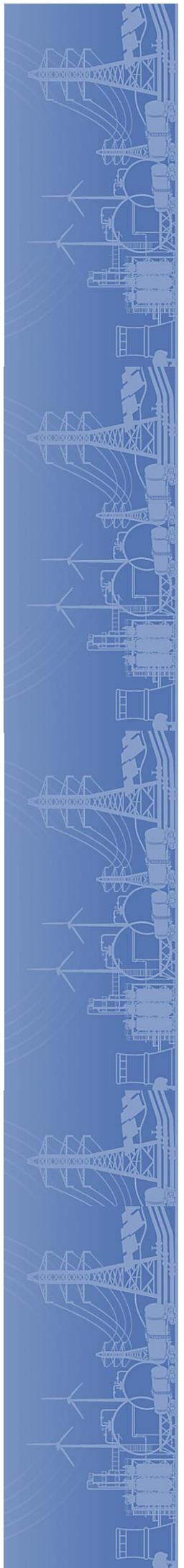


GEORGIAN ENERGY SECTOR IN THE CONTEXT OF EU ASSOCIATION



World Experience for Georgia (WEG)

**Georgian Energy Sector
In The Context Of EU Association**

Tbilisi, 2015

This book is a collection of articles prepared on the basis of presentations made at the public seminars organized by World Experience for Georgia (WEG) in collaboration with Institute of Energy and Sustainability (IES) of Ilia State University. The main goal of the series of Energy and Sustainability Policy seminars was to analyze the current situation and development trends in Georgia's energy sector with the focus on sustainability and reforms towards EU approximation.

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Preface

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Research in energy policy and sustainability is a developing field in Georgia. The amount of analytical material, intensity of ongoing research and the quality of public debate still need to be improved in order to create a solid factual and analytical basis for energy policies and strategies and to assure the public understanding and involvement for their implementation and sustainability. This task is becoming especially important after signing of the Association Agreement with the European Union that requires from Georgia to implement systemic reforms and structural improvements in energy sector.

This book represents an attempt to address this necessity to some extent. The material presented here is mainly based on the series of seminars organized in Ilia State University by the Institute of Energy and Sustainability (**IES**) in collaboration with World Experience for Georgia (**WEG**), from February 2014 till October 2015. For the fuller coverage of topics we have also included some of the results of research conducted under other projects.

The material presented here addresses both practical and theoretical issues of energy policy energy strategy, sector governance, regulation and operation. However, the main guiding theme of the book is approximation with the EU Energy Acquis and implementation of best industry practices, membership in European Energy Community (**EC**) being an effective means for streamlining the process.

The series of seminars providing the main material for this book was opened on February 20, the day when the negotiations on Georgia's membership in European Energy Community started, by EU commissioner in energy Guenther Oettinger. At the moment of publication of this book there is still little progress in Energy Community negotiations and sector reforms, therefore we believe that the book preserves its practical importance for facilitating future progress.

The following main thematic areas of energy policy are presented in the book:

- Requirements of EU Approximation and implications for the reform in energy sector of Georgia
- Energy security and energy transit projects
- Renewable Energy and Energy Efficiency
- Energy consumption patterns and energy planning

The book opens with the opening Address by the EU commissioner in energy which largely defines the EU attitudes and expectations towards Georgia's EU Association and

We hope that the presented material will facilitate informed decisions and practical policy steps by state agencies and non-state actors as well motivate future research by interested readers.

Abbreviations

AA – Association Agreement
ACER - Agency for the Cooperation of Energy Regulators
AGRI - Azerbaijan-Georgia-Romania interconnectors
Bcm – Billion cubic meters
BTC – Baku-Tbilisi-Ceyhan Pipeline
CSO – Civil Society Organization
EC – (European) Energy Community – *except in titles of EU directives*
EIB - European Investment Bank
ENTSO-E - European network of transmission system operators for electricity
ENTSO-G - European network of transmission system operators for gas
ESCO - Electricity System Commercial Operator
FIP - Feed-in Tariff
FIT - Feed-in Premium
GDP - Gross domestic product
GHG – Greenhouse gas
GOGC - Georgian Oil and Gas Corporation
HPEP - Hydro Power and Energy Planning Project
HPP – Hydro Power Plant
IAEA - International Atomic Energy Agency
IES – Institute of Energy and Sustainability, Ilia State University
LPG – Liquefied Petroleum Gas
LNG – Liquefied Natural Gas
NATO – North Atlantic Treaty Organization
NEAAP - National energy-efficiency action plan SCP – South Caucasus Pipeline
NSGP - North-South Gas Pipeline
OECD – Organization for Economic Co-operation and Development
SAIDI - System Average Interruption Duration Index
SAIFI - System Average Interruption Frequency Index
TAP – Trans Adriatic Pipeline
TANAP - Trans-Anatolian gas pipeline
TCP - Trans-Caspian pipeline USAID - United States Agency for International Development
WS – White Stream project

Opening Address at the first "Energy Policy and Sustainability" Seminar

*Guenther Oettinger, EU Commissioner for Energy of the EU
20/02/2014– Ilia State University*

Ladies and Gentlemen,

I am delighted to stand here today at the Ilia State University and to open the first "Energy Policy and Sustainability" Seminar.

This is my first time in Georgia and the culmination of the excellent impressions I have had from Georgia! And I do not just mean your excellent gastronomy and wine, but also your hospitality and sense of commitment.

Today, I met several members of the Government, and I met business representatives. It is a particular pleasure to me to meet with all of you here, as representatives of the civil society and as voices of the society you represent. This is why I would not like to come here and just make a speech, but I would rather prefer hearing from you, from your impressions and expectations. Let me therefore keep my words short.

You have come a long way since Georgia's independence in 1991. Over the past few years, Georgia has undertaken considerable efforts to move closer to the EU. These efforts are now resulting in important milestones that will mark the start of a new era in our relationship. After a three-year process, the EU and Georgia initialed last November the Association Agreement and its related Deep and Comprehensive Free Trade Area. We expect to sign these agreements by this summer.

These agreements are the most advanced of their type ever negotiated by the EU and they will entail significant benefits to Georgia. Firstly, the ambitious liberalization of import duties will provide better access for Georgian goods and services to the EU market, the largest single market in the world. It is estimated that the Deep and Comprehensive free Trade Agreement could **boost trade** between the EU and Georgia by **12% as regards Georgia's exports to the EU**, and **by 7.5% on imports from the EU**. This opportunity will be maximized by policy reforms and regulatory approximation in line with the EU standards, which will greatly contribute to the creation of an open, stable and predictable policy-making environment. In turn, these developments will also boost the inflow of European and Foreign Direct Investments to Georgia creating more enterprises and strengthening the competitiveness of the economy and individual sectors.. Stronger domestic rules will improve the **safety of consumer products** and therefore of consumers in general.

The DCFTA as a whole is expected to improve the current account balance of Georgia and boost the GDP by 4.3% (292 million EUR in national income), provided that the reforms are completed.

But it is not just trade we are talking about. We are talking about people! As an example, since 2012 the EU and Georgia hold a dialogue on visa liberalization, and the EU-Georgia Visa

Facilitation Agreement has been the first of the kind between the EU and a Southern Caucasus country. The Association Agreement also places great emphasis to the full absorption of values, such as democracy and rule of law, human rights and fundamental freedoms, good governance and sustainable development.

All in all, the implementation of these agreements will be conducive to further socioeconomic development and competitiveness, and hence to enhanced growth and job opportunities. Equally importantly, it will facilitate the progressive integration of Georgia with the EU standards and economy.

It is no secret that Georgia could be subject to significant external pressure to prevent the completion of these agreements. In the EU, we are aware of this, and we have a lot of respect and appreciation for Georgia's choice. I want to reassure you that the EU will remain vigilant and will stand by Georgia, in particular in the run-up to the signature of the agreements.

In addition, the EU will also support Georgia in implementing the ambitious reforms, both financially and by sharing the EU experience and know-how. In 2011-2013, the European Neighbourhood and Partnership Instrument provided Georgia with 230m EUR. Further considerable assistance will be devoted to the implementation of the Free Trade Agreement.

Energy cooperation is paramount to our overall partnership. Today, the Government of Georgia and the European Union launched the negotiations on Georgia's membership in the Energy Community.

We expect to finalize these negotiations by September this year.

What benefits does Georgia have from the Energy Community membership?

By extending most of the EU's internal energy policy to the contracting parties, the Energy Community creates the right conditions for a modern and competitive energy sector. This in turn attracts investments in power generation and networks, facilitates energy trade, and increases both the sustainability and the security of supply of the energy sector.

Placed in the heart of South Caucasus, Georgia plays an increasingly important role in the transit of hydrocarbons towards the EU. In particular, Georgia is a key transit country for the Southern Gas Corridor, a top priority project that will deliver natural gas from the Caspian Sea to the large EU and Turkish energy markets. The Final Investment Decision taken by the Shah Deniz II consortium last December represents a landmark decision for the Southern Gas Corridor that is of high strategic relevance for both Georgia and the EU.

The realization of the Southern Gas Corridor will in fact provide strong incentives to further deepen and sustain our energy cooperation based on mutual benefits. In this respect, this project still has a tremendous unexploited potential that can be realized. The EU does not expect the Southern Gas Corridor to only transport gas from Shah Deniz II field. We expect that in the medium-term this corridor could supply 10% of EU demand, accommodating additional volumes from other gas fields in Azerbaijan, Turkmenistan, Iraq, but potentially also Iran, among others. Upon realization of the Trans-Caspian Pipeline, Turkmenistan alone has indicated that is like to supply 30 bcm per year to the EU by 2025.

Facilitating and supporting the realization of this potential is in our mutual interest as it would maximize commercial benefits, strengthen the security of energy supply in Europe and in the region, and it would create a true "win-win" relationship based upon our common strategic interests.

Ladies and Gentlemen,

The EU attaches great value to Georgia's decision to move closer to the EU, not only in economic terms but also as regard our common values. This choice has been underpinned by concrete efforts which will soon start to bear their fruits. However, we are not at the end of the road yet. 2014 will be another important year in this respect, both for our overarching cooperation and for our common energy goals. The actual implementation of several ambitious agreements will not be possible without a clear vision, a strong ownership and a true commitment by Georgia.

The EU is ready to assist and support you in this historic journey.

Thank you.



Energy Community and Harmonization with Energy Acquis



Georgia's Integration with the EU in Energy Sector

Murman Margvelashvili, IES/WEG

15 July, 2014

On June 27, 2014 the Association Agreement between EU and Georgia (AA), was signed to create a new framework for bilateral cooperation. This framework provides an important mechanism for Georgia's political association and economic integration with the EU. More specifically it envisages harmonization of legislation of Georgia with 300 EU legal acts.

An important component of the Association Agreement is cooperation in the field of energy (Section VI). This includes strengthening of energy security, convergence with the EU Energy Acquis, development of cooperation in such areas as Electricity, natural gas and oil exploration, production and transportation, renewable energy and energy efficiency. The agreement also provides the possibility for Georgia to join the European Energy Community.

