

Study Report on
Best Practices in Sustainable Energy in
Georgia

Georgia

Sustainable Energy for All

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List of abbreviations

ASCM	Automated System of Commercial Metering
ASECCM	Automated System of Electricity and Capacity Control and Metering
BAU	Business As Usual
CCGT	Combined Cycle Gas Turbines
CO ₂	Carbon Dioxide
COP21	The 21st session of the Conference of the Parties to the UNFCCC
DCFTA	Deep and Comprehensive Free Trade Area
DSM	Demand-Side Management
DSO	Distribution system operator
EE	Energy Efficient
EED	Energy Efficiency Directive
ESCO	Electricity System Commercial Operator
EU	European Union
EU-GEORGIA AA/DCFTA	EU-GEORGIA Association Agreement / Deep and Comprehensive Free Trade Areas
EUR	Euro
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GEL	Georgian lari
GEMM	Georgian Electricity Market Model
GHG	Greenhouse Gas
GWh	Giga watt hour
ha	Hectare
HPP	Hydropower Plant
IFI	International Financial Institutions
INDC	Intended Nationally Determined Contribution
ISO	International Organization for Standardization
ktoe	Kilotonnes of oil equivalent

KW	Kilowatt
LED	Light Emitting Diode
LEDS	Low Emission Development Strategy
M&E	Monitoring and Evaluation
mln.	Million
MW	Megawatt
NEAP	National Environmental Action Programme
NEEAP	National Energy Efficiency Action Plan
NREAP	National Renewable Energy Action Plan
PJ	Petajoule - (10 ¹⁵) joules
RES	Renewable energy sources
SCADA	Supervisory Control and Data Acquisition System
SE4ALL-EECAA	Sustainable Energy for All in Eastern Europe, the Caucasus and Central Asia
SFM	Sustainable Forest Management
SME	Small and Medium-Sized Enterprise
TPES	Total primary energy supply
TSO	Transmission System Operator
TWh	Terawatt Hour
TYNDP	Ten-year network development plan
UNDA	United Nations Development Assistance
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

Executive Summary

The need to improve access to sustainable, affordable and environmentally sound energy services and resources was one of the main reasons to urge countries around the world to increase the awareness on the importance of addressing energy issues and to promote action at the local, national, regional and international levels. In response, Economic Commission for Energy launched UNDA project Sustainable Energy for All in Eastern Europe, the Caucasus and Central Asia (SE4ALL-EECAA). Project aims to strengthen the national capacity of economies in transition to develop National Action Plans for Sustainable Energy for all, namely in following areas: (1) ensuring universal access to modern energy services (2) improving energy efficiency and (3) increasing the share of renewable energy in the global energy mix.

While Georgia has huge renewable energy potential, country is high dependent on imported fossil fuels. Imported energy resources accounts approximately 67-70% of total primary energy supply. On the other hand, it is worth to note that in 2016 Georgia become full member of European Energy Community and based on its accession protocol, recently, Georgia is in the process of harmonization European third energy package with its energy legislation. Hence, Georgia's energy policy and strategy is to support renewable energy and energy efficiency programs in order to achieve sustainable economic development in the country.

Over last decade, reforms in the Georgian energy sector accompanied with energy infrastructure developed guarantees energy security of the country as well as supports rational use of energy resources, promotion of renewable energy resource and energy efficient and environmentally friendly clean technologies in all sectors of the economy. However, there is still lack of sufficient support mechanisms and level playing field that will promote large-scale development in this regard.

Georgia as one of the developing countries faces various challenges related to sustainable development which is directly related to concrete actions for effective adaptation to its national energy policy measures. The study was conducted through a comprehensive desk review together with stakeholder consultations covering ministries, energy companies, civil society organizations, investors and IFIs active in Georgia.

The activities under the study include a baseline status analysis of Georgia's energy sector on energy production and consumption. They cover assessment of existing best practices in sustainable energy, together with identification of challenges and implementation of measures to overcome these challenges.

1. Introduction

The importance and use of renewable energy sources (RES) and energy efficiency measures has been rising in recent years on a global scale. This tendency is expected to continue in the future because, on the one hand, energy is very crucial for everyday life, economic growth and development of the country. On another hand, countries have to be committed to take actions for environmentally acceptable and sustainable development path. This path will guarantee effective and sustained access to energy for all and will play a significant role in improving living conditions of population, and will contribute to economic development and human prosperity.

Taking into consideration direct relationship between lack of economic development, poverty indicators and absence of adequate energy services, utilization of RES for electricity generation, remote areas for cooking, heating and other applications accompanied with energy efficiency actions clearly demonstrates importance of RES for achieving sustainable development goals and creating better living conditions for people.

High prices on energy and renewable energy technologies generally leads to small share of renewable energy consumption in rural areas, while traditional fuels hold large share of households' energy consumption it takes a heavy burden on the environment.

Taking into consideration existing situation and need to improve access to sustainable, affordable and environmentally sound energy services and resources, Economic Commission for Energy is executing UNDA project Sustainable Energy for All in Eastern Europe, the Caucasus and Central Asia (SE4ALL-EECAA). Project aims to strengthen the national capacity of economies in transition to develop National Action Plans for Sustainable Energy for All.

Over the course of its development during last decade, Georgia prioritize and sustainable development of the country in order to tackle its energy security, environmental and economic challenges. Energy security is one of the main objectives of Georgian energy policy while country is highly dependent on imported fossil fuels. At the same time, economic development is steadily improving based on last years figures whereas environmental issues still remain challenging. Hence increasing energy efficiency and renewable energy sources development in the country can promote sustainable development of Georgia and increasing national security through increasing energy independence, ensuring environmental sustainability while creating continued economic growth.

Achieving sustainable development goals requires robust short, medium and long-term strategy and policy in the country. Such government policy will accelerate and create level playing field for renewable energy development and energy efficiency support in Georgia through identifying potential gaps and

providing action plan for adapting modern technologies, facilitating research and development, creating fair marketplace for environmental friendly services and educating and training a labor force to efficiently function new sustainable energy economy.

Background

Georgia is located at the crossroads of Western Asia and Eastern Europe. It borders Armenia, Azerbaijan, the Black Sea, the Russian Federation, and Turkey. Georgia’s land area is 69,700 square kilometers. Its capital is city of Tbilisi with around 1.2 million population. Georgia has a mild climate, with an average maximum temperature of 33°C in July and an average minimum of –3°C in January, although in some places the temperature reaches 40°C in summer and in other places –20°C in winter. A map of Georgia is presented in Figure 1.



Figure 1. Map of Georgia

Population of Georgia in 2017 was 3.726 million which is a dramatic reduction from previous estimates of 4.49 million. Georgia is classified as an upper-middle-income country with a per-capita Gross Domestic Product (GDP) at current prices of approximately USD 4067.7 per person in 2017. The Georgian economy has been developing with a steady growth rate – though this has been undermined by the global financial and economic crisis and conflict with Russia. For the period 2010-2015 real GDP in domestic currency has increased by 37%. However, Georgia has not yet achieved the economic standards of EU countries. Development of Georgia’s GDP and its actual growth rate is shown in Figure 2.

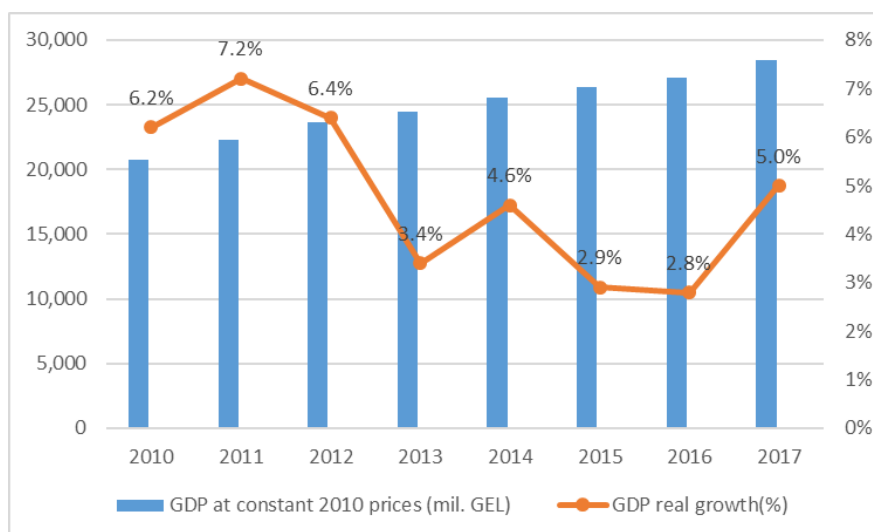


Figure 2. Development of Georgia’s GDP and its real growth rate

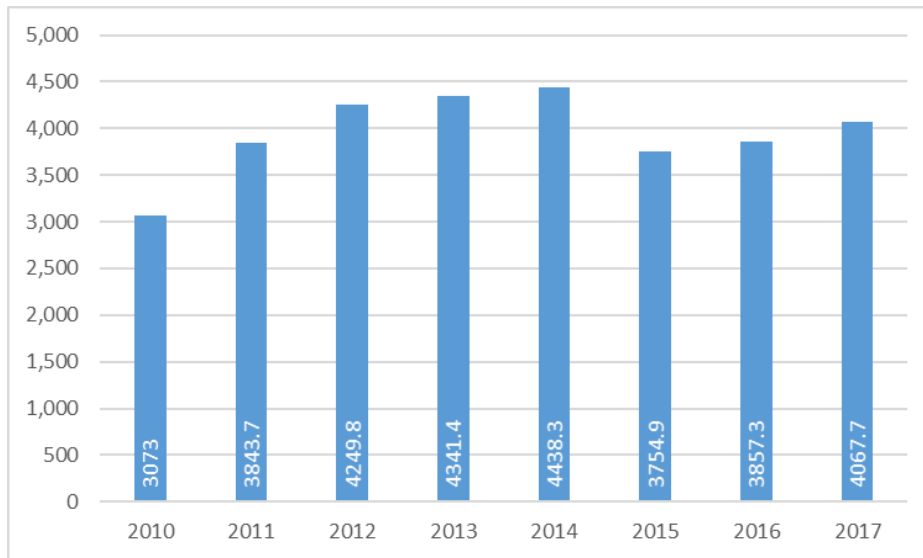


Figure 3. GDP per capita development in Georgia (at current prices, USD)

Figure 3 shows GDP intensity comparison of Georgia with some EU countries. GDP intensity measures indicates how much energy is needed to generate 1 unit (in this case USD) of GDP. This is a common tool to measure energy efficiency across the countries. Even though compared to other countries, Georgian economy does not have much energy intensive industry. Country's GDP intensity is still much higher than, for instance, Turkey's one, which has much more energy intensive economic structure. This indicates, that there is a potential for energy efficiency improvements.

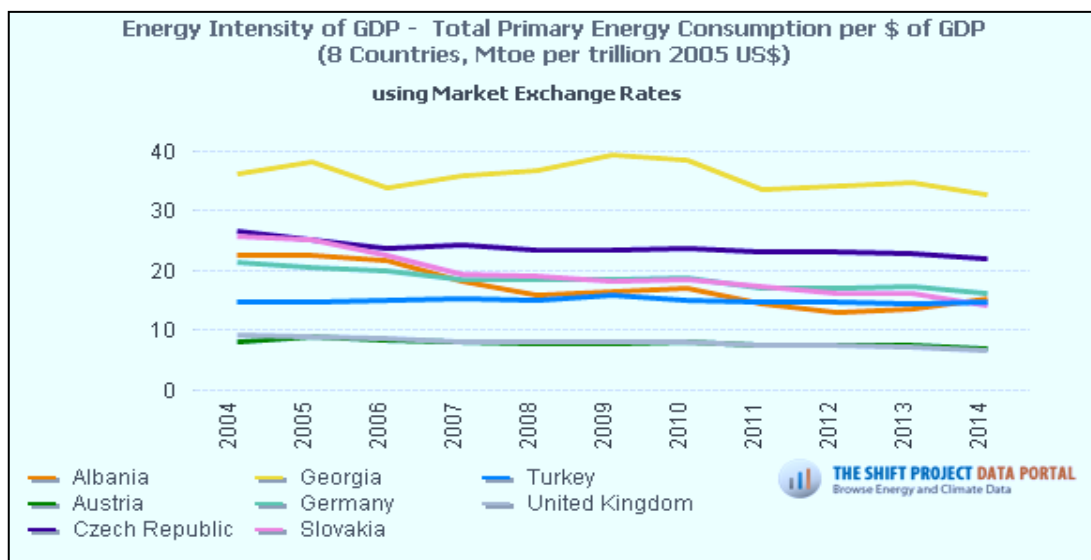


Figure 4: Energy intensity as a function of GDP of various countries¹

Georgia's main economic activities include agriculture (grapes, fruit, tea, and hazelnuts), mining (manganese, copper, and gold), industrial sector (beverages, wine, spirits, and spring water; metals, machinery, chemicals, and aircraft) and tourism. Agriculture remains important, as more than 50% of the population lives and works on the land and agricultural goods account for about 20% of exports. While other sectors have grown significantly during last years, agriculture has not and its share in total GDP has declined (Figure 5). Recently, Georgia's economy is highly dependent on imported fossil fuels, while dominated by industry activities.

¹<http://www.tsp-data-portal.org/Energy-Intensity-of-GDP#tspQvChart>

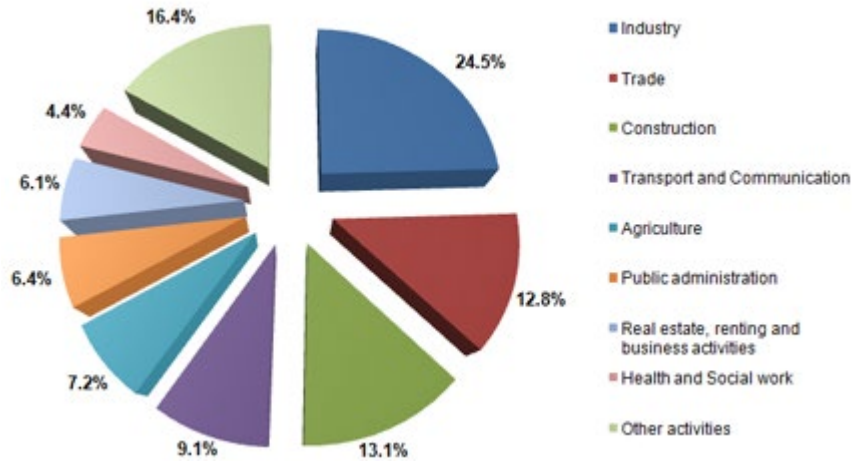


Figure 5: Share of GDP in 2017

In the year of 2016, Georgia’s total primary energy supply accounted for 4789.5 ktoe, where about 78% of energy resource, mostly oil products and natural gas were imported. On the other hand, total final energy consumption in the same years was 4330.5 ktoe dominated by oil products and natural gas with share of 64%. The transport sector was the biggest consumer, followed by residential at 29.4% and industry at 13.9% of the total final energy consumption (see figure 5 and figure 6).

