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REGULATORY IMPACT ASSESSMENT ON SUPPORT SCHEMES FOR RENEWABLE ENERGY

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ABSTRACT

Regulatory Impact Assessment on Renewable Energy Support Schemes is prepared under the framework of the USAID Energy Program. The objective of the program is to support strengthening Georgia's energy security and economic growth by facilitating investment in power generation capacity. The USAID Energy Program supports the Government of Georgia in reforming the energy market in compliance with the European Union Energy Acquis. The reforms will help to establish a competitive, transparent and non-discriminatory energy market and attract investments in the power generation facilities and strengthen the energy security of the country. The project aims to identify appropriate support schemes for stimulating the development of variable renewable energy sources in Georgia and evaluate their impact. The results of the study will serve the Government of Georgia to design the support policy for variable renewable sources on a cost-efficiency basis.

ACRONYMS

CfD	Contract for Difference
DSO	Distribution System Operator
EnC	Energy Community
EnCS	Energy Community Secretariat
EnCT	Energy Community Treaty
ESCO	Electricity Market Operator
EU	European Union
FDI	Foreign Direct Investments
FiP	Feed-in Premium
FiT	Feed-in Tariff
GEDF	Georgian Energy Development Fund
GEOSTAT	National Statistics Office of Georgia
GHG	Greenhouse Gas
GNERC	Georgian National Energy and Water Supply Regulatory Commission
GoG	Government of Georgia
GoU	Guarantee of Origin
GREDA	Georgian Renewable Energy Development Association
GRPC	Georgian
GSE	Georgian State Electrosystem
GWh	Gigawatt hour
HPP	Hydro Power Plant
IFI	International Financial Institutions
IRENA	International Renewable Energy Agency
kW	Kilowatt
kWh	Kilowatt hour
MO	Market Operator
MoESD	Ministry of Economy and Sustainable Development of Georgia
MoU	Memorandum of Understanding
MW	Megawatt
MWh	Megawatt hour
NREAP	National Renewable Energy Action Plan
O&M	Operation and Maintenance
OECD	Organization for Economic Cooperation and Development
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PV	Photovoltaic
RES	Renewable Energy Source
RIA	Regulatory Impact Assessment
RSSI	Renewable Scheme Support Index
TBD	To Be Determined
TPP	Thermal Power Plant
TWh	Terawatt hour
TYNDP	Ten Year Network Development Plan
USAID	United States Agency for International Development

USD	United States Dollar
VAT	Value Added Tax
VRES	Variable Renewable Energy Source
WEG	World Experience for Georgia

CONTENTS

1. EXECUTIVE SUMMARY

This report was prepared under the assignment "Regulatory Impact Assessment on Support Schemes for Renewable Energy Activity" funded by the USAID Energy Program.

The purpose of this report is to support the Government of Georgia (GoG) in the selection of the least cost policy option to stimulate utilization of renewable energy sources in Georgia. According to provisions of the recently adopted Law on Promotion of the Production and Use of Energy from Renewable Sources (later referred to Renewable Energy Law), the GoG should choose and implement an appropriate support mechanism to facilitate investments in the Renewable Energy Sources (RES). As stakeholder analysis revealed the Ministry of Economy and Sustainable Development of Georgia (MoESD) on top of traditional benefits associated with renewable energy is seeking analysis demonstrating impact of renewable energy resources in reducing import dependence. Therefore, the report identifies benefits associated with the development of renewable energy sources, including special emphasis on electricity import substitution and compares the costs of implementation of four different support schemes. Implementation costs of the support schemes are defined as the short-term government expenditures related to purchasing power from a renewable energy power plant.

This study was prepared in the following stages:

- High-level review of the international leadings practices of introducing support schemes for stimulating the development of renewable energy;
- Consultations with stakeholders to get a deeper understanding of existing barriers for renewable energy development in Georgia and perceptions of potential investors about desirable support schemes;
- Development of policy options with several alternatives for policy intervention, which effectively target renewable energy development needs in Georgia;
- Comparison and in-depth analysis of quantitative and qualitative characteristics of alternative policy options to identify the most cost-efficient policy design.

This Regulatory Impact Assessment (RIA) explores four policy options of support schemes for RES, including the mechanism of green certificates for facilitating investment in renewable energy sources. The following RES support schemes were analyzed:

1. Feed-in Tariffs (FiT) scheme. Under FiT Market Operator (MO) or designated authority buys renewable electricity from eligible producers at the fixed predefined price;
2. Feed-in-Premium (FiP) scheme. Under FiP, eligible producers receive the fixed premium on top of the market price of electricity;
3. Contract for Difference (CfD) support scheme. Under CfD, producers sign a contract with the state and fix the strike price of the electricity to ensure themselves against the volatility of the market price. In the market, they should sell electricity at the market price, but when it differs from the strike price they get compensated or reimburse the difference;
4. Green certificates. Under this scheme the power suppliers purchase the Green Certificates to meet their renewable energy quota. The renewable energy producers generate additional income through trading with Green Certificates. The demand and supply mechanism determines the price of Green Certificates in the market.

The initial research demonstrated that green certificate support scheme is currently not feasible and reasonable, therefore only qualitative analysis was conducted. For the rest of support schemes cost-benefit analysis was performed. While utilization of renewable energy sources in Georgia will greatly depend on the support level, we assume that all three support schemes have equal potential of achieving the same level of RES, hence calculated benefits from those policy options are the same. However, it is evident that costs of implementation are different from the Government's perspective, therefore important attention was devoted to cost-effectiveness analysis. Qualitative and quantitative findings of the report is summarized below.

Table 1. describes the main advantages and disadvantages of each policy option in more detail.

Table 1: The Qualitative Analysis of Policy Options

	Option 1: FiT	Option 2: FiP	Option 3: CfD	Option 4: Green Certificates
Advantages	• Easy to implement • More bankable • Preferred by International Financial Institutions (IFI) and investors • Does not require the existence of the organized market	• Market-oriented instrument, which improves market liquidity by requiring active participation of the producers in the market • More flexible than FiT • Compensation cost is relatively lower compared to FiT	• Redistributes the price risks between producers and the government • Highly transparent and flexible • Market based support scheme • Low risk for over- or under-compensation	• Green Certificate scheme could start functioning even in the absence of an open electricity market • Green Certificate scheme may function equally well for small and large scale projects • Not considered as a state aid
Disadvantages	• Not a market-oriented support scheme, limits the market liquidity • Rigid, does not adjust to the changes in technology costs • Potential risk for over- or under-compensation	• Relatively difficult to administer • Requires competitive market setup • Carries uncertainty risks for producers • The least preferred support scheme for producers	• Hard to implement without large liquid market • Relatively difficult to administer	• Puts pressure on end-user tariffs • Green Certificate scheme is more complex than other schemes, as it requires a separate market for certificates • Needs to be liquid enough to deliver desired results

The policy intervention will create the same benefits in each of the alternative schemes defined above (except for green certificates, since quantitative analysis was not conducted for it). The total estimated benefit of the policy intervention reaches 433 million USD. This monetary estimation includes benefits from import reduction, increased export potential and reduced natural gas import, used by thermal power plants. The present value of savings that can be generated from the reduction of imported power is 297 million USD. The policy intervention also creates opportunities for making additional 120 million USD from exporting excess electricity produced by utilization of the Variable Renewable Energy Sources (VRES). Also, the estimated savings from the reduction of natural gas import amount to 16 million USD. In addition, the development of clean energy sources will contribute to the reduction of Greenhouse Gas Emissions (GHG) and create new jobs.

Although all three support schemes lead to the achievement of the same policy targets, they come at different costs. The comparison of policy options indicates that the CfD is the least cost support mechanism for integration of the desired solar and wind power capacities in the system due to the lowest interim government exposure.

It should be noted, that total revenue received by investors from operations in the market and Government support will be reflected in the end-user electricity bills. However, since the market operator will be in charge of compensation for the support, therefore, the cost of support component will represent the interim Government exposure.

The first policy option suggests introducing the FiT scheme which costs 562 million USD in present value. Since the FiT scheme assumes the purchase of electricity at predefined price, investors' revenue will be equal to the cost of subsidizing the scheme.

The second policy option is to introduce the FiP scheme. The estimated present value of interim government costs to finance the FiP equals to 305 million USD, which is much lower compared to the cost of FiT. Together with the premium payments, investors will have an opportunity to receive extra income from sales in the power market in the amount of 343 million USD. Compared to other schemes, in this case, investors have a chance to receive the highest estimated total revenue in the amount of 648 million USD. However, the lack of historical data on the market price patterns limits producers in projecting potential revenues and evaluate the profitability of the development of VRES projects. The absence of a competitive electricity market makes the implementation of FiP too challenging for Georgia.

The third policy option is to introduce the CfD support mechanism. Compared to alternative policy options, this scheme has the lowest interim government cost which is 219 million USD. Investors' total revenue will amount to 562 million USD, like in the FiT scheme case. The only difference is that the major part of the revenue should be generated through electricity sales on the market.

The table below summarizes the benefits of each policy option and interim cost captured by the Government for implementing them.

Table 2: Benefits from Support Schemes (million USD)

	FiT	FiP	CfD	Green Certificates
Total Monetary Benefits (million USD)	433	433	433	N/A
Costs Captured by the Government (million USD)	-562	-305	-219	N/A
Net Benefits (million USD)	**-129**	**128**	**214**	**N/A**

As indicated in the table 2 the most cost-effective policy for the Government is implementation of CfD, as it leads achievement of the same level of benefits with the least interim government spending.

2. BACKGROUND

In 2017 Georgia became a contracting party of the Energy Community Treaty (EnCT). As a contracting party to the EnCT, Georgia plans to follow the provisions of the EU Directives and transpose the acquis communautaire according to the Energy Community (EnC) work program. Georgia needs to fulfill provisions of the third energy package, which aim to facilitate the establishment of a competitive market environment, the formation of an independent regulatory body, strengthening consumer protection, stimulating energy efficient consumption, and supporting the development of renewable energy sources.

The GoG gradually implements reforms in the energy sector in compliance with the provisions of the European Union (EU) third energy legal package. The approximation of Directive 2009/28/EnC on the Promotion of the Use of Energy from renewable resources (referred to as Renewable Energy Directive) is also part of obligations that need to be fulfilled by Georgia.

In 2019, the Parliament of Georgia approved a Law on Energy and Water Supply (New Energy Law) and Law on Promotion of the Production and Use of Energy from Renewable Sources (Renewable Energy Law). The Renewable Energy Law provides a legal basis for the development of renewable energy projects in Georgia. The provisions defined by the Law are fully compliant to the provisions defined under the renewable energy directive 2009/28/EnC. According to provisions defined in the Renewable Energy Law, the GoG should choose and implement an appropriate support mechanism to stimulate renewable energy development in the country. The elaboration of renewable energy support mechanism is under the responsibility of the MoESD.

The costs of implementing a support mechanism for renewable energy are borne either by consumers or by the state - depending on the type and nature of the scheme. Adequately selected support schemes should effectively stimulate the utilization of local renewable sources and create benefits of renewable energy projects, such as job creation, strengthened energy security, which outweigh the costs. In order to select appropriate support schemes, it is essential to have reliable information about the potential impact of alternative schemes in the Georgian context.

3. POLICY CONTEXT

The GoG launched a series of reforms in the energy sector to increase sector resilience, attract investment in infrastructure and, ultimately, strengthen the energy security of the country. This can be achieved by the development of the competitive energy market on the basis of a sound legal and institutional framework aligned with the EU Energy Acquis. The protocol concerning the accession of Georgia to the Treaty Establishing the EnC provides a list of directives that Georgia needs to approximate at the defined timeframe. Among this list is the EU Directive 2009/28/EnC, referred to as the Renewable Energy Directive defining provisions for the establishment of a legal and regulatory basis facilitating the consumption and production of renewable energy by December 31, 2018[1].

The Parliament of Georgia already approved a Renewable Energy Law that complies with the provisions of the Renewable Energy Directive. This law sets a legal basis for facilitating the generation and consumption of energy from RES. Provisions of the Renewable Energy Law consider the introduction of support mechanisms stimulating the utilization of renewable energy sources. The MoESD is in charge of the elaboration of an appropriate renewable energy support scheme for the approval of the GoG.

3.1 OBJECTIVES AND DIRECTIONS OF STATE ENERGY POLICY IN GEORGIA

Objectives of the state energy policy and policy directions to ensure achievement of policy goals are defined by the Parliament of Georgia in the resolution on "Main Directions of State policy in Energy Field," approved in 2015. The main objective of state energy policy is to strengthen the country's energy security for the protection of the national interests by ensuring a stable supply of various energy products at an acceptable quality, quantity, and price. In order to achieve policy goals, the resolution sets the following directions of the state energy policy:

- Diversification of energy supply, optimal utilization of domestic energy sources and establishment of energy reserves;
- Utilization of domestic renewable energy potential;
- Gradual alignment of Georgia's regulatory and legal framework with the EU Energy Acquis;
- Development of the energy market and improvement of energy trading mechanism;
- Reinforcement of Georgia's role as a transit country in the region;
- Development and implementation of a unified approach to energy efficiency in Georgia;
- Transition of Georgia to a regional center of clean energy production and trading;
- Consideration of environmental protection components in the implementation of energy projects;
- Improvement of quality of services and protection of consumers' interest.

In the decree №400 "on the approval of social and economic development strategy for Georgia" adopted in June 2014, the GoG sets similar objectives to ensure security and resilience of the energy sector. According to the strategy, the main objective of the policy is to increase energy independence and reduce import dependency of the country by facilitating Foreign Direct Investments (FDI) in the energy sector. The establishment of a sound regulatory framework for improving the investment environment in the sector is a very important measure to achieve defined goals.

The development of renewable energy projects is one of the primary goals of Georgia's energy policy for reducing dependence on imported energy resources. It also contributes to the diversification of energy supply sources and strengthens energy security, which is the main objective of the state energy policy[2]. Besides, the development of RES is a measure to address climate change.

[1] Source: https://matsne.gov.ge/document/view/3757843?publication=0
[2] The resolution of Parliament of Georgia on "Main Directions of State Policy in Energy," June 24, 2015.

3.2 EXISTING MEASURES FOR STIMULATING RENEWABLE ENERGY PROJECTS

Development of RES was always among prior directions of state energy policy, yet regulatory arrangement in Georgia does not have special provisions for stimulating it. The rules and procedures for building and operating power plants are the same for renewable as for conventional plants.

The main legislative document that regulates the country's energy sector is the Law on Energy and Water Supply which was adopted in December 2019 (later referred to as the New Energy Law) and repealing the Law on Electricity and Natural Gas adopted in 1997. The new energy law incorporates the provisions compliant with the third energy package and creates the legal basis for the establishment of competitive energy markets. The new energy law encourages domestic and foreign investments to rehabilitate and develop electricity, natural gas, water supply sectors, and utilize local hydropower and other renewable and alternative resources. It also defines small power plants with an installed capacity of 15 MW, thereby, emphasizing the importance of their development for utilizing renewable energy resources in an efficient and environmentally friendly manner.

Currently, there is a net-metering mechanism in place to facilitate the development of micro power plants working on renewable energy sources at the distribution level[3]. This scheme appeared to be an efficient tool for stimulating the development of micro-scale solar Photovoltaic (PV) systems. According to the latest data, there are more than a hundred consumers engaged in the net-metering scheme, while the total installed capacity of microgeneration plants is more than 1260 kW[4], the majority of them (93.1%) being solar power plants. These plants are exempted from acquiring construction permits or a production license and are excluded from the entrepreneurial activity and any other tax obligations. They are only required to apply directly for connection to the distribution network without submitting any permission, certificate, or any other document to the Distribution System Operator (DSO). The standard form of application is approved by the Georgian National Energy and Water Supply Commission (GNERC). If the application form is duly filled out by the applicant, the DSO is not authorized to reject it and request any additional information.

Guaranteed Power Purchase Agreements (PPA) provided by the GoG effectively encouraged investment in power generation projects, mainly in Hydro Power Plants (HPP). However, wind and solar potential remained underutilized. PPAs offered long-term guaranteed purchase of electricity at predefined prices. The duration of PPAs and prices for guaranteed electricity purchases varied across projects. Usually, agreements on guaranteed power purchase were signed for ten years with some rare exceptions. The support level varied by projects and was defined in Memorandums of Understanding (MoU) signed by the GoG and investors. Previously almost all new renewable power plants were eligible for PPAs. Nowadays, the GoG ceased the PPAs and investors do not receive long-term price guarantees from the state. However, the new law on renewable energy creates a legal basis for the introduction the support schemes for renewable energy projects and puts MoESD in charge of the elaboration of the relevant support mechanisms for facilitating the renewable energy development in Georgia.

The adoption of the new legislation on renewable energy will be a step forward to facilitate investment in renewable energy projects by providing transparent support mechanisms and ensuring equal treatment to all potential investors.

3.3 INVESTMENT PRACTICE IN RENEWABLE ENERGY PROJECTS IN GEORGIA

The initiation and development of power generation projects be it renewable or any conventional power plant is regulated by the following legal acts:

- The Law of Georgia on Public-Private Partnership (referred to as the PPP law), adopted in May 2018 by the Parliament of Georgia. It provides a legal basis for the establishment of PPPs for the implementation of projects with the high public interest;

[3] Power Plants up to 100 kW installed capacity are eligible for net-metering scheme.
[4] Based on the latest information provided by GNERC.

- The Government Decree №426, August 17, 2018, provides detailed instructions on rules and procedures for identification, initiation, preparation, implementation, and post-implementation stages of PPP projects;
- The Government Decree №515, October 31, 2018, on Rules and Conditions of Submitting to the Ministry of Economy and Sustainable Development and Reviewing the Proposals on Conducting the Construction Feasibility Study, Construction, Ownership, and Operation of those Power Plants which are not Public-Private Partnership Projects. The provisions of the Government Decree №515, October 31, 2018, define rules and procedures for construction and operation of power plants in Georgia. except for projects that are subject to the PPP law.

The PPP framework was established by the GoG to facilitate investment in projects of high public interest. It is applied as a tool for redistributing project risks and financial burden between a private investor and the state in different industries. Usually, priority is given to projects in education, healthcare, and energy sectors. Not all projects are eligible for the PPP arrangement. The PPP law defines criteria that should be satisfied by a project to qualify for the PPP. The criteria are the following[5]:

- Long term nature - the PPP agreement will be signed for at least for five years; the period of agreement will be defined by the legal act of the GoG;
- The value of the project should be at least 5 million GEL. This condition is valid until July 1, 2020, afterwards the minimum value of the PPP project will be defined by the legal act of the GoG;
- Responsibility for Public Service Provision - private partner/investor should develop public infrastructure or/and ensure the operation and/or maintenance of public infrastructure;
- Funding Responsibility - PPP project will be partially or fully financed by a public partner.

Since 2019 the PPP Agency is responsible for assisting the MoESD in the identification of potential projects and assessing their eligibility to PPP terms, developing and managing a database of PPP projects, elaborating standard forms of documents, including standard provisions of PPP contracts. Potential projects for PPP can be identified and initiated by the MoESD or by the PPP Agency. In some cases, the law allows investors to initiate projects for PPP agreements too. Decision about the implementation of PPP projects in the energy sector is made by the GoG based on proposals of the MoESD. Decision about the implementation of a PPP project depends on its strategic importance, its economic impact, availability of financial resources, and associated risks.[6]

Various forms of support can be provided under the PPP as at the project development as well at the operation stage. The GoG makes a decision about the type and level of support granted to PPP projects. According to the Article 28 of the PPP law, support granted to the project might include long-term guarantees on purchase, performance-based payments, guarantees on the value of public service provision, guarantees on tariff, grants, and subsidies to ensure expected payback on investment, granting land or exclusive rights on provision of public service at defined geographic area.

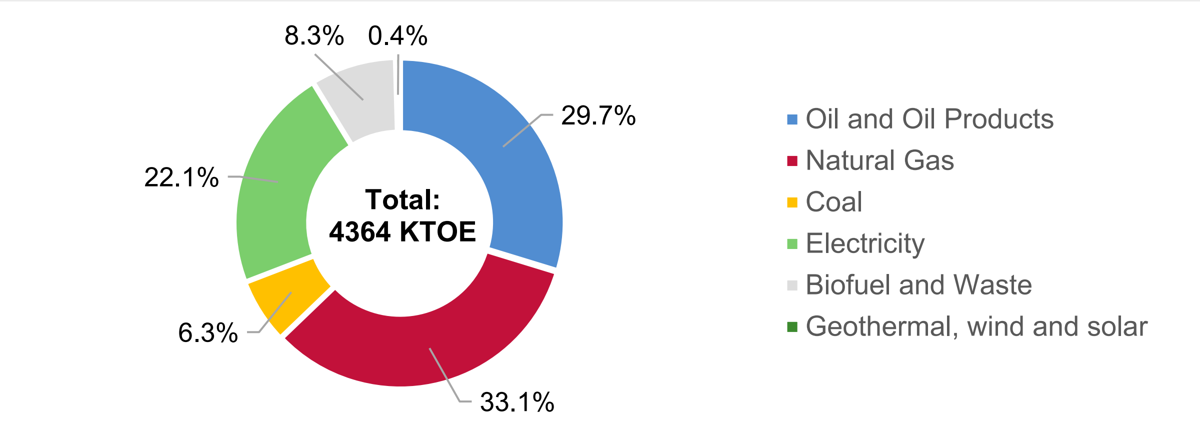
[5] Law of Georgian on Public-Private Partnership, May 4, 2018, Parliament of Georgia

[6] Law of Georgian on Public-Private Partnership, May 4, 2018, Parliament of Georgia

4. CURRENT STATE IN ENERGY SECTOR OF GEORGIA

Currently, the major share of energy consumption of Georgia is satisfied by imported energy resources. Imported oil products and natural gas constitute 63% of the total energy consumption of the country. Consumption of electricity makes up 22% of the country's energy consumption. The demand for electricity is satisfied by domestic resources mainly. Electricity generated by HPPs makes around 80% of domestic demand. The rest of the demand is satisfied by Thermal Power Plants (TPP) and imports.