Energy Clauses of Association Agreement

The cooperation provisions in the energy part of Association Agreement include the following key issues:

- Energy strategies and policies;
- Development of competitive, transparent and efficient energy markets allowing third parties a non-discriminatory access to networks and to consumers, following EU standards, including the development of the relevant regulatory framework, as required;
- Cooperation on regional energy issues and the possible accession of Georgia to the Energy Community Treaty in respect of which Georgia has a status of observer at present;
- Development of an attractive and stable investment climate by addressing institutional, legal, fiscal and other conditions;
- Energy infrastructures of common interest, in order to diversify energy sources, suppliers and transportation routes in an economic and environmentally sound manner;
- Enhancement of security of energy supply, increasing market integration and gradual regulatory approximation towards key elements of the EU acquis;
- Enhancement and strengthening of long-term stability and security of energy trade, transit and transport, and pricing policies, including a general cost based system for the transmission of energy resources, on a mutually beneficial and non-discriminatory basis in accordance with international rules, including the Energy Charter Treaty;
- Promotion of energy efficiency and energy savings in economic and environmentally sound manner;
- Development and support of renewable energies with a primary focus on hydro resources and promotion of bilateral and regional integration in this field;
- Scientific and technical cooperation and exchange of information for the development and improvement of technologies in energy production, transportation, supply and end

use with particular attention to energy efficient and environmentally friendly technologies, and

- Cooperation on nuclear safety, security and radiation protection, in accordance with the principles and standards of the International Atomic Energy Agency (IAEA) and the relevant international treaties and conventions concluded within the framework of the IAEA as well as in compliance with the Treaty establishing the European Atomic Energy Community where applicable

Georgia undertakes the responsibility within the defined timeframe to gradually approximate its legislation with EU legislation and international instruments in the following areas and specific directions:

Electricity

- DIRECTIVE 2009/72/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 July 2009 concerning common rules for the internal market in electricity.
- REGULATION (EC) No 714/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity
- DIRECTIVE 2005/89/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment
- DIRECTIVE 2008/92/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2008 concerning a Community procedure to improve the transparency of gas and electricity prices charged to industrial end-users

Natural gas

- DIRECTIVE 2009/73/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 July 2009 concerning common rules for the internal market in natural gas
- REGULATION (EC) No 715/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 July 2009 on conditions for access to the natural gas transmission networks
- DIRECTIVE 2008/92/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2008 concerning a Community procedure to improve the transparency of gas and electricity prices charged to industrial end-users
- REGULATION (EU) No 994/2010 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 October 2010 concerning measures to safeguard security of gas supply

Renewable energy

- Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources

Oil

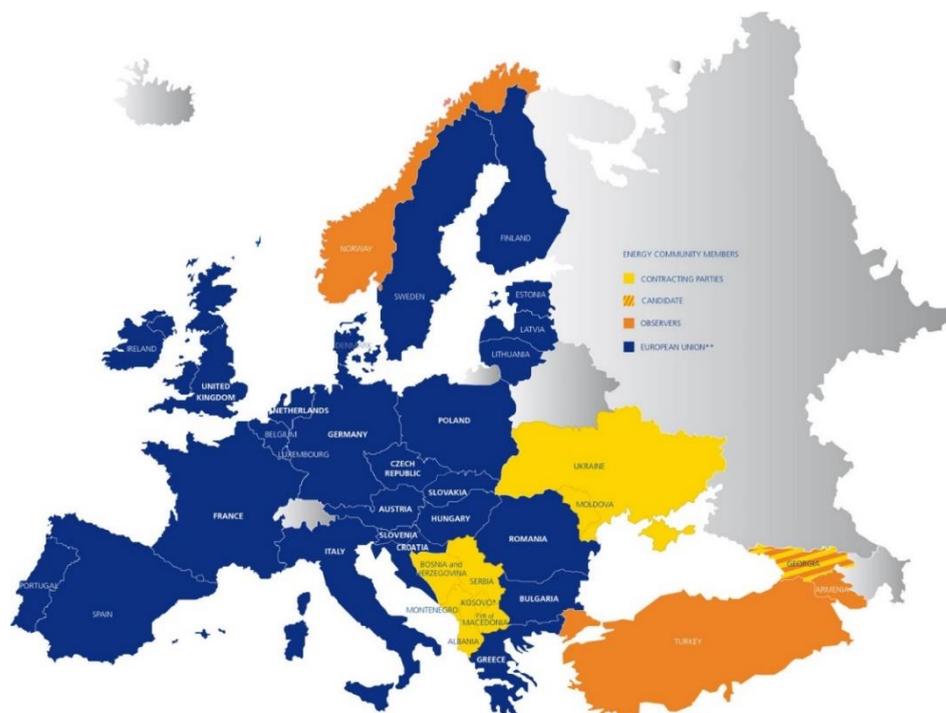
- COUNCIL DIRECTIVE 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products

Energy Efficiency

- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services
- DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings
- DIRECTIVE 2010/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products

Timetable: the Directive provisions shall be implemented in accordance with the timeline agreed by Georgia in the framework of the Energy Community Treaty. Should Georgia's accession to the Energy Community Treaty not become effective within 2 years of the entry into force of Association Agreement, a proposal for a timeline will be submitted to the Association Council no later than 3 years after the entry into force of this Agreement. As mentioned above, the main subject of EU-Georgia Association Agreement is the harmonization of legislative and regulatory environment of Georgia with the EU standards.

Picture 1. Map of the European Community



European Energy Community is an international organization that was established by signing the Energy Community treaty between the EU and 9 non-member countries in October 2005 in Athens, Greece. The Treaty entered into the force in July 2006. Georgia has been an Observer to the Energy Community Treaty since 2007. In 2013 Georgia expressed an interest in full membership and the European Commission launched official negotiation talks with Georgia on 20 Feb 2014.

Objectives of the EC are to:

- **Attract investment** in power generation and networks to ensure stable and continuous energy supply that is essential for economic development and social stability;
- **Create an integrated energy market** allowing for cross-border energy trade and integration with the EU market;
Enhance the security of supply;
- **Improve the environmental situation** in relation with energy supply in the region; and
- **Enhance competition** at regional level and exploit economies of scale.

More specifically the objectives of Energy Community are: a) in the short term - open and transparent energy markets, that will be implemented at the national level. b) Medium-term goals are the development of integrated regional markets and cross-border trade. C) The long-term goal – is the full integration into the common EU internal energy markets.

Why is the integration in Energy Community important for Georgia?

By signing the AA Georgia has already taken an obligation to implement the EU energy legislation package. The negotiations in the format of EC membership only define the timeframe and the conditions of implementation. If the EC negotiations fail, according to the Association Agreement, the same directives still have to be implemented. However, in this case this may have to be done with more rigid terms and conditions. Therefore it is more practicable to use the existing, more favorable framework of EC.

Negotiations in the Energy Community format has many positive sides and can bring important benefits for the country. In particular:

- The EC membership backed implementation of the European legislation and organizational structures creates a transparent and stable legislative and regulatory environment. This is an important precondition for attracting qualified strategic investors and boosting investment, as well as strengthening country's energy transit role and realization of important strategic projects.
- The membership of Energy Community is an important step towards political association and shows the maturity of the political choice. This should result in a higher degree of political support from European and Euro–Atlantic structures which is of paramount importance for country's security and independence.
- Membership of EC also increases the potential financial and technical support for implementation of European legislation. Georgia may have an opportunity to benefit e.g. from more favorable and longer-term credits from European Investment Bank (EIB)
- EC Membership requires, development of renewable energy sources and energy efficiency, protection of environment and competitive conditions, which in turn means the technical and structural development of the state and the society that should not be postponed. Implementing the joint projects with EC member states opens an additional possibility for the development of renewable energy in Georgia.

Thus, joining the Energy Community will help to reform the energy market, to implement the legislation on renewable energy and energy efficiency, to transit to "green energy". This will stimulate investment in energy sector from European and other countries. In the longer-term, Georgia will have the possibility to significantly contribute to energy security of the EU and the parties in the Energy Community Treaty, which will require considerable infrastructural investments.

Georgia's membership in the EC is consistent with the US energy policy in Europe and the principles of the US-Georgia Strategic Partnership Charter. Georgia's membership in Energy Community is also consistent with NATO's energy security interests. After country's joining the community the European Union will have more responsibility to respond to Russia's actions in the occupied territories.

It should be noted that in 2013 Russia offered Moldova to refuse joining the EC and offered reducing the gas price by one third, but Moldova rejected the offer. This shows once more the high political importance of this step.

Gas Supply in Georgia

*Teimuraz Gochitashvili, Dr of Sci, Professor
29 May, 2015*

Georgia is strongly committed to Euro-Atlantic integration. In September 2014 an Association Agreement with the European Union was signed and the negotiations on Energy Community membership (EC) are underway. The one main and obligatory requirement of EC membership is harmonization with the EU energy legislation and technical regulations, in order to form in Georgia the competitive energy markets, similar to the EU model.

The benefits of Integration with the Energy Community for Georgia include: improvement of investment environment, formation of transparent and liberal energy markets, implementation of European technical regulations that in turn are the prerequisite of higher quality and a necessary condition for compatibility European energy structures. Nevertheless, making prompt decisions without due consideration of some problematic issues related to this process might lead to significant negative results for Georgia. Some of the problems related to EC integration are analyzed below.

From the viewpoint of energy resources' supply, Georgia is a typical "island" with respect to European energy community. It does not have any common borders with the community and the existing infrastructure (including current and envisaged projects) is aimed to transit gas only in one direction. Thus, the opportunity for Georgia to get energy supply benefits like other EC members is quite limited compared to other EC member countries who are interconnected with each other through energy transit infrastructure.

Georgia has its longest border line with Russia, however the diplomatic relations are terminated with this country as it has occupied 20% of Georgian territory and has applied an

economic blockade. Russian Gazprom is a monopolist state exporter, which uses the natural gas as an instrument for political pressure on neighbor countries; For instance, Armenia, which receives gas through Georgia, buys this gas almost twice cheaper than the market price, thus industrial goods produced in Armenia (including electricity generated in thermal power plants, cement etc.) are in a privileged position, this will be a threat for Georgia (like it was in the years 2000-2006) if Georgia will be dependent on Russian gas. Winter of 2006 became an obvious example of Gazprom using gas for political goals: After sabotage of the two alternative branches of main gas pipelines on the territory of Russia, Georgia was cut off from gas supply for almost two weeks. Moreover, when after two weeks of energy blockade, through the efforts of Azerbaijan, it became possible to transit Russian gas through Azeri gas transportation system Gazprom stopped supplying Azerbaijan as well.

In addition, it is worth mentioning that Armenian government made a decision in favor of Eurasian Customs Union being lobbied by Russia. International community recognized Gazprom's gas policy in the region as the main factor forcing this decision.

Consequently, Russia as a gas supplier is unacceptable for Georgia today and in the foreseeable future, considering Georgia's integration with Euro-Atlantic structures.

Currently, and according to demand projections also in future, 90% of the total demand and 100% of socially sensitive consumers' demand can be satisfied by Azeri gas. The largest share of the gas supply is provided by state owned company – SOCAR. The affiliates of SOCAR also own the major share of Georgian gas distribution network (except Tbilisi) and dominate in the retail supply. SOCAR owns all main pipelines supplying Azeri gas to Georgia. These creates a high risk of the company owned by foreign government to acquire a monopoly position in Georgia's energy market.

Currently, the gas supplied by Shah Deniz gas consortium from SCP pipeline, based on the contracts for "Optional Gas" and "Additional Gas" play a significant role in ensuring the supplies to "social sector's (population and thermal power plants) and limiting SOCAR's monopoly in energy market.

The Optional Gas contract envisages only one type payment for the throughput over Georgian territory on gas distributed by SCP pipeline; the fee is proportional to the volume of gas transited through the territory of Georgia. All other taxes and charges are waived, except for the income tax for employees. In return, Georgia has an option to buy up to 5% of the gas volume transited at the price fixed by the contract.

Additional Gas agreement considers supplying up to 500 Mln cubic meters of gas through SCP pipeline until year 2026, at the price fixed in the contract, which is increasing annually by fixed escalation factor¹.

It has to be underlined, that the Host Government Agreement including the contracts on the Optional Gas and Additional Gas were signed with the account of existing market

¹ Interested readers can find the conditions of the host government agreement at the link: http://www.bp.com/content/dam/bp-country/en_az/pdf/legalagreements/SHA_eng_HGA_Host_Government_Agreement_Georgia__English_.pdf

conditions at the time of agreement, at the terms considered beneficial for all parties, Georgian government in particular, gave up the tax revenues in the amount of hundreds of million dollars. This decision was taken in order to ensure country's energy security, demonopolize the market and guarantee the supply of socially sensitive consumers with affordable fuel.

In relation to implementing the EU Energy Acquis, one should mention that building of the pipeline was finished in 2006 and as a "new infrastructure", with proper argumentation, can be subject to derogation under EU regulations,.

To sum up, in view of the following circumstances:

1. Georgian gas market is isolated from EC markets and is a typical "Island" from energy supply viewpoint;
2. Existing Optional Gas and Additional Gas contracts with international consortium ensure:
 - guaranteed supply of socially sensitive costumers at affordable fuel prices,
 - prevention of market monopolization or using gas as an instrument of political pressure by the foreign companies (SOCAR or Gazprom).
 - country's energy security (because of energy security Georgian government intentionally refused to receive financial income (not only from SCP, but also from ongoing BTC pipeline construction contracts)
 - Certain level of economic independence that will allow Georgia to continue moving forward Euro-Atlantic structures.

