly contributes to technological development in the country. In recent years the program supported two projects:

- AG-Microelectronics Ltd received support in the form of co-financing of bank loan interested rate. The factory produces LED lighting technologies.
- Greenergy ltd received support in the form of co-financing of bank loan interested rate. Greenergy uses modern technologies to produce wood pellets and briquettes. Although wood pellets and briquettes are widely used in developed countries, such technologies are only starting to develop in Georgia and can be considered as new and innovative product for the local market.

155 https://www.agmicroelectronics.com/

ii. Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers

Public funding for R&I in Georgia comes from several sources. Determination of funding priorities and decision-making are decentralized. Project-based funding comes from SRNSF, GITA and partially from "Produce in Georgia", and funding for a number of scientific and research institutions is mainly carried out by the Ministry of Education and Science of Georgia within the budget allocations of the relevant year, and the Ministry also determines and allocates funding to higher Educational institutions, the structural units of which are research institutes.

It is difficult to evaluate private sector spending on R&I because reliable data and statistics are lacking. However, based on the experts' estimates and scarce data that is available, private spending on RDI is very low. There is some international funding as well, but it is attracted in an ad-hoc manner.

There are currently no specific funding targets or objectives related to RDI in energy / climate change mitigation within the policy structure, neither there is any target concerning public expenditure on RDI in general. Additionally, there are no thematic R&D priorities in the country and R&D projects related to low carbon technologies are supported by the government through SRNSF or GITA based on the same conditions as any other project related to any other field.

Figure 4-10 below shows dynamics of public spending on RDI in 2015-2019 period. Due to absence of thematic national priorities, only general statistics are available, and it is impossible to correctly depict energy and climate research related expenditures. General expenditures on RDI in Georgia are mainly consist of public spending, as private spending is extremely low. In 2018 private sector spent 600 thd. GEL on RDI[156], in 2019 –1 181 thd. GEL. GERD[157] that include private and public spending was 0.3% of GDP (World Bank data), which is much lower that an average in EU (2%). Apart from total volume of spending the structure of expenditures is also very different in Georgia. While in EU only third of all spending on R&D comes from the government, in Georgia public spending share is above 90% of the total spending. Share of private spending is miserably low.

156 Data source: Geostat. The data includes both spending on outsourcing of R&D as well as for internal R&D

157 General Expenditure on R&D

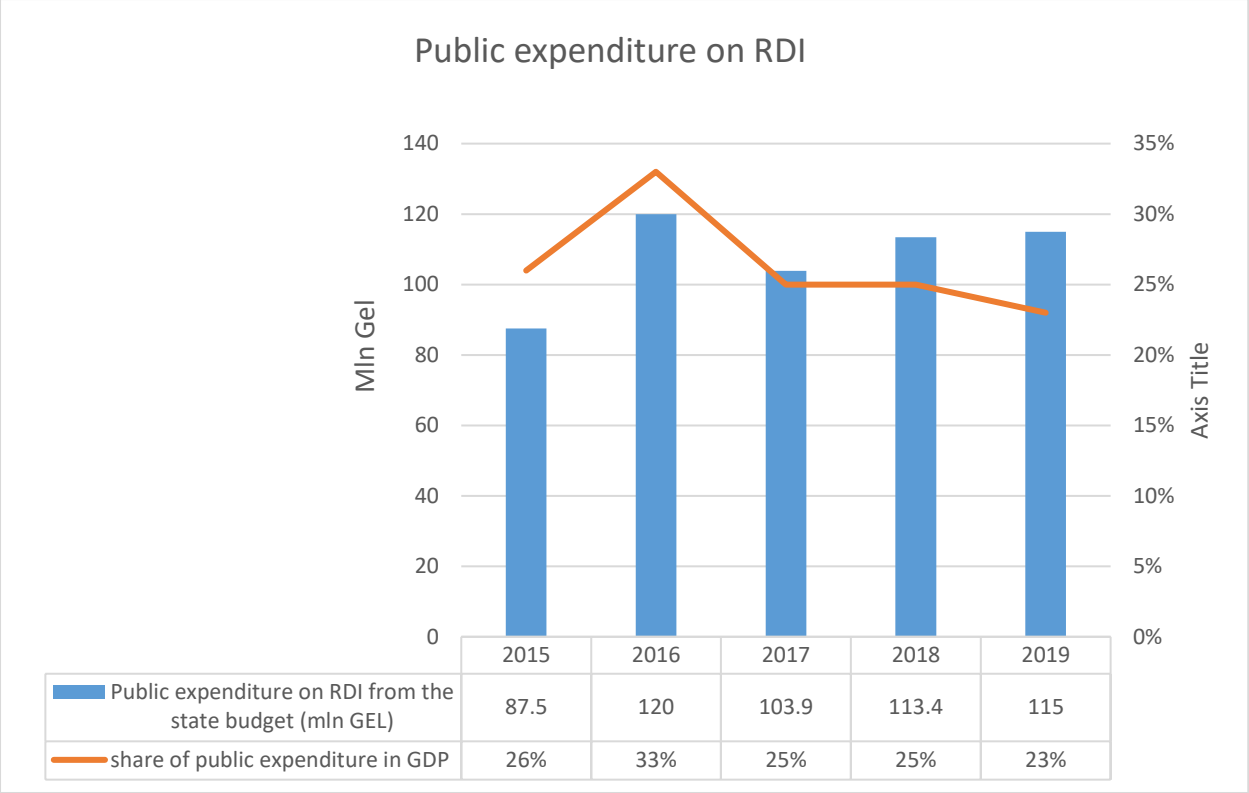


Figure 4-10: Public expenditure on RDI

Data source: Geostat and State Treasury

Note: Public expenditure data doesn't include money received from Horizon 2020 program, since yearly data on transfers is not available. General data on Horizon 2020 projects and funding volumes is presented below.

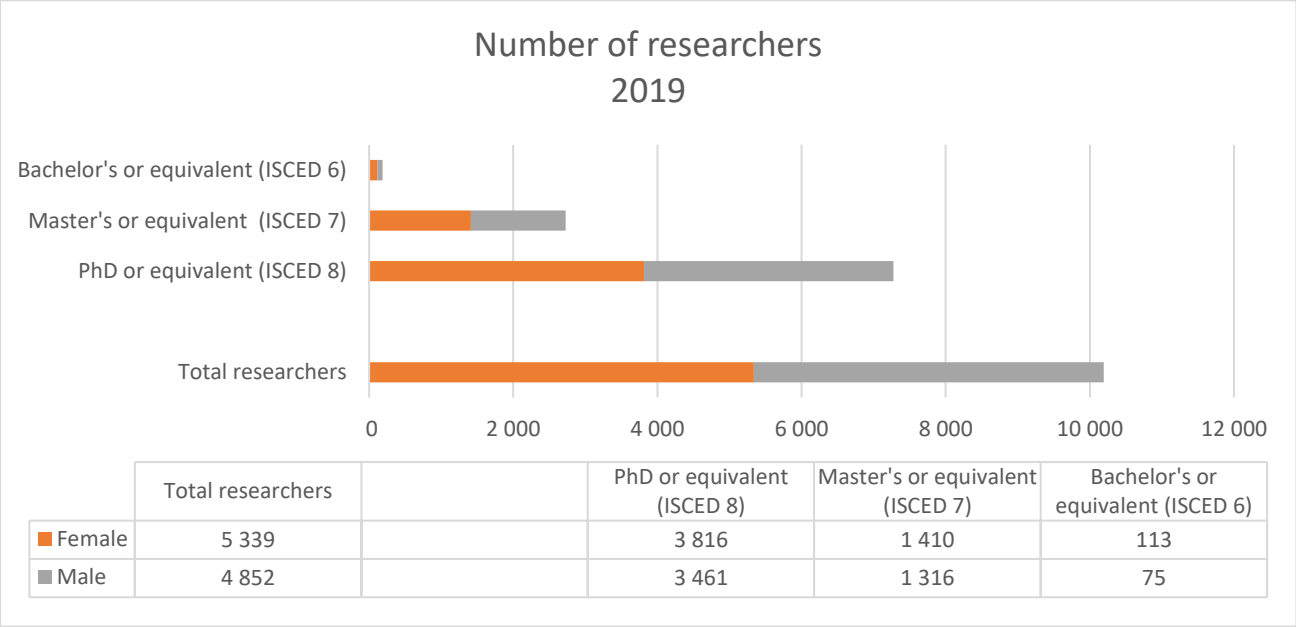
For the whole period of Horizon 2020 (2014-2020) Georgia received 358,630 EUR for energy related projects and 207,000 EUR for climate change mitigation related projects. General participation rate of Georgia is quite low, and its participation rank is 13th out of 16 Associated Countries. Total number of financed projects by Horizon 2020 for all thematic areas is just 50 with total EU contribution of 7.03 mln EUR. Although the data on public and private spending on energy related research is unavailable, in order to assess at least volumes of public project-based spending on low carbon technologies research and innovation, GITA and STNSF were asked to inventory all energy related projects they have supported in the recent years.

GITA supports innovation projects by different types of grant programs. Since the day of its establishment (2014) till 2020 GITA has financed two renewable energy projects via its micro grants financing stream. The first beneficiary project developed a prototype of water heating technology that exploits solar energy to heat water in very short time. The project received 3,186 GEL. Another project, supported by GITA, developed a prototype of technology that transforms solar energy directly into mechanical energy. This project received 4,991 GEL. Additionally, GITA financed a project that designed a Wi-Fi thermostat that leads to 16-39% of energy savings for heating. The project received 98,600 GEL from co-financing grants program.

In 2017-2020 years SRNSF funded 9 projects related to research on low carbon technologies with the total budget of 3.20 million GEL.

In addition to this, USAID through G4G program has elaborated the Recommendations to the National Innovation Strategy, with the focus on Digital and Innovation FDI attraction.

One of the reasons for low number of energy research projects is the lack of highly qualified researchers and research institutes. Researchers in R&D per million of population in Georgia is 1463 (2018, World Bank data) while average EU indicator is 4000 for the same period. In the energy sector the deficit of qualified researchers and research organisations is more substantial than on a national level. Figure 4-11 represents total number of researchers by gender and degree.



	Total researchers		PhD or equivalent (ISCED 8)	Master's or equivalent (ISCED 7)	Bachelor's or equivalent (ISCED 6)
Female	5 339		3 816	1 410	113
Male	4 852		3 461	1 316	75

Figure 4-11: Number of researchers
Source: Geostat

Another common indicator used to estimate RDI potential in the country is the number of patents per million of population. According to 2019 data there are 53 patents applications per mln. population in Georgia[158]. However, it should be noted, that there are no mechanisms currently in place to follow up with registered patents and/or monitor their application and commercialization. There are number of "inactive" patents that didn't find their application neither in domestic nor in international market.

The **National Intellectual Property Centre of Georgia "Sakpatenti"** has been set up to support the legal enforcement of intellectual property laws – which are currently in full harmony with international standards. Georgia is a member of all the main conventions and agreements on intellectual property protection. From the period 2012 – 2020, Sakpatenti registered in total 2189 patents. Out of this the number of energy related patents is:

- 32 patents are registered in the category "Electrical machinery, apparatus, energy "
- 1 patent registered in the category "Biotechnology and environmental technology"
- 4 patents registered in the category "Environmental technology"
- 52 patents are registered in the category "Engines, pumps, turbines, thermal processes and apparatus"
- 10 patents are registered in the category "Thermal processes and apparatus"

158 Data source: "World Intellectual Property Indicators" by WIPO. 197 patents applications in Georgia in 2019.

However, of registered patents only a small number were transferred to the market in Georgia or abroad. Sakpatenti is not in a position to track registered patterns and statistics on number of patents transferred/available on the market is not available. According to information gathered a large proportion of patents is not commercialized. In 2019 out of 197 total registered patents in Georgia only 6 were related to energy/climate change mitigation technologies. Out of 6 only 4 patents' status is "active", while the status of remaining two is suspended. The point that the author of the patent doesn't pay a regular fee for maintaining the active status of the patents implies on low probability of its market application.

Sakpatenti is also involved in the support of national innovation ecosystem of Georgia. Since 2015 Universities, Research Institutions along with individuals enjoy 70% discount on patenting fee. This discount has resulted in the increase of the number of applications by Universities and Research Institutions in the recent years.

Sakpatenti has a free-of-charge service of preliminary patent search and patentability assessment for innovative projects from Universities, Research Institutions, SMEs and individuals. This service is actively used by the Rustaveli Foundation for its Applied Research Grants.

The tables 4-24 and 4-25 below show the number of patents in the energy-related technology fields which have been granted in from 2012 to 2020 for inventions and for utility models.

Table 4-24: Number of patents issued on *inventions* in the energy-related technology fields

Technology field	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Electrical machinery, apparatus, energy	5	5	2	3	3	3		1		22
Biotechnology[159]									1	1
Environmental technology[160]					1					1
Engines, pumps, turbines[161]	6	13	5	11	2	3	1	2	2	45
Thermal processes and apparatus[162]	3	2	1							6
Total	**14**	**20**	**8**	**14**	**6**	**6**	**1**	**3**	**3**	**75**

Table 4-25: Number of patents issued on *utility model*s in the energy-related technology fields

Technology field	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total

159 keywords: biofuel, biomass, biomass residual or waste, energy

160 keywords: biofuel, biomass, biomass residual or waste, energy

161 keywords: energy, heat pump, heating, Cooling, solar, geothermal, wind, hydro

162 keywords: energy, heat pump, heating, Cooling, solar, geothermal, wind, hydro

Electrical machinery, apparatus, energy	5		1		1	1		2		**10**
Biotechnology[163]										**0**
Environmental technology[164]		1						2		**3**
Engines, pumps, turbines[165]	2	1		2	1				1	**7**
Thermal processes and apparatus[166]		2	2							**4**
Total	**7**	**4**	**3**	**2**	**2**	**1**	**0**	**4**	**1**	**24**

iii. Breakdown of current price elements that make up the main three price components (energy, network, taxes/levies)

Tax system in Georgia is regulated by the "Tax Code". Since January 2017, the excise tax on oil products and lubricants was increased dramatically, which led to increased prices for fuels. Later, in 2020, the government introduced another package of changes, including the one in relation to natural gas that is used in transport sector. The table 4-26 below summarizes the existing taxes for various energy carriers.

Table 4-26: VAT and excise tax rates on energy carriers

Gasoline	
VAT rate	18%
Excise rate	500 GEL/ton
Diesel	
VAT rate	18%
Excise rate	400 GEL/ton
Lubricants	
VAT rate	18%
Excise rate	800 GEL/ton
CNG	
VAT rate	18%
Excise rate	200 GEL/100 m^3
LPG	
VAT rate	18%
Excise rate	300 GEL /ton
Biodiesel*	
VAT rate	18%
Excise rate	150 GEL/ton
Natural gas	

163 keywords: biofuel, biomass, biomass residual or waste, energy

164 keywords: keywords: biofuel, biomass, biomass residual or waste, energy

165 keywords: energy, heat pump, heating, Cooling, solar, geothermal, wind, hydro

166 keywords: energy, heat pump, heating, Cooling, solar, geothermal, wind, hydro

VAT rate	18%, VAT exemption for natural gas imported for thermal power stations
Electricity	
VAT rate	18%
Excise rate	No

Source: Tax Code of Georgia

* Biodiesel and mixtures thereof, not containing or containing less than 70 % by weight of petroleum oils or oils obtained from bituminous minerals

Electricity tariffs

The price of electricity for commercial and household end-users are determined by GNERC, according to the adopted methodologies. In case of non-residential consumers, GNERC is entitled to set electricity supply tariff only for small enterprises to whom services are provided by the universal service provider, and consumers to whom services are provided by public service suppliers.

The end use tariff of electricity includes the following elements: the average cost of electricity purchase, tariff for dispatch, transmission, transit, and distribution (differs by voltage level), and the service tariff for balancing of electricity by the JSC Electricity System Commercial Operator (ESCO). All these elements, except the average price for electricity purchase, are fixed for 3 years period. In addition, VAT tax of 18% is applied to all end-use tariffs.

There is no open market for electricity in Georgia yet. As mentioned above, prices are determined by GNERC. The only exception is direct consumers, which buy electricity according to bilateral agreements. As of December 2021, there are 46 direct consumers on the market. However, within electricity market reform, the market structure will be changed, and it will become open the near future. Therefore, the existing structure of electricity tariff will be changed as well in the near future.

There are only two distribution companies on the market. JSC Telasi operates in the capital city – Tbilisi, while JSC Energo-Pro distributes electricity in all other regions. It should be noted, that in accordance with the law on "Energy and Water Supply", Separation of above-mentioned companies and activities has concluded in 2021 which refer to the unbundling of electricity distribution and supply activities. As a result, JSC Telasi and JSC "Energo-pro Georgia" are responsible for distribution, new companies "Tbilisi Electricity Supply Company" LTD (Telmiko) and JSC "EP Georgia Supply" – outside Tbilisi, are responsible for electricity supply to consumers. Aforementioned companies have been designated by the GoG as universal service suppliers, public service suppliers and alternative suppliers until January 1st, 2023.

Additionally, pursuant to the law on "Energy and Water Supply", electricity supply is defined as a competitive activity, which allows for independent suppliers to exist on the market. Residential and non-residential consumers can freely choose the supplier.

To incentivize a rational consumption of electricity, there are three steps of end use tariff for residential consumers:

1. A monthly consumption below 101 kWh,
2. A monthly consumption between 101 kWh and 301 kWh,
3. A monthly consumption more than 301 kWh

Non-residential consumers (public, private, industry and other non-residential sectors) pay a fixed tariff that doesn't vary with consumption level. The tariffs for non-residental sector are also determined by GNERC, although direct consumers can buy electricity based on bilateral contracts and thus bypassing the electricity public obligation suppliers. The prices are different based on the voltage level. The figure 4-12 below describes the composition of various types of electricity tariff.

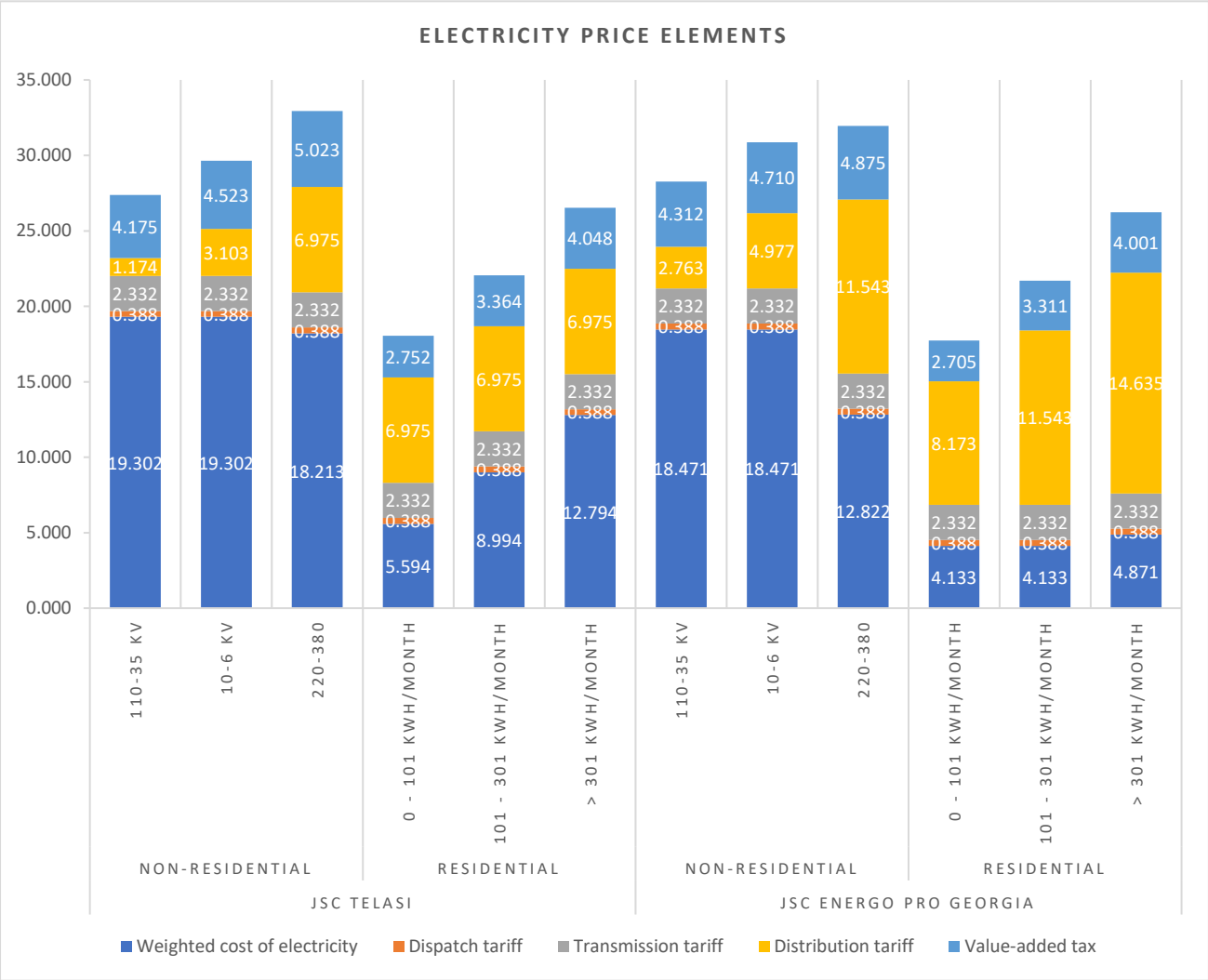


Figure 4-12: Electricity price elements

Natural gas tariff

Tariffs for residential sector is also regulated by GNERC, while commercial tariffs are deregulated since September 1st, 2007 (August 1st, 2008 for Tbilisi)[167]. Therefore, tariffs for non-residential consumers are not determined by GNERC.

The composition of the natural gas price is the following: transportation tariff (fixed by GNERC), tariff for supply and distribution tariff.

According to GNERC, there are 24 distribution companies operating on the market. However, three of them (LLC Tbilisi Energy, LLC SOCAR Gas Georgia and JSC SAKORGAS) distributed 89% of total distributed natural gas.

The figures 4-13 and 4-14 below describe the composition of residential tariff for the three largest natural gas distribution companies.

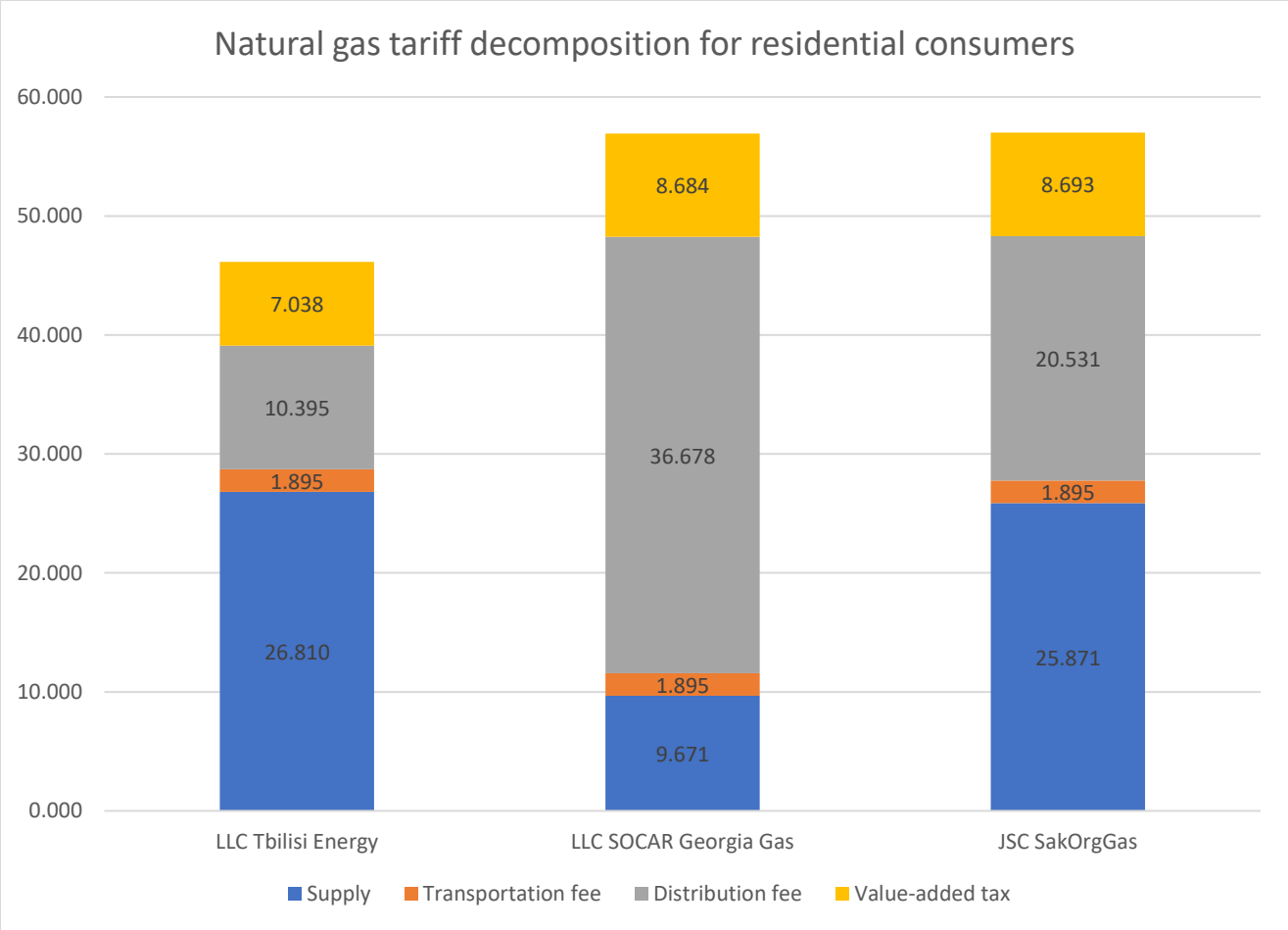


Figure 4-13: Price elements of natural gas tariff for residential consumers

167 https://matsne.gov.ge/ka/document/view/73006?publication=0

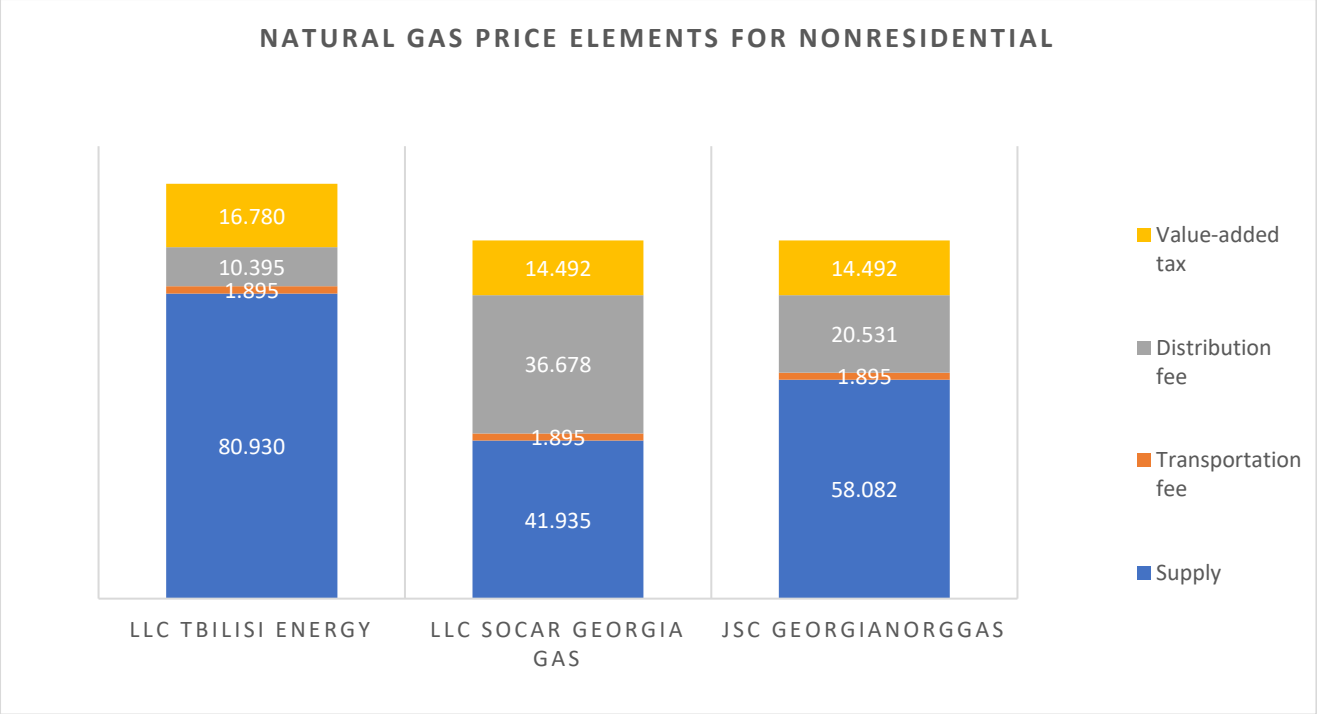


Figure 4-14: Price elements of natural gas tariff for non-residential consumers

iv. Description of energy subsidies, including for fossil fuels

The table 4-27 below describes describe the subsidies by the type of energy carrier.

The subsidies inventory was developed by Word Experience for Georgia for the OECD[168]. The data from this initial inventory was supplemented with the data on temporary subsidies design to support the economy and population in post-COVID period. Based on the methodology there are the following categories of subsidies:

- **direct transfers of funds** from the budget to energy producers and consumers (e.g. grants, support of energy purchases by low-income households)
- **tax expenditure and other government revenue foregone** (e.g. reduction or exemptions of certain taxes, such as value-added taxes (VAT) or excise taxes on fuel consumption)
- **induced transfers** (import tariffs, below-market electricity/heat prices, cross-subsidies in the electricity sector)
- **transfer of risk to government** (e.g. low-interest loans, loan guarantees).

The Table below summarizes the volume of subsidies per type of support and energy carrier. The following types of subsidies are present in Georgian energy sector:

- **Supply of natural gas to residential and power sector at below the market price.** Since 2010 so called "social gas" with the fixed price of 143 USD/1000 m^3, which is much below the market price,

168 The Organization for Economic Co-operation and Development https://www.oecd.org/

is provided to residential sector to keep the residential gas tariffs at a relatively low level as well as to power sector to subsidize electricity tariffs. Social gas at a fixed price is received by Georgia based on the confidential agreement between Georgian government and Azeri state oil and gas company Socar as a compensation for transit of natural gas through Georgia's territory. The amount of the subsidy is estimated as follows: The price of gas for thermal power plants and distribution companies is subtracted from the price of regional wholesale gas and multiplied by the amount of gas consumed by thermal power plants and distributors. Gas for thermal power plants is exempt from VAT, and this subsidy is calculated separately. To avoid double counting, it is assumed here that gas from thermal power plants is also taxed with VAT. Using this approach, the volume of subsidy in 2016 and 2017 -$105 mln and $114 mln respectively.

- **VAT exemption for imported natural gas supplied to thermal power plants**. According to Article 173 of the Tax Code of Georgia, "Exemption of import of goods from VAT" (p) Import of natural gas for electricity production (for thermal power plants) is exempted from tax.

- **Tax exemptions to oil and gas producing companies for certain operations.** Georgian oil and Gas Corporation based on the production sharing agreement (PSA) with Georgia Oil and Gas Limited paid 215,064 GEL in total as a profit tax in the budget during 2010-2019. GOGC paid profit tax instead of the Georgian Oil and Gas Limited, to facilitate and support production of local energy resource.

  The Tax Code of Georgia (Parliament of Georgia 2010), Article 206 paragraph 1 (F), provides exemption from property tax of the property used for oil and gas operations (activities) as provided for by the Law of Georgia on Oil and Gas. Property tax rate is 1% of the average annual net book value according to the Article 202, paragraph 3. GOGC provided amount of property tax exempted for the year 2018 (3.4mln. USD). Assuming the same amount for the previous years.

  According to the law on Fees for the Use of Natural Resources, article 5, the fee for extraction is 21 GEL per ton of crude oil and 2 GEL for 1000 m^3 of gas extracted. GOGC pays the fee instead of oil and gas companies operating in Georgia to facilitate and support production of local energy resource. The annual payments of the fee are provided by the GOGC.

- **Provision of gas to households in highland Kazbegi and Dusheti municipalities for free.** Reimbursement of gas cost supplied to households of Kazbegi and Dusheti municipalities from the state budget in winter months (from 15th of October to 15th of May). This support has been provided since the 1990s, when North-eastern gas transit pipeline (Russia-Georgia-Armenia) came into exploitation. This pipeline passes through the Kazbegi and Dusheti municipalities. Therefore, the Georgian government decided to supply gas to the households of these two municipalities for free, while the budget transfers go directly to gas suppliers. The subsidy has caused large market distortions. For example, residents used the free gas to heat their greenhouses and cultivate vegetables in highlands. Stricter limitations have been imposed in the last few years, but such practices still continue and the burden on the national budget.

- **Utility subsidy for socially vulnerable households in Tbilisi municipality**. Under the municipal social aid programme utility subsidy for electricity, water supply and waste disposal have been introduced to support socially vulnerable groups in Tbilisi municipality. Currently, families with scores (assigned to socially unprotected households by Social Service Agency (SSA) not exceeding 70,000, the total subsidy is GEL 106 per month, and for families with score between 70,000-200,000, the total subsidy is GEL 20 per month (for 5 months, during December-April). At the initial stage (during 2012-2016) all consumers received the subsidy.

- **Electricity subsidies for households in high mountain areas.** According to the Resolution N418 of the Government of Georgia (August 25, 2016) electricity subsidies are issued for permanent residential consumers in Highland Settlements of Georgia. Subsidy covers 50% of the monthly cost of consumed electricity, but no more than cost of 100 kWh per customer.

- **Electricity subsidy for socially vulnerable consumers.** The tariff subsidy is granted in accordance with the Resolution N381 of the Government of Georgia dated July 30, 2015, to families registered in the "Database of Socially Vulnerable Families" whose socio-economic ranking score does not exceed 70,000 (scores are assigned to socially unprotected families by SSA, based on the comprehensive methodology) **except the families registered in the administrative territories of Tbilisi municipality.** The subsidy is granted on the basis of the electricity consumed.

- **Electricity subsidy for families with 4 and more children.** Subsidies for large families are issued in accordance with the Resolution N517 of the Government of Georgia (October 31, 2018). For families with four children under the age of 18, the amount of electricity subsidy (social allowance) is GEL 20 at maximum per month, and for the 5th and per additional child - additional GEL 10 maximum, depending on the amount of electricity consumed. A family should be registered in the database of socially vulnerable families (at Social Service Agency) and the assigned ranking score should not exceed 300,000 units (scores are assigned to socially unprotected families by the Social Service Agency, based on the comprehensive methodology). Provision of this electricity subsidy does not exclude the family from receiving any of the other subsidies listed above.

In addition to permanent subsidies the government introduced additional temporary subsidies to help households cope with pandemic consequences. Households with monthly consumption of electricity below 200 kWh and the natural gas use below 200 m^3 are fully compensated for their monthly bills. The program's duration is November 2020-February 2021. In total the government allocated 270 mln GEL and approximate number of beneficiaries is 1 mln households.

From January 2021 new increased residential and non-residential electricity tariffs came into force. Non-residential tariff increased by an average 0.12 GEL/kwh, however, the government developed a list of business categories that will be subsidies by the half of the difference between old and new tariffs. The government will subsidize fully the difference between old and new tariffs for residential consumers, whose consumption is below 300 kWh/month.

Table 4-27: Fossil fuel subsidies in Georgia, GEL million (2010-2019)

Program	Mechanism of support	Indicator	Fuel	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Tax exemptions to oil and gas producing companies for certain operations	tax expenditure	PSE	natural gas, crude oil	7.4	6.1	6.9	6.9	7.1	8.8	9.1	9.5	9.5	10.4
Full cost compensation for the provision of free gas to households in the Kazbegi and Dusheti municipalities	direct transfer	CSE	natural gas	4.4	5.3	4.3	3.9	3.3	4.3	4.1	6.7	7.4	8.0
Utility subsidy for socially vulnerable households in Tbilisi municipality	direct transfer	CSE	electricity	n.a.	n.a.	6.4	44.2	45.1	47.0	25.6	7.3	7.3	8.3
Gas subsidy for households living on the border of temporarily - occupied region of Abkhazia and the Tskhinvali Region	direct transfer	CSE	natural gas	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.0	2.4	2.6
Electricity subsidies for households in high mountainous areas	direct transfer	CSE	electricity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.6	9.3	9.8
Electricity subsidy for socially vulnerable consumers	direct transfer	CSE	electricity	n.a.	n.a.	n.a.	n.a.	n.a.	1.5	3.8	3.0	2.7	2.9
Electricity subsidy for families with four and more children	direct transfer	CSE	electricity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1
Total direct transfers				**4.4**	**5.3**	**10.7**	**48.1**	**48.4**	**52.8**	**33.5**	**25.6**	**29.2**	**31.6**
Total tax expenditure				**7.4**	**6.1**	**6.9**	**6.9**	**7.1**	**8.8**	**9.1**	**9.5**	**9.5**	**10.4**
Total				**11.8**	**11.4**	**17.5**	**55.0**	**55.5**	**61.6**	**42.6**	**35.1**	**38.7**	**42.0**
Total, OECD (2018) report				**219**	**368**	**390.4**	**365**	**428**	**-**	**-**	**-**	**-**	**-**

5 Impact Assessment of Planned Policies and Measures[169]

5.1 Impacts of planned policies and measures described in section 3 on energy system and GHG emissions and removals, including comparison to projections with existing policies and measures (as described in section 4).

i.	Projections of the development of the energy system and GHG emissions and removals as well as, where relevant of emissions of air pollutants in accordance with Directive (EU) 2016/2284 under the planned policies and measures at least until ten years after the period covered by the plan (including for the last year of the period covered by the plan), including relevant Union policies and measures.

The table 5-1 below shows the projected GHG emissions through 2050 both in the WEM and NECP scenarios – including comparison to 1990 levels. Projections for energy-related emissions through 2050 were developed based on TIMES modelling. Projections for non-energy related emissions were calculated using projections within the Climate Strategy and Action Plan through 2030 and extending trends through to 2050.

It is noteworthy that with the measures described in Annex I and Annex II, would result in a reduction of GHG emissions in 2050 by 28% compared to 1990 excluding LULUCF and 40% including LULUCF. Without the measures described in Annex I and II, emissions are projected to increase in comparison to 1990.

Table 5-1: Projections of GHG emissions in the baseline and NECP scenarios

		2030		2040		2050	
	1990	baseline / WEM	NECP	baseline / WEM	NECP	baseline / WEM	NECP
GHG emissions (tCO_2eq) - excluding LULUCF	45,813	30,301	23,224	39,326	27,817	50,240	32,895
% against 1990 levels	N/A	-34%	-49%	-14%	-39%	10%	-28%
GHG emissions (tCO_2eq) - including LULUCF	39,460	24,371	17,070	32,480	19,953	42,479	23,631
% against 1990 levels	N/A	-38%	-57%	-18%	-49%	8%	-40%

Figures 5-1 and 5-2 show projections of GHG emissions in the WEM and NECP scenarios (kt CO_2eq).

169 Planned policies and measures are options under discussion and having a realistic chance of being adopted and implemented after the date of submission of the national plan. The resulting projections under Section 5.1.i. shall therefore include not only implemented and adopted policies and measures (projections with existing policies and measures), but also planned policies and measures.

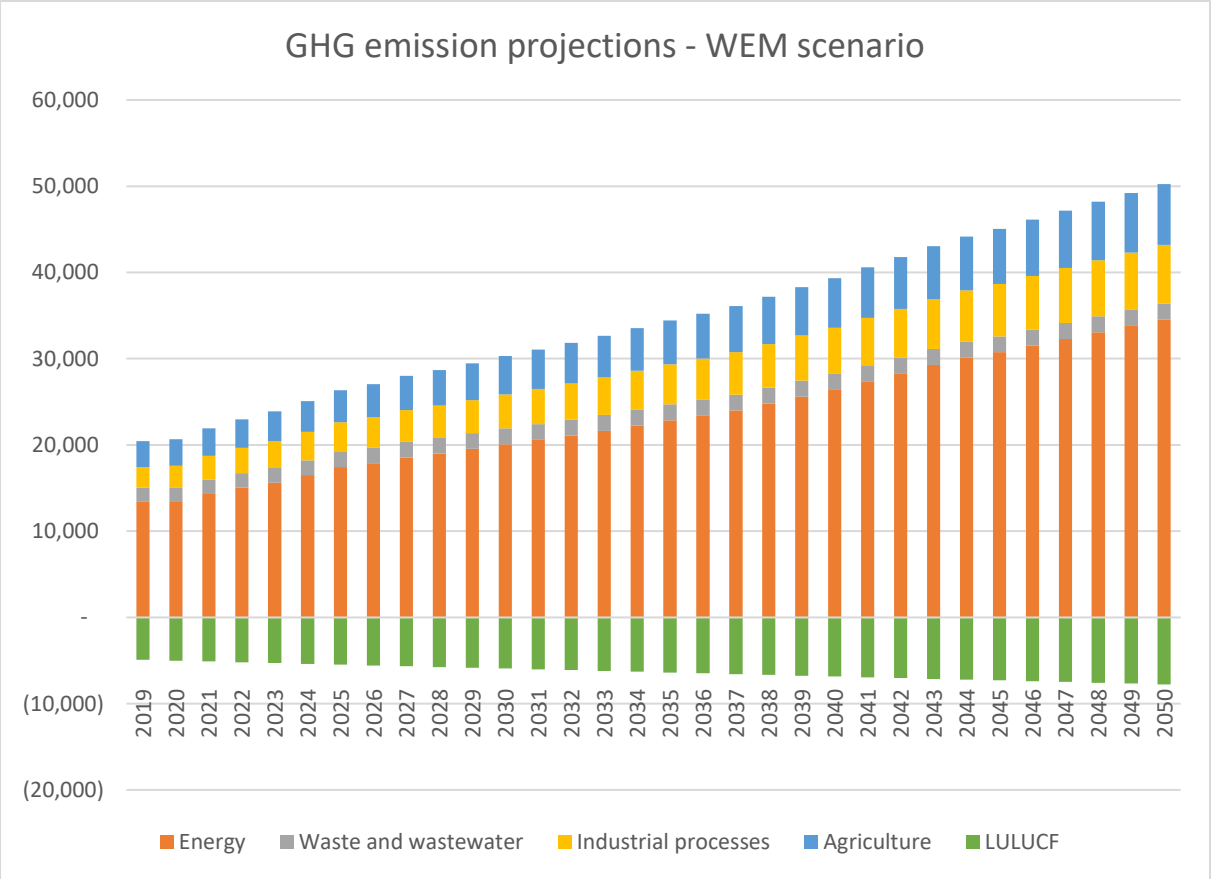


Figure 5-1: GHG emissions projections – WEM scenario (kt CO_2eq)

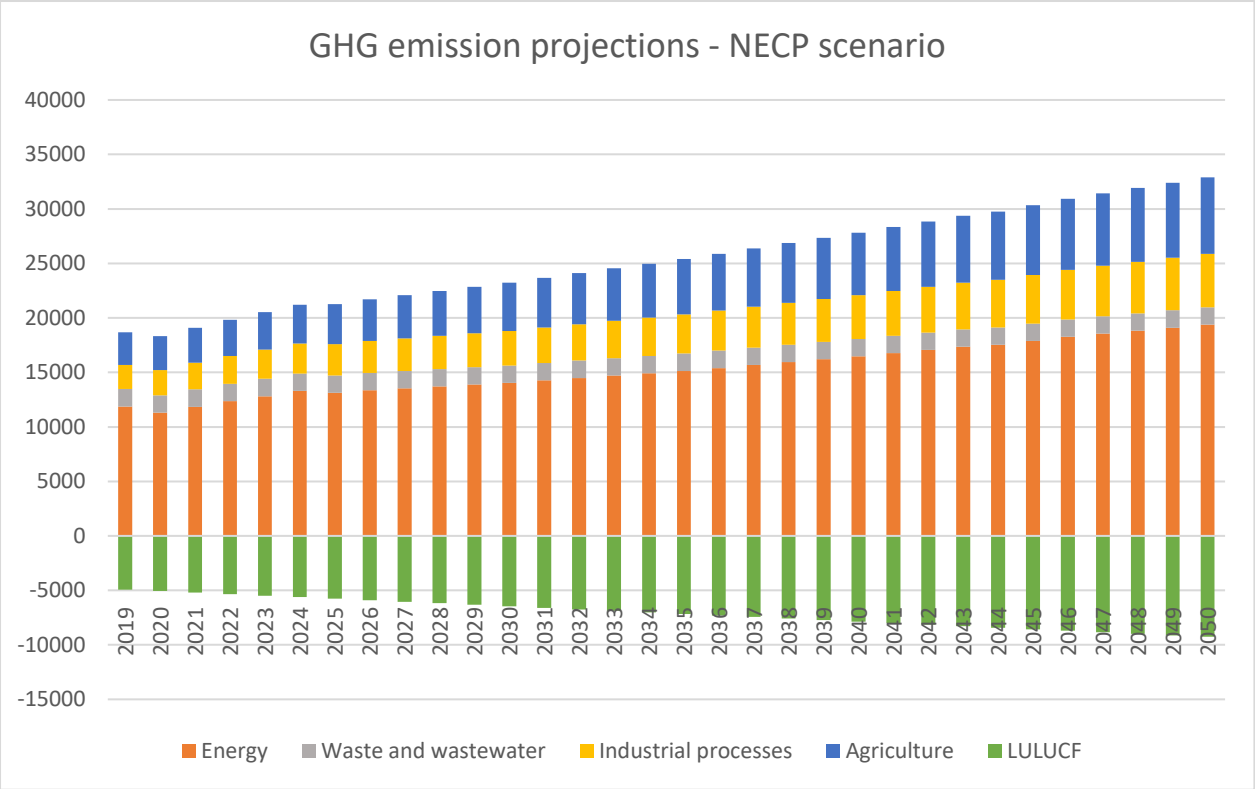


Figure 5-2: GHG emissions projections – NECP scenario (kt CO_2eq)

ii.	**Assessment of policy interactions (between existing policies and measures and planned policies and measures within a policy dimension and between existing policies and measures and planned policies and measures of different dimensions) at least until the last year of the period covered by the plan, in particular to establish a robust understanding of the impact of energy efficiency / energy savings policies on the sizing of the energy system and to reduce the risk of stranded investment in energy supply.**

The policies and measures for energy efficiency, renewable energy, internal energy market, and international inter-connections were all taken into account via the use of the TIMES model to ensure that changes in energy demand are met with supply – accounting for losses, imports, and exports.