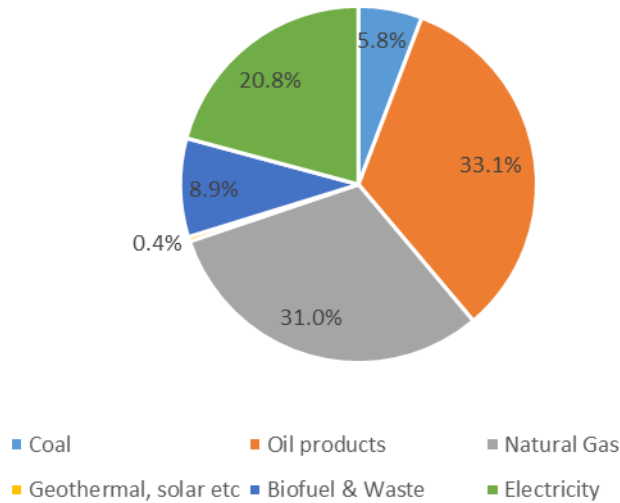


Figure 5. Final energy Consumption by sectors, 2016

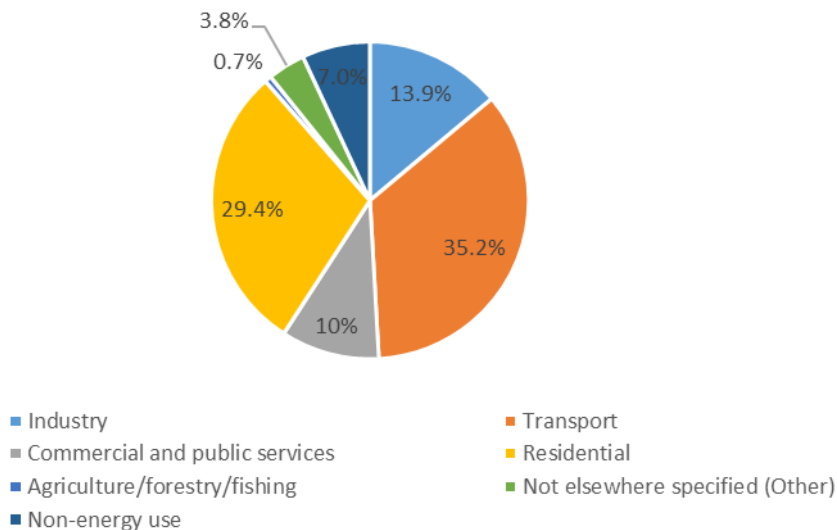


Figure 6. Final energy Consumption by sources, 2016

Institutional framework

The Government of Georgia (GOG) has set forth legislative frameworks supporting facilitate the utilization of the renewable energy and energy efficiency potential. Currently, there is not yet a dedicated renewable energy law and energy efficiency law in Georgia, but measures supporting the development of renewable energy and energy efficiency are included in number of associated policies. Table 1 summarises the existing regulatory framework supporting the development of renewable energy in Georgia.

It is worth to mention that according to the protocol concerning the accession of Georgia to the European Energy Community Treaty, Georgia has assumed an obligation to comply with the EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC) and on energy efficiency (2012/27/EU) by 31 December 2018 and reflect the latter in the National legislation. Currently the work on the development of renewable energy law and energy efficiency law is underway.

Table 1: Overview of all policies and measures

Name and reference of the measure	Type of measure	Expected result	Targeted group and or activity	Existing or planned	Start and end dates of the measure
National Laws					
Law on electricity and natural Gas of Georgia	Regulatory	The last amendments of the law stipulate encouragement of purchase and construction of micro (up to 100 kW) electrical plants. The customers will have possibility to generate electricity, use it and provide and sell to the grid the surplus electricity at the cost established by the Georgian National Energy and Water Regulatory Commission	Investors, end users	Existing	2006 - ongoing
Law on Energy Efficiency	Regulatory	Implement the EU's Energy Efficiency Directive (EED - 2012/27/EU), help Georgia to meet its commitments under the Energy Community Treaty and the EU Association Agreement, and achieve the goals set out in the National Energy Efficiency Action Plan (NEEAP).	Energy efficiency	Planned	Expected end of 2018
Law on Environmental Protection ²	Regulatory	Use of natural resources with consideration of environmental principles and sustainable development	Environment	Existing	10 Dec 1996
The Forest code of Georgia ³	Regulatory	Rules for conducting tending, protection, restoration, and the use of the Georgian Forest Fund's resources	<i>Biomass production</i>	Existing	22 June 1999 A Draft of new code is published
Law - Waste Management Code ⁴	Regulatory	facilitate waste prevention and its increased re-use as well as environmentally safe treatment of waste	<i>Biomass and biofuel production</i>	Existing	26 Dec 2014
Law of Georgia on Licenses and Permits ⁵	Regulatory	Governs issuance of construction and environmental impact permit	<i>RE project development</i>	Existing	24 June 2005
Law of Georgia on Environmental Impact Permits ⁶	Regulatory	Facilitates protection of the environment and natural resources from irreversible quantitative and qualitative changes, and their rational use	<i>RE project development</i>	Existing	14 Dec 2007
Law on Renewable Energy ⁷	Regulatory	To define open issues and approximate the Renewable Energy Directive	<i>RE project development</i>	Planned	First draft due by August

² http://www.vertic.org/media/National%20Legislation/Georgia/GE_EnvironmentalProtection.pdf

³ http://biomass.ge/sites/default/files/annex_1_acc200835_georgianforestcode.pdf

⁴ http://environment.cenn.org/app/uploads/2016/06/Waste-Management-Code_FINAL_2015.pdf

⁵ http://www.economy.ge/uploads/kanonmdebloba/sagareo_vachroba/Licenses_and_Permits_Legislation_ENG.pdf

⁶ <http://environment.cenn.org/app/uploads/2016/10/The-Law-of-Georgia-on-Environmental-Impact-Permit.pdf>

⁷ http://hydropower.ge/user_upload/6.HIPP_Report_on_RES_Law.pdf

Name and reference of the measure	Type of measure	Expected result	Targeted group and or activity	Existing or planned	Start and end dates of the measure
					2018
Law on Energy Performance of Buildings	Regulatory	To approximate the Energy Performance in Building Directive	<i>Building RE production</i>	Planned	30 June 2018
Strategies and plans					
Main Directions of the State Energy Policy of Georgia	Regulatory	The aim is to develop a long-term comprehensive state vision, which will later become the basis for the development of short, medium and long term strategies for 2030, with a special emphasis on the utilization of Georgia's renewable energy resources	Administration, planners	Existing	2015 - ongoing
Ten-year network development plan of Georgia for 2018-2028 ⁸	Regulatory	Reinforcement of national transmission system infrastructure, addressing the existing problems, responding to the future challenges and implementing the opportunities, including the Integration of renewable energy sources into the network	Administration, planners	Existing	2018-2028
Social-economic Development Strategy of Georgia 2020 ⁹	Regulatory	Use of natural resources, ensuring environmental safety and sustainability and avoiding natural disasters during the process of economic development	Administration, planners	Existing	2014 - 2020
Main Directions of the State Energy Policy of Georgia ¹⁰	Regulatory	The aim of the updated Energy Policy is to develop a long-term comprehensive state vision, which will later become the basis for the development of short, medium and long term strategies for 2030, with a special emphasis on the utilization of Georgia's renewable energy resources.	Administration, planners	Existing	2006- 1st version, 2015 updated version
National Energy Efficient Action Plan (NEEAP) of Georgia	Regulatory	Includes Georgia's indicative national energy efficiency targets for 2020, 2025, and 2030	Public administration, planners	Planned	2017-2030
Ministry of Energy Medium-term Action Plan	Regulatory	Development of Action Plans for the utilization of electricity from renewable and alternative energy sources and the creation of the legislation to support energy efficiency measures	Public administration, planners	Existing	2017-2020
The National Environmental Action Programme (NEAP) of Georgia ¹¹ 3rd National Environmental Action Program of	Regulatory	The elaboration of Low Emission Development Strategy (LEDS) (ongoing) and the Promotion of EE in the Transport and Building sectors	Climate change mitigation, energy efficiency	Existing	2017 – 2021

⁸ http://www.gse.com.ge/sw/static/file/TYNDP_GE-2018-2028_GEO.PDF

⁹ http://www.mrdi.gov.ge/sites/default/files/social-economic_development_strategy_of_georgia_georgia_2020.pdf

¹⁰

<http://www.energy.gov.ge/projects/pdf/pages/MAIN%20DIRECTIONS%20OF%20THE%20STATE%20POLICY%20IN%20ENERGY%20SECTOR%20OF%201047%20eng.pdf>

¹¹ http://moe.gov.ge/res/images/file-manager/wliuri-angarishi/DonorsCoordinationMeeting_MENRP_8_12_16.pdf

Name and reference of the measure	Type of measure	Expected result	Targeted group and or activity	Existin g or planne d	Start and end dates of the measure
Georgia 2017-2021 (NEAP 3)					
State Strategy for the Development of Solid Biofuels in Georgia	Regulatory	Sustainable management and provision of supply of solid biomass residues from forest, agriculture, industry and other sources; Support of the advancement of the new technologies and business processes for the production of the solid biofuels; Encouragement of the sustainable production and demand for the energy received from biomass residues	Biofuels and biomass production	Planned	Draft prepared in 2017. Currently is under review
Law on the System of Protected Territories ¹²	Regulatory	Encourages the activities aimed at preserving those areas, which are valuable for agricultural, industrial, transportation, energy purposes, as well as natural resources	Land use	Existin g	March 1996
Strategy for Agricultural development in Georgia 2015-2020	Regulatory	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	Biomass and biofuel production	Existin g	2015-2020
Rural Development Strategy of Georgia 2017-2020	Regulatory	The improvement of the management of water, forest and other resources and the promotion of sustainable systems of waste management in rural areas.	Biomass and biofuel production	Existin g	2017-2020
Administrative procedures					
Resolution No.107 on the Approval of the National Program “Renewable Energy 2008” ¹³	Regulatory	Defines the procedure for initiating and implementing renewable energy projects in Georgia	RE Investors	Existin g	18 April 2008
Decree No. 40 of the Minister of Energy of Georgia ¹⁴	Regulatory	Regulates the rules for construction, ownership and operation of Hydro Power Plants and Wind Power Plants and other renewable energy resources, which are not included in the List of Potential Power Plants in Georgia and will be identified by the investors	RE Investors	Existin g	10 April 2014
Resolution No. 214 on the “Approval of	Regulatory	Introduces rules for expressing interest in conducting technical and economic feasibility studies for new RE power plant	RE Investors	Existin g	21 August 2013

¹² <http://www.elaw.org/content/georgia-law-system-protected-territories-english>

¹³

<https://policy.asiapacificenergy.org/sites/default/files/State%20Program%20%E2%80%9CRenewable%20Energy%202008%E2%80%9D%20about%20Approval%20of%20the%20Rule%20to%20Enable%20the%20Construction%20of%20Renewable%20Energy%20Sourcesin%20Georgia.pdf>

¹⁴

<http://www.energy.gov.ge/projects/pdf/pages/Order%2040%2010042014%20On%20Approval%20of%20the%20terms%20and%20conditions%20648%20eng.pdf>

Name and reference of the measure	Type of measure	Expected result	Targeted group and or activity	Existing or planned	Start and end dates of the measure
Rules for Expressing Interest in Conducting Technical and Economic Feasibility Studies for the Construction, Ownership and Operation of Power Plants in Georgia ¹⁵		projects			

¹⁵ <http://www.energy.gov.ge/projects/pdf/news/Resolution%20N214%2028082013%20931%20eng.pdf>

The following administrative bodies are involved in the process of authorization, permitting, certification, commissioning and licencing: MoESD, MENRP, GNERC and local municipalities. Their respective roles are outlined in more detail below.

Ministry of Economy and Sustainable Development of Georgia (MoESD): At the beginning of 2018 what was previously the Ministry of Energy was merged into the MoESD, meaning that the MoESD is also now responsible for the Procedures for awarding authorization renewable energy projects (announcing expression of interest, including certain project in the potential RES list, accepting and reviewing prefeasibility and feasibility studies and agreeing of draft MoUs with the project promoters). The procedure is usually completed after the signing MoU with an investor.

The MoESD is also the entity that issues construction permits, manages state property and land, and conducts technical and constructions supervision – including construction projects with higher risks - and granting a commissioning certificate via the technical and construction supervision agency. Among others, the main responsibilities of the Ministry, within the competence of the legislation are:

- Analysis of economic situation of the country and development of economic policy;
- Developing the necessary measures for sustainable development of the country, encouraging types of resource-saving production; encourage and coordinate energy efficiency measures in construction, transport and service; Implementing measures to encourage the green economy;
- Developing policies and programs for promoting investments and innovations;
- Elaboration policy for standardization, metrology, accreditation and certification
- State and technical supervision of spatial planning, architectural and construction-engineering activities, supervision of preparation of project documents;
- Development of construction and design norms and rules.

Technical and Construction Supervision Agency: The Technical and Construction Supervision Agency is the legal entity of public law under the MoESD. The agency carries out the control and supervision of facilities with an increased technical risk, of special importance (including hydroelectric power plants). The agency is responsible for issuing construction permits and commissioning certificate after inspecting the quality and compliance of the construction. The agency is also responsible for the elaboration of standards and technical regulation and compliance checking of the constructions of special importance.

Ministry of Environment and Natural Resources Protection of Georgia (MENRP): The responsibility of MENRP 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. MENRP is an administrative body issuing permits for environmental impact. Of particular importance, the MENRP is responsible for the expert evaluation and approval of environment impact assessments and for granting an environment impact permit (part of second phase of the construction permit) with any generating facility with installed capacity more than 2 MW. The following departments are involved in the process:

- Licenses and Permits Department receives applications for the permits, carries out consultations with developers and communicates with other departments for the final decision on environmental impact permit.
- Environmental Inspectorate undertakes state control of the environment.

The Georgian National Energy and Water Supply Regulatory Commission (GNERC): GNERC is nominated by the law as the independent regulator of the sector. Commission members are selected by the Georgian Parliament. The Commission approves its own budget and is financed through a fee imposed on licensees, the Electricity Market Operator, small hydro plants, exporters, importers, and suppliers. According to the Law, GNERC may issue licences in the Georgian electricity and natural gas sectors, regulate activities of licensees, importers, exporters, the market operator, and suppliers, resolve disputes between licensees and customers, as well as monitor the energy market.

GNERC also adopts tariff calculation methodologies and approves tariffs to be applied by licensees, importers, the market operator, and suppliers, including the fee payable by customers for their connection to the electricity transmission and distribution networks. GNERC is responsible for approving Georgian Grid Codes, 5-year distribution network development plans and 3-year transmission investment plans.

The Market Operator – ESCO is responsible for concluding Power Purchase Agreements (via signed Memoranda of Understanding - MoU) along with the MoESD and RES developers entitled to an agreed upon fixed off-taker power purchase price for certain period (at least 8 months) over the course of a year and correspondingly purchasing the power at the agreed upon price.