Therefore, if there are no significant changes in country's economic and political environment, Georgia must be granted the right of derogation in SCP pipeline-related issues for the contract period.

Conclusion

EC Membership and implementation of mandatory procedures can ensure competitive market formation, encourage new investments for improving the infrastructure and getting stable and uninterrupted energy supply, increasing of energy security and improving environmental conditionb. Altogether this creates a favorable environment for Georgia to be successfully integrated into Euro-Atlantic structures.

At the same time, because of geographical and technical isolation from the community's united energy market, Georgia, at this stage, cannot benefit fully from some of the privileges related to EC membership. Therefore, Georgia must be given the right of derogation in some regulations concerning the ability to maintain energy security and supply of the socially sensitive citizens with affordable energy. Namely country should be granted the right for derogation to maintain the benefits to be received under existing transit contracts; as well as an extended time period for market liberalization at least until 2021.

The Electricity and Gas Price Transparency in Georgia

Iago Chiabrishvili, WEG
29 May, 2015

Requirements of the Directive 2008/92/EC of the European Parliament and of the Council of 22 October 2008 on concerning a Community procedure to improve the transparency of gas and electricity prices charged to industrial end-users

The directive requires to ensure transparency of gas and electricity prices charged to end-users, through setting up the European Procedure on dissemination and disclosure of energy prices. The procedure is necessary, insofar as this information enables consumers to select between different energy types and also between energy sources. The transparency of energy prices also ensures a healthy competition in the domestic market and its efficient operation.

Directive 2008/92/EC replaced the previous Directive 90/377/EEC on 29 June 1990 with the same title, which underwent several significant alterations during the years.

Pursuant to the directive in force the EU member states shall guarantee that enterprises providing industrial end-users with gas and electricity communicate the following information to the Statistical Office of the European Communities (Eurostat):

- The prices and terms of gas and electricity sale to industrial end-users;
- The price systems applied;
- The breakdown of consumers by categories and corresponding volumes⁷⁵

In the countries where the supply to industrial consumers is done by more than one entity, the information shall be provided by an independent statistical body. The prices reported must be the prices paid by industrial end-users in accordance with the categories defined in Annex I and Annex II of the directive, on the basis of range of annual energy consumption⁷⁶.

These prices are collected twice per year (January and July) and reflect average prices paid by industrial end-users during previous 6 months. They are to be expressed in national currency per gigajoule (for gas) and per kilowatt-hour (kWh) (for electricity). These prices must include all charges payable except initial connection charges. Three levels of costs are to be provided:

- The price excluding taxes and levies;
- The price excluding VAT and other recoverable taxes;
- The price including all taxes, levies and VAT.

These data, drawn up in conformity with the methodology described in Annex I and Annex II² shall be sent to Eurostat and the competent authorities of the Member States within two months. On the basis of these data Eurostat shall publish each May and each November, in an appropriate form, the prices of gas and electricity for industrial users in the Member

² Annexes to 2008/92/EC ANNEX I Gas prices (j),(n), ANNEX II Electricity prices (j),(o)

States and the pricing systems used to that end. Once a year the Commission shall deliver a summary report on the performance of this directive to the European Parliament, the Council and the European Economic and Social Committee.

In addition to the above:

Once every two years, information about data collection system shall be communicated to Eurostat;

- Once in two years EUROSTAT should be informed about the system for data collection
- Once per year, together with the January price reporting, information about the factors affecting the prices shall be communicated to Eurostat;
- Once per year, together with the January price reporting, the rates and method of calculation as well as a description of the taxes levied on sales should be reported to Eurostat;
- Once per year a breakdown of electricity prices into their main components shall be communicated to Eurostat.

Keeping in mind that the cost paid by industry for the energy affects its competitiveness and should therefore remain confidential, the system used by Eurostat ensures that transparency is not an obstacle to confidentiality.

In particular, Eurostat shall not disclose data which might, by its nature, are subject to commercial confidentiality. Such confidential statistical data transmitted to Eurostat shall be accessible only to officials of Eurostat and may be applied solely for statistical functions. They may be published in an aggregated form which does not enable individual commercial transactions to be identified.

On the basis of information collected by Eurostat, proceeding from the situation in the internal market, the commission shall, where appropriate, make a decision on appropriate actions or other proposals.

The Current Environment

Three distribution companies are active in the Georgian wholesale market – “Telasi”, “Energo-pro-Georgia” and “Kakhetis Energodistribucia”, whose marginal rates for consumers, including industrial end-users, are being set by an independent regulatory body -Georgian National Energy and Water Regulatory Commission (**GNERC**). In conformity with the latter’s Resolution # 20 of 18 September 2008, retail consumer has the right to buy electricity both from distribution licensee and from a small power plant according to duly executed agreement on electricity purchase. According to the ESCO official web-page, the number of such power plants in Georgia is up to 47. Due to the confidentiality reasons, it is not possible to get accurate information about the tariffs agreed in direct contracts between the consumer and producer.

Nevertheless, there is an evidence that the number of such contracts is small due to the different reasons. In future, in view of further liberalization of the electricity market, the

number of direct contracts will probably increase and the tariffs will be settled. Hence, while implementing the directive 2008/92/EC special attention should be paid to the accuracy of data presented by distribution companies to “GEOSTAT”. Currently the information about the electricity sold under direct contracts is accumulated at Electricity System Commercial Operator (ESCO), which uses this data to balance the electricity market. The possibility of its participation in statistic data collection process, at least with the aim of data comparison, needs to be further researched.

More than 37 companies are involved in natural gas supply activity, however, most of them are owned by SOCAR Gas Georgia (SOCAR Gas), which holds 35% of the market. In accordance with the Order No. 69 of 25 September 2007 of the Georgian Minister of Energy “On Deregulation and partial deregulation of activities in the gas supply”, the gas supply for legal persons (commercial sector) is deregulated, i.e. is not subject to regulation from GNERC. This, of course, causes diversity of prices for industrial consumers and the possibility of selective approach from the gas distributor. In contrast with electricity sector, there is no commercial operator in the gas sector and there is no effective system of control over direct contracts, which causes problems in gathering data about prices. The GNERC, which receives quarterly and annual reports from gas suppliers, should somehow engage in this process. If the reporting forms will be amended properly, in line with 2008/92/EC directive requirements regarding the prices for end-users, GNERC will easily detect inconsistencies in reports presented by gas distribution companies to the statistics office. It is noteworthy that pursuant to the Law of Georgia on Electricity and Natural Gas “the methodology approved by the Commission and tariffs set under this methodology shall protect consumers from monopoly prices” (Article 43.1.a). The existence of monopoly supplier (SOCAR-Gas), which is not subject to settling, contradicts to this demand. Consequently, it should be the GNERC function to control this aspect.

Main Problems and Challenges

As mentioned above, the number of industrial end-consumers, enjoying the right of direct electricity procurement from deregulated power plants is really low. This has a range of subjective reasons (shortcomings on legal, regulatory and management levels) analysis of which is beyond the scope of this article. In view of the practical absence of competition in electricity market (three influential territorial distribution companies instead of independent retail suppliers) it becomes clear that at this stage submission of the data to Eurostat, as required by the directive 2008/92/EC would be rather symbolic than of practical value.

It should be noted also that recently the number of direct consumers (whose yearly consumption is above 7 million kWh) in the electricity market has decreased. In 2006-2010 there were 10 direct consumers, while today only 5 remain. The rest buy electricity from distribution companies. There are two vertically integrated entities in Georgia – “Telasi” and “Energo-Pro-Georgia” owning generation, distribution and also supplying electricity; i.e. the market transparency is only symbolic.

The situation in the gas sector is even worse, as the number of direct consumers is also limited. The main distribution companies – “SOCAR Georgia Gas” Ltd and “Saqorgas” (former

“Itera” distribution companies, owned by SOCAR), and “Kaztransgas” Ltd remain also the main suppliers. The small distribution and supply companies are fully dependent on large main distribution companies. According to the Article 1(1.2) of the Natural Gas Market Rules⁷⁹ approved by Ministerial Order #114 of December 29, 2006, the Market Rules regulate the relations between natural gas providers, transmission and distribution licensees and direct consumers. However, paragraph 4 of the same Article further specifies that “the relations shall be settled by these rules in accordance with equality and freedom of will principles provided for in Georgian law, except for the cases when the supplier or/and the licensee has a dominant position in the market”. This is a clear admission of inequality.

On the other hand, “Natural Gas Supply and Consumption Rules” approved by GNERC Resolution #12 of July 9, 2009, also regulate the relations between natural gas providers and distribution licensees (Article 30). It also offers guarantees for unhindered access to the marketplace of new suppliers to secure a competitive environment for gas supply (Article 4, par.26). However medium and small suppliers, who buy gas from the above big distribution companies, cannot compete with the latter’s subsidiaries.

How to assure the compliance with directive Requirement?

Taking into account the requirements of directive 2008/92/EC the Georgian Government (Ministry of Energy) must develop and implement the data compilation system to be presented to Eurostat and should create an appropriate legal framework (develop legal instruments) to reflect the directive requirements.

Gas and electricity supplier companies shall be obliged to prepare the data according to 2008/92/EC directive requirements and present to the National Statistics Office of Georgia (Geostat) and to GNERC. Besides, Geostat shall develop a form and standards of cooperation with gas and electricity supply companies. Work out reporting methodology for undertakings, supplying gas and electricity to industrial end-consumers.

Geostat and GNERC shall participate in international cooperation with regards to price statistics as provided in 2008/92/EC directive.

Given the importance of accurate price statistics for proper development of retail markets the law should provide for administrative liability for presenting incorrect statistics.

Ministry of Energy of Georgia and GNERC shall ensure changes in market regulations to eliminate direct relations between monopoly supplier and a consumer, and destroy non-transparent environment in this sector.

Reforms in the Electricity Market

*Nino Maghradze, WEG
29 May, 2015*

Below we discuss the directive 2009/72/EC of 13 July 2009 on common rules for the internal market in electricity and regulation 714/2009 on conditions for access to the network for cross-border exchanges in electricity, implementation of which is a compulsory condition under the Association agreement.

The Third Package of energy directives establishes common rules for generation, transmission, distribution and supply of electricity, together with consumer protection, through improving and integrating the competitive electricity markets in the Community. It lays down the rules relating to the organization and functioning of electricity sector, open access to the market, criteria and procedures applicable to calls for tenders and granting of authorizations and the rules system operation. It also lays down universal service obligations and the rights of electricity consumers and clarifies competition requirements.

Below are the requirements under the directive and description of respective situation in Georgia:

Construction of new generation capacity, member States shall adopt an authorization procedure, which shall be conducted in accordance with objective, transparent and nondiscriminatory criteria. Details of the tendering procedure shall be printed in the Official Journal of the European Union at least six months prior to the end date for bids. Tender specifications shall contain a detailed description of the contract specifications and of the procedure to be followed.

To ease the construction of new generating capacities in Georgia, the government passed a resolution which sets out the procedures for expression of interests in building operation and ownership of power plants. The Ministry of Energy announces a call for expression of interests on a specific project or a call can be announced based on interest in specific project. After the expression of interests a memorandum shall be signed between the Georgian government, "Electricity Systems Commercial Operator" and the successful bidder. The Memorandum an agreement of parties' on cooperation. Essential condition for the construction, ownership and operation is the annual sale of 20% portion of generated electricity, during winter months, on the domestic market for 10 years after commissioning of the power plants³.

The terms of memorandum vary from case to case and are not fixed in any law or regulation. E.g. the principles of price offering for domestic electricity sales are not defined. Therefore, the existing Expression of Interest procedure is not transparent and competitive and needs further improvement.

³ This condition can also vary from case to case.