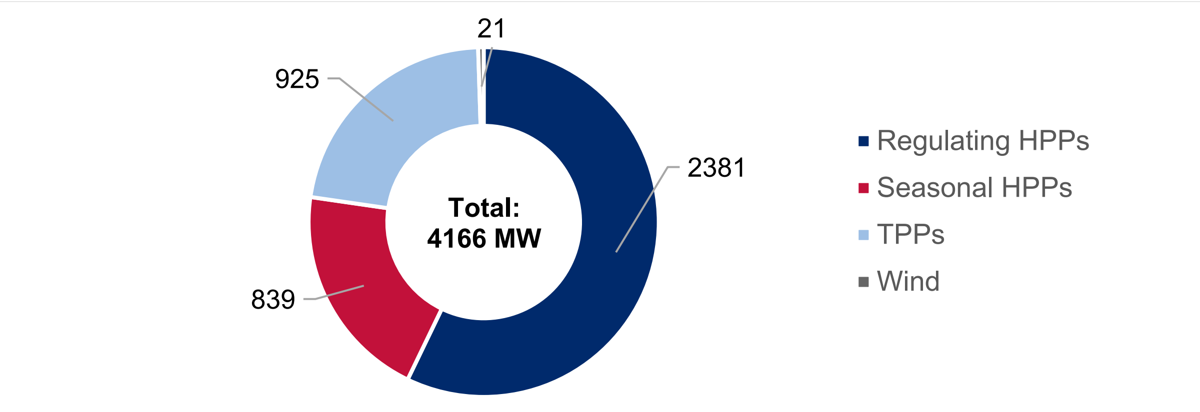
Graph 1: Energy Consumption Mix in Georgia in 2017[7]



Source: National Statistics Office of Georgia (GEOSTAT)

The total installed capacity of domestic power plants is 4166 MW, out of which HPPs make the largest portion 77%. The total installed capacity of TPPs is 925 MW. TPPs are mainly operating during the winter season when the country has peak demand and electricity generated by HPPs cannot satisfy domestic consumption[8].

Graph 2: Total Installed Capacity of Domestic Power Plants (MW)



Source: Ten Year Network Development Plan of Georgia (TYNDP), 2019-2029

Georgia is abundant with hydropower resources and HPPs make a major share in total electricity generation of the country. However, there are other renewable energy sources, including solar and wind power potential, which remain underutilized.

There is no precise estimate of renewable energy potential in Georgia. Roughly, the utilization of domestic renewable energy sources can generate more than 50 TWh annually. The biggest share of generation can be derived from HPPs: according to available data, the estimated potential of

[7] GEOSTAT, Energy Balances, 2017 (note: latest data on energy balances is available for 2017 years) remarks: KTOE-Thousand tone of oil equivalent, TOE is a unit of measurement defining the amount of energy released by burning of one tone of crude oil, according to International Energy Agency 1 TOE equals to 11.63 MWhs or 41.868 Gigajoules (GJ)

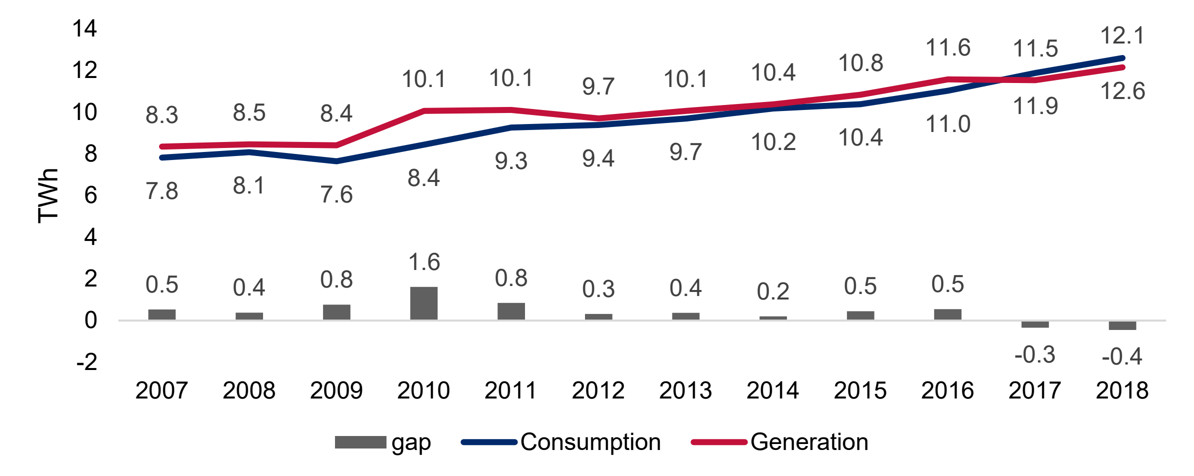
[8] Ten-Years Network Development Plan 2019-2029

hydropower resources comprises 15 GW installed capacity with 50 TWh annual generation. Except for hydropower, Georgia has the potential to generate electricity from other renewable resources, such as wind power (estimated potential 4 TWh), solar (estimated potential more than 3 TWh[9]), biomass (~0.8 TWh) and geothermal (~250 million m3 per year) resources. These resources can be used to enhance the domestic generation of electricity[10]. It should be noted that the economic viability of Georgia's renewable energy potential requires additional studies to correctly define the potential capacity of renewable resources.

GENERATION AND CONSUMPTION TRENDS

Georgia experiences a growing demand for electricity, which challenges its energy security and independence. According to the forecasts, the consumption of electricity will be increasing in the future and without additional capacities, the country will become more dependent on imported energy resources.

Graph 3: Generation and Consumption in 2007-2018 Years, in TWh



Source: Electricity Market Operator (ESCO)

Georgia imports energy mainly during the winter season when the domestic generation of HPP drops around 35% compared to the summer period[11]. Consumption of electricity during the winter season is 6 TWh on average, while electricity produced by HPPs during the winter season is 4 TWh on average[12], 39% lower than demand. During the winter period, Georgia consumes electricity generated by TPPs and imports extra electricity to fill the gap between HPP generation and consumption.

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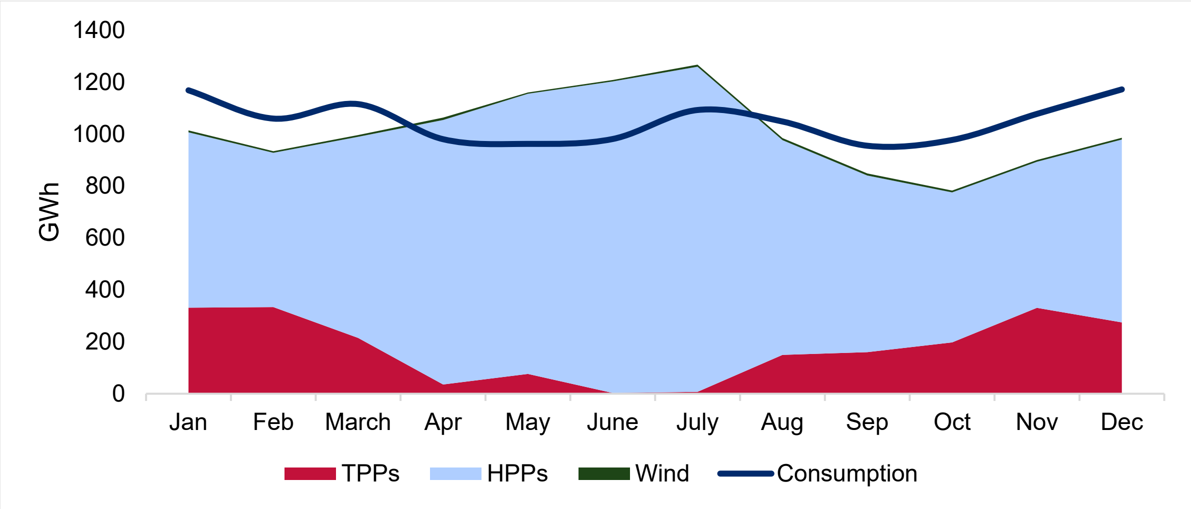
[9] Verified data on solar potential is not available. The value used in this document is based on the Ten Year Network Development Plan 2019-2029 of Georgia which states that installed capacity for solar potential plants equals 520 MW and annual generation 695 MWh. Contrary to the TYNDP, the website of the former Ministry of Energy states that Solar potential for Georgia equals 108 MW that is not likely to be adequate value. However, TYNDP focuses on the large scale solar project potential and does not contain the potential for micro and small scale (as well as rooftop) solar thus it's possible to conclude that total solar potential for Georgia is higher than provided in the official documents. On its hand, the document "Quantification of the Potential of Building PVs in Georgia and other Eastern Partner Countries" (see the link: https://europa.eu/capacity4dev/file/75632/download?token=_ZylmExi) provides information on rooftop potential of major cities in Georgia but it's based on various assumptions and according to the report maximum theoretical annual electricity generation from rooftop solar PVs equal 2,321 GWh.

[10] Source: Renewable Energy Support Scheme, USAID Energy Program, May 2018, the original source: Ministry of Economy and Sustainable Development, Energy Department: http://www.energy.gov.ge/energy.php?lang=eng&id_pages=60

[11] For the calculations winter period is assumed to be a period between September and February, the summer period is assumed to be a period between March and August, the calculation is based on the average HPP monthly generation patterns during 2015-2018 years.

[12] The calculations are based on the monthly consumption and generation during 2015-2018 years

Graph 4: Monthly Consumption and Generation by Type of Plants in 2018, in GWh (Gigawatt Hours)

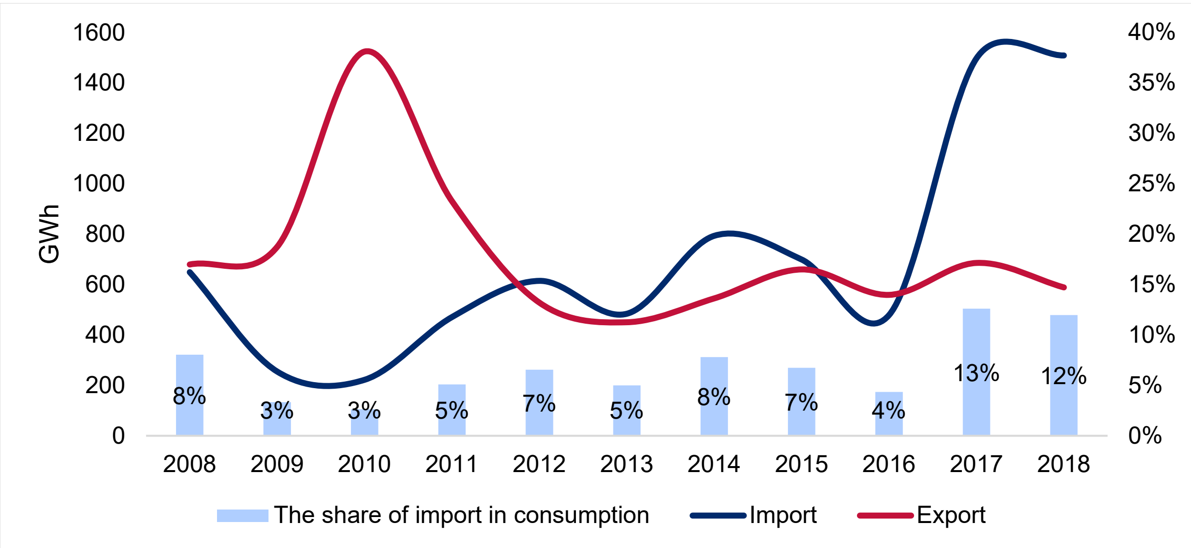


Source: *ESCO*

The average amount of electricity exported annually is 0.6 TWh. Occasionally the export happens during summer when Georgia has excess electricity generated by HPPs. Since 2012 Georgia is a net importer of electricity and faces a decreasing trend in electricity export. More than 50% of export goes to Turkey, which is the main export partner of Georgia in the cross-border trade of electricity. In 2018 the power exported to Turkey amounted to 0.4 TWh, which was 66 % of the country's total electricity export.

Due to the growing demand, the share of imported electricity in total consumption increased dramatically in the past two years. In 2008-2016, the annual import of electricity in Georgia was 0.5 TWh on average[13], and the average annual spending on electricity import was 27 million USD. However, in 2017 Georgia experienced significant growth in electricity import. The total amount of imported power almost tripled compared to 2016 and reached 1.5 TWh. The share of imported electricity in domestic consumption amounted to 13% in 2017 and 12% in 2018.

Graph 5: Import and Export of Electricity in 2008-2018, in GWh



Source: *ESCO*

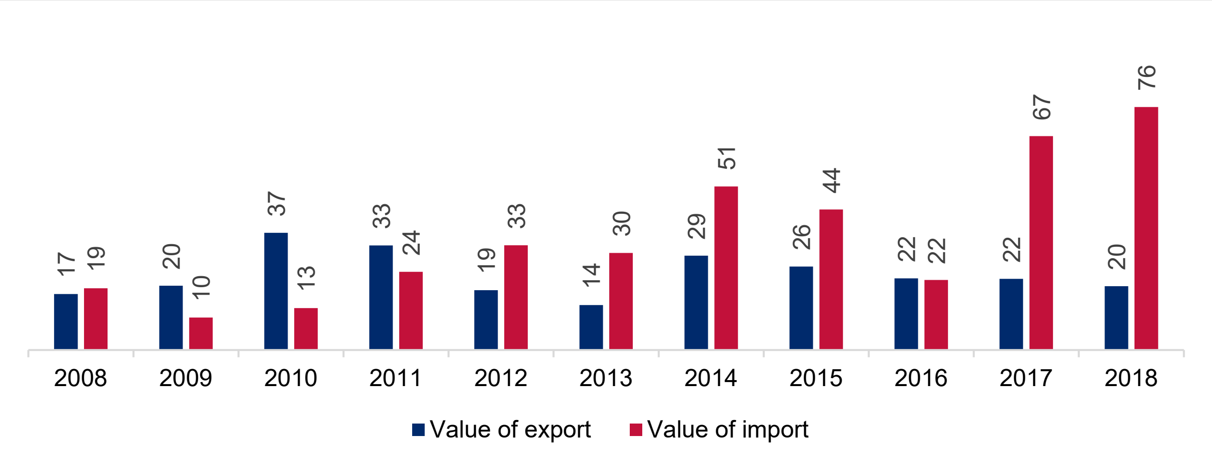
Until 2016 Russia took the major share in the total electricity import in Georgia, followed by Azerbaijan and Armenia. In 2016 the electricity imported from Russia took a 77% share of the country's import.

[13] The average annual import is calculated based on the data from ESCO electricity balances for 2008-2016 years.

The situation changed during 2017-2018, and currently, the electricity imported from Azerbaijan constitutes an 82% share in the total electricity import of Georgia.

In monetary terms, average annual spending on imports amounts to 35 million USD. Throughout 2008-2018 the total expenditure on imported power amounted to 389 million USD, out of which 37% of spending occurred throughout the 2017-2018 years and amounted to 143 million USD[14]. Regarding the export, throughout 2009-2018 the average value of the power exported annually amounted to 24 million USD, and the total value of export amounted to 259 million USD[15].

Graph 6: The Value of Import and Export, 2008-2018, in Million USD



Source: GEOSTAT

[14] Source: GEOSTAT import-export data
[15] The average value of annual export is calculated based on the value of export for 2008-2018 provided by GEOSTAT.

5. PROBLEM DEFINITION

Growing consumption of electricity is challenging the energy security of Georgia. Being an importer of oil products and natural gas, which take a substantial portion of the country's energy consumption mix, Georgia cannot afford to be dependent on imported power generation. There is no precise information on economically justified renewable potential. The rough estimates show that the country can achieve more than 50 TWh of annual power generation by utilization of domestic renewable energy sources.

The promotion of energy investment using long-term PPAs is no more valid. Becoming a contracting party of EnCT, the GoG limited provision of PPAs for new power generation projects and started to implement reforms in the energy sector to establish sound regulatory framework compliant with the EU Energy Acquis. The shift towards a new electricity market model created uncertainties about future conditions in the market and slowed down the development of new power generation capacities. As consumption of electricity follows the steady growth trend, it is essential to design long-term policy focusing on the development of renewable energy projects to meet increased electricity demand in the future.

THE GROWTH OF ELECTRICITY CONSUMPTION INCREASES GEORGIA'S DEPENDENCY ON IMPORTED ENERGY SOURCES

Within the last decade, the consumption of electricity grew by 5.8% on average and outpaced production growth, which grew by 4.4%[16]. If the consumption follows a similar pattern, the total demand for electricity will almost double by 2030 and reach 25 TWh[17]. It is clear that additional generation capacities will be required to address growing electricity consumption in the nearest future.

Until 2017 annual power generation exceeded the consumption. The import of electricity took place during the winter season, which is a peak demand period in Georgia, and the local generation is not enough to meet increased consumption due to the seasonality pattern of the country's hydropower system. The situation changed since 2017 when the annual consumption exceeded the annual domestic generation. The gap between consumption and generation amounted to 344 million kWh and increased up to 447 million kWh in 2018. In 2017, the share of imported power in domestic consumption amounted to 12%, which was three times higher compared to 2016.

The forecasts project further growth of consumption in the future. Without additional generation facilities, Georgia will become highly dependent on imported power. Growing dependency on imported power creates risks for the energy security of the country. Besides, the growing share of imported power in domestic consumption increases the vulnerability of end-user electricity prices against the exchange rate fluctuations.

THE LOW LEVEL OF INTEGRATION THE VARIABLE RENEWABLE ENERGY SOURCES (VRES)

The domestic generation capacity mainly consists of the HPPs and gas-fired TPPs. The existing generation capacity of Georgia amounts to 4166 MW out of which HPPs take up 77.3% share.[18]

HPPs are the primary sources of domestic electricity supply and take up to 80% share in total domestic power generation. However, the existing hydropower capacity takes only 22% of overall hydropower potential in Georgia. The other renewable energy sources, such as wind and solar, remain underutilized. Nowadays, only one 21 MW of installed capacity wind power plant is operating in Georgia, and its annual generation ranges between 84-87 million kWh. There exists no utility-scale solar plant. There are small-scale solar PV systems developed through the net-metering scheme, the capacity of which exceeds 1 MW. However, compared to the existing potential, the integration of variable renewable sources is very low in Georgia.

Due to the mismatch between monthly consumption and generation pattern, the share of imported energy sources in domestic consumption increases during the winter season, when demand for electricity reaches its peak. According to current forecasts, Georgia will become a summer and winter peak demand country in the nearest future.[19] Also, the daily peak load will shift from evening to daytime. The integration of wind and solar systems will assist in addressing potential shifts in demand patterns and satisfy demand during peak periods by domestic energy sources.

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[16] Source: ESCO energy balances.
[17] Own calculation, assuming that electricity consumption will follow the same pattern and grow by 5.8% in upcoming years.
[18] Source: Ten-Year Network Development Plan (TYNDP) 2019-2029, L2G2 scenario.
[19] Electricity Demand Forecasting Model, prepared under USAID supported program G4G, 2018.

6. SUMMARY OF PROJECT ACTIVITIES

Development of the RIA on renewable energy support mechanisms is comprised of two main tasks:

- Identification and selection of need-based support schemes for Georgia;
- Evaluation of different policy options for implementation of the selected support mechanisms.

This project started at the end of July 2019. The project implementation process included intensive consultations with the interested parties.

At the initial stage, the project team conducted a meeting with the USAID Energy Program representatives to agree upon the scope and methodology of the project. Afterwards, the project team met the MoESD representatives to get acquainted with their vision and expectations from the project.

This RIA focuses on the design and implementation of support mechanisms for intermittent renewable energy sources, such as utility-scale solar and wind power plants. The MoESD currently considers four support mechanisms: FiP, FiT, CfD, and Green Certificates. The MoESD intends to provide support not only for wind and solar projects but also for hydropower plants.