Local Government Authorities are responsible for the issuance of RES construction permits that belongs to the II-IV construction class in the case that such construction does not involve high risks (i.e. do not involve instance dams, derivation tunnels and etc.). There is no overlap between the responsibilities of central and local public authorities.

Transmission System Operator (TSO): The duties and responsibility of the TSO is conducted by Georgian State Electrosystem (GSE), which is the dispatch licensee as well as the transmission licensee. At the end of 2014, the dispatch licensee was nominated as a transmission system operator¹⁶, which signed agreements with other transmission licensees to transfer operation and development planning competences to the TSO. The TSO manages SCADA/Energy Management System (EMS) and uses automated metering, power control and recording systems.

Responsibilities and duties of TSO are to:

- Ensure the reliable operation of the electricity system, meet the requirements of all relevant licensees, importers, exporters and direct consumers in accordance with the approved balances and the relevant normative acts, having in mind electricity system security and minimum value principle

¹⁶ Dispatch licensee is not certified as Transmission System Operator per the 3rd energy package of EU.

- Install and operate all the technical requirements that are necessary for the normal operation of the system
- Fulfil requirements and parameters set out in the approved energy balances, export/import schedules and bilateral contracts among market participants
- Elaborate and submit to the Commission (GNERC) and to stakeholders an investment program
- Set up and manage unified registry of bilateral contract
- Communicate and share data with the Market Operator
- Prepare a Ten-Year Network Development Plan (TYNDP)

Distribution System Operators (DSOs): Distribution licenses¹⁷ operate and serve both their networks and also networks owned by third parties. The Distribution licensees provide two services at once for the retail consumers – network service and energy supply.¹⁸

Development priorities

According to Georgia’s social-economic development strategy “GEORGIA 2020”, economic development policy of the country is based on three main principles:

1. Ensuring fast and efficient economic growth driven by development of real (production) sector of the economy, which will resolve economic problems that exist in the country, by creating jobs and reducing poverty.
2. Implementation of economic policies facilitating inclusive economic growth, which imply universal involvement of the population in the economic development process, prosperity for each member of society through economic growth, their social equality and improvement of the living standards of population.
3. Rational use of natural resources, ensuring environmental safety and sustainability and avoiding natural disasters during the process of economic development.

In order to ensure abovementioned principles Government of Georgia sees importance of ensuring the necessary conditions for free private sectors, operating under an optimal, efficient and transparent government. It means establishment of an economy where the private sector will be free to make its own decisions, the supremacy of property rights will be guaranteed, and the private sector will be the main driving force behind the economic development. Free market relations will be combined with optimal model of state regulations, ensuring prosperity of each citizen accompanied with social security and justice. Reduction of unemployment and provision of dignified labor conditions to population orientation towards quality and accessible education, health care and basic social welfare systems.

The economic policy of the Government of Georgia considers private sector’s competitiveness as a very significant driver of economic development. The existence of competition in both the internal and external markets is a necessary precondition for a successfully functioning economy. Mutual openness to international trade must be ensured, and free-trade areas must be expanded. Ensuring the country’s readiness and attractiveness to foreign investments will become possible through implementation of stable

¹⁷There are two distribution licensees for electricity – JSC Energo-pro Georgia and JSC Telasi

¹⁸The DSOs are not unbundled as per the 3rd energy package of EU.

and predictable economic policies, as well as through integration with international financial markets and the reduction of the country's financial risks. Target results of Georgia's economic development policy by 2020 is presented in the Table 2.

Table 2. Economic indicators and energy sector targets under Georgia 2020¹⁹

Target	Base	2020
GDP per capita (GEL, nominal)	5811.7	13,000
GDP per capita (GEL, in constant prices)	5811.7	9200
Gini coefficient	0.41	0.35
Inflation (%)	2.4	3
Unemployment (%)	15	<12
Taxes (% of GDP)	24	25
Exports (goods and services, % of GDP)	45	65
Current account deficit (% of GDP)	>10	6
Public debt to GDP ratio (%)	34	<40

Along with general economic development principles, Georgia also prioritizes improvement of energy independence, energy efficiency and development of energy infrastructure. Georgia 2020 describes those priorities and problems which are important to be addressed, in order to benefit significant part of the Georgian population by inclusive economic growth. One of the main priorities of the strategy is the energy sector. One of the priorities of Georgia 2020 states the following goal: to develop infrastructure and to maximize the utilization of country's transit potential. Stable and available energy supply is envisioned as an important factor for improving competitiveness of private sector and utilization of Georgia's transit potential.

The Utilization of domestic energy resources and especially hydropower, in order to reduce energy import dependency and increase energy security still remains as the main direction for energy policy. Also, the strategy underlines increasing FDIs through further improvement of enabling environment and regulatory mechanisms. At the same time, the strategy paper raises the following problems in the sector: complexity of connection to the distribution network, technical limitations in energy distribution network that creates problems of stable supply and service quality and lack of competition in the "distribution business".

¹⁹Social-economic Development Strategy of Georgia "GEORGIA 2020"

The core directions of energy policy are:

- Increased energy independence: In order to increase energy independence and reduce energy imports, Government of Georgia will support local and foreign investment for the development of energy projects, focusing on local Energy utilization.
- Increased energy efficiency: for the purpose of energy saving and energy efficiency, a relevant legal framework will be created based on best international practice.
- To develop Competitive market and simplify connection to the energy sources: Facilitating development of competitive energy markets, Government of Georgia intends to support implementation of Georgian Electricity Market Model - GEMM 2015.
- Promotion of electricity export: Government of Georgia prioritizes accession to the European Energy Community in order to expand its export areas.

Implementation targets for energy sector together with economic indicators are following:

Table 3. Energy sector targets under Georgia 2020²⁰

Target	Baseline	2017	2020
Electricity Production (TWh)	9.7	14	18
Access to Electricity (According Doing Business Report)	50	35	25

In June 2014, the EU and Georgia signed an Association Agreement, which entered into force on July 1, 2016. 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. Georgia has recently joined the Energy Community as a Contracting Party. An expected energy market transformation is foreseen under the Energy Community Treaty implementation, which will have a strong direct and indirect impacts on the development of renewable energy.

As a full member of the Energy Community Treaty, Georgia plans to follow the provisions of the EU Directives and transpose the *acquis communautaire* according to the Energy Community work program. According to the provisions of the Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources, every Contracting Party has to draw up and promote a National Renewable Energy Action Plan (NREAP) to present to the Energy Community Secretariat with a view to comply with the binding targets stated within the Directive.

Georgia's energy system is in a phase of active development and reforms are particularly influenced by the Association Agreement signed with the European Union and its Energy Community membership. Under the Association Agreement, Georgia took an obligation of implementing the EU directives in energy sector and will have to comply with the requirements of the third energy package. The priority of these reforms are to enhance the legal and regulatory framework for doing business, along with deregulation, which has helped to trigger strong economic growth.

Apart from Georgia's economic policy, legal framework of energy sector and policy direction have been updated several times. The Law on Electricity and Natural Gas is the key part of legislation regulating the country's energy sector since 1997. The purpose of the Law is to:

²⁰Social-economic Development Strategy of Georgia "GEORGIA 2020"

- Encourage domestic and foreign investments in order to rehabilitate and develop the electricity, natural gas and water supply sectors;
- Support predominant use of local hydropower and other renewable, alternative and natural gas resources;
- Define small power plants as those with an installed capacity of less than 13 MW; and stipulate encouragement of acquisition and construction of micro (up to 100 kW) electrical plants.

The objectives of the law include stimulation of local hydro energy utilization and other renewable energy sources. It defines small power plants with an installed capacity of 13 MW, with emphasis on small scale power plants operating on renewable energy resources. Since 2006 the Law has been amended several times and currently incorporates some EU principles. Although, the Law is being modified according to EU Energy Acquis.

The key priority of the first energy policy was a full satisfaction of customer demand for electricity with the maximum possible utilization of local hydropower resources. After adopting the first energy policy document – “Main Directions of the State Energy Policy of Georgia” in 2006, the utilization of the country’s local indigenous renewable energy sources became one of the major factors of Georgia’s energy sector development.

A new Energy Policy is in force since June 2015 that aims development of a long-term comprehensive state vision, which will later become the basis for the development of short, medium and long term strategies for 2030.

Nowadays, the new energy policy sets out a strategic policy framework to address the priorities and development opportunities in the energy sector of Georgia. It comprises a set of measures and indicators, which have to ensure country's energy security and its development; also highlights new international directions, which is consistent with the association agreement and execution of other obligations under the international agreements. The core directions of national energy policy are:

- Diversification of supply sources, exploration and optimal utilization of local energy resources: Through diversification of supply sources it is intended to improve national energy security. Therefore, exploration of the potential natural resource reserves and their rational utilization need to be fully facilitated;
- Utilization of Georgia’s renewable energy resources: Georgia is among the leaders in the world with the per capita concentration of natural hydro resources. At the same time, it has other renewable potentials from wind, solar, biomass and geothermal resources, which can be used against climate change and carbon footprint. In this regard, creation of enabling investment environment through transparent and non-discriminatory legal basis is necessary;
- Gradual approximation and later harmonization of Georgia’s legislative and regulatory framework with the EU’s Energy Acquis: Georgia’s intention for stronger political and economic cooperation with EU can be supported by the gradual harmonization of Georgian energy legislation with the EU Energy Acquis. It will facilitate development of competitive, secure, financially stable and sustainable energy markets in Georgia;
- Improvement of energy market and energy trading mechanisms: Development of energy market and commercial relations under the competitive market principles will lead to transparent and non-discriminatory relations among market participants and improved energy trade balance of Georgia.
- Strengthening of Georgia’s importance as a transit route in the region: Georgia’s strategic geographical location between Europe and Asia as a transit corridor for energy resources must be effectively utilized that will improve its energy security and economic development;
- Georgia – regional platform for generation and trade of clean energy: enabling investment environment for Georgia’s hydro resources, infrastructure development and liberalized legal framework will turn Georgia into a regional platform for the generation and trading of clean energy.

- Development and implementation of an integrated approach to energy efficiency in Georgia: Currently energy intensity indicator for Georgia remains higher than EU member states and other developed countries. Therefore, facilitation of Demand-Side Management (DSM) in Georgia will decrease energy intensity which will lead to economic growth and development of the country;
- Taking into account components of environmental protection when implementing energy projects: For energy infrastructure projects, social and environmental impacts should be also considered according to best international practices;
- Improvement of service quality and protection of consumer interests: In order to improve service quality and protect consumer interests, strengthening the role of the regulatory authority body is necessary. It will ensure service monitoring quality and regulation of relations between service providers and consumers.

It is noticeable that the key policy directions have not changed significantly comparably from previous energy policy. Nevertheless, the aim of the updated Energy Policy is to develop a long-term comprehensive state vision, which will later become the basis for the development of short, medium and long term strategies for 2030, with a special emphasis on the utilization of Georgia’s renewable energy resources.

In 2017, the Government of Georgia approved and adopted the strategic document, a “Ten-year network development plan (TYNDP) of Georgia for 2018-2028” which 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 an integration of renewable energy sources into the network, which still remains as a major challenge for the wind and solar based electricity generation. The TNYDP is being elaborated and updated annually.

According to the state energy policy, the priorities of the Government of Georgia include the preferential utilization of renewable and alternative resources and the attraction of foreign investments in the energy sector. Such priorities have been the key drivers for the development of Georgia’s Energy sector during the last decade. Therefore, the State Program – “Renewable Energy 2008” was adopted in 2008, which has been successfully implemented since then. According to the program main directions, the energy sector has been deregulated, all power plants operating on renewable energy sources and constructed after 2008 are free to choose the buyer and set a price for produced electricity.

For the purpose of supporting the construction of new generation units the Government of Georgia has adopted state programs and several sub-laws, in particular:

- Resolution №107 on the Approval of the National Program “Renewable Energy 2008”²¹ which defines the procedure for initiating and implementing renewable energy projects in Georgia. This resolution does not contain renewable energy targets or a national action plan in the sector.
- Resolution №214 on the “Approval of Rules for Expressing Interest in Conducting Technical and Economic Feasibility Studies for the Construction, Ownership and Operation of Power Plants in Georgia”²² which effectively replaced resolution No.107 for new power plant projects and at the same time somewhat modifies the approach introduced by the 2008 resolution.
- Decree №40 of the Minister of Energy of Georgia²³ regulates the rules for construction, ownership

²¹Georgian Government (18 April 2008) Decree #107: About the Approval of the Rule to Enable the Construction of Renewable Energy Sources in Georgia. Available at http://www.esco.ge/files/decree_107_final.pdf

²²Government of Georgia (21 August 2013) Decree #214: About the Approval of the Rule of Expressing Interest in Technical and Economical Study of the Construction, Construction, Ownership, and Operation of Power Plants in Georgia. Available at: http://www.esco.ge/files/decree_214.pdf

²³Ministry of Energy (10 April 2014) Order №40 On Approval of the Terms and Conditions for Submission and Review of the Proposals about Construction Technical and Economic Feasibility Study, Construction, Ownership and Operation of those Hydro Power Plants to the

and operation of wind power plants and other renewable energy resources.

Recently the first National Energy Efficient Action Plan (NEEAP) of Georgia draft was published that includes Georgia’s indicative national energy efficiency targets for 2020, 2025, and 2030. However, NEEAP is not yet adopted. It is expected that official governmental consultations on NEEAP approval will be finalized in 2018 in order to adopt the action plan by the end of the year.

Pursuant to the EU-Georgia AA/DCFTA, Georgia has an obligation to implement the core of the EU energy efficiency legislation. The Government of Georgia plans to establish a new Renewable Energy & Energy Efficiency Agency or an Energy Efficiency Agency to support faster implementation of successful energy efficiency programmes and promotion of investments.

As for the implementation of Energy Efficiency, Government of Georgia has started preparation of the Law on Energy Efficiency in according with EU obligations, in particular according to the EU’s Energy Efficiency Directive (EED - 2012/27/EU). This step will facilitate to meet Georgia’s commitments under the Energy Community Treaty and the EU Association Agreement to transpose the above-mentioned directive by 2019, and achieve the goals set out in the National Energy Efficiency Action Plan (NEEAP).

The main goals of the Ministry of Economy and Sustainable development of Georgia (2017-2020)²⁴ include, inter alia:

- Development of Action Plans for searching, utilization and elaboration of electricity from the renewable and alternative energy sources.
- Establishment of legislation for Energy Efficiency and support to the realization of Energy Efficient Measures.