- **Three main options of unbundling in transmission systems:** unbundling transmission system ownership, assignment of Independent System Operator (ISO) and Transmission System Operator (TSO) ;

In Georgia formation of a transmission system operator takes place on the basis of “Georgian State Electricity System” (GSE). But there are two more transmission companies operating in the state (“Sakrusenergo” and “Energotrans” Ltd.), that own high-voltage transmission lines. Hence it is not clear how the system operator is going to be organized.

One of the requirements to the transmission system operator is to prepare a **Network Development 10 year Plan**.

GSE has completed the 10 year development plan of the transmission network in April 2015 and submitted to the regulatory commission⁴.

- **Third-party access on a nondiscriminatory basis**, which also implies quality and safety of supply and environmental protection. Nondiscriminatory access by third parties shall be guaranteed except for the case when it lacks the necessary capacity to meet technically and economically justified criteria.

New users and generation plants in Georgia, often have to upgrade part of the distribution network and to invest in other infrastructure. Although Regulatory commission has set a strict price for connection to the network, there is no other regulation defining the rights and obligations of the parties in order to avoid the subjective approach by distribution companies to new users and generation plants;

- **Creation of distribution system operator**, which may also be functioning under transmission system operator, in case of insufficient resources. Legal and functional unbundling is compulsory when it has more than 100 000 consumers and/or is a small isolated system.

We have no independent distribution system operators in Georgia. All network operators are suppliers and practically the sole suppliers at the same time, which violates the above requirement of unbundling the activities;

- **Unbundling of transmission and distribution systems from generation and supply sectors.** The main objective is to avoid any conflicts of interest so that the interests of all stakeholders are observed.

There are problems in Georgia in this regard too. In particular, “Energo-pro-Georgia” Distribution Company, (which supplies electricity to 75% of Georgian population) owns 1 thermal power plant, 9 medium-size hydro-power-plants and 2 small hydro-stations. The memorandums signed by the government with Inter RAO UES and Energo-Pro on long term tariffs for respective distribution companies violate the principles of unbundling. E.g. Distribution Company in Tbilisi and generation company Mtkvari are considered as parts of one commercial undertaking under memorandum)

⁴ By the time of this publication the Plan is approved.

- **Market opening for promotion of competition in the internal electricity market.** All large non- household consumers should have free choice of supplier.

In Georgia market is open for the users consuming over 3 million kWh a year. Pursuant to Georgian parliament Resolution on main direction of energy policy, in 2017 the market shall be open for consumers above 1 million kWh/a consumption [4]. However, the openness of the market does not work in practice. The number of direct consumers, declines every year, the main reason being a absence cheaper energy suppliers. As per market rules, the cheapest energy first goes to distribution companies and direct consumers often rely only on balancing electricity. The price of the latter, especially in the winter period, exceeds the regulated sales price set by a regulatory commission. Therefore the companies prefer not to remain direct consumers;

- **Upgrading of distribution networks, smart grids and metering system.**

Transmission network in Georgia is being renovated. However, complete modernization requires huge investments. One of the prerequisites for transferring to the retail market is the introduction of so called “smart” meters on wholesale level. Nowadays all qualified entities in the Georgian electricity market (distribution companies, direct consumers, generation licensees, and small power-stations) have been equipped by so called “Alfa” meters, with half-hourly transfer of data to upper level SCADA system. If some consumer decides to register as direct consumer, he will have to install this meter bay as an initial investment;

- **The regulatory authority shall ensure high standards of public service obligation in electricity supply, contributing to the protection of vulnerable customers.** This shall include e.g. the possibility of late of payment, etc.

The regulatory authority has set so called social tariffs however this may be regarded as a harmful practice of manipulating tariffs. This is not an efficient tool, especially when it comes to protection of socially vulnerable population. Moreover, there often are cases when solvent population enjoys these benefits;

- **The European Commission believes Energy policy documents of member states are of strategic importance.** Energy deficit in member states necessitates developing of action plan or/and other appropriate documents.

Energy policy has been developed in Georgia, which is submitted to the Parliament for consideration and approval; work on energy strategy is underway and has to be completed at the end of 2015⁵;

- **The increased role of regulatory authority in regulation of internal market.** *There is some progress in Georgia in this matter; in particular regulatory body the market monitoring function has been returned to GNERC. The independence and professional level of the regulatory body needs to be strengthened further, since a strong regulatory body constitutes grounds for long-term stability and improved investment climate. It is noteworthy*

⁵ Approved by the parliament on June 24, 2015

that Georgia, meets EU basic requirement – independence of regulatory authority, which is provided in the directive;

- **Facilitate cross-border cooperation** to secure the supply of all energy sources at competitive prices. It is necessary to develop specific mechanisms of compensation for the excess of transmission and set harmonized principles for cross-border trade prices and allocation of transmission capacity.

Georgia has separate documents for relations with each neighbor state. Among them are the agreements with Turkey on cross-border trade and interconnection, providing for capacity allocation on the new Black Sea transmission line. Significant projects were implemented during recent decade in terms of developing cross-border contacts, including the Black Sea regional transmission line, within which Gardabani - Akhaltsikhe, Zestafoni - Akhaltsikhe and Akhaltsikhe -Turkey border lines were rehabilitated/constructed and 500 kW substation (with DC insert) was constructed. Also, construction of transmission trunk line with Azerbaijan has been finished, and construction of “Kazbegi” transmission tie line with Russia is underway. Rehabilitation and restoration of high-voltage sub- stations are permanently carried out to ensure uninterrupted and reliable provision of electricity;

- **Establishing the European Network of Transmission System Operators (ENTSO-E).** This organization elaborates and establishes network codes, ensures coordination of network operations. Turkey joined this organization last year as associated member, since it is not a member of either EU or European Energy Community.

Georgia will have to make a lot of effort to achieve the same. Notably, Georgia needs to introduce the regulations, which apply in Turkey’s relations with ENTSO-E member states, at least on Georgia-Turkish border area. The Grid Code is being implemented in Georgia and its four chapters were adopted. There is ongoing work on remaining two chapters. Cross-border trade (electronic auction) and day ahead mechanisms using web platform were implemented.

Implementation of electricity directives is a time-consuming process, accompanied by many problems. In the case of Georgia these are:

- First of all Georgia has no land border with EU member states. Although, it is possible to export electricity via Turkey;
- Existence of vertically integrated undertakings in power sector and the memorandums signed by the government with their holding companies conflicts with the EU principles. In addition, under the memoranda signed with power plants under construction, capacity allocation for export over Black Sea transmission line is planned for many years ahead, whereas in EU member states cross-border capacity distribution is never planned for more than one year;
- The issue of power supply to Georgia’s conflict areas. More the 45% of Georgia’s power generation comes from Enguri and Vardnili power plants, located in conflict areas, which creates a threat to unimpeded and secure electricity supply;
- The EU allows certain member states (with small, isolated systems, depended on one supplier, or/ and where implementation of any provision prevents system operation, or/and may cause serious economic and financial losses) to apply for derogation from

certain obligations. In particular this refers to unbundling, third party admission, open market requirements etc.

- Out of a large range of recommendations, the following are important to be implemented in Georgia:
 - Establishment of market model adjusted to Georgian conditions, to meet competition and unbundling requirements resulting in market liberalization and transparency. Development of laws and regulatory instruments regarding market rules (rules of mutual settlements and balancing), and commercial (use of the system, connection and agreement on support services) and technical (transmission, distribution rules) regulations. Besides, the improvement of the existing legislation is needed;
 - Increase the role of the regulatory commission, in particular in terms of market functioning and cross-border trade;
 - Develop the market for ancillary services (balancing, reserve capacities, frequency regulation etc.) Which is a prerequisite for secure and quality electricity supply;
 - Establish sufficient level of transmission and distribution components of tariffs as to insure smooth operation of transmission and distribution network;
 - The implementation of effective measures to protect the interests of vulnerable population;
 - Encourage renewable energy generation and enhance energy efficiency, supporting activities;
 - Develop incentive mechanism for additional capacity building, including both, the additional cost of electricity produced, and tax incentives and competitive tenders announced by the government.

It should be underscored that electricity market liberalization in Europe took place in stages, which required three packages of respective energy directives. Georgia will have to go through all these stages for final reform. However, thorough evaluation of such decisions, scrutiny of each requirement's costs and benefits needs to be carried out prior to making specific steps for their implementation.

European Legislation Requirements in Oil and Gas Sector

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29 May, 2015*

The main purpose of European regulatory documents in the oil and gas sector, that the Georgian energy legislation should be to harmonized with, is the creation of a single liberal energy market with the agreed tariffs, to facilitate the cross-border movement of hydrocarbon resources, free trade under maximum transparency conditions, unimpeded and nondiscriminatory access of third parties to the existing infrastructure, and energy security for each country's, as well as the EU. Directive 2009/73/EC establishes common rules for transmission, distribution, supply and storage of natural gas. One of its primary goals is to

support competition at common internal European market, as well as stimulate cross-border energy links, non-discriminatory, transparent, common long term tariffs.

Article 3 of the directive provides that Member States shall ensure, on the basis of their institutional organization, achieving a competitive, secure market in natural gas, and shall not discriminate between those undertakings as regards their rights or obligations. Deviation from this clause of the law is permissible only provided that competition rules are not broken.

The only effective instrument for ensuring competitiveness, according to the directive, shall be unbundling of transmission systems and transmission system operators from other infrastructural activities, for both, local and other states' undertakings (see. Articles 9 and 11 of the directive). Unbundling implies effective delineation of activities in the fields of transmission and distribution from competitive activities (associated with both the retail and wholesale trade: production, supply and import), to exclude the discrimination in a competitive market.

Three models of unbundling are compliant with the third package of directives:

Ownership unbundling; designation and functioning of Independent system operators (ISO) and Independent Transmission Operators (ITO). Under certain circumstances, states may make a choice between them:

- In case of ownership unbundling model, vertically integrated undertakings will have to alienate gas pipelines that are in their possession. Producers and suppliers will have the full right to decide to whom, how, and at what price to sell the pipelines. However, in this case the producers and suppliers will not have the right to own a majority stake, to appoint a member of the governing body (board), etc. at Transmission System Operator Company;
- In case of **ISO** model suppliers still can own transmission infrastructure, but the decisions about operating, maintenance and investment planning shall be entrusted to another – independent company. Vertically Integrated Undertakings' basic task will be to ensure fundraising and meeting investment commitments. It is the task of an independent operator company to operate transmission system, technical maintenance, planning and investment mobilization. The ISO option shall be subject to approval by the Regulator and the government of an appropriate state;
- In case of **TSO** model Vertically Integrated Undertakings can own and operate the networks, but the control of all the activities related to the operation of networks shall be carried out through another undertaking, to take all the decisions independently. The Supervisory Body shall be in charge of the owner's financial interests, monitoring of the implementation of agreed program, not interfering with the day to day activities of the transmission system operator.

Transmission System Operator shall enjoy effective decision-making rights, independent from the vertically integrated undertaking, with respect to assets necessary to operate, maintain or develop the transmission system; recruit the personnel (who shall have no financial interest in Vertically Integrated

Undertaking); shall not joint real estate (office) or IT system in common with any vertically integrated undertaking; Transmission System Operator is obliged to invite independent auditor.

The directive also deals with the introduction of compulsory standards with regards to admission of third parties to the gas storage facility and improvement of the legal framework of operation in the retail market; Implying increased transparency and improvement of consumer protection rules (Articles 3.6 and 41), ensuring the possibility of opening the market and vendor selection (26.3) and an increase of the role and powers of regulatory authorities.

ACER (Agency for the Cooperation of Energy Regulators) and **ENTSO-G** (European Network of Transmission System Operators (gas)) have been established to support coordination and harmonization of relevant issues, develop and implement uniform commercial and technical codes and safety standards.

Similar to the market models of developed European states, transmission and distribution of natural gas are regulated and wholesale supplies of natural gas – deregulated in Georgia⁸⁰. According to Georgian legislation distribution of natural gas and its supply are different types of activity, although the distribution licensee is not prohibited from engaging in the supply. Hence, *distribution licensees, at the same time, are market suppliers, which complicates competition and inclusion of an alternative supplier in this market sector.*

Pursuant to the EU directive 2009/73/EC, when more than 100 000 consumers are connected to the distribution network, distribution and retail supply companies shall be independent entities and they shall be separated. There are three licensees of such distribution in Georgia: “Kaztransgas Tbilisi”, Ltd., “SOCAR Georgia Gas” Ltd. and “Sakorggas”. Under the EU directive other 24 licensees in natural gas do not need such separation of supply and distribution.