6.1 IDENTIFICATION AND SELECTION OF RENEWABLE ENERGY SUPPORT SCHEMES

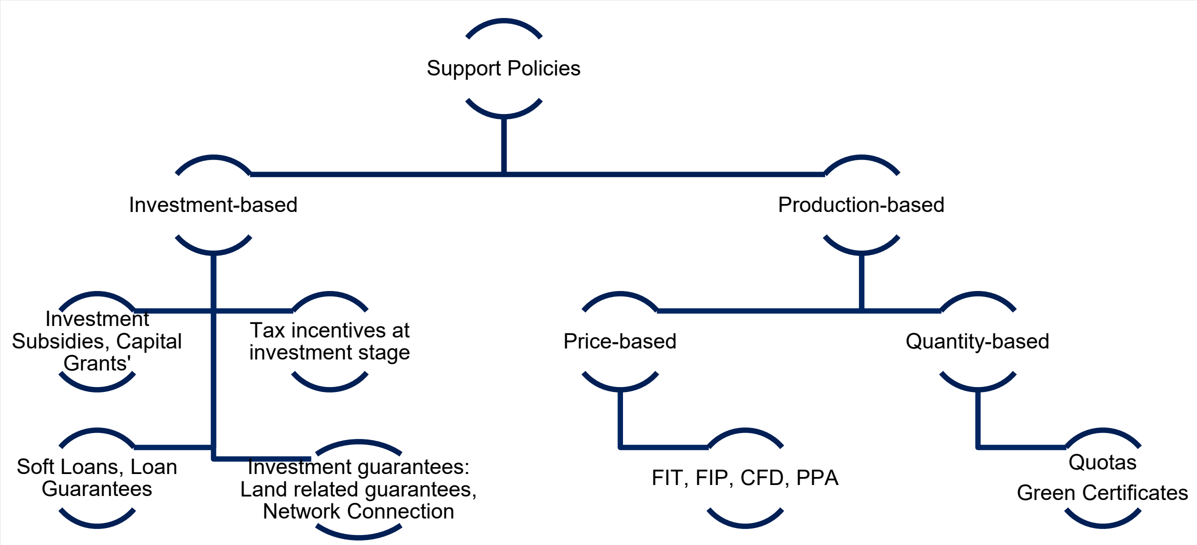
The identification of an appropriate support scheme for Georgia was conducted in two stages. Firstly, the shortlist of the most relevant support schemes for Georgia was created, based on the review of international best practice and expert judgment. Secondly, identification of existing barriers for VRES development and selection of need-based support schemes for Georgia was performed based on the consultations with stakeholders. The analysis included identification of roots of the problem hindering utilization of renewable energy, especially in regards to wind and solar potential in Georgia and the proposal of its potential solution by evaluating different options.

The barriers for integration of intermittent renewable energy sources might exist either at the project development stage or at the operation stage of the power plant. Respectively, potential policy measures are divided into two broader groups:

- **Investment-based policies** targeting the investment stage of the project, by providing various investment support, including grants, subsidies, soft loans.
- **Production-based policies** targeting the operation stage of the project by providing various support to ensure that the producer will attain the desired level of income. Production-based policies provide different type of support: quantity-based support includes quotas and renewable portfolio standards, that imposes mandatory requirements on suppliers to purchase a certain amount of renewable energy, while price-based support provides guarantees for attaining a certain level of income per kWh energy produced by the renewable plant (e.g., FiT, FiP, CfD).

Based on the results derived from the consultations, the project team selected support schemes targeting the barriers hindering the development of VRES in Georgia.

Figure 1: Investment-Based and Production-Based Support Schemes



6.2 HIGH-LEVEL ANALYSIS OF SUPPORT SCHEMES

For the initial evaluation of support schemes, the project team used Renewable Support Scheme Index (RSSI), which is constructed based on predefined criteria. The individual support schemes are assessed against each criterion based on a scale from 1 to 3, where 1 means negative influence, 2 - neutral, and 3 – positive impact. Criteria were selected based on the international experience and recommendations of the EU and EnC guidelines on renewable support scheme design elements. Ranges were assigned based on the assessment of the expected outcome of a specific support scheme against each criterion. Each selection of criteria was given a respective weight based on their importance and the Georgian electricity market needs. Table 4 provides the criteria and respective weights.

Table 3: Criteria and Respective Weights

Criterion	Transparency	Financial impact (Impact on state budget and/or electricity prices)	Impact on project investment costs	Easiness	Flexibility
Weights	0.2	0.3	0.2	0.15	0.15

The RSSI index included the following criteria:

- **Transparency:** This criterion implies assessing support schemes in terms of transparency, fairness, and non-discrimination among interested parties involved under the specific support scheme. As EU and EnC policy guidelines set transparency as one of the mandatory requirements, this criterion was also included to conduct an initial evaluation of support schemes. It includes procedures for allocation and determination of the level of support among eligible candidates. It is very important to have support schemes that set a level playing field for interested parties and also have their general terms and conditions set in advance and publicly available.
- **Financial impact:** support schemes will have financial impacts on the state budget (central or regional) or influence wholesale or retail electricity prices/tariffs. This criterion evaluates how the cost of support influences the state budget or end-user prices. As the support schemes are either funded by consumers or by the state budgets, there should be a special criterion to capture this impact. The financial impact of support schemes evaluates how the cost of support will influence retail electricity prices and what will be fiscal implications for the state budget.
- **Impact on project investment cost:** support schemes may lower project investment cost, financing, or subsidize some project activities through state budget (land acquisition, tax exemption, etc.) or from other funds and regulated tariffs (network connection, etc.). For the most part, such support schemes aim to support new technologies to enter the market that might have problems in equal conditions. Such support must be accomplished under state aid law and must be well justified.

- **Easiness:** This criterion evaluates the simplicity of administrative and institutional efforts and resources required for the enforcement of the specific support scheme.
- **Flexibility:** This criterion incorporates different factors attached to individual support schemes: 1) Being adapted to market development conditions and competition requirements; 2) Possibility of support scheme to be adapted to changing environments in technology development, market prices, and market development level itself.

Based on the high-level review of support schemes, nine support mechanisms with RSSI more than 2 were identified for further consideration.

- **Price-based schemes**: FiT, FiP and CfD;
- **Quantity-based schemes**: Green Certificates;
- **Self-consumption schemes**: Net metering of Renewable Energy;
- **Investment-based schemes**: Tax incentives, Soft Loan, Network connection.

6.3 CONSULTATIONS WITH STAKEHOLDERS

The objective of consultations was to identify target areas for policy intervention and define appropriate support mechanisms facilitating the utilization of variable renewable energy sources in Georgia. Information obtained from stakeholders contributed to the selection of appropriate support mechanisms for variable renewable energy sources in Georgia.

Consultation with stakeholders included in-person interviews and focus group discussions with project developers, existing producers, non-governmental organizations and think tanks working on renewable energy-related issues, industry experts, MoESD, Electricity Market Operator (ESCO), Georgian Energy Development Fund (GEDF), and Georgian State Electrosystem (GSE) representatives. Overall, 25 respondents from 20 organizations participated in focus group discussions and in-person interviews. The average duration of a meeting was two hours.

The following issues were covered during the consultations:

- Stakeholders' preferences and requirements for the selection of renewable energy projects;
- Existing barriers at different stages of the development of renewable energy projects:
  - *Barriers at the early stages of project development*: access to finance, availability of information on prospective projects, licensing and permitting issues, the competitiveness of technology, network connection issues;
  - *Barriers at the project exploitation stage*: access to the market, participation in electricity trade, price formation practice, and other risks related to electricity trade in the market.
- Existing need for support to stimulate investment in renewable energy projects;
- Compatibility of support scheme with current and future electricity market needs;
- Financing mechanisms for proposed renewable support schemes, allocation of costs among GoG and other market participants.

Topics discussed during consultations slightly varied between stakeholder groups. Appendix 1 provides a detailed list of stakeholders who participated in the discussions.

Based on the consultations, appropriate support mechanisms were selected and four policy options were developed for more detailed analysis. The preliminary results were presented to the USAID Energy Program team and MoESD representatives. Calculations were further adjusted based on their feedback.

After completion of the analysis, the project team together with the USAID Energy Program representatives organized a workshop and presented the results to the key stakeholders.

6.4 STAKEHOLDER ANALYSIS

Stakeholders that have an impact or are/could be influenced by the introduction of renewable energy support schemes were divided into four groups based on their influence and interests.

Table 4: Stakeholders' Influence/Interest Matrix

Interest/Influence	Low Influence	High Influence
Low Interest	Existing residential, commercial and wholesale consumers Electricity traders ESCO, PPP Agency	Ministry of Finance of Georgia (MoF), IFIs
High Interest	Existing renewable energy producers, project developers, Thinks tanks and Non-Governmental Organizations (NGOs), GEDF	Parliament of Georgia, MoESD, GNERC, GSE

Group of stakeholders that have high interest and influence on the development of renewable energy support schemes consists of the following organizations:

- **MoESD** that is in charge of development and implementation of the policy and strategy within the sector, including elaboration the support policy design and submit to the GoG for final approval;
- **Parliament of Georgia** that has the discretion of final approval of proposed main directions of the energy policy of the country as well as primary energy legislation;
- **GNERC** which is entitled to the regulatory framework of the energy sector; issues electricity generation, transmission and distribution licenses; approves secondary legislation which regulates grid access for variable renewable sources in the distribution network;
- **GSE** that is in charge of the transmission network development and arrangement of transmission network infrastructure for enhancing electricity system ability to accept variable renewable energy sources.

Stakeholders listed below belong to the group which have high interest and low influence on the process:

- **Existing renewable energy producers** and **project developers** who are waiting for the decision on support mechanisms to be implemented in Georgia;
- **Civil society organizations** and **think tanks** that are working on renewable energy-related issues;
- **DSOs** that will be in charge of the development of distribution network infrastructure to give access to variable renewable energy power plants and also might partly or fully cover network connection costs;
- **GEDF** that identifies potential renewable energy projects, performs feasibility analysis and makes decisions on project implementation.

Stakeholders with high influence and low interests are the following organizations:

- **MoF** which is not engaged in the development of the support schemes but has a strong influence in the decision-making process if the proposed schemes will create fiscal risks to the state budget;
- **IFIs** that make a decision on the provision of funds for renewable energy projects.

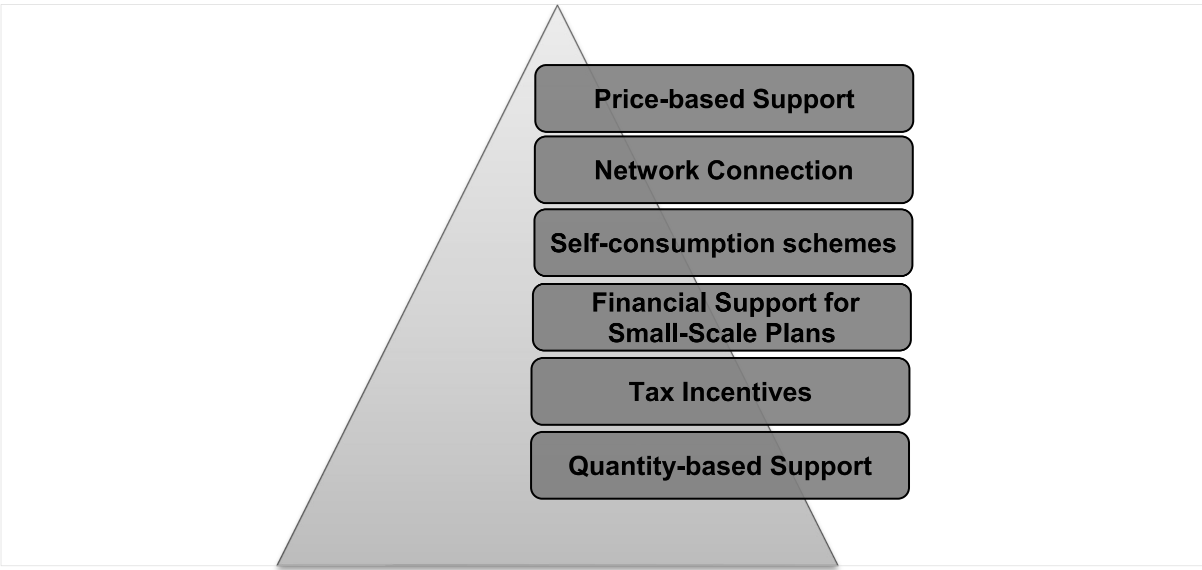
Stakeholders with low influence and low interest are:

- **Residential, commercial and wholesale consumers, electricity traders** that will fall under the influence of support mechanisms through the changing end-user electricity prices;
- **PPP Agency** that is in charge of assisting MoESD in identification strategically essential projects for PPP, evaluate their compatibility against criteria defined by PPP law and support implementation of PPP framework;
- **ESCO** that is an electricity market operator responsible for electricity trading and related operations on balancing market.

6.5 SELECTED SUPPORT SCHEMES

The support mechanisms are ranked according to stakeholders' preferences based on the information obtained during interviews and focus groups. Findings from the stakeholder consultations revealed that price-based support is crucial for stimulating investment in renewable resources. Besides, alongside Green Certificates, the MoESD also considers price-based support schemes as potential measures for the encouragement of investment in power generation. With this on mind, the project team decided to perform a more detailed analysis of price-based mechanisms and their potential impact.

Figure 2: Ranking of Support Schemes According to Stakeholders' Preferences



TAX INCENTIVES

The tax incentives, including Value Added Tax (VAT) and property tax exemptions, are among the least preferred support schemes by stakeholders due to the following reasons:

- Project developers prefer price-based incentives over tax-related preferences. Also, they did not mention the tax burden to be a barrier to renewable energy projects. Besides, considering that the tax burden is already low in Georgia, it is less likely that an additional reduction of tax rates or tax exemptions will have a significant impact on renewable energy investments.[20]
- The property tax paid by investors represents revenue sources for the local municipality budget. Because municipality budgets do not receive sufficient revenue and depend on funds transferred from the national budget, elimination or reduction of property tax will further reduce the revenue generated by local municipality budgets.
- The existing tax code allows companies to withhold VAT tax and exclude VAT paid from future tax payments. For that reason, the VAT exemption or reduction is less likely to have a significant impact on the development of renewable energy projects.

FINANCIAL SUPPORT: SOFT LOANS

Support scheme focused on provision of soft loans were neglected for the following reasons:

- Project developers do not find accumulation of funds to be a barrier unless there are certainties about future revenues from the project. Companies independently apply to financial institutions and private investors to accumulate funds for their projects. As a result, the additional provision of soft loans will not make a significant difference and will increase the burden to the state budget.
- Financial support can be useful for small scale projects with up to 2 MW installed capacity. Such projects obtain funds mainly from local sources, and small producers obtain financing at high-interest rates. The low-interest-rate loans for small-scale projects can be useful if the development of such projects will be among the state priorities. However, as the main focus

[20] According to Doing Business rating, the total tax and contribution in Georgia amounts to a 9.9% share of total profit, which is quite below than regional average that is 31.7% for Europe and Central Asia region. See the link: https://www.doingbusiness.org/en/data/exploreeconomies/georgia#DB_tax

of this project is the utility-scale projects, for those projects, financial support in terms of soft loans is less relevant compared to price-based support.

SUPPORT RELATED TO THE NETWORK CONNECTION

Financing of network connection costs were dismissed, as development of a transmission network is already considered in the Ten-Year Network Development Plan (TYNDP). Furthermore, the network costs for connecting a system owned by the GSE are not assumed to be a high burden by power project owners and developers.

The situation changes when it refers to integration of plants in the network owned by distributor companies. Majority of project developers assert that often, DSOs require from project owners to finance rehabilitation and upgrade of the grid in order to allow integration of plants, such costs are high, and the procedures also take longer time. Despite this fact, the project team decided to focus on the price-based mechanisms instead of network connection issues, as at the regulatory level, provisions are encouraging the integration of renewable energy into the system. GNERC already requires DSOs to provide the three years' grid investment plan to ensure a stable and secure power supply. Moreover, the Renewable Energy Law that is compliant with the renewable energy directive already provides provisions that the DSOs have to partly or entirely cover the integration costs of renewable plants. Also, the Renewable Energy Law entitles GNERC to review the procedures of integration and make necessary amendments to ensure the integration of renewable energy plants in the system.[21]

GREEN CERTIFICATES

Green Certificates belong to the quantity-based mechanisms stimulating renewable energy producers by providing opportunities to obtain additional income from clean energy production. The electricity suppliers have quota obligations to keep a certain share of renewable power in their supply bundle. The renewable energy producers receive Green Certificates per MWh of electricity generated from a renewable source. Thus renewable energy producers can trade certificates at a separate market and generate additional income.

The Green Certificates support scheme design can either be a technology-neutral or technology-specific. A technology-neutral scheme is simpler to design. The technology-neutral design makes all renewable technologies eligible for support, while the technology-specific design allows the only predefined type of renewable technologies to participate in the support scheme.

To ensure conformity, the introduction of the penalty system is applied practice. The penalties are determined administratively. The penalties should be higher than the price of Green Certificates to ensure the conformity of suppliers with quota obligations. However, the penalties should be reasonable and should not undermine investors' incentives to invest in renewable energy.

The Green Certificate is the tradable asset. The power suppliers purchase the Green Certificates to meet their renewable energy quota. The renewable energy producers generate additional income through trading with Green Certificates. The demand and supply mechanism determines the price of Green Certificates in the market. The price formation usually depends on the size of the quota obligation imposed by the Government and the number of certificates available for trade. Thus, by varying quota obligations periodically Government has a tool to control incentives at Green Certificates market and manage renewable energy production.

The Green Certificates' market exists and functions separately from the electricity market. Therefore, the introduction of the Green Certificates scheme requires the arrangement of a separate marketplace with separate trading mechanisms. Moreover, the effectiveness of the mechanism depends on the size of the Green Certificates' market. The market needs to be large enough to ensure the trading of a sufficient number of certificates. Also, the Green Certificates' market will need its own monitoring and administration mechanisms. Currently, the Renewable Energy Law provides the legal basis for the introduction of Green Certificates. The table below summarizes the advantages and disadvantages of the introduction the Green Certificates in Georgia.

[21] Article 16, Law on Promotion of the Production and Use of Energy from Renewable Sources (Renewable Energy Law).

Table 5: The Advantages and Disadvantages of the Introduction the Green Certificates in Georgia

Green Certificates in Georgia	
Advantages	**Disadvantages**
• The cost of establishing a Green Certificate system may be lower than the establishment of another mechanism because the 3rd energy package mandates to set up guarantee of origin tracking system; • Green Certificate scheme could start functioning even in the absence of an open electricity market; • Green Certificate scheme may function equally well for small and large scale projects; • Not considered as a state aid.	• Pressures end-user tariffs. The suppliers would be permitted to charge the additional cost of such purchases to the consumers. These funds would then be used to purchase certificates in a separate market for Green Certificates; • Green Certificate scheme is more complex than other schemes, as it requires a separate market for certificates. For this reason, Green Certificate scheme may also be more expensive to operate (unlike the cost of establishing the market) than other schemes; • Needs to be liquid enough to deliver desired results; • *Green Certificates are not an easily manageable tool and it needs constant control to prevent structural crises and oversupply/undersupply of certificates that anyway will deliver non-optimal generation development (Due to this reasons, Poland decided to decrease application of the scheme and as a consequence to abandon it and move to another support scheme (namely, FiP));* • Investors take the risk that support (certificate prices) will decrease if more renewable power capacities are developed than the support scheme assumed; • Green Certificates scheme enables price fluctuations caused by temporary surplus or shortage of certificates. Such fluctuations may occur as a result of a mismatch between demand and supply stemming from natural circumstances, total energy consumption, investment inertia.

The consultations with stakeholders revealed that the Green Certificates are the least preferred support schemes by stakeholders. Power project owners and developers do not consider quota-based mechanisms as useful support compared to price-based schemes. Besides, considering that renewables take around an 80% share of the power generation in Georgia, the imposition of quota-based systems will not make any difference and will only increase administrative burdens.

Furthermore, quota-based system requires respective market arrangements to obtain benefits from trading the certificates. However, establishment of Green Certificates' market requires time and as currently Georgia undertakes energy market reforms, having two parallel market development processes in electricity market will not be effective. The electricity market reform is a priority for development of the energy sector in Georgia, and, therefore, the focus must be directed towards the power market reforms. Moreover, considering existing situation in the market, it is hard to provide quantitative estimates about price patterns on Green Certificates market and respective costs and benefits brought by introduction of the scheme. Respectively, in the nearest future, without a strong electricity market through strong power trading mechanisms the introduction of the Green Certificate scheme is not recommended in Georgia. Therefore, Green Certificate scheme is not envisaged in the scenario analysis of selected support schemes.