It is most noteworthy that the implementation of EE measures are projected to impact the required electricity capacity significantly – decreasing the required capacity as follows:

- **For 2030 –** decreasing from 6902 MW in the WEM case to 5,791 MW in the NECP case
- **For 2050 –** decreasing from 8465 MW in the WEM case to 6,775 MW in the NECP case

It is evident that investing in "Negawatts" is an important policy choice for Georgia to ensure security of supply and meeting climate change goals.

iii.	**Assessment of interactions between existing policies and measures and planned policies and measures, and between those policies and measures and Union climate and energy policy measures.**

The NECP lays out existing policies and a plan of policies and measures to be adopted / implemented that are consistent with the EU's climate and energy policy measures. It is sufficiently ambitious to reach GHG reductions of 40% below 1990 levels for 2050, with appropriate medium-term targets as well.

The NECP envisages some growth in the absolute amount of energy consumption and GHG emissions in the coming 20 to 30 years, consistent with Georgia's status as a developing country. However, the NECP shows a commitment towards significant policies and investment programs that will move Georgia towards its climate and sustainable energy goals.

5.2 Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills, and social impacts, including just transition aspects (in terms of costs and benefits as well as cost-effectiveness) of the planned policies and measures described in section 3 at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures

This section provides an assessment on the non-energy impacts of energy and climate policies, as comprised in this NECP. The positive environmental effects of most of the energy and climate policies included in the NECP are self-evident – in particular related to renewable energy, energy efficiency, improved forest and agricultural resource management. Care must be taken with regards to some renewable energy investments to ensure that there are no (or limited) negative environmental impacts.

Additionally, investments in energy security described in the NECP (notably coal, oil, and natural gas exploration / utilisation) can potentially have harmful impacts on the environment which will need to be managed through appropriate permitting and mitigation strategies.

A comprehensive quantitative evaluation of the economic effects of energy, climate, and energy security policies across actors and dimensions is beyond the scope of this report. This section therefore provides a brief overview on impacts across three key dimensions, namely:

1) disposable household incomes, as a key indicator to measure the impacts on fuel and energy poverty

2) public budgets, to understand if measures have the potential to increase or decrease public revenue streams and

3) employment, as energy and climate policies bear great potential to provide green jobs.

It should be noted that for numerous measures, the impact on public budgets is very difficult to establish. For example, for some public programs (e.g. awareness raising), public budgets would likely need to be allocated which can be considered budget negative. However, energy savings resulting from actions taken by consumers can free up additional disposable household income. These savings allow households to increase the purchase of goods and services that – in turn – generate more revenue to the public budget. This is particularly because non-energy goods and services which are purchased tend to have better multiplier effects on the economy.

Additionally, for investments in energy security, the budgetary implications of potential investments are not evaluated. The manner in which the investments take place (e.g. public private partnership, public investment, or otherwise) will be critical in determining the positive or negative impacts on the national budget. In general, each specific large infrastructure investment would likely require a strategic assessment of the costs and benefits – as well as strategic environmental assessments.

Some measures require either public funds to operate, or include tax exemptions to incentive certain activities, thus negatively impacting public budgets (e.g. incentives for efficient vehicles). These effects are indicated by a value of "Potential negative impact" for impact on public budgets.

In general, policies improving EE in the building stock – residential and public sector buildings – as well as those improving appliances and devices, are likely to save consumers more than the investments themselves. For households, this can also mean reducing energy poverty.

Regarding employment, policies requiring construction works, such as building refurbishments or infrastructure related projects, have the best potential to create green jobs – though larger ongoing RES installations are not expected to create significant amounts of ongoing jobs.

The table 5-2 below shows the initial understanding of the impacts on disposable household incomes, public budgets, and employment.

Table 5-2: Qualitative assessment of non-environment / energy impacts of measures

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
Objective 1.1: Reduce emissions by 5% from Industrial Processes and Product Use (IPPU), processes			
GHG-1: Nitric Acid production with low GHG emissions Nitric acid production plants to be equipped with state-of-the-art technology to remove N_2O emissions from their production cycles.	No / limited impact	No / limited impact	No / limited impact
GHG-2: Develop plant-specific emission factors Introduction of a data management system that includes plant-specific emission factors to better estimate sector's emissions and mitigation potentials	No / limited impact	No / limited impact	No / limited impact
Objective 1.2: Reduce emissions from agricultural production and supporting low-carbon approaches in the agricultural sector.			
GHG-3: Changing livestock feed Maximize feed quality for 20% of cattle, leading to lower emissions from enteric fermentation.	No / limited impact	Potential negative impact	No / limited impact
GHG-4: Develop cost-benefit analysis and feasibility study to identify best options to further increase change in livestock feed The understanding on potential policy options is improved so that new actions can be identified for the 2023-2024 Climate Action Plan.	No / limited impact	No / limited impact	No / limited impact
GHG-5: Develop cost-benefit analysis and feasibility study to identify best options in which manure management systems can be implemented The understanding on potential policy options is improved so that new actions can be identified for the 2023-2024 Climate Action Plan.	No / limited impact	No / limited impact	No / limited impact
GHG-6: Research and feasibility study on the successful and widespread establishment of cooperatives The understanding on potential policy options is improved so that new actions can be identified for the 2023-2024 Climate Action Plan.	No / limited impact	No / limited impact	No / limited impact
GHG-7: Research and consultation processes to define economic and socially feasible Climate Smart Agriculture (CSA) actions in the context of Georgia The understanding on potential policy options	No / limited impact	No / limited impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
is improved so that new actions can be identified for the 2023-2024 Climate Action Plan.			
GHG-8: Develop a strategy for education and awareness raising (including on the use of synthetic fertilizers) The understanding on potential policy options is improved so that new actions can be identified for the 2023-2024 Climate Action Plan.	Positive impact	No / limited impact	Positive impact
Objective 1.3: Increase carbon sequestration by 10% in land use, land use change and forestry (LULUCF).			
GHG-9: Restoration of degraded forest area (including fire-sites) through forestation Restoration of 625 ha of degraded forest area (including fire-sites) through forestation	No / limited impact	Potential negative impact	Positive impact
GHG-10: Restoration of the degraded forest through supporting natural restoration Restoration of 2,411 ha of the degraded forest through supporting the natural restoration	No / limited impact	Potential negative impact	Positive impact
GHG-11: Introduction of sustainable forest management practice through the implementation of sustainable forest management plans Introduction of sustainable forest management practice on 402,109 ha of forest area through the implementation of the sustainable forest management plan, developed and approved for 11 municipalities. It includes the support of measures like the development of necessary infrastructure/ maintenance/ cutting/ forest restoration/sanitary cutting etc.	No / limited impact	Potential negative impact	Positive impact
GHG-12: Introduction of sustainable forest management practice through supervision and capacity development. Introduction and implementation of sustainable forest management practice and carrying out the supervision on 270,807 ha of forest territory by supplying sustainably harvested and produced firewood, strengthening the legal framework, managing knowledge and development capacities, supporting the enhancement of measurement, reporting and validation (MRV) systems.	No / limited impact	No / limited impact	Positive impact
GHG-13: Sustainable management and protection of the forest fund territories within the emerald network sites. Sustainable management and protection of the 643,100 ha of special areas of conservation (SAC) forest funds within the adopted and	No / limited impact	No / limited impact	Positive impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
nominated Emerald Network sites (590,103 ha adopted; 52,997 ha nominated)			
GHG-14: Protection and/or sustainable management of forests within the expanded protected territories. Protection and/or sustainable management of 162,895 het forest areas in new protected areas: - Racha National Park - 16 684 ha - Kvereti Protected Area – 14 711 ha - Tana Protected Area – 10 929 - -Tana and Tedzami Protected Landscape – 10 217 ha - Machakhela Protected Landscape – 3 326 ha	No / limited impact	No / limited impact	Positive impact
GHG-15: Strengthening and support of inter-sectoral coordination related to forest matters Enhancement and support of inter-sectoral coordination related to the forest matters	No / limited impact	No / limited impact	No / limited impact
GHG-16: Promoting sustainable management of forests by supporting the multifunctionality of forests, raising public awareness and supporting public involvement in the forest reform processes. Promoting sustainable management of forests, by supporting the multifunctional use of forests, raising public awareness, and supporting public involvement in the forest reform processes	No / limited impact	No / limited impact	No / limited impact
Objective 1.4: Promoting low-carbon development of the waste sector by promoting climate-smart and energy-efficient technologies and services.			
GHG-17: Closing official (unauthorized) non-hazardous landfills	No / limited impact	Potential negative impact	No / limited impact
GHG-18: Closing dumpsites	No / limited impact	Potential negative impact	No / limited impact
GHG-19: Construction of regional non-hazardous landfills.	No / limited impact	Potential negative impact	Positive impact
GHG-20: Upgrade and improvement of Tbilisi's landfill. Installing a methane capture and recovery system in Tbilisi's landfill	No / limited impact	No / limited impact	Positive impact
GHG-21: Collection and use of methane in Kutaisi's non-hazardous waste landfill	No / limited impact	No / limited impact	Positive impact
GHG-22: Collection and use of methane in Rustavi's non-hazardous waste landfill	No / limited impact	No / limited impact	Positive impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
GHG-23: Collection and use of methane in Batumi's non-hazardous waste landfill. Installing a gas capture and recovery system in Batumi's landfill (conditional measure)	No / limited impact	No / limited impact	Positive impact
GHG-24: Introduction of source separation practices by municipalities and encouragement of paper waste recycling.	No / limited impact	No / limited impact	Positive impact
GHG-25: Biodegradable (organic and garden waste) recycling. Organic and garden waste composting	No / limited impact	No / limited impact	Positive impact
GHG-26: Construction of municipal wastewater treatment plants. Construction of 7 municipal wastewater treatment plants	No / limited impact	Potential negative impact	Positive impact
GHG-27: Methane capture and recovery in Tbilisi's wastewater treatment plant.	No / limited impact	No / limited impact	Positive impact
GHG-28: Methane capture and recovery in Batumi's wastewater treatment plant.	No / limited impact	No / limited impact	Positive impact
GHG-29: Methane capture and recovery in Kobuleti's wastewater treatment plants	No / limited impact	No / limited impact	Positive impact
GHG-30: Education and awareness raising on organic waste management Develop an awareness-raising strategy and campaign for local governments, entrepreneurs, and farmers to increase chance of composting	No / limited impact	No / limited impact	No / limited impact
GHG-31: Establish a consolidated process for collecting and updating data for the waste sector Establishment of a clear list of indicators to be monitored as well as a methodology to obtain the data.	No / limited impact	No / limited impact	No / limited impact
Objective 1.5: Increase the share of final energy consumption from renewable energy sources (target of 27,4 %% by 2030)			
RE-1: Ongoing technical and procedural support for wind power production Until 2024 it includes plans to install 354 MW of wind power. Additional support and installation are expected through at least 2030 - 730 MW; 2050 – 1573 MW	No / limited impact	Positive impact	Positive impact
RE-2: Ongoing technical and procedural support for solar power production Until 2024 it includes installation of 117 MW of solar power. Additional support and installation are expected through at least 2030: 2030 - – 560 MW; 2050 - 1383 MW	No / limited impact	Positive impact	Positive impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
RE-3: Ongoing technical and procedural support for hydro power production Until 2023 it includes the installation of 326.79 MW of hydropower (though there may be some delays of plants above 13 MW). Additional support and installation are expected through at least Regulating Hydros: 2030 – 430 MW 2050 – 1 GW Run-of-river hydros 2030 - 237 MW 2050 - 230 MW Total additional capacity of 5,510 MW in 2050	No / limited impact	Positive impact	Positive impact
RE-4: Support for micro-generation from renewable sources Through various support mechanisms (simplified administrative procedures, green tariff, etc.), the expected capacity will be 200 MW by 2030 and 400 MW by 2050.	Positive impact	Positive impact	Positive impact
RE-5: Ongoing support for geothermal heat production Continued support for expansion of the use of existing geothermal production – including feasibility studies (cost-benefit analyses, resource assessments) and investments.	No / limited impact	No / limited impact	Positive impact
RE-6: Biofuel production and sales Gradual increase of sales and consumption of B7, a 7% biodiesel – 93% diesel mixture	Potential negative impact	Positive impact	No / limited impact
RE-7: Encourage uptake of solar water heating systems Implementation of financial incentives and informational campaigns for solar water heater systems in buildings.	Positive impact	Positive impact	Positive impact
RE-8: Facilitate alternate energy utilisation in cement production Introduce policies or regulation to facilitate and increase the use of waste as fuel in cement production.	No / limited impact	No / limited impact	No / limited impact
RE-9: Improved management of solid biomass resources Implementation of the new Forest Code, inventory of forests, and support for the use of residues.	Potential negative impact	Positive impact	Positive impact
Objective 2.1: Achieve primary energy consumption savings in the buildings sector			
EE-1: Development of building energy performance certification scheme / minimum	Positive impact	Positive impact	Positive impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
performance standards Draft and approve the methodology for certification of buildings and relevant subordinate normative act as well as ensure the implementation thereof.			
EE-2: Energy efficient procurement Legal measure to ensure that public procurement takes into account energy consumption	No / limited impact	Positive impact	No / limited impact
EE-3: Energy efficiency retrofit in schools and other central-government owned buildings Improvement of all exterior enclosure of school buildings, installation of energy efficient bulbs, retrofit/replacement of solid fuel heaters. Investments will represent at least 1% annually of central government owned / operated building area	No / limited impact	Positive impact	Positive impact
EE-4: Establish energy efficiency information systems for public buildings Compile information on buildings characteristics and energy consumption for national and municipal public sector buildings.	No / limited impact	Positive impact	No / limited impact
EE-5: Development of qualification, accreditation, and certification schemes for independent energy sector experts Development of the certification system for energy service providers, energy auditors, energy managers and assemblers, working on the installation of energy appliances in buildings sector.	No / limited impact	No / limited impact	Positive impact
EE-6: Implementation of energy efficiency awareness raising programmes for the public Informing the public about financially effective and easily achievable changes in the energy consumption process and/or dissemination of information about energy-efficient measures.	No / limited impact	Potential negative impact	No / limited impact
EE-7: Training and education, including energy advisory programmes Facilitate business environment for energy efficiency investments by training project developers and local financial institutions on key aspects of EE project finance.	No / limited impact	Potential negative impact	No / limited impact
EE-8: Development of standards, norms, and labelling schemes for appliances Providing more information to customers when buying or replacing home appliances, eliminating non-ecodesign compliant products to increase the market share of energy-efficient appliances.	Positive impact	No / limited impact	No / limited impact
EE-9: Installation of energy efficient lighting	Positive impact	Positive impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
Introduction of regulations for incandescent bulbs and implementation of information and awareness campaigns and support mechanisms with the target of 100% replacement of incandescent and halogen light bulbs with energy-efficient bulbs in residential, commercial, and public buildings by 2022.			
Objective 2.2: Achieve primary energy consumption savings in the industry sector			
EE-10: Incentivising / mandating energy efficiency in industry Developing energy savings agreements with (a) Large industrial companies and (b) Important industrial sectors which are energy-intense	Positive impact	Potential negative impact	Positive impact
EE-11: Substitute wet method with dry method for cement production Switch cement production method to the dry method (reducing energy use)	No / limited impact	No / limited impact	No / limited impact
EE-12: Energy audits and management systems, boiler inspections in the industry sector Requirement of energy audits or EnMS in non-SMEs with support for SMEs	Positive impact	No / limited impact	Positive impact
Objective 2.3: Achieve primary energy consumption savings in the transport sector			
EE-13: Increase in taxes for transport fuels Decreasing activity of gasoline and diesel-driven cars, with a proportion of drivers making the shift to using public transport systems as a primary mode.	Potential negative impact	Positive impact	No / limited impact
EE-14: Tax incentives for electric and hybrid vehicles Increasing market penetration of hybrid and electric vehicles (and improving EV infrastructure), and gradual replacing of existing fleet.	Positive impact	Potential negative impact	No / limited impact
EE-15: Design and implement regulations for vehicle roadworthiness Removal of least efficient vehicles from the vehicle stock and upgrade of fleet, improving average fleet efficiency and air quality.	Positive impact	Positive impact	Positive impact
EE-16: Consideration of the possibility of increasing the import tax on old passenger vehicles Decreasing imports of old, inefficient vehicles, with greater market penetration for new models as well as hybrids and electric vehicles.	Potential negative impact	Positive impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
EE-17: Improved public transportation and shifts to sustainable transportation modes To shift modal share from private vehicle-use to public transport through improving the public transport infrastructure.	Positive impact	Potential negative impact	No / limited impact
EE-18: Measures included in Tbilisi's 'Green Transport Policy' Action Plan Expanded capacity and ridership of the metro; expanding capacity for non-motorised transport; improved efficiency of bus routes; reduced private car activity in central districts; expanded capacity and ridership of bus fleet; implementation of a parking system.	Positive impact	Potential negative impact	No / limited impact
EE-19: Measures listed in Batumi's Sustainable Urban Mobility Plan (SUMP) Improved efficiency of bus routes; reduced private car activity in central districts; expanded capacity and ridership of bus fleet; expanded capacity for non-motorised transport.	Positive impact	Potential negative impact	No / limited impact
EE-20: Emission quality standards on the import and production of vehicles (EUR4 / EUR5) Large emission intensity improvements to new car stocks and a gradual replacement of the existing fleet with more efficient models.	Potential negative impact	No / limited impact	No / limited impact
Objective 2.4: Achieve primary energy consumption savings in gas and electricity infrastructure			
EE-21: Improvement of average efficiency of thermal electricity plants Improvement of average efficiency of thermal electricity plants. The efficiency of thermal generation reaches 44% by 2018 (actual value), 45% by 2022, 49% by 2028, and 50% by 2030.	No / limited impact	No / limited impact	No / limited impact
EE-22: Reduction of losses in electricity transmission networks and grid integration of new generation Energy savings through measures to develop Georgia's transmission networks to accommodate for larger energy production and consumption	No / limited impact	No / limited impact	No / limited impact
EE-23: Regulations on the rules of calculation of normative electricity losses - stimulating investments Tariff methodology that provides incentives for distribution companies to make investments into their network and to optimize operational costs	No / limited impact	No / limited impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
EE-24: Regulations on the rules of calculation of normative natural gas network losses - stimulating investments Development and implementation of a tariff methodology that provides incentives for natural gas distribution companies to make investments into their network to reduce losses.	No / limited impact	No / limited impact	No / limited impact
EE-25: Utilisation of smart meters Development of regulatory mechanisms and investment support programme to encourage the use of smart meters amongst final consumers of electricity.	Positive impact	No / limited impact	No / limited impact
Electricity Sector			
Objective 3.3: Increasing the diversification of energy sources, suppliers, and supply routes in electricity sector			
Diversification of power plants according to the types of primary energy-generating product used (including wind, solar, coal etc.), to avoid major disruptions in electricity generation during periods of unavailability of primary energy-generating products and reduce dependence on imported energy. By 2030, in order to meet the future demand for electricity, the Ministry of Economy and Sustainable Development considers it necessary to implement 667 MW of hydropower plants, 730 MW of wind power plants, 560 MW of solar power plants and 2 new combined cycle thermal power plant projects with a total installed capacity of 500 MW. However, these numbers do not limit the technical feasibility of including more renewable energy sources in the system.	See RE measures in Chapter 3.1 and EE measures in Chapter 3.2		
ES-1: Construction of new power interconnectors with neighbouring countries To enhance the diversification and reliability of cross-border transmission capacity the following projects are planned until 2030: - Ksani-Stepantsminda-Mozdok and Stepantsminda substation (500 kV OHL, connection with Russia);· - Akhaltsikhe-Tortum and addition of a back-to-back station in Akhaltsikhe (400 kV OHL, connection with Turkiye)· - Batumi-Muratli and construction of a constant power conversion station in Batumi (154 kV OHL, connection with Turkiye);· - Marneuli-Ayrum (500 kV OHL, connection with Armenia).·	No / limited impact	No / limited impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
- Gardabani-Agstafa construction of second circuit of 330 kV OHL· - Georgia-Russia-Azerbaijan power system connection project (feasibility study)			
Objective 3.4 Reducing energy import dependency in electricity sector			
Implementation of energy efficiency measures to reduce electricity demand/consumption, and import	See Energy Efficiency sub-chapter (3.2)		
By 2025 the Ministry plans to construct two new gas-fired combined cycle TPPs with total installed capacity of 500 MW and to close existing inefficient TPPs. This will save at least 76 mcm of imported gas annually. 310 mcm of imported gas will be saved during 2026-2030 as a result of commissioning of the new TPPs. It also effectively guarantees base power to the country and positively impacts the system's reliability	See Energy Efficiency sub-chapter (3.2)		
Objective 3.1 Deploying domestic energy sources			
Creating a favorable investment climate for investments renewable and clean energy technologies	See Decarbonization sub-chapter (3.1)		
ES-2: Rehabilitation and upgrade of existing energy infrastructure and increase their capacity The rehabilitation of the largest Enguri HPP during mid-January to mid-April of 2021. After rehabilitation, the HPP will generate an additional 100-120 mln kWh of electricity annually. To increase the reliability of internal networks the following projects are planned until 2030: - Jvari-Tskaltubo-Akhaltsikhe (standby line for 500 kV OHL "Imereti") - Jvari-Khorga, Batumi-Akhaltsikhe and "kolkhida 1" OHL rehabilitation (enhancement of 220 kV network in the West Georgia) - Reinforcement of Kakheti Infrastructure project - Reactive power source (condenser batteries) in 220 kV substations of Eastern Georgia - Tbilisi Region Security Secure Electricity Supply Project - - - Rehabilitation of the existing 500 kV OHL "Imereti"	No / limited impact	No / limited impact	Positive impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
To integrate renewable energy sources and meet the increased demand, the following projects are planned until 2030: - Svaneti - N–Racha-NamakhvaniGuria and Kakheti (integration of hydro power plants from these regions into the network)			
Objective 3.8 Demand response			
ES-3: Upgrading smart management tools – SCADA/ WAMS Full upgrade of SCADA system of GSE, for data capacity and increased reliability of TSO operation. Extension of WAMS (Wide-area monitoring system) – to harmonize the functionality of technological process and system automatics of generation facilities to grid code requirements. Use of WAMS will make possible the uninterrupted monitoring of functionality of regulators both in normal and emergency state of Georgian power system.	No / limited impact	No / limited impact	Positive impact
ES-4: Development of smart technologies (metering) for demand side management CBA for smart metering has a positive result. Development of a 10-year smart metering strategy has been prepared by GNERC based on the CBA. GNERC has chosen an implementation strategy (Scenario 3: Smooth and Slow) from the cost-benefit analysis which has the least influence on tariffs. The chosen scenario considers that after 10 years from the decision made by the state 80% of users should have smart metering. The target for 2030 is a 60% roll-out of smart meters.	Positive impact	No / limited impact	No / limited impact
Objective 2.5 Energy Storage			
Construction of regulating HPPs with water reservoirs			
ES-5: Construction of pumped-storage power plant To increase power system flexibility and reliability and to facilitate integration of intermittent renewable energy sources in the network hydro-pumped storage (600 MW installed capacity) and power batteries are considering in the TYNDP of Georgia for 2021-2031. Development of these infrastructure are on a study level financed by EIB.	No / limited impact	No / limited impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
ES-6: Develop hydrogen technologies as a storage A study on hydrogen technologies for the region will be conducted with the assistance of EBRD. Hydrogen is also considered in EIB research.	No / limited impact	No / limited impact	No / limited impact
Natural Gas Sector			
Objective 3.5 Increasing the diversification of energy sources, suppliers, and supply routes in gas sector			
ES-7: Diversify gas supply routes, swaps Within the framework of a Project of Mutual Interest (PMI) the South Caucasus Pipeline (SCP) Georgian Offtake Expansion for EU LNG Swap is considered. The swap of regasified LNG landing at a terminal in Turkiye, Greece or Italy with piped gas delivered to Georgia through its offtake of the SCP could provide Georgia with indirect access to LNG. The option does not require development of new infrastructures. In addition, the possibility of transforming natural gas received from diversified sources into different products [e.g.: liquefied gas (LNG), compressed gas (CNG), and liquefied petroleum gas (LPG)] and delivering such products to the mountainous regions that are not covered by the main gas pipeline system, is being discussed. These products can also be effectively used as fuel for motor and maritime transport and towing. Replacing of diesel-powered engines with LNG (CNG) engines will significantly reduce both operating costs and adverse environmental impacts.	No / limited impact	No / limited impact	No / limited impact
ES-8: Developing LNG infrastructure facility Longer term options include: - Development of an LNG receiving terminal in Georgia is pending on opening of black sea access to international shipment of LNG through the straights. Dialogue will be maintained on this option with Turkiye and other interested Black Sea littoral states; - Liquefaction and export terminal in Georgia, receiving gas from Azerbaijan and potentially Central Asia, and export to Eastern Europe, particularly Ukraine and Moldova. Is pending on availability of gas from Central Asia and Ukraine's decision to develop a regasification facility.	No / limited impact	No / limited impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
- The development of Small Scale (SS) Liquefaction Facility for internal use of LNG as a truck fuel or for seasonal consumption peak shaving.			
Objective 3.6 - Reducing energy import dependency in the natural gas sector			
Implementation of energy efficiency measures to reduce gas demand/ consumption, and import	No / limited impact	No / limited impact	No / limited impact
Objective 3.1 - Deploying domestic energy sources			
ES-9: Exploring and developing potential of hydrocarbon deposits To mitigate dependence on imports to some extent and increase the country's energy security, more emphasis will be placed on increasing the exploration and extraction of local gas supplies. Even if 5% of the country's proven natural gas reserves are extracted annually, gas production could amount to about 200 million m^3, which increase the current share of local gas in the country's total consumption (about 0.3% in the current period) up to 7.5-8%.	No / limited impact	Positive impact	Positive impact
Objective 3.8 Demand response			
ES-10: Development of SCADA system It is planned to equip gas pipelines with the modern Supervisory Control and Data Acquisition (SCADA). Considering the peculiarities of operation of the Georgian gas pipelines at the current stage, the system design and installation is planned for 2022	No / limited impact	No / limited impact	No / limited impact
Objective 2.5 Energy storage			
ES-11: Developing gas storage, maintaining sufficient stocks determined according to the law on energy and water supply It is planned to build an underground gas storage facility (with 500 mcm of total volume) at Samgori South Arch (Dome). It is expected that the gas storage facility will be ready to receive gas by 2024, when supply of significantly increased volumes of gas from the second phase of Shah-Deniz gas field operation begins. However, the construction has been postponed by several years due to financial	No / limited impact	No / limited impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
problems caused by the COVID-19 epidemic. The technical parameters of the gas storage facility are set by European Energy Community Regulation # 994/2010 (on Security Measures of Gas Supply).			
Oil Sector			
Objective 3.7 Increasing the diversification of energy sources, suppliers, and supply routes in the oil sector			
Promoting electric and natural gas-fuelled transport	See Energy Efficiency sub-chapter (3-2)		
ES-12: Develop oil refineries in Georgia To determine the feasibility of new oil-refining capacity, Georgia plans to attract potential investors to Black Sea and/or the other free industrial zones based on advantageous start offer.	No / limited impact	No / limited impact	No / limited impact
ES-13: Exploring and developing potential of hydrocarbon deposits The results of recent exploration activities in different regions of the country (2D and 3D dimensional seismic exploration, single drill holes) strongly indicate at the high probability of opening new hydrocarbon deposits in the country. The total volume of prospective oil resources estimated on the promising onshore and Black Sea offshore exploration areas are about 909.2 million tonnes (best estimate). Particularly promising is the shelf part of Georgia's Black Sea. Several large sites (Gudauta, Ochamchire, Kulevi) have been studied in the north during the Soviet times by seismic exploration; in the south, in the shelf zone of Adjara and Guria, in the first half of 2000s American company “Anadarko” studied highly prospective large anticlines (Iberia, Colchis, Lazika, Egris), however, drilling on the Georgian shelf has not been carried out so far. The Energy Strategy 2020-2030 considers the feasibility of intensive and costly work to increase local oil and gas production.	No / limited impact	Positive impact	Positive impact
ES-14: Creating and holding compulsory (state and private) strategic stocks of petroleum products The draft Law on Maintaining Mandatory Stocks of Crude Oil and Oil Products establishes rules for the creation, management, and use of mandatory reserves to ensure continuous supply of petroleum products. The required volume of supplies is calculated for at least 90 days of average daily imports 90 days or 61 days of consumption – whichever is higher. Importers will be	No / limited impact	No / limited impact	No / limited impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
responsible for maintaining the supplies and controlled by the Georgian Oil and Gas Agency.			
Coal Sector			
Objective 3.2 Deploying domestic energy sources			
ES-15: Exploring and developing potential of coal deposits The total economic potential of Georgia's coal deposits can be estimated at about 200 million tons, including about 180 million tons of sub-bituminous coal and about 20 million tons of brown coal. The prospects for rehabilitation and intensive development of the local coal industry are related to its use in the power generation sector. Georgian local coal will be used solely for the purposes of reducing the energy security risks and addressing social and economic problems of local communities.	No / limited impact	No / limited impact	Positive impact
Objective 4.1: Reduce the percentage of the population in situations characterised by energy poverty (Target: reduction from an estimated 43% in 2017 to less than 15% in 2030)			
EP-1: Ongoing social assistance programmes Ongoing assistance programmes to poorer households and those in mountainous regions	Positive impact	Potential negative impact	Positive impact
Priority 1: Develop strong national Research, Development, and Innovation (RDI) system to support clean energy transition			
Objective 5.1.1: Increase public spending on R&I			
RIC -1: Increase public spending on R&I to 1% of GDP and public spending on sustainable energy and climate change R&I to 0.1% of GDP by 2030.	No / limited impact	Potential negative impact	Positive impact
RIC -2: Define thematic priorities for national RDI and define Energy RDI as one of the priorities	No / limited impact	No / limited impact	No / limited impact
Objective 5.1.2: Capacity building for stimulating R&I			
RIC -3: Support the development and improvement of sustainable energy educational programs	No / limited impact	No / limited impact	No / limited impact
RIC -4: Provide national scholarships for Georgian students pursuing their education in the leading universities abroad in the field of sustainable development	No / limited impact	No / limited impact	No / limited impact
Objective 5.1.3: Support and strengthen RDI related to sustainable energy.			
RIC -5: Funding national research and development projects aligned with the National Energy Policy priorities	No / limited impact	Potential negative impact	Positive impact

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
- Research the solutions for resource efficiency in energy production and consumption - Support innovative and research projects to support sustainable utilization of domestic renewable energy - Support the research of potential for green hydrogen in Georgia - Research on climate change and its impact on energy system - Research related to integration of variable renewable energy sources into the system and the capacities of energy storage (including hydro-accumulating power stations, batteries, etc.) - Social Studies and Humanities (SSH) in energy, policy research and energy security risk analysis - Research smart systems and ICT/AI solutions for optimization of energy sector (e.g. forecasting, long-term energy planning, power expansion planning, etc.)			
RIC -6: Develop the monitoring indicators for energy R & DI related to country's security and development priorities.	No / limited impact	No / limited impact	No / limited impact
Objective 5. 1.4: Promote innovation in business and stimulate private investments in R&I			
RIC -7: Promote certification of new products and technologies through Sustainable Business award	No / limited impact	No / limited impact	No / limited impact
RIC -8: Support Research2Business fellowship program for knowledge and technology transfer from science to private sector (industry) with focus on low carbon technologies	No / limited impact	No / limited impact	No / limited impact
RIC -9: Create B2B type platform to connect PhD and experienced researchers to businesses and business research and innovation needs	No / limited impact	No / limited impact	No / limited impact
Priority 2: Strengthen international cooperation in RDI			
Objective 5.2.2: Improve Georgian researchers and research organizations participation rate in EU framework program "Horizon Europe" and their integration in EU research community			
RIC -10: Nominate NCP or NCPs for Cluster 5 of Horizon Europe program	No / limited impact	No / limited impact	No / limited impact
RIC -11: Ensure proper representation of energy and climate change issues in Georgia's Horizon Europe work programme committee delegation	No / limited impact	No / limited impact	No / limited impact
Objective 5.2.1: Support Georgian researchers and research organizations participation in			

Activity/measure and description	Disposable household incomes	Public Budgets	Employment
large international RDI programs (e.g. COST, NATO SPS, other)			
RIC -12: Conduct regular info days to increase awareness in energy and climate change RDI	No / limited impact	No / limited impact	No / limited impact
RIC -13: Work on bilateral and multilateral initiatives - cooperation with international organizations	No / limited impact	No / limited impact	No / limited impact

5.3 Overview of investment needs

i.	**Existing investment flows and forward investment assumptions with regard to the planned policies and measures**
ii.	**Sector or market risk factors or barriers in the national or regional context**
iii.	**Analysis of additional public finance support or resources to fill identified gaps identified under point ii.**

The most significant current investment flows related to the NECP are related to the following key areas:

- Renewable energy (including hydropower, wind, and solar energy) and efficient thermal energy investments
- Efficient automobiles (especially hybrid vehicles) which are influenced by tax policies and other regulatory instruments to improve the vehicle fleet
- Improvements of the energy / electricity system including connection of renewable energy producers and inter-connections with other countries

Additional significant investments can be foreseen in energy efficiency in buildings, in industry, in improving public transport, in improving waste management systems, and in improving forest management systems.

These key elements combined form the basis of the climate and energy efficiency dimensions of the NECP.

Additionally, a number of potential investments are being developed with regards to energy security which are detailed in Annex I and Annex II.

The table 5-3 below outlines the investment needs identified for the period through 2030 – though not all investments are fully budgeted. Additionally, it is noteworthy that diffuse investments are not included in these calculations – this includes for example investments in new lighting or heating equipment by households, investment in new efficient vehicles, etc.

It is noteworthy that the largest portion of investments to be mobilized have to do with renewable energy and energy security. However, it can also be expected that more diffuse investments in energy efficiency will also be large (but as noted, this is not accounted for).

The budget allocations from the central government are estimated to be 741 million GEL over the 9 year period of 2022 through 2030 – with a particular focus on energy efficiency. Much of this investment relates to:

- Waste and wastewater management investments (landfills, wastewater treatment plants)

- Tax incentives for hybrid / electric vehicles
- Energy efficiency investments in public buildings (schools in particular) – which will then yield financial savings
- Incentives to industry for carrying out energy efficiency measures; and
- Support for the development of the electricity (particularly transmission) and natural gas infrastructure.

For energy security, the investments are also quite large in the private sector – wherein it is assumed that most large investments will be carried out through agreements with private sector actors or state-owned companies – and not financed through the state budget.

Detailed information is included in Annex II on the expected amounts and types of financing required for specific measures.

Table 5-3: Financing required for the NECP through 2030.

Sector	Central budget financing required through 2030 (Million GEL)	Private sector / other financing required through 2030 (Million GEL)
AFOLU and other sectors	9.00	35.86
Waste management	83.51	170.26
Renewable Energy	0.16	18,413.44
Energy Efficiency	459.17	3,237.56
Energy Security	-	5,764.51
Energy Poverty	189.00	-
Research, Development, and Innovation	To be defined	To be defined
Total	**740.85**	**27,621.62**

5.4 Impacts of planned policies and measures described in Section 3 on other Member States and regional cooperation at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures

i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible.

Due to its geographical location, Georgian transmission power and gas network may be used for energy transit between 1) Russia and Armenia/Iran, 2) Azerbaijan and Turkiye, 3) Russia and Turkiye, and 4) Armenia/Iran and Turkiye.

The goal of GSE is development of stable, reliable, cost-effective and efficient transmission system ensuring at any development stage, sufficient transfer capacity for fulfilling increased consumption, integration of renewable energy sources into the network and power exchange with neighbouring countries.

The existing cross-border links serve for power exchange between Georgia and Russia and transit from Russia and Azerbaijan to Turkiye, as well as for bidirectional power exchange between Georgia and Turkiye, Azerbaijan and Armenia. However, such power flows are restricted due to both limitations

stemmed from the acceptable operating modes of national power system and physical capacities of above cross-border OHLs.

For 2025-2030 horizon, Georgia, due to its geographical location, will gain an important role in the planned regional integration of the power systems of the Caucasian (and Black Sea) countries assuming promotion of energy trading between these countries and development and use of Georgian hydropower resources.

For 2025-2030, cross-border links between Georgian and its neighbouring power systems will significantly advance, allowing 1050MW power exchange with Turkiye, 1600 MW with Russia and 700 MW with Armenia. There is already possibility of 700-1000 MW power exchange between powers systems of Georgia and Azerbaijan.

The transit corridor located in the territory of Georgia is one of the most attractive routes to deliver hydrocarbons of the Azerbaijan and Central Asia to international markets. This corridor is used to transmit oil, petroleum and gas through pipelines, railway and Georgian seaports. Development of gas storage in Georgia will have positive impact on reliability and security of gas supply with neighbouring states as well.

ii. Impacts on energy prices, utilities, and energy market integration

Development of energy security measures will have positive effect on regional market integration, reliability of energy infrastructure and ensure competitive price for end-users.

Detailed analysis of the impact on energy prices and utilities was not carried out in preparation of this NECP. It can, however, be concluded that investments in energy efficiency and renewable energy – as well as security of supply - will be drivers for market stabilisation. In particular, renewable energy prices for solar and wind have a downward trend. Combined with hydroelectrical generation and efficient thermal generation to ensure adequate supply, this should lead to stable and affordable prices for consumers.

iii. Where relevant, impacts on regional cooperation

6 List of parameters and variables[170] [171] [172] [173]

6.1 General parameters and variables

6.1.1 Population 2005-2050 [million]

	Unit	2005	2010	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Population	million	3.920	3.800	3.720	3.728	3.728	3.727	3.720	3.727	3.728	3.728	3.729	3.730	3.731	3.731

*Source: GEOStat [2005-2020] (*https://www.geostat.ge/en/modules/categories/41/population*), , then calculated using growth rate [2020-2050]*

6.1.2 Gross Domestic Product (GDP) 2015 -2050 [euro million]

	Unit	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
GDP	million EUR	13,464	13,343	12,927	12,832	12,772	10,579	12,921	16,417	20,354	25,260	31,431	37,485
GDP (growth)	percent	3.0	2.9	4.8	4.8	5.0	-6.8	5.76	4.91	4.39	4.41	4.47	3.59

*Source: GEOstat - Constant prices 2015 [2010-2019] (million GEL to million EUR using yearly variable currency exchange) (*https://www.geostat.ge/en/modules/categories/23/gross-domestic-product-gdp*)*

6.1.3 Sectoral gross value added (including main industrial, construction, services, and agriculture sectors 2010-2020 [million EUR]

	Unit	2010	2015	2016	2017	2018	2019	2020
Agriculture	million EUR (2015)	966	1,052	985	840	906	864	829
Commercial	million EUR (2015)	1,710	1,637	1,585	1,528	1,527	1,568	1,327
Industry & energy	million EUR (2015)	1,402	1,665	1,675	1,603	1,570	1,544	1,287
Transport	million EUR (2015)	619	734	659	680	673	691	473

Source: GEOstat (million GEL to million EUR using constant currency exchange).

6.1.4 Number of households 2016-2050 [thousands]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050

170 For the plan covering the period from 2021 to 2030: For each parameter / variable in the list, trends over the years 2005 – 2040 (2005 – 2050 where appropriate) including for the year 2030 in five-year intervals shall be reported both in Section 4 and 5. Parameter based on exogenous assumptions v modelling outputs shall be indicated.

171 For As far as possible, reported data and projections shall build on and be consistent with Eurostat data and methodology used for reporting European statistics in the relevant sectoral law, as European statistics are the primary source of statistical data used for reporting and monitoring, in accordance with Regulation (EC) No 223/2009 on European Statistics

172 Note: all projections are to be performed on the basis of constant prices (2016 prices used as base year)

173 The Commission will provide recommendations for key parameters for projections, at least covering oil, gas, and coal import prices as well as EU ETS carbon prices.

Number of households	1000 hh	1,035	1,046	1,056	1,058	1,064	1,086	1,109	1,131	1,155	1,178	1,203

*Source: GEOStat population [2005-2019] (*https://www.geostat.ge/en/modules/categories/41/population*), NECP [2020-2050]*

6.1.5 Household size 2016-2050 [inhabitants/households]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Household size	inhabitants / households	3.60	3.57	3.53	3.52	3.50	3.43	3.36	3.30	3.23	3.17	3.10

Source: NECP [2020-2050]

6.1.6 Disposable income of households 2005-2050[euro]

	Unit	2005	2010	2015	2016	2017	2018	2019
Annual average income of households	EUR	1,428	2,710	4,346	4,496	4,547	4,786	5,064

Source: GEOStat [2005-2019] (https://www.geostat.ge/en/modules/categories/50/households-income)(GEL to EUR using constant 2015 currency exchange).

6.1.7 Number of passenger-kilometres: all modes, i.e. split between road (cars and buses separated if possible), rail, aviation, and domestic navigation (when relevant) 2005-2020 [million pkm]

	Unit	2005	2010	2015	2016	2017	2018	2019	2020
Road	million pkm	5,388	5,885	6,756	6,945	7,140	7,340	7,545	5,856
Rail	million pkm	720	654	465	545	593	634	676,6	247
Aviation	million pkm	511	369	549	518	712	1,169	1,278	257
Domestic navigation	million pkm	-	6	1	1	1	1	1	-
Underground	million pkm	676	505	658	675	729	805	881	446

***Source**: GEOstat (*https://bit.ly/3UWLhG7)

6.1.8 Freight transport tonnes-kilometres: all modes excluding international maritime, i.e. split between road, rail, aviation, domestic navigation (inland waterways and national maritime) 2005-2020 [million tkm]

	Unit	2005	2010	2015	2016	2017	2018	2019	2020
Road	million tkm	578	620	664	674	683	693	702	712
Rail	million tkm	6,127	6,228	4,261	3,423	2,963	2,598	2,935	2,926
Aviation	million tkm	4	1	41	44	150	229	269	438
Domestic navigation	million tkm	69	-	-	-	-	-	-	-

***Source**: GEOstat (*https://bit.ly/3fZKoOf)

6.1.9 International oil, gas, and coal fuel transport prices [EUR/GJ or euro/toe] based on the Commission's recommendations

Fuel	Unit	2010	2019	2025	2030	2035	2040
Crude oil	(USD2019/GJ)	19.40	13.43	15.14	16.20	17.27	18.12
Natural Gas	(USD2019/GJ)	8.25	6.35	6.35	7.11	7.49	7.87
Coal	(USD2019/GJ)	4.32	2.44	2.64	2.84	2.80	2.76

Source: *IEA WEO2020 energy prices projections*

6.1.10 Eu-ETS carbon price [EUR/EUA] based on the Commission's recommendations 2005-2050

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
EU-ETS	EUR/EUA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

6.1.11 Exchange rates to EUR and to USD (where applicable) assumptions [euro / currency and USD / currency]

	Unit	2005	2010	2015	2016	2017	2018	2019	2020	2025	2030
Exchange rate USD	USD/GEL	1.81	1.78	2.27	2.37	2.51	2.53	2.82	3.03	3.03	3.03
Exchange rate EUR	EUR/GEL	2.26	2.36	2.52	2.62	2.83	2.99	3.15	3.34	3.34	3.34

Source: National Bank of Georgia [2005-2020] Yearly average calculated from monthly average.
(https://nbg.gov.ge/publications/annual-reports)

6.1.12 Number of Heating Degree Days (HDD)

	Climate zone 1 (e.g. City of Batumi)	Climate zone 2 (e.g. City of Tbilisi)	Climate zone 3 (e.g. City of Akhaltsikhe)
Heating Degree Days	**1665.8**	**2309.0**	**3678.3**

a. Number of Cooling Degree Days (CDD). There is no official amount of cooling degree days in Georgia.