The expediency of promoting competitive market principles is declared in the Law of Georgia “On Electricity and Natural Gas” (see. Article 1). However, there are no commitments or mechanisms of achieving this goal in this or any other law or regulation.

According to preliminary estimates, implementation of this directive in Georgia requires serious preliminary work. Different articles of the directive will affect the functions and activities of the Ministry, regulatory authority, Georgian Oil and Gas Corporation (GOGC), Gas Transmission Company (GGTC), subsidiaries of leading international companies (SOCAR) working in this sector, “Kaztransgas Tbilisi” and other players. Besides, as mentioned above, the structure of the local market, basically meets, except some nuances, the directive requirements. Presumably, basic changes will affect distribution companies (SOCAR subsidiaries and Kaztransgas Tbilisi), whose activities – distribution and supply - shall be carried out by two independent entities, separated from each other at least on legislative level: distribution system operator, who will be isolated from retail (and wholesome) supply, and a retail supplier (the exception applies to the above mentioned undertakings with more than 100 000 consumers).

The directive allows for certain exemptions for new member states. This refers also to the cases when a state is not directly linked to another member states' networks and more than 75% of supplies are carried out by one supplier and where additional energy security risks may occur. In addition, when building new infrastructure, high risk investments will either prevent the inflow of capital or will increase the competition conditions, like it happens in case of South Gas Pipeline. Also, in order to secure derogation, unlimited competition conditions shall be safeguarded, and the regulatory authority shall make decisions, taking into account supply security and specific market conditions (e.g. as it is in Georgian market, when SOCAR, under terms of a single contract for gas supplies also provides seasonal balancing services).

Regulation (EC) #715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions of access to the natural gas transmission networks

Among the objectives of the Regulation is the establishment of third-party unimpeded and nondiscriminatory access services, the determination of transparency requirements, objective technical and economic criteria for third-party access and related dispute resolution.

It is implied that uniformity of tariffs should facilitate cross-border trade and the transmission system operator, as well as regulatory authorities should try to change the structure and the principles to achieve consistency of non-uniform tariffs.

It is impossible, without detailed scrutiny, to conclude on how smoothly this regulation could be implemented in Georgia, and how much time it would take. In particular this refers to the articles, according to which in determining tariffs the actual costs, including the investment component, and transparency, as well as compliance with best international practice should be taken into account. As is well known tariffs in the Georgian natural gas market are often determined on the basis of memoranda between the government and gas companies. These memoranda also provide for seasonal supply and consumption balancing, and other terms, which are conditioned by not only economic parameters, but also by considerations of energy security and other technical, social and political factors.

In terms energy resource supply Georgia is isolated from Energy Community member states. It has no common border with any of these states and hence no direct contacts with them. Besides, the existing infrastructure, designed for unidirectional gas flow, makes it impossible, at this stage, to benefit from it, as is the case with member states, directly connected to a single network.

“Gazprom” – the Russian gas exporter national monopoly - which, by its technical capabilities can be the largest gas supplier to Georgia, frequently uses gas as an instrument for political influence. In particular, for Armenia, where gas is supplied through Georgia, tariffs are much below the market price. This makes goods produced in Armenia, including electricity, much cheaper thus making our economy uncompetitive. Diplomatic relations with Russia are terminated because of 2008 military aggression and annexation policy. Therefore, participation of Russia in internal market is not under consideration. Georgia gets from Russia only 10% of total consumed gas as compensation for transit to Armenia

(about 90% of Georgia's total requirement and 100% of "socially vulnerable" ⁶population's requirement are met with Azerbaijani gas.). In all probability, this trend will continue in the future.

Most of Azerbaijani gas supplies is implemented on the basis of the memorandum and the agreement between the Georgian government and SOCAR - Azeri state gas company. SOCAR subsidiaries own most of Georgia's distribution networks (in fact everywhere, except Tbilisi) and they also prevail in retail supply. SOCAR owns all main gas pipelines in Azerbaijan, through which gas is supplied to Georgia. However, ignoring the current gas supply patterns and full-scale liberalization with the view of convergence with the European market would need good preparation, as it may cause significant problems related to energy security, and create problems with our strategic partner – Azerbaijan. This issue needs in-depth examination and, appropriate steps with due consideration of the legitimate interests of all stakeholders.

Gas supplied through the SCP pipeline on the basis of Option and Additional Gas Supply contracts by Shah Deniz international consortium, plays an important role for guaranteed supply of the market social sector and limiting the monopoly in the local market. Option and Additional gas contracts were signed in 2001-2003 on the basis of present and forecasted market conditions. The contracts were signed on mutually beneficial conditions. In particular, the Georgian side virtually gave up taxes required by law, thus ensuring energy security of the country and guaranteed supply of gas to socially vulnerable consumers. Today annual option and additional gas supply are 700-800 m³, which is 35-40% of total consumption in Georgia. According to the agreement with SOCAR this amount of gas is passed to Azerbaijani side for further supplies, adjusted for seasonal variation of demand.

For energy security and de-monopolization of the marketplace, and to guarantee gas supply to socially vulnerable population, it would be advisable that Georgia requests derogation rights in the matters, related to SCP pipeline. In particular, it is desirable that Georgia demanded exceptions in relation to existing transit-related sales contracts and/or rights of non-proliferation of this standard for the projects, outside of its regulation.

As an outcome of preliminary analysis, it can be said that Regulation 715/2009 requirements may be introduced in Georgian legislation after 2020 – that is when launching of Shah Deniz 2nd phase supplies to Turkey and Europe are planned. Also, by then Georgia will already possess a strategic reserve storage facility, on which they are already working.

Oil and Petroleum Products

Directive 94/22/EC 30/06-1994 on the conditions for granting and using authorization for the prospection, exploration and production of hydrocarbons

The directive establishes a common framework for granting authorization and management of prospecting, exploring for and producing hydrocarbons for member states. The primary

⁶ This includes total population; also thermal power plants, owned by different local and international companies.

aim is to ensure transparency of all the operations related to granting authorization and its availability to all entities, having appropriate financial and expert capacities. The directive requires that the granting of authorization is established on the publicized criteria. It also imposes restrictions and requirements, justified by national security and public safety; financial contribution to be fixed in such a way as not to interfere in the management of entities and to be used in a non-discriminatory way, monitoring the activities of entities only to the extent necessary to ensure their compliance with obligations.

Georgian legislation basically complies with these requirements, in particular pursuant to the Law "On Oil and Gas" access to prospecting is granted only for the blocks announced by Oil and Gas Regulatory Agency on the basis of the terms of public tender. However, some minor innovations, including those of technical character, will have to be reflected in the Law "On Oil and Gas" and in the bylaws (e.g. "National regulation of oil and gas operations"). In particular, under Georgian law, a notice inviting applications to participate in a competition is published 45 days before the end date for the applications, whereas the directive requirement is 90 days between the day of announcement in the Official Journal of the European Union and the deadline for submission. Overly, the criteria to determine the winner, have to be published before or after the tender announcement, but prior to starting the procedure.

The Directive, in contrast to Georgian legislation, permits granting authorization without initiating a tender in exceptional cases, for example to the holder of an authorization for a contiguous area, in reasonably justified cases.

Pursuant to the directive, one of the main criteria is the applicant's technical and financial capability, whereas in Georgian reality the amount of proposed financial compensation is determinative for making the determination. It is likewise needed to inform unsuccessful companies, on their request, about the causes of their bankruptcy.

Georgian legislation should also reflect the commitment of member state authorized agency (Oil and Gas National Agency) to publish and present to the European Commission its annual reports, including the information on the updated assessment of reserves.

Directive 2009/119/EC imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products

This directive sets the rules for ensuring a high level of security of oil supply to the Community through reliable and transparent mechanisms based on solidarity amongst Member States, maintaining minimum stocks of petroleum and/or petroleum products and putting in place the necessary procedural means to cope with severe deficits.

The basic requirement of the directive is that the total oil stocks held at all times within the Community for their benefit correspond, at the rattling least, to 90 days of average daily net imports or 61 days of average daily inland consumption, whichever of the two amounts is more outstanding.

Given the specifics of our country (Georgia has neither strategic storage, nor oil refinery), one of the ways to implement the directive would be to oblige the retail and wholesale

suppliers of petroleum products to ensure appropriate stocks. Most likely it will require them to make additional investments in these stocks and will reduce the operational storage capacity.

If the directive is enforced in such a way, legislative changes and appropriate steps by the companies will be required. Besides, these activities will cause some increase of prices, which is why consultations with the companies would be advisable. Appropriate state monitoring is necessary. The possibility of building a storage facility by the state should also be thoroughly studied before taking final decision.

Energy Efficiency Regulations in Buildings EU Directives

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21 May, 2014*

Implementation of the EU-Georgia Association Agreement is followed by prolonged and important process of harmonization of Georgian legislation with EU Acquis. Along with other legislative acts, energy efficiency regulations are especially important. As a result of contemporary patterns of energy consumption along with the transport sector, energy efficiency legislation gives the most important role to energy efficiency in buildings.

EU directive on Energy end-use efficiency and energy services (EU Directive 2006/32/EC) clearly defines energy efficiency as interrelation between energy consumed and the resulting services or products. Energy efficiency is a set of measures that makes it possible to provide more services and products using the same energy or to produce the same output using less energy.

The importance of energy efficiency was first highlighted in the Messina declaration in 1955, as an instrument of supplying affordable energy to the European economy. However, in accordance to evolving global challenges, the definition of energy efficiency has been expanded and it has acquired an importance of an instrument for energy safety, environmental protection, social equality and regional development.

Unfortunately, in Georgia, due to a number of subjective and objective reasons, legislation on energy efficiency including legislation of energy efficiency in buildings, does not exist.

Therefore, after Association Agreement comes into force, the main task instead of harmonization will be the formation of legislation anew.

Relevant EU legislation consists of three directives as follows.

- EU directive 2006/32/EC –Energy end-use efficiency and energy services



- EU directive 2006/31/EC –Energy performance of the buildings
- EU directive 2010/30/EC - energy product labeling

The fourth - **Directive 2009/28/EC on the promotion of the use of energy from renewable sources** can be grouped with these three since it also partly regulates the issue of renewable energy use in buildings.

Let us consider them separately:

EU directive 2006/32/EC –Energy end-use efficiency and energy services

The Directive promotes improvement of energy efficiency of end-users. It requires, among others, the adoption of indicative energy savings targets and National Energy Efficiency Action Plans (NEEAPs), promotes the exemplary role of the public sector, setting-up of energy efficiency criteria in public procurement, energy audits, procedures for monitoring and verification of energy savings, and other measures to promote energy efficiency and energy services . Also it should be noted that, national governments are responsible for developing the sources and instruments for financing energy efficiency measures.

EU directive 2010/31/EC - Energy performance of buildings

This directive is the foundation of energy consumption in buildings, and thus of energy efficiency. It aims at making buildings’ structural and utility systems compatible with the local climate conditions and at due consideration of operational and Indoor climate and Economic profitability requirements. According to this directive, the parties must meet the minimum requirements for building energy systems of existing and new buildings. In addition, they must ensure certification of buildings’ energy systems that considers regular inspection of the utility systems (Boiler rooms, ventilation, air conditioning etc.) in buildings.

According to the directive governments have the following obligations:

- Develop and implement the methodology of measuring energy performance of the buildings, including zero energy buildings, with the account of their regional location
- Draw up national plans for increasing then number of nearly zero-energy buildings.
- Creation of financial incentive schemes
- Determine procedures for inspecting of building utility systems, their certification and its visibility
- Create of an independent expertise and controlling body.
- Organize information campaigns

EU directive 2010/30/EC – on labeling of energy related products

The main purpose of the Energy Labelling Directive 2010/30/EU is to establish a harmonization framework for labelling the energy consuming equipment which will give the user the needed information about energy efficient product.

The directive defines an obligation for producers and suppliers of all energy consuming equipment, determines criteria for state procurements and penalties.