SELECTED SUPPORT SCHEMES

The project team selected the following price-based mechanisms for further analysis:

- FiT - as the existing market structure does not allow for competitive trade, FiT is the most relevant price-based support scheme under the existing market structure;
- FiP - considering that the GoG plans to establish the new electricity market model, the FiP can be considered as a replacement for the FiT scheme;
- CfD - this scheme can be an alternative to FiT and FiP, as it provides guarantees on future project revenues and also incentivizes producers to participate in trade.

Based on the selected support schemes the project team developed three options of policy intervention. Comparison of proposed policy options against baseline will assist to capture potential impacts.

It is worth mentioning that together with support scheme design the proposed level of support is another influential determinant of the policy success. Therefore, during the analysis the project team evaluated optimal level of support for each support scheme to ensure that proposed policy options effectively address the problem and will facilitate development of renewable energy projects in Georgia.

7. ASSUMPTIONS

The calculations performed to evaluate the impact of potential policy interventions are based on the following assumptions:

Table 6: Generation

Type of Assumption	Assumptions	Comment
Annual generation	25% of potential capacity will be commissioned according to schedule; Five-year delay in commissioning of 75% of potential capacity	G2L2 scenario from TYNDP
Wind and solar projects	No integration of wind and solar projects under baseline policy option	G2L2 scenario from TYNDP
Monthly generation	The projected monthly generation data is derived from the decomposition of the annual generation based on the monthly generation patterns of HPPs, TPPs and wind, 2008-2018 years	Historical data is derived from ESCO energy balances, the projections are results of the authors' calculations
Import and export	Based on the monthly gaps between projected consumption and generation	Authors' calculations
Monthly Consumption	The data is derived from the decomposition of the projected annual consumption. The calculations for decomposition are based on the average monthly consumption patterns throughout the 2008-2018 years	Annual generation and consumption projections are based on the G2L2 scenario from TYNDP, the projected monthly consumption is the results of the authors' calculations
Annual generation of potential wind and solar plants	Based on the planned annual generation of potential wind and solar plants	MoESD data

Table 7: Electricity Price

Type of Assumption	Assumptions	Comment
Market price of electricity	Based on the price projections performed for RIA of the proposed energy law on electricity prices	RIA prepared by USAID Energy Program
Price of imported electricity	The projections are based on the historical data on imported electricity price throughout 2008-2018 years	Historical data about the amount and value of imported electricity is obtained from the ESCO, GEOSTAT. Price projections are the result of the authors' calculations
Price of exported electricity	The projections are based on the historical data on exported electricity price throughout 2008-2018 years	Historical data about the amount and value of exported electricity is obtained from the ESCO, GEOSTAT. Price projections are the result of the authors' calculations
Price of Natural Gas for TPPs	143 USD per 1000 m^3, assuming to stay constant throughout the 2019-2030 years	GNERC

Table 8: Calculation of Minimum Revenue Per kWh Electricity of Potential Wind and Solar Projects:

Type of assumption	Assumptions	Comment
Installed cost per MW of solar power plant	596 thousand USD	IRENA projections, 2018
Installed cost per MW of wind power plant	1.3 million USD	IRENA projections 2018
Operation and Maintenance (O&M) for solar systems	4 USD/kW/Year	O&M costs by countries from Organization for Economic Cooperation and Development (OECD) report, 2015 Authors' calculation to adjust with Georgian prices

Type of assumption	Assumptions	Comment
O&M for wind system	Variable - 0.002 USD per kWh/year Fixed - 5.56 USD/kW/Year	International Renewable Energy Agency (IRENA), renewable energy costs, 2015 Authors' calculations to adjust with Georgian prices
Discount rate	16.98%	The sum of risk free interest rate, market equity premium and country risk premium[22]
Payback on investment	10 years	Stakeholders' consultation

[22] The data is obtained from the following documents "Country Risk: Determinants, Measures and Implications –The 2018 Edition". A. Damodaran, Stern school of Business, July 2018

8. POLICY OBJECTIVES

GENERAL OBJECTIVES

The general objectives for the introduction of renewable energy support schemes are:

- Increase energy security and reduce import dependency by facilitating investment in local renewable energy projects;
- Establish the regulatory and legal framework compliant with provisions of the EU Energy Acquis.

SPECIFIC OBJECTIVES

Specific objectives of the policy intervention are the following:

- Increase domestic power generation capacity by facilitating the utilization of domestic renewable energy potential;
- Establish enabling environment for the attraction the investment in domestic power generation projects;
- Facilitate integration of variable renewable energy sources in domestic electricity system;
- Ensure uninterrupted supply of energy at desired quality, quantity, and affordable price;
- Ensure enforcement of provisions defined under Renewable Energy Law;
- Ensure transparent and non-discriminatory provision of in-demand support mechanisms for local renewable energy projects.

9. POLICY OPTIONS

The objective of this policy intervention is to encourage integration solar and wind capacities that will help satisfy domestic demand and contribute to gradual reduction of power import in Georgia.

This RIA evaluates the three options for policy intervention that consider the introduction of selected price-based support schemes for utility-scale wind and solar projects. The comparison of the proposed policy options against the baseline scenario will assist in capturing social and economic impact of suggested policy intervention.

This RIA evaluates the following options for introduction of the renewable support schemes for utility-scale wind and solar projects:

- **Baseline Scenario –** the development patterns in the electricity market under no policy intervention;
- **Option 1: Introduction of FiT –** introduction of FiT for facilitating the development of utility-scale wind and solar projects throughout the 2020-2030 years;
- **Option 2: Introduction of FiP –** introduction of FiP for facilitating the development of utility-scale wind and solar projects throughout the 2020-2030 years;
- **Option 3: Introduction of CfD –** introduction of CfD for facilitating the development of utility-scale wind and solar projects throughout the 2020-2030 years.

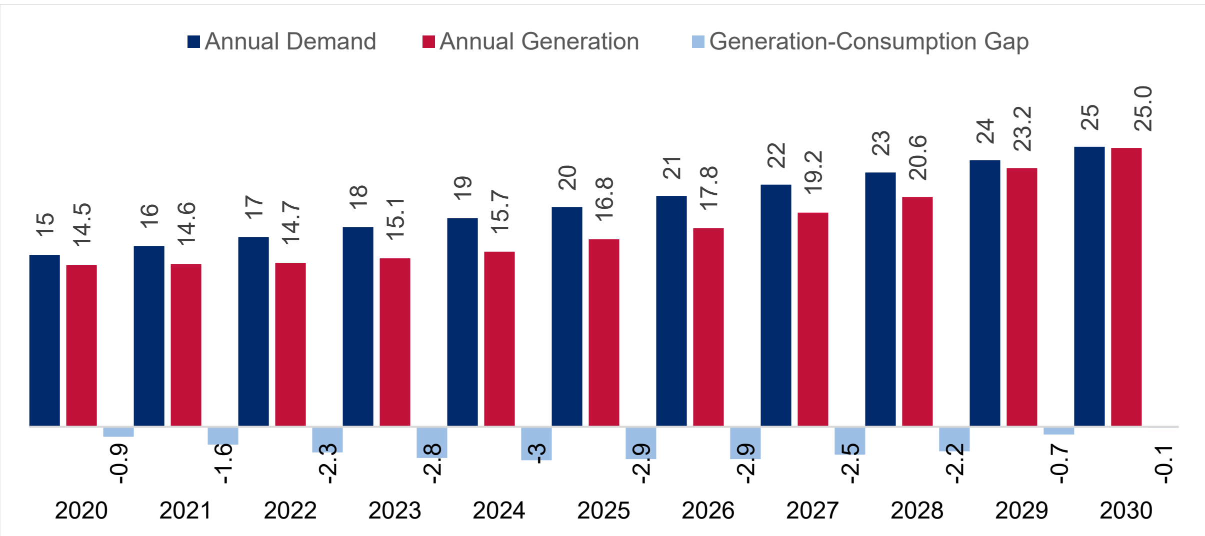
9.1 BASELINE SCENARIO

The baseline scenario, so-called “status quo”, is the benchmark for the RIA to evaluate the impact of policy intervention in the absence of the reform or any other intervention. The baseline option assumes that the existing trends are expected to continue evolving at present pace during the whole period of analysis. It provides the annual power generation and consumption trends without policy intervention. Based on the generation and consumption patterns projected in the baseline scenario, it is possible to identify the amount of wind and solar capacity required to fill generation-consumption gaps and reduce dependence on imported power.

THE RESULTS OF THE BASELINE SCENARIO

The baseline projections indicate a 63% growth in electricity consumption throughout the 2020-2030 years, while the growth of generation will amount to 72% during the similar period. The gap between annual generation and consumption will gradually increase throughout the 2020-2024 years, which leads to increased dependence on imported power. The negative gap between generation and consumption will reach its peak by 2024 and will amount to 3 TWh. Afterwards, the projections show a gradual decrease in generation-consumption gap until 2030.

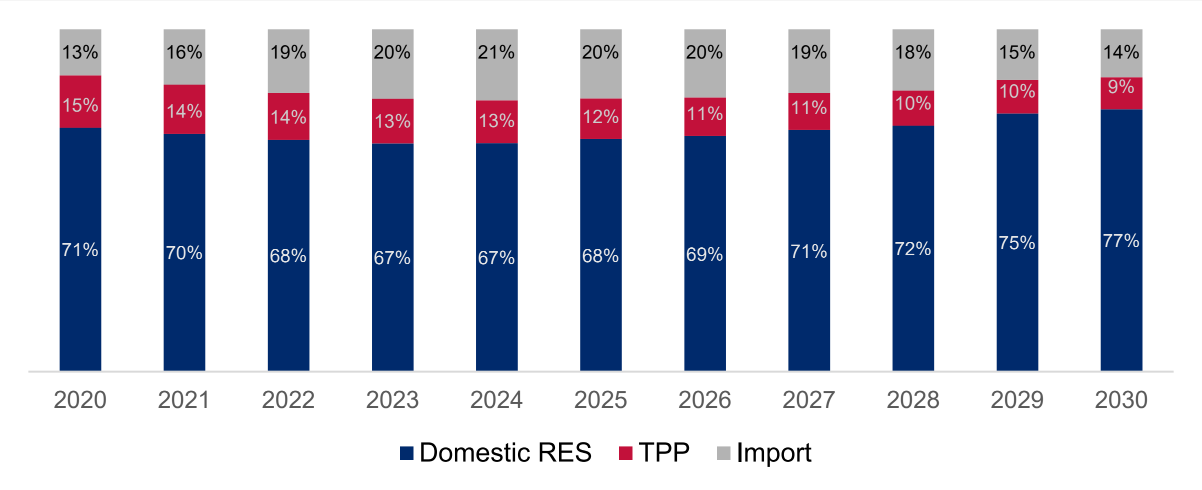
Graph 7: Projected Annual Generation and Consumption in TWh, 2019-2030 Years



Source: *TYNDP for 2020-2030, G2L2 Scenario*

The domestic renewable energy sources, mainly HPPs, will satisfy a major share of consumption. However, due to growing demand, the share of HPPs of total consumption will be gradually decreasing until 2024 and will experience an increasing trend since 2025. The rest of the demand will be satisfied by TPPs and imported power. The share of imports in total consumption will range between 13-21%. The share of imported power in total consumption will reach its peak by 2025 and will fall gradually in the subsequent years.

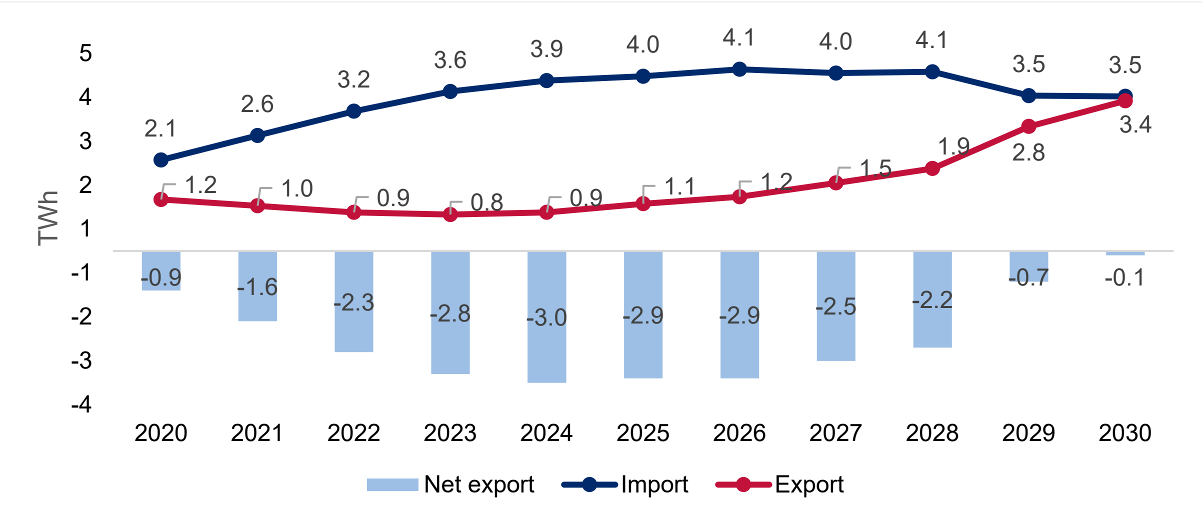
Graph 8: Share of Electricity Supply Sources in Total Consumption, 2020-2030 Years



Source: TYNDP for 2020-2030, G2L2 Scenario, Authors' calculations

Under baseline scenario, the country will import 39 TWh of electricity throughout to 2020-2030 years. The import of electricity will take place between September and April, due to the seasonal pattern of HPP generation. The period between May to August the country will have excess generation which will be exported to the neighboring countries. The total amount of exported electricity throughout 2020-2030 years will be 17 TWh.

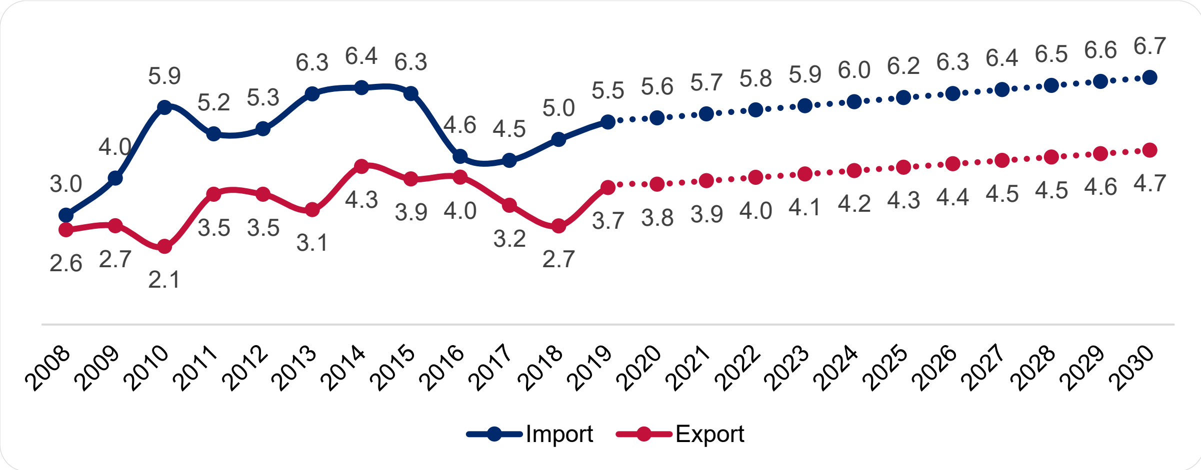
Graph 9: Import and Export Projections for 2020-2030 Years, TWh



Source: TYNDP, ESCO, Authors' calculations

The import and export price projections rely on the historical price trends throughout the 2008-2018 years. The project team applied the exponential smoothing model to derive the forecasted prices. The results show a 2% average annual growth of imported electricity prices. The weighted average price of imported power will increase gradually and reach 6.7 US cents per kWh by 2030. The export prices will increase to 4.7 US cents per kWh by 2030.

Graph 10: Import and Export Price Trends, Historical and Projected Prices, (USc/kWh), 2008-2030 Years

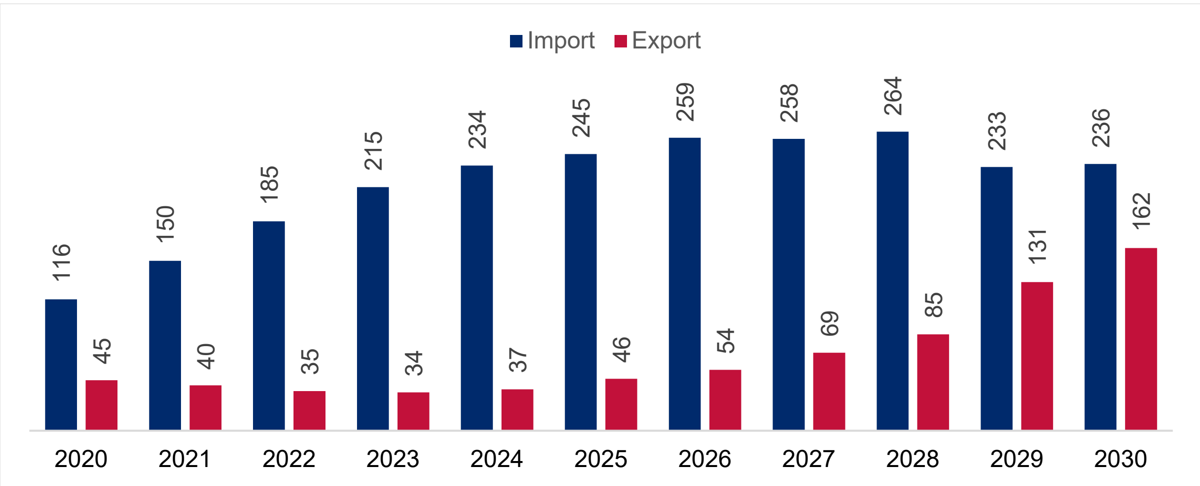


Source: ESCO, GEOSTAT, Authors' calculation

The country's annual spending on imported power will increase gradually due to growth in the amount and price of imported electricity. Throughout the 2026-2028 years, the country will have the highest spending on imports, which will decrease after 2028 due to a reduced requirement on imported power.

Until 2024 the export of electricity will experience a decreasing trend and the income obtained from exporting the power will be decreasing as well. After 2024, due to the commissioning of new HPPs, the country will have an excess generation which will lead to growth in electricity export until the end of the period of analysis.

Graph 11: Annual Expenditure on Import and Income from Export, in million USD, Current Values, 2020-2030 Years



Source: Authors' calculations based on TYNDP for 2020-2030, G2L2 Scenario

Under the baseline option, throughout the 2020-2030 years, the present value of imported power will amount to 957 million USD, while the present value of export will amount to 256 million USD.

Except for power imports, the TPPs will produce electricity to satisfy part of consumption during the winter season. As TPPs are dependent on imported natural gas to produce electricity, in the analysis, the value of natural gas imported for TPPs is considered as a cost for Georgia. The baseline option assumes that the annual generation of TPPs will amount to 2.3 TWh on average, which requires around 590 million m^3 natural gas annually, the value of which in monetary terms amounts to 85 million USD. The GHG emissions from TPPs will amount to 12 million tons throughout 2020-2030 years.

THE SUMMARY OF BASELINE SCENARIO

Throughout the 2020-2030 years, the present value of costs incurred under the baseline scenario amounts to 1.1 billion USD. The present value of imported power amounts to 957 million USD and the expenses related to purchasing the natural gas for TPPs amount to 408.4 million USD. The income derived from the export of the excess generation during summer months is treated as benefits under the baseline. The present value of income derived from power export throughout 2019-2030 years will amount to 256.7 million USD. The table below summarizes the costs and benefits under the baseline scenario.

Table 9: A Summary of Costs and Benefits Under Baseline Option

Type of costs/benefits	Present value of costs/benefits (in million USD)
Expenses on electricity import	-957
Expenses on natural gas import for TPPs	-408
Income derived from electricity export	256
Net cost under baseline scenario	**-1,109**

9.2 SETTING UP THE POLICY TARGETS

This RIA aims to define the most cost-efficient support schemes which will facilitate development of the renewable energy plants in Georgia at a lowest possible governmental cost. The study applies cost-efficiency approach to assess the policy options for the following reasons:

- The policy aims to decrease dependency on imports by facilitating the utilization of local renewable energy sources. Therefore, each support scheme has to achieve the same policy target.
- Due to the volatile patterns in production, the electricity system has capacity limits for integration the renewable energy sources without altering the stability of power supply. The capacity constraints of the existing power system determine the limits for the integration the renewable power.
- It is difficult to estimate the expected level of the integration of the renewables under different support schemes, as the success of the policy largely depends on the level of the support provided under each policy design. The level of support plays a crucial part in the achievement of the policy target. While the design of the support scheme depends on the market arrangement, the determination of support level depends on the investors' perception of the country risks and the desired payback period on their investment.

DETERMINATION OF THE POLICY TARGETS

The goal of the policy is to define the optimal level of support that facilitates the maximum reduction of the negative gap between generation and consumption by integration of solar and wind power capacities. Proposed policy options assume gradual integration of solar and wind power capacities to achieve maximum share of import substitution. All proposed policy options consider the capacity limits of the system for VRES integration defined under the TYNDP.