Based on this Acton plan various activities are envisaged to be implemented in the nearest future. Table 4 summarises planned activities:

Table 4. Planned activities

Institutional				
Regulatory	Initial activities will focus on project/investment identification, donor coordination, facilitation of grant-making, and facilitation of technical assistance.	Private actors including industries and power sector companies, municipalities and central-government ministries/agencies, general public	Planned	2019
Information provisions				
Soft	The measure will promote RES policy by engaging in outreach and awareness-raising events and will equip participants with improved knowledge on RES	End-users in residential sector, public, commercial/business es, media	Planned	
Certification and standards				
Regulatory	<ul style="list-style-type: none"> • National Standard for solid biofuel stoves; • National standard for solid biofuels-Quality Assurance- 	Biofuel producers	Planned	The standards have been drafted, not

Ministry of Energy of Georgia, which are not Included in the List of Potential Power Plants in Georgia. Availableat <http://www.energy.gov.ge/projects/pdf/pages/Order%2040%2010042014%20On%20Approval%20of%20the%20terms%20and%20conditions%20648%20eng.pdf>

²⁴<http://www.energy.gov.ge/projects/pdf/pages/Energetikis%20Ministris%20Brdzaneba%2045%2029062016%20Sakartvelos%20Energetikis%20Saministros%20Sashualovadiani%20Samokmedo%201674%20geo.pdf>

	<ul style="list-style-type: none"> Part 1; <ul style="list-style-type: none"> • National Standard for solid biofuels-Quality Assurance Part 2; wood briquettes for non-industrial use; • National Standard--Quality Assurance-Part 3; Fuel Wood for non-industrial use 			yet approved
Regulatory	It will establish the building energy performance requirements through building codes and certification	New buildings, significant reconstruction of existing buildings (including appliances and systems for lightning, heating, cooling), and existing buildings being rented, sold, or public	Planned	30 June 2018
Regulatory	This measure involves the setting up of officially approved certification and/or accreditation schemes, including suitable training facility and programmes as relates to buildings. It will increase the number and capacity of providers of energy services, energy audits, energy managers and installers of energy-related building elements	Energy managers and installers of energy-related building elements	Planned	30 June 2019
Regulatory	It will increase the number and capacity of providers of energy services, energy audits, energy managers and installers of energy-related building elements; The Control system should provide information enabling evaluation of the effectiveness of the Certification Scheme	Energy managers and installers of energy-related building elements	Planned	31 Dec 2019
Regulatory	Environmental assessment code will envisage the requirements of the convention “on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters” (Aarhus Convention) in the environmental protection issues and will ensure public participation in the decision-making process in relation with effects on the environment, particularly to bring potential negative impact of high risk activities on the condition of the natural environment, as well as on human life and health under the environment assessment regulation, in compliance with the requirements of EU directive 2011/92/EC “on the assessment of the effects of certain public and private projects on environment”		Planned	Draft law was published 21 June 2017

Besides, above mentioned policies and action plans, Georgia has elaborated several other strategic documents to pave the way for countries sustainable development. One of them is the National Environmental Action Programme (NEAP) of Georgia 2012-16²⁵, which assumes that Georgia is on a fast track for economic development; also highlights that economic growth is the basis for the country's welfare which may bring considerable pressure on natural resources and the environment; therefore, sustainable economic development is important for the country from the perspective of environmental protection and rational use of natural resources. The NEAP sets long-term (20-year) goals and short-term (5-year) targets in 11 thematic environmental areas including climate change. Climate change mitigation is among the short-term targets – this is target No 3 and aims to create the favourable conditions for the reduction of GHG emissions. According to National Energy Efficiency Action Plan (NEEAP) proposed measures to mitigate the climate change are 1) to implement the Low Emission Development Strategy (LEDS) and 2) to promote the energy efficiency in Transport and Building sectors.

The Draft Solid Biofuels' State Strategy is another strategic document elaborated for Development of Solid Biofuels in Georgia. The draft of the strategy is expected to be approved and adopted by the government in the near future.

The major goal of the Solid Biofuels' strategy is to facilitate the utilization of solid biomass residues in Georgia, through the encouragement of the production and utilization of the modern solid biofuels. The main directions of the strategy include:

- Sustainable management and provision of supply of solid biomass residues from forest, agriculture, industry and other sources;
- Support of the advancement of the new technologies and business processes for the production of the solid biofuels;
- Encouragement of the sustainable production and demand for the energy received from biomass residues.

Georgia has also developed Georgia's Intended Nationally Determined Contribution (INDC), which was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) at the COP21 in Paris at the end of 2015. According to the INDC Georgia plans to unconditionally reduce its greenhouse gas (GHG) emissions by 15% below the CCGT (BAU) scenario for the year 2030. The 15% reduction target can be increased up to 25% in a conditional manner, subject to a global agreement addressing the importance of technical cooperation, access to low-cost financial resources and technology transfer. The 25% reduction below BAU scenario would also ensure that Georgia's GHG emissions by 2030 will stay at 40% below the 1990 levels. Georgia also submitted a forest related annex as part of the INDC document describing that the Georgian Government prioritizes three options for climate change mitigation activities in the forestry sector: (a) establishing Sustainable Forest Management (SFM) practices; (b) conducting afforestation / reforestation and assist natural regeneration; and (c) expanding the protected area.

Overview of Georgia's Energy Sector

According to existing studies, Georgia has an immense untapped potential of wind, solar, geothermal, and especially hydro resources.

²⁵http://www.preventionweb.net/files/28719_neap2.eng.pdf

- For hydropower, it is estimated that a total potential capacity of 15,000 MW exists with a total production potential of 50TWh per year of which approximately 22% is currently utilized in terms of capacity and 17% in terms of production (expected by end of 2018).
- The average annual electricity generation potential of wind in Georgia is estimated to be 4 TWh with an installed capacity of 1,500 MW.
- According to recent hydro-geological studies, Georgian geothermal water reserves reach 250 million m³ per year.
- At present there are more than 250 natural and artificial water channels, where the average temperature of geothermal waters ranges from 30°C to 110°C, while the total potential amount to be withdrawn is 160,000 m³ per 24 hours.
- Due to the geographical location of Georgia, solar radiation is rather high. In most regions of the country there are 250 – 280 sunny days annually with approximately 6,000 – 6,780 hours of sunlight per year. The annual solar radiation varies depending on the region from 1,250-1,800 kWh/m².

Apart of its energy potential, Georgia's energy sector is in a state of active development. Reforms are particularly influenced by the Association Agreement signed with the European Union in June 2014. Under the Agreement, Georgia took an obligation of implementing the EU directives in energy sector and will have to comply with the requirements of the third energy package.

According to the 2016 Energy Balance of Georgia renewable energy accounted for 81% of the Georgian energy production – wherein 25% of total primary energy supply (TPES) was made up of hydro - 16%, biofuels (mainly wood) and waste – 8% and geothermal, solar, etc. – 0.4%. These levels were almost similar in 2015. It is worth noting that biomass, mostly the firewood, has a major share in primary energy consumption and is increasingly causing forest degradation. Additionally, wind energy production began in late 2016.

On the other hand, fossil fuels accounted 75% of primary energy consumption in Georgia. Almost all fossil fuels (97%) 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 tendency of an increase in fossil fuels consumption in recent years which leads to increased import volumes. The largest increase can be seen in natural gas imports.

The structure of the electricity market, reflecting amendments made to Georgian legislation in previous year is provided on figure 7. Electricity trade at wholesale level is mainly carried out on the basis of the direct contracts. Electricity sale will take place through generators, importers, whereas the electricity is purchased by the distribution licensees (in terms of supply), direct customers, exporters, electricity generators (in cases of plant losses) and the dispatch licensee (for the purpose of ensuring electricity (capacity) transit with the view to cover losses related to the purchase of the electricity). For the purpose of electricity trade at the wholesale market, registration with the Electricity System Commercial Operator (ESCO) as a qualified enterprise is necessary.

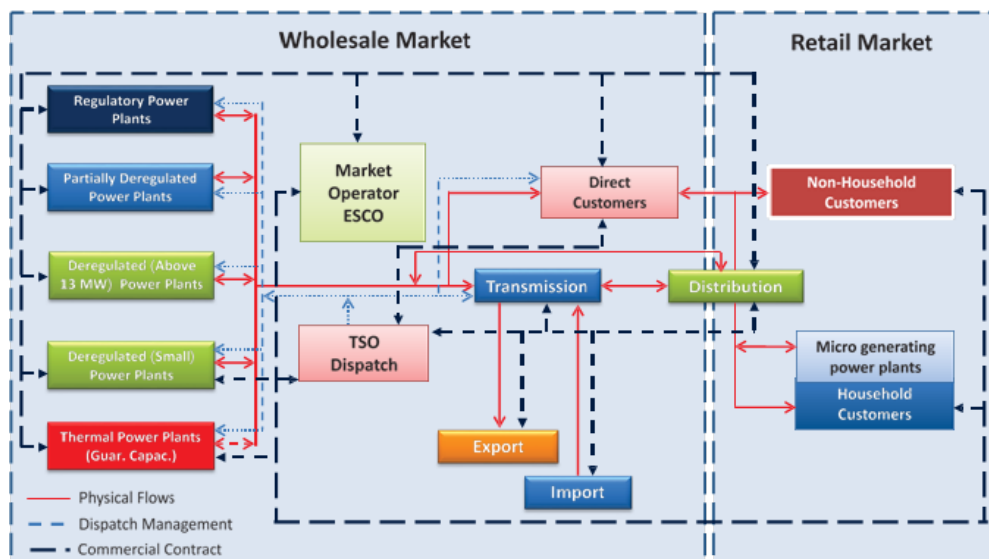


Figure 7. Structure of the Electricity Market in Georgia

For the regulatory purposes, electricity generators are classified as:

- Regulatory power plants to which the Georgian National Energy and Water Supply Regulatory (Commission) sets fixed tariffs;
- Partially deregulated power plants to which the Commission sets marginal (upper margin) tariffs;
- Deregulated power plants constructed after August 1, 2008 and act on the market without any tariffs set by the Commission;
- Guaranteed capacity sources (Thermal Power Plants) to whom the Commission sets guaranteed capacity fee and marginal tariffs (upper margin) of the electricity generation.

For the power plants with installed capacity exceeding 13 MW, the Commission issues electricity generation license, whereas power plants up to 13 MW (small power plants) are exempted from licensing procedures. The list of guaranteed capacity sources is defined by the Government of Georgia individually according to the time periods during which those guaranteed capacity sources can provide guaranteed capacity to the system and they are used for ensuring sustainable, secure and reliable functioning of the integrated electricity system of the country.

The electricity import and export activities are deregulated and do not require licensing. The price of the electricity export activities is free (without tariffs), whereas the price for the electricity import is set according to the marginal tariff formula set by the Commission.

In terms of purchase and selling electricity the Electricity System Commercial Operator (ESCO) is entitled to purchase and/or sell electricity through direct contracts or standard terms and conditions of the balance electricity direct contracts, for the purpose of meeting (balancing) qualified enterprises' demand. At the same time, ESCO organizes guaranteed capacity trading, registers companies as participants to the wholesale trade, makes amendments to the registration data and revokes registrations. The market operator possesses and exploits the Automated System of Commercial Metering (ASCM) that encompasses unified base and gets metering data from Automated System of Electricity and Capacity Control and Metering (ASECCM) automatically. It is intended for receiving, checking, collecting, grouping and summing up data for the wholesale electricity trade.

Direct customers are consuming the electricity for own needs in accordance with the minimum amounts defined under the market rules. From January 1, 2017 the abovementioned amount is 1 kWh electricity.

Respectively, from January 1, 2017 almost all customers are entitled to register at the wholesale market as a qualified enterprise and purchase electricity directly from generation units and importers on the basis of direct contracts. Electricity distribution licensees purchase electricity at wholesale market in order to cover retail consumption of the customers within their service areas.

The Transmission System Operator (TSO) and the Transmission and Distribution licensees carry out network and system services. The TSO (the Dispatch Licensee) has signed contracts with the Transmission Licensees on conveying rights of operating and developing transmission network to it. The TSO manages system mainly through Supervisory Control and Data Acquisition System (SCADA) and at the same time uses upper level Automated System of Electricity and Capacity Control and Metering (upper level ASECCM).

The Distribution licensees carry out network services, including wheeling, through networks under their ownership or under the third person's ownership. The distribution licensees provide network services to: retail customers that purchase electricity from small power plants based on direct contracts, direct customers connected to the distribution network and so called distributed generation – power plants that are connected to the distribution network.

Electricity is sold by the distribution licensees at the electricity retail market on the basis of household tariffs set by the Commission. At the same time, they ensure network and system service of retail customers. According to the current legislation sale of the electricity to the retail customers can be carried out by the small power plants, though their participation at the retail market is quite rare, as far as small power plants have possibility to sell generated electricity at wholesale market for the price higher than weighted average price of the household tariffs that does neither incentivize them, nor customers to trade on the basis of direct contracts.

Retail customers are categorized as household and non-household customers at the market. Since 2016 a type of retail customer possessing renewable energy micro-generating power plants (up to 100 MW) has been added to those categories.

After amendments in the Georgian Law on Electricity and Natural Gas, the Law incorporated provisions that micro power plants, with installed capacity up to 100 KW, may be included in the net-metering policy only in the case that production takes place at the point of consumption. There is no additional procedure to apply for participation in net-metering policy. All consumers with connected micro generators can automatically benefit from net-metering. At the same time, Commission's regulation on "Electricity (Capacity) Supply and Consumption Rules" defines net-metering policy, micro generation connection procedures, and compensation mechanisms in detail. According to the Commission's regulation, connections of micro power plants to the distribution network are carried out on a simplified procedure (based on one stop shop principle). Customer submits the application and forgets. DSO takes over the application and carries out all related works without customer involvement. Procedure are as simple as possible, there is not envisaged to make it even simpler. The timeframe of micro generator connection after application is strictly defined from 20 up to 40 days depending on the capacity and connection voltage level. The rules are published and available for customer on the Commission's website.

A consumer with micro generation can benefit from net metering within a month. With regards to balancing out excess energy, it is done on monthly basis. The net excess energy provided onto the grid by the micro generator is carried over to next month's bill as kWh credits that can be consumed by the consumer in that particular month. In case there is still surplus generation after some time the consumer has the right to claim

financial remuneration that equals the opportunity cost (average wholesale energy price) of a supplier (i.e. DSO).

According to data of 2017, electricity generation (bus bar delivery) has been slightly (by 0.4%) decreased in comparison to the previous year, while, it has been increased by 6.8% in comparison to 2015. Reduction of generation in comparison to the previous year has been caused by stopping the biggest power plant in Georgia (Enguri HPP) for two weeks and also by less water inflow. Despite the abovementioned, electricity generation annually increases by 3.5% in average according to the data of 2007-2017. Such increase is an outcome of the electricity generated by the power plants, which has been put into operation during those years.

On the contrary to the electricity generation decrease a significant increase in the electricity consumption has been observed. In 2017 the electricity consumption has increased by 7.7% in comparison to previous year, whereas in comparison to 2015 it has been increased by 14.4%. The electricity consumption in Georgia during 2007-2017 has been increasing by 4.4% in average (see Figure 8).