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources

This Directive establishes obligation for member states to create the action plan about using renewable energy resources. In particular, the reflection of the use of renewable energy activities in construction norms and rules.

The development of legal framework of Energy efficiency in buildings is very complex and multi-disciplinary challenge and the involvement of financiers, economists and engineers with international experience largely determines the success of the process.

Environmental Requirements - Georgia in Energy Community

Nino Chkhobadze, Greens' Movement

21 May 2014

European Energy Community (EC) was formed in 2006, in order to reorganize European energy sector and to integrate East and Southeast countries' energy systems, thus the aim was to form united European energy market.

Energy community is considered to operate during 10 years and it consolidates 73 mln population of regional energy markets.



The Community first of all, considers national legal framework of member countries to be harmonized with the European Union legislation. This is a necessary condition for forming united European energy market in the future (for consolidation of regional markets).

Georgian government made a decision to integrate with European energy community. In order Georgian energy sector to integrate with European energy sector a number of internal reforms are needed:

- establishment of high technical standards
- implementation of modern rules for governance and regulation
- attracting new investments

- Encouraging competition on domestic energy market etc.

One of the main issues is harmonization of environmental legislation with the legislation (directives) of European Union, which requires amendments of different laws in energy sectors (oil and gas, hydro energy, renewable/alternative energy). Implementations of energy efficient technologies is also important.

Main principles that must be implemented in Georgian environmental and energy legislation are:

- Minimizing the environmental impact using cost effective methods.
- Minimizing the degraded areas in ecosystems
- Prevention of degradation of ecosystem (in spite of economic priorities);
- Implementing of the principle - “every polluter pays”
- Interests of the society.

Therefore, the following measures need to be implemented:

- Taking into account environmental requirements while developing and implementing energy policy.
- Implementing the pricing system with the account of environmental costs
- Recognition of contemporary norms and standards of environmental protection;
- Forming of energy efficiency policy, utilizing renewable energy, encouraging use of cleaner energy, implementation of technologies that reduce pollution of the environment;
- Implementation of environmental and economically efficient energy policy.
- Increasing acknowledgement of Georgian population about the cost of projects that are financed to reduce damaging impact on environment;
- Encouraging energy efficient and environmentally accepted technologies, methods and processes that reduce impact on environment at minimum level;
- Encouraging implementation of new, modern and innovational technologies;
- Conduct the whole process of Environmental Impact Assessment, encouraging implementation of procedure of Strategic Environmental impact Assessment.
- Encourage implementation of the appropriate environmental programs.

Directives which require implementation:

Directive 2010/75/Eu of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

The change should be prepared in the law on "Air Pollution" (1999).

Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants

The change should be prepared in the law on "Air Pollution" (1999).

Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels and amending Directive 93/12/EEC

The change should be prepared in the law on "Air Pollution" (1999).

Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment

A new law on "Environmental Impact Procedure" should be Developed and approved, which must reunite the "The Law on Environmental Impact Permit" and "The Law on Ecological Expertise" and to introduce new regulations.

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

The new law is being prepared on the animal facilities, but it is not implemented in the current legislation.

Ukraine, Energy Community and the EU: Expectations and Results.

Some conclusions for the EU-oriented countries

*Mykhailo Gonchar, NOMOS, Ukraine
20 February, 2014*

Georgian full-fledged membership in the Energy Community will become a definitively positive fact for your country. This very thing will bring you closer to the EU. Irrespectively whether Georgia will be someday EU member or not, your energy sector will become an integral part of the European energy market after implementation of corresponding EU legislation. However, it is important to understand very clearly, what the Energy Community is and what it is not.

1. Signatory to the Energy Community Treaty makes you closer to the EU but it definitely does not open the way to the EU membership perspective. Here you should not have any illusions. Your country belongs to five states, which are important for the EU either as energy suppliers or as transit countries: Norway, Ukraine, Moldova, Georgia and Turkey. Ukraine and Moldova are ECT member states; Norway and Turkey have observer status and do not want to join the ECT. Georgia is a key transit country for oil and gas supply from Caspian region with a perspective to insert gas flows from Central Asia.
2. The ECT is a tool of influence of the European Commission on ECT signatories, but it will not become your tool of influence on Brussels. The maximum you may count on is the possibility to be heard. The ECT is the mechanism for EU energy legislation

- implementation into the legislative, regulatory and legal framework of the Treaty signatories, which are not the EU member states. It is the very attractiveness of the ECT.
3. The membership at the Treaty and the successful implementation of European energy legislation will have some positive impact on investment attractiveness of your energy sector for EU investors. As for investors from countries, where state-owned energy monopolies dominates (Russia, China, and Azerbaijan) usually they perceive country's ECT membership as a negative factor restricting impact on their activities.
 4. I would like to share with you some conclusions regarding my country and its experience of 3 years membership at the ECT. Since February 1, 2011, Ukraine has been the signatory to the Treaty and has been implementing European energy legislation according to the Protocol on Ukraine's accession. However, I would not describe the implementation process as definitely successful. Speaking from the point of view as an independent think tank, I will state that this process is very slowly and problematic. I would not recommend it as a model for your country.
 5. There are several reasons, why Ukraine's membership is not a successful one, at least during the last three years:
 - The government, which is already dismissed, had only declarative approach toward prioritization of Ukraine's commitments under the Treaty, real priorities were concentrated on relations with Gazprom, which was and is vexed with the ECT.
 - The government had populism view on Ukraine's European integration, energy sector reforms were simulated and did not bring any qualitative changes.
 - Russia made all and very efforts to hamper closer relations between the EU and Ukraine, in particular in energy sector. It requested twice Ukraine's withdrawal from the ECT. The same request was made also to Moldova.
 6. However, there are some problems in the Energy Community of European origin. The very first is a lack of the EU single voice, announced back in 2007. Declared by the EU single external energy policy is still only on the paper, influencing directly processes within Energy Community Treaty. The second problem is a lack of consensus regarding EU perspectives for several neighbouring countries, which are participants of the Eastern Partnership Program and important partners for the EU in terms of energy communication (supply and transit). If regarding Western Balkans Brussels has clear perception of these countries as the future EU members whether already realized (as it was in case of Croatia), realized later (Macedonia) or realized in the most postponed perspectives (Serbia), there are no such a vision toward Eastern Europe. Ukraine, Moldova and Georgia are not even identified as European countries to the full extent. It should be noted, that the EU does not dare to call new partnership program **Eastern-EUROPEAN Partnership**, having limited it to the vague Eastern Partnership. Therefore, Western Balkan countries in contrary to Eastern Europe have quite serious stimulus to implement the ECT as an element of the sectoral integration into the EU before gaining full membership. Bulgaria and Romania became signatories to the ECT after they had received clear EU membership perspective in two years.
Automatic ECT expansion to the Eastern Europe without a simultaneous solution of the question about European membership perspective for those countries creates huge problems for promotion of European rules of play in energy sector. Contrary to Western Balkans with a single European integration model Eastern Europe has an alternative

Russian integration model. It is difficult to call it integration model in European meaning. It is rather a model for reconstruction of the Soviet space with dominant role of Russia and simultaneous deep limitation of allied countries sovereignty. This model reminds rather "Anschluss" and is of course unacceptable for political and economic elites in Eastern European countries. However, it is difficult for them to resist to pressure from Kremlin regime, which acts with clear awareness that the EU will stand aloof from, limiting the reaction to verbal rhetoric, as it was in case of Georgia in 2008 and as it is currently the case with Ukraine. The third problem results from two previous; it is instrumental insufficiency of the Energy Community Treaty. It should be noted that a breach of ECT obligations does not lead to any significant consequences. Ukraine's example is here very demonstrative. Failing to meet ECT obligations, the government has not only ignored warnings from Vienna and Brussels but also announced that Ukraine may even withdraw from the Treaty. During three years of membership, Ukraine warned twice about such an intention.

7. A particular problem is the challenge on the part of the Russian Federation to the EU energy policy. Russia defied the EU, striving not only to prevent the spread of the European rules in the post-Soviet space, but also to affect Brussels to revise some of the key provisions of the EU energy legislation, such as the Third Energy Package. In the post-Soviet space, Russia is trying to maximize the lobbying communication mechanisms with the aim to deform legislative and regulatory framework in one or another country on its favour. The usual method is a promise of gas preferences in exchange for not implementing the norms of the European energy legislation. The Government and the President of Ukraine have had the illusions, that without irritating Russia, they would be able to achieve the revision of discriminatory gas contracts of 2009. However, as we can see, it did not work. The gas contracts remained unrevised, an implementation of Second Energy Package is not completed, and the uncertainty concerning the Third Energy Package persists. That is, the benefits of the situation get neither Ukraine nor Energy Community and the EU but a third party.

At the same time, the EU faces a choice: to promote European principles of the energy markets functioning or to support the relations with Russia and it prefers the second. Certainly, first, this applies not only to the EU as a whole but also to the key member states, traditionally oriented to the Russian Federation in the field of energy. Thereby, the EU value structure devaluates, undermining the confidence in Europe and not only concerning the sphere of energy.

8. The fifth problem is a lack of contractual arrangements laid down in Chapter IV of the Mutual Assistance. Thus, during gas crisis of 2009 the Energy Community did not make any influence on the events. The only thing that Energy Community can do is to give consultations and advices in case of crisis uprising.
9. A real thing that Energy Community lacks is the solidarity mechanism in the case of the third party actions against one or several member states of the Treaty. The bright example is the Russian project "South Stream", which is a bypassing one in relation to Ukraine, Moldova, Romania, and directed to deprive this countries of their transit function of gas supply to the EU and to cause the economic damages. Moreover, Russia demands to withdraw the project from the Third Energy Package. However, neither Energy Community nor the European Commission has no objection to project

implementation, limiting it selves only by observations, that the project must meet the European energy law. Therefore, do not be surprised if some time after the accession of Georgia to the ECT, Russia will demand from you to give access for "Gazprom" to your pipelines, basing its claim on the EU Third Energy Package. However, you will not find solidarity in Brussels and Vienna.

10. Now, let us talk about the future of Caspian and possibly Central Asia gas transit through Georgia. As you know, "Nabucco" broadly represented, as the EU priority number one is no longer relevant. In fact, "Nabucco" became a symbol of collapse of the EU external energy policy. Azerbaijan and Turkey now prepare to implement the project TANAP. Gas to it will come from the Caspian Sea through Georgia. One should pay attention to some of the trends the European gas market and Russian gas policy. The EU gas market is becoming more competitive thanks to LNG. LNG from the U.S. will come earlier than gas from Shah Deniz to the EU gas market. This will already happen in 2016. Russia, having lost in recent years a significant proportion of the EU gas market due to the price escalation policy, will take steps to recover the lost positions. Herewith, the work will be done in two directions. The first direction is a more flexible pricing, an access of independent gas producers to gas export, but keeping "Gazprom" as a single export channel. The second direction is the elimination of competitors. In this sense, the gas flows from the Caspian Sea and in the future from the Central Asia are competitive to traditional gas flow from Siberia. As well as pipeline projects designed to bring new gas to the EU market by the independent from Russia route.
11. Russia is implementing a large-scale economically senseless pipeline project "South Stream" to bring gas from Siberia and Yamal to Southern Europe. Moscow for several years unsuccessfully has been trying to get the priority status for it from the European Commission and the exclusion from the Third Energy Package. One of the arguments is the so-called transit instability through Ukraine, which they confirm using gas crises of 2006 and 2009. Now, in order to finally reach an agreement with the EU on "South Stream", Russia not only uses the political crisis in Ukraine, but also actively affects it, trying to demonstrate to Brussels once again the need of bypassing Ukraine. Transformation of Ukraine into the "dark zone" fits best to "convincing argument" of Russia in Brussels. Now, if to make an extrapolation to the South Caucasus and consider that "Gazprom" does not need a competitive gas from the Caspian Sea on the not enough capacious market in Southern Europe, it is possible to conclude that, in your region the destabilization scenario can be expected. According to the logic of the Kremlin, it should be another argument for Europe in the benefit of the "stable" gas supplies from Russia via the no transit direct "South Stream" compared with supplies from the unstable Caspian region through the unstable South Caucasus.
12. We would like this scenario to remain in the category of hypothetical, but events in my country should be taken into account in Georgia, the EU and NATO. Therefore, membership in the Energy Community, the future Association Agreement with the EU (if it is signed) are undoubtedly positive developments in your country, but they do not solve the problems of security and mutual aid. These problems should be addressed through the United States and NATO. Moreover, that MAP was promised to Georgia in Bucharest in April 2008. EU is passive, weak and helpless when it comes to Russia. We

saw this in the case of Georgia in 2008, now it is seen in Ukraine. Probably gas corruption forces have already won the European values in Brussels.