7 Energy balances and indicators

7.1 Energy supply

(1) Indigenous Production by fuel type (all energy products that are produced in significant quantities) [TJ]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050

Biofuels	TJ	16,188	15,214	11,336	10,263	10,722	9,448	7,283	7,255	7,722	10,492	11,135
Coal	TJ	4,843	4,474	2,332	64	63	62	64	70	1,190	4,127	7,695
Oil and Products	TJ	1,639	1,687	1,735	1,783	1,832	2,073	2,314	2,555	2,796	3,037	3,278
Renewables	TJ	34,387	34,256	36,872	33,269	36,183	41,420	55,226	62,136	70,236	79,932	90,276

Source Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(2) Net imports by fuel type (including electricity) [TJ]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Coal	TJ	6,071	7,724	10,329	10,035	9,922	10,647	10,749	11,878	13,109	14,399	15,166
Electricity	TJ	4,783	4,121	4,631	5,518	4,610	2,301					
Gas	TJ	81,681	85,807	85,229	96,574	92,123	104,635	113,720	126,488	135,880	144,672	155,905
Oil and Products	TJ	45,571	23,278	23,183	23,588	19,316	23,563	22,276	25,015	28,136	31,487	34,382

Source: IEA [2005, 2010] (https://www.iea.org/data-and-statistics) , Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(3) Import dependency from third countries [%]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Biofuels	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coal	%	55.6	63.3	81.6	99.4	99.4	99.4	99.4	99.4	91.7	77.7	66.3
Gas	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Oil and Products	%	96.5	93.2	93.0	93.0	91.3	91.9	90.6	90.7	91.0	91.2	91.3

Source: IEA [2005, 2010](https://www.iea.org/data-and-statistics) , Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(4) Main import sources (countries) for main energy carriers

Electricity		Unit	2016	2017	2018	2019
Russia	Import from	TWh	369.159	452.217	206.498	524.535
	Export to	TWh	-147.589	-261.923	-96.889	-59.217
Azerbaijan	Import from	TWh	109.777	917.571	1230.092	1101.975
	Export to	TWh	-5.448	-1.722	-23.115	-12.104
Turkiye	Import from	TWh			64.399	

	Export to	TWh	-294.487	-284.516	-386.260	-112.795
Armenia	Import from	TWh		127.397	7.834	0.001
	Export to	TWh	-111.485	-137.542	-82.317	-59.304

Source: Georgia's Electricity Market Operator ESCO https://bit.ly/3EwAJbo

(5) Oil and oil poducts, natural gas, nuclear energy, electricity, received heat, renewable energy, waste) [TJ]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Biofuels	TJ	16,188	15,214	11,336	10,263	10,722	9,721	8,961	10,701	14,146	16,369	16,402
Coal	TJ	10,914	12,256	13,898	12,386	12,307	14,605	16,870	21,018	27,071	33,107	38,071
Electricity	TJ	4,783	4,116	4,627	5,467	4,578	2,638					
Gas	TJ	81,909	88,957	89,641	102,918	102,207	132,538	150,625	166,569	185,916	213,451	236,684
Oil and Products	TJ	47,209	27,896	28,917	29,906	26,339	34,936	39,658	45,729	53,004	61,677	69,784
Renewables	TJ	34,387	34,256	36,872	33,269	34,876	44,097	56,768	63,504	65,575	70,448	76,584

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

7.2 Electricity and heat

(1) Gross electricity generation (GWh)

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Electricity	GWh	11,365	11,322	11,925	11,630	12,668	13,479	16,249	19,241	21,348	23,988	26,756

Source: Energy Balances of Georgia [2015-2019] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(2) Gross electricity generation by fuel (all energy products) [GWh]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Coal-fired	GWh	16	24	11								
Gas-fired	GWh	2,119	2,108	2,009	2,717	2,966	2,384	2,443.67	2,572	2,539	2,618	2,657
Hydro	GWh	9,221	9,103	9,821	8,828	9,218	10,084	10,221.52	11,191	11,975	13,920	16,094
Solar	GWh					6	160	807.09	1,680	2,116	2,175	2,175
Wind	GWh	9	88	84	85	478	850	2,549.10	3,798	4,718	5,274	5,830

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(3) Share of combined heat and power plant generation in total electricity and heat generation [%]

	Unit	2016	2017	2018	2019	2020	2025	2030
CHP	%	0	0	0	0	0	0	0

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(4) Capacity electricity generation by source, including retirements and new investment [MW]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Coal-fired	MW	13	13	13	13	13	13	13	13	13		
Gas-fired	MW	1,081	1,081	1,081	1,081	1,311	1,171	1,171	1,401	961	899	909
Hydro	MW	2,968	3,161	3,253	3,325	3,325	3,559	3,992	3,992	4,284	4,923	5,510
Solar	MW					4	102	547	1,068	1,345	1,383	1,383
Wind	MW	20	20	20	20	126	226	750	1,021	1,273	1,423	1,573

Source: Energy Balances of Georgia [2015-2020] https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(5) Heat generation from thermal power generation [GWh]

	Unit	2016	2017	2018	2019	2020	2025	2030
Heat	GWh	0	0	0	0	0	0	0

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia)

(6) Heat generation from combined heat and power plants, including industrial waste heat [GWh]

	Unit	2016	2017	2018	2019	2020	2025	2030
Heat	GWh	0	0	0	0	0	0	0

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia)

(7) Cross-border interconnection capacities for gas and electricity [Definition for electricity in line with outcome of ongoing discussions on basis for 15% interconnection target] and their projected usage rates [MW]

Electricity		Unit	Summer	Winter
Russia	Export	MW	1,620	1,700
	Import	MW	1,720	1,800
Turkiye	Export	MW	1,050	1,050
	Import	MW	1,050	1,050

Azerbaijan	Export	MW	2,000	2,200
	Import	MW	2,000	2,200
Armenia	Export	MW	800/850	800/850
	Import	MW	800/850	800/850

Source: GSE (https://www.gse.com.ge/sw/static/file/TYNDP_GE-2021-2031_ENG_NEW.pdf)

7.3 Transformation sector

(1) Fuel inputs to thermal power generation (including solids, oil, gas) [TJ]

	Unit	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Oil products	TJ	0	0	0	0	0	0	0	0	0	0	0	0
Natural gas	TJ	22,479	18,072	18,367	17,373	23,988	21,776	16,893	16,710	18,561	17,687	17,726	17,749
Coal	TJ	0	0	0	0	0	0	0	0	0	0	0	0

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(2) Fuel inputs to other conversion processes [TJ]

	Unit	2005	2010	2015	2016	2017	2018	2020	2025	2030
Crude oil (refineries)	TJ	616	2697	1,062	1,007	1,598	1,587	616	2697	1,062
Oil products (refineries)	TJ	0	2210	0	0	0	0	0	2210	0

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

7.4 Energy consumption

(1) Primary and final energy consumption [TJ]

Domestic supply	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Total primary energy	TJ	205,064	208,054	205,868	213,828	201,911	236,157	257,898	280,453	306,970	339,600	370,068
Total final energy consumption	TJ	171,507	173,110	169,956	174,412	172,347	198,892	214,439	232,822	254,381	280,217	304,127

Source: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia) , NECP [2020-2050]

(2) Final energy consumption by sector (including agriculture, commercial, industry, residential, transportation, and other) [TJ]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Agriculture	TJ	1,234	1,294	1,114	1,103	1,097	1,197	1,284	1,420	1,587	1,787	1,976
Commercial	TJ	18,133	18,965	21,555	22,406	22,463	22,243	26,799	31,717	35,106	39,043	42,975
Industry	TJ	28,408	31,814	32,855	30,672	30,598	37,707	48,744	54,384	65,109	78,135	90,714
Residential	TJ	52,986	55,946	51,384	54,455	58,151	62,104	60,414	60,152	60,177	59,193	58,205
Transportation	TJ	63,810	57,886	56,130	58,362	50,851	64,703	64,300	73,533	81,154	89,558	97,074
Other	TJ	6,937	7,207	6,918	7,416	9,187	10,704	8,000	12,220	12,220	12,220	12,220

Source: Energy Balances of Georgia [2015-2018] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]

(3) Final energy consumption by fuel (all energy products) [TJ]

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Electricity	TJ	37,751	40,345	42,934	43,399	45,781	52,759	49776.5	71,162	78,930	88,024	96,008
Natural Gas - Commercial	TJ	23,848	28,147	28,334	36,105	33,255	44,989	59,632	71,239	85,698	107,102	124,541
Natural Gas - Social	TJ	27,337	30,307	30,259	29,360	27,878	36,057	34,351	31,249	25,202	15,001	9,294
Coke Oven coke	TJ	3,701	4,098	4,669	3,886	3,847	4,706	5,533	6,530	7,707	9,111	10,356
Anthracite (Hard Coal)	TJ	79	187	212	245	240	294	346	408	482	570	647
Charcoal	TJ	10										
Diesel	TJ	27,293	27,422	29,119	30,724	34,262	44,798	54,128	63,015	73,663	86,284	98,145
Fuel Oil	TJ	499	942	268	109	89	106	121	136	152	170	184
Gasoline	TJ	26,288	27,343	28,849	30,744	26,647	36,724	42,098	49,010	57,292	67,107	76,332
Geothermal	TJ	642	661	674	684	681	726	726	726	726	726	726
Jet Fuel	TJ	3,095	4,113	4,420	4,372	4,166	4,665	5,149	5,635	6,245	6,974	7,622
Lignite/Brown coke	TJ	4,393	3,840	1,973	64	111	168	216	1,705	4,610	6,946	8,580
LPG	TJ	737	659	825	485	467	372	236	199	130	93	53
Other Bituminous Coal	TJ	2,290	3,498	6,685	8,191	8,109	9,437	10,713	12,313	14,210	16,480	18,488
Other Oil Products	TJ	287	57			340	1,330	2,711	3,894	5,453	7,509	9,828

Other vegetal materials and residual	TJ	225									417	450
Primary Solid Biofuels	TJ	15,953	15,214	11,336	10,263	10,722	9,721	8,961	10,701	14,146	15,953	15,953
Solar	TJ	128	125	125	126	120	206	311	455	635	863	1,113

*Source: Energy Balances of Georgia [2015-2018] (*https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia*), NECP [2020-2050]*

(4) Non-energy consumption [TJ]

	Unit	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Natural Gas	TJ	9,435	7,706	8,655	9,561	10,144	6,388.9	8,278	10,178	19,678	23,909	29,120	34,131

*Source: Energy Balances of Georgia [2015-2020] (*https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia*),, NECP [2020-2050]*

(5) Primary energy intensity of the overall economy (primary energy consumption per GDP [TJ/EUR])

	Unit	2005	2010	2015	2016	2017	2018	2020	2025	2030
Total	TJ/million EUR	397.5	338.2	420.41	345.33	326.69	318.55	396.2	365.4	320.4

*Source: GEOstat - Constant prices 2015 [2010-2019] (million GEL to million EUR using variable yearly currency exchange) (https://www.geostat.ge/en/modules/categories/23/gross-domestic-product-gdp), Energy consumption: Energy Balances of Georgia [2015-2018] (*https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia)

(6) Final energy intensity by sector (including industry, residential, tertiary, and transport (including split between passenger and freight transport, when available)

	Unit	2016	2017	2018	2019	2020
Agriculture	TJ/ million EUR	1.25	1.54	1.23	1.28	1.38
Commercial	TJ/ million EUR	11.44	12.41	14.12	14.29	17.09
Industry & energy	TJ/ million EUR	16.96	19.84	20.93	19.86	22.72

***Source**: GEOstat - Constant prices 2015 [2010-2019] (million GEL to million EUR using variable yearly currency exchange) (https://www.geostat.ge/en/modules/categories/23/gross-domestic-product-gdp), Energy consumption: Energy Balances of Georgia [2015-2018] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia)*

(7) Energy Consumption by Residential and Transport Sectors per capita 2016-2050

	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050

Residential	TJ per capita	0.014	0.015	0.014	0.015	0.016	0.017	0.016	0.016	0.016	0.016	0.016
Transport	TJ per capita	0.017	0.016	0.015	0.016	0.014	0.006	0.005	0.004	0.004	0.003	0.003

***Source**: GEOStat [2005-2020] (https://www.geostat.ge/en/modules/categories/41/population), then calculated using growth rate [2020-2050]Energy consumption: Energy Balances of Georgia [2015-2020] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia)*

7.5 Prices

(1) Electricity prices by type of using sector [EUR/kWh]

Electricity	Unit	Band	2018		2019	
	*includes VAT	(annual consumption)	January- June	July - December	January- June	July - December
Household	EUR/kWh	Band - I (<1,000 kWh annual)	0.059	0.057	0.057	0.048
	EUR/kWh	Band - II (1,000 < X < 2,500 kWh)	0.064	0.067	0.070	0.057
	EUR/kWh	Band - III (2,500 < X < 5,000 kWh)	0.068	0.074	0.079	0.063
	EUR/kWh	Band - IV (5,000 < X < 15,000 kWh)	0.076	0.083	0.073	0.073
	EUR/kWh	Band - V (>15,000 kWh)	0.072	0.082	0.082	0.070
Non-household	EUR/kWh	Band - I (<20 MWh)	0.069	0.084	0.079	0.067
	EUR/kWh	Band - II (20 < X < 500 MWh)	0.064	0.080	0.076	0.063
	EUR/kWh	Band - III (500 < X < 2,000 MWh)	0.058	0.070	0.067	0.057
	EUR/kWh	Band - IV (2,000 < X < 20,000 MWh)	0.053	0.064	0.060	0.051
	EUR/kWh	Band - V (20,000 < X < 70,000 MWh)	0.049	0.060	0.057	0.051
	EUR/kWh	Band - VI (70,000 < X < 150,000 MWh	-	0.057	0.054	-

Source: GEOStat (https://www.geostat.ge/en/modules/categories/88/data-on-consumer-prices-of-electricity-and-natural-gas-january-june-2018)

(2) National retail fuel prices (including taxes, per source and sector) [euro / GJ]

Gas	Unit	Band	2018		2019	
	*includes VAT	(annual consumption)	January-June	July - December	January- June	July - December
Household	EUR/GJ	Band - I (<20 GJ)	4.332	4.360	4.270	4.270
	EUR/GJ	Band - II (20 < X < 200 GJ)	4.180	4.212	4.067	4.102
	EUR/GJ	Band - III (>200 GJ)	4.125	4.217	4.017	4.083
Non-household	EUR/GJ	Band - I (<1,000 GJ)	7.021	7.196	7.013	7.425
	EUR/GJ	Band - II (1,000 < X < 10,000 GJ)	7.035	7.200	7.113	7.441
	EUR/GJ	Band - III (10,000 < X < 100,000 GJ)	6.984	7.292	7.250	7.669
	EUR/GJ	Band - IV (100,000 < X < 1,000,000 GJ)	6.892	7.171	7.267	7.247
	EUR/GJ	Band - V (1,000,000 < X < 4,000,000 GJ)	6.787	7.152	7.215	7.422
	EUR/GJ	Band - VI (>4,000,000 GJ)	-	-	-	-

Source: GEOStat https://www.geostat.ge/en/modules/categories/88/data-on-consumer-prices-of-electricity-and-natural-gas-january-june-2018)

7.6 Investment

Investment costs in energy transformation, supply, transmission, and distribution sectors

7.7 Renewables

(1) Gross final consumption of energy from renewable sources and share of renewable energy in gross final energy consumption and by sector (electricity, heating and cooling, transport) and by technology

Total	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Gross final consumption of energy from renewable sources	TJ	50,574	49,470	48,208	43,531	46,905	50,868	62,509	69,391	77,958	90,425	101,411
Share of renewable energy in gross final energy consumption	%	25.9	28.0	27.4	24.0	26.8	26.2	28.8	29.5	30.1	31.4	31.9

Source: Energy Balances of Georgia [2015-2018] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]. Renewable sources include categories "Hydro, Wind, solar, etc." and "Biofuels and waste".

By sector	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Industry	TJ	0	0	1	1	1	2	0	0	0	0	0

Residential	TJ	253	265	268	269	305	351	331	533	696	903	1,154
Commercial and public services	TJ	479	483	492	498	456	601	774	894	1,032	1,195	1,345
Agriculture, forestry and fishery	TJ	37	38	39	43	87	60	63				
Transport	TJ	0	0	0	0	0	0	0	0	0	0	0
Not elsewhere specified (other)	TJ	0	16.0	0	0	0	0	0	0	0	0	0

Source: Energy Balances of Georgia [2015-2018] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]. Renewable sources include categories "Hydro, Wind, solar, etc." and "Biofuels and waste".

By technology	Unit	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
Biodiesels	TJ						543	1,046	1,822	2,842	4,077	5,502
Biogasoline	TJ						248	458	732	1,003	1,566	2,047
Charcoal	TJ	10										
Geothermal	TJ	642	661	674	684	729	799	834	929	1,018	1,126	1,234
Hydro	TJ	33,585	33,155	35,769	32,154	33,574	36,729	40,763	40,763	43,618	50,703	58,620
Other vegetal materials and residual	TJ	225	178				954	2,659	1,580	757	1,729	466
Primary Solid Biofuels	TJ	15,953	15,036	11,336	10,263	10,722	7,703	3,120	3,120	3,120	3,120	3,120
Solar	TJ	128	125	125	126	142	798	3,464	6,616	8,417	8,895	9,187
Wind	TJ	32	316	303	305	1,738	3,094	10,166	13,829	17,183	19,209	21,234

Source: Energy Balances of Georgia [2015-2018] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia) NECP [2020-2050] Renewable sources include categories "Hydro, Wind, solar, etc." and "Biofuels and waste".

(2) 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 PV systems, solar thermal systems, biomass, heat pumps, geothermal systems, as well as all other decentralized renewables systems.

(3) Where applicable, other national trajectories, including those that are long-term or sectoral the share of food-based and advanced biofuels, the share of renewable energy in district heating, as well as the renewable energy produced by cities and renewable energy communities.

8 GHG emissions and removals related indicators

(1) GHG emissions by policy sector (EU ETS, effort sharing, and LULUCF)

	Unit	2016	2017	2019	2020	2025	2030	2035	2040	2045	2050
EU ETS	tCO_2eq	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Effort sharing	tCO_2eq	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LULUCF	tCO_2eq	-4,797	-4,924	-4,924	-5,064	-5,764	-6,464	-7,164	-7,864	-8,564	-9,264

***Source**: Fourth National Communication of Georgia (2021) [2005-2017]* (https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20%20English%202020%2030.03_0.pdf), *NECP [2020-2050*

(2) GHG emissions by IPCC sector and by gas (where relevant, split into EU ETS and effort sharing sectors [tCO_2eq]

	Unit	2016	2017	2019	2020	2025	2030	2035	2040	2045	2050
Energy	tCO_2eq	11,355	10,726	11,877	11,297	13,126	14,038	15,138	16,464	17,894	19,374
Waste	tCO_2eq	1,559	1,562	1,592	1,592	1,592	1,592	1,592	1,592	1,592	1,592
IPPU	tCO_2eq	1,822	1,990	2,206	2,325	2,868	3,163	3,597	4,032	4,467	4,902
Agriculture	tCO_2eq	3,798	3,488	3,003	3,103	3,690	4,431	5,080	5,729	6,378	7,028
LULUCF	tCO_2eq	-4,797	-4,924	-4,924	-5,064	-5,764	-6,464	-7,164	-7,864	-8,564	-9,264
Total excluding LULUCF	**tCO_2eq**	**18,534**	**17,766**	**18,678**	**18,316**	**21,276**	**23,224**	**25,407**	**27,817**	**30,332**	**32,895**
Total including LULUCF	**tCO_2eq**	**13,738**	**12,842**	**13,754**	**13,252**	**15,513**	**16,760**	**18,244**	**19,953**	**21,768**	**23,631**
Source: Fourth National Communication of Georgia (2021) [2005-2017] (https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English	**Unit**	**2005**	**2010**	**2015**	**2016**	**2017**	**2018**	**2018**	**2020**	**2025**	**2030**

%202020%2030.03_0.pdf), NECP [2020-2050]											
CO2	$GtCO_2eq$	4,760.0	7,027.0	10,277.0	10,399.2	11,007.3	11,614.3	12,226.1	13,538.7	16,818.3	20,566.3
CH4	$GtCO_2eq$	4,013.0	4,353.0	5,088.0	5,135.4	5,260.3	5,294.4	5,503.9	2,547.4	3,476.0	3,930.2
N_2O	$GtCO_2eq$	1,901.0	1,773.0	2,084.0	2,067.7	1,871.0	1,945.1	2,034.7	3,161.4	3,773.6	4,539.9
HFC-134a	$GtCO_2eq$	4.6	26.4	77.8	73.2	81.7	83.0	90.1	97.2	132.6	150.0
HFC-125	$GtCO_2eq$	2.3	12.9	37.6	40.2	48.8	43.5	47.2	50.9	69.5	78.6
HFC-143a	$GtCO_2eq$	1.7	13.9	18.0	14.6	15.9	18.0	19.5	21.1	28.7	32.5
HFC-32	$GtCO_2eq$	0.3	0.9	6.0	7.1	8.9	7.3	8.0	8.6	11.7	13.3
SF6CO	$GtCO_2eq$	NE	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.6	0.7
Total	**$GtCO_2eq$**	**10,684**	**13,207**	**17,591**	**17,738**	**18,294**	**19,006**	**19,930**	**20,889**	**25,806**	**30,886**

***Source**: Fourth National Communication of Georgia (2021) [2005-2017] (https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)*

(3) Carbon Intensity of the overall economy [tCO_2eq/GDP]

	Unit	2016	2017	2019	2020	2025	2030	2035	2040	2045	2050
Carbon intensity (excluding LULUCF)	tCO_2eq/ million EUR	1.969	1.541	1.712	1.687	1.647	1.067	0.942	0.831	0.728	0.662
Carbon intensity (including LULUCF)	tCO_2eq/ million EUR	1.459	1.114	1.261	1.221	1.201	0.770	0.676	0.596	0.523	0.476

***Source:** GDP: GEOstat - Constant prices 2015 [2010-2019] (million GEL to million EUR using variable yearly currency exchange) (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia)*

(4) CO_2 emission related indicators

(a) GHG intensity of domestic power and heat generation [tCO_2eq/MWh]

	Unit	2016	2017	2019	2020	2025	2030	2035	2040	2045	2050
GHG intensity	$GtCO_2eq$/GWh	1.6	1.6	1.6	1.4	1.7	1.8	2.0	2.1	2.3	2.2

***Source:** Energy Balances of Georgia [2015-2018] (https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia), NECP [2020-2050]*

(b) GHG intensity of final energy consumption by sector [tCO_2eq/TJ]

	Unit	2005	2010	2015	2016	2017	2018	2020	2025	2030
Industrial	tCO2eq/ktoe	1.47	2.10	1.73	1.52	1.50	1.45	1.61	1.61	1.61
Residential	tCO2eq/ktoe	0.83	1.14	1.28	1.35	1.42	1.72	1.63	1.77	1.87
Commercial	tCO2eq/ktoe	0.47	4.02	1.02	0.96	0.93	0.86	0.92	0.92	0.92
Agriculture	tCO2eq/ktoe	2.30	3.53	2.00	1.33	1.36	1.64	2.03	2.09	2.05
Transport	tCO2eq/ktoe	2.82	3.24	2.87	4.27	4.38	4.51	2.90	2.90	2.90

Source: *Energy Balances of Georgia [2015-2018] (*https://www.geostat.ge/en/modules/categories/328/energy-balance-of-georgia)

(5) Non-CO_2 emission related parameters

(a) Livestock: dairy cattle [1000 heads], non-dairy cattle [1000 heads], sheep [1000 heads], pig [1000 heads], poultry [1000 heads]

	Unit	2005	2010	2015	2016	2017
Cattle	thousand heads	1,226	1,100	992	963	910
Buffalos	thousand heads	23	17	15		
Sheep	thousand heads	720	597	842	876	856
Goats	thousand heads	96	57	50	61	51
Horses	thousand heads	43	0	0		
Swine	thousand heads	455	110	161	136	151
Poultry	thousand heads	7,482	6,522	8,309	8,238	8,386

Source*: GEOstat (https://geostat.ge/media/43146/8.Livestock_Numbers_%28Annual%29_ENG.xls)*

(b) Nitrogen input from application of synthetic fertilizers [kt nitrogen]

	Unit	2005	2010	2015	2016	2017
N_20 (Synthetic fertilizers)	kt	910	990	980	1000	780

Source*: Fourth National Communication of Georgia (2021) [2005-2017] (https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)*

(c) Nitrogen input from application of manure [kt nitrogen]

	Unit	2005	2010	2015	2016	2017
N_20 (Manure management)	kt	1040	900	1140	1160	1090

***Source**: Fourth National Communication of Georgia (2021) [2005-2017]*
(https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)

(d) Nitrogen fixed by N-fixing crops [kt nitrogen]

	Unit	2005	2010	2015	2016	2017
N_20 (Organic N fertilizers applied to soils)	kt	370	310	400	400	380

***Source**: Fourth National Communication of Georgia (2021) [2005-2017]*
(https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)

(e) Nitrogen in crop residues returned to soils [kt nitrogen]

	Unit	2005	2010	2015	2016	2017
N_20 (Crop residue decomposition)	kt	210	70	120	120	90

***Source**: Fourth National Communication of Georgia (2021) [2005-2017]*
(https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)

(f) Area of cultivated organic soils [thousand ha]

	Unit	2010	2015	2016	2017	2018	2019	2020
Annual crops	thousand ha	256.7	263.7	240.0	220.3	207.1	203.0	209.9
Permanent crops	thousand ha				120.8			127.9

***Source**: Fourth National Communication of Georgia (2021) [2005-2017]*
(https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)

(g) Municipal solid waste (MSW) generation

	Unit	2015	2016	2017	2018	2019	2020
MSW	Thousand tons	774.7	870.3	922.1	977.4	994.6	973.3

***Source**: GeoStat*

(h) Methane generated from the municipal solid waste (MSW) landfilled

	Unit	2005	2010	2015	2016	2017	2018	2019	2020	2025	2030
Methane from MSW	$GgCO_2eq$	824	881	894	1,016	1,073	1,069	1,112	1,135	1,212	1,301

***Source**: Fourth National Communication of Georgia (2021) [2005-2017]*
(https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)

(i) Share of CH_4 recovery from total CH_4 generated from landfills [Gg CO_2eq]

"Methane isn't recovered for energy nor flared from landfills in Georgia, so methane recovery R =0. Besides, there aren't managed sites covered with methane oxidizing material, consequently Oxidation Factor OX=0."

	Unit	2005	2010	2015	2016	2017	2018	2019	2020	2025	2030
Methane recovery from landfills	%	0	0	0	0	0	0	0	0	0	0

***Source**: Fourth National Communication of Georgia (2021) [2005-2017]*
(https://unfccc.int/sites/default/files/resource/4%20Final%20Report%20-%20English%202020%2030.03_0.pdf)

Annex II: Detailed descriptions of measures listed in Section 3

Policies and Measures - Dimension Decarbonisation: GHG Emissions and Removals

GHG-1: Nitric acid production with low GHG emissions

GHG-1: Nitric acid production with low GHG emissions		
Objective 1.1: Reduce emissions from Industrial Processes and product use (IPPU) sector by 5% compared to reference levels		
Description: Nitric acid production plants to be equipped with state-of-the-art technology to remove N_2O emissions from the production cycle. This measure is conditional on international financial support.		
Timeframe		2021-2024 for beginning the measure and ongoing afterwards
Sector		Industry
Relevant planning documents, legal, and regulatory acts		• CSAP • Synergies with Directive 2008/50/EC of the Association Agreement on ambient air quality and Directive 2010/75/EU on industrial emissions
Implementation status		In planning
Assumptions		• The enterprise is equipped with new technology, which will emit at least 95% less N_2O. • The new equipment produces 100% nitric acid.
Results to be achieved		Compared to 2015 baseline (annual): • 426 $GgCO_2e$ reduced in 2030
Sources of Financing (GEL)	**State Budget**	N/A
	Municipal	N/A
	Private sector / publicly owned companies	8,910,000 GEL through 2024 (from Rustavi Azoti Ltd)
	Donor support	8,910,000 GEL in grants through 2024 (from German government)
Responsible agency		LTD Rustavi Azoti

Partner institution		MEPA on behalf of GoG
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	N_2O emissions reduced as reported by the company involved
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness. This measure is also linked to measures in industry to encourage efficiency.

GHG-2: Develop plant-specific emission factors

GHG-2: Develop plant-specific emission factors		
Objective 1.1: Reduce emissions from manufacturing processes		
Description: Introduction of a data management system that includes plant-specific emission factors to better estimate sector emissions and mitigation potentials. This will increase the capacity of the Private sector / publicly owned companies in reporting GHG-related data.		
Timeframe		2021-2024 for beginning the measure and ongoing afterwards
Sector		Industry
Relevant planning documents, legal, and regulatory acts		• CSAP • Synergies with Directive 2010/75/EU of the Association Agreement on industrial emissions and Article 314 on promoting information exchange and cooperation
Implementation status		In planning
Assumptions		N/A
Results to be achieved		• Adoption of at least two industry-specific emission factors • The emission factor specific to at least two major industries is established.
Sources of Financing (GEL)	**State Budget**	In-kind contributions
	Municipal	None
	Private sector / publicly owned companies	None
	Donor support	99,600 GEL in grants through 2024 (from GEF/UNEP)
Responsible Agency		Climate Change Division of MEPA
Partner Institution(s)		LTD Rustavi Azoti, Heidelberg Cement

Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	• Number of emission factors • Number of data systems
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness

GHG-3: Changing livestock feed

GHG-3: Changing livestock feed	
Objective 1.2: Reduce emissions from agricultural production and support low-carbon development approaches in the agricultural sector	
Description: Maximize feed quality for 20% or more of cattle, leading to lower emissions from enteric fermentation. Georgia has enough diversity in terms of forage plants, which could limit rumination while increasing or keeping productivity of livestock. Optimal feed mixes need to be identified and then communicated to dairy farmers through a manual. Further, Georgian grape marc should be explored as an alternative cheap dietary supplement for tackling ruminant emissions. This measure is conditional on international financial support. **Outcome Indicators:** A methodology has been developed to reduce emissions from enteric (intestinal) fermentation in cattle and change the feed for cattle that has been agreed with stakeholders; At least one recommendation campaign has been conducted to reduce emissions from enteric (intestinal) fermentation in cattle and change the feed for cattle in all regions with the participation of at least 50 farmers in each; The project concept to improve the quality of livestock feed and preserve pasture biodiversity has been developed and international funding has been requested for its implementation; Pasture management legislation has been developed.	
Timeframe	2021-2024 for beginning the measure and ongoing afterwards
Sector	Agriculture
Relevant planning documents, legal, and regulatory acts	CSAP
Implementation status	In planning
Assumptions	
	Compared to 2015 baseline (annual):

Results to be achieved		6.83 $GgCO_2e$ reduced in 2030
Sources of Financing (GEL)	**State Budget**	530,000 GEL to develop methodology and run a recommendation campaign to reduce emissions from enteric (intestinal) fermentation in cattle, change the feed for cattle
	Municipal	None
	Private sector / publicly owned companies	To be generated through policies (amounts not calculated)
	Donor Support	To be decided
Responsible Agency		MEPA (Department of Environment and Climate Change); Department of Agriculture, Food and Rural Development
Partner Institution(s)		• LEPL "Scientific Research Centre" • A (A) IP "Rural Development Agency" • LEPL "Environmental Information and Education Centre" • LEPL "National Agency for Sustainable Land Management and Land Use Monitoring" • Agricultural producers
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	• Number of cattle livestock receiving feed of improved quality • Amount of optimized feed provided, by type
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness

GHG-4: Develop cost-benefit analysis and feasibility study to identify best options to further increase change in livestock feed

GHG-4: Develop cost-benefit analysis and feasibility study to identify best options to further increase change in livestock feed **Outcome Indicator:** A technical analysis report has been prepared that analyses at least two new alternatives to nutrition improvement.

Objective 1.2: Reduce emissions from agricultural production and support low-carbon development approaches in the agricultural sector		
Description: Analyse the cost, benefits, and feasibility of additional measures for managing enteric fermentation in livestock with the goal of identifying new actions for the 2023-2024 Climate Action Plan		
Timeframe		2021 - 2024
Sector		Agriculture
Relevant planning documents, legal, and regulatory acts		CSAP
Implementation status		In planning
Assumptions		Assumes availability of funds for commissioning the study.
Results to be achieved		A technical analysis report has been prepared that analyses at least two new alternatives to nutrition improvement.
Sources of Financing (GEL)	**State Budget**	218,000 GEL
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	To be sought
Responsible Agency		MEPA (Department of Environment and Climate Change; Department of Agriculture, Food and Rural Development)
Partner Institution(s)		• LEPL "Scientific Research Centre" • A (A) IP "Rural Development Agency"
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	Number of technical analysis papers
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness

GHG-5: Develop cost-benefit analysis and feasibility study to identify best options in which manure management systems can be implemented

GHG-5: Develop cost-benefit analysis and feasibility study to identify best options in which manure management systems can be implemented

Outcome Indicator: A technical analysis report has been prepared that analyses at least two new alternatives to manure management.		
Objective 1.2: Reduce emissions from agricultural production and support low-carbon development approaches in the agricultural sector		
Description: Analyse the cost, benefits, and feasibility of additional measures for introducing manure management systems with the goal of identifying new actions for the 2023-2024 Climate Action Plan		
Timeframe		2021 - 2024
Sector		Agriculture
Relevant planning documents, legal, and regulatory acts		Climate Action Plan
Implementation status		Under consideration
Assumptions		Assumes availability of funds for commissioning the study.
Results to be achieved		A technical analysis report has been prepared that analyses at least two new alternatives to manure management.
Sources of Financing (GEL)	**State Budget**	218,000 GEL
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	To be sought
Responsible Agency		MEPA (Department of Environment and Climate Change; Department of Agriculture, Food and Rural Development)
Partner Institution(s)		• LEPL "Scientific Research Center" • A (A) IP "Rural Development Agency"
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	Number of technical analysis papers
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness

GHG-6: Research and feasibility study on the successful and widespread establishment of cooperatives

GHG-6: Research and feasibility study on the successful and widespread establishment of cooperatives		
Objective: Reduce emissions from agricultural production and support low-carbon development approaches in the agricultural sector		
Description: Research and feasibility study of establishing cooperatives with the goal of identifying new actions for the 2023-2024 Climate Action Plan		
Timeframe		2021 - 2024
Sector		Agriculture
Relevant planning documents, legal, and regulatory acts		Climate Action Plan
Implementation status		In preparation
Assumptions		Assumes availability of funds for commissioning the study.
Results to be achieved		Completion of a technical analysis paper
Sources of Financing (GEL)	**State Budget**	940,000 GEL
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	To be sought
Responsible Agency		MEPA
Partner Institution(s)		Donor support
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	Number of technical analysis papers
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness.

GHG-7: Research and consultation processes to define economic and socially feasible Climate Smart Agriculture (CSA) actions in the context of Georgia

GHG-7: Research and consultation processes to define economic and socially feasible Climate Smart Agriculture (CSA) actions in the context of Georgia

<table>
<tr><td colspan="3">Objective 1.2: Reduce emissions from agricultural production and support low-carbon development approaches in the agricultural sector</td></tr>
<tr><td colspan="3">Description: Research to identify cost-effective CSA actions and stakeholder consultations to select options that are technically and socially feasible in Georgia with the goal of identifying new actions for the 2023-2024 Climate Action Plan.

Achievements should include:

A technical analysis report has been prepared containing recommendations for at least two measures that are most promising for the implementation of climate-smart agriculture (CSA) practices;

The CSA Working Group holds at least two consultative meetings per year;

By 2024, a good agricultural practice guide has been prepared for at least 5 agricultural crops.</td></tr>
<tr><td colspan="2">Timeframe</td><td>2021 - 2024</td></tr>
<tr><td colspan="2">Sector</td><td>Agriculture</td></tr>
<tr><td colspan="2">Relevant planning documents, legal, and regulatory acts</td><td>Climate Action Plan</td></tr>
<tr><td colspan="2">Implementation status</td><td>Under consideration</td></tr>
<tr><td colspan="2">Assumptions</td><td>Assumes availability of funds for commissioning the study.</td></tr>
<tr><td colspan="2">Results to be achieved</td><td>Completion of a technical analysis paper</td></tr>
<tr><td rowspan="4">Sources of Financing (GEL)</td><td>State Budget</td><td>330,000 GEL</td></tr>
<tr><td>Municipal</td><td>None</td></tr>
<tr><td>Private sector / publicly owned companies</td><td>None</td></tr>
<tr><td>Donor support</td><td>To be sought</td></tr>
<tr><td colspan="2">Responsible Agency</td><td>MEPA (Department of Environment and Climate Change; Department of Agriculture, Food and Rural Development)</td></tr>
<tr><td colspan="2">Partner Institution(s)</td><td>• LEPL "Scientific Research Centre"
• A (A) IP "Rural Development Agency"
• Ministry of Environment Protection and Agriculture (Policy and Analytics Department)</td></tr>
<tr><td rowspan="2">Monitoring</td><td>Agency / Source</td><td>MEPA</td></tr>
<tr><td>Progress indicator(s)</td><td>Number of technical analysis papers</td></tr>
</table>

Links to other policies and measures and/or dimensions	Research, innovation, and competitiveness

GHG-8: Develop a strategy for education and awareness raising (including on the use of synthetic fertilizers)

GHG-8: Develop a strategy for education and awareness raising (including on the use of synthetic fertilizers)		
Objective 1.2: Reduce emissions from agricultural production and support low-carbon development approaches in the agricultural sector		
Description: Develop a strategy for education and awareness to support and enable implementation of selected mitigation measures such as the use of alternatives to synthetic fertilizers and identifying new actions for the 2023-2024 Climate Action Plan.		
Timeframe		2021 - 2024
Sector		Agriculture
Relevant planning documents, legal, and regulatory acts		CSAP
Implementation status		Under consideration
Assumptions		At least 12 awareness-raising events to be held. Percentage of farmers informed by extension centres and the National Food Agency who have improved information on sustainable pet feeding practices and sustainable soil management: • 0% in 2020 • 50% of the target contingent of farmers in 2022 • 50% of the target contingent of farmers in 2024 • 50% of the target contingent of farmers in 2026 • 50% of the target contingent of farmers in 2028 • 50% of the target contingent of farmers in 2030
Results to be achieved		Completion of a strategy paper
	State Budget	330,000 GEL
	Municipal	None

Sources of Financing (GEL)	**Private sector / publicly-owned companies**	None
	Donor Support	To be sought
Responsible Agency		MEPA
Partner Institution(s)		• LEPL "Environmental Information and Education Centre" • A (A) IP "Rural Development Agency"
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	Number of strategy papers
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness

GHG-9: Restoration of degraded forest area (including fire-sites) through forestation

GHG-9: Restoration of degraded forest area (including fire-sites) through forestation	
Objective 1.3: Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%.	
Description: Restoration of 625 ha of degraded forest area (including fire-sites) through forestation. In 2020 and 2021-2023 a total of 250 ha[174] and 375 ha of the degraded forest territories (including fire-sites) will be restored through forestation (125 ha per annum). The exact areas will be chosen by the end of each year.	
Timeframe	2020 to 2024
Sector	Forestry
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Article 302 • 4th National Environmental Action Program of Georgia 2022-2026 • Georgia's Rural and Agricultural Development Strategy – 2021-2027
Implementation status	In 2019-2022, the National Forestry Agency implemented 8.7 ha of forest area;

174 125 ha of this will be within the Agricultural Development Action Plan

		In 2019-2022, natural renewal of 2113.9 ha of forest was promoted; In 2023, it is planned to promote the natural renewal of 1636.6 ha[175]
Assumptions		The measure is a mitigating measure for the sector for the climate change. It will be part of the Low Emission Development Strategy (LEDS) currently under preparation. By 2024, 625 ha of forest area has been restored through forestation. Area of forest per hectare on which restoration work was carried out: • 190 ha in 2019[176] • 890 ha in 2022 • 2090 ha in 2024 • 2690 ha in 2026 • 3290 ha in 2028 • More than 4000 ha in 2030 For input into the EX-ACT emissions calculations, the model assumes a Cool Temperate Moist climate zone, with Low Activity Clay (LAC) soils. Land Use changes from Degraded Land to Temperate Mountain Forest Systems, with no fire use involved. It assumes an Implementation Phase of 3 years and a Capitalisation Phase of 17 years. Average of 18.4 tCO_2eq/ha per year carbon uptake
Results to be achieved		Compared to 2015 baseline (annual): Removals of 11.5 $GgCO_2e$ annually from 2022 through at least 2030
	State Budget	2,625,000 GEL through 2024
	Municipal	None

175 According to the June 2023 data of the National Forestry Agency.

176 The mentioned target indicators were determined according to the 2021-2023 action plan of the 2030 strategy of climate change of Georgia. According to the 2022 implementation report of the Ministry of Environment Protection and Agriculture of Georgia, in 2021, in order to restore degraded forests, forest restoration measures were implemented on an area of 783 ha, of which forest restoration works were carried out on 150.2 ha through afforestation, and on an area of 632.8 ha, natural renewal promotion works, and in 2022, the National Forestry Agency did not implement afforestation measures.

Sources of Financing (GEL)	**Private sector / publicly-owned companies**	None
	Donor Support	3,640,000 GEL in grants from GCF, German government
Responsible Agency		MEPA
Partner Institution(s)		LEPL National Forest Agency
Monitoring	**Agency / Source**	LEPL National Forest Agency
	Progress indicator(s)	ha of restored forest area
Links to other policies and measures and/or dimensions		Has synergy with other GHG/AFOLU measures.

GHG-10: Restoration of degraded forest through supporting natural restoration

GHG-10: Restoration of degraded forest through supporting natural restoration	
Objective 1.3: **Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%**	
Description: Restoration of 2,411 ha of degraded forest through supporting the natural restoration. The following actions will be / have been carried out: 1. In 2020-2023, a total of 800 ha of degraded forests will be restored by the National Forest Agency (200 ha per annum) 2. Tbilisi City Municipality restored 20 ha of degraded forest territory in 2019 with support from GIZ 3. In 2019-2024, Adjara Forest Agency will restore 600 ha of degraded forest territory (subalpine) 4. 991 ha of forest territory will be restored by Akhmeta Municipality in 2020-2024 This measure is partially conditional on international financial support.	
Timeframe	2019-2022 (will continue through 2024)
Sector	Forestry
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement, Article 302 • 4th National Environmental Action Program of Georgia 2022-2026

		• Georgia's Rural and Agricultural Development Strategy – 2021-2027
Implementation status		Currently under implementation - at this stage the National Forest Agency has promoted self-renewal on 171 ha. By 2024, the forest will be restored through natural restoration approx. 1,300 ha area.
Assumptions		For input into the EX-ACT emissions calculations, the model assumes a Cool Temperate Moist climate zone, with Low Activity Clay (LAC) soils. Land Use changes from Perennial/Tree Crop to Temperate Mountain Forest Systems, with no fire use involved. It assumes an Implementation Phase of 5 years and a Capitalisation Phase of 15 years. Average of 2.9 tCO_2eq/ha per year carbon uptake
Results to be achieved		Compared to 2015 baseline (annual): Removals of 6.9 GgCO2e annually from 2022 through at least 2030
Sources of Financing (GEL)	**State Budget**	Items 1. and 3. are financed by the state budget - 1,125,000 GEL
	Municipal	None
	Private sector / publicly-owned companies	None
	Donor Support	GIZ funded item 2. Donor support to be identified for item 4: 3,633,260 GEL in grants from GCF, German government
Responsible Agency		MEPA
Partner Institution(s)		• LEPL National Forestry Agency • LEPL Adjara Forest Agency • N(n)LE "Tusheti Protected Areas Administration" under the Akhmeta Municipality
Monitoring	**Agency / Source**	National Forest Agency, implementation partners
	Progress indicator(s)	ha of restored forest area, by activity number
Links to other policies and measures and/or dimensions		Has synergy with other AFOLU measures.

GHG-11: Introduction of sustainable forest management practice through the implementation of sustainable forest management plans

GHG-11: Introduction of sustainable forest management practice through the implementation of sustainable forest management plans	
Objective 1.3: **Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%**	
Description: Introduction of sustainable forest management practices on 402,109 ha of forest area through the implementation of a sustainable forest management plan, developed and approved for 11 municipalities. The forest management plans will introduce and support measures like the development of necessary infrastructure/ maintenance/ cutting/ forest restoration/sanitary cutting, etc. The measure is partially conditional on international climate finance, 270,807 ha is funded within the framework of the project funded by GCF, and 131,302 ha within the state budget funding.	
Timeframe	2021-2022 (will continue through 2027 and beyond)
Sector	Forestry
Relevant planning documents, legal, and regulatory acts	• Forest Code • CSAP • Association Agreement, Article 302 • 4th National Environmental Action Program of Georgia 2022-2026 • Georgia's Rural and Agricultural Development Strategy – 2021-2027 • Regional Development Program – 2018-2021 • National Environment and Health Action Plan of Georgia for 2018-2022 (NEHAP-2)
Implementation status	Climate change adaptation plans for the protected areas of Kazbegi, Pshav-Khevsureti and Tusheti have been prepared for the areas under the management of the Agency of Protected Areas. Work is underway to develop and update 7 protected area management plans, where climate change mitigation issues are taken into account
Assumptions	This measure includes only the development of sustainable forest management plans, including 270,807 ha and subsequent implementation. The measure will be part of the Low Emission Development Strategy (LEDS) currently under preparation.