The TYNDP document provides information on potential wind and solar power capacities in Georgia. According to TYNDP, throughout 2020-2030 years, the current system can integrate up to 520 MW solar and 1330 MW wind capacities without harming system resilience and stability. Worth to mention, that higher integration of VRES in the system would be possible if there would be enough storage capacities to maintain balance in the system. However, for the analysis project team selected the capacity limits which do not require additional efforts and network costs to ensure integration of VRES in the electricity network.

Based on the information, the project team for each plant calculated minimum revenue required to make the power plant attractive for investment. Therefore, assuming that only power plants that obtain desired payback on investment under the proposed support level will be constructed in respective years.

Table 10: The System Capacity Limits for Integration of VRES, in MW, 2020-2030 Years[23]

YEAR	2020	2025	2030
SOLAR (MW)	130	260	390
WIND (MW)	333	665	1000

DETERMINATION OF THE SUPPORT LEVEL

The determination of the proper support level plays a crucial role in the success of the policy. Support level should provide substantial income for renewable energy producers to obtain payback on their investment within defined period of time. When support level is low, it is difficult to achieve desired level of integration of the renewable energy in the system. However, a high level of support leads to the overcompensation, thus increasing the volume of interim governmental costs and add additional burden on end-user tariffs. Therefore, in order to ensure the integration of desired solar and wind capacities, it is essential to determine the optimal level of support that will make wind and solar projects attractive to investors.

The guiding principles for calculating optimal level of support are the following:

- The payback period on investment should not exceed ten years in order to ensure investors willingness to fund the project according to the consultations with stakeholders;
- For each potential wind and solar project, the minimum amount of revenue per kWh of electricity is calculated so as to ensure payback on investment in ten years;
- The list of potential solar and wind projects is based on the TYNDP;
- Costs of building and operation of the solar and wind power plants are based on the reports of IRENA.

Optimal rates for the proposed support schemes are calculated in the following four steps:

- **First step:** identify the annual generation and consumption gap and estimate requirement of import for 2020-2024 by comparing monthly consumption and generation;
- **Second step:** considering the limitations of the electricity network, identify the amount of solar and wind capacities required to keep annual generation-consumption gap close to zero in 2020-2024;
- **Third step:** identify the least cost wind and solar projects that provide sufficient capacity to reduce negative gap between generation and consumption in 2020-2024;
- **Fourth step:** the minimum per kWh revenue requirement of the last plant that fulfills the capacity requirements will be the determinant of support scheme rates.

The determined level of support for selected schemes provides sufficient income for renewable producers for obtaining payback on their investment within the ten years. Therefore, all the proposed mechanisms ensure achievement of the same policy targets with the different costs.

RESULTS OF THE POLICY INTERVENTION

This RIA applies a cost-efficiency approach to determine the least cost policy from the interim government costs point of view design ensuring the development of renewable energy sources in Georgia. Therefore, the support level determined for each support scheme ensures the same level of integration of renewable energy within the power system. The policy targets are defined according to the system capacity limits for the integration of the variable renewable sources.

Results of the proposed policy interventions suggest integration of 689 MW wind and 120 MW solar power capacities by 2025, which is sufficient to substitute the import and also achieve excess generation. Table 9 provides a timeline of the integration of solar and wind power plants.

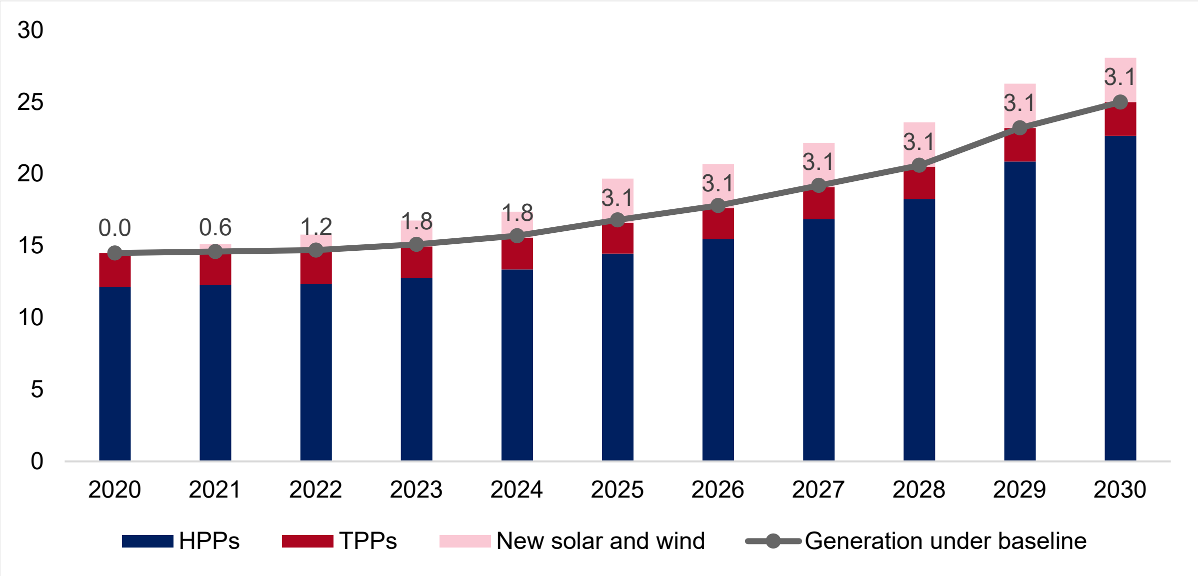
Table 11: The Wind and Solar Capacities Added into the System, in MW, 2020-2030 Years

	2020-2024	2025-2030	Cumulative Capacity
	MW	MW	MW
SOLAR	120	0	120
WIND	344	345	689
TOTAL CAPACITY	464	345	809

[23] Ten-Year Network Development Plan, 2019-2029

Annual generation of newly built wind and solar projects ranges from 0.6 TWh to 3.1 TWh in 2021-2030. Growth of generation due to integration of wind and solar capacities will reduce generation-consumption gaps and gradually substitute the import.

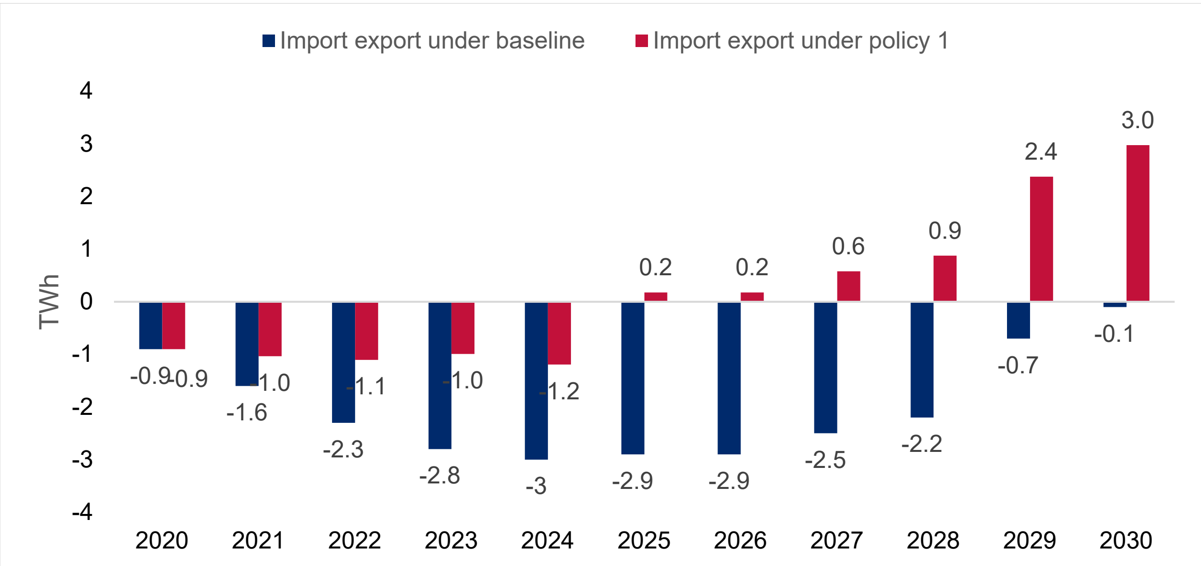
Graph 12: Domestic Generation Growth Compared to Baseline, TWh, 2020-2030 Years



Overall, 23.8 TWh of additional generation can be obtained from development of the VRES, the present value of which amounts to 343 million USD.

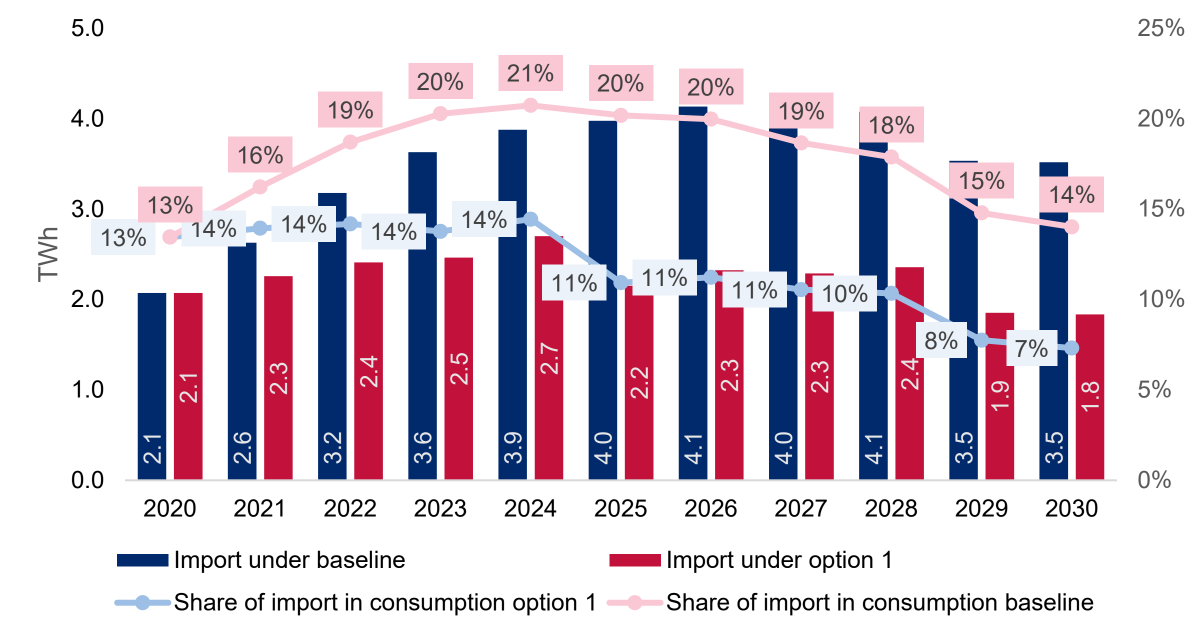
With growth of domestic generation, the negative gap between generation and consumption will gradually decrease until 2024. Afterwards, the country will have excess generation, which can be exported to the neighboring countries.

Graph 13: Change in Generation and Consumption Gap, in TWh, 2020-2030 Years



Growth of domestic generation due to integration of solar and wind plants will lead to gradual reduction of dependence on imported power. The share of imports in total consumption will be twice less compared to the baseline.

Graph 14: Change in Import Compared to the Baseline, TWh, 2020-2030 Years

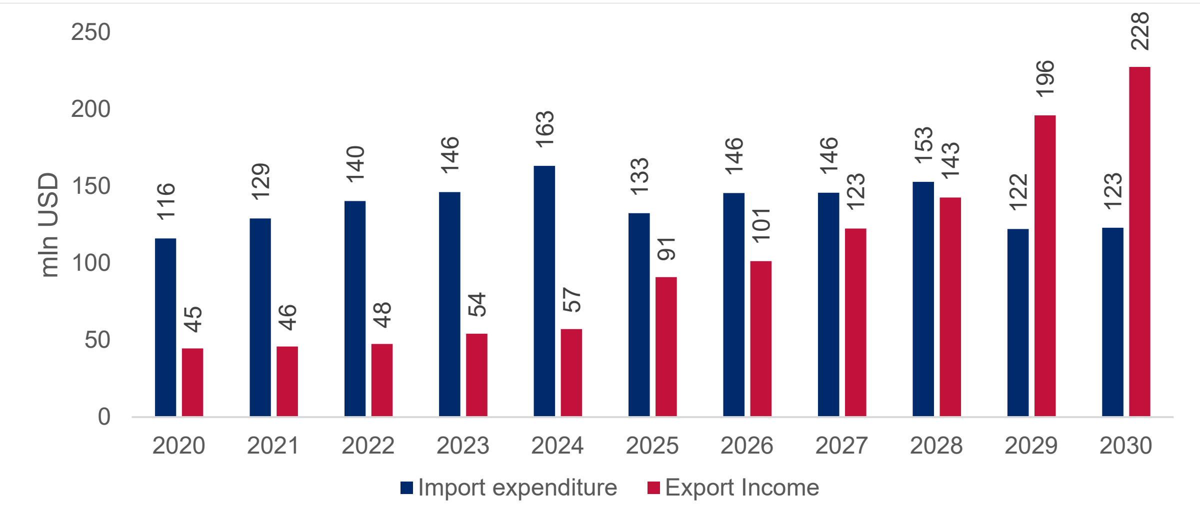


Except reduction of the electricity import, the integration of VRES will reduce the dependency on TPP generation too. As a result, the country will have a lower requirement to import natural gas for TPPs and GHG emissions will be reduced too.

THE EXPECTED BENEFITS FROM THE POLICY INTERVENTION

The integration of new solar and wind projects will contribute to increase domestic power generation and reduce dependence on imported power, which is the main goal of the policy intervention. Besides, the projections show that starting from 2025 the country will have excess generation, which will increase its potential to export electricity in neighboring countries.

Graph 15: Annual Expenditure on Import and Income from Export, Million USD, 2020-2030 Years



Monetary effects of this intervention are reflected in reduced import expenditure and increased income from exported power. After the intervention, the discounted present value of import costs will decrease to 660 million USD, while expenditure on imported power under the baseline was 957 million USD.

The development of wind and solar power projects creates an opportunity to save up to 297 million USD from import substitution. Starting from 2025, excess power generation will create opportunities for income generation by exporting surplus electricity to neighboring countries. The estimated present value of income obtained from export is 377 million USD, which is 120 million USD higher compared to the baseline and is an additional benefit of the policy intervention. Due to growth in a domestic generation, Georgia will need to enhance its cross-border transmission capacity to export excess generation to the neighboring systems. Current cross-border transmission capacity of Georgia is 2550 MW and is expected to increase up to 4500 MW by 2020, which allows for transmission of power for satisfying import-export requirements.[24]

The integration of the VRES will have a moderate impact on TPP generation, too, and will reduce the expenses on natural gas imports for TPPs. Compared to the baseline, the present value of the cost of natural gas imported for TPPs will be 392 million USD, which is lower by 15 million USD compared to the baseline. The reduced generation of TPPs will also have a positive impact on GHG emissions and reduce them by 410 thousand tons, compared to the baseline.

The table below summarizes the expected benefits from development of renewable energy sources in Georgia.

Table 12: Expected Benefits of the Policy Intervention in Million USD

Present Value	Baseline	Policy Intervention	Impact of the Policy
Import expenses	- 957	- 660	297
Import of natural gas for TPPs	- 408	- 392	15
Income from export	256	376	120
GHG emissions	12 million tons	11.9 million tons	- 0.41 million tons

IMPACT ON THE JOB CREATION

Policy intervention will benefit in 2880 new direct and indirect jobs. The major share (76.5% or 2202 jobs) of jobs will be created for the construction of power plants. At the O&M stage of the VRES development, it is expected to have 678 new jobs or 23.5% of total job creation.

Table 13: Number of Jobs Created at the Construction and O&M Stages

	Construction, manufacturing and installation	O&M	Number of Jobs
Solar	663	512	1175
Wind	1539	166	1705
Total	**2202**	**678**	**2880**

The number of jobs was calculated with the following method[25]:

Number of Jobs=TEM*RM*LMP*IEM

- TEM - Technology employment multiplier;
- RM - Regional Multiplier;
- LMP - Local manufacturing percentage;
- IEM - Indirect Employment Multiplier.

Table 14: The Multipliers Used for Estimating a Job Creation by the Development of VRES

	Construction, manufacturing, installation	O&M	TEM (Per MW)	RM	LMP	IEM	Capacity	Number of Jobs
Solar	6.21	4.8	11.01	1	50%	1.78	120	1705
Wind	2.51	0.25	2.78	1	50%	1.78	689	1175
Total								**2880**

9.3 POLICY OPTION 1: INTRODUCTION OF FIT

The first policy option is to introduce the FiT as a support mechanism for new wind and solar projects throughout 2020-2030 years. The FiT scheme provides a guaranteed payment to VRES generators per kWh of electricity generated for a certain period of time. Power producers sell electricity to the

[24] GNERC, Annual report 2018.

[25] The assumptions and approach for estimation potential number of jobs created is based on the study "Assessment of the Challenges and Opportunities for Renewable Energy Transportation", prepared by Z, Gachechiladze, N. Sumbadze, PMCG, research, 2016

authorized body at a predefined fixed price, which is called the FiT rate. The FiT scheme provides long-term guarantees on the purchase of the electricity produced by renewable energy producers, so it is most preferable scheme for them. It is an effective mechanism to secure investments in renewable energy but it is not a market-based support scheme as it discourages producers to engage in competitive electricity trade. However, for countries that do not have an established organized market, the FiT is the appropriate support scheme to stimulate development of renewable energy projects. In addition, the countries conduct a periodic revision of FiT rates to adjust compensation in accordance to changes in technology costs to avoid overcompensation of support to the producers considering the gradual decrease in costs of VRES technologies.

DESCRIPTION OF THE POLICY OPTION 1

The proposed option suggests introducing the FiT to support VRES projects starting from 2020. Due to the volatility in the production of renewable power plants, it will be more efficient to apply FiT for the whole year. The proposed policy option suggests providing FiT for twelve consecutive months in a year over ten years' period of time. Usually, FiT is paid by a preselected authorized body, either an electricity system operator or market operator. In case of Georgia, it is suggested to authorize the ESCO as a body in charge of the provision of FiT payment to eligible producers. This option suggests a revision of FiT rates every three years in order to mitigate the risk of over- or under-compensation. FiT rates should be defined in 2020 for the plants commissioned throughout the 2020-2024 years. In 2024, new FiT rates will be determined and updated only for the plants commissioned during 2025-2030 years.

The table below summarizes key elements of the proposed policy design.

Table 15: FiT Policy Design Elements

FIT Policy Design Elements	
Duration of the FIT	10 years
Annual provision of the FiT	12 months
Eligibility	Utility-scale wind and solar projects
Revision period of FIT rates	3 years
Body in charge of FIT payments	ESCO

DETERMINATION OF FIT RATES

The determination of support level is based on the minimum revenue requirements of investors per kWh of produced electricity that ensures the payback on investments within ten years. FiT rate should provide sufficient income per kWh of electricity to make projects profitable from the investors' perspective, at the same time, avoid overcompensation of support from the consumer point of view.

Considering technological progress and future reduction of renewable energy costs, FiT rate should be revised periodically to reflect the real cost of technology. In this analysis the support level is determined in two periods: period 1 (2020-2024 years) and period 2 (2025-2030 years). The planning period starts in the first period. In 2020, the desired capacity level for import substitution should be determined and the FiT rates should be set accordingly. In period 2, the rates should be updated. Updated FiT rates will be applied only to newly commissioned plants while existing plants will receive the amount of support defined at their operation commencement date. The table below provides the FiT rates for wind and solar plants for 2020-2030 years.

Table 16: The FiT Rates for Wind and Solar Plants for 2020-2030 Years

	Period 1: 2020-2024	Period 2: 2025-2030	Comment
Wind Projects	7.1 USc/kWh	6.6 USc/kWh	Calculated based on the minimum revenue requirement per kWh of last power plant providing sufficient capacity for import substitution
Solar Projects	8.2 USc/kWh	6.6 USc/kWh	

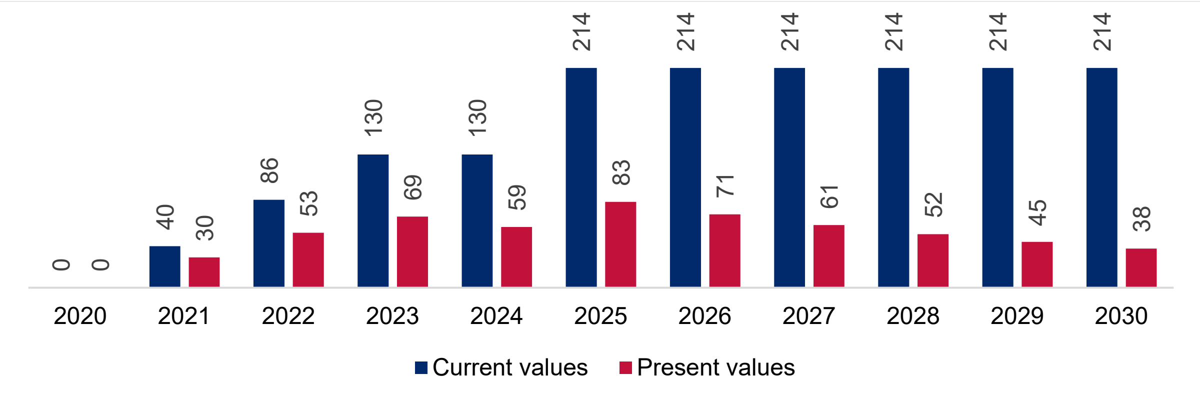
ASSOCIATED COSTS UNDER POLICY OPTION 1

The proposed FiT rates ensure the profitability of renewable energy projects and, hence, provide preconditions for the integration of renewable wind and solar plants at the desired level. As a result, the newly added capacities and growth of the domestic generation will be the same as in the case of other policy alternatives. The only difference will be the price paid to fund the support schemes.