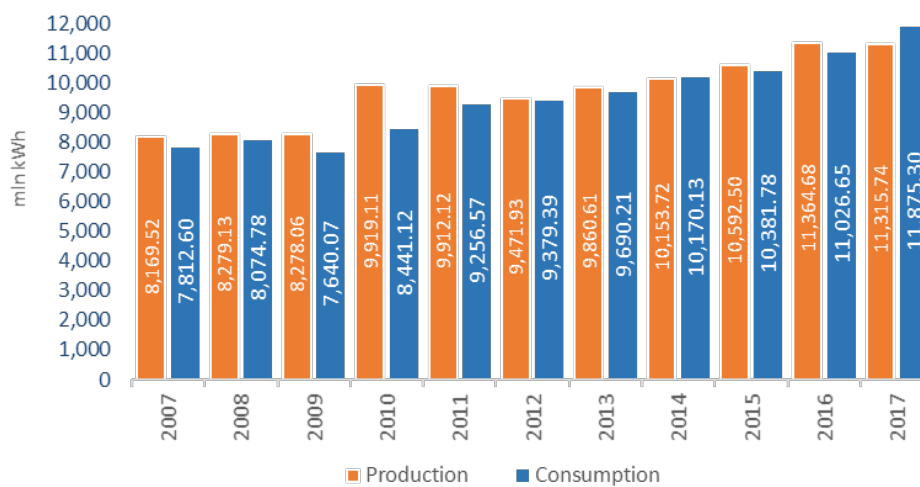


Figure 8. Electricity generation (bus bar delivery) and consumption

In the electricity generation structure increase of the electricity shares generated (delivered on a bus bar) by thermal and hydro power plants is more or less stable. Electricity generated by the thermal power plants in 2016-2017 has constituted 18.8% of the total generated electricity. The share of the electricity generated by HPPs in the total generation has been 80.4%, whereas in 2016 it has been 81.1%.

The share of the electricity generated by the wind power plant being put into the operation by the end of 2016 has been 0.8% (see Figure 1.5). Notably, two medium capacity Hydro Power Plants – Shuakhevi HPP (installed capacity 178.72 MW) and Khelvachauri HPP (with 47.48 MW installed capacity) and three small power plant – Ghoresha HPP (with 0.125 MW installed capacity), Kintrisha HPP (with 5.5 MW installed capacity) and Nabeghlavi HPP (with 1.9 MW installed capacity) have been put into operation during 2017. Shares of the electricity generated (delivered on a bus bar) by HPPs according to the regulatory regimes is provided on Figure 9.

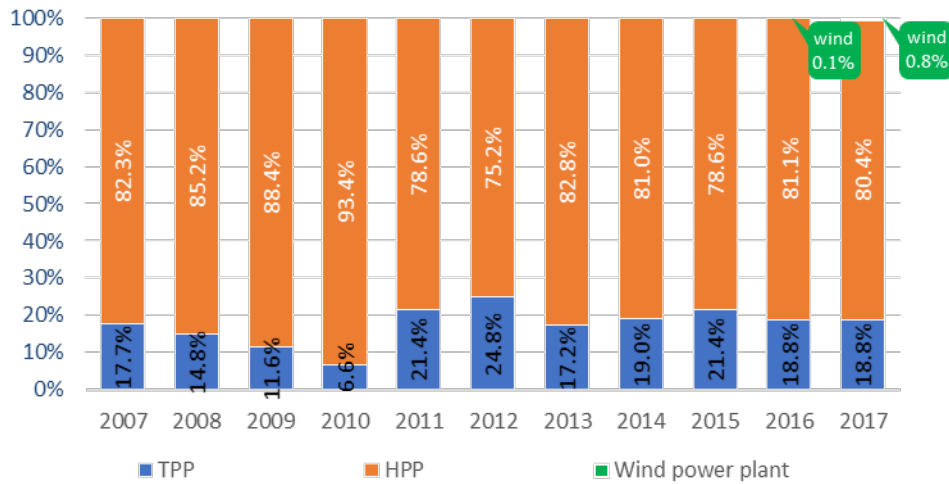


Figure 9. Structure of the electricity delivered on a busbar by the power plants

In 2017 the share of the electricity generated by regulatory power plants in the total generation of HPPs has been 46.5%, the share of partly deregulated HPPs has been 37.9%, whereas the share of deregulated HPPs has been 15.6% out of which 58.6% is the share of the electricity generated (delivered on a bus bar) by power plants up to 13 MW installed capacity, whereas the share of small power plants has been 41.6%.

In 2017 the electricity distribution companies are still represented by important share (71%) in the electricity supplied to the customers. The share of the direct customers has been 12%, whereas the share of the electricity supplied to Abkhazia (breakaway region) has been 16.9%. The electricity consumed by the electricity distribution companies has been increased by 7.1% in comparison to the previous year and by -14.7% in comparison to 2015. The volume of electricity consumed by the direct customers has increased by 17.8% in comparison to the previous year and by 16.8% in comparison to 2015. Amount of the electricity supplied to Abkhazia has increased by 3.9% in comparison to previous year and by 11.4% in comparison to 2015.

In 2017 the electricity imports exceeded exports by 2.2 times (see Figure 10) and reached to 1,497.2 mln kWh that exceeds the same indicators of the previous year by three times and indicators of 2015 by two times.

With regards to exports, 685.7 mln kWh electricity has been exported from Georgia that exceeds indicators of the previous year by 22.7%. The dramatic increase of imports has been caused by the decreased water inflow and stopping of Enguri HPP for two weeks. Besides, for the purpose of meeting internal consumption and filling the deficit that has resulted from decreased hydro generation, thermal generation was substituted by import based on its competitive price.

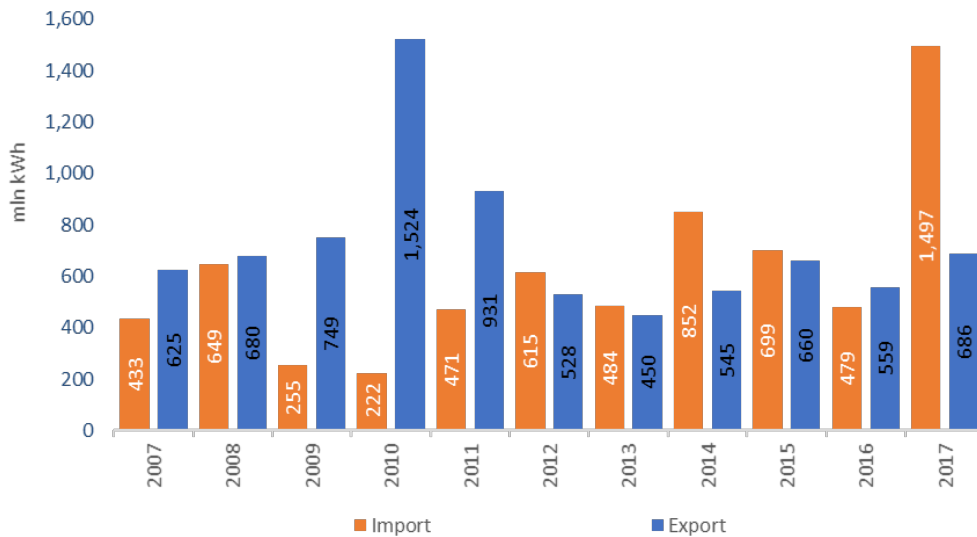


Figure 10. Electricity import and export by years

The main feature of the energy security in the electricity sector is uninterrupted supply. It can be ensured through meeting electricity demand by maximum utilization of indigenous resources. This will enable substitution of import in a short-term perspective and thermal generation in a long-term perspective. The dynamics of the electricity generation and consumption per month is provided on Figure 11. As it can be observed from the Figure, hydro and thermal generation capacities are not enough to meet the demand in autumn and winter periods. Respectively, electricity import becomes necessary for satisfying the demand. On the other hand, abundant water resources in second half of spring period and summer makes it possible to meet the electricity demand and export the rest of the electricity.

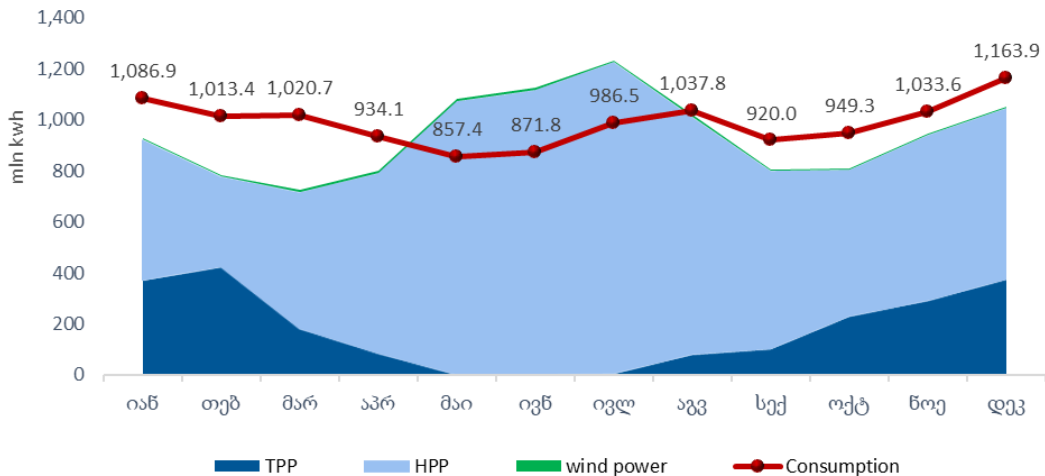


Figure 11. Electricity generation and consumption per months in 2017

The figure 11 reflects that electricity supply and consumption in Georgia is seasonal. The electricity consumption in winter periods is higher than in summer periods, whereas electricity supply has counter seasonal character. Respectively, in terms of consuming electricity the peak demand in Georgia is in winter.

Based on analysing results of the electricity supply and consumption balance 2017, one can state that important attention shall be paid to the construction of new generation units through utilizing local energy resources. Respectively, hydrocarbon resources and renewable resources shall be utilized together with hydro resources to a maximum extent, including wind and solar energy resources. Notably, total generation capacity of Georgia has been increased by 6.3% in comparison to 2016 and has reached 4,112.59 MW

(installed capacity of small power plants has increased by 4.9% in comparison to the previous year, whereas, installed capacity of large and medium HPPs by 8.6%). The generation capacities according to power plant types are provided on Figure 12.

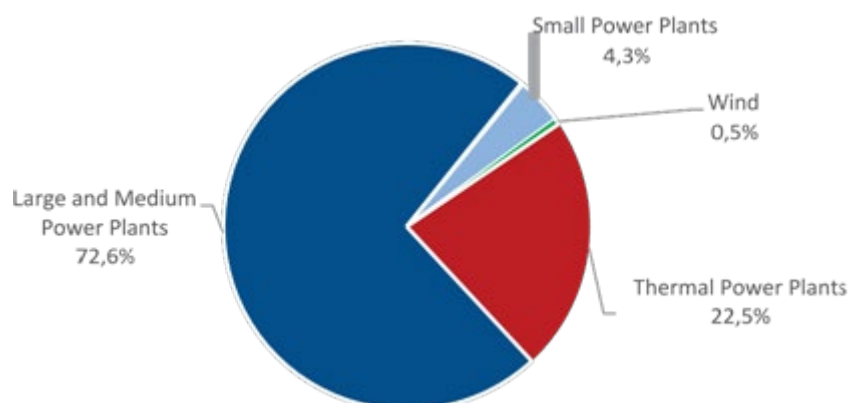


Figure 12. Structure of the generation capacities

At present, the power generation sector of Georgia consists of seasonal regulation and run of river hydropower and thermal power plants operating on natural gas and coal as well, with a total installed capacity of 4102.7 MW. A seventy-six operational hydro power plants with 3156 MW total installed capacity and one (1) wind power plant with 20.7 MW installed capacity in total generate approximately 80% of total electricity of the country and rest 20% is generated from thermal power plant.

In recent years, Georgia has experienced considerable increase in electricity generation which is mainly resulted due to new, mainly hydro power plants commissioning. Since 2012, 24 HPPs (513.61 MW) were constructed and operated. On the other hand, increase of electricity consumption overruns electricity generation. For such purposes, Government of Georgia aggressively facilitates investment projects to construct new generation stations along with the development of energy infrastructure. Recent energy projects which are under construction and licensing stages are mostly HPPs and amounting to 1563 MW of installed capacity with expected total annual electricity generation of 5382 GWh. Moreover, there are additional 109 perspective renewable energy projects (3671 GW installed capacity and annual electricity generation about 14279.4 GWh) on different stages of implementation. In total there are 164 renewable energy projects, (total installed capacity of which are estimated to be 5,234.01 GW with 19,661.42 GWh electricity generation), which also include wind, solar and biomass (waste) projects. However high capital costs of other RES compared to hydro resources and problem of grid access still obstructs their implementation on large scale in Georgia.

As for thermal power, there are four gas-fired thermal power plants and one coal-fired thermal power plant with total installed capacity of 924,4 MW.

- Tbilisres Unit 3, Unit 4 – in exploitation since: 1963; installed capacity 270 MW;
- Mtkvari Unit 9 - in exploitation since 1991; installed capacity 300 MW;
- Gardabani Gas Turbine (G-Power) – in exploitation since 2006; installed capacity 110 MW;
- Gardabani CCGT – in exploitation since Autumn 2015; installed capacity 231.2 MW;
- Tkibuli Coal-fired plant – in exploitation since autumn 2015; total installed capacity 13.2 MW.

The most significant power addition to the thermal energy was 231.2 MW combined cycle power plant, since the unit 3 and the Unit 4 are already out-of-date and only run with 34% of efficiency, although they were rehabilitated several times. Unit 3 and Unit 4 will be decommissioned by 2020. Additionally, Ministry of Economy and Sustainable Development has planned to construct another 230 MW thermal power, equipped with combined cycle gas turbine, and decommission Mtkvari Unit 9 by 2025.

Moreover, construction of coal-fired thermal power plant, with 150 MW installed capacity, is strongly supported by the Government in order to promote utilization of local resources, to enhance energy security and simultaneously to solve unemployment issues, of a new coal-fired thermal power plant will be equipped with clean coal technologies.

Georgian natural gas market is a market of direct contracts. Both long-term and short-term contracts are concluded among suppliers and between suppliers and customers. Natural gas remains one of the substantial energy sources for Georgia by means of which 31% of final energy consumption of Georgia is satisfied. In 2017 the demand for natural gas increased by 3.6% compared to the previous year, which mostly was caused by the increased demand at household sector. The information on natural gas market is given on the Figure 13. Increased demand of natural gas at household sector is a result of current gasification process. In the reporting year 101,527 new consumers were connected to the natural gas distribution network and the total number of the consumers comprised 1,157,127 by the end of 2017.