		Sustainable forest management plan has been developed and approved in at least 7 municipalities (Lanchkhuti, Chokhatauri, Dedoplistskaro, Sighnaghi, Adigeni, Lentekhi, Lagodekhi, Akhmeta); 269,954 ha of forest area is sustainably managed in the municipality. According to the data of 2023, the following are approved: Lanchkhuti, Chokhatauri, Lagodekhi, Lentekhi. It has been developed and the approval process is in progress: Dedoplistskaro-Sighnaghi, Akhmeta. A management plan is being developed: Adigeni. More than 50% of protected area management plans by 2024 integrate climate change mitigation issues. For input into the EX-ACT emissions calculations, the model assumes a Cool Temperate Moist climate zone, with Low Activity Clay (LAC) soils. For Degradation Management, the type of vegetation is temperate mountain forests. For Western Georgia, it stays at a large level of degradation without the project, and it changes from a large level to a low level of degradation with the project. For Eastern Georgia, it stays at a moderate level of degradation without the project, and it changes from a moderate level to a low level of degradation with the project. It assumes no occurrence of fire. The model assumes an Implementation Phase of 10 years and a Capitalisation Phase of 10 years. Average of 1.0 tCO_2eq/ha per year carbon uptake in West Georgia and 1.7 tCO_2eq/ha in East Georgia (average 1.4)
Results to be achieved		Compared to 2015 baseline (annual) - removals of 560 $GgCO_2e$ annually from 2022 through at least 2030
Sources of Financing (GEL)	**State Budget**	2,510,000 GEL
	Municipal	None
	Private sector / publicly-owned companies	None
	Donor Support	9,190,000 GEL (2,526,000 EUR) in grants from GCF
Responsible Agency		MEPA
Partner Institution(s)		• LEPL National Forest Agency

		• State Sub-Agency Department of Environmental Supervision • Department of Biodiversity and Forestry of the Ministry of Environment and Agriculture • Non-entrepreneurial legal entity "Tusheti Protected Landscape Administration" under Akhmet Municipality - international organizations • Protected Areas Agency
Monitoring	**Agency / Source**	LEPL National Forest Agency
	Progress indicator(s)	ha of sustainably managed forest area in 11 municipalities
Links to other policies and measures and/or dimensions		Has synergy with other GHG/AFOLU measures.

GHG-12: Introduction of sustainable forest management practices through supervision and capacity development

GHG-12: Introduction of sustainable forest management practices through supervision and capacity development
Objective 1.3: **Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%.**
Description: Introduction and implementation of sustainable forest management practices, including supervision of 270,807 ha of forest territory by supplying sustainably harvested and produced firewood, strengthening the legal framework; supporting the enhancement of measurement, reporting and validation (MRV) systems. The following sub-measures will be implemented: 1. Update and refinement of the supervisory regulations, procedures and protocol for effective supervision; 2. Equipping the employees of the Department of Environmental Supervision with modern and upgraded equipment, technologies, and vehicles for effective supervision. 3. Introduction of corresponding mechanisms and technologies for supporting the supply of sustainably harvested and produced firewood (including the development of necessary training modules); 4. Establishment and composing of 14 business yards[177]

177 The mentioned indicator is determined according to the 2021-2023 action plan of the 2030 climate change strategy of Georgia. From 2021 until now, 11 business yards have been completed, 6 business yards are under construction, and 12 business yards are planned to be built.

5. Supporting vocational education and raising qualification within the forest sector, which implies elaboration and implementation of educational programs.
6. Development of university programs in the areas of conservation and creating models for sustainable use of the economic potential of forests, which will ensure the decrease of the ongoing socio-economic and energy pressure on forests that stem from the unsustainable methods and creating conditions for sustainable forest management.
7. Integration of issues related to the adaptation to climate change in the process of planning, management and monitoring of the forest sector;
8. Strengthening MRV systems and institutional setup of forests;
9. Development of FIMS (Forest Information Monitoring System) modules.

The measure will result in:

- Updated regulations, procedures and protocols for supervision;
- Trained and equipped employees of the Department of the Environmental Supervision;
- Implemented mechanisms and technologies, which will support supply of sustainably harvested and produced firewood;
- Established and equipped 14 business yards;
- The legal framework has been improved, which will support sustainable forest management (in particular, the new Forest Code and Regulations #179 #241 #242 have been approved).
- Integration of climate change adaptation issues into the process of planning, management and monitoring of the forest sector;
- Strengthened MRV system and institutional setup; and
- Developed FIMS (Forest Information Management System) modules.

This measure is conditional on international financial support.

Timeframe	2021-2023 (will continue through 2028)
Sector	Forestry
Relevant planning documents, legal, and regulatory acts	• Forest Code • CSAP • Association Agreement, Article 302 • 4th National Environmental Action Program of Georgia 2022-2026 • Georgia's Rural and Agricultural Development Strategy – 2021-2027 • Regional Development Program – 2018-2021

		• National Environment and Health Action Plan of Georgia for 2018-2022 (NEHAP-2)
Implementation status		Beginning in 2021
Assumptions		This measure is very important for the forest sector of Georgia. As a result of its implementation, it is possible to double the adaptation and mitigation impacts of Georgia's AFOLU measures. Also, with the introduction of a monitoring system (MRV) it is possible to confirm and control the increase of the absorption potential over a long period of time. For input into the EX-ACT emissions calculations, the model assumes a Cool Temperate Moist climate zone, with Low Activity Clay (LAC) soils. For Degradation Management, the type of vegetation is temperate mountain forests. For Western Georgia, it stays at a large level of degradation without the project, and it changes from a large level to a low level of degradation with the project. For Eastern Georgia, it stays at a moderate level of degradation without the project, and it changes from a moderate level to a low level of degradation with the project. It assumes no occurrence of fire. The model assumed an Implementation Phase of 10 years and a Capitalisation Phase of 10 years. Average of 1.5 tCO_2eq/ha per year carbon uptake
Results to be achieved		• 14 business yards have been established and staffed; • Supervision based on the principles of sustainable forest management practices covers 270,807 ha of forest area. • Compared to 2015 baseline (annual) - removals of 393 $GgCO_2e$ annually from 2022 through at least 2030
Sources of Financing (GEL)	**State Budget**	In-kind
	Municipal	None
	Private sector / publicly-owned companies	None
	Donor Support	378,000 GEL (103,819 EUR) in grants from GCF
Responsible Agency		MEPA
Partner Institution(s)		• LEPL National Forest Agency • State Sub-Agency Department of Environmental Supervision

		• LEPL Environmental Information and Education Center Non-governmental organizations and international organizations
Monitoring	**Agency / Source**	LEPL National Forest Agency
	Progress indicator(s)	Number of updated and/or adopted regulations, procedures, and protocols for effective forest supervision
Links to other policies and measures and/or dimensions		Has synergy with other GHG/AFOLU measures.

GHG-13: Sustainable management and protection of the forest fund territories within the adopted and nominated emerald network sites

GHG-13: Sustainable management and protection of the forest fund territories within the adopted and nominated emerald network sites	
Objective 1.3: **Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%**	
Description: Sustainable management and protection of the 643,100 ha of special areas of conservation (SAC) forest funds within the adopted and nominated Emerald Network sites (590,103 ha adopted; 52,997 ha nominated). This measure involves sustainable management of forest territories through development, adaptation, and implementation of sustainable management plans that include measures such as development of necessary infrastructure, maintenance, cutting, restoration of the forest, sanitary cutting, etc. This measure is conditional on international financial support.	
Timeframe	2021-2024 (will be continued until 2030)
Sector	Forestry
Relevant planning documents, legal, and regulatory acts	• Forest Code • CSAP • Association Agreement, Article 302 • 4th National Environmental Action Program of Georgia 2022-2026 • Georgia's Rural and Agricultural Development Strategy – 2021-2027 • Regional Development Program – 2018-2021 • National Environment and Health Action Plan of Georgia for 2018-2022 (NEHAP-2)

Implementation status	Forest inventory and forest management plan preparation works were carried out within the competence of the Protected Areas Agency. Forest management plans are being prepared in 2 protected areas, totaling 12,251.8 hectares, namely: • 4,935.8 ha of the Tsiv-Gombori reserve (state budget) • 7,216 ha of Erusheti National Park; (state budget) The technical task of forest inventory and forest management plans of Tusheti National Park (9214ha) and Tusheti State Nature Reserve (10275ha) has been prepared. As of 2023, a total of 12 forest management plans have been approved, forest inventory has been conducted on a total of 179,887.5 hectares: 1. Machakhela National Park - area: 7 333 ha; 2. Kolkheti National Park - area: 29,033 ha; 3. Katsoburi barred - area: 271 ha; 4. Nezvi forest - area: 9 212.5 ha; 5. Ajamet's Strict Nature Reserve - area: 4 991 ha; 6. Tbilisi National Park - area: 21,031 ha; 7. Pshav-Khevsureti National Park - area: 18,266 ha; 8. Borjom-Kharagauli National Park - area: 56 112 ha; 9. Lagodekhi Strict Nature Reserve - area: 2025 ha; 10. Lagodekhi State Nature Reserve - area: 19,755 ha; 11. Tetrobi Strict Nature Reserve - area: 3,089 ha; 12. Algeti National Park - area: 8,769 ha; The above plans have been prepared keeping in mind the conservation of emerald net habitats.
Assumptions	This measure is important because it primarily ensures the protection of biodiversity, as a result of which the forest ecosystem increases its ability to adapt to climate change and consequently increases its carbon stocks.

		By 2024, emerald network management plans have been developed for at least 100,000 ha of emerald network forest area. CO_2eq reductions assume the measure is carried out on 52,997 hectares. For input into the EX-ACT emissions calculations, the model assumes a Cool Temperate Moist climate zone, with Low Activity Clay (LAC) soils. For Degradation Management, the type of vegetation is temperate mountain forests. It stays at a moderate level of degradation without the project, and it changes from a moderate level to a low level of degradation with the project. It assumes no occurrence of fire. The model assumes an Implementation Phase of 10 years and a Capitalisation Phase of 10 years Average of 1.5 tCO_2eq/ha per year carbon uptake
Results to be achieved		Compared to 2015 baseline (annual) - removals of 51.2 $GgCO_2e$ per year through 2030
Sources of Financing (GEL)	**State Budget**	To be defined related to management.
	Municipal	None
	Private sector / publicly-owned companies	None
	Donor Support	60,000 GEL from German government
Responsible Agency		MEPA
Partner Institution(s)		• LEPL "National Forest Agency" • LEPL "Agency of Protected Areas" • Department of Biodiversity and Forestry Policy of the Ministry of Environment and Agriculture.
Monitoring	**Agency / Source**	State Sub-Agency, Department of Biodiversity and Forest Policy
	Progress indicator(s)	ha of protected and sustainably managed forest fund area within the Emerald Network
Links to other policies and measures and/or dimensions		Has synergy with other GHG/AFOLU measures.

GHG-14: Protection and/or sustainable management of forest areas within the new protected territories

GHG-14: Protection and/or sustainable management of forest areas within the new protected territories	
Objective 1.3: **Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%**.	
Description: This measure involves protection and/or sustainable management of 162,895 ha of forest area within the new protected territories by LEPL Agency of Protected areas, including the following areas (indicative list as follows): - Racha National Park - 16,684 ha - Svaneti Protected Areas - 22,325 ha - Tana Protected Areas – 10, 929 ha [178] - Tana and Tedzami Protected Landscape – 10, 217 ha - Machakhela Protected Landscape – 3, 326 ha	
Timeframe	2021-2027 (will be continued until 2030)
Sector	Forestry
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement, Article 302 • 4th National Environmental Action Program of Georgia 2022-2026 • Regional Development Program – 2018-2021
Implementation status	Under implementation
Assumptions	For input into the EX-ACT emissions calculations, the model assumes a Cool Temperate Moist climate zone, with Low Activity Clay (LAC) soils. For Degradation Management, the type of vegetation is temperate mountain forests. For Western Georgia, it stays at a large level of degradation without the project, and it changes from a large level to a low level of degradation with the project. For sites in Eastern Georgia (Erusheti, Trialeti, Ateni, Dzama, and Aragvi), it stays at a moderate level of degradation without the project, and it changes from a moderate level to a

178 The said protected areas have been created by the relevant legislation of the Parliament of Georgia since January 1, 2023, the process of establishing administrations is underway, after the completion of which the process of receiving and handing over the forests presented in the above-mentioned areas will be carried out. The technical task regarding the rule of temporary regulation of the above-mentioned territories, on the basis of which the prohibited and permitted activities within the restricted of the protected territories are determined.

		low level of degradation with the project. No occurrence of fire is assumed. The model assumes an Implementation Phase of 2 years and a Capitalisation Phase of 8 years for the sites in Western Georgia (Samegrelo, Racha, Sveneti, and Racha-Lechkhumi). The model assumes an Implementation Phase of 10 years and a Capitalisation Phase of 10 years for the sites in Eastern Georgia (Erusheti, Trialeti, Ateni, Dzama, and Aragvi). Overall average of 1.3 tCO_2eq/ha per year uptake.
Results to be achieved		• Compared to 2015 baseline (annual) - removals of 213 $GgCO_2e$ per year through 2030 • The protected / sustainably managed forest area within the newly established areas is at least 150,000 ha.
Sources of Financing (GEL)	**State Budget**	185,845 GEL through 2024
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	None
Responsible Agency		• LEPL Agency of Protected Territories • Local municipalities • LEPL National Forestry Agency
Partner Institution(s)		Donor support
Monitoring	**Agency / Source**	LEPL Agency of Protected Territories
	Progress indicator(s)	ha of protected/sustainably managed forest are within the newly established territories
Links to other policies and measures and/or dimensions		Has synergy with other GHG/AFOLU measures.

GHG-15: Strengthening and support for inter-sectoral coordination related to forest matters

GHG-15: Strengthening and support for inter-sectoral coordination related to forest matters
Objective 1.3: **Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%**.
Description: This measure will enhance and support inter-sectoral coordination related to forest matters. Activities will include organization of inter-sectoral meetings, strengthening of coordination

mechanisms between authorities (including identification of contact persons/groups), and launching and updating of an electronic system for information exchange within the National Forest Program process. The strengthened coordination with related sectors will result in more effective integration and consideration of forestry matters into national strategic planning and also enable consideration of economic, energy, social and other priorities within forest sector planning.		
Timeframe		2021-2022 (will be continued until 2030)
Sector		Forestry
Relevant planning documents, legal, and regulatory acts		CSAP Association Agreement, Article 302
Implementation status		Beginning in 2021
Assumptions		Assumes availability of funds for assistance in coordination.
Results to be achieved		No direct impact on GHGs
Sources of Financing (GEL)	**State Budget**	N/A
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	None
Responsible Agency		State Sub-Agency, Department of Biodiversity and Forest Policy
Partner Institution(s)		Donor support
Monitoring	**Agency / Source**	State Sub-Agency, Department of Biodiversity and Forest Policy
	Progress indicator(s)	Number of activities to strengthen inter-sectoral coordination
Links to other policies and measures and/or dimensions		Has synergy with other GHG/AFOLU measures.

GHG-16: Promoting sustainable management of forests by supporting the multifunctionality of forests, raising public awareness, and supporting public involvement in forest reform processes

GHG-16: Promoting sustainable management of forests by supporting the multifunctionality of forests, raising public awareness, and supporting public involvement in forest reform processes

<table>
<tr><td colspan="3">Objective 1.3: Enhance carbon sequestration in Land Use, Land Use Changes, and Forestry (LULUCF) by 10%.</td></tr>
<tr><td colspan="3">Description: This measure will promote sustainable management of forests by supporting the multifunctional use of forests, raising public awareness, and supporting public involvement in forest reform processes. Specific activities include:
• Assessment of the non-wood potential of forests (including touristic and recreational), identification of priorities for public engagement, and development/implementation of recreational potential;
• Development and implementation of a strategy and action plan for communicating the multifunctionality of forests, options, and technologies for using forests sustainably, and benefits to the local population of implementing these.
This measure is conditional on international financial support.</td></tr>
<tr><td colspan="2">Timeframe</td><td>2021-2023 (will be continued until 2030 and beyond)</td></tr>
<tr><td colspan="2">Sector</td><td>Forestry</td></tr>
<tr><td colspan="2">Relevant planning documents, legal, and regulatory acts</td><td>• CSAP
• Association Agreement, Article 302
• The fourth National Environmental Action Program of Georgia 2022-2026
• Georgia’s Rural and Agricultural Development Strategy – 2021-2027
• Tourism Strategy - 2025
• National Environment and Health Action Plan of Georgia for 2018-2022 (NEHAP-2)</td></tr>
<tr><td colspan="2">Implementation status</td><td>Will start in 2021</td></tr>
<tr><td colspan="2">Assumptions</td><td>Increased awareness and engagement in reforms will result in reduced pressure from the population on forests as a source of timber.</td></tr>
<tr><td colspan="2">Results to be achieved</td><td>No direct impact on GHGs
The annual number of cases of illegal logging and use of timber by the population in the target areas is reduced by 30%;
By 2024, at least 10 permits have been issued for the use of non-timber resources, and at least 3 permits have been issued for the use of recreational resourcesA public awareness campaign plan has been developed.</td></tr>
<tr><td></td><td>State Budget</td><td>None</td></tr>
</table>

Sources of Financing (GEL)	**Municipal**	None
	Private sector / publicly owned companies	None
	Donor Support	1,330,000 GEL (365,000 EUR) in grants through 2024 from GCF, Government of Germany, Government of Sweden, Government of Switzerland
Responsible Agency		MEPA
Partner Institution(s)		• LEPL Agency of Protected Areas • LEPL National Forest Agency • LEPL Environmental Information and Education Centre • LEPL Adjara Forest Agency • N(n)LE "Tusheti Protected Areas Administration" under the Akhmeta Municipality
Monitoring	**Agency / Source**	State Sub-Agency, Department of Biodiversity and Forest Policy
	Progress indicator(s)	Development and implementation of an action plan for communicating benefits of forests Amount of legal and illegal cutting of firewood and timber, m^3
Links to other policies and measures and/or dimensions		Has synergy with other GHG/AFOLU measures.

GHG-17: Closing official non-hazardous landfills

GHG-17: Closing official non-hazardous landfills	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Landfills existing when the Waste Management Code was adopted will continue operations only if they have a permit issued in compliance with the Law of Georgia on Environmental Impact Permit. The landfills that do not have a permit will be required to close gradually, including Batumi, Kutaisi, and other plants in Eastern and Western Georgia. MEPA will decide and plan the closure of each of these landfills in parallel with the construction of new regional landfills. None of the existing landfills operating in Georgia has a methane gas collection and reuse system in place.	
Timeframe	Existing landfills will be closed by the end of 2028 in a phased manner once the construction of regional non-hazardous waste disposal facilities/landfills is completed.

Sector	Waste
Relevant planning documents, legal, and regulatory acts	Climate Strategy 2020-2030 and Action Plan 2020-2023 (CSAP) Association Agreement: supports implementation of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste; Council Directive 1999/31/EC landfill waste amended by Regulation (EC) No 1882/2003 Waste Management Code 4th National Environmental Action Programme (NEAP-4) of Georgia 2022-2026 National Waste Management Strategy and Action Plan National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status	Ongoing
Assumptions	By the Waste Management Code, all the landfills w/o the permit should be closed. It is assumed that by 2024 at least 4 landfills will be closed. Total reductions: 416.85 GgCO2e (or 19.85 GgCH4) • 59.9 $GgCO_2e$ (Batumi) • 63 $GgCO_2e$ (Kutaisi) • 189 $GgCO_2e$ (other - Eastern Georgia) • 105 $GgCO_2e$ (other -Western Georgia) According to the plan, out of 33 existing landfills, only Tbilisi and Rustavi landfills should be maintained. One of the other 31, Borjomi, is already closed. The closing effect of the other 30 landfills in terms of reducing methane emissions is calculated as follows: - The emissions of Batumi and Kutaisi landfills before and after closure are calculated with the appropriate coefficients of these cities (Georgian National Greenhouse Gas Inventory, within the framework of the 4th National Communication); The opening years of these landfills are taken as the initial years. - The rest of the existing legal landfills are divided into two groups; In accordance with the dry temperate and humid temperate climates to ensure maximum approximation to the real conditions (because the model used assumes different parameters for different climates). The initial year

		for these groups is the year of opening of the latest open landfills (2012). - The sum of the amounts of waste disposed at the respective landfills was entered into the model for both groups, and the populations attached to them were calculated based on the standard coefficient of waste generated per capita (Note: The population taken to the Kutaisi Nikea landfill is much larger than the city population itself. In particular, St. The existing landfill of Kutaisi (Nikea) serves the municipalities of Kutaisi, Baghdati and Tskaltubo. - The population has remained unchanged since 2017. This assumption is based on the fluctuation of the demographic dynamics of the country within zero. - Methane emissions were calculated for both groups after closure (from 2017 to 2030 - in case of closure in 2024) and in case of closure (from 2017 to 2030). - Emission reductions were calculated with corresponding differences, and summarized: for Batumi (3), Kutaisi (3), dry climate group (6) and humid climate group (5) landfills. (3 + 3 + 6 + 5 = 17 Gg of methane by 2030, this difference will increase more in the coming years). Methane emissions from closed landfills will be reduced in 2046 (Batumi), 2040 (Kutaisi), 2060 (dry) and 2050 (wet). Note: It is assumed that after 2025, these masses of waste will be transferred to the respective regional landfills (along with the waste placed in natural landfills after their closure), which will serve the same population.
Results to be achieved		70 $GgCO_2e$ reduced in the year 2030 416.85 $GgCO_2e$ – cumulative through 2030
Sources of Financing (GEL)	**Overall budget** **State Budget**	2023-2024 - 6 000 000 GEL
	Municipal	N/A
	Private sector / publicly-owned companies	N/A
	Donor Support	2025 Year, KfW –- 10 000 000 GEL (closing 2 landfills)
Responsible Agency		Ministry of Regional Development and Infrastructure

		Government of the Autonomous Republic of Adjara
Partner Institution(s)		MEPA
Monitoring	**Agency / Source**	• The Ministry of Regional Development and Infrastructure of Georgia • LLC "Solid waste menegment company of Georgia"
	Progress indicator(s)	Number of closed landfills
Links to other policies and measures and/or dimensions		Decarbonization: GHG-19

GHG-18: Closing dumpsites

GHG-18: Closing dumpsites	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Dumpsites are scattered all over the country, their actual number is unknown, and there is no official information about the amount and composition of waste disposed at these dumpsites. According to the National Waste Management Strategy and Action Plan, all existing dumpsites should have been closed by the end of 2020 which did not meet the codes set out by the Waste Management Code. The national waste collection rate should be at 90% by 2020 and at 100% by 2025, with all municipal waste being collected, partially recycled and disposed at non-hazardous waste landfills.	
Timeframe	2026
Sector	Waste
Relevant planning documents, legal, and regulatory acts	• CSAP • National Waste Management Strategy and Action Plan • Association Agreement: supports implementation of Directive 2008/98/EC of the European Parliament and of the European Council of 19 November 2008 on Waste Management; Directive 1999/31/EC on Landfill Waste (EC) as amended by Regulation No. 1882/2003 • Waste Management Code • 4 th National Environmental Action Programme (NEAP-4) of Georgia 2022-2026 • National Waste Management Strategy and Action Plan

		• National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status		Ongoing
Assumptions		100% of natural landfills closed by 2026. Assumes that after closure, methane emissions will continue until the end of the dissolution period, including until 2030 The waste will instead be collected and sent to the regional landfills since they are constructed under GHG-21 Regional landfills are to be constructed before. The climatic division with respect to natural landfills did not occur due to the lack of relevant data. The model therefore selected a dry temperate climate for all natural landfills. The calculations were performed for one hypothetical natural landfill. The amount of waste, and its corresponding population, was calculated from the total population and the total amount of waste generated minus the same values of legal landfills. 2017 data were used. The closing year was considered to be 2020. The initial year was 2000. Emission reductions were calculated for the period from 2020 to 2030 (with a difference between the emissions without closure and the emissions after closure) and amounted to 16 gigabytes of methane. It is noteworthy that gas emissions continue to close after closure, although they are rapidly declining, and will flow very late, after 2080.
Results to be achieved		29 Gg CO_2e reduced in 2030 294 Gg CO_2eq cumulative through 2030
Sources of Financing (GEL)	**State Budget**	None
	Municipal	2,800,000 GEL
	Private sector / publicly owned companies	N/A
	Donor Support	To be determined
Responsible Agency		Municipalities

Partner Institution(s)		• MEPA • MRDI • LLC "Solid Waste Management Company"
Monitoring	**Agency / Source**	Reported by municipalities to MEPA
	Progress indicator(s)	Number of dumpsites closed
Links to other policies and measures and/or dimensions		Decarbonization: GHG-19

GHG-19: Construction of regional non-hazardous landfills

GHG-19: Construction of regional non-hazardous landfills	
Objective 1.4: Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services	
Description: Eight new modern landfills will be constructed throughout Georgia, which will minimize the negative impact of landfills on the environment. The landfills will include complete hydro-insulation as well as modern systems for recycling leachate waters and capturing methane gas. It is planned to arrange flares or/and gas recovery systems at all regional landfills, ensuring combustion (flaring) or/and recovery of the extracted gas. For the first years, the produced gas will be flared; later, after some time, when the MSW is increased, the gas can be recovered (captured).	
Timeframe	2021-2027 (last quarter)
Sector	Waste
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: supports implementation of Directive 2008/98/EC of the European Parliament and of the European Council of 19 November 2008 on Waste Management; Directive 1999/31/EC on Landfill Waste (EC) as amended by Regulation No. 1882/2003 • Waste Management Code • 4th National Environmental Action Programme (NEAP-4) of Georgia 2022-2026 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status	Ongoing

Assumptions	The landfills will be phased in by 2024, in parallel with closing of the old LFs, and will receive approximately 900,000 tons of waste annually. Potential for methane generation is 68 Gg CH_4 (or 63 Gg – in case the landfill is covered by a layer of soil) **in 2030 ≈ 220-238 ktCO_2e** Total in 2024-2030: 1,323-1,428 ktCO_2e = (63-68 ktCH_4)) – in case all the landfills are in place since 2024. Methane gases generated at the landfills will be captured with an effectiveness of about 80% In the case of 80% methane recovery, emission reduction respectively amounts to 54.4 or 50.4 Gg methane in 2024-2030 (For details (estimations are made by the projects' designers), see 2nd BUR: 1) Imereti, Racha-Lechkhumi-Kvemo Svaneti : 0.9273 Gg CO_2 Eq/year = 4.031739 t CH_4/Year; Total - 0.25125392 Gg of methane 2) From Adjara landfill (will be arranged in 2022): Recovery of 80% of generated methane*, 672 t CH_4/year*, Total (2024-2030) 4704 t CH_4 (before 2024 – just flaring). From landfills of (3) Kakheti and (4) Samegrelo-Zemo Svaneti (will be arranged by 2024): 0.9 Gg methane/year (=5.4 Gg 2023-2030); From the landfills of (5 and 6) Samtskhe-Javakheti, Mtskheta-Mtianeti and Shida Kartli: 50% extraction; NE yet, under consideration about the number of landfills. A study has been already conducted. From the landfill of (7) Kvemo Kartli (will be arranged by 2023): 0.0392 Gg methane by 2023 and 1.735 Gg per year from 2025 to 2030, Total in 2024-2030 - 7.0576 Gg of Methane. This measure involves the collection of waste from closed legal as well as natural landfills, in stages, so that by 2024 all these landfills should be arranged. Accordingly, the mass of waste disposed at these landfills was determined on the basis of the mass obtained from the closed legal and natural landfills.

		Emissions were calculated for one hypothetical landfill, to which approximately 2.42 million people were 'connected' (excluding the population of closed Tbilisi and Rustavi-Gardabani). The parameter values in the model were selected in accordance with the high standards set for these landfills; In particular, 50% - managed, 50% - well-managed, semi-aerobic) and calculations were performed for two values of the oxidation coefficient: OX = 0 (default) and OX = 0.1 (in case of land cover). Accordingly, the amount of methane emitted from 2024 to 2030 was 67 and 61 g, respectively. It should be noted that the arrangement of regional landfills by itself cannot reduce methane emissions without their further 'capture' or other treatment. According to the second biennial report of Georgia, the new regional landfills envisage the burning of torches in the first place, and then - the "recovery" of methane for its further use. These quantities depend on the efficiency of biogas collection for each landfill.
Results to be achieved		By 2024, 3 new landfills have been arranged (Adjara, Kvemo Kartli, Samegrelo). Compared to 2015 baseline (annual) - in 2030: 220-238 $GgCO_2e$ generated, 80% of it reduced
Sources of Financing (GEL)	**State Budget**	2023-2024 – 70, 000, 000 GEL Through 2030: 43,680,000 GEL (12,000,000 EUR - loans from IFIs
	Municipal	N/A
	Private sector / publicly-owned companies	N/A
	Donor Support	KfW – 25, 000,000 GEL
Responsible Agency		Ministry of Regional Development and Infrastructure of Georgia • LTD Solid Waste Management Company of Georgia • Government of Autonomous Republic of Adjara
Partner Institution(s)		• MEPA
	Agency / Source	• MRDI

Monitoring		• LTD "Solid Waste Management Company" • Government of the autonomous republic of Adjara
	Progress indicator(s)	Number of constructed landfills
Links to other policies and measures and/or dimensions		Decarbonization: GHG-18, GHG-20 Research, innovation, and competitiveness

GHG-20: Upgrade and improvement of Tbilisi's landfill

GHG-20: Upgrade and improvement of Tbilisi's landfill	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Installing a methane gas capture and recovery system in Tbilisi's landfill. Tbilisi city landfill is designed in accordance with modern standards. However, it lacks a system of methane gas and seepage water/leachates recycling, which avoids GHG emissions. Construction is expected to be completed by 2024 (last quarter of 2023)	
Timeframe	2021-2023 (last quarter of 2023) Construction and further utilization.
Sector	Waste
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Council Directive 1999/31/EC on landfill waste (EC) as amended by Regulation No. 1882/2003 • Waste Management Code • 4th National Environmental Action Programme (NEAP-4) of Georgia 2022-2026 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status	Ongoing
Assumptions	The treatment plant is equipped with gas collection and recycling systems. According to the EIA document, gases from the landfill should be captured with an 80% efficiency.

		Involves the arrangement of landfill and wastewater treatment systems. Since the implementation dates are unknown, the initial year was 2024. Biogas collection-utilization efficiency 80%. This percentage was used to calculate the 'recovery' of methane, assuming that the volume fraction of methane in the generated biogas is half. Therefore, a 40% reduction in methane (recovery) is calculated.
Results to be achieved		The Tbilisi landfill has a gas collection and exhaust water management system, which fully complies with the technical regulations on landfill arrangement, operation, closure, and further maintenance approved by the Government of Georgia. 136 $GgCO_2e$ reduced in 2030. Cumulative through 2030: 680.4 Gg CO_2e (32.4 Gg CH_4)
Sources of Financing (GEL)	**State Budget**	N/A
	Municipal	4,000,000 GEL (loan) GEL 2,013,907.80 has been allocated for the construction works of the westward expansion of the third cell of the Tbilisi household waste landfill. For the construction of the fourth cell - 986,092.2 GEL this year
	Private sector / publicly owned companies	N/A
	Donor Support	Loan from EBRD The amount of the loan for the improvement of the wastewater treatment system of the Tbilisi Didi Lilo landfill - 7,000,000 euros (without VAT) Arrangement of gas collection system - 18,000,000 euros (without VAT) The total amount of the loan for the arrangement of the material recovery facility (MRF) - 12,000,000 euros (without VAT)
Responsible Agency		Tbilisi Municipality
Partner Institution(s)		MEPA Tbilservi Group Ltd
	Agency / Source	Tbilisi Municipality

Monitoring	**Progress indicator(s)**	• A system for gas and leachate management is installed at the landfill • m^3 of gas captured tracked by the operator
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy (potential use of the gas) Energy security Research, innovation, and competitiveness

GHG-21: Collection and use of methane in Kutaisi's non-hazardous waste landfill

GHG-21: Collection and use of methane in Kutaisi's non-hazardous waste landfill	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Installing a methane capture and use system in Kutaisi's landfill. The landfill has been in operation since 1956 and the total amount of waste received at the landfill is unknown. 59% reduction of methane emissions generated from the remaining mass after the closure of the landfill is planned. Preparation of the gas collection design documents as well as the construction and commissioning of the gas collection system is scheduled to take place in the 2025. It is not planned to set up a gas collection system at the existing Kutaisi landfill (Nikea) during the operational stage. After the construction of the new regional non-hazardous waste disposal facility (I quarter of 2025), it is planned to close the existing Kutaisi landfill (Nikea) and arrange a gas collection system. This measure is conditional on international financial support.	
Timeframe	last quarter of 2025)
Sector	Waste
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Council Directive 1999/31/EC on landfill waste (EC) as amended by Regulation No. 1882/2003 • Waste Management Code • 4th National Environmental Action Programme (NEAP-4) of Georgia 2022-2026 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)

Implementation status		Not begun yet
Assumptions		59% reduction of methane emissions
Results to be achieved		The Kutaisi landfill has a gas recycling system, which fully complies with the technical regulations approved by the Government of Georgia on Landfill Arrangement, Operation, Closure and Further Care. Compared to 2015 baseline (annual): 33 $GgCO_2e$ reduced in 2030 Total cumulative reduction through 2030: 199.3 $ktCO_2e$ (or 9.49 kt CH_4)
Sources of Financing (GEL)	**State Budget**	4,000,000 GEL
	Central Budget	N/A
	Municipal	N/A
	Private sector / publicly owned companies	N/A
	Donor Support	KfW, EU/NIF
Responsible Agency		Ltd Solid Waste Management Company of Georgia
Partner Institution(s)		MEPA
Monitoring	**Agency / Source**	Ltd Solid Waste Management Company of Georgia
	Progress indicator(s)	• Gas recycling systems are installed at the landfills • m^3 of gas captured tracked by the operator
Links to other policies and measures and/or dimensions		Decarbonization: GHG-19, renewable energy Energy security Research, innovation, and competitiveness

GHG-22: Collection and use of methane in Rustavi's non-hazardous waste landfill

GHG-22: Collection and use of methane in Rustavi's non-hazardous waste landfill
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**
Description: Installing a methane gas capture and recovery system in Rustavi's landfill which has been in operation since 2010. By 2017, the amount of waste received at the landfill was around 200,000

tonnes. In 2017 alone, about 36,000 tons of waste were placed at the landfill. Preparation of the gas collection design documents and construction and commissioning of the gas collection system was scheduled to take place in 2020-2024. However, only flaring is taking place. Installation of a gas collection system is conditional. This measure is conditional on international financial support.		
Timeframe		2020-2024 (last quarter of 2023)
Sector		Waste
Relevant planning documents, legal, and regulatory acts		• CSAP • Association Agreement: Supports implementation of Council Directive 1999/31/EC on landfill waste (EC) as amended by Regulation No. 1882/2003 • Waste Management Code • 4th National Environmental Action Programme (NEAP-4) of Georgia 2022-2026 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status		Functioning – flaring in in place
Assumptions		Assumes 59% reduced methane emissions in case of CH_4 recovery, however, only flaring is taking place so far (since 2020)
Results to be achieved		**In case of methane recovery:** Compared to 2015 baseline (annual): 14.5 $GgCO_2e$ reduced in 2030 Cumulative emission reduction between 2024-2030: 86.73 $ktCO_2e$ (or 4.13 $ktCH_4$) **From flaring:** emission reduction = 21.358 Gg CO_2eq (instead of 1.1703 Gg CH_4 will be 3.218 CO_2 will be emitted) annually (from 2021)
Sources of Financing (GEL)	**State Budget**	591, 743 (for installation of a flare)
	Municipal	N/A
	Private sector / publicly owned companies	N/A

	Donor support	
Responsible Agency		Ltd Solid Waste Management Company of Georgia
Partner institution(s)		• MEPA • MRDI
Monitoring	**Agency / Source**	Ltd Solid Waste Management Company of Georgia
	Progress indicator(s)	• Gas recycling systems are installed at the landfills • m^3 of gas captured tracked by the operator
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy security Research, innovation, and competitiveness

GHG-23: Collection and use of methane in Batumi's non-hazardous waste landfill

GHG-23: Collection and use of methane in Batumi's non-hazardous waste landfill	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Installing a methane gas capture and recovery system in Batumi's landfill, which has been in operation since 1965. The total amount of waste collected at the landfill shifts between 3-3.5 million tonnes. In 2017 alone, 65,000 tonnes of waste were placed at the landfill.Currently, the closure of the non-compliant landfill and the preparation of project documentation for the gas transmission (methane gas) system are in progress, the implementation of closure measures is planned from 2024. Within the framework of the Adjara Solid Waste Management Project, the construction of Tsetskhlauri modern standard sanitary landfill has alredy finished in Kobuleti Municipality, . After its commissioning, the landfills that do not comply with existing legislation in Batumi and Kobuleti municipalities will be closed. An integral part of the closure project is the installation of gas extraction systems, a new landfill in 3-4 years based on the installation of the systems will generate up to 1 MW of electricity. The generated energy will be self-used. On the technical feasibility of closing the old landfills, work is underway on feasibility study.	
Timeframe	2023-2025 (las quarter of 2024)
Sector	Waste
Relevant planning documents, legal, and regulatory acts	• CSAP

		• Association Agreement: Supports implementation of Council Directive 1999/31/EC on landfill waste (EC) as amended by Regulation No. 1882/2003 • Waste Management Code • 4th National Environmental Action Programme (NEAP-4) of Georgia 2022-2026 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status		Flaring is ongoing, and when the sufficient gas is generated, it will be collected (since 2024)
Assumptions		• Assumes 80% extraction of generated methane • Assumes 59% reduced methane emissions after landfill closure
Results to be achieved		The new sanitary landfill of Adjara, site in the village of Tshektauri, Kobuleti municipality has a gas collection and recycling system, which fully complies with the technical regulations on landfill arrangement, operation, closure, and further maintenance approved by the Government of Georgia. After gas collection begins, compared to 2015 baseline (annual): 29 Gg CO_2eq reduced in 2030 Total emission reduction between 2024-2030: 174.3 ktCO_2eq (or 8.3 kt CH_4)
Sources of Financing (GEL)	**State Budget**	N/A
	Municipal	4,000,000 GEL (loan, EBRD)
	Private sector / publicly-owned companies	N/A
	Donor Support	Loan 3 000 000 euro and 4 000 000 euro
Responsible Agency		Adjara AR Ministry of Finances and Economy
Partner Institution(s)		• Ministry of Environment and Agriculture • Ministry of Finance and Economy of Adjara • Ltd Adjara Waste Management Company • Batumi City Hall
	Agency / Source	Ministry of Finances and Economy of Adjara

Monitoring	**Progress indicator(s)**	• Gas recycling systems are installed at the landfills • m3 of gas captured tracked by the operator
Links to other policies and measures and/or dimensions		Decarbonization: GHG-18, renewable energy Energy security Research, innovation, and competitiveness

GHG-24: Paper waste recycling

GHG-24: Paper waste recycling	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: The Waste Management National Strategy for 2016-2030 and National Action Plan for 2016-2020 set a minimum rate of recycling for certain kinds of municipal waste which must be achieved by 2030. Recycling rates for paper and cardboard waste are provided for 2020, 2025 and 2030. Paper is an organic material which results in methane emissions in the landfill. Increased recycling of paper will therefore decrease landfill methane generation. This measure is conditional on international financial support. An information brochure has been prepared	
Timeframe	2021-2023 (last quarter of 2023)
Sector	Waste
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Directive 2008/98/EC of the European Parliament and of the European Council on waste management • Waste Management National Strategy for 2016-2030 and National Action Plan for 2016-2020
Implementation status	Planning
Assumptions	Annual mass of recycled paper comprises no less than 30% of produced paper waste. 2020-2030 Gradual removal of paper from municipal solid waste for recycling (30%, 50% and 80% respectively by 2020, 2025 and 2030) was assessed based on the working version of the Climate Change Action Plan (Waste Sector), and for the methane reduction assessment. The IPCC Waste Model was used.

		In the calculation, the initial year 2019 was taken as the baseline, after which the removal of a piece of paper from the waste begins. The calculations were performed with this approach: 30% of the paper waste is removed from a certain source of their generation (for example, special boxes were set up in several cities) by 2020, and after that this mass will never return to the landfill; Then such boxes are added in stages so that 50% removal is carried out by 2025 and 80% by 2030. In calculating the effect of the measure, the first step was to calculate the amount of paper in all existing legal landfills (based on their respective percentages) and calculate the 30% minus the 2020 waste rate (88.2 g of methane). It should be noted that by 2020 we will not have access to natural landfills yet. In the second stage, from 2020 to 2025, the amount of paper on the hypothetical landfill in 2020 (which is already reduced by 30% compared to 2019) is added to the amount of paper removed from natural landfills (75 g) and further calculations (50% removal by 2025 and 80% removal by 2030) is implemented based on this number.
Results to be achieved		• The amount of paper waste recycled each year is at least 30% of the generated paper waste • The practice of separating paper sources has been introduced in at least 2 municipalities • An information brochure has been prepared. Compared to 2015 baseline (annual): • 54 $GgCO_2e$ reduced in 2030 • Total emission reduction between 2021-2030: 483 kt CO_2eq (or 23 Gg CH_4)
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None through 2024 (administration only)
	Private sector / publicly owned companies	21,000 GEL plus ongoing costs to be covered through revenue generation
	Donor Support	To be sought
Responsible Agency		MEPA
Partner Institution(s)		• Private companies

		• Municipalities
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	Amount of paper waste recycled
Links to other policies and measures and/or dimensions		

GHG-25: Biodegradable (organic and garden waste) recycling

GHG-25: Biodegradable (organic and garden waste) recycling	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Diverting organic and garden waste away from landfills for use in composting will reduce landfill methane generation. A composting facility for processing biodegradable (organic and garden) waste is functioning in Marneuli Municipality (not registered yet), another facility is being constructed in Kutaisi municipality. The facility will produce organic fertilizer/compost and is scheduled to start operation in 2020. The purpose of the project is the production of organic fertilizer/compost by recycling biodegradable (organic and garden) waste.	
Timeframe	2021-2023 (last quarter of 2023)
Sector	Waste
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Directive 2008/98/EC of the European Parliament and of the European Council on waste management • Waste Management Code
Implementation status	Ongoing. Supported by JOP Black Sea Basin during 2014-2020.
Assumptions	Kutaisi facility (registered) is assumed to begin from 2021, Marneuli-resided facility (not registered) is already functioning
Results to be achieved	Around 1 $GgCO_2e$ reduced in 2030. Total emission reduction between 2021-2030: 9.16 Gg CO_2eq (or 0.436 Gg CH_4). According to the IPCC 2006 guidelines, composting emissions are poor because biodegradable masses are processed aerobically and only small anaerobic 'pockets' can be a source of methane emissions. This practice is considered to be the best practice in the world as it allows to reduce the mass of waste

		disposed of in landfills and to save the emissions that would have arisen from it if it remained in the landfill. The practice of composting has just started in Georgia and a pilot project is currently being implemented in Kutaisi to compost organic green waste from the garden. Based on the projected productivity of the enterprise (2040 tonnes of green organic waste recycled per year), the emission is calculated, which will be 'saved' or will not flow as a result of the removal of this mass from the municipal landfill.
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None – potential ongoing expenses after initial investment
	Private sector / publicly-owned companies	None
	Donor Support	1,092,000 GEL (300,000 EUR) (Grant from EU)
Responsible Agency		Respective Municipalities
Partner Institution(s)		• The Imereti Scientists' Union "Spectri" (Georgia) • MEPA
Monitoring	**Agency / Source**	Respective Municipalities
	Progress indicator(s)	Amount of organic waste (organic and garden) recycled for compost, by type
Links to other policies and measures and/or dimensions		

GHG-26: Construction of municipal wastewater treatment plants

GHG-26: Construction of municipal wastewater treatment plants	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Construction of 7 municipal wastewater treatment plants. The plants will significantly reduce the negative environmental impacts of wastewater from domestic and industrial sectors which would otherwise be released to natural aquatic areas. Two WWTPs (Poti and Zugdidi) will be equipped with gas collection systems for recovery of generated gas.	
Timeframe	2021 – 2025 (last quarter of 2023) for construction and ongoing utilisation afterwards

Sector	Wastewater
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Council Directive 91/271/EEC concerning urban wastewater treatment, as amended by Directive 98/15/EC and Regulation No. 1882/2003 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status	Ongoing
Assumptions	As a result of wastewater treatment in 7 treatment plants with 80% extraction of methane in Poti and Zugdidi. The measure planned in this sub-sector (construction of new modern treatment systems) involves the completion of 7 treatment plants under construction, while the remaining 14 stations are in the design phase. According to the biennial report of Georgia for 2019, from the stations under construction (Poti, Zugdidi, Gudauri, Anaklia, Ureki, Telavi and Tskaltubo) it is envisaged to collect the biogas released as a result of anaerobic rot in the gas tank for use, and also to install a torch for excess gas. However, this method is used only at Zugdidi and Poti stations, as it seems unprofitable to use any method of gas utilization at other stations. Both methane and nitrogen suboxide emissions from wastewater treatment plants are possible because household wastewater is rich in food waste and protein. The plan envisages the use of the following types of cleaning: centralized aerobic cleaning and anaerobic reactor. In the first case, the more methane is produced, the worse it is managed (cleaned), as well as nitrogen suboxide. In the second case, a significant amount of methane is generated, and it is necessary to capture it or burn it with a torch, while nitrogen suboxide is not produced. Therefore, the emission potential of methane and nitrogen suboxide is calculated, and the magnitude of the emission reduction will depend on the type of specific measures to be implemented, for each specific station. A) Methane emission potential

	According to the 2006 IPCC Guidelines, methane emissions are calculated by the formula: CH_4 = TOW * EF, Where: TOW (kgBOD / y) = P * BOD (g / pers / day) * 0.001 * 365 * I EF (kg CH4 / kg BOD) = Bo * MCF The 2006 IPCC Guidelines give us almost all standard coefficients (Bo = 0.6, MCF = 0 to 1, depending on the type of treatment, I = 1 or 1.25 (in the case of industrial water), but still require national indicators P (population) and BOD (Lb) knowledge. The total potential for methane generation was calculated from all (21) new stations using the national parameter of the number of connected populations and the amount of wastewater discharged daily per capita. From the three existing stations, Tbilisi-Rustavi-Gardabani station performs only the first biological and chemical treatment, aerobic stabilization of the sludge, mechanical cleaning; Batumi and Kobuleti treatment plants are of deep anaerobic lagoon type. From this data we have the populations to be connected to the construction stations, but we did not have BOD (g / person / day. The only source for calculating this value was the existing stations - Tbilisi and Batumi - Indicators: From the Tbilisi station we have the JBM value at the exit (23 mg / l) and the actual volume at the entrance (480 000 m^3 per day). From these data, the number of litres per capita (connected to the station) (480000 m^3 / 1233820 =) 0.389 m^3 / person / day was calculated. For one quantity of m^3 in Batumi, the indicator of Batumi was taken (115 mg / l (= 115 g / m^3). G / day / person. Using this coefficient, we can calculate the potential range of methane emitted from the wastewater of new plants from MCF = 0.3 (aerobic centralized, poor purification) to MCF = 0.8 (in the case of anaerobic reactor or anaerobic lagoon) per year, depending on the population. It is assumed that the number of connected populations has remained unchanged since 2019[179].