Requirements of the European Energy Community in Electricity Sector

Zviad Gachechiladze, GNERC

21 May 2014

A number of requirements will be necessary to be met in Georgian electricity sector in order to become a part of the Energy Community (EC), however, it will be an important step forward for country's development. What is the goal of accession and what benefits do we expect from it? Attracting new investments in Georgia's electricity sector; creating favorable environment for sustainable development of the field and increasing the reliability of electricity supply are the main benefits expected from EC membership.

Meeting the requirements of the founding agreement, creating an appropriate roadmap for membership and the action plans for certain power sector entities are the necessary preconditions of EC membership. Negotiations are in progress to create Georgian roadmap but the Results are not known yet. A typical roadmap includes introduction of the legislative acts (*Acquis Communautaire*) adopted by the EC, formation of the electricity market (wholesale market, retail market), tariff system reform, etc. One of the European requirements is for consumer tariffs to be transparent and non-discriminatory. The process of tariff formation must be based on fair costs, provide incentives for improvement, include benchmarking methodologies, etc.

Among the mandatory legislative acts established by the European Parliament and the Council, third energy package directives and regulations should be considered in a first place. These directives/regulations are:

- 2009/72/EC directive – concerning common rules for the internal market in electricity;
- (EC) 714/2009 regulation - on conditions for access to the network for cross-border exchanges in electricity;
- 2005/89/EC directive - concerning measures to safeguard security of electricity supply and infrastructure investment.

Requirements of these directives can be summarized as follows:

- Separating and unbundling the competitive and monopolistic markets – this is needed for encouraging competition and for non-discriminative access of the third party to networks.
- Creating ten-year plan for network development;
- Reinforcement of the regulatory institutes
- Consumer protection;
- Taking part in operating of the new structures (ENTSO-E, ACER).

Directives of the European committee pay much attention to strengthening of the regulatory body. The regulators function must be:

- Monitoring of service quality, market functioning, implementation of the 10-year development plan etc.
- Tariff methodology and tariffs;
- Grid codes;
- Creation of an effective system of penalties and incentives
- Licensing;
- Consumer rights and dispute settlements;
- Energy efficiency encouragement;
- Approval of the united network development plan;
- Regulation of Cross-border exchange;
- Investigations;
- Implementing decisions of the ACER that creates new liabilities;

Development of the wholesale market for electricity requires market model formation, creating competition, development of IT technologies, transparency, market instruments for capacity allocation of cross-border exchange, including auctions for electricity trade. Thus sharing of European common energy rules is extremely important for making the trade easier.

In order to develop competition, retail markets must be open and consumers should have an opportunity to choose or change their suppliers. It is essential for information to be accessible and suppliers to be obliged to respond to complaints. Development of smart grids and protection of vulnerable consumers is especially important in this respect.

Implementation of EU legislation, regulations and codes can bring a significant benefit to Georgia's electricity sector. There is an expectation that Georgia will make a step forward towards EU by becoming a member of the EC. In addition, reinforcement of competition, attracting investments and fair regulation of tariffs will be achieved.

One needs to take into account that the challenges accompanying EC integration are getting harder with time as European legislation increases in volume and gets more complex, thus the reforms in energy sector will be related to certain costs. These costs may be caused by implementation of new standards and rules or be related to transaction and administrative expenditures. In addition, a study is needed to identify the potential of competition in retail and wholesale market in Georgia.

To overcome the challenges of EC integration significant efforts will be needed for institutional and legislative development. Enforcement of the regulatory mechanism for competition according to the European liberal principles with the account of specific conditions of Georgian electricity sector will be important as well.

Energy Security and Transit Energy Projects



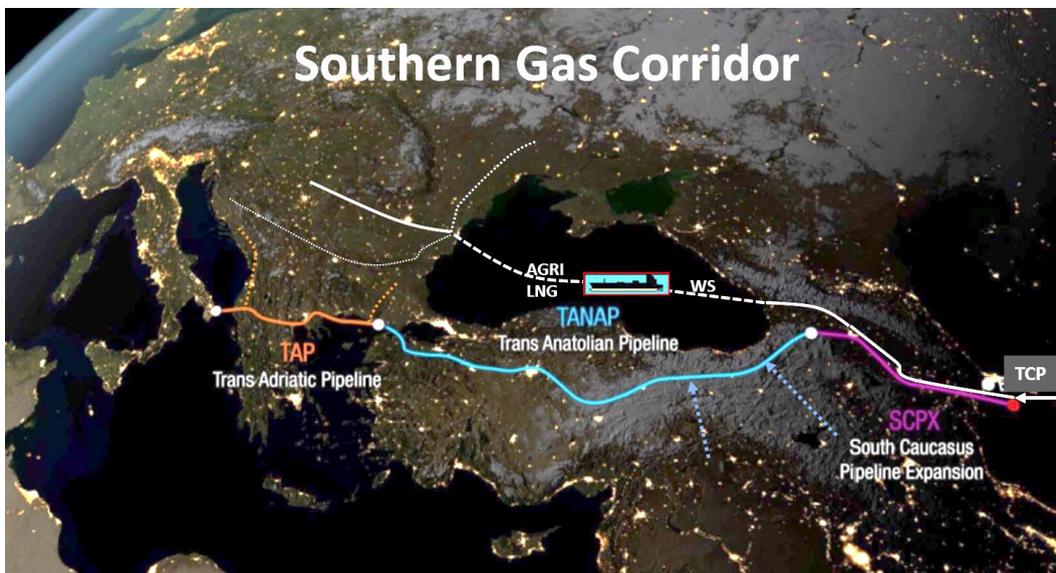
Strategic Energy Transit Projects in the Gas Sector

Teimuraz Gochitashvili, Dr of Sci, Professor
15 December, 2014

Transit corridor across Georgia, is the most attractive supply route of Caspian and Central Asia hydrocarbons to the international markets. Oil, oil products and gas are transported through Georgia by pipelines, railway or sea ports, mainly due to the preferable geopolitical location for supplying hydrocarbons of the European and international markets from the region, holding vast reserves of energy resources, but isolated from these markets, and motivated to choose independent export routes to avoid the territories of the competitor countries (Russia, Iran...).

There are lot of important factors favorable for development of new international projects through Georgia with substantial transit potential for further significant increase of transit. Various alternative projects of delivering gas from Azerbaijani and Central Asia to Europe through Southern Energy Corridor are being actively discussed and developed. This will ensure the further diversification of the European market and minimize the potential negative impact of the dictate from monopoly supplier.

Through the Southern gas corridor (see Figure) it's envisaged to deliver the gas from Azeri Shah Deniz gas field to the Balkans and South and/or Central Europe through the South Caucasus Pipeline system (SCP) going through Georgia and the planned pipeline projects TANAP, TAP. It's also planned to construct Trans-Caspian pipeline (TCP) to supply Turkmen gas through this route.



SCP transports the gas from Shah Deniz gas field to Erzurum (Turkey) through Georgia. The length of pipeline's Georgian section is 248 km (total length 690 km). A maximum rated pressure is 95 bar, Pipeline diameter – 1067 mm. The current throughput capacity of the pipeline is 8-9 bcm/a actual load 6 bcm/a (5.85bcm in 2014). The pipeline is operating since 2006. SCP system, in general, includes SCP and other related facilities. The total maximal throughput capacity of the system is limited to 30 bcm per year. The main shareholders of SCP Co are BP (SCP-'s technical operator) and SOCAR.

Development of Shah Deniz gas field includes two phases: 1st phase with the capital costs of \$4bln and rated peak production of 8.4 bcm/a; 2nd phase with the capital costs of approximately \$45bcm and the peak production of 16 bcm/a, with the envisaged first delivery of gas to the international markets in 2018-2020. The potential 3rd phase of the field is also being discussed with the potential to increase the production to 22-25bcm/a and the start of production in 2030. According to expert assessments, the total export potential of Azerbaijan, including the possible production of other gas fields (Azeri-Chirag-Guneshli deep water, Apsheron, Nakhichevan Umid/Babek etc) can achieve 35-40 billion cubic meters per year.

SCP expansion activities are underway in Azerbaijan and Georgia including the construction of parallel pipelines and additional compressor stations. After completion of SCP X project, the annual capacity of system will increase up to 24 billion cubic meters per year, to be ready for export of additional volumes of gas produced from the second phase of Shah Deniz development. According to the expansion plan 63.8 (56 + 5.3 + 2.5) km 1220 mm parallel pipeline, 2 powerful compressor stations and new measuring units will be built in Georgia.

Alternative project for delivery of Caspian and Central Asia gas to Europe envisages construction of Azerbaijan-Georgia-Romania Interconnector (AGRI), which includes pipelines on Azerbaijani and Georgian territories, liquefied natural gas (LNG) terminal at the Georgian Black Sea coast, transportation to the Romanian coast by tankers, the regasification terminal and distribution systems in Romania and Hungary. A feasibility study report on AGRI is already prepared.

Another alternative is the development of "White Stream" (WS) and "Trans-Caspian pipeline" (TCP) joint project concept, which should ensure 8, 16 and 32 billion m³ gas delivery (step by step increasing capacity) .

It has to be mentioned, that major Southern Gas Corridor Infrastructure Projects are included in the list of EU Projects of Common Interest.

North-South Gas Pipeline (NSGP) transports Russian gas to Armenia. The pipeline consists of 1200 and 1000 mm sections; its rated capacity is respectively 16/10 billion m³ / year. The total length of the pipeline is 234 km, the design pressure - 55 bar. Pipeline operates since 1994.

NSCP is a strategic state infrastructure and is owned by Georgian Oil and Gas Corporation (GOGC itself is owned by state with 100% share through the Partnership Fund). GOGC coordinates transit issues, including the buying and selling of gas and supply of the vulnerable, so-called "Social" consumers. NSCP is operated by Georgian gas Transportation Company (100% state-owned, managed through the Ministry of Energy).

In the recent years, when Georgia is mainly using the gas from Azerbaijan's Shah Deniz gas fields and other gas supply pipelines, the NSGP load is significantly reduced, actually it is 2.5 billion m³/y, including mainly the transit of gas to Armenia.

Midwifing the TCP – A Unique Opportunity for the EU-Georgia Strategic Cooperation and Encouraging EC Standards-Based Reforms in Georgia

Giorgi Vashakmadze,

*Director of W-Stream Ltd - the promoter of the
Trans-Caspian and White Stream Gas Pipelines
20 February, 2014*

The EU advocates for stable and transparent regulatory rules for the energy production and trade in the countries that play important role as energy suppliers, and especially in countries that are interested in closer ties with the EU.

Transparent and stable regulatory rules enhance countries' attractiveness in the eyes of western investors who conduct their business in accordance with the best business practices and thus encourage investment inflows from the EU and the US, while on the other hand, diminishing interest of those who tend to benefit from non-transparent business environment. Greater transparency in how government deals with investors also make countries more resilient against intrusive external influences that can affect political decisions.

Georgia was invited to join the European Energy Community back in 2006. In the subsequent years multiple attempts were made by the EU and the US to encourage the Georgian leadership to apply for the membership to the European Energy Community, including the statement by the President of the European Commission, José Manuel Barroso⁷ in 2010 following his meeting with President Saakashvili. Had Georgia accepted the invitation, it would have enabled the country to considerably advance its energy and antimonopoly regulation reforms initiated and legislatively enacted earlier with the help of numerous grant programs funded by international donors. Georgia's United National Movement (UNM) government chose not to get engaged and demonstrated utmost reticence on the subject, both vis-à-vis its western partners and its own society. Furthermore, they took the path of reversing the achievements of the previous reforms, further distancing the country from the requirements of the Energy Community.