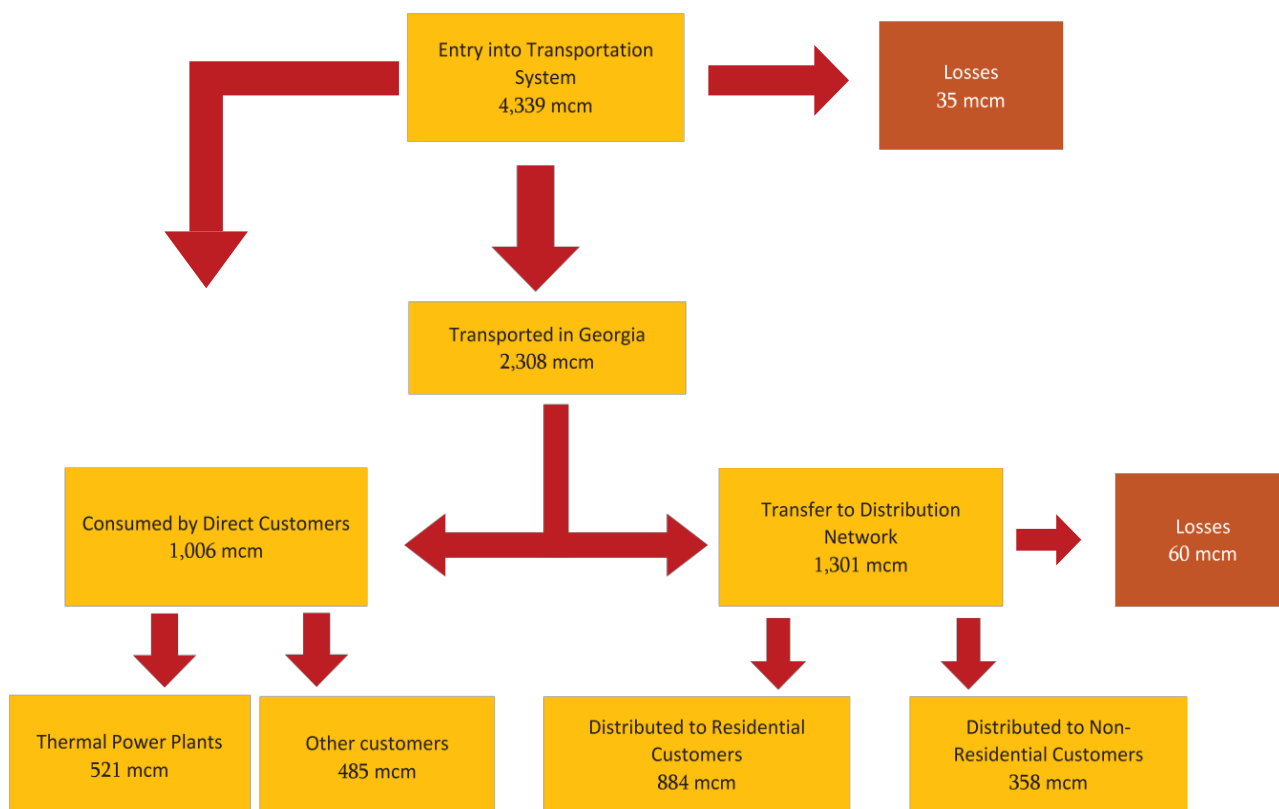


Figure 13. Transported and consumed natural gas

Two main suppliers delivering natural gas to the retail customers are Socar Georgia Gas LLC and KazTransGas Tbilisi LLC. Although natural gas distribution and supply activities are defined as separate activities, the distribution licensees are not prohibited to carry out a supply activity, and accordingly, licensees also represent natural gas suppliers in the relevant natural gas distribution area. The exception is Inter Gazi LLC, Gastrans Service LLC, Ambrolaugazi JSC and Gazmsheni LLC. Despite the fact that they are distribution licensees, they do not carry out the natural gas supply activity. Among distribution licensees only 3 of them are subject to obligatory unbundling according to the Directive 2009/73/EC of European Parliament (only KazTransGas Tbilisi LLC, Socar Georgia Gas LLC and SakOrgGaz JSC are providing natural gas distribution to more than 100,000 customers).

In the process of reviewing activity of natural gas supply to the third party's distribution network, it is important to distinguish natural gas supply for household and non-household customers. Among 26 distribution licensees, 21 of them at the same time are the only suppliers for the household customer

connected to its distribution network. In case of 5 distribution licensees, only one supplier supplies the natural gas to the household customer connected to each distribution network in each area. In case of household customers, the decision of entering the area of licensee by the supplier is conditioned by financial, technical and other reasons and not by the competition at the market.

In case of big non-household customers, the suppliers are more willing to supply natural gas to the customers connected to the different distribution network leading to the existence of different suppliers in different distribution networks. As a result, more than one supplier supplies natural gas to the customers in the area of the 5 distribution licensees.

In addition, the legal status for natural gas transportation licensee (Georgian Gas Transportation Company LLC) is not defined pursuant to the Directive 2009/73/EC. At present, Georgian Gas Transportation Company LLC possesses natural gas transportation system of Georgia based on lease agreement. Except for natural gas transportation, it performs the activity of natural gas supply and is not independent in the activity (it is not functionally unbundled from the system owner. At the same time, one person participates in the management of both the licensee and the network owner). Based on above-mentioned certification requested by the Directive 2009/73/EC of Georgian Gas Transportation Company LLC can be carried out only after functional and managerial unbundling.

The Republic of Azerbaijan still remains as the main supplier of natural gas for Georgia, from where Georgia received natural gas necessary to satisfy its needs. In 2017 Georgia is still the transit country of natural gas from Russia to Armenia. Accordingly, Georgia receives natural gas from Russia as a fee for transit from Russia to Armenia. In addition, Georgia received natural gas from South Caucasus Pipeline (SCP) as a transit fee. Local extraction remains insignificant. Information regarding received natural gas in Georgia in 2017 is given in Table 5 below.

Table 5. Natural gas sources in Georgia

Natural Gas Entry Point	Volume (Mln m3)	Share in total volume (%)
Azerbaijan	1 199.75	51.2%
Russia	134.59	5.7%
SCP	Optional and	821.08
	Import	179.96
Local extraction	7.82	0.3%
Total	2 343.20	100%

2. Analysis of best practices in sustainable energy in the beneficiary country

2.1 Access to Electricity

According to database from Sustainable Energy for All Global Tracking Framework, led by World Bank, International Energy Agency and the Energy Sector Management Assistance Program, 100% of Georgian population has access to the electricity²⁶ However, according to the information from the Ministry of

²⁶ <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=GE>

Economy and Sustainable Development of Georgian all households in urban areas have access to electricity while in rural areas there are few villages where households lack in access to electricity.

2.2 Modern Energy for Cooking

According to the results of the survey - “Energy Consumption in Households”, conducted in 2017 by National Statistics Office of Georgia, more than half of households (52.8%) use natural gas for cooking at cooker (77.8% in urban and 27.8% in rural area), 24.6% uses firewood and agricultural waste, 16.7% - liquid gas, while electricity is consumed by 5.7% of households (see figure 14).

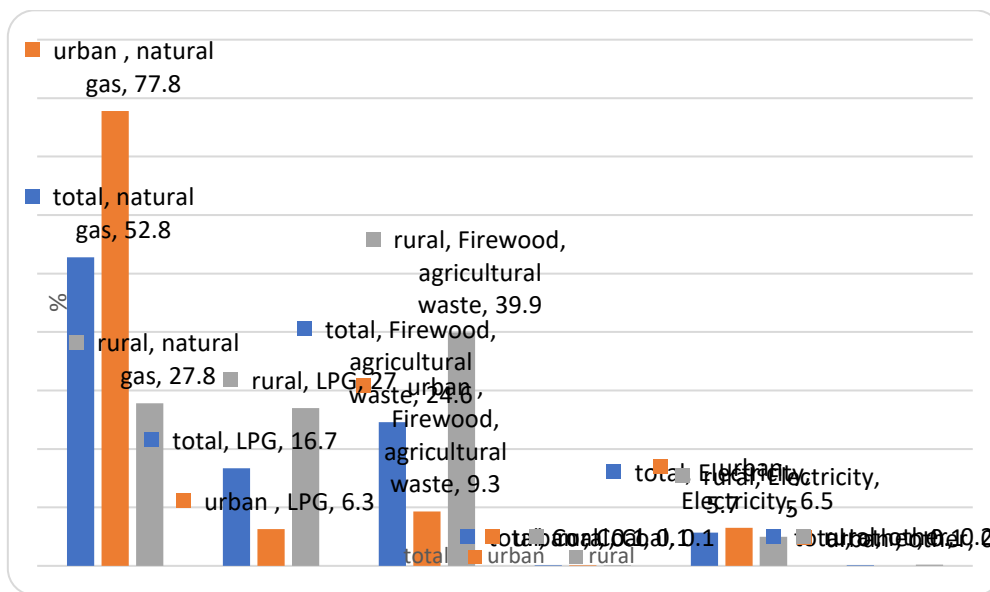


Figure 14. Distribution of households by used energy forms for cooking at cookers

As for energy forms, used by households for cooking in the oven, 43.0% come to the natural gas, 33.7% to the firewood and agricultural waste. The substantial share has also electricity (14.9%). These indicators are significantly different by urban and rural areas, which is clearly visible on the figure below (see figure 15).

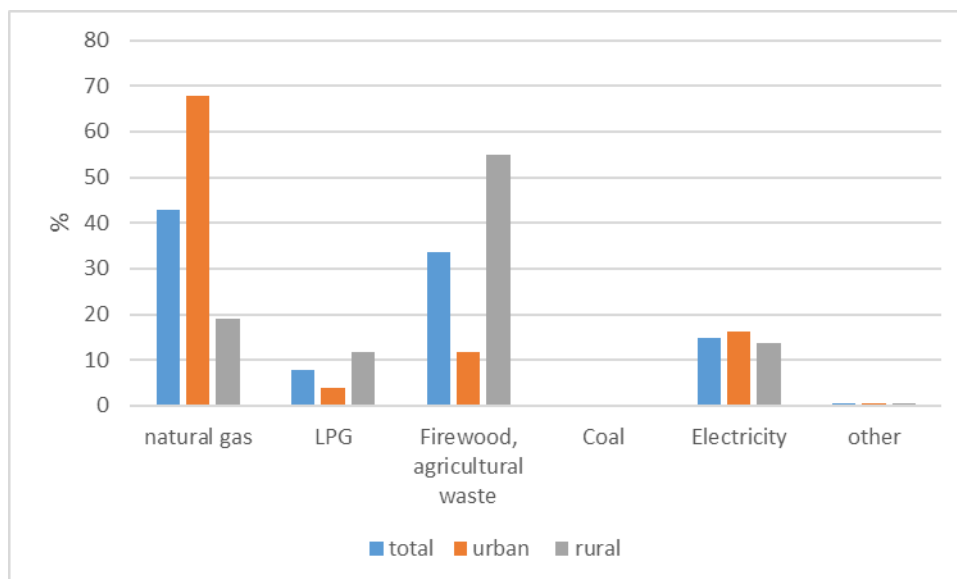


Figure 15. Distribution of households by used energy forms in the oven

In Georgia, firewood is largely used by rural households in woodstoves for both cooking and heating, which are mostly inefficient. Practical evaluations have shown that using a woodstove to cook or heat have efficiency rate about 30-35% and therefore a lot of fuelwood is used. However, consumers prefer the inefficient woodstoves due to its low price. Over the last years, rural population has placed a high burden on the country's indigenous woodlands and forests, and in certain areas, biomass resources have been coming under pressure.

Currently, 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 the Ministry of Environment and Agriculture estimates the annually available renewable wood resource at 600,000 m³, while the total consumption is estimated at 2.5 million m³. On the other hand, 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:

Biomass residues: The theoretical potential is approximately 1 million m³ of biomass residues. There is approximately 3.02 million ha of agriculture land. Nearly 0.8 million ha of this is arable land and 0.33 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.²⁷

Residential waste: An Approximately 900,000 tonne of waste per year accumulates in the Tbilisi and Kutaisi waste disposal sites according to municipal data. An estimated 90 million m³ biogas could be obtained by re-treating these residues; this would equal 64 million m³ of natural gas. Approximately 160 million m³ of biogas can be annually obtained from the sewage water cleaning station of Tbilisi (serving

²⁷Current land policy issues in Georgia - J. Ebanoidze, Association for the Protection of Landowners' Rights, Tbilisi, Georgia

1.2 million). The resulting biogas energy is estimated to be 1,000 GWh/year equalling 100 million m³ of natural gas.

Table 6: Biomass supply in 2014

Sector of origin	Amount of domestic resource (1)	Imported		Exported	Net amount	Primary energy production (ktoe)	
		EU	Non-EU	EU / non EU			
(A) Biomass from forestry (2)	Of which (1000 m3):	2,474.8	0	0	0	2,474.8	461.05
	(1) direct supply of wood biomass from forests and other wooded land for energy generation	2,474.8	0	0	0	2,474.8	461.05
	(2) indirect supply of wood biomass for energy generation	0	0	0	0	0	0
(B) Biomass from agriculture and fisheries	Of which (tonnes):	9,800	0	0	0	9,800	3.98
	(1) agricultural crops and fishery products directly provided for energy generation (tonnes):	8,900	0	0	0	8,900	3.81
	(2) Agricultural by-products / processed residues and fishery by-products for energy generation	900	0	0	0	900	0.17
(C) Biomass from waste	Of which:	0	0	0	0	0	-
	(1) Biodegradable fraction of municipal solid waste including bio-waste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants) and landfill gas	0	0	0	0	0	-
	(2) Biodegradable fraction of industrial waste (including paper, cardboard, pallets)	0	0	0	0	0	0
	(3) Sewage sludge	0	0	0	0	0	0

2.3 Renewable Energy

The Government of Georgia has set forth legislative frameworks supporting facilitate the utilization of the renewable energy potential. Currently, there is no renewable energy law in force, however measures supporting the development of renewable energy are included in number of associated policies

It is important to note that according to the protocol concerning the accession of Georgia to the European Energy Community Treaty, Georgia has assumed an obligation to comply with the EU Directive on the promotion of the use of energy from renewable sources (2009/28/EC) by 31 December 2018 and reflect the latter in the National legislation. Currently the work on the development of Renewable Energy Law and National Renewable Energy Action Plan (NREAP) is underway.

According to draft NREAP, the national overall target for the share of renewable energy in gross final energy consumption from 27.9%, in 2014, can be increased up to 30% by 2020. Taking into consideration that Georgia has yet to undertake a comprehensive nationwide renewable energy resource assessment, the following resources have been observed to have potential in the country:

- Biomass energy from solids;
- Hydro power;
- Solar include solar panels; and
- Wind.

The following estimates for cost represent only the expected investment cost for infrastructure development, and not the total systems costs to achieve abovementioned target. Specifically, the following are important to note for specific support measures:

1. **Promotion of solar hot water heaters:** The expected cost represents the expected required subsidy for market stimulation of 150 EUR per solar hot water heater through 2020, with potential for continuation afterwards. The expected GHG reductions are estimated based on reductions of non-sustainable wood and / or natural gas usage.
2. **Promotion of electric vehicles:** The expected cost represents estimated infrastructure costs for charging stations at EUR 4,000 per charging station and an expected requirement of 850 - 900 charging stations required through 2020. The costs do not represent the system costs in terms of electricity costs, capital costs / subsidies / tax breaks for electric vehicle purchases, or other ongoing maintenance costs of infrastructure.