179 It should be noted that in 2021-2022, the Abastumni resort treatment plant was built, which is working in a test mode, therefore, according to the EIA report, the number of people connected to the treatment plant should be 1,500 permanent residents and 5,500 tourists by 2040. In total, 7,000 people will be connected to the treatment plant. Also, the construction of

	Thus, there is significant potential for methane emissions from new plants and the magnitude of its reduction will depend on the specific treatment type of the water treatment plant. It should be noted that the removed (sludge) sludge contains a significant amount of perishable component and is a source of methane emissions without proper treatment. However, our practice (yard stacking) provides aeration, which prevents the formation of methane. Periodic removal of this mass is important to ensure an adequate level of aeration. Most likely, it is possible to 'catch' or remove methane or burn it with a torch. In the first case, the amount of 'removed' methane will depend on the productivity of the methane collection device (%) and is calculated by multiplying the amount of methane produced by the corresponding percentage; In the case of torch combustion, the amount of methane produced and burned is calculated from the amount of methane generated and burned, based on the chemical reaction: $CH_4 + 2O_2 = CO_2 + 2H_2O$ The starting point is the origin of methane, the potential of which is counted here. B) Nitrogen oxide emission potential This emission occurs at some water treatment plants due to the protein and nitrogen content in the wastewater. The calculation is based on the national per capita protein intake and standard coefficients. Old, 1996 revised IPCC guidelines for sewerage: N_2O (S) = Protein • FracNPR • NRPEOPLE • EF where: N_2O is N_2O emissions from wastewater (kg N_2O-N / year) Protein - per capita protein consumption per year (kg / person / year) NRPEOPLE – Population EF - Emission coefficient (standard value 0.01 (0,002-0,12) kg N_2O-N / kg in wastewater N FracNPR - Nitrogen content in protein, standard value = 0.16 kg N / kg protein

the Zugdidi treatment plant was completed in 2021, and according to the EIA report, 78,016 people should be connected to it by 2030.

		To calculate this emission in the 2015 cadastre for the Protein parameter, FAO data on per capita protein consumption for Georgia (1990-1992 (56 g / person / day), 1995-1997 (69 g / person / day), 2000-2002 (72 g / person / Day) and 2005-2007 (77 g / person / day), and for the period 2008-2015 this figure was increased by one gram (g / person / day) until 2015. After 2015, the coefficient is 85. As a result, in 2015 N_2O emission in Georgia was 0.19 g N_2O = 58 CO_2eq (see Table 6.13 N_2O emission (g) from sewage). Using the same coefficient, the number of properly connected populations can be calculated from the N_2O emitted from the new treatment plants, in the event of its occurrence (which occurs during aerobic central treatment). The 2006 guideline distinguishes between direct and indirect emissions of N_2O, the first of which refers to emissions from the treatment system and is very small, so it only makes sense to count for advanced treatment systems, while indirect emissions are the amount of N_2O that enters the reservoir. N_2O emissions do not occur in the deep anaerobic lagoon, but at central aerobic treatment plants this emission is induced, and its reduction calculation is related to specific measures. Thus, only potential emissions for both methane and nitrogen suboxide emissions are calculated, and the specific reduction will depend on the specific measure implemented. This measure (removal of biogas from construction sites) does not imply a reduction in nitrogen oxide, but knowledge of its release potential will be useful for future measures (eg, production of compost from demethanised sludge for agricultural purposes).
Results to be achieved		Construction of 7 municipal wastewater treatment plants. Two WWTPs (Poti and Zugdidi) will be equipped with gas collection systems for recovery of generated gas. Compared to 2015 baseline (annual): 12 $GgCO_2e$ reduced in 2030 Total emission reduction between 2020-2030: 118 $ktCO_2e$ (or 5.62 $ktCH_4$)
	Central budget	34,214,344 GEL Total budget = 183,146,618 GEL (State + donors)
	Municipal	N/A as currently foreseen

Sources of Financing (GEL)	**Private sector / publicly-owned companies**	N/A as currently foreseen
	Donor Support	148,906,274 GEL (loan from ADB)
Responsible Agency		Ltd "United Water Supply Company of Georgia"
Partner Institution(s)		• MEPA • MRDI
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	• Number of constructed treatment plants reported • m^3 of water processed / tonnes of sludge • m^3 of biogas used
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy security Research, innovation and competitiveness

GHG-27: Methane capture and recovery in Tbilisi's wastewater treatment plant

GHG-27: Methane capture and recovery in Tbilisi's wastewater treatment plant	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Install a methane gas capture and end use system in Tbilisi's wastewater treatment plant. This measure is conditional on private financial support.	
Timeframe	2021-2023 (last quarter of 2023)
Sector	Wastewater
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Council Directive 91/271/EEC concerning urban wastewater treatment, as amended by Directive 98/15/EC and Regulation No. 1882/2003

		• National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status		In planning
Assumptions		• Assumes 80% recovery of produced methane, for self-use • The potential for methane emissions in Measure GHG-27 uses the same national coefficients in the assumptions for Measure GHG-26.
Results to be achieved		Tbilisi Urban Wastewater Treatment Plant has gas collection and recycling systems that are fully compliant 91/271 / EEC Council of Europe Directive. 81-87 Gg CO_2eq (or 3.85-4.14 kt CH_4) reduced in 2030 and annually
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	21,000 GEL (GWP Ltd) (initial activity)
	Donor Support	None
Responsible Agency		LTD Georgian Water and Power
Partner Institution(s)		• Ministry of Environmental Protection and Agriculture • Tbilisi municipality City Hall
Monitoring	**Agency / Source**	LTD Georgian Water and Power
	Progress indicator(s)	• m^3 of water processed / tonnes of sludge • m^3 of biogas recovered
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy security Research, innovation, and competitiveness

GHG-28: Methane capture and recovery in Batumi's wastewater treatment plant

GHG-28: Methane capture and recovery in Batumi's wastewater treatment plant

Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**		
Description: Install a methane gas capture and recovery system in Batumi's wastewater treatment plant. This measure is conditional on private financial support.		
Timeframe		2021-2023 (last quarter of 2023) construction and further utilization
Sector		Wastewater
Relevant planning documents, legal, and regulatory acts		• CSAP • Association Agreement: Supports implementation of Council Directive 91/271/EEC concerning urban wastewater treatment, as amended by Directive 98/15/EC and Regulation No. 1882/2003 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status		Methane recovery has not begun yet, but flaring is happening
Assumptions		• Assumes 80% recovery of produced methane • The potential for methane emissions in Measure GHG-28 uses the same national coefficients in the assumptions for Measure GHG-26.
Results to be achieved		In case of methane recovery: 23.5-28 Gg CO_2eq (or 1.12-1.32 Gg CH_4) reduced in 2030 and annually for 2022-2030
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	17,500 GEL (LTD Batumi Water) (initial activity)
	Donor Support	None
Responsible Agency		LTD Batumi Water
Partner Institution(s)		Ministry of Environmental Protection and Agriculture Batumi municipality City Hall

Monitoring	**Agency / Source**	LTD Batumi Water
	Progress indicator(s)	• m^3 of water processed / tonnes of sludge • m^3 of biogas recovered
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy security Research, innovation, and competitiveness

GHG-29: Methane capture and recovery in Kobuleti's wastewater treatment plant

GHG-29: Methane capture and recovery in Kobuleti's wastewater treatment plant	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Install a gas capture and recovery system in Kobuleti's wastewater treatment plant. This measure is conditional on private financial support.	
Timeframe	2021-2023 (last quarter of 2023) construction and further utilization
Sector	Wastewater
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Council Directive 91/271/EEC concerning urban wastewater treatment, as amended by Directive 98/15/EC and Regulation No. 1882/2003 • National Waste Management Strategy and Action Plan • National Environment and Health Action Plan of Georgia 2018-2022 (NEHAP-2)
Implementation status	Not begun yet
Assumptions	• Assumes 80% recovery of produced methane • The potential for methane emissions in Measure GHG 29 uses the same national coefficients in the assumptions for Measure GHG-26.
Results to be achieved	Kobuleti treatment plant has gas collection and recycling systems, which are fully compliant with 91/271/EEC Council of Europe Directive

		Compared to 2015 baseline (annual): 7.1-7.9 Gg CO_2eq reduced (or 0.34-0.38 Gg CH_4) in 2030
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	17,500 GEL (Kobuleti Water Ltd)
	Donor Support	None
Responsible Agency		LTD Kobuleti Water
Partner Institution(s)		MEPA Kobuleti municipality
Monitoring	**Agency / Source**	LTD Kobuleti Water
	Progress indicator(s)	• m^3 of water processed / tonnes of sludge • m^3 of biogas recovered
Links to other policies and measures and/or dimensions		Decarbonization: Kobuleti treatment plant has gas collection and recycling systems, which are fully compliant with 91/271 / EEC Council of Europe Directive Energy security Research, innovation, and competitiveness

GHG-30: Education and awareness raising on organic waste management

GHG-30: Education and awareness raising on organic waste management	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Develop an awareness raising strategy and campaign for entrepreneurs and farmers to increase the promotion of the use of composting.	
Timeframe	2021-2022 (last quarter of 2024)
Sector	Waste
Relevant planning documents, legal, and regulatory acts	CSAP
Implementation status	Ongoing

Assumptions		None
Results to be achieved		Development of the strategy Increase amount of organic and garden waste reused as reported by municipalities
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	118,800 GEL (30,000 EUR) (grant) Governments of Sweden, Norway, UK
Responsible Agency		MEPA LEPL Environmental Information and Education Centre
Partner Institution(s)		Municipalities
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	• Number of strategy papers • Number of awareness campaigns • Amount of recycled organic and garden waste, by types and municipalities.
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness

GHG-31: Establish a consolidated process for collecting and updating data for the waste sector

GHG-31: Establish a consolidated process for collecting and updating data for the waste sector	
Objective 1.4: **Support low-carbon development of the waste sector through encouraging climate-friendly innovative technologies and services**	
Description: Establishment of a clear list of indicators to be monitored as well as a methodology for obtaining the data.	
Timeframe	2021-2023
Sector	Waste
Relevant planning documents, legal, and regulatory acts	CSAP

Implementation status		In planning
Assumptions		No emissions reductions / impacts calculated
Results to be achieved		• The National Statistics Office of Georgia has started producing waste statistics • Emission reports rely on sources and data (including incineration and composting)
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	62,500 GEL (grant from EU)
Responsible Agency		National Statistics Office of Georgia (GeoStat)
Partner Institution(s)		MEPA
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	Number of strategic documents Number of indicators, metrics and/or emission factors adopted
Links to other policies and measures and/or dimensions		Research, innovation, and competitiveness

Policies and Measures - Dimension Decarbonization: Renewable Energy

RE-1: Ongoing technical and procedural support for wind power production

RE-1: Ongoing technical and procedural support for wind power production
Objective 1.5: Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)
Description: Public agencies and subordinate will support increasing the potential of renewable energy sources in the following ways: 1) by conducting preliminary research works; 2) preliminary technical and economic evaluation of projects; 3) with a preliminary assessment of the impact on the environment; 4) Finding investors and getting them interested in existing projects.

By 2024, it includes development of the following wind power plants:[180] - Imereti - 102 MW - Rikoti-Fona -20 MW - Nigoza - 50 MW - Dirbula - 21 MW - Ruisi - 12.6 MW - Samgori - 8 MW - Zestafoni - 50 MW - Tbilisi - 54 MW - Kaspi - 54 MW	
Timeframe	2021 – 2024 (with utilisation and new plants through 2030 and beyond)
Sector	Energy
Relevant planning documents, legal, and regulatory acts	• TYNDP • CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC
Implementation status	According to the status report of the Ministry of Environment Protection and Agriculture of December 31, 2022, at the stations: Imereti - 102 MW, Ricoti-Fona - 20 MW, Tbilisi - 54 MW, Kaspi - 54 MW, Samgori - 8 MW and Nigoza - 50 MW, basic studies have been completed and construction is underway Signing of contracts. Completion of their construction is planned for 2024: construction works on the stations of Dirbula and Ruisi will begin after the completion of feasibility studies[181].
Assumptions	1. Due to implemented energy efficiency measures the annual electricity demand grows by 2.0-2.5% only; 2. The seasonal availability factors for the wind power plants are: Dec-Mar - 41%; April-June -45%; July-Sept - 40%; Oct-Nov - 45%) 3. Financial Lifetime: 30 years 4. Investment Cost - 1320 USD/kW

180 Implementing companies are expected to be: Imereti - Infinite Energy Ltd; Rikoti-Fona - Taba Ltd; Tbilisi - JSC "Caucasus Wind Company"; Kaspi - JSC "Caucasus Wind Company"; Samgori - Vento Ltd; Zestaponi - Zestaponi Wind Power Plant Ltd; Nigoza - JSC "Chalik Georgia Wind"; Ruisi - Ruisi Wind Power Plant Ltd, Dirbula - Ltd. "Sinte"

181 See the status report of the Ministry of Environment Protection and Agriculture of Georgia on December 31, 2022: https://mepa.gov.ge/Ge/Reports

Results to be achieved		2030 - 730 MW total capacity 2050 – 1573 MW total capacity
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	2,742,000,000 GEL through 2024 5,908,000,000 GEL through 2050
	Donor Support	None
Responsible Agency		MoESD,
Partner Institution(s)		Power generation companies that will implement this measure JSC GEDF
Monitoring	**Agency / Source**	GNERC
	Progress indicator(s)	Annual generation by power plants (MWh)
Links to other policies and measures and/or dimensions		Decarbonization: GHG Emissions and Removals Energy security Internal energy market

RE-2: Ongoing technical and procedural support for solar power production

RE-2: Ongoing technical and procedural support for solar power production
Objective 1.5: **Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)**
Description: Public agencies and subordinate will support increasing the potential of renewable energy sources in the following ways: 1) by conducting preliminary research works; 2) preliminary technical and economic evaluation of projects; 3) with a preliminary assessment of the impact on the environment; 4) Finding investors and getting them interested in existing projects. By 2024, it includes development of the following solar power plants[182]: • Udabno - 5 MW • Unspecified solar power plant - 1 MW

182 Implementing companies are expected to be: Desert Solar Station - Georgian Solar Company Ltd; Gardabani - EBRD; Marneuli - New Generation Ltd; Sagarejo - JSC "Georgian Energy Development Fund"

• Flevi - 7 MW • Gardabani - 50 MW (EBRD) • Marneuli - 68 MW • Geosolar - 9 MW • Sagarejo - 25 MW		
Timeframe		2021 – 2024 (with utilisation and new plants through 2030 and beyond)
Sector		Energy
Relevant planning documents, legal, and regulatory acts		• Ten Year Network Development Plan • CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC
Implementation status		According to the status report of the Ministry of Environment Protection and Agriculture of December 31, 2022, the projects are in different stages of development: Udabno (5 MW) - work is underway on the construction contract; Flavi (7 MW) - the contract has not been signed Gardabani (50 MW) (EBRD) - work is underway on the technical-economic study contract Marneuli (68 MW) - completed the technical-economic studies, the process of signing the construction contract is underway; Geosolar (9 MW) - work is underway to sign the technical-economic research agreement;
Assumptions		• Due to implemented energy efficiency measures the annual electricity demand grows by 2.0-2.5% only; • The seasonal availability factors for the solar power plants are: Dec-Mar - 41%; April-June -43%; July-Sept - 46%; Oct-Nov - 18%); available only during daytime. • Financial Lifetime: 30 years; • Investment Cost – 650 USD/kW
Results to be achieved		2030 – 547 MW 2050 – 1383 MW
	State Budget	None
	Central Budget	None
	Municipal	None

Sources of Financing (GEL)	**Private sector / publicly-owned companies**	1,113,000,000 GEL through 2030 2,814,000,000 GEL through 2050
	Donor Support	None
Responsible Agency		MoESD,
Partner Institution(s)		• Power generation companies that will implement this measure • JSC Georgian Energy Development Fund
Monitoring	**Agency / Source**	GNERC
	Progress indicator(s)	Annual generation by power plants (MWh)
Links to other policies and measures and/or dimensions		Decarbonization: GHG Emissions and Removals Energy security Internal energy market

RE-3: Ongoing technical and procedural support for hydro power production

RE-3: Ongoing technical and procedural support for hydro power production
Objective 1.5: **Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)**
Description: Public agencies and subordinate will support increasing the potential of renewable energy sources in the following ways: 1) by conducting preliminary research works; 2) preliminary technical and economic evaluation of projects; 3) with a preliminary assessment of the impact on the environment; 4) Finding investors and getting them interested in existing projects. By 2024, it includes development of the following hydro power plants (above 13 MW)[183]: • Kirnati - 51.25 MW • Khobi - 46.7 MW • Mtkvari - 53 MW • Mestiachala 1 - 20 MW • Stori 1 - 20.03 MW • Samkhuristskali 2 - 26.28 MW • Metekhi 1 - 36.73 MW • Ghebi - 14.34 MW

183 Implementing companies are expected to be: Kirnati - Adjara Energy 2007 Ltd; Khobi - Kartli Investment Group Energy Ltd; Mtkvari - Mtkvari HPP Ltd; Mestiachala - JSC "Svaneti Hydro"; Story - Gota 21 Ltd; Samkhuritskali - "Feri" Ltd; Metekhi - Phasis Energy and Yenugen Ltd; Ghebi - Phasis Energy and Yenugen Ltd; Chiora - Chiora HPP Ltd; Zoti Cascade - JSC "Georgian Renewable Energy Company".

• Chiora - 14.15 MW • Zoti - 44.31 MW	
Timeframe	2021 – 2024 (with utilisation and new plants through 2030 and beyond)
Sector	Energy
Relevant planning documents, legal, and regulatory acts	• TYNDP • CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC
Implementation status	According to the status report of the Ministry of Environment Protection and Agriculture of December 31, 2022, work is underway on the following hydropower plants: Kirnati (51.25 MW) - partially commissioned (27 MW); Completion is planned for 2023 and about 95% of the work is done. Khobi 2 (46.7 MW) - the project is in the construction stage, about 80% of the works have been completed. Mtkvari (53 MW) - the project is in the construction stage, about 80% of the works have been completed. Mestiachala 1 (20 MW) - put into operation. Story 1 (20.03 MW) - the project is in the construction stage, about 85% of the works are completed. Samkuristskali 2 (26.28 MW) - construction work has been stopped due to residents' protest. Metekhi 1 (36.73 MW) - the project is under construction, suspended. Ghai (14.34 MW) - the project is in the construction stage, suspended. Chhiora (14.15 MW) - the project is in the construction stage, about 50% of the works have been completed. Zoti (46.07 MW) - the project is in the construction stage, about 55% of the works have been completed. In addition, during 2021-2022, 15 HPPs were commissioned with a total installed capacity of 46 MW. Since the deadlines for the execution of projects change periodically due to various circumstances - the construction is completed earlier or on the contrary is delayed (financial problems, environmental conditions, social problems, etc.), as well as new projects are added and/or existing memorandums are canceled, it would be more correct for the assessment to be in operation Using installed capacity as an indicator rather than specific projects.
Assumptions	• Due to implemented energy efficiency measures the annual electricity demand grows by 2.0-2.5% only • Investment costs between 1000 USD/kW and 3000 USD/kW

Results to be achieved		**Regulating hydros:** 2030 – 430 MW 2050 – 1 GW **Run-of-river hydros:** 2030 - 237 MW 2050 - 230 MW Total capacity of 5,510 MW in 2050
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	1,980,000,000 GEL through 2024 4,402,000,000 GEL through 2030 13,384,000,000 GEL through 2050
	Donor Support	None
Responsible Agency		MoESD
Partner Institution(s)		Power generation companies that will implement this measure JSC GEDF
Monitoring	**Agency / Source**	GNERC
	Progress indicator(s)	Annual generation by power plants (MWh)
Links to other policies and measures and/or dimensions		Decarbonization: GHG Emissions and Removals Energy security Internal energy market

RE-4: Support for micro-generation from renewable sources

RE-4: Support for micro-generation from renewable sources	
Objective 1.5: **Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)**	
Description: Policy and investment support for microgeneration of electricity (up to 500 kW) for a total of at least 200 MW in 2030	
Timeframe	2018 – 2020 for policy adoption, with ongoing implementation

Sector		Energy
Relevant planning documents, legal, and regulatory acts		• Law on Energy and Water Supply • Renewable Energy Law
Implementation status		Share of energy consumption from renewable energy sources at 0.5% in 2019
Assumptions		Due to implemented energy efficiency measures the annual electricity demand grows by 2.0-2.5% only; The seasonal availability factors for the solar power plants are: Dec-Mar - 41%; April-June -43%; July-Sept - 46%; Oct-Nov - 18%); available only during daytime. Financial Lifetime: 30 years; Investment Cost - 715 USD/kW (for commercial, larger systems) and 858 USD/kw for residential smaller systems;
Results to be achieved		Expected generation capacity of 200 MW by 2030, 400 MW by 2050 through various support mechanisms (easier administrative procedures, green tariff, etc.).
Sources of Financing (GEL)	**State Budget**	109,692,000 GEL through 2030 (Code 24 14)
	Municipal	None
	Private sector / publicly owned companies	1,074,000,000 GEL private sector investment (including 53,000,000 EUR already planned via loans and grants from donors.184
	Donor Support	To be established
Responsible Agency		MoESD
Partner Institution(s)		JSC "Georgian State Electrosystem"
Monitoring	**Agency / Source**	GNERC
	Progress indicator(s)	• Number of connections • Power supplied
Links to other policies and measures and/or dimensions		Decarbonization: GHG Emissions and Removals Energy security Internal energy market

184 Sources: EBRD, WB, KFW, EU-NIF

RE-5: Ongoing support for geothermal heat production

RE-5: Ongoing support for geothermal heat production		
Objective 1.5: **Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)**		
Description: Continued support for expansion of the use of existing geothermal production – including feasibility studies (cost-benefit analyses, resource assessments) and investments[185].		
Timeframe		2020 – 2022 for policy development and ongoing investments
Sector		Energy
Relevant planning documents, legal, and regulatory acts		REAP
Implementation status		In development
Assumptions		The use of geothermal energy increases via linear progression from previous years.
Results to be achieved		• 2030 - 840 TJ • 2050 - 1234 TJ
Sources of Financing (GEL)	**State Budget**	N/A
	Municipal	Not yet defined
	Private sector / publicly owned companies	Not yet defined
	Donor Support	N/A
Responsible Agency		MoESD
Partner Institution(s)		Municipalities
Monitoring	**Agency / Source**	GNERC
	Progress indicator(s)	Annual energy production from geothermal sources
Links to other policies and measures and/or dimensions		Decarbonization: GHG Emissions and Removals Energy security

185 Source: EBRD, WB, KfW, EU-NIF

RE-6: Biofuel production and sales

<table>
<tr><td colspan="3">RE-6: Biofuel production and sales</td></tr>
<tr><td colspan="3">Objective 1.5: Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)</td></tr>
<tr><td colspan="3">Description: Initially, the policy measure will involve the regulations for certification of biofuels (biodiesel, bioethanol or other) as sustainable. Additionally, there will be an introduction of biofuel production capacity and gradual increase of sales and consumption of B7, a 7% biodiesel – 93% diesel mixture.

Outcome Indicators:

Created a database on the production and sale of biodiesel

One information brochure has been prepared and published</td></tr>
<tr><td colspan="2">Timeframe</td><td>2019 - 2030</td></tr>
<tr><td colspan="2">Sector</td><td>Energy / Waste / Transport</td></tr>
<tr><td colspan="2">Relevant planning documents, legal, and regulatory acts</td><td>CSAP

Renewable Energy Law</td></tr>
<tr><td colspan="2">Implementation status</td><td>In development</td></tr>
<tr><td colspan="2">Assumptions</td><td>• All other measures in transport sector take place

• The fuel consumption of biofuel blends is the same as for pure fossil fuels</td></tr>
<tr><td colspan="2">Results to be achieved</td><td>• Created a database on the production and sale of biodiesel

• One information brochure has been prepared and published

• Biodiesel share in total diesel for transport: 2030 -4%; 2050% - 12%

• Bioethanol share in total gasoline for transport: 2030 -4%; 2050% - 12%</td></tr>
<tr><td rowspan="4">Sources of Financing (GEL)</td><td>State Budget</td><td>Administrative Costs</td></tr>
<tr><td>Municipal</td><td>N/A</td></tr>
<tr><td>Private sector / publicly owned companies</td><td>Not defined – ongoing costs for fuel imports</td></tr>
<tr><td>Donor Support</td><td>N/A</td></tr>
<tr><td colspan="2">Responsible Agency</td><td>MEPA</td></tr>
</table>

Partner Institution(s)		• LTD Biodiesel Georgia • The Biomass Association of Georgia
Monitoring	**Agency / Source**	National Statistics Office of Georgia, GeoStat
	Progress indicator(s)	Top-down information on fuel consumption Status of regulations adopted to enable certification of sustainable biofuels and their sale
Links to other policies and measures and/or dimensions		Decarbonization: GHG-1, RE-6, RE-7 Energy security Research, innovation, and competitiveness

RE-7: Encourage uptake of solar water heating systems

RE-7: Encourage uptake of solar water heating systems	
Objective 1.5: Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)	
Description: Implementation of financial incentives, supportive policies, and information campaigns to promote the use of solar water heating systems in residential and commercial buildings. The use of the solar systems will replace national gas and other types of traditional fuels. The measure entails introduction of a program for establishing the market for this technology (i.e., solar water heating systems). This includes the development of policies (e.g., standards, planning, and permits), awareness raising, and other promotional activities. This measure is conditional on international financial support. According to a public opinion poll conducted before and after the information campaign, the awareness of the target audience about solar water heating has been increased by at least 50%.	
Timeframe	2019 - 2030
Sector	Energy / Buildings
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC-EPBD and Directive 2012/27/EC EED
Implementation status	Under development
Assumptions	In 2016, around 15.6% of total final energy consumption in commercial and public buildings is used for water heating, from which 64% is from electricity, and 20% by gas. Remaining mostly

		comes from geothermal energy. It is assumed that demand will grow together with the growth of commercial space. In 2016, around 10.1% of total final energy consumption in residential buildings is used for water heating, from which 78% is from gas. The share of households that have hot water from tap is 65%, to grow to 75% by 2030 and 90% by 2050. Gasification assumed to reach 95% by 2030. Assumed 1200 USD / system for households, 10,000 USD/ system for commercial buildings
Results to be achieved		SHW implementation as follows: **Residential:** 2030 - 5000 households 2050 – 25,000 households; **Commercial:** 2030 - 70 buildings 2050 - 210 buildings
Sources of Financing (GEL)	**State Budget**	164,000 GEL incentive programme
	Municipal	None
	Private sector / publicly owned companies	Households and commercial sector: 163,000,000 GEL (investment)
	Donor Support	To be established
Responsible Agency		MoESD
Partner Institution(s)		MEPA, Ministry of Finance
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	• Number of financial incentives adopted • Number of residential and commercial buildings where solar energy is used for water heating • Market surveys of solar water heating system installers
Links to other policies and measures and/or dimensions		Decarbonization: GHG Emissions and Removals Energy efficiency: EE-3, EE-6, EE-8 Energy security

	Research, innovation, and competitiveness

RE-8: Facilitate alternate energy utilization in cement production

RE-8: Facilitate alternate energy utilization in cement production		
Objective 1.5: Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)		
Description: Introduce policies or regulation to facilitate and increase the use of organic waste as a fuel in cement production. The waste-to-energy will replace the use coal for energy generation. This measure is conditional on international financial support.		
Timeframe		2019 - 2030
Sector		Industry / Waste
Relevant planning documents, legal, and regulatory acts		• CSAP • Association Agreement: Supports implementation of Directive 2008/50/EC on ambient air quality and Directive 2010/75/EU on industrial emissions
Implementation status		In development
Assumptions		In 2016 coal makes 70% of final energy used for process heat in non-metallic mineral industry. It is assumed that the change of fuel will require no or minimal technological change.
Results to be achieved		15% of coal is substituted by Municipal Solid Waste by 2030
Sources of Financing (GEL)	**State Budget**	N/A
	Municipal	N/A
	Private sector / publicly owned companies	Investment to be defined
	Donor Support	N/A
Responsible Agency		• LTD Heidelberg • MoESD
Partner Institution(s)		LTD Heidelberg
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	• Number of regulations adopted

		• Amount of waste-to-energy generated by industry
Links to other policies and measures and/or dimensions		Decarbonization: GHG Emissions and Removals Energy security Research, innovation, and competitiveness

RE-9: Improved management of solid biomass resources

RE-9: Improved management of solid biomass resources		
Objective 1.5: Increase the share of final energy consumption from renewable energy sources (target of 27,4% by 2030)		
Description: Implementation of new Forest Code, inventory of forests, and support for the use of residues. This measure is conditional on international financial support.		
Timeframe		2021-2025 Policy adoption and implementation until 2030.
Sector		Forestry
Relevant planning documents, legal, and regulatory acts		Forest Code
Implementation status		Under development
Assumptions		• Available sustainable solid biomass resources make up 3120 TJ (400,000 m^3) annually • Available sustainable agricultural residues make around 3000 TJ annually
Results to be achieved		Implementation of forest code to ensure only sustainable biomass resources are used for energy.
Sources of Financing (GEL)	**State Budget**	Minimal – focused on enforcement
	Municipal	N/A
	Private sector / publicly owned companies	Ongoing as part of operations and maintenance
	Donor Support	GCF / GIZ grants (covered in other measures)
Responsible Agency		MEPA
Partner Institution(s)		Donor agencies

Monitoring	**Agency / Source**	Forest Agency
	Progress indicator(s)	• Ha under improved management • m^3 of wood produced sustainably
Links to other policies and measures and/or dimensions		Decarbonization: GHG-9 through GHG-16 Energy security Research, innovation, and competitiveness

Policies and Measures - Dimension Energy Efficiency

Energy Efficiency in Buildings

EE-1: Development of building energy performance certification scheme / minimum performance standards

EE-1: Development of building energy performance certification scheme / minimum performance standards
Objective 2.1: Achieve primary energy consumption savings in the buildings sector
Description: This measure involves the national scale transposition and enforcement of the Energy Performance in Buildings Directive (2010/31/EU). It will establish the building energy performance requirements through building codes and certification. The current construction code includes a statement on energy efficiency but does not set up any energy efficiency indicators for buildings. Based on the Code's requirement, the Government of Georgia will elaborate and issue technical regulations on building energy efficiency by 1 June 2020. This measure will cumulatively promote efficiency improvements in the subsector for public, residential, and commercial buildings. Implementation of the EPBD will create the legal and regulatory basis, technical capacity, norms, and technical guidance, as well as awareness of users of buildings and transform the market towards more efficient buildings. Aspects of the transposition and enforcement of the EPBD include the following: • Adoption of a methodology for calculating the energy performance of buildings; • Calculation of cost-optimal levels of minimum energy performance requirements and setting these levels for new and existing buildings; • For new buildings, ensuring that before construction starts, the technical, environmental, and economic feasibility of high-efficiency alternative systems if available is considered and taken into account; • For existing buildings, ensuring that when buildings undergo major renovation, the energy performance of the building or the renovated part is upgraded to meet minimum energy performance requirements;

- For the purpose of otimizing the energy use of technical building systems, setting system requirements in respect of the overall energy performance, the proper installation, and the appropriate dimensioning, adjustment and control of the technical building systems;
- Ensuring that a target date is set and implemented for all new buildings to be nearly zero energy buildings – as well as some level of refurbished buildings;
- Where considered appropriate, development financial incentives to address market barriers;
- Development and implementation of a system for energy performance certification for new and existing buildings;
- Implementation of necessary actions to establish regular inspection of the accessible parts of systems used for heating buildings and air conditioning systems;
- Development of a building stock Inventory;
- Development of reference buildings;

The full policy package will require laws, regulations and activities which are to be adopted/ amended and enforced/ implemented, as follows:

- Code of Spatial Planning, Architectural and Construction Activities of Georgia;
- Laws and regulations affecting construction and the operation of the residential building stock;
- Energy Law;
- Technical regulations on energy audits;
- Technical regulations on building energy efficiency;
- A programme for training, examination and certification of energy auditors;
- A programme for training of Homeowners and Homeowners Associations;
- A tariff system for charging for trainings and examination; and
- A tariff system for charging for carrying out energy audits.

Energy auditing will define the technology connected to building materials, windows, doors, insulation materials, lighting, and HVAC systems.

Public sector entities will be obliged to carry out regular energy audits of their building stock every 3 years and to provide an energy performance certificate. Starting from 2025, energy performance certificates will become mandatory for:

(a) buildings or building units which are constructed, sold or rented out to a new tenant;

(b) buildings where a total useful floor area over 500 m^2 is occupied by a public authority and frequently visited by the public – later this threshold of 500 m^2 shall be lowered to 250 m^2.

Implementation of the EPBD will involve a phased approach with new buildings addressed first, then buildings undergoing major renovations, public buildings, and then moving on to requirements for existing buildings.

By law, the percentage of each newly constructed building subject to certification that is certified for energy efficiency:

- 0% in 2022
- 100% in 2024
- 100% in 2026
- 100% in 2028
- 100% in 2030

The following by-laws have been drafted, agreed, and adopted with non-governmental organizations, as well as with construction companies, in accordance with the deadlines set out in the Energy Efficiency Law of Buildings.

- National Methodology for Calculating Energy Efficiency of Buildings; Minimum energy efficiency requirements for buildings, building parts or building elements
- Comparative methodology for calculating cost-optimal levels of energy efficiency minimum requirements;
- Energy efficiency due to the rule of development of one or more programs and their use;
- Rules for total energy efficiency of engineering and technical systems in existing and new buildings, selection and installation, regulation, and management of technical systems
- Rules for energy efficiency certification of buildings;
- Rules for inspection of heating and air conditioning systems in buildings;
- Rules for certification and accreditation of independent experts issuing energy efficiency certificates for buildings and inspecting building heating and air conditioning systems
- Rules for checking and verifying energy efficiency certificates, inspection reports for heating and air conditioning systems
- Rules for production of building energy certificates, independent experts, and inspection report register / database
- National plan to increase the number of buildings with almost zero energy consumption

Timeframe	2021-2024 for initial policy development (with potential update afterwards) and then implemented through 2030 and beyond.
Sector	Buildings
Relevant planning documents, legal, and regulatory acts	• TYNDP • CSAP

	• Association Agreement: Supports implementation of Directive 2009/28/EC-EPBD; Directive 2012/27/EC EED; and Directive 2010/31/EU
Implementation status	Under implementation
Assumptions	The calculation for energy saved involved estimating energy savings for newly built residential buildings where: • New dwellings and buildings projected to be built were estimated for each year from now through 2030; • Energy consumption per dwelling/building was estimated according to building type without any EPBD intervention (BAU case); • Energy consumption per dwelling/building was estimated according to building type with energy demand reductions due to EPBD interventions (EE case); • Total projected primary and final energy consumed by new dwellings was calculated for the BAU and EE cases. **Assumptions:** Energy savings calculations focus on new buildings in the residential sector, and assume the following cases: • In 2016 - the energy consumption in fully heated residential area is 147 kwh/m^2, only around 41% of area is heated. • In 2016 - the energy consumption in fully heated commercial/public buildings is 134 kwh/m^2, only around 77% of area is heated in private buildings and 41% - in state and municipal buildings; • It is assumed that all newly built areas are fully heated; In the remining areas fully heated are: • by 2030 - residential - 60%, private commercial - 90%, public - 70%; • by 2050 - residential - 80%, private commercial -100%, public - 100%. Penetration of cooling:

		• by 2030 - residential - 40%, private commercial - 50%, public – 70% • by 2050 - residential - 70%, private commercial - 15%, public - 20%.
Results to be achieved		• The final energy consumption in fully heated new residential area - 80 kwh/m^2; • The final energy consumption in new commercial or public area - 90 kwh/m^2.
Sources of Financing (GEL)	**State Budget**	N/A
	Municipal	For enforcement / inspection – estimated 500,000 GEL per year
	Private sector / publicly-owned companies	Not calculated – expected marginal investments per m2.
	Donor Support	• 87,579,360 GEL in loans and grants (from EBRD, DANIDA, KfW, EU) for developing a methodology for building certification • 33,264,000 GEL in grants (from EU,KfW) for creating, approving and implementing by-laws on energy efficiency of buildings.
Responsible Agency		MoESD
Partner Institution(s)		Relevant accredited bodies
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	• Number of subordinate normative acts and standards adopted • Number of sample buildings constructed • Number of buildings certified
Links to other policies and measures and/or dimensions		Decarbonization: RE-8 Energy efficiency: EE-2 through EE-9 Research, innovation, competitiveness

EE-2: Energy efficient procurement

EE-2: Energy efficient procurement
Objective 2.1: Achieve primary energy consumption savings in the buildings sector

Description: This is a legal measure to ensure that public procurement takes into account energy consumption. The Government of Georgia has already elaborated and adopted procurement regulations that allow for the inclusion of operation and maintenance costs during the operational lifetime of energy consuming products and services including buildings and transport means. The primary purpose of this measure is to build upon the establishment of the possibility of energy efficient procurement and incorporate it into practice – making it possible to achieve long term sustainability and optimisation of overall operation and maintenance costs of state property by decreasing energy bills for any goods and properties procured by state and/or local government institutions. The secondary purpose is to promote energy efficiency product market formulation. An additional aim of this measure is for the public sector to lead the market by the example it sets. The measure will help improve the general knowledge of all public procurement stakeholders and increase the inclusion of energy efficient procurement elements into procedures at both central and municipal levels.

In order to achieve this, further work must be done on producing appropriate educational materials (reference books, guides) and distributing the existing educational and promotional materials electronically and through workshops.

The measure will involve building on the legislation and developing a national programme for public procurement with technical know-how for including and evaluating energy efficiency requirements in public procurement procedures by applying the criterion of the economically most favourable bid. Procurement guidelines will have to be developed which will include life cycle cost and benefits, as well as methods of calculating this for procurement of high energy consuming goods and products. This measure has to some extent already been implemented with the inclusion of energy efficiency criteria in public procurement procedures.

A programme / plan for integrating green procurement requirements into public procurement practices will be developed. The process will involve establishing targets and identifying the key stakeholders and actions that should be undertaken on the national and local level in order to achieve better integration of the green public procurement criteria into the public procurement procedures. There would be a lower ambition level in the early period, followed by gradual upgrade of the requirements to raise the minimum efficiency requirements as well as the fraction of public procurement that must meet the set criteria. The European Commission criteria for energy efficient public procurement and efficiency indicators can provide guidance on international best practice[186]. The guidelines and Order of the Chairman of State Procurement Agency[187] will be applicable for all forms of procurement procedures (Simplified Procurement Procedures, Contests, Tender and Consolidated Tenders).

The measure will combine rule changes with capacity building, such as development of instruction manuals, delivery of trainings and advice on application of this regulatory tool. The capacity building must address the use of energy efficiency criteria, the energy efficiency requirements for most frequently procured/ typical products, and the integration of additional energy efficiency criteria into procurement documentation.

186 See https://green-business.ec.europa.eu/green-public-procurement_en

187 See http://www.procurement.gov.ge/ELibrary/LegalActs.aspx?lang=en-US

Timeframe		2021-2024 for initial policy development (with potential update afterwards) and then implemented through 2030 and beyond.
Sector		Buildings
Relevant planning documents, legal, and regulatory acts		EE Law
Implementation status		Under development
Assumptions		Assumes technical assistance in rolling out energy efficient procurement across appropriate institutions.
Results to be achieved		Life cycle costs incorporated into tendering of energy consuming goods and services.
Sources of Financing (GEL)	**State Budget**	Limited to in-kind from procurement agencies (recouped increases in investment through energy savings)
	Municipal	Limited to in-kind from procurement agencies (recouped increases in investment through energy savings)
	Private sector / publicly-owned companies	None
	Donor Support	Technical assistance programme required.
Responsible Agency		State Procurement Agency
Partner Institution(s)		• Ministry of Economy and Sustainable Development of Georgia • Ministry of Regional Development and Infrastructure of Georgia • LEPL - Municipal Development Fund of Georgia[188]
Monitoring	**Agency / Source**	National energy management information system
	Progress indicator(s)	• Number of public tenders incorporating energy efficiency into their terms, as determined through surveys; • Energy consumption by public buildings; • GHG emissions associated with energy use by public buildings

188 The relevant directive/order of the Chairman of the State Procurement Agency has not yet been issued. As soon as they are issued, LEPL "Municipal Development Fund of Georgia" will act in accordance with the requirements of the legislation. At this stage, in all projects completed and ongoing by the Fund, which include an energy-efficient component, procurement procedures are carried out in accordance with the requirements of the donor organizations (CEB and NEFCO).

Links to other policies and measures and/or dimensions	Decarbonization: RE-7 Energy efficiency: EE-3 Energy security

EE-3: Energy efficiency retrofits in schools and other central government-owned buildings

EE-3: Energy efficiency retrofits in schools and other central government-owned buildings	
Objective 2.1: Achieve primary energy consumption savings in the buildings sector	
Description: Georgia's Energy Efficiency Law (Article 17) explicitly requires the renovation of buildings owned and occupied by the Central Government. This measure will result in building retrofits to improve energy efficiency in compliance with the Law. The minimum target is that 1% of the total useful floor area of heated and/or cooled buildings owned and occupied by public bodies must be renovated each year to meet the minimum energy performance requirements. Example retrofit measures include improvements to the exterior enclosures of buildings, installing energy efficient light bulbs, and retrofitting/replacing solid fuel heaters. Investments will represent at least 1% annually of the central government-owned and/or operated building area. The measure will entail improvement/insulation of all external boundary constructions of school buildings, including but not limited to windows and energy end-user effective systems, such as: energy efficient light bulbs and heaters that operate with solid fuel. The investments and/or reconstruction to be carried out under this measure will be part of the big investment program designed for reconstruction of schools. Cooling systems are not considered in the calculations. For kindergartens the investments will include: • Insulation of roof; • Installation of new windows; • Insulation of walls; • Insulation of the floor; • Installation of new heating systems in combination with solar water collectors for hot water supply system; • Installation of a new ventilation system; • Installation of efficient bulbs; • Installation of solar hot water systems. This measure is conditional on international financial support.	
Timeframe	2021-2024 for initial policy development (with potential update afterwards) and then implemented through 2030 and beyond.
Sector	Buildings

Relevant planning documents, legal, and regulatory acts		• EE Law • CSAP
Implementation status		Under development – feasibility study complete.
Assumptions		Retrofitted buildings match the demand for new buildings in EE-1
Results to be achieved		Each year, 10% of schools implement three of the three energy efficiency initiatives - upgrading the external constraint, installing energy-saving light bulbs, and replacing a solid fuel heater - with at least one.
Sources of Financing (GEL)	**State Budget**	83,730,000 GEL through 2030 (approximately 9,300,000 GEL per year)
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	9,654,480 GEL in grants and loans (from E5P, NEFCO) through 2024
Responsible Agency		MoESD
Partner Institution(s)		LEPL "Municipal Development Fund"
Monitoring	Agency / source	Ministry of Education and Science of Georgia
	Progress indicator(s)	• Energy consumption by building • Number of building energy audits
Links to other policies and measures and/or dimensions		Decarbonization Energy security

EE-4: Establish energy efficiency information systems for public buildings

EE-4: Establish energy efficiency information systems for public buildings
Objective 2.1: Achieve primary energy consumption savings in the buildings sector
Description: Georgia's Energy Efficiency Law requires introduction of energy management systems in buildings and other premises owned and occupied by public bodies. The aim of this measure is to provide information about energy efficiency planning on the municipal and national level for publicly owned buildings initially – with potential expansion to other sub-sectors of the public sector. The measure involves creating a database on energy consumption at the municipal and national level to

allow for analysis and evaluation. The information system should be implemented at the municipal level. The government/appropriate ministry can then aggregate municipal information adding data about central-government owned buildings.