As the FiT scheme considers the purchase of the electricity produced by renewable plants at a predefined price, the renewable producers will not participate in trading electricity on the wholesale power market. Therefore, the expenses for funding the FiT scheme will be the total cost of the policy intervention, and thus will be the interim governmental cost of the presented policy option.

As the cost-efficiency analysis assumes the achievement of the same targets with different policy design, the impacts in terms of changes in import expenditure and export income will be the same as in the previous options. The benefits in terms of investment and job creation will be also the same. The only difference will be in the cost of support schemes. And the policy option having the lowest interim governmental costs exposure will be defined as the most cost-efficient support scheme. The present value of the costs spent on the support scheme will amount to 562 million USD. The graph below provides the current and present values of annual spending on support mechanism.

Graph 16: Annual Expenses to Finance FiT, in Million USD, Current and Present Values, 2020-2030 Years



9.4 OPTION 2: INTRODUCTION OF THE FIP AS A SUPPORT THROUGHOUT 2020-2030 YEARS

The second policy option is to introduce the FiP as a support mechanism for VRES. The FiP scheme provides renewable energy producers additional compensation "premium" above the market price. The FiP scheme requires producers to sell produced electricity on the market. They receive market price of electricity and additional premium payment per kWh of electricity sold on the market.

There are two options for the FiP support design:

- Fixed FiP: the premium remains fixed regardless of the market price;
- Sliding (floating) FiP: the premium changes depending on the market price.

Currently, Georgia is in the process of reforming the electricity market and does not have the established electricity market allowing competitive trading with power. Lack of historical data on the market price of electricity creates uncertainty about market price trends on electricity and makes it difficult for investors to make reliable calculations regarding profitability of their investments. Therefore, it is recommended to introduce the fixed FiP design even though sliding FiP would be more effective to mitigate the risk of overcompensation or under-compensation of the investors.

DESCRIPTION OF THE POLICY OPTION 2

The proposed policy option suggests to provide FiP to eligible technologies for ten years, within twelve consecutive months per annum. To avoid overcompensation of under-compensation of investors, it is suggested to revise the FiP rates every three years and adjust them in accordance to technology costs. This option complies with the recommendations given in the EnC policy guidelines. In particular, it is suggesting to provide market-based support schemes when the competitive market is in place. According to the concept of the new electricity market model, the GoG plans to start gradual opening of the market in 2021. The implementation of this option is quite realistic for Georgia because the GoG shall approve the support schemes by the end of 2020 and the construction of wind and solar plants usually takes not more than 2 years.

Table 17: FIP Policy Design Elements

FIP Policy Design Elements	
Duration of the FIP	10 years
Annual provision of the FIP	12 months
Design of the FIP	Fixed FiP
Eligibility	Utility-scale wind and solar projects
Revision period of FIP rates	3 years
Body in charge of FIP payments	ESCO

DETERMINATION OF THE FIP RATES

The approach for determination of the FiP rates is the same as in the previous policy options. It should guarantee integration of solar and wind capacities and ensure sufficient revenues to provide payback on investment in ten years.

We calculated the minimum revenue requirements per kWh of each potential wind and solar projects that ensure payback on investment in ten years. Also, we considered the number of capacities required to reduce generation consumption gaps during 2020-2024 and 2025-2030 years. Then we identified the least cost plants that satisfy capacity requirements. Also, we considered market price projections derived from the RIA on New Energy Law. The difference between the minimum revenue requirement per kWh of the last power plant fulfilling capacity requirements and the market price will be the FiP rate for the respective period. The table below provides FiP rates for 2020-2030 years.

Table 18: The FiP Rates for Wind and Solar Plants

	Period 1: 2020-2024	Period 2: 2025-2030	Comment
FiP for Wind Projects	4.2 USc/kWh	2.4 USc/kWh	Calculated based on the minimum revenue requirement per kWh of last plant providing sufficient capacity for import substitution
FiP for Solar Projects	5.3 USc/kWh	2.4 USc/kWh	

This option also considers periodic revision of FiP rates to adjust changes in technology costs. In 2020, the GoG will determine FiP rates for power plants to be commissioned throughout the 2020-2024 years. In 2024, the GoG will update FiP rates for the power plants to be commissioned from 2025. The duration of support scheme is ten years from the date of operation commissioning of the power plant.

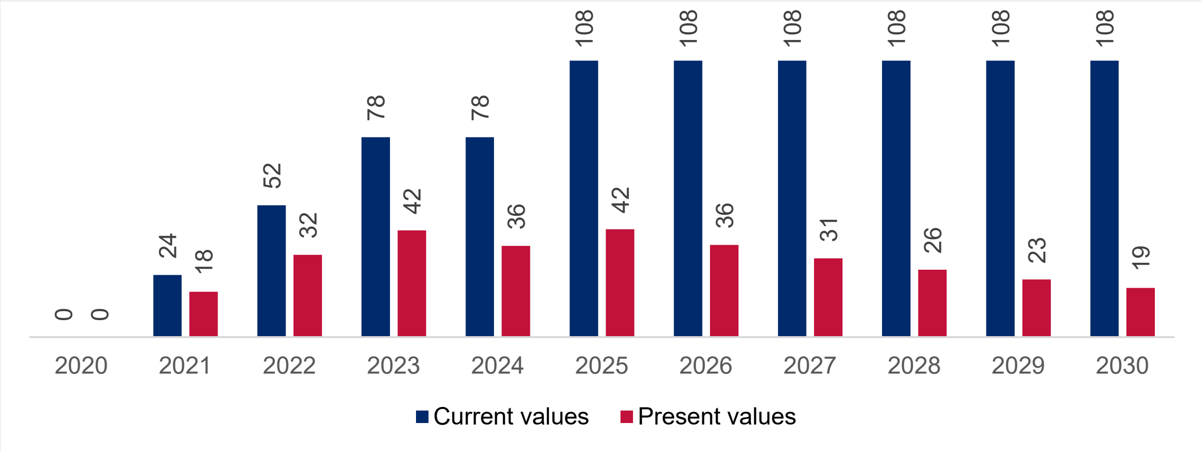
Due to high price uncertainties, in the initial period of the market opening the higher FiP rates will be required to facilitate integration of sufficient solar and wind capacities for keeping the generation-consumption gap close to zero and achieve maximum substitution of the power import. However, later the rate of FiP will be reduced, due to expected growth in the market price of electricity and reduction in VRES technology costs.

ASSOCIATED POLICY COSTS UNDER OPTION 2

The associated policy costs include the compensation or premium paid to renewable energy producers and the cost of electricity purchased at the wholesale market. The cost for purchased renewable electricity will vary following a market price change, while the cost of the funding a FiP scheme will depend on the amount of renewable electricity produced and FiP rates determined by the policy.

The annual spending on financing the FiP is provided in the graph below.

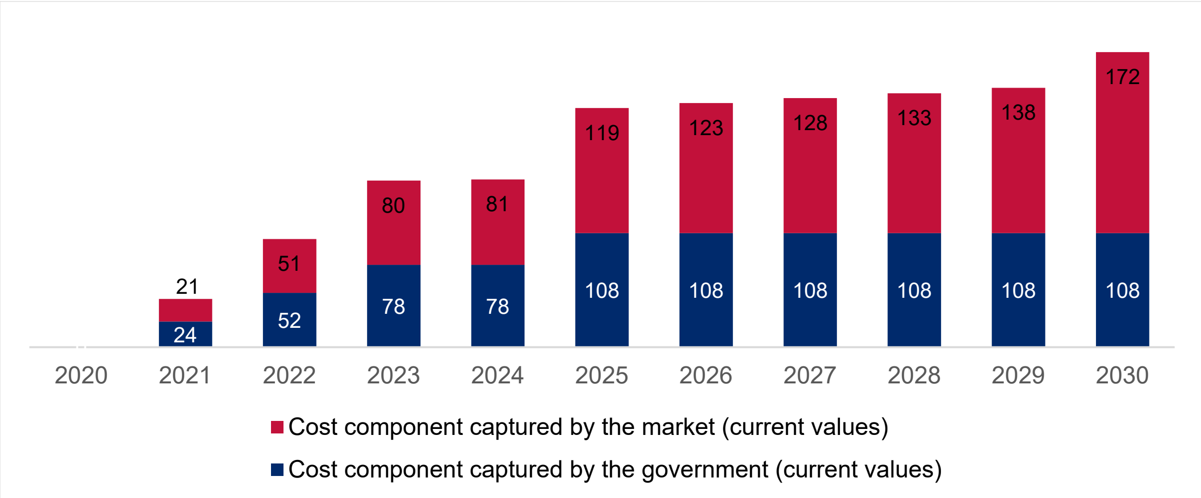
Graph 17: Annual Expenditure on FiP, Million USD, 2020-2030 Years



The present value of support component cost for financing the FiP scheme, which can be assessed as an interim government exposure, will amount to 305 million USD. In addition to the support component, consumers will experience cost for purchasing renewable energy from the wholesale market, which will amount to 343 million USD in present values. Under the FiP support scheme design, the total cost of policy will be 648 million USD.

The graph below provides current values of the annual policy costs for the proposed policy intervention.

Graph 18: Total Annual Cost of FiP Policy in Current Values, Million USD, 2020-2030 Years



9.5 OPTION 3: INTRODUCTION OF CFD

The third policy option is to introduce CfD in 2020. CfD conceptually lays between the FiP and FiT. That is, CfD sets a target price – strike price - for renewable energy production that will be paid for their generated electricity. This scheme is much like the tariff which is set in the case of FiT, but under CfD producers get as a support only the difference between the wholesale market price and the strike price. CfD provides a guarantee on income per kWh of electricity sold on the market, and unlike the FiT, it encourages producers to participate in the market. In 2020-2021, the CfD will compensate for difference between the strike price and the price of electricity sold on the balancing market. After 2022, the CfD will compensate for the difference between the strike price and the market price of electricity, sold at the wholesale market. Thus, CfD protects investors' income from price volatility in the electricity market.

CfD can be designed in two ways:

- ***One sided CfD*** – if the price in the spot market is lower than the strike price defined in the contract then renewable producers get compensation for the difference. However, in case the market price exceeds the strike price the producers do not receive any payment.
- ***Two-sided CfD*** – this type of contract assumes that payments will be made from both parties of the contract. If the strike price is higher than the market price of electricity then producers will get compensation for the difference. However, if the market price exceeds the strike price, producers shall pay to their counterpart the excess income obtained from the market.

DESCRIPTION OF THE POLICY OPTION 3

The proposed option suggests introducing a two-sided CfD mechanism to support integration of the renewables in the Georgian electricity system. Two-sided CfD is a tool to redistribute price fluctuation risks among renewable energy producers and the state. Also, the CfD mechanism is an optimal way to mitigate the risk of overcompensation and under-compensation to renewable energy investors.

The proposed policy option suggests providing a CfD support mechanism for the twelve consecutive months during the ten years. To adjust support level to changing technology costs the policy assumes revision of strike price rates every three years. The revised rate will be applied only to newly built power plants. The payment of compensation for the difference between the strike price and the market price of electricity will be under the responsibility of the market operator.

DETERMINATION OF THE CFD STRIKE PRICE

The approach to identify optimal strike price for CfD is similar to the approach applied for calculation of the FiT rate. The proposed strike price will ensure that minimum income per kWh of electricity for a 10-year payback period on investment. The calculations of the amount of targeted installed capacities and the level of the strike price are the same as in Policy Option 1.

Similar to previous policy design, the third policy option also implies a periodic revision of strike price of CfD contract for newly built power plants. This option assumes different strike prices for power plants built until 2024 and for plants built after 2024.

Table 19: The CfD Strike Price Rates

	Period 1: 2020-2024	Period 2: 2025-2030	Comment
Strike Price for Wind Projects	7.1 USD/kWh	6.6 USD/kWh	Calculations are based on the minimum revenue requirement per kWh of the last power plant providing sufficient capacity for import substitution
Strike price for Solar Projects	8.2 USD/kWh	6.6 USD/kWh	

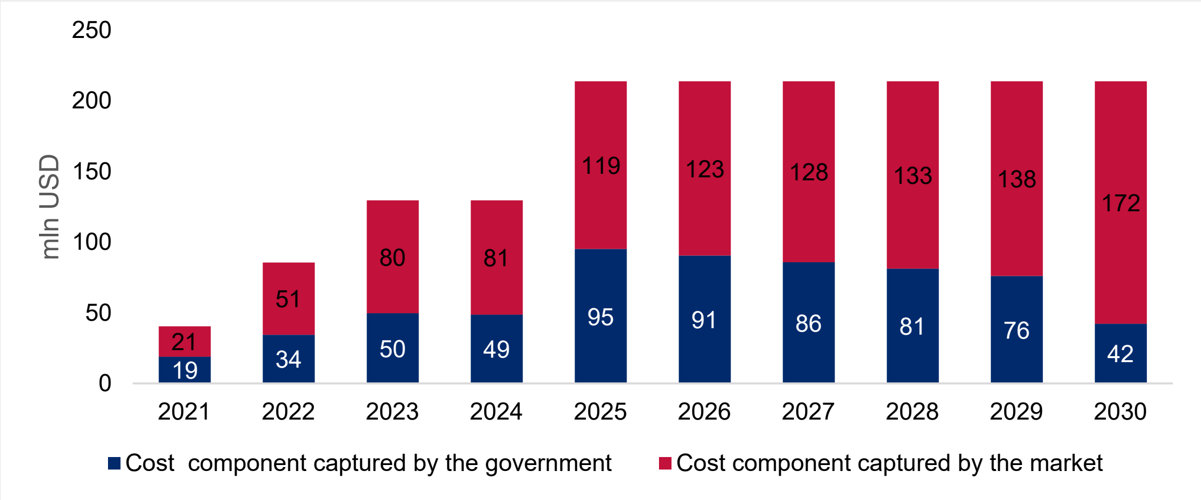
ASSOCIATED POLICY COSTS UNDER OPTION 3

Introduction of CfD will have the same impact on VRES integration and annual generation as FiT and FiP schemes proposed in the previous policy scenarios. However, the cost to finance CfD is different.

The first policy option assumed to provide a fixed FiT and FiP rate for solar and wind projects, so the cost of support entirely depends on the proposed rates. The approach for determining the correct strike price in CfD, ensuring integration of the targeted level of solar and wind power capacities, is similar to the approach used in option 1. According to the design of CfD mechanism, support cost is the difference between the strike price of the CfD contract and the market price of electricity. Therefore, the amount of compensation paid to the power producers changes with the market price. The cost of support component, which represents the interim government exposure, per kWh of electricity increases when market price falls and decreases when it grows.

The graph below provides the current value of the annual policy costs.

Graph 19: Current Value of the Annual Policy Costs Under CfD, Million USD, 2020-2030 Years



The total policy cost has two components. The first component is the cost incurred for the compensation of the difference between the strike price and market price (support component cost), which represents the volume of the interim government exposure under this policy option. The second component is the cost captured from the electricity sales on the power market. The forecasts show that the market price will not exceed the strike price of the CfD contract in the reviewed period, therefore the renewable power producers are not expected to receive excess income above the strike price and as a result will not be oblige to reimburse excess income obtained from the market. Therefore, no payments are expected to be done to the state. The present value of the total cost of policy amounts to 562 million USD, out of which 343 million USD is the cost captured from trading the added generation on the market, the cost to finance the support component (volume of interim government exposure) amounts to 219 million USD in present values.

10. COMPARISON OF THE POLICY OPTIONS

10.1 THE SWOT ANALYSIS OF THE SUPPORT SCHEMES

The project team performed qualitative assessment of renewable energy projects support mechanisms to identify their advantages and disadvantages, in addition to the evaluation of their monetary costs.

EVALUATION OF THE FiT

FiT is the most desired support for renewable energy producers because this scheme provides guarantees on both income and on sales. Considering that renewables are characterized by volatility in production, the renewable energy producers have less control over their generation and are not flexible to promptly respond to market signals. Under this support scheme, producers are not required to participate in the electricity trade. The responsible body, usually, market operator is in charge of purchase of the electricity generated by the eligible entities. FiT insulates new market entrants from market price risk, thus, lowering the impact on capital costs and enabling private investment. Furthermore, as Georgia does not have an established electricity market, FiT is a suitable scheme that will be functional under the existing arrangement of the electricity sector. According to Energy Security Secretariat (EnCS) policy guidelines, FiT is considered as one of the simplest schemes for implementation. Its simplicity makes it a suitable support scheme for markets with a large number of less commercial participants (such as households and/or community-based initiatives).

Although FiT is the most preferred support scheme for potential renewable energy producers, it has the highest policy cost for the government (interim government exposure) compared to other policy alternatives. FiT excludes producers from active participation in the electricity trade and the state faces limitations in developing liquid electricity market. Besides, the FiT scheme is rigid and does not consider the changes in technology costs, which creates the risk of overcompensation or under-compensation of a certain types of technologies. Experience of EU countries suggests phasing out FiT and replacing it with FiP to expose renewable energy producers to market price signals.

Table 20: SWOT Analysis of the FiT Scheme

Strength	Weakness	Opportunity	Threats
• Secures investments by providing long term guarantees on price and sales; • Simple to administer; • Does not require existence of an organized electricity market.	• Does not require active participation of producers in the electricity market, which limits the market liquidity; • Is rigid and does not adjust to changes in technology costs.	• Easy to implement in the existing market arrangements in Georgia; • Is the most preferable support scheme by investors, which guarantees the achievement of the desired renewable energy targets; • Periodic revision of FIT can mitigate the risk of overcompensation or under-compensation of the investors.	• There is a risk of overcompensation or under-compensation of the investors; • Higher integration of renewables might lead to an increase in compensation costs and put pressure on the state budget and/or end-user electricity prices.

EVALUATION OF THE FiP

The FiP is a market-based support scheme that encourages producers to sell electricity to the power market. It provides producers with a guaranteed premium above the market price. It should be noted that the FiP might not be effective for wind technologies, as they cannot control the generation and time of supply of electricity to the market. FiP can be effective for technologies that have more control over their production, such as HPP, solar, thermal, biogas and biomass projects[26]. The FiP is a more flexible instrument, particularly if the premium is sliding. In the case of fixed FiP, the periodic adjustments of the support level to the technology costs or setting up the caps and floors allow

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[26] Toby D. Couture. Karlynn Cory, Claire Kreycik, Emily Williams, "A Policymaker's Guide for Feed-in Tariff Policy Design", Technical Report of National Renewable Energy Laboratory (NREL), 2010, see the link: https://www.nrel.gov/docs/fy10osti/44849.pdf

avoiding overcompensation or under-compensation. However, fixed premiums usually ensure better cost predictability, whereas floating premiums make it difficult to forecast total support costs.

FiP scheme is not easy to implement and administer, compared to FiT. From the perspective of project developers, the FiP is less preferred compared to FiT because the total revenue of producers depends on the price and amount of electricity sold in the market. It is difficult to project future electricity prices on the market because Georgia does not have an established electricity market yet. According to results derived from the stakeholders' consultations, the producers will need at least five years of market price data to perform financial calculations and evaluate the profitability of the project. Due to these uncertainties, the provision of FiP will not be enough for project developers to perform reliable financial projections and convince investors to fund their projects.

Table 21: SWOT Analysis of the FiP Scheme

Strength	Weakness	Opportunity	Threats
• It is a market-oriented instrument and improves market liquidity by requiring active participation of the producers in the market; • FiP is a flexible instrument, compared to FiT; • Compensation cost is relatively low, compared to FiT.	• Relatively difficult to administer; • Requires the existence of competitive market; • Does not fully abolish the price uncertainty risks to producers; • Is the least preferable support scheme by renewable producers;	• FiP can be effective support scheme after the establishment of the strong electricity market enabling competitive trade; • Periodic revision of the FiP rates, or providing caps and floors might mitigate the risk of overcompensation or under-compensation;	• There is a risk of overcompensation or under-compensation; • If the support level is not properly determined it might fail to achieve the targeted level of integration of the renewables; • At the initial stage of the establishment of the electricity market, FiP might lead to the development of the renewables at a slower pace; • Under high level of the support, it might increase producers' incentives to reduce prices on the market and sent wrong price signals.