For the following three measures, the expected costs represent the expected investments in power production facilities, and not the entire system costs (off-taker costs and connection fees).

3. **Ongoing support for hydropower production**
4. **Ongoing support for wind production**
5. **Ongoing support for solar power production**
6. **Ongoing support for Net metering program/policy**

Ongoing support for hydropower, wind and solar power production is aimed to help integration of these renewable energy resources in the electricity network together with signed memorandum of understanding (MoU) between Government of Georgia and investor. MoUs also incorporate long term power purchase agreement which guarantees investor secure return on investments. According to TYNDP 2018-2028 power plants which are planned to come online during 2018-2020 can contribute to total installed capacity and gross generation of the electricity system of Georgia;

Table 7: Estimated contribution from renewable energy sources to the system

	2018		2019		2020	
	MW	GWh	MW	GWh	MW	GWh
Hydro	3,244.3	8,234.0	3,345.8	8,707.4	3,410.2	9,019.6
< 1 MW	6.3	16.8	6.5	17.8	6.6	18.2
1 MW - 10 MW	153.9	501.9	160.2	537.4	197.6	709.9
> 10 MW	3,084.1	7,715.3	3,179.1	8,152.3	3,206.1	8,291.5
<i>Of which pumping</i>	-	-	-	-	-	-
Solar:	1.5	2.4	4.7	7.5	14.7	23.7
<i>photovoltaic</i>	1.5	2.4	4.7	7.5	14.7	23.7
<i>concentrated solar power</i>	-	-	-	-	-	-
Tide, wave, ocean	-	-	-	-	-	-
Wind:	20.7	88.0	45.7	167.2	79.8	301.8
<i>onshore</i>	20.7	88.0	45.7	167.2	79.8	301.8
<i>offshore</i>	-	-	-	-	-	-

Along with support for renewable energy resources, support for net metering policy is also planned to continue while it bring additional benefits to customers and electricity system overall. The Georgian Law on Electricity and Natural Gas contains provisions that exclude micro producers of energy, with installed capacity up to 100 KW, from the obligation to obtain construction permits or a production license and are excluded from the entrepreneur activity and any tax obligations. The procedures for these small-scale decentralized installations such are micro power plants are simplified since they are not tied with certain permit requirements (all type of micro generators also hydro power plants up to 50 kw), such as land rights, construction permits, etc. Micro generators are only required to apply directly for connection to distribution network without submitting any permission, certificate or any other additional document to DSO. The application’s standard form is approved by GNERC and in case the application form is filled out properly by applicant, the DSO is not authorized to reject such an application based on the request of additional information or documents. If small-scale installations are used for own-consumption then there is also no need for a distribution network connection procedure.

The Georgian Law on Electricity and Natural Gas also provides a net-metering policy framework. According to the Law, a micro generator may be included in the net-metering policy only in the case that production takes place at the point of consumption. There is no additional procedure to apply for participation in net-metering policy. All consumers with connected micro generators can automatically benefit from net-metering.

GNERC’s regulation on “Electricity (Capacity) Supply and Consumption Rules” defines net-metering policy, micro generation connection procedures, and compensation mechanisms in detail. According to the GNERC regulation, connection of micro power plants to the distribution network are carried out on a simplified procedure (based on one stop shop principle). Customer submits the application and forgets. DSO takes over the application and does all related works without customer involvement. Procedure are as simple as possible, there is not envisaged to make it even simpler. The timeframe of micro generator connection after application is strictly defined from 20 up to 40 days depending on the capacity and connection voltage level. The rules are published and available for customer on the GNERC’s website.

A consumer with micro generation can benefit from net metering within a month. With regards to balancing out excess energy, it is done on monthly basis. The net excess energy provided onto the grid by the micro generator is carried over to next month’ bill as kWh credits that can be consumed by the consumer in that particular month. In case there is still surplus generation after some time the consumer has the right to claim financial remuneration that equals the opportunity cost (average wholesale energy price) of a supplier (i.e. DSO).

Table 8: Estimated costs and benefits of the renewable energy policy support measures

Measure	Expected renewable energy use (ktoe) (2018 - 2020)	Expected cost (in EUR) (2018 - 2020)	Time frame	Expected GHG reduction by gas (tonnes/yr)
1. Promotion of solar hot water heaters	5.2	€ 2,328,000	2018 - 2020 (and beyond)	7,118
2. Promotion of electric vehicles	14.7	€ 3,440,000	2018 - 2020 (and beyond)	Not calculated
3. Ongoing support for hydropower production	516.9	€ 984,782,000	2018 - 2020 (and beyond)	Not calculated

4. Ongoing support for wind production	25.2	€ 70,500,000	2018 - 2020 (and beyond)	Not calculated
5. Ongoing support for solar power production	0.7	€ 4,903,000	2018 - 2020 (and beyond)	Not calculated
6. Ongoing support for geothermal heat production	61.6	Not calculated	2018 - 2020 (and beyond)	Not calculated

2.4 Energy Efficiency

Taking into consideration the rate of increase in electricity consumption in Georgia, energy efficiency can mitigate this growth rates. Number of effective policy and sectorial energy efficiency measures are considered in the country's draft national energy efficiency action plan, which is intended to implement. However, one of them, which gives short term impact and result is an elimination of inefficient light bulbs in the household sector. Therefore, replacement of incandescent light bulbs with efficient bulbs has been identified as the highest priority measure for addressing economic and supply security issues at a very low cost. It is the most profitable and easy way to implement energy efficiency measure on a large scale. This measure provides a high return on investment to energy consumers.

According to National Statistics Office of Georgia, about 78% of light bulbs in the household sector are Incandescence (see table 9).

Table 9. Information on Electricity light bulbs used in Georgian population

Type of light bulb	Total		Urban		Rural	
	Thousand	%	Thousand	%	Thousand	%
Incandescence	7,189.4	77.7%	4,197.7	71.2%	2,991.7	89.0%
Tubular fluorescent	197.6	2.1%	138.7	2.4%	58.9	1.8%
LED	1,317.8	14.2%	1,058.1	18.0%	259.7	7.7%
Halogen	551.2	6.0%	500.0	8.5%	51.2	1.5%
Total	9,256.0	100.0%	5,894.5	100.0%	3,361.5	100.0%

According to estimates, roughly 32 mln. Georgian Lari is needed to provide household customers with efficient light bulbs; in result of it approximately 500 MW of electricity can be saved. Such saving is equivalent to build a new power plant of installed capacity 500 MW, approximately at 600 – 700 mln. USD in total.

On the other hand, household will pay on average 5 - 8 GEL less per month and daily peak consumption is going to reduce by 500 MW since the savings are going to happen exactly at peak periods Furthermore implementation of this measures will cause reduction of CO₂ emissions by 523437 Tons.

There is a huge energy efficiency potential in Georgia. According to preliminary analysis which are described in the table 10.

Table 10: energy efficiency potential in Georgia versus the Business As Usual Case (BAU)

Year	2014		2020		2025		2030	
Category	Primary Energy (GWh)	Final energy (GWh)	Primary Energy (GWh)	Final energy (GWh)	Primary Energy (GWh)	Final energy (GWh)	Primary Energy (GWh)	Final energy (GWh)
BAU	54,894	46,758	63,185	57,426	85,542	70,201	101,810	83,710
Savings from measures	-	-	6,494	3,767	13,334	7,698	17,321	10,936
With measures	54,894	46,758	56,691	53,659	72,209	62,502	84,489	72,774
% energy reduction from the BAU	0%	0%	10%	7%	16%	11%	17%	13%

As can be seen from table 10, energy efficiency measures would have a significant impact on Georgia's energy consumption as well as the efficiency of energy production – particularly on electricity production from natural gas-fired power plants. It is worth to note that compared to energy efficiency obligatory scheme based on EU Energy Efficiency Directive, it is more convenient and optimal to choose alternative measures that can also lead to same energy savings from energy efficiency measures.

The alternative measures incorporates following activities:

- Financing schemes for energy efficiency
- Incentivising / requiring energy efficiency in industry
- Training and education, including energy advisory programmes
- Standards and norms and labelling schemes in appliances

Below is the description of alternative measures:

Alternative policy measure 1– Financing schemes for energy efficiency

The Government of Georgia plans to establish a new Renewable Energy & Energy Efficiency Agency or an Energy Efficiency Agency - with the exact scope to be decided by the Government) (from here onwards – the New Agency) to support faster implementation of successful energy efficiency programmes and promotion of investments. The key principles of the Agency will be:

- **The overall mandate of the Agency will have a broad scope for interventions.** This would mean that a regulatory act to start the fund would allow it to intervene related to at a minimum energy efficiency.

- **The intention is to have the institution independent of a specific ministry.** Though it may initially be housed within a Ministry (either the Ministry of Energy or Ministry of Economy and Sustainable Development), it will be explored as to whether it will be possible to eventually move towards being independent of allocations from the Central Government – though Central Government funds and donor funds could be utilised.
- **The Agency will initially be funded by Central Government allocations, but investigate implementation of ongoing revenue streams to allow for grant-making** – which will be further elaborated during the development of the Agency.
- **Initial activities will focus on project/investment identification, donor coordination, facilitation of grant-making, and facilitation of technical assistance.** There are a number of activities and investments planned in Georgia. These activities include numerous current and potential large-scale investment programmes for EE, indicating that access to loan finance is not the barrier either for the public sector or for the industry or transport sectors. Indeed, the barriers related to finance are much more likely to be related to the bankability of the organizations taking a loan, identification of investment opportunities, capacity of organizations to apply for finance or develop projects, awareness of end-consumers and business leaders, etc. rather than ability to identify concessional finance. A national organization should carry out and coordinate such activities. This institution (in the form of an Agency) would then remain in place post-project – which would be important for ensuring the impact is sustainable and nation-wide. If there is no sustained national institution which can capture the capacity being built, there may not be a sustainable impact from these programmes. Operationally, this would mean – for example – that donor funds for grants (and some of the technical assistance budgets) are funnelled through the Agency who then hires staff or consultants as needed. *These activities should be particularly focused on leveraging grants and technical assistance for private sector finance.*
- **The focus will not be on establishing a Financial Institution which lends directly to clients:** Georgia already has a vibrant and largely effective finance sector which can serve end users such as households, industries, etc. Setting up a parallel financial institution does not seem necessary since it could crowd out private finance and also take a lot of time and effort.
- **The initial focus will be based on 3 main beneficiary groups** in areas where activities are already planned for implementation but which are not coordinated and otherwise may not lead to lasting capacity being built. The 3 main groups would be:
 - **Private actors including industries and power sector companies** for EE improvements and audits. UNIDO for example is planning to implement a project for industries. And there may be significant scope for investment in improved hydro-power production.
 - **Municipalities and central-government ministries/agencies** for public building improvements, street lighting improvements, and transport fleet improvements. There are significant investments already being planned by EBRD (up to EUR 130 million and more), NEFCO/E5P (EUR 8.4 million), and likely KfW in these areas. It would be very useful to have central coordination of these activities in combination with technical

assistance packages which increase the capacity of a specific Government-owned entity (the Agency) for evaluating and implementing on-going investments.

- **The general public** including for example:
 - General EE awareness in the residential sector and related to efficient lighting regulations.
 - Green driving information campaigns (perhaps also promoting technical inspections).
 - The NAMA planned for efficient stoves and solar hot water heaters.

Alternative policy measure 2 – Incentivising / mandating energy efficiency in industry

Incentive programmes to encourage EE 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 EE investments. Such a mechanism will reward industries that invest in EE. This measure will be coupled with steps in the coming years by the Government to allow the prices for energy 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 introduction of a measure to incentivise and potentially mandate energy efficiency 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 be would likely be:

- bespoke for large, energy-intensive industry organisations
- top-down/ generic for sub-sectors with large numbers of SME operators

In moving forward with such a measure, the process will:

- Start with recognized energy-intensive sectors and/or very large sites
- Over time, be rolled out to medium and smaller energy-intensive 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.

- Those outside the scheme or failing to meet their targets would not be able to access these support programmes and may have an additional fee for energy or pollutant emissions (with some flexibility to accommodate organizations that can clearly demonstrate energy-saving activities, but that have been foiled by events outside their control, such as substantial downturn in production).
- If a fee system is chosen, it 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 EE activities that should be undertaken anyway, but without being overly burdensome to the enterprise.
- GNERC already sets fuel tariff rates, therefore can adjust the tariff rates so that the process is revenue neutral overall.
- 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 CO₂) savings and/or (ii) purchase kWh (or CO₂) 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.

Alternative policy measure 3 – Training and education, including energy advisory programmes

The market of energy efficiency in Georgia lacks capacity of adequate project developers, EE and sustainable energy investment professionals as well as adequate expertise which can help the project owners and beneficiaries adequately initiate dialogue and conclude an EE financing deal between the EE 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 project developers and local financial institutions on key aspects of EE project finance. In particular, the measure will involve:

- Identifying key entities who can develop energy efficiency projects, providing them with improved knowledge and skills for making better EE investment decisions;
- Presenting trainees with EU best practices on EE financing conditions, technologies and methods, including risk management, security activities and monitoring steps, as well as their efficient use,
- Presenting effective approaches and systems for EE financing, including case studies of completed loan deals and investment projects, as well as demonstration of working plants constructed through EE financing tools, and projects implemented within the scope of EE financing;
- Producing bankable EE projects and business plans, organizing Business-to-Business meetings with financial institutions and other potential interested 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.

Alternative policy measure 4 - Standards and norms and labelling schemes in appliances

Georgia plans to follow the provisions of the EU Directives and plan the transposition according to the Energy Community work program. 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. This will include drafting, adopting and ensuring enforcement of legislation and its delegated acts on Labelling of energy related products. Implementation will apply a phased approach, with only a limited number of appliances subject to labelling in the first phase. The list of appliances subject to labelling would then be gradually enlarged. To this aim, the corresponding international and European (CEN) standards on testing the energy performance of selected energy-consuming appliances must be translated and adopted. The development and enforcement of the regulatory package for appliance labelling must be accompanied by design and launch of a labelling outreach campaign.

Due to the missing framework and low level of awareness, the appliance labelling program will require extensive groundwork. In addition, the appliance labelling has a delayed impact on the appliance market due to the slow appliance replacement rate, especially in years of low economic activity. Consequently, this activity will not deliver energy savings within 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.

Alternative policy measure 5 - Qualification, accreditation, and certification schemes

This measure involves the setting up of officially approved certification and/or accreditation schemes, including suitable training facility and programmes as relates to buildings. This will increase the number and capacity of providers of energy services, energy audits, energy managers and installers of energy-related building elements.

The Government will ensure that the proposed scheme provides transparency to consumers, are reliable and contributes to national energy efficiency objectives.

The Government will also make publicly available the certification and/or accreditation schemes or equivalent qualification schemes and shall cooperate among themselves on comparisons between, and recognition of, the schemes.

The Government will take appropriate measures such as the development of a website to make consumers aware of the availability of qualification and/or certification schemes and of certified auditors.