At the municipal level, the database would extend over the entire stock of buildings is use of the municipality or placed under its management (governmental offices, education, health care, social services, culture, municipal services, etc.). The information would include:

- Primary information about the site (principal design and construction characteristics of the building, installed capacity and energy supply systems);
- Variable data on energy consumption by fuel types, time periods, and technologies

Data Entry includes: Information about municipal sites, budgetary expenditures, degree days, energy production. Information about sites includes:

- General information – the name of the site, sector, address, contact person, number of buildings;
- Descriptive information of the building – type of building, year of construction, number of floors, type of construction, floor area, total floor area, built up volume, type of heating, capacity of heat installation, heated space, average annual number of permanent residents/tenants, duty cycle of building use, number of workdays per year and per week, number of workhours per day, energy efficiency activities/measures, using of renewable energy and type of renewable energy, data about installation of building and heating/cooling sources;
- Information about fuel and energy consumption for a fixed period – quantity and amount with possibility of conversion into tonnes of oil equivalent, MWh and specific energy consumption (kWh/m^2).

Information about energy production includes:

- Type of heat plant;
- Used fuel;
- Type of production;
- Annual energy production in MWh.

To enable analysis and assessment of program/policy effectiveness, the measure also envisages creation of a national database for tracking building energy consumption at the municipal and national levels. The structure of a national database could be the same as for municipalities – and by necessity aggregate the municipal databases into a national one. This database could aggregate data not only at national level, but according to the administrative or climatic zones. Comparison of average data from different municipalities, or average data about typical buildings will provide good ideas about municipal and governmental initiatives. Ideally, this system would be developed in way to provide on-line access with the respective levels of access.

This measure is conditional on international financial support.

Timeframe	2021-2024 for initially setting up the system and then continued implementation through 2030 and beyond.

Sector		Buildings
Relevant planning documents, legal, and regulatory acts		• Energy Efficiency Law • CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC-EPBD and Directive 2012/27/EC EED
Implementation status		Work on this system started in 2021
Assumptions		Energy savings not calculated for this measure – but could be expected to be 10 – 15% of public energy consumption.
Results to be achieved		Strengthening of the enabling environment for improving energy efficiency in buildings, adopted by 2023. No quantitative targets.
Sources of Financing (GEL)	**State Budget**	Estimated 1,000,000 GEL for initial investments / operation
	Municipal	Estimated 24,000 GEL per year per municipality with energy management system / manager
	Private sector / publicly owned companies	None
	Donor Support	To be established
Responsible Agency		MoESD
Partner Institution(s)		LEPL "Municipal Development Fund of Georgia"[189]
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Number of information systems established in public buildings
Links to other policies and measures and/or dimensions		Decarbonization: RE-7 Energy efficiency: EE-2, EE-3, EE-9

EE-5: Development of qualification, accreditation, and certification schemes for independent energy sector experts - buildings

189 With the financing of international financial institutions (CEB and NEFCO), the following programs are being implemented - "Project for rehabilitation and energy efficiency of Tbilisi public schools" (CEB from 2019) and rehabilitation and energy efficiency improvement of public schools in mountainous regions of Georgia (E5P, NEFCO from 2022), and in 2023 In the first quarter of the year, the program "Improving the energy efficiency of public buildings in Georgia and using renewable-alternative energy" (E5P, NEFCO) was completed.

EE-5: Development of qualification, accreditation, and certification schemes for independent energy sector experts - buildings	
Objective 2.1: Achieve primary energy consumption savings in the buildings sector	
Description: Development of an accreditation and certification process for energy service providers, energy auditors, energy managers, and assemblers working on the installation of energy appliances in the buildings sector. The measure entails: • Development of officially recognized certification and/or accreditation schemes, including the use of relevant educational spaces and programs, which will increase the number of energy service providers, energy auditors, energy managers and assemblers, working on the installation of energy appliances in construction sector, and strengthen their skills. • The government will ensure the transparency of the proposed plan for customers and will ensure reliability and compliance with the implementation of national energy efficiency objectives; • The government will also ensure public access to certification and/or accreditation schemes, or to equivalent qualification schemes, and will cooperate with other actors for the purpose of comparing and recognizing the mentioned programs; • For the purpose of ensuring customer access to information about the qualification and/or certification plans and certified auditors, the government will create a website; • The energy audits prepared within this program and verified by a dedicated professional may be used for developing a database about building energy use.	
Timeframe	2021-2023 for policy development and then implemented through 2030 and beyond.
Sector	Buildings
Relevant planning documents, legal, and regulatory acts	• Energy Efficiency Law • CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC-EPBD, Directive 2012/27/EC EED, and Directive 2010/31/EU
Implementation status	Under development
Assumptions	Energy savings not calculated for this measure
Results to be achieved	Strengthening of the enabling environment for improving energy efficiency in buildings, adopted by 2023. No quantitative targets for GHG reductions Total percentage of certified and certified specialists in energy efficiency of building heating, cooling and ventilation systems and electrical equipment: • 0% of the target contingent in 2020

		• 30% of the target contingent in 2024 • 60% of the target contingent in 2026 • 80% of the target contingent in 2028 • 100% of the target contingent in 2030 With the involvement of stakeholders (energy NGOs, energy providers, construction, and auditing companies), qualification, accreditation and certification schemes have been developed and approved, which are fully compliant with the 2009/28/EC Directive. With the involvement of stakeholders, at least two educational and vocational training programs have been developed and approved in Tbilisi and the region.
Sources of Financing (GEL)	**Central Budget**	1,080,000 GEL for establishment of training / certification programs. Ongoing costs to be covered through fees.
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	To be established
Responsible Agency		MoESD
Partner Institution(s)		• Georgia Accreditation Center • Accredited entities • Training centres
Monitoring	**Agency / Source**	Georgia Accreditation Center
	Progress indicator(s)	• Number of accreditation and certification programmes and systems introduced • Number of officially accredited/certified professionals and entities • Number of people trained on accreditation and certification programmes
Links to other policies and measures and/or dimensions		Decarbonization: RE-7 Energy efficiency: EE-1, EE-2, EE-3, EE-6, EE-8, EE-9

EE-6: Implementation of energy efficiency awareness raising programmes for the public

EE-6: Implementation of energy efficiency awareness raising programmes for the public	
Objective 2.1: Achieve primary energy consumption savings in the buildings sector	
Description: Development and introduction of awareness programmes informing the public about financially effective and easily achievable options for modifying building energy consumption and/or dissemination of information about energy-efficiency measures. The information will be disseminated through various types of media and focus on investments in the building and public sector. This measure seeks to promote energy efficiency policy by engaging in outreach and awareness-raising events, focused predominantly on the general public but also including businesses. Particular issues to be addressed include: • Highlighting problems that need to be addressed through legislation or regulation (i.e. preparing the public for energy efficiency legislation/regulations which will be implemented); • Providing the public with information on energy efficiency measures which can be carried out; • Developing energy efficiency information materials and working with the general public, including students and children, as well officials, business entities, NGOs, etc. This measure also equips participants with improved knowledge and skills to make better decisions regarding energy efficiency.	
Timeframe	2021-2024 for initial policy development (with potential update afterwards) and then implemented through 2030 and beyond.
Sector	Buildings
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC-EPBD and Directive 2012/27/EC EED
Implementation status	Under development
Assumptions	Energy savings not calculated for this measure
Results to be achieved	According to a public opinion poll conducted before and after the information campaign, the awareness of the target audience has been improved by at least 50% for energy efficiency and 30% for incandescent light bulbs. Percentage of consumers who cite energy efficiency of buildings and household items as an important factor in consumer decision making: • 40% of the target contingent in 2022 • 55% of the target contingent in 2024 • 60% of the target contingent in 2026 • 70% of the target contingent in 2028

		• 80% of the target contingent in 2030 A program of vouchers for energy efficient stoves has been developed There have been at least 2 information campaigns on energy efficient stoves and ancillary financial support programs.
Sources of Financing (GEL)	**State Budget**	280,000 GEL through 2023 for energy efficiency information campaign
	Municipal	Not described here – to be established by the municipalities
	Private sector / publicly owned companies	None
	Donor Support	To be defined
Responsible Agency		MoESD
Partner Institution(s)		• MEPA • Municipalities • NGOs • Donors
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	• Number of awareness programs implemented • Number of people reached by awareness programs
Links to other policies and measures and/or dimensions		Decarbonization: RE-7 Energy efficiency: EE-1, EE-5, EE-7, EE-8, EE-9

EE-7: Training and education, including energy advisory programmes

EE-7: Training and education, including energy advisory programmes
Objective 2.1: Achieve primary energy consumption savings in the buildings sector
Description: This measure will facilitate and strengthen the business environment and Private sector / publicly owned companies engagement in energy efficiency investments by training project developers and local financial institutions on key aspects of energy efficiency project finance. The market for energy efficiency in Georgia lacks capacity of adequate project developers, energy efficiency and sustainable energy investment professionals as well as adequate expertise which can help project owners and beneficiaries adequately initiate dialogue and conclude an energy efficiency financing deal between a project owner and the financier. The business environment for energy

efficiency investments will be accelerated by developing a holistic capacity building program and implementing it targeting training of project developers and local financial institutions on key aspects of energy efficiency project finance. The measure includes:

- Identification of independent entity(s) that can prepare and implement energy efficiency projects and enhancing their knowledge and skills to implement such projects successfully;
- Preparation of training programs based on the best European practices on financing of energy efficiency projects, technologies and methods, risk management, labour security and monitoring;
- Introduction of effective approaches and systems for financing energy efficiency based on the experiences of finished investment projects. Demonstration of implemented projects financed through special financial instruments;
- Creation of energy efficiency projects and business plans that are acceptable to the banks. Organizing meetings between business representatives and financial institutions as well as with other potential investors.

The three pillars of the energy efficiency investment market are the borrowers (local companies which are energy consumers), the project developers (engineers, auditors, ESCOs, etc.), and financiers (local financial institutions who offer financing for investments). If one or more of these pillars lacks institutional or technical capacity to adequately process decisions on energy efficiency finance, the market will remain underdeveloped.

- To develop the capacity of **borrowers,** trainings on the use and benefits of energy auditing, investing energy efficiency will be organized for industries and SMEs.
- At the same time, **the energy engineers, energy audit companies and companies providing energy services** will be trained to offer and commercialize their services to the local companies and deliver adequate investment documents (in addition to the engineering reports).
- As the last pillar, capacity building will be organized for **local financial institutions and companies providing energy services** on performance contracting.

Where possible, combined study tours and capacity building workshop on Energy Efficiency Awareness Raising. Study tours to an EU country with advanced energy efficiency in partnership with local energy efficiency info centre or similar institute, including onsite workshops, will be organized.

Timeframe	2021-2024 for initial policy development (with potential update afterwards) and then implemented through 2030 and beyond.
Sector	Buildings
Relevant planning documents, legal, and regulatory acts	• Energy Efficiency Law • CSAP
Implementation status	Under development
Assumptions	Energy savings not calculated for this measure

Results to be achieved		Strengthening of the enabling environment for Private sector / publicly owned companies investment in energy efficiency, achieved by 2030
Sources of Financing (GEL)	**State Budget**	300,000 GEL / year for the first 5 years (1,500,000 GEL total)
	Municipal	None
	Private sector / publicly-owned companies	None
	Donor Support	To be defined
Responsible Agency		MoESD
Partner Institution(s)		• MEPA • Donor / IFIs
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	• Number of training courses developed • Number of trainings conducted • Number of advisory programmes established • Number of people and institutions trained • Energy savings and GHG reductions achieved as reported by surveys of recipients of trainings / advisory programmes
Links to other policies and measures and/or dimensions		Energy efficiency: EE-1, EE-5, EE-6, EE-9, EE-10

EE-8: Development of standards, norms, and labelling schemes for appliances

EE-8: Development of standards, norms, and labelling schemes for appliances
Objective 2.1: Achieve primary energy consumption savings in the buildings sector
Description: This measure will provide information on appliance efficiency to customers who are buying or replacing home appliances. It will also remove non-ecodesign compliant products from the market and increase the market share of energy-efficient appliances. Using the provisions of the Directive 2010/30/EU of the European Parliament and of the Council as the basis for defining labelling requirements, an energy efficiency labelling system for energy consuming appliances in Georgia will be introduced based on best practice. The implementation of the Ecodesign Directive 2009/125/EC is also expected in the coming period. This will include drafting, adopting, and ensuring enforcement of

legislation and its delegated acts on labelling and minimum energy performance standards of energy-consuming products. The measure will be implemented gradually. Initially, only certain parts of energy-based appliances will be labelled. At subsequent stages, the list of labelled products will significantly increase. To this end, European (European Committee for Standardization – CEN) and international standards for testing the energy efficiency of house appliances will be translated and adopted. The adoption of an energy labelling regulations package will be accompanied by an information campaign on energy labelling. In the absence of legislative regulations and low consumer awareness, the labelling program will require significant preparatory work prior and during its introduction. It should be considered that the labelling of house appliances has a delayed effect on the appliance market due to their low replacement rate, especially in years with low economic activity. Therefore, this measure will not result in energy savings for the first three years. Energy savings will be achieved through: • Increased awareness and consequently modified end-user behavior; • Informed decision-making in purchase or replacement of appliances, vehicles, and industrial equipment; • Enhanced market penetration of energy efficient appliances; and • Removal of inefficient products from the market.	
Timeframe	2021-2024 for initial policy development (with potential update afterwards) and then implemented through 2030 and beyond.
Sector	Buildings
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC-EPBD and Directive 2012/27/EC EED
Implementation status	
Assumptions	Already in Georgia some labels are being used. It is assumed that the following percentages of new appliances purchased will be A+, A++, or A+++: • 2021, 2022, and 2023 - 5% • 40% in 2024 and growing by 7.5% each year until reaching 92.5% in 2030 *Over the period of implementation, costs are expected to include:* • In-kind contribution from the Government of Georgia for policy development and then for

	implementation/management (part time from inspection agencies); • Technical assistance of national experts and international experts over the course of the first 3 years would be necessary for setting up the policy, training inspection agencies, and ensuring a smooth implementation **Outcome indicators:** • Developed circuits for energy efficiency of home appliances, which take into account the views of non-governmental organizations and private companies and fully comply with the Directive 2010/30 / EU **The following technical regulations have been approved before December 31, 2024:** • on the energy labelling rules for household dishwashers; • on the rule of energy labelling of refrigerating appliances; • on the rule of energy labelling of household washing machines and household washing-dryers; • on the rule of energy labelling of electronic displays; • on the rule of energy labelling of the air conditioner for household use; • on the rule of energy labelling of residentialventilation units; • on the rule of energy labelling of professional refrigeration-storage cabinets; • on the rule of energy labelling of local space heaters; • on the rules of energy labelling of solid fuel boilers and packages of a solid fuel boiler, supplementary heaters, temperature controls and solar devices; • on the rules of energy labelling of domestic stoves and range hoods; • on the rule of energy labelling of water heaters, hot water storage tanks and packages of water heater and solar device; • on the rules of energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device • on the rule of energy labelling of electric light sources;

		• on the rule of energy labelling of household tumble dryers;
Results to be achieved		Only efficient heating and cooling systems are available on market from 2025
Sources of Financing (GEL)	**State Budget**	390,000 GEL through 2024 – mostly for enhancing market surveillance activities
	Municipal	None
	Private sector / publicly-owned companies	Investments ongoing and marginal to prices.
	Donor Support	33,660,000 GEL in grants (from GCF, German Government, Swedish Government) for efficient woodstoves
Responsible Agency		MoESD
Partner Institution(s)		• Market Surveillance Authority • Retailers • Equipment producers • City Halls of relevant municipalities
Monitoring	**Agency / Source**	Market Surveillance Authority
	Progress indicator(s)	• Number of standards and labelling schemes adopted • Number of efficient and non-energy efficient appliances available in stores, as reported surveys of retailers (Implementation Body to be clarified)
Links to other policies and measures and/or dimensions		Energy efficiency: EE-1, EE-5, EE-6, EE-8, EE-10 Research, innovation, and competitiveness

EE-9: Installation of energy efficient lighting

EE-9: Installation of energy efficient lighting
Objective 2.1: Achieve primary energy consumption savings in the buildings sector
Description: This measure involves introduction of regulations to phase out the use of incandescent light bulbs, development of information materials, and implementation of awareness campaigns and support mechanisms with the target of replacing 100% of incandescent and halogen light bulbs with energy-efficient bulbs in residential, commercial, and many public buildings by 2022. In addition, informational and awareness raising campaigns on sustainable use of electricity will be conducted.

In the residential and commercial sectors, the measure will be implemented by adopting regulations that create a barrier on the import and/or sale of non-efficient light bulbs (i.e. implementation of the Ecodesign directive - 2009/125/EC). The regulations may prohibit import of light bulbs which do not meet certain efficiency requirements or increase taxes on non-effective light bulbs. Additional customs taxes will be designed and introduced to differentiate between various categories of light bulbs in accordance with their effectiveness. The Customs Department of the Revenue Service of Georgia has already developed a Classification Code for imported fluorescent bulbs (LED and CFL bulbs), which was initiated by the Ministry of Energy of Georgia. In the public sector, the measure entails replacement of incandescent bulbs in public buildings over the long-term. By the end of 2022, the measure will result in 100% replacement in an area of approximately 987,000 m^2. Kindergartens and schools are not included in this activity.	
Timeframe	2021-2024 for initial policy development (with potential update afterwards) and then implemented through 2030 and beyond.
Sector	Buildings
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC-EPBD and Directive 2012/27/EC EED
Implementation status	Under development
Assumptions	• In 2016 around 77.7% of bulbs are incandescent and account to 91% of electricity used for lighting. Similar assumption is made for commercial sector • For public lighting it is assumed that 50% of electricity consumed goes to mercury vapor bulbs • Only efficient lighting is available on market from 2025
Results to be achieved	Percentage of public buildings that use energy efficient light bulbs: • 20% in 2022 • 30% in 2024 • 40% in 2026 • 60% in 2028 • More than 70% in 2030 The fee on incandescent light bulbs has been increased by 100%; By 2023, the share of energy-efficient light bulbs purchased for all public buildings has increased to 100%.

Sources of Financing (GEL)	**State Budget**	Marginal increases in initial prices – usually with payback periods of 1 – 2 years maximum.
	Municipal	Marginal increases in initial prices – usually with payback periods of 1 – 2 years maximum.
	Private sector / publicly-owned companies	Marginal increases in initial prices – usually with payback periods of 1 – 2 years maximum.
	Donor Support	To be defined
Responsible Agency		MoESD
Partner Institutions		• MRDI • State Procurement Agency • Municipalities • Market Surveillance Authority • Customs Service • Retail stores
Monitoring	**Agency / Source**	MoESD, Market Surveillance Authority
	Progress indicator(s)	• Number of regulations / standards adoptedNumber of energy efficient and traditional light bulbs used in buildings, by sector and for public buildings floor area (m^2) • Number of energy efficient and traditional light bulbs available in retail stores, as determined through retail surveys
Links to other policies and measures and/or dimensions		Decarbonization Energy efficiency: EE-1, EE-2, EE-5, EE-6, EE-7, EE-8 Energy security Research, innovation, and competitiveness

Energy Efficiency in Industry

EE-10: Incentivizing / mandating energy efficiency in industry

EE-10: Incentivizing / mandating energy efficiency in industry
Objective 2.2: Achieve primary energy consumption savings in the industry sector

Description: This measure involves developing and entering into energy savings agreements with (a) large industrial companies and (b) important energy intensive industrial sectors.

Incentive programmes to encourage energy efficiency in industry can take many forms. Given the relatively small size of Georgia's industrial sector, energy-saving agreements will signal to industry that the Government is supportive of energy efficiency investments by first introducing support mechanisms (see below) and introducing a carbon fee on fossil fuels and electricity by 2025 which could be reduced based upon the achievement of efficiency benchmarks according to a voluntary agreement.

Such a mechanism will reward industries that invest in energy efficiency. This measure will be coupled with steps in the coming years by the Government to allow energy prices for industry to increase to reflect the market price (and no more than this). All mechanisms and policies which may result in an increase in energy prices will be studied thoroughly to assess the consequences for industry and how any negative consequences can be counteracted with support for energy efficiency.

The measure would involve the Georgian Government negotiating and then agreeing with key industrial actors and/or sub-sectors on a series of realistic energy performance targets, with interim milestones. Targets will be performance related, i.e. energy or emissions per unit of production. These negotiations would likely be:

- bespoke for large, energy-intense industry organisations
- top-down/ generic for sub-sectors with large numbers of SME operators

Targets for such a scheme will be challenging but realistic and be based on energy-audit findings and/or benchmark comparisons between the Georgian Enterprise and typical and best international practices. Overall, the targets will be broadly in line with the Georgian Government's long-term targets to improve energy performance across industry between now and 2030. In moving forward with such a measure, the process will:

- Start with recognized energy-intense sectors and/or very large sites
- Over time, be rolled out to medium and smaller energy-intense sectors and/or sites as Government become confident in the process

The measure will initially be voluntary, and there will be incentives to participate/ disincentives not to participate. Over time, if deemed necessary, the agreements may become mandatory for certain industrial actors. The details of the scheme, its mechanism and "what if" questions, will be addressed through consultation between Government, industry, and other stakeholders. However, the scheme may include the following:

- Those within the scheme and meeting their targets are eligible for Government support such as technical assistance, access to grant funding/interest rate subsidies, etc.
- The fees will be valued at around 5-10% of the unit cost of the fuel, i.e. enough to raise awareness nationally, focus the attention of top-management and encourage enterprises to carry-out the many simple, no/low cost energy efficiency activities that should be undertaken anyway, but without being overly burdensome to the enterprise.
- GNERC sets tariff for the fuel, which means it can regulate the tariff. As a result the whole process is unbiased in terms of income.

- Options will be explored to allow organisations to participate in a "White certificate" or similar trading scheme to (i) trade/ sell their excess energy (or CO_2) savings and/or (ii) purchase kWh (or CO_2) in the case of under-performance, so as to remain within the Agreement.

A secondary benefit from this measure would be to create a series of sector-organisations that could act as the focal point for these agreements plus other activities, for example identifying suitably qualified independent energy auditors for their sector.

Specific industry targets are laid out below.

Sector	Energy Carrier	Efficiency improvements (average)	Share of industries undergoing improvement (NECP)			Share of industries undergoing improvement (WOM)	
			2030	2040	2050	2030	2050
Iron and steel	coke	15%	40%	60%	100%	5%	10%
	electricity	25%					
	Others	15%					
Chemical and petrochemical	electricity	20%	40%	60%	100%	5%	10%
	natural gas (energy and non-energy uses)	20%					
non-metallic minerals	coke, natural gas	5%	40%	60%	100%	5%	10%
	electricity (motors, compressors, pumps)	35%					
	Switch to fossil fraction of MSW		15%	15%	15%	5%	10%
Food, beverages, and tobacco	electricity	40%	30%	60%	100%	5%	10%
	natural gas	40%					
	Switch to organic/agri waste		20%	40%	60%	5%	10%
Others (mainly construction and mining & quarrying)	electricity	40%	20%	60%	100%	5%	10%
	natural gas	10%					
	Oil products	5%					

Timeframe	2021 – 2030
Sector	Industry
Relevant planning documents, legal, and regulatory acts	Energy Efficiency Law
Implementation status	Primary law developed, secondary legislation and implementation plan to be undertaken
Assumptions	Assumptions for EE in specific sectors outlined above For costs, estimated a total of €180 million (563.4 million GEL) of investment, of which up to 10% would be incentivised from government over 10 years.

Results to be achieved		Targets described above.
Sources of Financing (GEL)	**State Budget**	56,340,000 GEL over 10 years
	Municipal	None
	Private sector / publicly owned companies	Industry / private enterprises: 563,400,000 GEL over 10 years
	Donor Support	None
Responsible Agency		MoESD
Partner Institutions		• Various private companies • Industry associations
Monitoring	**Agency / Source**	MoESD in cooperation with Geostat
	Progress indicator(s)	• Number of agreements with companies and sectors • Energy savings or energy intensity of production/output, as reported by participating private companies
Links to other policies and measures and/or dimensions		Decarbonization Energy security Research, innovation, and competitiveness

EE-11: Substitute wet method with dry method for cement production

EE-11: Substitute wet method with dry method for cement production
Objective 2.2: Achieve primary energy consumption savings in the industry sector
Description: This measure involves switching cement production method to the dry method which results in lower energy use and higher productivity. Cement making is one of the biggest energy-consuming sectors in Georgia. Geostat data indicates coal consumption for non-metallic minerals accounted for 2,242 GWh in 2014, equivalent to 21.3% of the total energy consumed by Georgian industry (including for energy uses and non-energy uses). Most of this will be for cement, and most of Georgia's cement industry still uses the "wet kiln process", recognized as energy inefficient. One cement kiln recently converted to the dry method. However, it is estimated that there remains approximately 1.0 million tonne/year still produced via the wet process. The wet process requires 1.26 to 1.62 MWh brown coal energy per tonne of production in the two plants in Georgia operating with the wet process. The dry process is expected to require only 0.92 MWh of brown coal energy per tonne of production.

In addition to switching the process from wet to dry, the energy received during the clinker cooling process should be used to dry raw materials and frequency regulators can be used in the rotating furnace and exhaust switcher. The introduction of this technology is expected to reduce energy consumption to 3.4 GJ/t clinker.		
Timeframe		2021-2023
Sector		Industry
Relevant planning documents, legal, and regulatory acts		• CSAP • Association Agreement: Supports implementation of Directive 2008/50/EC on ambient air quality and Directive 2010/75/EU on industrial emissions
Implementation status		Ongoing
Assumptions		The measure has been implemented. The results have been estimated based on the actual fuel consumption in 2019 in non-metallic mineral industries from national energy balance and the calculation of baseline case which assumes that the fuel consumption would have followed the GDP growth rate if measure was not implemented.
Results to be achieved		100% of cement production is carried out using a new technology.
Sources of Financing (GEL)	**State Budget**	None
	Central Budget	None
	Municipal	None
	Private sector / publicly owned companies	Industry / private enterprise investment
	Donor Support	None
Responsible Agency		Cement and mineral processing industry (Heidelberg Ltd.)
Partner Institution(s)		MEPA
Monitoring	**Agency / Source**	MoESD, Geostat
	Progress indicator(s)	Number of new technologies and/or processes adopted
Links to other policies and measures and/or dimensions		Decarbonization: RE-8 Energy efficiency: EE-10

	Energy security Research, innovation, competitiveness

EE-12: Energy audits and management systems, boiler inspections in the industry sector

EE-12: Energy audits and management systems, boiler inspections in the industry sector
Objective 2.2: Achieve primary energy consumption savings in the industry sector
Description: This measure will introduce a requirement that large enterprises conduct energy audits or EnMS and provide support to small- and medium-sized enterprises (SMEs) to encourage these to also conduct energy audits. The measure involves two energy saving actions: **Energy audits:** Improve the process for energy-management, improve capacity of energy auditing, and implementation of mandatory energy auditing amongst large industrial consumers. This includes ensuring the availability of efficient, high-quality energy audit schemes which are designed to identify potential energy efficiency improvement measures, and which are carried out in an independent manner, to all final consumers, including smaller domestic, commercial and small and medium-sized industrial customers. **Inspections of boilers / air conditioning systems:** Based on site visits, a large proportion of industry and non-industry boilers and steam/ hot-water systems, as well as air-handling/ air-conditioning systems, are old, poorly insulated (if at all), badly maintained and generally not functioning correctly – thus wasting significant amounts of energy. Regular inspections are legally prescribed by the Rule Book on Building Energy performances pursuant to the requirements of the Energy Performance of Buildings Directive. The Technical and Construction Supervision Agency (TACSA) is the governmental entity, Under the MoESD, in charge of supervising hot water boilers including supervision of safety and control of subsequent documentation of regular inspections performed by industries. This measure would involve several activities: • Defining criteria to decide which industries are required to either carry out audits or have an Energy Management System in place – then developing a list of these companies based on statistical reporting; • Development and adoption of an Energy Audit Rulebook (for industries); • Development and adoption of industrial Boiler Inspection Procedures; • Training and certification of Independent Energy Auditors; • Training and certification of Hot Water Boilers Auditors; • Improving information availability, training, advice, free or low-priced energy audit support, etc.; • Raising EE technology and techniques knowledge & awareness through: o Effective energy management – ideally working towards ISO 50001 o Process optimisation: pinch technologies, planning & scheduling, design

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System optimisation (compressed air, fan systems, pump systems, motors, boilers and steam/ hot-water generation and distribution, waste-heat recovery)

Development of programmes to encourage SMEs to undergo energy audits and implement recommendations – including helping to cover costs;
Encourage training programmes for the qualification of energy auditors in order to facilitate sufficient availability of experts.

The EED (Article 7, Clause 24) mandates that large industries have audits every 4 years or implement an energy management system. This mandate is not expected to be introduced in Georgia in initial 2-year time period – but the obligation is expected to be in place by 2023. In the meantime, it is planned to identify co-financing for energy audits from donors alongside strong encouragement from the Government for implementation. It is also worth noting that in general energy management systems are the more effective way of achieving longer-term, low / no-cost energy savings.
</td></tr>
<tr><td colspan="2">Timeframe</td><td>2021 – 2030</td></tr>
<tr><td colspan="2">Sector</td><td>Industry</td></tr>
<tr><td colspan="2">Relevant planning documents, legal, and regulatory acts</td><td>Energy Efficiency Law</td></tr>
<tr><td colspan="2">Implementation status</td><td>Primary legislation adopted; secondary legislation drafted</td></tr>
<tr><td colspan="2">Assumptions</td><td>Expected implementation in:
100% of large industries over the course of a 5-year period (estimated 86 firms through 2022) – after which audits for these companies will become mandatory every 4 years if they do not have an approved Energy Management System in place (i.e. 25% of firms implementing audits every year)
6% of medium-sized industries per year (67 per year out of an estimated 1,111)
1% of small-sized industries per year (55 per year out of 5,487)
Cost per audit assumed to be EUR 10,000 for large industries, EUR 6,000 for medium, and EUR 3,000 for small. These costs would decrease (by about half) after the market is more fully established.</td></tr>
<tr><td colspan="2">Results to be achieved</td><td>All category 1 businesses</td></tr>
<tr><td rowspan="2"></td><td>State Budget</td><td>1,090,000 GEL over 10 years in support (109,000 GEL per year)</td></tr>
<tr><td>Municipal</td><td>None</td></tr>
</table>

Sources of Financing (GEL)	**Private sector / publicly owned companies**	12,740,000 GEL over 10 years (1,274,000 GEL per year) – with high profitability
	Donor Support	To be determined.
Responsible Agency		MoESD
Partner Institution(s)		Various private companies Industry associations
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	• Number of requirements adopted • Number of audits conducted by companies subject to legal requirement • Number of SMEs supported • Amount of energy and GHG reductions achieved, by company / sector
Links to other policies and measures and/or dimensions		Energy efficiency: EE-10 Energy security

Energy Efficiency in Transport

EE-13: Increase in taxes for transport fuels

EE-13: Increase in taxes for transport fuels	
Objective 2.3: Achieve primary energy consumption savings in the transport sector	
Description: Increasing the tax on gasoline and diesel for oil products and lubricants by 250 GEL/tonne of fuel will encourage adoption of more fuel-efficient vehicles, reduce passenger vehicle kilometers driven, and result in a proportion of drivers shifting to public transportation. This measure has already been undertaken in previous years and will be reconsidered in future years as well.	
Timeframe	Until 2024 Acceptance of the policy, with the prospect of further updates.
Sector	Transport
Relevant planning documents, legal, and regulatory acts	CSAP
Implementation status	Ongoing
Assumptions	The results have been estimated based on the actual fuel consumption in 2019 in road transport from national energy

		balance and the calculation of baseline case which assumes that the fuel consumption would have followed the GDP growth rate if measure was not implemented. Impact estimated together with other implemented measures.
Results to be achieved		Compared to 2015 baseline (annual): The estimated energy reductions in 2019 - 17.7 PJ (Impact includes the combined impact of EE-13 through EE-16)
Sources of Financing (GEL)	**State Budget**	Budget revenue generating measure 300,000 GEL for the report on the feasibility of increased fuel taxes
	Municipal	N/A
	Private sector / publicly owned companies	Not calculated
	Donor support	None
Responsible Agency		Ministry of Finance
Partner Institution(s)		MoESD, MEPA
Monitoring	**Agency / Source**	Geostat
	Progress indicator(s)	• Passenger transport demand by vehicle and transport type, million pkm • Gasoline and diesel use by transport and vehicle type, unit
Links to other policies and measures and/or dimensions		Decarbonization: RE-6 Energy efficiency: EE-14, EE-15, EE-20 Energy security

EE-14: Tax incentives for electric and hybrid vehicles

EE-14: Tax incentives for electric and hybrid vehicles
Objective 2.3: Achieve primary energy consumption savings in the transport sector
Description: This measure describes a policy already in place to increase the market penetration of hybrid and electric vehicles, and lead to a gradual replacement of the existing fleet. It will also increase the demand for renewable energy by switching away from fossil fuels to electricity from the grid, which is primarily powered by renewables. As part of the measure, the Government has reduced excise taxes by 50% for the purchase of hybrid vehicles that are older than 6 years and 60% for the purchase of

vehicles that are less than 6 years old. The Ministry has also removed excise taxes (i.e., 100% reduction) for the purchase of electric vehicles. One issue to be addressed is that, at present, there is no precise definition of "hybrid vehicles" in the legislation, which creates some gaps in tax and customs administration. For example, at the legislative level there is no limit defined for internal combustion engine, hybrid and electric vehicles and the use of tax concessions becomes questionable (e.g "MHEV" and "EREV" type vehicles). Therefore, there should be a definition of hybrid added to secondary legislation in the coming period. This issue is beyond the competence of the Ministry of Finance of Georgia and requires additional analysis.	
Timeframe	Prior to 2024 Adoption of the policy, with continued support expected until at least 2030
Sector	Transport
Relevant planning documents, legal, and regulatory acts	• REAP • CSAP • Renewable Energy Law • Association Agreement: Supports implementation of Directive 2009/28/EC promotion of the use of renewable energy • Existing regulations
Implementation status	Ongoing
Assumptions	The measure has been implemented. The results have been estimated based on the actual fuel consumption in 2019 in road transport from national energy balance and the calculation of baseline case which assumes that the fuel consumption would have followed the GDP growth rate if measure was not implemented.
Results to be achieved	• A research report on the cost-effectiveness of new tax incentive alternatives for electric vehicles has been published • By 2024, 15 new charging points will be installed in Tbilisi on the streets for electric vehicles – with significant scale up afterward • At least 3,500 places have been added within the framework of the zone-hour parking system throughout Tbilisi, which envisages zero tariffs for electric vehicles • Estimated market targets include the following: ➢ 2030 - hybrids - 40%, electric - 10% ➢ 2050 - hybrids - 60%, electric - 35%

Sources of Financing (GEL)	**State Budget**	Reflected as lost revenue estimated at approximately 10 million GEL annually – 90,000,000 GEL through 2030
	Municipal	None
	Private sector / publicly owned companies	Investments (buying a car) not estimated
	Donor Support	Need to find donors for charging stations
Responsible Agency		Ministry of Finance
Partner Institution(s)		MoESD, LEPL Service Agency
Monitoring	**Agency / Source**	Ministry of Internal Affairs / GeoStat, MoESD (for charging stations)
	Progress indicator(s)	• Number of vehicles on the road, by type and fuel use • Number of electric vehicles charging stations
Links to other policies and measures and/or dimensions		Decarbonization: GHG-1, RE-7 Energy efficiency: EE-13, EE-15 Energy security Internal energy market

EE-15: Design and implement regulations for vehicle roadworthiness

EE-15: Design and implement regulations for vehicle roadworthiness
Objective 2.3: Achieve primary energy consumption savings in the transport sector
Description: This measure involves the development and introduction of regulations to improve the average vehicle fleet efficiency by incentivizing and/or requiring the removal of the least efficient vehicles from the vehicle stock. This involves introduction of an inspection regime for all types of road vehicles which would be linked with vehicle registration – in line with Directive No 2009/40/EC on roadworthiness tests for motor vehicles and their trailers. The measure will improve safety, efficiency, and environmental impact of vehicles. Implementation would involve the setting up of approximately 30 technical inspection centres around the country, with 3 inspection lanes each. In addition to the technical inspection which would test for pollutants and potential safety hazards in vehicles, the inspection regime would allow the Government to "know the fleet", collecting detailed information for each vehicle on (amongst other items): • Model of the vehicle • Size of the engine (potentially also listed fuel efficiency)

- Type of fuel used
- Kilometres travelled each year

Energy savings result from improved energy performance due to improved maintenance of the vehicle fleet. An awareness campaign will also be necessary related to this process. This measure also improves vehicle safety and likely save a significant amount of lives. Additionally, other pollutants - such as carbon monoxide and Sulphur dioxide - would be reduced drastically. It is estimated that approximately 25% of private vehicles will not pass the tests in their current state and will need to be scrapped or refurbished.

The regulations requiring the emission tests were phased in as follows:

- Starting in July 2018, government and commercial cars were required to undergo the test;
- In October 2018, the test became mandatory for all vehicles with engines of three cylinders;
- In 2019, the test became mandatory for all vehicles in Georgia.

Outcome Indicators:

CSAP

Activity 2.1.1 Implementing changes in existing regulation related to the technical inspection of vehicles

Indicator: At least one piece of legislation / by-law has been passed to reduce the tendency to bypass inspections.

CSAP

Activity 2.1.2 More efficient execution of fines foreseen under the Administrative Offences Code of Georgia in terms of technical inspection of the vehicles.

Sub-categories:

2.1.2.1. a) By 2024, an additional 150 video cameras equipped with a technical inspection check-in function have been purchased and operated;

2.1.2.1.b) Appropriate normative act and / or administrative measure has been adopted, which imposes a fine of at least 4 times a month on inspected vehicles.

Timeframe	2018 – 2024 Policy adoption and implementation by 2030.
Sector	Transport
Relevant planning documents, legal, and regulatory acts	• CSAP • Association Agreement: Supports implementation of Directive 2009/28/EC promotion of the use of energy from renewable sources
Implementation status	The vehicle emission test has been phased in and all vehicles in Georgia are now being tested.

Assumptions		The measure has been implemented. The results have been estimated based on the actual fuel consumption in 2019 in road transport from national energy balance and the calculation of baseline case which assumes that the fuel consumption would have followed the GDP growth rate if measure was not implemented. Impact estimated together with other implemented measures.
Results to be achieved		All vehicles in Georgia comply with the road worthiness directive
Sources of Financing (GEL)	**State Budget**	Already implemented
	Municipal	None
	Private sector / publicly owned companies	Not calculated
	Donor Support	None
Responsible Agency		MoESD
Partner Institution(s)		• Private contractors for inspections • LEPL "National Accreditation Center"
Monitoring	**Agency / Source**	Georgian Accreditation Center, Geostat
	Progress indicator(s)	• Number of vehicles inspected by inspection facility • For the regulated vehicle categories, number of vehicles on the road by type and age
Links to other policies and measures and/or dimensions		Energy security

EE-16: Consideration of the possibility of increasing the import tax on old passenger vehicles

EE-16: Consideration of the possibility of increasing the import tax on old passenger vehicles
Objective 2.3: Achieve primary energy consumption savings in the transport sector
Description: This measure increases import taxes on old vehicles, in order to decrease imports of old, inefficient vehicles and grow the market penetration of newer models, including hybrid and electric vehicles. The policy will be implemented as follows: • Increase the tax on imported vehicles older than 12 years by 200%; • Increase the tax on imported vehicles between 10–12 years old by 120-160%; and

• An increase of 14-80% on cars between 6–10 years old.		
Timeframe		Adoption of the policy by 2024 and implementation by 2030
Sector		Transport
Relevant planning documents, legal, and regulatory acts		CSAP
Implementation status		Under implementation
Assumptions		The measure has been implemented. The results have been estimated based on the actual fuel consumption in 2019 in road transport from national energy balance and the calculation of baseline case which assumes that the fuel consumption would have followed the GDP growth rate if measure was not implemented.
Results to be achieved		Increased efficiency of the vehicle fleet (combined with EE-13 to EE-15 leading to energy savings).
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	Not calculated
	Donor Support	None
Responsible Agency		Ministry of Finance
Partner Institution(s)		Ministry of Finance
Monitoring	**Agency / Source**	GeoStat
	Progress indicator(s)	• Number of import taxes increased • For the vehicle categories covered by new import taxes, number of vehicles on the road by type and age
Links to other policies and measures and/or dimensions		Energy Efficiency - EE-13, EE-14, EE-15 Energy security

EE-17: Improved public transportation and shifts to sustainable transportation modes

EE-17: Improved public transportation and shifts to sustainable transportation modes
Objective 2.3: Achieve primary energy consumption savings in the transport sector

Description: This measure will result in a shift in modal share from private vehicle-use to public transport and non-motorised transport by improving the capacity, ridership, and efficiency of municipal public transport systems and non-motorised transport infrastructure. This measure builds on activities by the municipalities of Tbilisi, Batumi, Rustavi, and Gori, including:

- MT-5A: Optimise public transport system routes through modern technology and automated systems;
- MT-5B: Implement and enforce public parking tariffs, and create pedestrian and cycling routes;
- MT-5C: Improve road infrastructure and traffic management systems;
- MT-5D: Renew the public transport fleet by improving bus stock and reducing activities by the local minibuses known as Marshutkas (Tbilisi and Batumi are included in separate measures – EE-17 and EE-18, respectively, though other municipalities such as Poti[190] and Kobuleti[191] have reported as planning to carry).

Timeframe		Start implementing measures from 2020 and continue implementation until 2030.
Sector		Transport
Relevant planning documents, legal, and regulatory acts		CSAP
Implementation status		Ongoing / In planning
Assumptions		Linked with measures in Tbilisi and Batumi (see below)
Results to be achieved		Combined with E-18 and EE-19, the share of public transport in motorized road transport in 2016 was 48%, in WEM case it will be 34% in 2030 and 24% in 2050
Sources of Financing (GEL)	**State Budget**	To be established
	Municipal	To be established and reported on
	Private sector / publicly owned companies	None
	Donor Support	None
Responsible Agency		Municipal governments of Tbilisi, Batumi, Rustavi, and Gori
Partner Institution(s)		• Private transport companies in the respective cities

[190] In November 2021, Poti will receive 10 new diesel buses, which is also one of the most effective measures to achieve energy efficiency goals. The cost of the project is EUR 1,078,659, of which EUR 917,508 euros is from the municipality, and EUR 165,151 is a grant.

[191] According to the city, there are discussions regarding purchasing hybrid or electric-powered buses, which will serve both the city of Kobuleti and the Kobuleti-Batumi direction.

		• Relevant NGOs
Monitoring	**Agency / Source**	MEPA Municipalities
	Progress indicator(s)	• Number and type of activities / investments introduced by municipality • Reported vehicle usage by municipality, by type and fuel • Passenger transport demand by transport mode, million pkm
Links to other policies and measures and/or dimensions		Decarbonization Energy efficiency: EE-18, EE-19 Energy security

EE-18: Measures included in Tbilisi's 'Green Transport Policy' Action Plan

EE-18: Measures included in Tbilisi's 'Green Transport Policy' Action Plan
Objective 2.3: Achieve primary energy consumption savings in the transport sector
Description: To shift modal share from private vehicle-use to public transport and non-motorised transport through improving the capacity, ridership, and efficiency of municipal public transport systems and non-motorised transport infrastructure. Tbilisi's measures to encourage activity-shifting include: • **MT-7A Bus fleet renewal: number and type of buses that are put into operation; number and type of buses out of operation:** In accordance with the agreement signed on April 24, 2019 by LLC "Tbilisi Transport Company"LLC, 220 units of ISUZU brand (model - Novociti life) 8 m, working on a diesel engine, M3 category bus with Euro 6 emission standard were purchased on the basis of the financing received within the sub-program "Modernization of rolling stock of city passenger transport (01 02 02)" of the budget of Tbilisi Municipality. In order to implement the "Tbilisi Bus Project Continuation", the EBRD allocated money for the purchase of environmentally friendly, low-floor, compressed natural gas (CNG) buses and for the rehabilitation and construction of bus depots. 226 units of BMC brand 12-meter, environmentally friendly, low-floor, compressed natural gas (CNG) M3 category bus were purchased within the framework of the mentioned project by "Tbilisi Transport Company" LLC in the period of 2020-2021. In accordance with the agreement signed on June 6, 2021, on the basis of funding received by „Tbilisi Transport Company" LLC within the framework of the Tbilisi Municipality Budget "Modernization of Rolling Stock of City Passenger Transport (01 02 02)" sub-program, 180 units of ISUZU brand (model - Novociti life) 8 m long, working on diesel engine, M3 category bus with Euro 6 emission standard were purchased. As of June 2023, the operational fleet of "Tbilisi Transport Company" LLC has been fully updated, it owns 860 units of M3 category buses, as well as 194 units of Bogdan brand M3 category buses in the non-operational fleet. A contract is being signed for the purchase of 160 units of M3 category 18-meter environmentally friendly, compressed natural gas (CNG) city buses.