EVALUATION OF THE CFD

The CfD is a market-oriented mechanism and requires producers to sell electricity on the market to obtain compensation. Therefore, the CfD increases the liquidity of the electricity market. This scheme is highly transparent as well as easily implementable. Furthermore, this scheme is flexible to adjust to the changing environment.

The main advantage of the CfD is that this scheme equally redistributes the price uncertainty risks among renewable energy producers and the state. The CfD is conceptually between the FiP and FiT. That is, the CfD support scheme implies setting a target price (strike price) for renewable energy production that will be paid for generated electricity. CfD gives the same level of confidence to investors as FiT. CfD guarantees the income of producers and is as bankable as the FiT scheme. This scheme is much like the tariff which is set in the case of FiT, only the difference between the wholesale market price and the strike price is provided to the producers. Therefore, if the price growth on the electricity market is expected, the CfD is a more suitable support scheme compared to other options, as it leads to lower cost for compensating the price difference between the strike price and spot price, thus lowering the interim exposure of the government. Moreover, if the market price exceeds the strike price, the excess income is paid back by the renewable energy producers to the state. It should be noted, that the CfD requires a price signal to be efficient. In other words, there should be a liquid day-ahead market against which the difference to the strike price level can be calculated. It is hard for the state to determine the appropriate level for target prices without appropriate reference prices available.

It will be more appropriate to introduce two-sided CfD, obliging producers to pay the excess difference back to the central counterparty, in order to put less pressure on end-user tariffs. CfD can also be an effective solution in order to substitute existing long term PPAs with CfD and incentivize such producers to participate in the market. However, CfD has its risks as well. As in the case of FIP, the producers who benefit from the CfD support will tend to make low price bids aiming to fit into the hourly market and get most of the targeted price (income) through support compensation. This risk shall be assumed and regulatory measures shall be imposed to restrict producers to send wrong market signals.

Table 22: SWOT Analysis of the CfD Scheme

Strength	Weakness	Opportunity	Threats
• It is a market-oriented instrument and improves market liquidity by requiring active participation of the producers in the market; • CfD provides equal guarantee on price for the investors as the FiT; • CfD redistributes the price related risks among producers and the state; • CfD is highly transparent and flexible.	• Relatively difficult to administer; • Requires the existence of the competitive power market.	• CfD can be effectively used to substitute existing PPA and increase the liquidity of the electricity market.	• If the support level is not properly determined might fail to achieve the targeted level of integration of the renewables; • Under high level of the support might increase producers' incentives to reduce prices on the market and sent wrong price signals.

EVALUATION OF THE GREEN CERTIFICATES

Green Certificates are the quantity-based instruments that stimulate renewable energy development by spurring the demand. Under the Green Certificate scheme, the energy suppliers are required to purchase a certain share of renewable energy, which increases the demand. The penalties are imposed for violation of the quota obligations, which ensures compliance and effectively sets a ceiling on the price of the certificate. The Green Certificates are traded in the separate market, which creates an opportunity for power producers to generate the extra income.

Certificate trading mechanism is effective when non-renewable energy dominates in the market and is much less useful for renewable energy-based systems. However, for specific technologies (i.e. intermittent RES-solar and wind) quota obligations might be useful. Green Certificates lays the burden on suppliers, which generally means that the scheme is financed through application of the additional costs on the consumer's electricity bill. It might also create market entry barriers for small and medium-size suppliers. Therefore, such support is not recommended unless there is a strong organized energy market.

In case of Georgia, securing price uncertainty risks and providing guarantees on the income is the main determinant for investors to invest in renewables. So, Green Certificates do not target the existing market needs. Moreover, the development of the market for trading certificates is required to make the mechanism functional. As Georgia currently undertakes electricity market reforms, the additional reform for the formation of a separate market for trading certificates will increase costs and create an administrative burden. Therefore, currently, the Green Certificates support scheme is not compatible with the Georgian market needs.

Table 23: SWOT Analysis of the Green Certificates

Strength	Weakness	Opportunity	Threats
• Creates demand for the clean energy; • Generates additional income for the renewable energy producers; • Increases participation and involvement of demand-side; • Decoupling of certificate and power markets.	• Requires the establishment of the separate market for certificate trading; • Does not provide guarantee on price and income; • Is not efficient in small markets with high share of renewable energy production.	• Under existence of the strong electricity trading mechanism, might be effective to stimulate clean energy production; • The possibility to trade with certificates in international markets.	• The establishment of the certificates market in parallel with the power market might increase administrative burden and lead to the policy failure; • Inadequate quota obligation might put a pressure to the end-user electricity prices.

10.2 COMPARISON OF POLICY OPTION COSTS

The comparison of policy options explored in this RIA will assist in identifying the lowest cost policy design facilitating the achievement of policy targets. This study analyzed the four policy alternatives: FiT, FiP, CfD, and Green Certificates. The quantitative analysis was performed only for price-based support schemes, while Green Certificates were evaluated only qualitative basis due to data limitation.

The objective of the policy intervention is to ensure the integration of sufficient VRES capacities to satisfy domestic demand and reduce the share of imported power. The analysis revealed that the introduction of Green Certificates is too early for Georgia, as currently, price-related support is more important for investors. Furthermore, the Green Certificates scheme requires the establishment of a separate market for trading with the certificates. As Georgia currently has ongoing reforms in the electricity market, the parallel process for the establishment of the green certificates' market contains risk to reduce the effectiveness of the energy market reforms. Therefore, the Green Certificates scheme can be considered when Georgia will have well-established energy markets.

All policy options suggesting the introduction of the price-based support schemes imply the integration of a similar amount of VRES capacities in 2020-2030. However, the costs of policy intervention are different for these options.

The cost of policy mainly depends on the expenses required for financing support schemes, which represent the interim government cost. As a result, the Policy Option 3 to introduce the CfD as a support scheme is preferable over the policy alternatives, as it has the lowest interim government cost compared to other policy options.

Table 24: Comparison of the Policy Costs

Comparison of the Policy Option Costs			
	FiT	**FiP**	**CfD**
Cost component captured from the Government (million USD)	562	305	219
Cost component captured from the Market (million USD)	-	343	343
Total Policy Costs (million USD)	**562**	**648**	**562**

The table shows that the FiP has the highest total policy cost compared to the FiT and CfD. Even though the CfD and FiT schemes have similar total policy costs, the CfD is preferable because the compensation for the support scheme, which represents the interim government exposure, amounts to 219 million USD in present values. In case of the FiT, the total 562 million USD is disbursed as a compensation of the support mechanism thus stands for the volume of the interim government exposure. Moreover, CfD provides additional benefit compared to FiT, as it requires the active participation of producers in the power market and increases the liquidity of the electricity market.

The FiP is the second policy alternative after CfD requiring the lowest interim government cost. The estimated present value of the support compensation cost to finance FIP amounts to 305 million USD. As the GoG plans a gradual opening of the electricity market from 2021, the implementation of FIP in Georgia is quite realistic. From the perspective of project developers, the FiP is the least preferred option. Under FiP design their revenues will depend on the prices and amount of electricity sold on the market. As the competitive market is not established yet in Georgia, there is no historical data on market prices, which limits investors in evaluating project profitability even in the presence of the FiP support scheme.

In conclusion, the CfD can be considered to be the least-cost policy option, ensuring the achievement of the targeted level of the VRES integration at the lowest cost of financing (interim government cost).

11. MONITORING AND EVALUATION

This section provides the monitoring and evaluation plan for the introduction of the support schemes and implementation of other legal and regulatory measures facilitating the development of the renewable energy sources in Georgia. We have designed and timed core progress indicators for the key objectives of the intervention in a way that the results can be used as an input for the future regulatory impact assessments.

The list of activities indicated in the table corresponds to the provisions of the Renewable Energy Law.

Table 25: Monitoring and Evaluation

Activity	Deadline	Responsible for preparation	Responsible for approval	Comment
Adoption of the Georgian Law on Support of Generation and Consumption of Energy from Renewable Resources	31.12.2019	MoESD	Parliament of Georgia	Adopted in December 2019 by Parliament of Georgia
Adoption of the methodology of calculation of energy produced by renewable energy resources	31.05.2020	MoESD	GoG	Adoption of the methodology within the National Renewable Energy Action Plan (NREAP) is essential for the state to deliver on its international and domestic commitments. However, it is not directly connected to the implementation of the proposed support scheme.
Adoption of the rules of processing applications for authorization, certification and licensing of renewable energy installations	31.12.2020	TBD	TBD	Within its capacity of a licensing authority, the GNERC is recommended to act as a body in charge of adoption of the rules.
Adoption of National Renewable Energy Action Plan	31.12.2020	MoESD	GoG	NREAP is an important policy document for dimensioning RES support schemes, auctions, and technology-wise approaches. Early adoption of the document will facilitate timely introduction of policy measures for active promotion of RES.
Adoption of the document setting up renewable energy support schemes	31.12.2020	MoESD	GoG	Early adoption of the document setting up renewable energy support schemes will facilitate timely promotion of RES and contribute to the goals of the state energy policy.
Adoption of the methodology for calculation of the FiT rates	31.12.2020	TBD	TBD	In the transitional phase, it is necessary to set up administrative tariff calculation methodology for the FiT stemming from the support schemes adopted by the GoG. Within its competence in tariff setting, the GNERC is recommended to be in charge of designing and approval of the methodology.
Organization of the first auction and determination of the support level (green tariffs) for RES	31.12.2020	MoESD	GoG	Early adoption of RES support schemes and green tariff calculation methodologies will make it possible to organize the first auction in 2020 or determine the support level (FiT rates) for the RES projects.

Activity	Deadline	Responsible for preparation	Responsible for approval	Comment
Adoption of the rules of conducting auctions on promoting production from renewable energy and conferring privileged energy producer status	31.05.2021	MoESD	GoG	Adopting appropriate rules will make it possible to organize RES auctions/tenders, thus, aid in defining the optimal level of support for RES.
Approval of standard form of CfD contracts	31.12.2021	TBD	GoG	CfD contracts can help to integrate RES into commercial transactions in the market. If the GoG will consider CfD as a potential support schemes, approval of standard forms of CfD contracts will be a step forward in launching organized electricity market. Besides, it will increase certainty and confidence of investors in the commitment of the state to provide support for RES development. It is recommended to assign the responsibility for preparation of this document on the MoESD.
Adoption of the rules of certification of installers of renewable energy appliances	31.12.2021	TBD	GoG	These rules refer to technical aspects of RES development. Several temporary measures can be implemented before establishing rules for certification of installers and starting the certification process. It is recommended to assign the responsibility for preparation of these rules on the MoESD.
Rules of issuing Guarantees of Origin (GoU)	31.12.2021	GNERC	GNERC	GoU are essential for quota obligations or green certificates, etc. If the GoG does not plan adopting these type of support instruments, GoU can be abolished. Therefore, the proposed timeline is acceptable.

12. CONCLUSION

According to the results of the RIA, the policy intervention through introduction of renewable energy support scheme will increase Georgia's energy independence and strengthen its energy security. In particular, the introduction of the renewable energy support mechanism with the proposed level of support will ensure the development of 120 MW solar and 689 MW wind capacities, which is compliant with the existing system limits under the TYNDP. The electricity generated from the additional 809 MW of renewable capacities will facilitate the reduction of the generation-consumption gap and increase the export. In addition, renewable energy development will facilitate job creation and reduce greenhouse gas emissions. The estimated total monetary benefit under the policy intervention amounts to 433 million USD in present value.

Table 26: Estimated Monetary Benefits from the Policy Intervention

Estimated benefits	Present Value (Million USD)
Savings on electricity import	297
Savings on the natural gas imports for TPPs	15
Additional income from the electricity export	120
Job creation	2880 new job places
Reduction in the GHG emissions	0.41 million tons
Total Benefits	**432**

The benefits of the policy intervention are the same for all policy alternatives. The impact of the policy intervention includes the growth of investment, job creation, reduced dependence on import, and income generation potential by exporting surplus power to neighboring countries. The comparison of the support schemes is based on the cost-efficiency approach, which compares the policy costs required to achieve the same targets under different policy design.

The cost-efficiency analysis of the proposed support scheme reveals that CfD is a more appropriate instrument facilitating renewable energy development at a lower cost for the state (interim government exposure). Although the FiP is also a market-oriented instrument, it is the least preferred support mechanism by renewable producers and project developers because it carries the price uncertainty risks and reduces incentives to invest in renewables. There is a probability that the FiP mechanism might lead to the development of renewable projects at a slower pace than the FIT and CfD scheme, because Georgia does not have a well-functional competitive electricity trading system yet. Despite the fact that total policy cost in the case of FiT and CfD is the same, CfD is still the most preferred mechanism for the following reasons:

- CfD has a lower support component (interim government cost) compared to FiT. In the case of CfD, the present value of the support cost amounts to 219 million USD and the rest part is captured from the electricity market. Compared to CfD, in case of the FiT whole policy costs are covered through the support cost component;
- CfD is a more flexible mechanism, the volume of the compensation changes with the market price variation. As it requires the active participation of the electricity producers in the power market, CfD increases the market liquidity, which is not attainable in the case of FiT;
- CfD provides the same confidence to investors as the FiT because it grants guarantees on the future income. However, unlike the FiT, the CfD more effectively balances the price uncertainty risks between renewable energy producers and the state.

APPENDIX 1: POLICY OPTION: FIT PLUS FIP

This policy option suggests to introduce FiT support scheme before the competitive electricity trading mechanism is established. After power market is established, proposed policy suggests to substitute the FiT with FiP scheme for the new power plant projects. This policy option recommends to provide support to the investors for the ten years from the operations commissioning of the power plant.

This policy scenario assumes that the electricity market will gradually open at the wholesale level between 2020 and 2021 as it has been defined in the concept on New Electricity Market Model. The proposed policy option suggests providing FiT for power plants commissioned throughout 2020-2024 and provide to FIP for power plants commissioned after 2024.

The arguments for proposed policy design are the following:

- The current market structure limits the possibility for competitive trading of electricity, so, price-based mechanisms, such as FiP and CfD, will not work under the existing market structure;
- Georgia will need new generation capacities between 2020-2024 to satisfy domestic demand for power;
- 2019-2022 is a transitional period for Georgia when the country is moving towards a new electricity market model. By 2022, the electricity market is expected to open at the wholesale level. However, the project developers will need time to adjust to the new market conditions and identify market price trends for performing financial calculations. Considering this, the FiT is the appropriate price-based support scheme that will facilitate development of the new VRES power plants commissioned throughout the 2020-2024 years.

Due to market price-related uncertainties, the FiP scheme will not work in the initial period of the market opening. That is why the provision of FiT for plants commissioned throughout 2020-2024 and provision of FiP for plants commissioned at a later period is an optimal solution.

The FiT and FiP rates will be changing periodically. The proposed period of FiT and FiP revision is three years, as it coincides with the GNERC tariff setting period. The updated support rates will apply only for the newly built power plants. The level of the support will depend on the amount of new capacities required for import substation. The main objective of the support mechanisms will be to ensure that added capacities of VRES will be sufficient to reduce negative gap between generation and consumption.

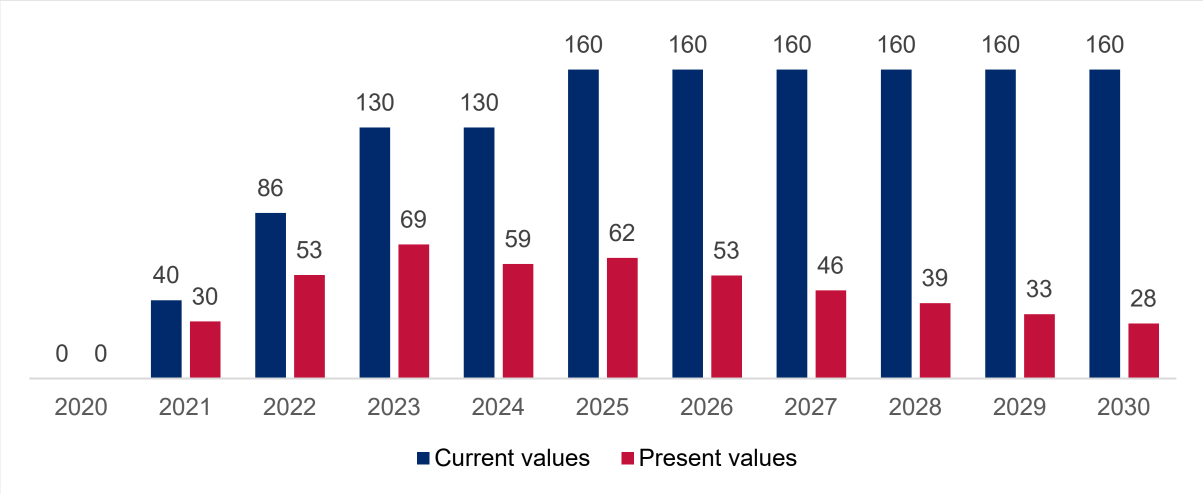
The respective FiT and FiP rates for the different period are provided in the table below.

Table 27: The FiT and FiP Rates for Wind and Solar Plants

	Period 1: 2019-2023	Period 2: 2024-2030	Comment
FiT for Wind Projects	7.1 USc/kWh	-	Calculated based on the minimum revenue requirement per kWh of last power plant providing sufficient capacity for import substitution.
FiT for Solar Projects	8.2 USc/kWh	-	
FiP for Wind and Solar Projects	-	2.4 USc/kWh	Calculated based on the difference between minimum revenue requirement per kWh and market price in 2023 year.

The amount of funds required to finance the proposed support schemes represents the main cost of policy intervention. Although the money spent on financing the support mechanisms is included in the producers' income, from a country-level perspective, these costs are considered as interim government costs and is included in the policy costs. The annual spending on support schemes depends on the development pace of VRES projects and the amount of power generated by supported projects. The estimated present value of costs to finance FiT plus FiP under proposed policy design amounts to 472 million USD. The graph below provides estimated annual costs for financing the support scheme.

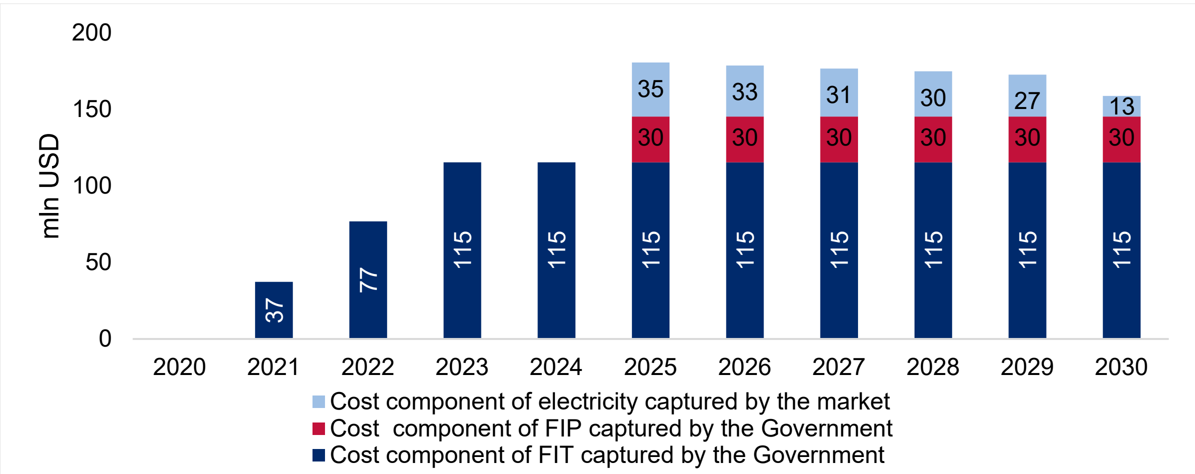
Graph 20: Estimated Annual Costs of FiT Plus FiP, Current and Present Values, in Million USD, 2020-2030 Years



Except the support component cost, the total policy cost also includes cost for the electricity traded on the domestic market. The power plants which will fall under FiT design will not be obliged to participate in the electricity market. Only power plants, which will be commissioned after 2024 and fall under FiP scheme design, will have obligation to sell electricity in the market to obtain the premium on top of the market price. The present value of the added generation sold on the domestic market amounts to 49 million USD and is included in the total policy cost.

The table below provides the current value of annual costs incurred under the proposed policy option.

Graph 21: Current Value of Annual Cost Under FiT Plus FiP Scheme Design, in Million USD, 2020-2030 Years



The total cost for the proposed policy option amounts to 522 million USD. Although, the combination of the FiT plus FiP has the lowest interim government policy costs compared to other alternatives discussed in the report, it should be noted, that if the selection of support scheme will be based on the costs of financing the support component, CfD will still remain the preferred policy option compared to other alternatives.