At the same time, this measure involves the setting up of officially approved qualification certification and/or accreditation schemes, including suitable training facility and programmes for industry. This will increase the number and capacity of providers of energy services, energy audits, energy managers and installers of industrial energy-related technologies.

The Government will ensure that the proposed scheme provides transparency to consumers, are reliable and contributes to national energy efficiency objectives.

The Government will also make publicly available the certification and/or accreditation schemes or equivalent qualification schemes and shall cooperate among themselves on comparisons between, and recognition of, the schemes.

The Government will take appropriate measures such as the development of a website to make consumers aware of the availability of qualification and/or certification schemes and of certified auditors.

3. Analysis of gaps in implementing sustainable energy practices and existing challenges for their implementation in the beneficiary country

Facilitating renewable energy and energy efficiency support programs

At present, there is no one-stop shop for coordinating all steps. The main counterparty for facilitation between different state authorities is the MoESD. However, all the permits and licensees (if needed) have to be managed by the investor. The timetables for processing applications are defined by laws and sub-laws, and mostly they are communicated in advance.

Authorization of renewable energy projects largely depends 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 the larger RES projects, the average time for obtaining an approval (signing an MoU) with ministry is very much dependent on the individual project and the seriousness of each investor undertaking a feasibility study. The timetable 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. 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 organization responsible for issuing a license for projects with an installed capacity larger than 13 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.

ESCO

There is no specific government fund dedicated to providing financial incentives to the energy efficiency programs. Currently, Energy service companies (ESCOs) do not exist in Georgia while awareness of the concept and the benefits is still need to be improved. Development of an ESCO market can build capacity, address public procurement and financing issues, lower costs, increase potential for bundling of project, and provide other operational improvements in energy efficiency measures. Government intends to introduce market for ESCOs through energy efficiency law.

Transport

The number of electric vehicles starting to increase in recent years. However, their share in total transport stock remains negligible compared to cars with internal engines. Barriers for the operation of electric vehicles are high costs, high taxes, lack of charging infrastructure.

Renewable energy sources and grid access

Currently Georgia does not have dedicated law on RES. Only short and limited definition of RES exists in the Georgian Law on Electricity and Natural Gas. Currently, in Georgian energy legislation all types of energy sources are treated similarly. Therefore, this requirement should be also considered in the development process of the renewable energy law for Georgia. Furthermore, Georgian Law on Electricity and Natural Gas Law does not go further than allocating “bio” source of energy to renewable energy source in general. There are no specific provisions regarding biofuels and bio liquids in Georgian legislation, either definition nor sustainability criteria or financial support schemes as it is required by the Directive. On the other hand, Georgian legislation does not imply any provisions regarding guarantees of origin and shall have to envisage requirements imposed on guarantees of origin to enable qualification of RES and eligibility for power exchange for the purposes of Article 9 of the Directive.

The only support mechanism for RES development was currently enacted in the primary and secondary legislation. It mainly covers mainly retail electricity market, enabling retail consumers install micro generations from RES. However, as a whole, Georgian legislation is silent on the technical specification of support schemes as RES do not benefit from support schemes. GNERC’s resolution on “Electricity (Capacity) Supply and Consumption Rules” does not go into more details of technical specifications and certification micro-generation issue neither in terms of facilities nor certification requirements for construction works (installers). Furthermore, Georgian Grid Code also enacted by GNERC in 2014 does not contain any provision regarding technical criteria for renewable energy equipment.

One of the barriers to commercial feasibility and broad utilization of RES is not the lack of RES but the absence of inadequacy of existing transmission lines to move energy from generation to consumption or support the anticipated growth in RES requiring grid access. In general, renewable energy project developers are reluctant to build transmission and distribution lines where RES exist but there are scarce transmission and distribution facilities. The EU has recognized that the NRAs in CPs must take action to simplify the conditions for grid connections and extensions, eliminate red tape for innovative small and

medium-sized enterprises and enable better integration of RES into the power grid including cross-border grid connections. The answer is in Article 16 of the directive which deals with “Access to and operation of the grids”, providing for facilitation of access of RES to the grid to be implemented in a way that does not work contrary to the competitive electricity market.

Georgia undertakes significant attempts to facilitate integration of RES into transmission grid. Georgian Law on Electricity and Natural Gas establishes obligation and procedures for preparation of Ten Year Network Development Plan (TYNDP) by Georgian TSO. One of the main goal of the plan is to integrate RES into transmission network. According to 2018-2028 TYNDP, significant projects are envisaged to integrate RES into transmission network among which are two development transmission infrastructure in all directions where potential RES projects are planned.

More problematic situation is in distribution network where operates two major private companies, such are JSC “Telasi” and JSC “Energo-pro Georgia”. Due to the lack of unbundling of the distribution network from production and supply, distribution companies (who at the same time undertake generation and supply activities) put certain barriers for distributed RES at their network. Barriers are mostly shown in the form of exaggerated technical terms of reference upon connection application by RES. Inadequate financial burden for reinforcing distribution network by RES developers are major obstacle in embankment of RES projects. The situation was aggravated by lack of proper legislative and regulatory framework. Despite the fact that third party access was guaranteed by the Georgian Law on Electricity and Natural Gas, no proper regulation sets clear policy about RES grid access. Given the abovementioned, all burden to develop distribution facilities shifted toward RES developers that created unfavorable conditions for RES access to distribution network. To improve this situation, GNERC established distribution grid code through 2016 year 23 April №11 resolution on amendments into Grid Code. According to distribution network development chapter, distribution companies are obliged to prepare distribution network five-year development plans and one of the goal of the plan must be development of the grid for RES integration in coordination with transmission network development 10 year plans.

The existing network infrastructure currently have remote control capability and can use power measures to control and manage the networks power flows. Despite this, IT tools include stochastic RES forecasting in scheduling of plant and new voltage conductors to accommodate large volumes of RES is missing. There is no R&D initiatives including developing home networks for use with smart meters and charging infrastructure for electric vehicles allowing potential for vehicle to grid flow of energy is not part of distribution network investment plans yet in Georgia. 13th chapter – distribution metering code of Georgian Grid Distribution Code mentions about development of smart metering systems at retail level and sets certain requirements that such metering systems must satisfy but does not set precise obligation and targets for distribution companies to develop such systems, rather it envisages this activity to be voluntary endeavor of distribution companies. Thus, neither Georgian grid code nor other normative acts supports development of intelligent network systems in Georgia.

For developing RE projects, clear and transparent administrative procedures such as licensing, planning permission and grid access approvals are necessary to be in place. Unclear administrative procedures may cause administrative cost increases and delay RE’s deployment.

In regard to administrative procedures, Ministry of Energy of Georgia is responsible for preparing potential projects, accepting interests from developers and negotiating project characteristics and monitoring construction according to the terms of memorandum of understanding. Either Ministry of Economy and Sustainable Development of Georgia or local authorities are responsible for granting permits to construct generation facilities. GNERC is responsible to license generator if it is above 13 MW. Ministry of Environment and Natural Resources Protection of Georgia is responsible for environmental permits to be granted to the RE developers before signing MoU with Ministry of Energy of Georgia.

In Georgia connection procedure is the same for all type of generators and load. Georgian grid code regulates connection rules to transmission and distribution network based on the standard application form that RES must submit once it has all permits for construction and right on the land. After which TSO carries

out studies on network impact and proposes connection offer that among others comprises terms of reference and connection agreement draft. Neither primary nor secondary legislation defines type of connection method (i.e. shallow, deep... etc.) that is subject of uncertainty and abuse of the dominant position by the network companies and thus obstacle of RES integration into the network.

Currently, Georgian legislation does not envisage group processing of connection application of RES. All application must be based on individual approach that creates certain barriers for developers to prepare so cold basin development joint projects and/or connection cost sharing between adjacent RES projects.

Connection to the distribution network is more complicated rather than transmission network as distribution system is not unbundled in Georgia according to 3rd energy package requirements and distribution companies are at the same time incumbent producers and suppliers. When RES-electricity investors are to connect to integrated network operators that have production and trading interests, these operators might be motivated to foreclose those RES-electricity projects from the market that compete directly with their production units. These barriers can be easily implemented by the integrated network operator through discriminatory practices to grid connection requests. In order to promote fair competition for development opportunities, regulators should ensure transparent and nondiscriminatory practices from the side of network companies with regard to grid connection and access.

Regulators can respond to such a situation either by providing generation developers a non-constrained connection right to the grid or by establishing, in cooperation with the network companies, connection capacity limits to the grid and develop an evaluation and selection methodology to grant scarce development and connection rights. This latter option is called queue management.

Competitive tendering to allocate connection capacity and /or resource development licenses (or rights) should be preferred to other allocation schemes (e.g. first come first served) because such tenders might provide RES resource development at least cost for the customers. For example, winning a tender of this sort can be based on the fee/kWh feed in tariff bid of the developers. Such a scheme, by promoting competition, might provide a significant discount to an officially established uniform feed in tariff.

Georgian legislation does not contain any specific provision that regulates guaranteed or priority access of RES to the grid except market rules that defines that electricity produced by small power plants (less than 13 MW) is subject of guaranteed purchase by ESCO and it regulates also access priorities on the new cross-border interconnectors. Regarding curtailment, current dispatch model, that is based on the central dispatching approach, doesn't envisage any curtailment rules or compensation mechanism. Curtailments are based on the real regimes and is operational peculiarities of the Georgian transmission system. Thus, Georgia in this part is not in compliance with the obligation of the Directive. Access priorities on the cross-border interconnectors are determined based on the following declining sequence:

- a) Electricity import and export in emergency situations;
- b) Export of electricity generated by a renewable power plant (including hydro power plants) built in Georgia after 2010, conditional that there is a long term electricity export agreement provided for in Paragraph 9, Article 141 of these Rules – during the effective period of the agreement;
- c) Export of electricity generated by a renewable power plant (including hydro power plants) built in Georgia after 2010, conditional that less than 10 years have passed since the start-up and beginning of the commercial operation of the power plant and there is no long term electricity export agreement provided for in Paragraph 9, Article 141 of these Rules. Export of electricity generated by a renewable power plants (including hydro power plants) which are under construction also belong to the same priority group if:
 - c.a) An agreement is signed with the government on construction of the power plant,
 - c.b) A long term agreement provided for in Paragraph 9, Article 141 of these Rules has not been signed for export of its generation.

d) Export, transit, re-export of electricity generated by other Georgian power plants or imported into Georgia which is not provided for in Paragraphs (a), (b) and (c) of this Clause

At first hand priority of access rules grants priority of access on cross-border trade to RES, but it discriminates between new and old RES, also gives priority to such RES which has signed agreement with government of Georgia for construction of power plans over the RES projects that has not signed the agreement. Such differentiation between RES projects additionally must be analyzed through transparency and discrimination criteria of the Directive of the common electricity market. Thus, Georgian energy legislation (including IVth chapter of Georgian grid code regarding dispatch and scheduling rules) does not define precise priority of dispatch of the power generation under non-discriminatory and transparent approach. However, according to Electricity (capacity) market rules merit order dispatch must be based on least cost principles, taking into account system security issues. The principles of abovementioned must be incorporated in the Georgian legislation to ensure priority of access and dispatch is ensured.

At the same time, Georgian energy legislation does not set clearly RES connection charge and/or cost sharing/bearing methodology that leaves quite flexible and discriminatory power to network companies to obligate RES developers to bear way much more cost that is necessary for connection to the grid. However, Georgian Law on Electricity and Natural Gas gives authority to GNERC to set transmission network connection charge methodology, but no such methodology was adopted yet. Thus, neither primary nor secondary legislation does not set connection type and clear boundary (physical or financial) of connection point between network company and the user. Connection agreement and terms of reference are subject of bilateral negotiations between network company and applicant that is non-transparent and may be discriminatory.

Taking into consideration the above, the new RES legislation should set the requirements to the transmission system operator and distribution system operators along with NRA's approval to provide any new producer of energy from renewable sources wishing to be connected to the system with the comprehensive and necessary information required, including a comprehensive and detailed estimate of the costs associated with the connection and a reasonable and precise timetable for receiving and processing the request for grid connection. In this context, GNERC's role should be monitoring for non-discriminatory and transparent charging for transmission and distribution tariffs electricity from renewable energy sources. At the same time, GNERC should monitor TSO and DSO in order to identify any discriminative treatment of RES suppliers regarding grid connection costs and timetable. GNERC should ensure that the charging of transmission and distribution tariffs does not discriminate against electricity from RES, including in particular electricity from RES produced in peripheral regions, such as island regions, and in regions of low population density.

4. Conclusions and recommendations

Despite the fact that Georgia's Energy Sector, mainly the Electricity part, is relatively Green – produced from source of renewable energy, there are many issues and gaps for sector development in a sustainable manner, moreover increase of the consumption and to meet the demand through the sustainable way is even more challenging.

The key issues and gaps to be addressed are identified and summarized as follows:

- Lack of the capacity of customers in order to address inefficiencies;
- Improved efficiency in the operation and maintenance of machinery and equipment, and adoption of technological improvements and upgrades;
- Promotion of technical research and development to adapt efficient woodstoves and programs to the country context;

- Development of performance standards and benchmarks on safety, energy efficiency, emissions, and durability of woodstoves;
- Promotion of awareness raising, consumer research and business development, taking account of consumer preferences and behavior;
- Development of innovative financing mechanisms that can target subsidies and grants on woodstoves;
- Enhancing the capacity of local and national institutions to promote advanced efficient biomass woodstoves;
- Encouraging the establishment of energy funds to enable financial institutions to effectively administer support to promote biomass woodstoves;
- Development and implementation of coordination, monitoring and evaluation (M&E) mechanisms on efficient woodstoves.
- Intensive and extensive public awareness and education on the benefits of energy efficiency;
- Development and timely implementation of policy and regulatory framework for energy efficiency;
- Improved institutional capacity building and effective coordination for monitoring and enforcement of relevant regulations;
- Fiscal and financial incentives to encourage the use of energy efficient appliances and technology by households, commercial and industrial sectors;
- Innovative financing schemes for energy efficiency and conservation programs;
- Initiate periodical evaluating the level of energy efficiency and conservation nationwide, covering domestic, industrial, commercial and agricultural users as well as public services (e.g. health and education);
- High initial investment cost of energy generation from solar and wind resources compares to hydro resources;
- Establishment of a new Renewable Energy & Energy Efficiency Agency;
- Establishment of standards and norms and labelling schemes in appliances;
- Establishment of Qualification, accreditation, and certification schemes for energy efficiency auditing:
 - 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 Energy Audit Rulebook;
 - 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:
 - Effective energy management – ideally working towards ISO 50001
 - Process optimization: pinch technologies, planning & scheduling, design.
 - System optimization (compressed air, fan systems, pump systems, motors, boilers and steam/ hot-water generation and distribution, waste-heat recovery);
 - Development of programs to encourage SMEs to undergo energy audits and implement recommendations – including helping to cover costs;
 - Encourage training programs for the qualification of energy auditors in order to facilitate sufficient availability of experts.