The project also includes the design and construction of a new fourth bus depot, and as of today, a tender has been announced for the preparation of design and cost accounting documentation for the municipal bus park in Alekseevki settlement (adjacent to the airport) and procurement of construction works using the Design-Build method. As of today, 111 bus routes operate in Tbilisi.

- **MT-7B Metro expansion**: **number of trains regularly operating on the line, average waiting time of passengers using the system:** Tbilisi Metro is served by 48 trains (4-car trains), of which 33 trains serve the first metro line (Akhmeteli-Varketili line), and 15 trains serve the second metro line (**Saburtalo** line). "Livable Cities Investment Program in Tbilisi – Universal access and inclusive mobility to the Tbilisi metro system" is implemented with the involvement of the Asian Development Bank (ADB) and the Cities Development Initiative for Asia (CDIA). . Within the framework of the program, it is planned to carry out rehabilitation construction works in Tbilisi metro stations - Didube, Delis, Technical University and Akhmeteli Theater. Specifically, it is planned to fully rehabilitate metro stations and improve access. Within the framework of the same project, the construction/reconstruction of the second exits of Akhmeteli metro and Marjanishvili metro is planned. The first stage of the project is planned to be implemented within the next 5 years. On January 17, 2023, loan and grant agreements were signed between Georgia and the European Bank for Reconstruction and Development. Considering the mentioned agreement, it is planned to rehabilitate 12 stations of the Tbilisi Metro. Estimated period of project implementation is 2023-2029.
- **MT-7C** Bus **network restructuring**: Implementing measures to prioritise bus lanes (e.g., bus rapid transit, or BRT). It is assumed that this measure will cover 50% of bus ridership by covering some of the busiest avenues in Tbilisi.
- **MT-7D Implementing a parking system**: **Proportion of inner city areas covered by the parking** system**. Number of vehicles using paid parking systems**: In total, 27,681 parking spaces are allocated for parking in the capital. Of these, 9,419 parking spaces are allocated for zonal parking, and 18,262 spaces are allocated for standard parking. The total area of the parking place for one car is 15 sq.m. Also, it should be noted that within the framework of projects financed by the European Bank for Reconstruction and Development (EBRD), in accordance with the Bank's Performance Requirements and the agreed "Environmental and Social Action Plan" (ESAP), the company has introduced and is developing "Environmental and Social Management" system" (ESMS). This system contributes to the improvement of the company's environmental indicators, using the risk assessment process conducted according to international standards, developed management plans (waste management, environmental pollution prevention and control, resource management, etc.) and monitoring system (ecological audit, routine inspections, reporting)

  - **Tbilisi bus reform** - the municipal bus park is being increased by an additional 160 units, high-capacity 18-meter buses.
  - **Intelligent transport system** - the project envisages the introduction of an intelligent transport system in Tbilisi within the next 6 years, i.e. Traffic lights, cameras and other relevant traffic technology connected to a unified control center to provide real-time traffic management.
  - **Rehabilitation of road infrastructure** - the arrangement of transport corridors in Tbilisi and the rehabilitation of the corresponding road infrastructure in accordance with the principles of multimodal design are being carried out step by step. This includes the arrangement of public

transport and active mobility infrastructure, such as special bus lanes, bus stops, safety islands, safe crossings, cycle paths, etc. ➢ **Sustainable Urban Mobility Plan** - Sustainable Urban Mobility Plan represents the strategy and action plan for the development of sustainable transport in Tbilisi. The plan is under development ➢ **Metro modernization** – the metro modernization project envisages the rehabilitation of Tbilisi metro stations in accordance with the principles of universal and inclusive accessibility. ➢ **Ropeway** - ropeway projects are still part of the strategic plan, although their short-term investment plan has not been drawn up at this stage. ➢ **Parking** – zonal-hourly and standard	
Timeframe	2019– 2024 Initiation and implementation of measures until 2030
Sector	Transport
Relevant planning documents, legal, and regulatory acts	CSAP
Implementation status	Ongoing
Assumptions	See below for transport mode estimates
Results to be achieved	A Sustainable Urban Mobility Plan (SUMP) has been developed; The bus fleet has been renovated; At least 3,500 new parking spaces have been added to the zonal-hour parking system; At least 1 new street has been rehabilitated in accordance with the principles of multimodal planning. Percentage of trips to Tbilisi by non-motorised transport (bicycles and walking): • 30% in 2022 • 32% in 2024 • 33% in 2026 • 34% in 2028 • 35% in 2030 Percentage of travel in Tbilisi by public transport (metro, bus, minibus): • 40% in 2022 • 41% in 2024 • 42% in 2026

		• 43% in 2028 • 45% in 2030
Sources of Financing (GEL)	**State Budget**	None
	Municipal	64, 790, 000.00 GEL 21, 289, 768.20 EUR 89, 343, 373.05 EUR 62, 800, 000 EUR 245, 000, 000 GEL 14, 000, 000 EUR 15, 000, 000 EUR 856, 000 EUR 50, 000, 000 EUR 4, 700, 000 GEL
	Private sector / publicly owned companies	None
	Donor Support	Loans and grants from EBRD, ADB, KfW, AFD, CDIA to cover investment costs. **EBRD** 80, 000, 000 EUR 67, 597, 448.33 EUR 17, 228, 000 EUR **ADB, CDIA** 30, 000, 000 USD **EBRD** 50, 000, 000 EUR 5, 000, 000 EUR
Responsible Agency		Municipal government of Tbilisi
Partner Institution(s)		• Tbilisi Transport Company • Tbilisi Minibus • Tbilisi Parking

Monitoring	**Agency / Source**	Municipal government of Tbilisi
	Progress indicator(s)	**MT-7A Bus fleet renewal:** Number and type of buses entering service; number and type of buses retired from service. **MT-7B Metro expansion:** Number of trains in regular operation on the line, average waiting time for passengers using the system. **MT-7C Bus network restructuring:** Proportion of bus routes covered by BRT lanes. **MT-7D Implementing a parking system:** Proportion of inner-city areas covered by parking system; number of vehicles using paid parking systems.
Links to other policies and measures and/or dimensions		Decarbonization: GHG-1 Energy efficiency: EE-17 Energy security

EE-19: Measures listed in Batumi's Sustainable Urban Mobility Plan (SUMP)

EE-19: Measures listed in Batumi's Sustainable Urban Mobility Plan (SUMP)	
Objective 2.3: Achieve primary energy consumption savings in the transport sector	
Description: To shift modal share from private vehicle-use to public transport and non-motorised transport by improving service and introducing additional costs for private vehicle use. The measure will also increase the proportion of passenger transport activity that is electrified. Specific activities include: • **MT-9A Reorganization of on-street parking:** In 2019, create and introduce city zones and assign payment tariffs. • **MT-9B Public transport measures:** Bus network optimization, BRT corridor, taxi regulation, and bus **fleet** renewal. The number of minibuses will be halved (from 478), a BRT bus corridor will be implemented in 2019, and the city will purchase 40 new EURO 5 diesel and 10 electric buses.	
Timeframe	2019-2024 Initiation and implementation of measures until 2030
Sector	Transport
Relevant planning documents, legal, and regulatory acts	CSAP
Implementation status	Ongoing
Assumptions	See above for key measures

Results to be achieved		• By 2024, more than 20% of the measures included in the Batumi Sustainable Urban Mobility Plan have been implemented • 8 new electric buses operating until 2024 • By 2024, zonal-hour parking will be introduced at least 6 locations
Sources of Financing (GEL)	**State Budget**	None
	Municipal	4,800,000 (loan from IFIs – see below)
	Private sector / publicly owned companies	None
	Donor Support	4,000,000 GEL (grants mobilised from EBRD and E5P)
Responsible Agency		City Hall of Batumi
Partner Institution(s)		Batumi Autotransport
Monitoring	**Agency / Source**	City Hall of Batumi
	Progress indicator(s)	**MT-9A Reorganization of on-street parking:** Proportion of inner-city areas covered by parking system; number of vehicles using paid parking systems. **MT-9B Public transport measures:** Number and type of buses entering service; number and type of buses retired from service; proportion of bus routes covered by private bus lanes.
Links to other policies and measures and/or dimensions		Energy efficiency: EE-18 Energy security

EE-20: Emission quality standards on the import and production of vehicles (EUR4 / EUR5)

EE-20: Emission quality standards on the import and production of vehicles (EUR4 / EUR5)
Objective 2.3: Achieve primary energy consumption savings in the transport sector
Description: This measure would involve the introduction of more stringent standards on imported vehicles as well as vehicles produced in Georgia. The standards would ban or increase the cost of older and less efficient vehicles thereby encouraging a gradual replacement of the existing fleet with more efficient models. This shift would result in a significant improvement in the efficiency and emission intensity of the vehicle fleet. In 2018, a cost-benefit analysis was done to assess the feasibility of an import and/or production ban on vehicles below Euro 4 or Euro 5 standards. The actual implementation is under evaluation. Discussions ongoing. Implementation is conditional on the approval of the policy.

Timeframe		2021 – 2024 Policy adoption and implementation until 2030
Sector		Transport
Relevant planning documents, legal, and regulatory acts		CSAP
Implementation status		Under consideration
Assumptions		The following reductions are to be achieved for energy intensities of road vehicles: • 2030 - Light Delivery Vehicle (LDVs) - 20%, freight vehicles - 10%; • 2040 - LDVs - 40%, freight vehicles - 30%;
Results to be achieved		A study has been conducted to examine the economically feasible imposition of a progressive import tax on import taxes for cars aged 5 and under, aged 5 to 10 and aged 10 and over, at a rate directly proportional to the age of the vehicle and engine capacity.
Sources of Financing (GEL)	**State Budget**	910,000 GEL through for the study on the feasibility of standards
	Municipal	N/A
	Private sector / publicly owned companies	N/A
	Donor Support	213,840 GEL (54,000 EUR) in grants from UNEP for cost-effectiveness analysis and implementation of engine EUR4/EUR5 including 2024
Responsible Agency		MEPA
Partner Institution(s)		• Service Agency of the Ministry of Internal Affairs of Georgia • Ministry of Internal Affairs of Georgia
Monitoring	**Agency / Source**	MEPA
	Progress indicator(s)	N/A
Links to other policies and measures and/or dimensions		Decarbonization: RE-6 Energy efficiency: EE-13, EE-14 Energy security

Energy Efficiency in Gas and Electricity Infrastructure

EE-21: Improvement of average efficiency of thermal electricity plants

EE-21: Improvement of average efficiency of thermal electricity plants	
Objective 2.4: Achieve primary energy consumption savings in gas and electricity infrastructure	
Description: This measure will result in primary energy savings in thermal power production by replacing old Thermal Power Plants (TPP) with newer more efficient TPPs – most likely these will use combined cycle gas turbine (CCGT) technology. Activities under this measure include: • The Gardabani CCGT TPP of 231 MW which was installed in Kvemo Kartli (2015); • The Tbilsresi Unit 3+4 which will be decommissioned in 2020 or at least not favoured in the dispatch system. Instead, the unit will be available as a backup power source for the dispatch system; • Mtkvari Energy which will be decommissioned in 2025. Primary energy savings are estimated by calculating the amount of electricity which could be produced by the CCGT, then replacing the older TPPs with the CCGT plants and calculating the primary energy needs to produce the same amount of electricity for the grid. Primary energy savings are achieved by a reduction of primary energy required for the same amount of electricity production from thermal power plants – where the conversion coefficient of the older plants is much lower than the CCGT plant. This essentially means that less fuel / natural gas would be required (primary energy) to produce the same amount of electricity (final energy).	
Timeframe	2020 – 2030
Sector	Power generation
Relevant planning documents, legal, and regulatory acts	Ten Year Network Development Plan CSAP
Implementation status	Partially implemented, partially in planning
Assumptions	270 MW of new thermal power plant capacity is expected to enter operation in 2023 with efficiency of 51%, which substitutes exiting non-efficient power plants. Investment cost 1595 USD/kw, financial lifetime 35 years. In 2019, the combined cycle thermal power plant - Gardabani 2 was put into operation with capacity of 255 MW. The thermal power plant receives natural gas with social price of 143 USD/thousand m^3.
Results to be achieved	Substitute exiting inefficient thermal capacity with new efficient thermal plants by 2030.

Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	546,000,000 GEL (150,000,000 EUR) - JSC GOGC
	Donor Support	None
Responsible Agency		MoESD
Partner Institution(s)		JSC GOGC
Monitoring	**Agency / Source**	GNERC
	Progress indicator(s)	Annual fuel use and generation of CCGT power plants compared to open cycle plants
Links to other policies and measures and/or dimensions		Decarbonization: RE measures (for balancing) Energy security Internal energy market

EE-22: Reduction of losses in electricity transmission networks and grid integration of new generation

EE-22: Reduction of losses in electricity transmission networks and grid integration of new generation
Objective 2.4: Achieve primary energy consumption savings in gas and electricity infrastructure
Description: This measure will result in energy savings by developing Georgia's transmission networks to accommodate a larger amount of energy production and consumption while producing less system losses. Georgian State Electrosystem (GSE) is owned by the MoESD. GSE provides transmission and exclusive dispatch services to about 60 eligible companies in Georgia. Cross-border electricity trade opportunities, high electricity demand growth, and the need for evacuation of the energy generated by the planned power plants will mean a need for investments in the transmission infrastructure for ensuring adequate development of the network. GSE own a total of 156 lines of 500-400-330-220-110-35 kV with the total length of 4454.25 km, including: • 500kV transmission line length – 937 km • 400kV transmission line length – 32.6 km • 330kV transmission line length -37 km • 220kV transmission line length – 1943.3 km • 110kV transmission line length – 955.7 km

• 35kV transmission line length – 548.45 km High voltage transmission grid total losses from 2014 through 2017 were around 2% which is quite a bit higher than the EU average. These transmission losses are expected to grow with the commissioning of additional generating capacity. However, according to the 10 Year Network Development Plan (TYNDP) of Georgia for 2022-2032, Georgia is planning to invest in targeted projects which will reduce losses for particular local network sections.		
Timeframe		2020 – 2030
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Underway
Assumptions		According to the 2016 energy balance, electricity losses make 7.5% of total final electricity consumption
Results to be achieved		Total electricity losses (per energy balance) - 5% by 2030
Sources of Financing (GEL)	**State Budget**	100,830,000 GEL (27,700,000 EUR)
	Municipal	None
	Private sector / publicly owned companies	Included under energy security and internal energy market investments
	Donor Support	Support through lending (EBRD, WB, KFW, EU-NIF)
Responsible Agency		GNERC
Partner Institution(s)		GSE, Sagrusenergo, and JSC ENERGO-PRO
Monitoring	**Agency / Source**	GNERC MoESD
	Progress indicator(s)	Annual losses by the transmission network
Links to other policies and measures and/or dimensions		Decarbonization Energy efficiency: EE-23, EE-25 Internal energy market Energy security

EE-23: Regulations on the rules of calculation of normative electricity losses - stimulating investments

EE-23: Regulations on the rules of calculation of normative electricity losses - stimulating investments		
Objective 2.4: Achieve primary energy consumption savings in gas and electricity infrastructure		
Description: This measure involves the introduction of a tariff methodology that provides incentives for distribution companies to make investments into their network and to optimize operational costs. These "Rules of calculation of normative electricity losses" would rely on international practices for reducing network losses. According to such rules, normative losses for each period of regulation are set on the basis of actual losses of the previous period, and they are not changed during the whole regulation period. This incentivises distribution companies to reduce network losses within the regulated period. In 2006 GNERC established a group of experts to study and analyse energy losses in the electricity network. Based on their research and recommendations, GNERC approves normative electricity losses in electricity networks for transmission and distribution licensees.		
Timeframe		2020 – 2030 years with further extension.
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		Current GNERC regulations
Implementation status		Underway
Assumptions		• Final energy savings do not result of this measure. Primary energy savings were estimated by calculating the reduction in the amount of electricity to be purchased by the distribution companies from the electricity producers and therefore a reduction in electricity production needed as a whole; • According to the 2016 energy balance, electricity losses make 7.5% of total final electricity consumption – which can be reduced.
Results to be achieved		Total electricity losses (per energy balance) - 5% by 2030 (included in EE-24)
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	Estimated to be 327,600,000 GEL (EUR 90,000,000 through 2030 (EUR 10 million per year)
	Donor Support	None
Responsible Agency		GNERC

Partner Institution(s)		Distribution companies including JSC ENERGO-PRO Georgia, JSC Telasi
Monitoring	**Agency / Source**	GNERC, Distribution companies
	Progress indicator(s)	Annual losses by the transmission network
Links to other policies and measures and/or dimensions		Decarbonization Energy efficiency: EE-24 Internal energy market Energy security

EE-24: Regulations on the rules of calculation of normative natural gas network losses - stimulating investments

EE-24: Regulations on the rules of calculation of normative natural gas network losses - stimulating investments
Objective 2.4: Achieve primary energy consumption savings in gas and electricity infrastructure
Description: This measure involves the regulatory framework that requires natural gas distribution companies to make investments into their network to reduce losses. This measure results in rehabilitation of gas networks / systems – including pipelines, valves, pressure reduction stations, etc. Reductions in losses are highly encouraged under licensing agreements. Specific interventions include: • Replacement of old, depreciated gas pipelines; • Enhanced maintenance and leakage control • Control of meters and replacement as needed; • Additional measures including those to combat non-technical losses such as theft. These measures would mostly reduce leakage within the gas distribution pipeline. There will also be significant investments in other aspects such as metering, but these are not included in the financial or energy parameters of the measure. As part of the regulations, natural gas distribution companies are required to achieve low levels of losses of 2% in the coming 5 years. It is planned that they will undertake feasibility studies to identify potential performance improvements – which can then be utilised by the companies to define an investment programme.[192]

192 See GNERC (2015) The Resolution N5 of March 26, 2015 on Approving Rule of Calculation of Normative Losses in Natural Gas Distribution Network Available at https://matsne.gov.ge/ka/document/view/2800042?publication=0

Timeframe		2020 – 2030 years with further implementation
Sector		natural gas
Relevant planning documents, legal, and regulatory acts		Current regulations
Implementation status		Ongoing
Assumptions		• According to the 2016 energy balance, natural gas losses make 5.8% of total primary supply. • Assumes total natural gas losses (per energy balance) - 4% by 2030
Results to be achieved		4% losses in natural gas
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	Estimated to be 144,140,000 GEL through 2030 (16,020,000 GEL per year (4,400,000 EUR per year)
	Donor Support	None
Responsible Agency		GNERC
Partner Institution(s)		Natural gas distribution companies

Monitoring	**Agency / Source**	Natural gas distribution companies
	Progress indicator(s)	Annual losses by the transmission network
Links to other policies and measures and/or dimensions		Decarbonization Energy security

EE-25: Utilization of smart meters

EE-27: Utilization of smart meters	
Objective 2.4: Achieve primary energy consumption savings in gas and electricity infrastructure	
Description: Development of regulatory mechanisms and investment support programme to encourage the use of smart meters by final consumers of electricity. This Twinning Project on Smart Meter Development has involved GNERC and E-Control. A Time-of-Use (ToU)-Tariff-Model was developed for the household and service sectors, which showed potential cost savings for both sectors: the effects are not significant at the beginning of the model but increase steadily over time. A Cost-Benefit analysis was also performed, modelling four different scenarios plus business-as-usual through 2040. The project has shown positive results in all four scenarios compared to business-as-usual, which implies that the country would have an indirect obligation to implement smart metering. GNERC has chosen an implementation strategy (Scenario 3: Smooth and Slow) from the cost-benefit analysis which has the least influence on tariffs. The chosen scenario considers that after 10 years from the decision made by the state 80% of users should have smart metering. This puts the deadline of an 80% roll-out beyond 2030. The target for 2030 is a 60% roll-out of smart meters. The government will continue cooperation with key international organisations and Donors to develop Twinning Projects and other types of bilateral support.	
Timeframe	2020 – 2030 and beyond
Sector	Electricity
Relevant planning documents, legal, and regulatory acts	Energy Efficiency Law, Twinning Project Report
Implementation status	GNERC has chosen an implementation strategy (Scenario 3: Smooth and Slow) from the cost-benefit analysis of the Twinning Report, which has a target roll-out of 80% of users having smart meters within a 10-year timeframe.
Assumptions	The Time-of-Use-Tariff-Model is based on several key parameters and assumptions: • The model was calculated for the period of 20 years

	• Different types of households were defined – the types depend on the electricity demand and the appliances/applications which are used • The different types of households are subject to a dynamic development over the time period of the model • Load-curves were developed for all types of households– for winter and summer • The different types of households have different levels of electricity demand and different potentials to shift loads (shave peak-loads) throughout a day – key assumption: the higher the demand, the higher the potential • The Time-of-Use-Tariffs are simple in the model and are based on a high tariff during peak-times and a low tariff during off-peak-times • Another assumption was the price elasticity of households – key assumption: the higher the difference between peak and off-peak tariffs, the higher is the probability that households shift loads (shave peak-loads) • Not all the households participate in a Time-of-Use-Tariff-Model – key assumption: the higher the demand, the probability that households participate increases The Cost-Benefit Analysis includes the following assumptions: • All payments are discounted to the 1st of January 2019 • Georgian smart meters are expected to fulfil the basic requirements set out in the respective European Commission recommendation • The analysis is generous on the cost side, but restrictive concerning benefits • All input parameters are either derived from information received by GNERC experts and the system operators or rely on assumptions. Some of these assumptions are based on publicly available information, others build on own experience • The analysis ensures that the Net Present Value is not affected by changes in the price level. Therefore, prices (depending on the data source, either from 2018 or from 2019) are regarded constant and a real social discount rate is applied. This real discount rate is derived from the Georgian nominal refinancing rate and the rate of inflation. The current

		macroeconomic environment implies a real discount rate of 2.00% for the analysis. This discount rate lies within the band proposed by the literature • The model considers the time period under consideration to be from 2020 to 2040 in order to reflect one full life cycle of smart meters. Consequently, these devices are expected to reliably perform their intended functions over this period
Results to be achieved		• 60% of users have a smart meter in 2030 • 80% of users have a smart meter 10 years from the start of implementation
Sources of Financing (GEL)	**State Budget**	To be decided
	Municipal	N/A
	Private sector / publicly owned companies	To be analyzed
	Donor Support	To be decided
Responsible Agency		GNERC, with distribution companies
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GNERC
	Progress indicator(s)	• Number of electricity consumers with smart meters • Annual electricity consumption reported by end users with smart meters • National average electricity consumption by end users
Links to other policies and measures and/or dimensions		Decarbonization Energy efficiency Energy security

Policies and Measures – Dimension Energy Security

ES-1: Construction of new power interconnectors with neighbouring countries

ES-1-1: Ksani-Stepantsminda-Mozdok

ES-1-1: Ksani-Stepantsminda-Mozdok

Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines**

Description: Secure reliable Russia-Georgia-Armenia-Iran transit potential Back-up for the existing 500 kV voltage line "kavkasioni" (Georgia-Russia).

Implementation of this measure represents will significantly improve reliability and stability of the entire Georgian transmission network.Currently, the electrical system of Georgia works in parallel mode mainly with the Russian system, which is very beneficial in terms of stability and frequency regulation (the Russian system is 50 times more powerful than the system of Georgia). The reliability of working with the Russian system through only one existing 405 km long 500 kV Egkh "Caucasion" is not very high; Due to the long length of this line and the very difficult track passing through the Caucasus mountains, the probability of accidents on it is quite high, which will immediately stop the power exchange with Russia.

This measure entails construction of the 500 kV OHL Ksani-Stepantsminda and OHL Ksani-Mozdok lines, which will back up OHL Kavkasioni and thus minimize interruption risks which ensures the reservation of power "Caucasion" and therefore minimizes the interruption of power transit with Russia when transiting power up to 700-1000 MW with Russia, ensures the reliability of this transit by complying with the N-1 condition. In addition, this line will generally increase the ability to exchange power with Russia by about 1,000 MW, which is necessary will be in perspective when large capacity trades from Russia to Armenia and Iran are envisaged (to be supplemented by inflows from Russia to cover Georgia's domestic deficit during the winter). Through this project, Tergi HPPs (Larsi HPP, Darial HPP and other prospective HPPs) will be integrated into the transit network through the 500/110 kV "Stefantsminda" power station. The mentioned project will also increase the reliability of 500 kV Ksani power supply. It is worth noting that the 500 kV section Ksani-Stephantsminda has been built at the first stage, which will initially (2019-2030) operate at 110 kV voltage and will ensure not only the power output of Larsi HPP and Darial HPP in the transit network, but also 110 kV in the "Zhinvali HPP-K/S Kazbegi" "Alternative power supply of 110 kV substations is also included. And after the construction of the "Stephantsminda-Mozdok" section from the Russian side, the entire "Ksani-Stephantsminda-Mozdok" line will switch to 500 kV voltage, a 500/110 kV autotransformer will be installed in Stepantsminda, which will be connected to Larsi HPP, Darial HPP and other regional HPPs.

The project includes the following components:

Planned:

- 500/110 kV SS “Stepantsminda”, installed capacity 250 MW;
- 500 kV OHL SS “Stepantsminda” border of Russia1, length 13 km;

Finished:

- 500 kV OHL SS “Ksani” – SS “Stepantsminda”, length – 100km;
- 12.6 km section of Ksani –Stepantsminda, 133/166 section;
- Installation of 110 kV bay for 500 kV OHL “Ksani-Stepantsminda” in 500 SS Ksani;
- Temporary 110 kV OHL connection between SS Ksani-500 and 500 kV OHL Ksani-Stepantsminda; Length - 0.7 km.

Timeframe		2030
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		The project is suspended
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 205 MW • Reduction of losses: 56,5 Million KWh • Increase in network transfer capacity (normal/emergency modes): 700/1000 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	74, 861, 478 GEL through 2030
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • Power exchange with Russia, MW import and export • HPPs integrated, MW
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy efficiency: EE-24 Energy security

ES-1-2: Akhaltsikhe - Tortum

ES-1-2: Akhaltsikhe - Tortum	
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines**	
Description: This measure will increase the capacity and reliability of power exchanges between Georgia and Turkiye and provide back-up for the 400 KV Akhaltsikhe-Borchkha transmission line. In the coming years, the integration of large-capacity HPPs into the energy system of Georgia is planned, the total capacity and production of which in the spring-summer period exceeds the country's consumption and its growth rates. Accordingly, the surplus of this capacity should be exported. In this regard, Turkey is the most attractive of the neighboring countries. In addition, in winter, during the period of water scarcity, the Georgian system may need to import energy from the Turkish system (for example, in 2021, in certain periods, the Akhaltsikhe-Borchkha line imported approx. 500 MW). The disconnection of the mentioned line could have caused an emergency situation (due to the emergency disconnections of the Akhaltsikhe-Borchkha line, in order to avoid the blackout of the system, in some cases it was necessary to limit 500-600 MW of consumers in the Georgian system). Therefore, in order to avoid the loss of import-export of large capacity, it is planned to build a new 400 kV OHL Akhaltsikhe-Tortumi transmission line connecting Turkey. This line, compared to the existing 400 kV OHL Akhaltsikhe-Borchkha, which runs from Akhaltsikhe to the southwest, will be able to export energy to Turkey with higher reliability, since the capacity of the Borchkha-Akhaltsikhe line is added on the way to the west of Turkey by the capacities of 436 Borchkha HPP, Derineri HPP and the HPPs of the Black Sea region of Turkey, whose water abundance The period coincides with the period of water abundance in West Georgia's HPPs. Therefore, the power transit from Georgia is often limited in the months of April-May-June. On the other hand, the Thortumi node, which is located south of Akhaltsikhe, is close to the consumption centers in this region. Accordingly, the export of power in this direction will be carried out practically without interfering factors. In addition, two 400 kV OHL power lines connecting to Turkey (Akhaltsikhe-Borchkha and Akhaltsikhe-Tortum) will reserve each other and in case of shutdown of one of them, the other will fully take over the transit function. In the future, it is also planned to increase the installed capacity of the Akhaltsikhe DC substation to 1050 MW, which will be implemented by commissioning the third 350 MW power unit. The project includes the following components: • Extension of 500 kV Akhaltsikhe to connect with 400 kV overhead power line "Akhaltsikhe-Thortum, It is to connect and arrange the cell; • Addition of the third 350 MW, 500/400 kV direct current substation block in Akhaltsikhe; • 400 kV overhead power line Akhaltsikhe-Tortum; Length: 150 km (33 km to the Georgia-Turkey border), capacity 1850 MW.	
Timeframe	2024 – 2025
Sector	Electricity transmission and distribution

Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Ongoing
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 0 MW • Reduction of losses: 61.5 million, kWh • Increase in network transfer capacity (normal/emergency modes): 350 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	495, 009, 805 GEL through 2025
	Donor Support	N/A
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • HPPs integrated, MW • Power exchange with Turkiye, MW import and export
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy efficiency: EE-24 Energy security

ES-1-3: Marneuli-Airumi

ES-1-3: Marneuli-Airumi

Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines**		
Description: This measure will increase the possibility of electricity transit from Russia to Armenia-Iran. The 500 kV substation "Marneuli" power station will be connected with the 500 kV power line to the 500 kV wing of the "Airum" power station in Armenia, with which 350 MW will be connected in the first stage, 700 in the second stage, and 1050 MW (3X350 MW) in the third stage. 500/400 kV direct current substation, from where the double chain 400 kV OHL goes to Iran (Airumi-Ddmasheni-Noravani-Iran). Thus, through this project, it will be possible to transit 1050 MW of power from Georgia (and Russia) to Armenia (and Iran) and vice versa. 500 kV OHL "Marneuli-Airum" will practically be a continuation of transit road "Mozdok-Stephantsminda-Ksani". Power will be transferred from "Ksani" to "Marneuli" via three 500 kV "roads": Ksani-Marneuli, Ksani-Zestafoni-Akhaltsikhe-Marneuli, Ksani-Gardabani-Marneuli, which will ensure the connection between Russia-Georgia and Armenia-Iran High reliability of power exchange. With the help of the 500 kV Marneuli-Airum power plant, the possibility of exchanging power between Georgia and Armenia will increase, as well as with the strong connection of the Marneuli power station to the electrical system, it will be possible to restore the system from scratch. • The project includes the following components: 500 kV OHL “Marneuli – Ayrumi” (to Armenian power supply system) length - 35.56 km (construction of new OHL of 18.56 km – from SS “Marneuli 500” to Georgian-Armenian border). • Reconstruction of section between towers N42-N109 of 500 kV OHL "Mukhrani" (part of the OHL Marneuli-Airum), 17 km.		
Timeframe		2025
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Planned
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 0 MW • Reduction of losses: 21.8 million, kWh; • Increase in network transfer capacity (normal/emergency modes): 700/700 MW
	State Budget	None
	Municipal	None
	Private sector / publicly owned companies	56 000 000 GEL through 2025

Sources of Financing (GEL)	**Donor Support**	None
Responsible Agency		GSE (the project is implemented by JSC GES "Sakrusenergo")
Partner Institution(s)		• JSC UES "Sakrusenergo" • MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • Power exchange with Russia, Armenia and Iran, MW import and export
Links to other policies and measures and/or dimensions		Energy efficiency: EE-23 Energy security

ES-1-4: 330 kV Gardabani-Aghstafa Ringing

ES-1-4: 330 kV Gardabani-Aghstafa Ringing
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines**
Description: This measure will ensure the capacity to exchange 700-1,000 MW of electricity between Georgia and Azerbaijan in compliance with the N-1 criterion; it will increase the capacity and reliability of power exchange in the Azerbaijan-Georgia-Turkiye direction; and it will improve the reliability of the Georgia-Russia-Azerbaijan synchronous ring operation. As of today, the connection to the power system of Azerbaijan cannot provide sufficient reliability, the capacity in the N-1 situation does not exceed 240 MW (330 kV capacity of Gardabani). If this line is doubled, its capacity will be equal to the capacity of 440 fields of 500 kV OHL Mukhran, which will provide the possibility of exchanging 700-1000 MW of power between Georgia and Azerbaijan, which will also enable the smooth exchange of 700 MW between the energy systems of Azerbaijan and Turkey through the energy system of Georgia. In addition, the reliability of the operation of the Georgia-Russia-Azerbaijan synchronous link will also increase.

• The project includes the following components:Construction of second circuit of 330 kV OHL "Gardabani-Agstafa", length 21 km (till Georgia-Azerbaijan border); • 330/220 kV, 400 MVA AT in SS Gardabani and arrangement of relevant bays.		
Timeframe		2023
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		Ten Year Network Development Plan of Georgia for 2023-2033
Implementation status		Completed in early 2023.
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 0 MW • Reduction of losses: 13.8 million kWh • Increase in network transfer capacity (normal/emergency modes): 400 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	30 395 674 million GEL through 2023
	Donor Support	None
Responsible Agency		GSE, (The project is implemented by JSC GES "Sakrusenergo")
Partner Institution(s)		• SC "Sakrusenergo" • MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • Power exchange with Russia, Turkiye and Azerbaijan, MW import and export

Links to other policies and measures and/or dimensions	Energy security

ES-2: Rehabilitation and upgrade of existing energy infrastructure and increase their capacity

ES-2-1: Jvari-Tskaltubo-Akhaltsikhe

ES-2-1: Jvari-Tskaltubo-Akhaltsikhe
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines**
Description: This measure will improve the sustainability and security of the Georgian energy system by providing back-up for the Enguri-Zestaponi-Akhaltsikhe 500 kV line ("Imereti" and "Zekari"). This will reduce the risks of accidents, the number of breakdowns and the unavailability of electricity. It will also improve the transit capability and reliability of the lines connecting Russia and Enguri to Turkiye / Armenia. This is the measure of the most necessary and strategic need for the transmission network of Georgia and the entire energy system, after the completion of which the 500 kV network of Western Georgia, instead of the current low-reliability radial type (Enguri-Zestafoni), will have an annular shape (Enguri-Zestafoni-Akhaltsikhe-Tskaltubo-Jvari). It will simultaneously solve several main tasks: 1. Increasing the reliability of the existing network. The point is that even before the construction of Khudon HPP and Nenskra HPP, it is necessary to have an additional 500 kV hydropower plant in the western region, which will ensure the full reservation of 500 kV HPP "Imereti" and 500 kV HPP "Zekari" and the reliable output of Engur HPP power to the consumption of Eastern Georgia and the export line of Akhaltsikhe. Today, during the emergency shutdown of "Imereti", the anti-accident system automation limits (turns off) the load equal to 70-80% of the overflow on this line in the eastern (east of Kutaisi) and generation in the western (mainly Engur HPP) parts of Georgia, which in most cases is 700 MW. exceeds s. After the completion of this project, such shutdowns will no longer take place. 2. In Enguri node, in addition to the generation of Enguri, the import of 500 kV from OHL "Kavkasion" is also used as generation.whose delivery to the east of Georgia and Akhaltsikhe-Marneuli (export to Turkey, Azerbaijan and Armenia) is limited by the capacity of Imereti. The mentioned problem will be solved when the 500 kV power plant "Jvari-Tskaltubo-Akhaltsikhe" is put into operation, the capacity of the internal network of Georgia from Jvari to Akhaltsikhe will increase dramatically. 3. The power of Khudon HPP, Nenskra HPP, Mestiachala HPP, Tekhur Cascade, Alpana HPP, Namakhvani Cascade, Tshnisskali Cascade, planned HPPs on Khaledula River, Oni HPPs Cascade and others, totaling about 3000 MW of HPP capacity will be transported to the consumption centers through substation Jvari, Tskaltubo and Zestafoni, and for export to Turkey, Azerbaijan and Armenia. 500/220 kV substation Tskaltubo provides the connection of the existing "Imereti" reserve lines Jvari-Tskaltubo and Tskaltubo-Akhaltsikhe to the 220 kV network. It will reserve the 500/220 kV substation and provide voltage regulation in the 500 kV network (installation of 250 regulated reactors is planned in the substation). The project "Jvari Tskaltubo-Akhaltsikhe" has undergone some modification, as a result of which, at the initial stage, 500 kV OHL Tskaltubo-Akhaltsikhe will be built on two-chain supports, but in order to minimize the initial investment, only one chain of wires will be hung. And in the following years,

depending on how new HPPs will be built, consumption will increase and the possibilities of inter-system exchange will be doubled. • The project includes the following components: • 500 kV substation "Tskaltubo" (501 MW at, 250 MW adjustable reactor); • 500 kV substation "Akhaltsikhe extension" to connect "Tskaltubo-Akhaltsikhe"; cell arrangement. • 500 kV air OHL "Jvari-Tskaltubo", length - 80 km, capacity 2100 MW; • 500 kV Tskaltubo-Akhaltsikhe (one chain) on two-chain supports, length 104 km, capacity 2100 MW.		
Timeframe		2023 - 2025
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Ongoing
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 3061 MW • Reduction of losses: 234,7 Million KWh • Increase in network transfer capacity (normal/emergency modes): 1200/2100 MW and 2400/4200 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	292 569 805GEL through 2025
	Donor Support	TBD
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent

		• System stability during disturbances • HPPs integrated, MW • Power exchange with Russia, Armenia and Turkiye, MW import and export
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy efficiency: EE-24 Energy security

ES-2-2: Jvari-Khorga

ES-2-2: Jvari-Khorga
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines**
Description: This measure will increase the reliability of electricity supply to temporarily -occupied region of Abkhazia, Samegrelo, Adjara and Guria and strengthen the 220 kV network of Western Georgia. Jvari-Khorga is a multipurpose project designed for addressing several important objectives. The most important desired project outcome is improved reliability of West Georgia's 220 kV network. Specifically, after 220 kV OHL Paliastomi-2 is tied to SS Khorga, Jvari-Enguri and Khorga nodes will be interconnected by four parallel 220 kV OHLs thus increasing reliability of the power supply of 220 kV substations Enguri, Vardnili, Zugdidi, Khorga and Menji as well as backing up 500/220 kV autotransformer installed in SS Enguri, and 220 kV OHLs Egrisi-1,2, Kolkhida-2a, Kolkhida 2 and Paliastomi-2(1). Along with "Tskaltubo-Zestaponi", this project will increase transfer capacity of 220 kV main of entire east part of Georgian transmission network and to some extent will back up 500 kV OHL Imereti, reducing the number of consumers to be tripped by ECS (Emergency Control System) in case of emergency outage of above mentioned 500 kV OHL. In addition, installation of a tie-line connecting SS Khorga with OHL Paliastomi will improve power supply of 220 kV SS Batumi and entire Adjara and Guria Regions (due to significant shortening of this line's Batumi-Khorga section). Also, voltage instability problem in SS Batumi will be eliminated, and evacuation of the power generated by Shuakhevi HPP will be provided (at the first stage, only Batumi - Shuakhevi HPP section of 220 kV OHL Batumi-Akhaltsikhe will be constructed). One of the major purposes of SS Khorga is ensuring power supply of Poti Free Industrial Zone and prospective port. For this, installation of 400 MVA 220/110 kV autotransformer is envisaged. This substation may be connected with prospective power plants to be constructed in Samegrelo and the western part of Lower Imereti, as well as with the ones planned in the Jvari area (e.g. Khobi HPP). • The project includes the following components:Double chain 220 kV "Odishi 1,2" (Jvari-Khorga), length 60 km, cable capacity 2x300 MW;

• Intrusion of 500 KV substation "Kavkasion" , into the substation "Jvari" 500/220" 16 km (2x8 km);500/220 kV substation "Jvari", installed capacity 500 MW • 180 (3x60) Mvar reactor to be installed in SS Jvari-500; • "Khorga" 220/110 kV substation, installed capacity 400 MWDoubling of 220 kV OHL "Pelvis-Khorga" substation, cable brand 2xAC-400Installation of 2 bays in SS Menji for “Khorga-1,2” (Menji-Khorga); • From 220 kV OHL Paliastomi-2 in 220/110 kV SS Khorga.		
Timeframe		completed in the first half of 2022
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		finished
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 204 MW • Reduction of losses: 12552 MWh • Increase in network transfer capacity (normal/emergency modes): 200/400 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	63,226,790 GEL through 2022
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Network transfer capacity, MW • System transmission losses, MW and percent

		• System stability during disturbances • HPPs integrated, MW
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy efficiency: EE-24 Energy security

ES-2-3: Batumi - Akhaltsikhe

ES-2-3: Batumi - Akhaltsikhe
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines**
Description: Increase the reliability of Adjara-Guria electricity supply; increase export potential to Turkiye; integration of Shuakhevi HPP, Skhalta HPP and other promising HPPs in the network with high quality and high reliability; and improving the reliability of the western part of the transmission network. This event has several purposes. First of all, it is worth mentioning the integration of Shuakhevi HPP and Skhalta HPP (200 MW in total) and the reliable output of their power. HPPs are connected to both Batumi and Akhaltsikhe 220 kV power stations, therefore, in any mode, the N-1 criterion is fulfilled on the Batumi-Shuakhevi-Akhaltsikhe section. In addition, the capacity of the mentioned HPPs may be produced both in the direction of "Menji" and 220 kV "Khorga" to meet the domestic consumption of the country, as well as for export to Turkey through the Akhaltsikhe direct current connection. The project completely solves the voltage problem of 220 kV in "Batumi" and increases the reliability of the supply of 220 kV in "Batumi" (and the entire Adjara-Guria regions), Shuakhevi HPP and Skhalta HPP are connected to this substation. The mentioned measure also participates in increasing the reliability of the western part of the transmission network, which allows to reduce the limited consumption by about 100 MW in case of turning off the 500 kV OHL "Imereti". In 2017, the 220 kV OHL Shuakhevi-Batumi power plant was put into operation, which provides the power output of Shuakhevi HPP and Skhaltahe HPP, and in 2023, the Shuakhevi-Akhaltsikhe section will be put into operation. The measure also envisages a 125 MW 220/110/35 kV autotransformer in Shuakhevi, for the integration of the power of the nearby HPPs into the network and also to strengthen the supply reliability of the nearby 110/35 kV distribution network. The project includes the following components:Ongoing: • Double-circuit 220 kV OHL Shuakhevi-Akhaltsikhe, Line length: 90 km; Capacity: 2x400 MW; • 220/110/35 kV 125 MVA autotransformer and step-up SS in Shuakhevi;

Finished: • Installation of 2 bays for 220 kV double-circuit OHL "Batumi-Akhaltsikhe" in 500 kV SS Akhaltsikhe; • Double-circuit 220 kV OHL Batumi-Shuakhevi, Line length 50 km, capacity 2x400 MW; • Two 220 kV cells in Batumi substation for 220 kV OHL Batumi – Akhaltsikhe.		
Timeframe		2023 – 2026
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Ongoing
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 231 MW • Reduction of losses: 5.97 Million KWh • Increase in network transfer capacity (normal/emergency modes): 800/800 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	93,100,000 GEL through 2026
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • Power exchange with Turkiye, MW import and export

	• HPPs integrated, MW
Links to other policies and measures and/or dimensions	Decarbonization: Renewable energy Energy efficiency: EE-24 Energy security

ES-2-4: Rehabilitation of 220 kV "Kolkhida-1"

ES-2-4: Rehabilitation of 220 kV "Kolkhida-1"	
Objective 3.10: Strengthening the reliability and capacity of the electricity transmission network through upgrades to local transmission lines	
Description: This measure will improve the sustainability and security of the Georgian energy system by adding back up infrastructure for 500 kV "Imereti". This will reduce the risks of accidents, the number of emergency shutdowns and the unavailability of electricity. The measure reinforces the 220 KV network to increase system stability and decrease capacity of consumers to be limited by anti-breakdown automatics. As a result of the calculation, it was determined that after the implementation of the "Jvari-Khorga" and "Tskaltubo-Zestafoni" projects, when the 500 kV OHL "Imereti" is turned off (if the flow on this line before the accident is within 425 MW), the 220 kV OHL "Kolkhida-1" It loads approximately 180-225 MW and is almost 30% higher than the load of its parallel branches, namely "Senaki-1" and "Senaki-2". Taking into account the technical condition, the permissible capacity of the so-called "Kolkhida-1" does not exceed 139 MW. Therefore, it is necessary to rehabilitate the mentioned power plant and increase its capacity to 300 MW. • The project includes the following components:Rehabilitation of 220 KV OHL „Kolkhida-1“, length 66 km.	
Timeframe	2023
Sector	Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts	TYNDP
Implementation status	Ongoing
Assumptions	N/A
Results to be achieved	• Capacity of integrated HPPs: <1 MW • Reduction of losses: 1 Million KWh • Increase in network transfer capacity (normal/emergency modes): 150 MW

Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	10,542,000 GEL through 2023
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • HPPs integrated, MW
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy security

ES-2-5: Svaneti

ES-2-5: Svaneti
Objective 3.9: **Rehabilitation and upgrade of existing energy infrastructure and increase their capacity**
Description: The total installed capacity of existing and planned small and medium-sized HPPs in the area of 110/35 kV Khudon to Mestia in Svaneti is approximately 200 MW. It is impossible to extract this power through the existing infrastructure, therefore, by 2024, the construction of a new 500/110/35 kV substation is planned, where 500 kV OHL Kavkasioni will be intruded and in this way the capacity of the existing and prospective stations in Upper Svaneti will be extracted. It should be noted here that in the future, in the case of construction of the Khudoni HPP, its connection to the mentioned substation is considered. In addition to small and medium-sized hydropower stations in Svaneti, the construction of such powerful hydropower stations as Nenskra (280 MW), Khudoni (702 MW) and Dizi (250 MW) is planned. The total capacity of these HPPs is approximately 1230 MW, for which this project envisages the construction of a 500 kV OHL Jvari-Nenskra, a 500/220 kV substation "Nenskra" and a two-chained 220 kV highway Nenskra-Mestia (Nenskradizi), which ensures the construction of HPPs Reliable connection to the network by meeting the N-1 criteria. In addition, it should be noted that the main

purpose of the 220 kV Nenskra-Mestia (Dizzy HPP) is the integration of the Dizzy HPP (250 MW) into the network, the construction of which, according to preliminary data, is planned near Mestia. As for the 220 kV substation and the connection to St. Mestia, its implementation is planned not by GSE, but by the implementing party of the Dizi HPP project. The implementation of the mentioned project depends on the construction of Dizi HPP, therefore a number of technical issues will be clarified in the future. The mentioned project serves to bring out the capacity of the HPPs in full. Therefore, the construction of certain areas of it will depend on the entry of generating capacities in specific nodes.