APPENDIX 2: STAKEHOLDERS CONSULTATION PROCESS

Stakeholder	Timing of consultation	Consultation method	Discussion Topics
MoESD	August 8, 2019	Meeting	The state targets and priorities for renewable energy technologies Preferred support schemes Ongoing renewable energy projects
NGOs and Think Tanks: - *World Experience for Georgia (WEG)* - *Green Alternative* **Existing producers and project Developers:** - *Georgian Renewable Energy Development Association (GREDA)* - *Georgian Renewable Power Company (GRPC)* - *Biodiesel Georgia* - *Silk Road Energy* - *Qartli wind Farm/GEDF* - *Solar House* - *Cerberus Frontier Georgia* - *ALT Energy* - *Helios Energy Georgia* - *Dariali Energy* - *Mtkvari Energy* - *Marneuli 1930* - *Kabalhesi 2006* - *Khertvisi HPP* - Ghoresha LLC	19 September-October 4, 2019	Meeting, interviews	The barriers for integration variable renewable sources Preferred support schemes for renewable development The financing mechanisms of support schemes Allocation mechanisms for support schemes Tax incentives for renewable energy development
GSE ESCO	October 2, 2019	Meetings	System capacity for integration variable renewable energy sources Advantages and disadvantages of variable renewable power for the system The preferable support mechanisms under existing market arrangement The preferable support mechanisms under new market arrangement The financing approach for support schemes Allocation mechanisms for support schemes
MoESD	November 15, 2019	Meetings	Introduction of the preliminary results
Stakeholders' Workshop	November 29, 2019	Workshop	Presentation of the RIA results to the stakeholders

APPENDIX 3: CONSUMPTION AND GENERATION FORECAST FOR BASELINE

Monthly Consumption Forecast (TWh)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Jan	*1.5*	*1.5*	*1.6*	*1.7*	*1.8*	*1.9*	*2.0*	*2.1*	*2.2*	*2.3*	*2.4*
Feb	*1.3*	*1.4*	*1.4*	*1.5*	*1.6*	*1.7*	*1.8*	*1.8*	*1.9*	*2.0*	*2.1*
March	*1.4*	*1.4*	*1.5*	*1.6*	*1.7*	*1.8*	*1.9*	*1.9*	*2.0*	*2.1*	*2.2*
Apr	*1.2*	*1.3*	*1.4*	*1.4*	*1.5*	*1.6*	*1.6*	*1.7*	*1.8*	*1.9*	*2.0*
May	*1.2*	*1.2*	*1.3*	*1.3*	*1.4*	*1.5*	*1.6*	*1.6*	*1.7*	*1.8*	*1.9*
June	*1.1*	*1.2*	*1.3*	*1.3*	*1.4*	*1.5*	*1.5*	*1.6*	*1.7*	*1.8*	*1.9*
July	*1.2*	*1.3*	*1.4*	*1.4*	*1.5*	*1.6*	*1.7*	*1.8*	*1.8*	*1.9*	*2.0*
Aug	*1.3*	*1.3*	*1.4*	*1.5*	*1.5*	*1.6*	*1.7*	*1.8*	*1.9*	*1.9*	*2.0*
Sep	*1.2*	*1.2*	*1.3*	*1.3*	*1.4*	*1.5*	*1.5*	*1.6*	*1.7*	*1.8*	*1.9*
Oct	*1.2*	*1.3*	*1.3*	*1.4*	*1.5*	*1.6*	*1.6*	*1.7*	*1.8*	*1.9*	*2.0*
Nov	*1.3*	*1.4*	*1.5*	*1.6*	*1.6*	*1.7*	*1.8*	*1.9*	*2.0*	*2.1*	*2.2*
Dec	*1.5*	*1.6*	*1.7*	*1.8*	*1.8*	*1.9*	*2.0*	*2.1*	*2.3*	*2.4*	*2.5*
Annual	***15.4***	***16.2***	***17***	***17.9***	***18.7***	***19.7***	***20.7***	***21.7***	***22.8***	***23.9***	***25.1***

Forecasted Monthly Generation of HPPs (TWh)

Years	Total in TWh	Jan	Feb	March	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2020	**12.1**	0.9	0.7	0.9	1.1	1.5	1.6	1.6	1.2	0.7	0.6	0.6	0.7
2021	**12.2**	0.9	0.7	0.9	1.1	1.5	1.6	1.6	1.3	0.7	0.6	0.6	0.7
2022	**12.3**	0.9	0.7	0.9	1.1	1.5	1.6	1.6	1.3	0.7	0.6	0.6	0.7
2023	**12.7**	0.9	0.7	0.9	1.2	1.6	1.7	1.7	1.3	0.7	0.6	0.6	0.7
2024	**13.3**	0.9	0.8	0.9	1.2	1.7	1.7	1.8	1.4	0.7	0.7	0.7	0.8
2025	**14.4**	1.0	0.8	1.0	1.3	1.8	1.9	1.9	1.5	0.8	0.7	0.7	0.8
2026	**15.4**	1.1	0.9	1.1	1.4	1.9	2.0	2.0	1.6	0.9	0.8	0.8	0.9
2027	**16.8**	1.2	1.0	1.2	1.5	2.1	2.2	2.2	1.7	0.9	0.8	0.9	1.0
2028	**18.2**	1.3	1.1	1.3	1.7	2.3	2.4	2.4	1.9	1.0	0.9	0.9	1.1
2029	**20.8**	1.5	1.2	1.5	1.9	2.6	2.7	2.8	2.1	1.2	1.0	1.1	1.2
2030	**22.6**	1.6	1.3	1.6	2.1	2.8	3.0	3.0	2.3	1.3	1.1	1.2	1.3

HPP and Wind Generation forecasts for the baseline (TWh)

Year	Jan	Feb	March	Apr	May	June	July	Auf	Sep	Oct	Nov	Dec	Total
2020	0.87	0.71	0.87	1.12	1.51	1.59	1.62	1.26	0.68	0.61	0.62	0.71	**12.1**
2021	0.88	0.72	0.88	1.13	1.52	1.61	1.63	1.27	0.68	0.61	0.63	0.71	**12.3**
2022	0.88	0.73	0.88	1.14	1.53	1.62	1.64	1.28	0.69	0.62	0.63	0.72	**12.4**
2023	0.91	0.75	0.91	1.18	1.58	1.67	1.70	1.32	0.71	0.64	0.65	0.74	**12.8**

HPP and Wind Generation forecasts for the baseline (TWh)													
Year	Jan	Feb	March	Apr	May	June	July	Auf	Sep	Oct	Nov	Dec	Total
2024	0.95	0.78	0.95	1.23	1.66	1.75	1.78	1.38	0.74	0.67	0.68	0.78	**13.4**
2025	1.03	0.85	1.03	1.33	1.80	1.89	1.92	1.49	0.81	0.72	0.74	0.84	**14.5**
2026	1.10	0.91	1.10	1.42	1.92	2.03	2.06	1.60	0.86	0.77	0.79	0.90	**15.5**
2027	1.20	0.99	1.20	1.55	2.09	2.21	2.24	1.74	0.94	0.84	0.86	0.98	**16.9**
2028	1.30	1.07	1.30	1.68	2.27	2.39	2.43	1.89	1.02	0.91	0.93	1.06	**18.3**
2029	1.49	1.22	1.49	1.92	2.59	2.73	2.78	2.16	1.16	1.04	1.07	1.21	**20.9**
2030	1.62	1.33	1.62	2.09	2.82	2.97	3.02	2.34	1.26	1.13	1.16	1.32	**22.7**

Consumption Generation Gap (TWh)												
	Jan	Feb	March	Apr	May	June	July	Auf	Sep	Oct	Nov	Dec
2020	-0.6	-0.6	-0.5	-0.1	0.4	0.4	0.4	0.0	-0.5	-0.6	-0.7	-0.8
2021	-0.7	-0.7	-0.6	-0.2	0.3	0.4	0.3	0.0	-0.5	-0.7	-0.8	-0.9
2022	-0.7	-0.7	-0.6	-0.2	0.3	0.4	0.3	-0.1	-0.6	-0.7	-0.8	-1.0
2023	-0.8	-0.8	-0.7	-0.2	0.2	0.3	0.2	-0.1	-0.6	-0.8	-0.9	-1.0
2024	-0.8	-0.8	-0.7	-0.3	0.3	0.4	0.3	-0.1	-0.7	-0.8	-0.9	-1.1
2025	-0.8	-0.8	-0.7	-0.2	0.3	0.4	0.3	-0.1	-0.7	-0.8	-1.0	-1.1
2026	-0.9	-0.9	-0.7	-0.2	0.4	0.5	0.4	-0.1	-0.7	-0.9	-1.0	-1.1
2027	-0.9	-0.9	-0.7	-0.2	0.5	0.6	0.5	0.0	-0.7	-0.9	-1.0	-1.2
2028	-0.9	-0.9	-0.7	-0.1	0.6	0.7	0.6	0.0	-0.7	-0.9	-1.0	-1.2
2029	-0.8	-0.8	-0.7	0.0	0.8	1.0	0.8	0.2	-0.6	-0.9	-1.0	-1.1
2030	-0.8	-0.8	-0.6	0.1	0.9	1.1	1.0	0.3	-0.6	-0.9	-1.0	-1.2

TPP Generation Monthly Forecasts (TWh)													
Years	Jan	Feb	March	Apr	May	June	July	Auf	Sep	Oct	Nov	Dec	Total
2020	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.00	0.15	0.25	0.35	0.56	**2.35**
2021	0.37	0.37	0.20	0.09	0.00	0.00	0.00	0.05	0.15	0.24	0.35	0.51	**2.33**
2022	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.10	0.15	0.25	0.35	0.45	**2.35**
2023	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.10	0.15	0.25	0.35	0.45	**2.34**
2024	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.10	0.15	0.25	0.35	0.45	**2.34**
2025	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.10	0.15	0.25	0.35	0.45	**2.34**
2026	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.08	0.15	0.25	0.35	0.47	**2.34**

TPP Generation Monthly Forecasts (TWh)													
Years	Jan	Feb	March	Apr	May	June	July	Auf	Sep	Oct	Nov	Dec	Total
2027	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.02	0.15	0.25	0.35	0.54	**2.34**
2028	0.38	0.37	0.20	0.09	0.00	0.00	0.00	0.00	0.15	0.25	0.35	0.55	**2.34**
2029	0.38	0.37	0.20	0.00	0.00	0.00	0.00	0.00	0.15	0.25	0.35	0.65	**2.34**
2030	0.38	0.37	0.20	0.00	0.00	0.00	0.00	0.00	0.15	0.25	0.35	0.65	**2.34**

Import-export by months (TWh)																
Year	Jan	Feb	March	Apr	May	June	July	Auf	Sep	Oct	Nov	Dec	Total	Import	Export	Net import export
2020	-0.2	-0.2	-0.3	0.0	0.4	0.4	0.4	0.0	-0.3	-0.4	-0.4	-0.3	**-0.9**	**-2.1**	**1.2**	**-0.9**
2021	-0.3	-0.3	-0.4	-0.1	0.3	0.4	0.3	0.0	-0.4	-0.4	-0.4	-0.4	**-1.6**	**-2.6**	**1.0**	**-1.6**
2022	-0.4	-0.3	-0.4	-0.1	0.3	0.4	0.3	0.0	-0.4	-0.5	-0.5	-0.5	**-2.3**	**-3.2**	**0.9**	**-2.3**
2023	-0.4	-0.4	-0.5	-0.2	0.2	0.3	0.2	0.0	-0.5	-0.5	-0.5	-0.6	**-2.8**	**-3.6**	**0.8**	**-2.8**
2024	-0.4	-0.4	-0.5	-0.2	0.3	0.4	0.3	0.0	-0.5	-0.6	-0.6	-0.6	**-3.0**	**-3.9**	**0.9**	**-3.0**
2025	-0.5	-0.5	-0.5	-0.1	0.3	0.4	0.3	0.0	-0.5	-0.6	-0.6	-0.7	**-2.9**	**-4.0**	**1.1**	**-2.9**
2026	-0.5	-0.5	-0.6	-0.1	0.4	0.5	0.4	0.0	-0.5	-0.6	-0.7	-0.7	**-2.9**	**-4.1**	**1.2**	**-2.9**
2027	-0.5	-0.5	-0.5	-0.1	0.5	0.6	0.5	0.0	-0.5	-0.6	-0.7	-0.6	**-2.5**	**-4.0**	**1.5**	**-2.5**
2028	-0.5	-0.5	-0.5	0.0	0.6	0.7	0.6	0.0	-0.5	-0.7	-0.7	-0.6	**-2.2**	**-4.1**	**1.9**	**-2.2**
2029	-0.4	-0.4	-0.5	0.0	0.8	1.0	0.8	0.2	-0.5	-0.6	-0.7	-0.5	**-0.7**	**-3.5**	**2.8**	**-0.7**
2030	-0.4	-0.4	-0.4	0.1	0.9	1.1	1.0	0.3	-0.5	-0.6	-0.7	-0.5	**-0.1**	**-3.5**	**3.4**	**-0.1**

APPENDIX 4: BASELINE POLICY OPTION RESULTS

	Import	Export	Net-export/ import	Import price	Export Price	Import cost	Import cost	Export Income	Export Income	TPP generation	Gas consumed by TPPs	Price of Gas	Cost of Gas for TPPS	Cost of Gas imported for TPPs	GHG emissions
	TWh	TWh	TWh	USc/ kWh	USc/ kWh	Mln USD Current values	Mln USD Present Value	Mln USD Current Value	Mln USD Present Value	TWh	mln m³	USD/1000 M3	Mln USD current value	Mln USD present value	Thousand Tons
2020	-2.1	1.2	-0.9	5.6	3.8	(116.1)	(99.3)	44.6	38.1	2.35	592.5	143	84.7	72.4	1.12
2021	-2.6	1.0	-1.6	5.7	3.9	(150.2)	(109.8)	40.1	29.3	2.33	588.0	143	84.1	61.5	1.11
2022	-3.2	0.9	-2.3	5.8	4.0	(185.2)	(115.7)	35.1	21.9	2.35	590.7	143	84.5	52.8	1.12
2023	-3.6	0.8	-2.8	5.9	4.1	(215.5)	(115.1)	33.9	18.1	2.34	589.3	143	84.3	45.0	1.11
2024	-3.9	0.9	-3.0	6.0	4.2	(234.5)	(107.0)	36.7	16.7	2.34	589.9	143	84.4	38.5	1.11
2025	-4.0	1.1	-2.9	6.2	4.3	(244.8)	(95.5)	45.9	17.9	2.34	589.7	143	84.3	32.9	1.11
2026	-4.1	1.2	-2.9	6.3	4.4	(259.1)	(86.4)	53.8	18.0	2.34	589.7	143	84.3	28.1	1.11
2027	-4.0	1.5	-2.5	6.4	4.5	(258.2)	(73.6)	69.0	19.7	2.34	589.7	143	84.3	24.0	1.11
2028	-4.1	1.9	-2.2	6.5	4.5	(264.5)	(64.5)	85.3	20.8	2.34	589.7	143	84.3	20.6	1.11
2029	-3.5	2.8	-0.7	6.6	4.6	(233.2)	(48.6)	131.5	27.4	2.34	589.7	143	84.3	17.6	1.11
2030	-3.5	3.4	-0.1	6.7	4.7	(235.9)	(42.0)	161.6	28.8	2.34	589.7	143	84.3	15.0	1.11
Total	**(38.67)**	**16.77**	**(21.90)**			(2,397.2)	(957.6)	737.5	256.7	**25.76**	6,488.7		927.9	408.4	12.26

APPENDIX 5: POLICY OPTION 1 RESULTS

	Solar Power Plants capacity (MW)	Wind Power Plants capacity (MW)	Capacity constraints for Solar Power Plants under TYNDP 2020-2030 (MW)	Capacity constraints for Wind Power Plants under TYNDP 2020-2030 (MW)	Solar Power Plants Cumulative Capacity (MW)	Wind Power Plants Cumulative Capacity (MW)	Solar and Wind Power Plants Cumulative Capacity (MW)
2020	0	0	**130**	**333**	**0**	**0**	**0**
2021	20	90	**130**	**333**	**20**	**90**	**110**
2022	50	120	**130**	**333**	**70**	**210**	**280**
2023	50	134	**130**	**333**	**120**	**344**	**464**
2024	0	0	**130**	**333**	**120**	**344**	**464**
2025	0	345	**260**	**665**	**120**	**689**	**809**
2026	0	0	**260**	**665**	**120**	**689**	**809**
2027	0	0	**260**	**665**	**120**	**689**	**809**
2028	0	0	**260**	**665**	**120**	**689**	**809**
2029	0	0	**260**	**665**	**120**	**689**	**809**
2030	0	0	**390**	**1000**	**120**	**689**	**809**

	Solar generation (TWh)	Wind generation (TWH)	Total generation (TWh)	Consumption generation gap under scenario (TWh)	Import under scenario 1 (TWh)	Export under scenario 1 (TWh)
2020	-	-	-	(0.90)	(2.07)	1.17
2021	0.04	0.53	0.57	(1.03)	(2.26)	1.18
2022	0.11	1.09	1.19	(1.11)	(2.41)	1.19
2023	0.17	1.63	1.81	(0.99)	(2.46)	1.33
2024	0.17	1.63	1.81	(1.19)	(2.70)	1.37
2025	0.17	2.90	3.08	0.18	(2.15)	2.13
2026	0.17	2.90	3.08	0.18	(2.32)	2.32
2027	0.17	2.90	3.08	0.58	(2.29)	2.75
2028	0.17	2.90	3.08	0.88	(2.36)	3.14
2029	0.17	2.90	3.08	2.38	(1.85)	4.23
2030	0.17	2.90	3.08	2.98	(1.84)	4.81

Years	Import cost under scenario 1: Current Values (mln USD)	Export income under scenario 1: Current Values (mln USD)	Import cost under scenario 1: Present Value (mln USD)	Export income under scenario 1: Present Value (mln USD)	Cost of Gas imported for TPP Current Value (mln USD)	Cost of Gas imported for TPPS Present Value (mln USD)	GHG emissions (Thousand Tones)
2020	(116.1)	44.6	(99.3)	38.1	(84.7)	(72.4)	1.13
2021	(129.1)	45.9	(94.3)	33.5	(82.4)	(60.2)	1.10
2022	(140.4)	47.6	(87.7)	29.7	(80.4)	(50.2)	1.07
2023	(146.3)	54.2	(78.1)	28.9	(79.0)	(42.2)	1.05
2024	(163.3)	57.3	(74.5)	26.1	(79.4)	(36.3)	1.06
2025	(132.5)	91.0	(51.7)	35.5	(77.2)	(30.1)	1.03

Years	Import cost under scenario 1: Current Values (mln USD)	Export income under scenario 1: Current Values (mln USD)	Import cost under scenario 1: Present Value (mln USD)	Export income under scenario 1: Present Value (mln USD)	Cost of Gas imported for TPP Current Value (mln USD)	Cost of Gas imported for TPPS Present Value (mln USD)	GHG emissions (Thousand Tones)
2026	(145.7)	101.4	(48.6)	33.8	(78.0)	(26.0)	1.04
2027	(145.9)	122.5	(41.6)	34.9	(80.2)	(22.9)	1.07
2028	(152.9)	142.7	(37.3)	34.8	(80.9)	(19.7)	1.08
2029	(122.2)	196.2	(25.5)	40.9	(84.3)	(17.6)	1.12
2030	(123.1)	227.6	(21.9)	40.6	(84.3)	(15.0)	1.12

APPENDIX 6: WIND AND SOLAR POWER COSTS (PER KWH)

Wind	Minimum revenue requirements per kWh for potential wind power plants			
Wind projects	**USc/kWh**		**average tariffs by capacity**	**USc/kWh**
Tariff for the Lowest cost plant	4.8		**Up to 15 MW**	8.2
Tariff for the highest cost plant	16.4		**16 MW to 40 MW**	8.0
average tariff	7.9		**41 MW to 99 MW**	7.9
			100 MW and more	8.1

Solar	Minimum revenue requirements per kWh for potential solar power plants			
Solar Projects	**USc/kWh**		**average tariffs by capacity**	**USc/kWh**
Tariff for the lowest cost plant	6.8		**up to 2 MW**	0
Tariff for the highest cost plant	10.3		**3 to 15 MW**	7.6
Average tariff	9.6		**16 MW to 40 MW**	0
			41 MW to 99 MW	10.0
			100 MW and more	0

APPENDIX 7: INTERIM GOVERNMENT COSTS OF THE SUPPORT SCHEMES

	FiT+FiP	CfD	FiT	FiP	Green Certificates
Years	million USD	million USD	million USD	million USD	
2020	-	-	-	-	N/A
2021	30	14	30	18	
2022	53	22	53	32	
2023	69	27	69	42	
2024	59	22	59	36	
2025	62	37	84	42	
2026	53	30	71	36	
2027	45	24	61	31	
2028	39	20	52	26	
2029	33	16	45	23	
2030	28	8	38	19	
Total	**473**	**219**	**562**	**305**	

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