- The project includes the following components:500/110/35 kV SS Idliani, 267 MVA;
- Loop in/Loop out of 500 kV OHL "Kavkasioni" in/from SS ''Idlianii", length 0.5 km;
- 500/220 kV SS "Nenskra", 2x501 MVA;
- Loop in/Loop out of 500 kV OHL "Kavkasioni" in/from SS ''Nenskra", length 2 km;
- 2-circuit 220 kV OHL Nenskra HPP-SS Nenskra, length 1 km;
- 2- circuit 220 kV OHL Nenskra-Mestia, length 57 km;
- 500 kV OHL Nenskra-Jvari, length 47 km;
- Extension of 500 kV SS "Jvari" for connection of 500 kV OHL Jvari-Nenskra and arrangement of bays.

Timeframe		2024– 2030
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Planned
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 1479MW • Reduction of losses: 182.8 Million KWh • Increase in network transfer capacity (normal/emergency modes): 700 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	266 057 078 GEL through 2030
	Donor Support	None
Responsible Agency		GSE

Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • HPPs integrated, MW • Power exchange with Turkiye, MW import and export
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy efficiency: EE-24 Energy security

ES-2-6: Guria

ES-2-6: Guria
Objective 3.9: **Rehabilitation and upgrade of existing energy infrastructure and increase their capacity**
Description: This measure will integrate promising hydropower plants in the Guria region into the network and will improve food reliability in the Guria and Batumi regions. The main scope of this measure is the integration of prospective HPPs of Guria into the grid. (up to 160 MW in total) For this purpose, 220 kV line "Paliastomi-1" (Menji-Batumi) will be installed in the 220 kV part of the power station. As a result of this, the reliability of power supply of Batumi and Adjara region will increase and the voltage problem of Batumi will be further reduced, since instead of two long lines (Vardnili-Batumi and Menji-Batumi), Batumi will be supplied by Ozurgeti-Batumi and Khorga-Batumi. . This will increase the possibility of withdrawing power from the Ozurgeti substation. The Ozurgeti substation will also be connected to the new 110 kV OHL “Ozurgeti-Zoti” which will ensure the reliable delivery of the generation of promising HPPs of the Guria region to the grid. In order to increase the security of supply to the consumers of Adjara and Guria regions: to instruct the relevant distribution company to install 110 kV OHL "Chakvi" (existing "Ozurgeti-110-Batumi-1-110") and OHL "Anaseuli" in the new 220/110 kV substation "Ozurgeti" "(existing "Ozurgeti-110-Kobuleti-110"). • The project includes the following components:220/110 kV 250 MVA SS Ozurgeti ;

• Tie-line from 220 kV OHL "Paliastomi-1" to Ozurgeti substation; • Double-circuit 110 kV OHL "Ozurgeti – Zoti HPP", 49 km, 2x110 MW capacity.		
Timeframe		2023 – 2024
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP 2023-2033
Implementation status		Ongoing
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 156 MW • Reduction of losses: <1 million kWh • Increase in network transfer capacity (normal/emergency modes): <5 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	77 158 850GEL through 2024
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • HPPs integrated, MW
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy efficiency: EE-24 Energy security

ES-2-7: Racha and Namakhvani

ES-2-7: Racha and Namakhvani
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines**
Description: This measure will connect power output from Namakhvani cascade (Lower Namakhvani HPP and Upper Namakhvani HPP) to the grid and improve the reliability of connections to Tskhenistskali Cascade, Oni Cascade, Kheledula HPP, Lajanur HPP and other HPPs in the region. The project ensures the integration of approximately 1300 MW of HPPs into the network and the reliable output of their power, therefore, the construction of certain areas of it will depend on the entry of generating capacities into specific nodes. 220/110 kV substation Lajanuri will have the following generation capacities: • On the 220/110 kV wings of this substation - local prospective HPPs - a total of about 55 MW; • 110 kV OHL Ifari-Jakhunderi-Lajanuri - existing and prospective upper; • Svaneti HPPs, 127 MW in total; • The capacity of the existing Lajanuri HPP-111.8 MW; • 220 kV OHL Oni-Lajanuri (initially it will work at 110 kV and will be included in the existing substation Oni 110) - existing and planned HPPs in the vicinity of Oni Cascade and Oni, up to 400 MW in total • 220 kV OHL Kheledula - with Lajanuri - planned HPPs on the Kheledula river and Tskhenistskali Cascade, in total about 400 MW. The new substation of Lajanuri will also be connected to the double chained 220 kV OHL "Derchi" (Tskaltubo-Lajanuri) and 500 kV OHL Lajanuri-Tskaltubo (operating at 220 kV voltage at the initial stage), which, together with the above-mentioned capacities, will integrate into the Namakhvani cascade power network. For this purpose, the construction of a two-chain 220 kV transmission line Lajanuri-Tskaltubo is planned, one chain of which will enter upper Namakhvani and thus evacuate a significant part of the power of this station to the New Lajanuri substation, while the other chain will enter lower Namakhvani HPP, As a result, the main part of its capacity will flow in the direction of the substation Tskaltubo. In the mentioned period, the new Lajanuri HPP, 220 kV Lajanuri HPP- Lajanuri HPP, and accordingly the new 500 kV Lajanuri-Tskaltubo should be completed in order to reliably transfer the power of the existing Lajanuri HPP, the planned HPPs in Racha, and the Svaneti HPPs in the direction of Tskaltubo. In the mentioned period, the new substation Lajanuri , 220 kV OHL Lajanuri , Lajanuri HPP, and accordingly the new 500 kV OHL Lajanuri-Tskaltubo should be completed in order to reliably transfer the power of the existing Lajanuri HPP, the planned HPPs in Racha, and the Svaneti HPPs in the direction of Tskaltubo. 220 kV voltage infrastructure (Tskaltubo-Namakhvani-Lajanuri) together with 500 kV OHLTskaltubo Lajanuri ensures fulfillment of the N-1 criterion in the Lajanuri-Tskaltubo section, Which means that

despite the shutdown of any one of these lines, the power generated by the above-mentioned stations will continue to be transmitted to the grid without interruption. As mentioned,500/220 kV transmission lines, the new Lajanuri substation will be connected to one of the central nodes of the transmission network, the Tskaltubo substation, where the main flow of power will be provided at 500 kV voltage.

The Tskaltubo substation, will also be connected to powerful 500 kV substations in the form of Akhaltsikhe and, in the future, Djvari substations, from which it will be possible to transfer the power of the mentioned stations both for export, from the Akhaltsikhe node to Turkey, and to powerful consumption centers - from Zestafoni in the Tbilisi-Rustavi direction. The mentioned project serves to bring out the capacity of the HPPs in full. Therefore, the construction of certain areas of it will depend on the entry of generating capacities in specific nodes.

The project includes the following components:

- Expansion of 220 kV substation "Tskaltubo";
- New 220/110 kV 250 MVA substation "Lajanuri";
- Single-circuit 220 kV OHL substation Lajanuri-Lajanuri HPP, length 4 km;
- 500 kV OHL Lajanuri-Tskaltubo , length 49 km;
- Double circuit (split into phases) 220 kV OHL "Namakhvani-Tskaltubo"
- Doublecircuiting “Derchi”, length 24 km, capacity 1000 MW;
- Double-circuit (split into phases) 220 kV OHL, lower Namakhvani – upper Namakhvani-Lajanuri length 34 km, capacity 1000 MW (double circuiting of "Derchi" OHL);
- Double-circuit 110 kV OHL Oni-Lajanuri, 55 km in dimensions of 220 kV; An additional 8 km, 110 kV section to the existing Oni substation;
- 2-circuit 220 kV OHL Kheledula-Lajanuri, lengh 45 km
- Extension of 220/110 kV SS Lajanuri with 500 kV switchyard, 801 MVA

Timeframe	2023-2030
Sector	Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts	TYNDP
Implementation status	Ongoing
Assumptions	N/A
Results to be achieved	• Capacity of integrated HPPs: 1534 MW • Reduction of losses: 205.1 million kWH • Increase in network transfer capacity (normal/emergency modes): 700 MW

Sources of Financing (GEL)	**State Budget**	289 247 938GEL through 2030
	Central Budget	None
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • HPPs integrated, MW
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy efficiency: EE-24 Energy security

ES-2-8: Rehabilitation of 500 kV Imereti

ES-2-8: Rehabilitation of 500 kV Imereti
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic and inter-systemic improvements and upgrades to local transmission lines**
Description: This measure will improve the sustainability and security of Georgia's Energy System by providing back-up for 500 kV Jvari-Tskaltubo-Akhaltsikhe. It will also secure power from the Khudoni-Enguri junction to Turkiye and to the eastern region of Georgia (and Armenia). 500 kv OHL "Imereti" connects Engurhesi generation node (>1500 MW) with consumption facilities located in the east of Georgia. It should be noted that, on the other hand, the Enguri node is connected to the 500 kV OHL "Caucasus"connecting to Russia. And in the east of Georgia there is a permanent power supply, (700MW), from which 400kV OHL "Meskheti" goes to Turkey.

Georgia's summer peak consumption increases by about 5% annually (due to the pandemic, the year 2020 is an exception) during this period, the thermal plants in the east are turned off, therefore, during periods of summer water scarcity, when the generation of seasonal plants in Georgia is significantly reduced, Enguri node is used as a significant part of domestic consumption feeding, as well as exporting to Turkey, which is limited by the current capacity of 500 kV OHL"Imereti" (854-970 MW). Accordingly, in case of further increase in summer consumption, regardless of the presence of water resources on Enguri, it will no longer be possible to transfer power to the east, thus it will be necessary to limit exports and/or include thermal plants in eastern Georgia. Being within the nominal limits of the capacity of 500 kV OHL "Imereti" (≈2000 MW) will be relevant even after the construction of its parallel 500 kV highway Jvari-Tskaltubo-Akhaltsikhe. Although the said highway will reserve the shutdown of Imereti, the so-called "Imereti" cannot reserve the shutdown of any section of this highway. Therefore, the rehabilitation of the 500 kV OHL "Imereti" and its reduction to normal parameters is one of the most priority projects.

The project includes the following components:

- Rehabilitation of 500 KV OHL “Imereti”, length 128 km

Timeframe		2028
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP 2023-2033
Implementation status		Planned
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: >1,000 MW • Reduction of losses: <1 million kWh • Increase in network transfer capacity (normal/emergency modes): 1,200/2,100 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	63 000 000 GEL through 2028
	Donor Support	None
Responsible Agency		GSE (project will be implemented by JSC “Sakrusenergo”)
Partner Institution(s)		JSC “Sakrusenergo” MoESD

Monitoring	**Agency / Source**	JSC "Sakrusenergo"
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances • HPPs integrated, MW • Power exchange with Russia, Armenia and Turkiye, MW import and export
Links to other policies and measures and/or dimensions		Decarbonization: renewable energy Energy security

ES-2-9: Renovation of substations

ES-2-9: Renovation of substations
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines**
Description: This measure will improve the sustainability of Georgia's energy system and the security of customer supply. Currently, the distribution network of Samtskhe-Javakheti is connected to the transmission network with a considerable length of infrastructure in the direction of Khashuri-Khramhesi. The existing wires in the mentioned section are quite outdated, and generation sources are not connected to these parts of the network, therefore this section is less reliable in terms of food safety.Thus, in order to increase the reliability of power consumption in the Samtskhe-Javakheti region, it is important to connect it to the locally existing 220 kV network (Akhaltsikhe). Therefore, in order to solve the above-mentioned problem, to provide reliable energy supply for the Youth Olympics, and also to develop the tourist infrastructure of the region, It is advisable to arrange a 110 kV wing in Akhaltsikhe substation and connect it to the existing distribution network. The project "Upgrading the infrastructure of 15 substations" involves the planning of the area of open distribution equipment in the 500/220 kV substation 15 belonging to SSE, the arrangement of access and internal roads, drainage, building repairs, rehabilitation of external lighting, installation of video surveillance cameras, painting of metal structures of portals and others. . Some of the mentioned works have been completed, some are in progress, and some are planned for the next period. In order to integrate the planned small and medium-sized HPPs in the Oni region, it is planned, in the case of the Oni cascade construction, to create a 110 kV wing in the 220 kV substation and install a 220/110 kV AT, after which Oni-Lajanuri will switch to 220 kV. The arrangement of two 110 kV voltage

cells in Zestafon 500 serves to connect the 100 MW Imereti wind farm to the grid and reliably deliver its power to the grid. The project includes the following components: • Arrangement of 110 kV 2 bays in SS “Zestafoni”; • 110 kV switchyard and 2x63 MVA 220/110 kV autotransformers in SS "Akhaltsikhe"; • Renovation of 15 substations; • 110/35 kV switchyard 220/110/35 kV autotransformers in SS “Oni-220".		
Timeframe		2042 – 2028
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Planned
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: About 250 MW • Reduction of losses: < 1 million kWh • Increase in network transfer capacity (normal/emergency modes): 100 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	60 564 000 GEL through 2028
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent

	• System stability during disturbances
Links to other policies and measures and/or dimensions	Energy efficiency Energy security

ES-2-10: Strengthening the infrastructure of Kakheti

ES-2-10:Strengthening the infrastructure of Kakheti
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines**
Description: This measure involves integration into the network of promising HPPs in the Kakheti region and improvement of food security in the Kakheti and Dusheti regions. Kakheti is the largest region in Georgia, where tourist infrastructure and industry are intensively developing, therefore it is important that the supply of this region is carried out in a reliable way. Currently, the supply of Kakheti and Dusheti regions, as well as the generation output from these regions, is carried out with 220 kV OHL "Manavi" and 220 kV OHL "Lomi", 463 of which the emergency shutdown of one of the lines leads to the blackout of the users of the respective region and the generation. It should be noted that, the current generation of Kakheti and Dusheti regions is about 150 MW, to this will be added the capacity of prospective stations, which is about 100 MW, and in total, these regions will produce 250 MW of power. In addition, in the long term, the construction of the 140 MW "Ilto-Alazni" cascade in Kakheti is planned, if we take into account this capacity, the Kakheti and Dusheti regions will generate approximately 430 MW. Therefore, the Kakheti project envisages the construction of a 220 kV network from Gurjaani to Zhinvali. A new 220/110/10 kV Telavi substation will be built, from Gurjaani to new Telavi, 2 circuit OHL will be built in the dimension of 220 kV, of which one circuit will be hung in the first stage. A new two-circuit 220 kV OHL with one circuit hanging will also be built from New Telavi to Zhinvali. The construction of a 220/110 kV substation in Zhinvali is envisaged, which will ensure the increase of the reliability of both consumption supply and generation output of Kakheti and Dusheti regions to the N-1 criterion. In addition, it is planned to rehabilitate Gurjaani substation and build a 110 kV infrastructure in the direction of Stori (the potential of Stori Cascade and Nafareuli HPPs in the vicinity reaches 70 MW). It should be noted that in the first stage (before the construction of the new Telavi 220/110 kV) 110 kV OHL Stori-Telavi will be connected to OHL Ikalto, and in this way the power of Stori HPP will be brought into the system. In order to develop the existing tourist potential in Tusheti, the Kakheti infrastructure strengthening project includes an element that includes the construction/rehabilitation of a 35 kV network from Stori in the direction of Tusheti. The project includes the following components: • 1-circuit 110 kV OHL Story HPP - construction of new Telavi, length 50 km; • 110 kV OHL "Ikalto" should be intruded in Akhal Telavi district (Stori Telavi line will be temporarily connected to the intrusion site);

• Construction of 220/110/10 kV New Telavi substation; • Construction/rehabilitation of 35 kV network in Tusheti direction, length 35 km; • 2-circuit 220 kV OHL New Telavi-Akhmeta, with the construction of single circuit, length 30 km; • Rehabilitation of 220/110 kV SS Gurjaani; • 2-circuit 220 kV OHL Akhmeta-New Zhinvali, with the construction of single circuit, length 33 km; • 220/110 kV new substation in Zhinvali.		
Timeframe		2024 – 2027
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP 2023-2033
Implementation status		Planned
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 316 MW • Reduction of losses: 24.5 million kWh • Increase in network transfer capacity (normal/emergency modes): 300 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	194 401 200GEL through 2027
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances

		• HPPs integrated, MW
Links to other policies and measures and/or dimensions		Decarbonization: Renewable energy Energy security

ES-2-11: Reactive power source (capacitors Battery)

ES-2-11: Reactive power source (capacitors Battery)		
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines**		
Description: This measure will maintain voltage levels within the permissible limits of the Georgian power system in normal and N-1 mode. Electricity consumption in Georgia is increasing every year (due to the pandemic, the year 2020 is an exception), in the maximum modes of operation of the power system there are low voltage problems on the substations located in the east of Georgia. This problem is especially noticeable in the N-1 mode, when the 500 kV OHL "Kartli-2" or 500 kV OHL "Vardzia" is turned off, at this time the voltage levels in the eastern part of the system are significantly lower than the nominal.In order to avoid this, it is necessary to install reactive power generating equipment, namely capacitor batteries, in the 220 kV substations in the eastern part of the system (Navtlughi, Gldani, Lisi, Didube, Ksani, Gardabani, Marneuli). It should be noted that some substations can be replaced by some other substation, which will be revealed at the stage of further studies The project includes the following components: • 600 MV AR reactive power compensation equipment in 220 kV substations of Eastern Georgia.		
Timeframe		2024 – 2029
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Planned
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 0 MW • Reduction of losses: 1.7 mln. kWh • Increase in network transfer capacity (normal/emergency modes): 0 MW
	State Budget	None
	Municipal	None

Sources of Financing (GEL)	**Private sector / publicly owned companies**	33 600 000GEL through 2029
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD
Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances
Links to other policies and measures and/or dimensions		Energy efficiency Energy security

ES-2-12: Safe electricity supply of Tbilisi region

ES-2-12: Safe electricity supply of Tbilisi region
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines**
Description: This measure will ensure the reliability of supplies to Tbilisi, introduce a connection to Gardabani Thermal Power Plant 2 to ensure reliable power output, and strengthen the Marneuli-Gardabani junction. Georgia's electricity consumption is increasing every year (the exception is 2020, the period of the pandemic), and this increase is especially noticeable in the Tbilisi region, with the existing infrastructure it is impossible to provide safe electricity supply to these 467 regions. Therefore, the project "Safe electricity supply of Tbilisi region" is planned in the future. The report of the prospective modes showed that both the 500/220 kV autotransformers and Tbilisi 220 kV network N-1 modes will include the overloading of the Ksani 500/220 kV autotransformer, as well as the 220 kV OHL Aragvi and Kukia. Accordingly, it is necessary to change the autotransformer in Ksan and install an autotransformer with a capacity of 801 MV. Also strengthening of 220 kV OHL Aragvi and Kukia. The need for the construction of the 220/110/35 kV substation Norio is caused by the increase in consumption on the Lilo-Vaziani-Sartichala section. Recently, the intensity of consumption growth in the mentioned nodes has decreased, therefore the mentioned substation will be built following the growth of consumption. • The project includes the following components:

• Construction of second circuit of 220 kV OHL "Aragvi" and arrangement bays; length 34 km • Rehabilitation of the 220 kV OHL Alaverdi section (from the entry point in Marneuli to the border of Armenia, 18.6 km); • 220/110 kV SS "Norio", with 2x125 MVA installed capacity • Loop in/loop out of 220 kV OHL "Varketili" in/from SS "Norio-220", length 2x4 km; • Replacement of 500/220 kV 501 MVA autotransformer with 500/220 kV 801 MVA one in SS "Ksani-500". • Construction of second circuit of 220 KV OHL "Kukia"; length 17 km Finished: • Intrusion of 220 kV "Alaverdi" substation in Marneuli, 2x16.7 km and arrangement of two 220 kV bays. • Rehabilitation of the 220 kV OHL "Alaverdi" part (from thermal station 2 to the Alaverdi cutting site), length 7.5 km.		
Timeframe		2023 – 2027
Sector		Electricity transmission and distribution
Relevant planning documents, legal, and regulatory acts		TYNDP
Implementation status		Planned
Assumptions		N/A
Results to be achieved		• Capacity of integrated HPPs: 0 MW • Reduction of losses: 11.95 million kWh • Increase in network transfer capacity (normal/emergency modes): 400 MW
Sources of Financing (GEL)	**State Budget**	None
	Municipal	None
	Private sector / publicly owned companies	71 716 400 GEL through 2027
	Donor Support	None
Responsible Agency		GSE
Partner Institution(s)		MoESD

Monitoring	**Agency / Source**	GSE
	Progress indicator(s)	• Transmission overhead lines upgraded or expanded, voltage and length (km) • Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA) • Amount of transmission losses, percent • System stability during disturbances
Links to other policies and measures and/or dimensions		Energy security

ES-2-13: Strengthening of Kartli 220 kV network

ES-2-13: Strengthening of Kartli 220 kV network
Objective 3.10: **Strengthening the reliability and capacity of the electricity transmission network through systemic improvements and upgrades to local transmission lines**
Description: This measure will strengthen the network of eastern Georgia and provide reliable output in the capacity network of Combined Heat and Power Plant 1; ensure reliability of supply while meeting increased consumption in eastern Georgia; support integration of Mtkvari basin with hydropower plants and renewable energy sources; and provide back-up for the 500 kV Kartli-2 and Vardzia lines. About 50 years ago, the eastern and western parts of the electrical system of Georgia were connected by a single circuit of 220 kV OHL from 220 kV substation Zestafon to 220 kV substation Gardabani (through 220 kV OHL Navtlughi). Therefore, the 220 kV sections Zestafoni-Khashuri-Gori-Ksani and Navtlughi-CCGT1-Gardabani are outdated. As of today, the operating margins of the 220 kV Navtlugi-CCGT-Gardabani are so low that it is not possible to safely and reliably evacuate the entire generation of the convertor CCGT1 to the network. Also, the operating limits of the 220 kV highway Zestafoni-Khashuri-Gori-Ksani are also very low. In the future, when there will be an increase in users in Eastern Georgia, there will be a reset of the mentioned elements, in N-1 mode, when OHL "Kartli-2" or OHL "Vardzia" is turned off. In order to avoid the mentioned problems, it is planned to rehabilitate the 220 kV OHL Navtlughi 1, 2 and double circuit the Kartli 220 kV highway (Zestafoni-Ksani). This project will contribute to the integration of renewable energy sources in Khashuri and Gori nodes (Mtkvari HPP cascade, wind and solar stations) It should be noted that in Shida Kartli region there is a potential for the construction of up to 500 MW of wind and solar power stations, therefore, by strengthening the mentioned highway, reliable output of power from these stations to consumption centers and for export will be ensured. Expansion of the existing Gori substation and arrangement of additional cells, both for lines and generation connection, is not possible due to the fact that the substation is located in a densely populated area. That is why it is advisable for the representatives of the stations to organize a 220 kV collector substation "Gori New" where there will be an intrusion of OHL "Urbnisi" and "Liakhvi".

<table>
<tr><td colspan="3">It should be noted that the element P.15.1 "220 kV OHL Liakhvi double-circuit, length 56 km" will be implemented by JSC “Georgian state Electrosystem”with its own funds.

The project includes the following components:

• Rehabilitation of 220 kV OHL “Liakhvi” , Length 56 km;
• Rehabilitation of 220 kV OHL Navtlugi 1,2, length 38 km;
• Rehabilitation of 220 kV OHL "Surami", length 67 km;
• Rehabilitation of 220 kV OHL "Urbnisi", length 45 km;
• Rehabilitation of 220 kV OHL "Surami", length 67 km</td></tr>
<tr><td colspan="2">Timeframe</td><td>2025-2028</td></tr>
<tr><td colspan="2">Sector</td><td>Electricity transmission and distribution</td></tr>
<tr><td colspan="2">Relevant planning documents, legal, and regulatory acts</td><td>TYNDP</td></tr>
<tr><td colspan="2">Implementation status</td><td>Projecting stage</td></tr>
<tr><td colspan="2">Assumptions</td><td>N/A</td></tr>
<tr><td colspan="2">Results to be achieved</td><td>• Capacity of integrated HPPs: 766 MW
• Reduction of losses: 4.4 million kWh
• Increase in network transfer capacity (normal/emergency modes): 400 MW</td></tr>
<tr><td rowspan="3">Sources of Financing (GEL)</td><td>State Budget</td><td>None</td></tr>
<tr><td>Municipal</td><td>None</td></tr>
<tr><td>Private sector / publicly owned companies</td><td>117 600 000 GEL through 2028</td></tr>
<tr><td>Donor Support</td><td>None</td></tr>
<tr><td colspan="2">Responsible Agency</td><td>GSE</td></tr>
<tr><td colspan="2">Partner Institution(s)</td><td>MoESD</td></tr>
<tr><td rowspan="2">Monitoring</td><td>Agency / Source</td><td>GSE</td></tr>
<tr><td>Progress indicator(s)</td><td>• Transmission overhead lines upgraded or expanded, voltage and length (km)
• Substation autotransformers and Back-to-Back links upgraded or installed, rating (kV) and capacity (MVA)</td></tr>
</table>

		• Amount of transmission losses, percent • System stability during disturbances
Links to other policies and measures and/or dimensions		Decarbonization: Renewable energy Energy security

EP-1: Ongoing social assistance programmes

EP-1: Ongoing social assistance programmes		
Objective 4.1: Reduce the percentage of the population in situations characterised by energy poverty		
Description: This measure involves ongoing assistance programmes to poorer households and those in mountainous regions.		
Timeframe		2020 – 2030
Sector		Population
Relevant planning documents, legal, and regulatory acts		Various legal acts already in place
Implementation status		Legal acts and support schemes in place. Definitions of energy poverty and tracking mechanism to be defined.
Assumptions		Only includes direct payments – does not include indirect subsidies through the social tariff for natural gas.
Results to be achieved		Reduction of percentage of the population in situations characterised by energy poverty from an estimated 43% in 2017 to less than 15% in 2030.
Sources of Financing (GEL)	**State Budget**	189,000,000 GEL (21,000,000 GEL per year) direct payments
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	To be established
Responsible Agency		Social Service Agency
Partner Institution(s)		Municipalities
	Agency / Source	Social Service Agency

Monitoring	**Progress indicator(s)**	Household surveys of access to high-quality energy (heating, cooking, hot water), levels of suppressed demand, and affordability
Links to other policies and measures and/or dimensions		Energy Efficiency measures for households

Policies and measures - Dimension Research, Innovation and Competitiveness

RIC-1: Increase public spending on R&I to 1% of GDP and public spending on sustainable energy and climate change R&I to 0.1% of GDP by 2030

RIC-1: Increase public spending on R&I to 1% of GDP and public spending on sustainable energy and climate change R&I to 0.1% of GDP by 2030		
Objective 5.1.1: Increase public investment in RDI		
Description: This measure is directly linked to the measure RIC -2 and should be conducted in conjunction. The total (baseline and project based) public spending on RDI should continuously gradually increase reaching the level of 1% of GPD by 2030, while spending on sustainable energy and climate change to reach 0.1% of GDP by 2030. The Research and Innovation Council (RIC)[193] was established in 2015 with the aim to support R&I development in the country. RIC is chaired by the prime minister and its members are the ministers of the MoESD (deputy chair), MES, finance, foreign affairs, justice, regional development and infrastructure, defense, labour, health and social affairs, and agriculture, the heads of the two parliamentary committees, business representatives, the president of the National Academy of Science, the director of the SRNSF, the director of the IPR Agency (Sakpatenti), and several scientists.		
Timeframe		2022-2023
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		**I**ncreased effectiveness of public spending on RDI and targeted support to the priority areas.
	State Budget	Administrative expenses
	Municipal	None

193 https://www.gov.ge/files/469_59882_627761_78.pdf;%20http://gov.ge/files/411_47332_283575_32.3.02.15.pdf

Sources of Financing (GEL)	**Private sector / publicly owned companies**	None
	Donor Support	To be sought
Responsible Agency		MoESD will be responsible for leading negotiation on the specific target for public spending on energy related R&I with MoF and Research and Innovation Council.
Partner Institution(s)		Research and Innovation Council, MoF
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Progress can be analysed through monitoring of public spending as a share of GDP.
Links to other policies and measures and/or dimensions		Measure RIC 2; RIC 15

RIC-2: Define thematic priorities for national R&I and define Energy related R&I as one of the priorities

RIC-2: Define thematic priorities for national R&I and define Energy related R&I as one of the priorities		
Objective 5.1.1: **Increase public investment in R&I**		
Description: Development of thematic RDI priorities based on the current needs of social-economic development of the country will be initiated by MoESD to be developed by Research and Innovation Council. Sustainable energy and climate research to be defined as high strategic priority for R&I. One of RIC main tasks is to identify the thematic priorities of Georgia by government decree, which has not been done so far.		
Timeframe		2022-2023
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		Defined thematic priorities to increase efficiency of public spending on R&I and ensure alignment with national social economic development priorities.
	State Budget	Administrative expenses
	Municipal	N/A

Sources of Financing (GEL)	**Private sector / publicly owned companies**	N/A
	Donor Support	Technical assistance to support research on the priority thematic areas
Responsible Agency		RIC
Partner Institution(s)		MoESD and other line Ministries
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Existence of thematic priorities for R&I approved by the respective government decree.
Links to other policies and measures and/or dimensions		Measure RIC 1; RIC 4

RIC-3: Support the development and improvement of sustainable energy educational programs

RIC-3: Support the development and improvement of sustainable energy educational programs	
Objective 5.1.2: Capacity building for stimulating R&D development	
Description: First of all, this measure implies inventories of existing educational programs in the field of sustainable development and analysis of their adherence to the current energy & climate sector needs. Existing programs should be designed to cover the needs of domestic renewable energy development, climate change mitigation and adaptation, etc. Development of energy sector puts a strong demand on qualified personnel, researchers and specialists. Modern standards, best practices, modern technologies, and other relevant materials should be an integral part of modern educational programs. International expertise is very important for implementation of this measure. MoESD will cooperate with international Donor to initiate review of existing program and development of actionable recommendations for their improvement and alignments with modern standards. MoESD will cooperate with universities to motivate their participation in this initiative. **Expected impact:** Improved research capacity and pool of young researchers and qualified personnel	
Timeframe	2023-2024
Sector	RDI / Energy
Relevant planning documents, legal, and regulatory acts	N/A
Implementation status	Under consideration
Assumptions	N/A

Results to be achieved		Improved research capacity and pool of young researchers and qualified personnel
Sources of Financing (GEL)	**State Budget**	Administrative expenses
	Municipal	N/A
	Private sector / publicly owned companies	N/A
	Donor Support	Technical assistance to support review of existing educational programs and education needs assessment. Financial assistance to cover expenses of local consultant that will work with an international expert.
Responsible Agency		MoESD
Partner Institution(s)		MEPA, Universities
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Report reviewing existing programs; Education needs assessment
Links to other policies and measures and/or dimensions		

RIC-4: Provide national scholarships for Georgian students pursuing their education in the leading universities abroad in the field of sustainable development

RIC-4: Provide national scholarships for Georgian students pursuing their education in the leading universities abroad in the field of sustainable development	
Objective 5.1.2: Capacity building for stimulating R&D development	
Description: It was created in order to promote the development of international training academic programs and the promotion of international training academic cooperation, which serves to train qualified personnel employed in both the public and private spheres of Georgia. Since 2014, the center has funded more than 1,300 scholarship recipients, the priority directions are determined by the center's respective scholarship program.	
Timeframe	2022-2023
Sector	RDI
Relevant planning documents, legal, and regulatory acts	N/A

Implementation status		N/a
Assumptions		N/A
Results to be achieved		Improved research capacity and developed pool of highly qualified young researchers
Sources of Financing (GEL)	**State Budget**	Administrative expenses for shifting existing program.
	Municipal	N/A
	Private sector / publicly owned companies	N/A
	Donor Support	To be sought
Responsible Agency		MoESD
Partner Institution(s)		MEPA. IEC
Monitoring	**Agency / Source**	IEC
	Progress indicator(s)	Sustainable energy and climate change is defined as a one of directions at LEPL "International Education Centre"
Links to other policies and measures and/or dimensions		Measure RIC-2

RIC-5: Funding national research and development projects aligned with the National Energy Policy priorities

RIC-5: Funding national research and development projects aligned with the National Energy Policy priorities
Objective 5.1.3: Support and strengthen RDI related to sustainable energy.
Description: Funding national research and development projects aligned with the National Energy Policy priorities: 1. Research the solutions for resource efficiency in energy production and consumption 2. Support innovative and research projects to support sustainable utilization of domestic renewable energy (e.g. biomass, hydro, solar, wind, geothermal): potential and deployment options 3.Support the research of potential for green hydrogen in Georgia 4. Research on climate change and its impact on energy system 5. Research related to integration of variable renewable energy sources into the system and the capacities of energy storage (including hydro-accumulating power stations, batteries, etc.)

6. Social Studies and Humanities (SSH) in energy, policy research and energy security risk analysis 7. ICT/AI solutions for optimization of energy sector (e.g. forecasting, long-term energy planning, power expansion planning, etc.). MoESD will cooperate with research teams and institutions working with various energy and climate change related planning and forecasting to develop a sustainable analytical team of modelers to provide analytical support to the development of strategic documents.		
Timeframe		From 2023 and onward
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		• Mobilized and coordinated donor support and alignment of RDI with sectoral development priorities. • Improved energy and climate change planning and forecasting capacity. • Improved analytical support to development of strategic documents (national strategies, action plans, network development plans, etc)
Sources of Financing (GEL)	**State Budget**	Administrative expenses for coordination with Donors and research teams
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	Financial and technical assistance volume – To be determined
Responsible Agency		MoESD
Partner Institution(s)		International Donors, research organisations and institutes
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Funded research projects in the National Energy Policy priority fields
Links to other policies and measures and/or dimensions		

RIC-6: Development of research monitoring indicators according to Georgia's security and development priorities.

RIC-6: Development of research monitoring indicators according to Georgia's security and development priorities.		
Objective 5.1.3: Support and strengthen RDI related to sustainable energy.		
Description: Research and innovation status quo analysis will be conducted to understand and analyse the current state of sustainable energy and climate change RDI. Considering sectoral development priorities targets, indicators and monitoring system will be developed		
Timeframe		2022-2024
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		Developed and regularly measured indications allow tracking sector development (dynamics), effectiveness of policy interventions and support mechanisms. Data will be used not only for monitoring and adjustment of policy measures, but also for international and national reporting.
Sources of Financing (GEL)	**State Budget**	Administrative expenses
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	Potentially to be sought for technical assistance
Responsible Agency		MoESD
Partner Institution(s)		MEPA, Geostat
Monitoring	**Agency / Source**	Geostat
	Progress indicator(s)	Official statistics for the developed indicators
Links to other policies and measures and/or dimensions		Measure RIC 1

RIC-7: Promote certification of new products and technologies through Sustainable Business award

RIC-7: Promote certification of new products and technologies through Sustainable Business award		
Objective 5.1.4: **Promote innovation in business and stimulate private investments in R&I**		
Description: In order to promote penetration of modern low carbon technologies and innovative approaches to improve resource efficiency in industry and commercial sectors, a Sustainable Business Award will be established. Businesses that receive international environmental certification (e.g. ISO 50001, ISO 40001) or introduce modern low carbon technologies to significantly improve resource efficiency or reduce consumption of fossil fuels will be nominated for the Innovation Award.		
Timeframe		From 2023 and onward
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		Increased number of enterprises that use low carbon technologies and adhere to the best international standards.
Sources of Financing (GEL)	**State Budget**	Administrative expenses
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	Non-financial contribution to support outreach and international recognition
Responsible Agency		MoESD
Partner Institution(s)		GITA, Produce in Georgia, Business associations
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Established Sustainable Business Award
Links to other policies and measures and/or dimensions		

RIC-8: Support Research2Business fellowship program for knowledge and technology transfer from science to private sector (industry) with focus on low carbon technologies

RIC-8: Support Research2Business fellowship program for knowledge and technology transfer from science to private sector (industry) with focus on low carbon technologies		
Objective 5.1.4: **Promote innovation in business and stimulate private investments in R&I**		
Description: Support Research2Business fellowship programs in the field of sustainable development. Within the program PhD students and early-stage researchers can pursue/tailor their research in the specific industry (Private companies operating in the Energy and Climate fields). This will help to both increase applicability and relevance of research results as well as increase private investments in RDI. This measure is linked with measure RIC -9		
Timeframe		From 2023 and onward
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		Increased number of applicable research that adhere to the business needs. Increased private sector involvement and private spending share on RDI.
Sources of Financing (GEL)	**State Budget**	Administrative expenses
	Municipal	None
	Private sector / publicly owned companies	Private companies participating in the program to cover stipend / internship salary
	Donor Support	None
Responsible Agency		MoESD (as an initiator)
Partner Institution(s)		Business Associations (BAG, SME Association), Chamber of Commerce, Produce in Georgia
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Research2Business fellowship program in place. Number of fellows enrolled into the program
Links to other policies and measures and/or dimensions		Measure RIC 9

RIC-9: Create B2B type platform to connect PhD and experienced researchers to businesses and business research and innovation needs

RIC-9: Create B2B type platform to connect PhD and experienced researchers to businesses and business research and innovation needs.		
Objective 5.1.4: **Promote innovation in business and stimulate private investments in R&I**		
Description: This measure is linked to measure RIC-8 and includes development of digital platform to connect researchers, young research teams and businesses. Businesses will be able to post their research needs in the specific area, while young researchers and PhD students will be review them and select the one for their PhD thesis or a specific post Doc research. The platform can be used as a base and as a tool for Research2Business fellowship program.		
Timeframe		2022-2023
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		Increased number of applicable research that adhere to the business needs. Increased private sector involvement and private spending share on RDI.
Sources of Financing (GEL)	**State Budget**	To be determined
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	Donor financial assistance to develop a proper tool and to boost the platform. Funding volume to be determined
Responsible Agency		MoESD.
Partner Institution(s)		GITA
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	Digital platform that connects businesses and researchers in place
Links to other policies and measures and/or dimensions		Measure RIC- 8

RIC-10: Nominate NCP or NCPs for Cluster 5 of Horizon Europe program

RIC-10: Nominate NCP or NCPs for Cluster 5 of Horizon Europe program		
Objective 5.2.2: **Improve Georgian researchers and research organizations participation rate in EU framework program "Horizon Europe"**		
Description: MES is currently negotiating with Horizon Europe concerning the status of Georgia in the program. The NCP structure for Horizon Europe will be similar to Horizon 2020 NCP structure, but coordination and monitoring of their work will be improved. MES and SRNSF will provide support to NCP in their daily activities through various means, including provision of space for info days and workshops.		
Timeframe		2021-2022
Sector		RDI
Relevant planning documents, legal, and regulatory acts		Under the ongoing negotiation Between MeS and Horizon Europe program
Implementation status		Planned measure for 2021
Assumptions		N/A
Results to be achieved		Increased participation rate in the largest EU research and innovation program Horizon Europe, strengthen international cooperation in research and innovation.
Sources of Financing (GEL)	**State Budget**	Administrative expenses
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	None
Responsible Agency		MES
Partner Institution(s)		MoESD, MEPA
Monitoring	**Agency / Source**	EU Funding and Tenders Portal
	Progress indicator(s)	Appointed NCP/s for Cluster 5. Information can be checked via EU Funding and Tenders portal.
Links to other policies and measures and/or dimensions		Measure RIC-11

RIC-11: Ensure proper representation of energy and climate change issues in Georgia's Horizon Europe work programme committee delegation

RIC-11: Ensure proper representation of energy and climate change issues in Georgia's Horizon Europe work programme committee delegation		
Objective 5.2.2: **Improve Georgian researchers and research organizations participation rate in EU framework program "Horizon Europe"**		
Description: Since Horizon Europe is a new program, the work programme committee members shall be re-nominated, and proper representation of energy and climate change issues shall be ensured. Members will cooperate with Georgian research community, actively attend Horizon Europe's work program meetings and communicate/voice research needs relevant to national context there.		
Timeframe		2021-2022
Sector		RDI
Relevant planning documents, legal, and regulatory acts		Under the ongoing negotiation between MES and Horizon Europe program
Implementation status		Planned measure for 2021-2022
Assumptions		N/A
Results to be achieved		Georgian RDI priorities voiced at Horizon Europe work programme development meetings, improved cooperation with other countries members or associated countries to Horizon Europe.
Sources of Financing (GEL)	**State Budget**	Administrative expenses, national budget to cover travel expenses for those members who are not reimbursed by EU Commission.
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	Potential EU support – amount to be determined
Responsible Agency		MES
Partner Institution(s)		MoESD, MEPA
Monitoring	**Agency / Source**	MES
	Progress indicator(s)	Appointed delegation member or members responsible for energy and climate change
Links to other policies and measures and/or dimensions		Measure RIC 10

RIC-12: Conduct regular info days to increase awareness on international research programs in energy and climate fields

RIC-12: Conduct regular info days to increase awareness on international research programs in energy and climate fields		
Objective 5.2.1: Support Georgian researchers and research organizations participation in large international RDI programs		
Description: Regular info days, workshops and other means of information dissemination will be used to inform researchers and research organization on available international RDI programs with relevant eligibility criteria (e.g. COST, NATO SPS, other). Support their participation through provision of practical information. Horizon Europe NCPs will support the Ministry and participate in respective information events/joint info days.		
Timeframe		From 2022 and onward
Sector		RDI, Energy
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		N/A
Assumptions		N/A
Results to be achieved		Strengthened international cooperation in research and innovation, diversification of RDI funding.
Sources of Financing (GEL)	**State Budget**	Administrative expenses
	Municipal	None
	Private sector / publicly owned companies	None
	Donor Support	Donor support sought
Responsible Agency		MES
Partner Institution(s)		SRNSF, Horizon Europe NCPs, GITA, MoESD
Monitoring	**Agency / Source**	MES
	Progress indicator(s)	Event memos or calendar of info days
Links to other policies and measures and/or dimensions		Measure RIC-10

RIC-13: Work on bilateral and multilateral initiatives- cooperation with international organizations

RIC-13: Work on bilateral and multilateral initiatives- cooperation with international organizations		
Objective 5.2.1: **Support Georgian researchers and research organizations participation in large international RDI programs**		
Description: MoESD will work on forming new bilateral or multilateral cooperation in the field of energy and climate change RDI to create new opportunities for international cooperation for Georgian research community		
Timeframe		From 2022 and onward
Sector		RDI
Relevant planning documents, legal, and regulatory acts		N/A
Implementation status		Under consideration
Assumptions		N/A
Results to be achieved		Diversified RDI funding, strengthened international cooperation and integration of Georgian researchers in EU research community.
Sources of Financing (GEL)	**State Budget**	Administrative expenses
	Municipal	None
	Private sector / publicly-owned companies	None
	Donor Support	None
Responsible Agency		MoESD
Partner Institution(s)		SRNSF, GITA, MEPA
Monitoring	**Agency / Source**	MoESD
	Progress indicator(s)	At least one bilateral cooperation program to support R&I in sustainable energy and climate change by 2030
Links to other policies and measures and/or dimensions		

Annex II: Additional information about available renewable energy resources

Wind energy - Georgia has a significant potential of using wind energy. In case of widespread use of solar power plants, Georgia will need to create backup generation capacities or install modern energy-saving batteries, as it is almost impossible to predict wind power generation.

Solar energy - Due to the geographical location of Georgia, duration of effective sunshine is quite long. One of the optimal solutions for power supply to mountainous, hard-to-reach, scarcely populated villages are autonomous micro power plants operating with solar photoelectric converters.

Geothermal energy - The total estimated reserves of geothermal resources on the territory of Georgia are about 250 million m3 per year. The temperature of geothermal waters of the country varies between 30-110 °C. In order to realize Georgia's geothermal energy potential, it is envisaged to attract investors and promote the development of the sector in general. For example, within the framework of the Covenant of Mayors initiative, it is considered to provide the state and/or grant funding for using geothermal energy for heating and hot water supply in municipal buildings (kindergartens, schools).

Biomass - Timber biomass is one of the main energy resources in Georgia. According to MEPA, the forest area of Georgia is 3,124,200 hectares and is currently fully state owned. Forests are currently being inventoried in the regions of Georgia in stages. Due to the fact that the process is quite time consuming, in only a few years the country will have information on the amount of resources available within the framework of sustainable forest management.