This situation changed after the new government assumed power following the 2012 elections: Georgia has officially applied for Energy Community membership. This is a remarkable change of Georgia's posture for which the new government should be given due credit. But what has remained unchanged, is the lack of awareness of the society, even country's NGO sector, about Georgia's prospects of joining the European Energy Community and its potential benefits for Georgia's future. The importance of stable and transparent regulatory rules has not been featured in media discussions. The role, nature or purposes of the Energy Community has never been explained to the society and even less is known about its role in securing country's long-term political stability which in turn defines whether Georgia is perceived as a reliable ally to Europe's energy supply diversification efforts, especially its

⁷http://europa.eu/rapid/press-release_SPEECH-10-660_en.htm?locale=en

strategic but extremely complex natural gas supply arrangements envisaged by EU's Southern Gas Corridor plans.

Georgia successfully established itself as a reliable and instrumental transit partner while negotiating and implementing the East-West pipeline projects in the late 90s – early 2000s, but did nothing to keep or enhance this reputation after the Rose Revolution.

This is how Financial Times saw the situation just 3 weeks before the Russian military invasion of August 2008⁸:

“The US and most European Union members support Georgia's efforts to escape Russia's influence and integrate with the west, including joining NATO. The west is also worried about the security of pipelines taking Caspian oil and gas across the Caucasus to Turkey. Meanwhile, a resurgent Russia sees the region, including the pipelines, as a key test of its capacity to reassert itself in the former Soviet Union.”

Another quote from the same article: “Abkhazia and South Ossetia are levers with which to put pressure on Tbilisi to slow its pro-west policies and drop its NATO bid. Dmitri Trenin, deputy director of the Carnegie Moscow Center, a think-tank, says: “Russia has no strong interest in Abkhazia itself. Russia is telling Georgia: ‘If you join NATO you will pay a very big price. You will never get back Abkhazia.’”

Those who have been participating in the East-West Energy Corridor development remember that similar messages were coming from Russian officials in relation to BTC in late 90s: If you allow building BTC - you will never get back Abkhazia.

Georgia was wise not to be swayed away from pursuing the development of these pipelines, nor its NATO aspirations.

Today, in the eve of signing major political and trade agreements with the EU, different Government officials are frequently quoted saying that after the events of 2008, Russia has no more leverages over Georgia's decision- making. What is apparently meant here is that no additional leverages remain for Russia in relation to Abkhazia and South Ossetia. But the question is whether the territorial integrity - a painful point mentioned by the Financial Times – is the only substantial weakness of Georgia that Russia has a possibility to exploit?

Weak and nontransparent energy sector opens another opportunity for meddling, though in more sophisticated and far less visible ways.

And in any case – a vulnerable and nontransparent energy sector means less reinvestments, less best practices, less competitive economy, less jobs.

When it comes to complex and geopolitically significant transit projects, it also means that the country is seen as a less reliable transit partner.

⁸<http://www.ft.com/intl/cms/s/0/0287616e-5108-11dd-b751-000077b07658.html#axzz2tmc0GPw4>

Timely adoption of the Energy Community standards could change the reality. Today, Georgia's energy sector is much far away from the Energy Community standards of transparency and good governance than it was 9 years ago. This back-rolling was unjustifiable and unfortunate.

The United National Movement government has thrown away practically all legislative reforms that had been undertaken through and with the help of the US and EU funded institutional building programs. The practice was even worse. Meticulous 'scientific' justifications had been devised and offered to justify the need of vertically integrated players in Georgia, deriding the notion of strategic assets/infrastructure and abolishing regulatory instruments.

A one-time chance – the big privatization – conducted after the Rose Revolution (and so highly praised in the West that was too busy to look into the details of this undertaking) have brought neither best business standards, nor sustainability to the sector.

The main thing was 'forgotten' while praising Georgian 'anti-corruption' reforms and was overlooked by public: non-transparent privatization of energy assets allow stealing a sizeable portion of revenue for many years ahead.

Given the almost complete lack of information, it comes as no surprise that there was no public questioning of reasons as to why starting from 2006 Georgia was persistently ignoring EU calls on joining the Energy Community.

Even when President Barroso publicly stated in 2010: "Concerning the diversification of energy sources and routes, the development of the Southern corridor is a key priority for the European Union. We attached great importance to the crucial transit role played by Georgia. And I encourage Georgia to formally apply for membership to the Energy Community. This would enable further deepening of our relations and reinforce Georgia's attractiveness for energy investments", there was complete silence from government officials as well as media and expert community. This should have served as an alert, but again, this fact was misinterpreted in the West: the West was convinced that Georgian reforms deserve just applause – not critical assessment.

In July 2010, the Eurasian Energy Analysis highlighted renewed attempts of the government to sell Georgian North-South gas pipeline⁹ that was just refurbished with the grant money provided by US Millennium Challenge Corporation:

"Georgian Prime Minister Nika Gilauri promised that if Georgia sold shares of the pipeline, that the government would keep controlling interest. The opposition tried to hold the prime minister to his word by offering an amendment that would limit the sale of pipeline shares to 49 percent. Had the amendment passed, it would have been impossible for the government to sell control of the pipeline to any outside investors. Parliament rejected the amendment, leaving open the possibility that either GAZPROM or a GAZPROM affiliate could snap up the pipeline".

⁹<http://eurasianenergyanalysis.blogspot.com/2010/07/georgia-selling-gas-pipeline-that-feeds.html>



Gazprom has been targeting Georgian North-South gas pipeline since 1995. Ownership of this pipeline and the right-of-way would potentially allow Russia to kill the projected large scale East-West gas transportation and flood EU countries with cheaper Iranian supplies via ‘Russian’ pipelines.

Such broader geopolitical considerations are important to keep in mind while negotiating some of the EC Treaty application for Georgia. This will require a thoughtful attitude from negotiating teams from both sides. As an example, Russia might demand to provide access for Gazprom to existing and future pipelines, basing its claim on certain provisions of the Treaty. Georgia, a bridge between the Caspian gas resources and the EU certainly has its geopolitical specificities that need to be taken into account.

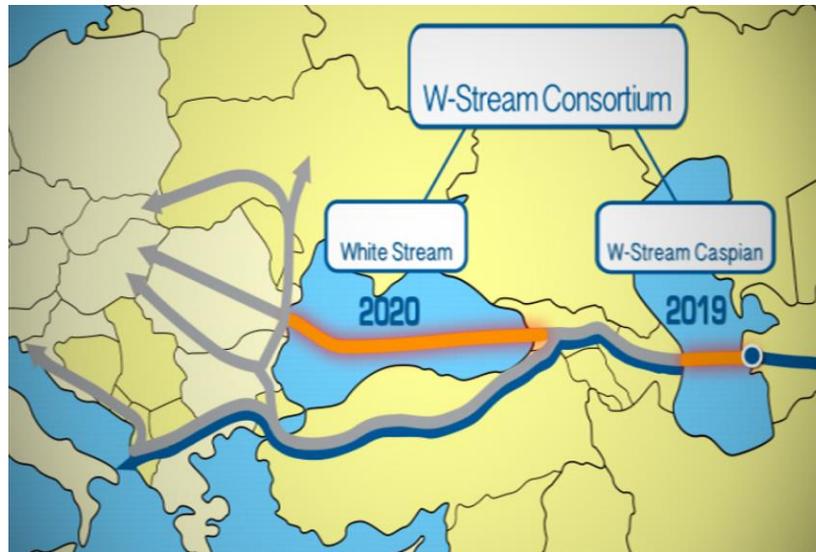
The way the international diplomacy was using Turkmen gas transit as a high value bargaining chip and a possible 'carrot' to engage with Iran back in 2009, can serve as an illustration for the above: In response to the Turkmen President Gurbanguly Berdymukhammedov stating that " ...we are looking for conditions to diversify energy routes and the inclusion of new countries and regions into the geography of routes ", Deputy Assistant Secretary of State George Krol has publicly suggested that the US remained open to the prospect of gas from Central Asia being exported to Europe via Iran.

EU’s interest in new external pipeline supplies from new energy sources and through independent routes lead to the development of the Southern Gas Corridor plan and inclusion of this plan into the Connecting Europe Facility (CEF) scheme. The latter allows spending of EU taxpayers’ money for covering up to a half of the construction costs of SGC pipelines. The Southern Gas Corridor has been identified as one of four European infrastructure priorities in gas and oil by 2020.

A fully pledged Southern Gas Corridor is now perceived by all involved parties as a doable undertaking — an undertaking capable of achieving its declared strategic objectives of reliably supplying sizable quantities of gas to the European market.

For two decades the EU has been working on gaining access to the Caspian’s energy resources, particularly to Turkmen gas, but the recent developments with SD2, TANAP and TAP are certainly creating a momentum for the EU to push the Caspian agenda even stronger than

before. These developments create favorable conditions for Georgia to join the team and become a helpful and reliable ally to the EU and Caspian suppliers in implementing the Trans-Caspian Pipeline. It is only through joint, concerted efforts that the success can be ensured. EU efforts are clearly aiming towards the implementation of the TCP, as a part of multi-project bundles within the SGC scheme before 2020. Georgia can help in midwifing these plans, or can remain a watcher hoping to harvest the fruits if others succeed in doing the job.



The changes over the past decade in global energy affairs have been unprecedented. The global energy map has been redrawn as a result of the unconventional oil and gas revolution in North America and the emergence of large energy consumers in Asia. EU countries are extensively subsidizing the renewables and emergence of North American cheap coal to the European markets has contributed towards further shrinkage of EU gas market. Now the prospects of Iran opening are perceived as more realistic in medium term. Georgia needs to see these and other developments as an encouragement to start playing an active role in Southern Gas Corridor developments. EU market will need the TCP, but this need will not be permanent – other developments will certainly make it less necessary if the current window of opportunity is lost. And it is vital that Georgia thoughtfully embraces opportunities of the Energy Community to free itself from the ties of nontransparent relations with its current energy players invisibly influencing its future.

Georgia's Energy Security Risks and Their Mitigation Measures¹⁰

Murman Margvelashvili, WEG
1 August, 2014

Energy Security is one of the key components of any country's national security. Energy Security is especially important for Georgia, considering the tense and unstable political situation in the region, when the threat of using energy as a leverage of political influence and pressure is high.

¹⁰ Study funded under USAID G-PAC program implemented by East-West Institute

Many infrastructural and institutional projects are being implemented in Georgia In order to increase Energy Security: Hydropower plants and transmission lines are being built intensively; Georgian electricity market is being harmonized with Turkish electricity market; Negotiations for Energy Community membership are in progress after signing the Association Agreement with the EU, etc. A dynamic environment necessitates the revision of energy security risks and proper consideration of national values in mitigation measures.

It should be noted, that despite 24 years of independence, the comprehensive studies and research on Georgia's energy policy and energy security in particular still lacking. Soviet-era research institutes were closed down and never replaced with any research organizations or groups that would provide sound analytical material for policy makers, based on world best practices.

The present paper aims to formulate the definition of energy security and risk assessment principles based on international experience and own research.

The problems can be divided into three categories:

1. **Georgia`s strategic documents do not offer definition of energy security and its links to the country's core interests and values** – this creates the threat that individual measures for increasing energy security can contradict other important interests. For example, sometimes an increase in supply (using hydropower) is declared as an independent goal without considering whole energy system and economic welfare. This raises serious public discussion, debates and contradiction. It also creates the risk that for achieving short-term energy supply goals, the more fundamental long-term interests can be jeopardized.
2. **Energy policy and strategy documents are not based on substantial analysis of energy security risks-** no systematic review of energy security challenges has ever been conducted. There is no data for energy statistic analysis and energy balance¹¹, which complicates the process of revealing major strength, weaknesses, opportunities and threats of energy sector.

Examples:

- *Recent studies show that one of the two most consumed local energy resource in Georgia is fire wood which is mainly used for heating. The wood resources are quickly diminishing due to the intensive cutting¹². We should expect the energy poverty of the rural population in the coming years and/or significant increase in natural gas and electricity consumption in winter (with the increase of energy dependence). To avoid these threats it is necessary to implement complex measures which include increase efficiency of wood use, find alternative energy sources etc. This fact is ignored by the decision makers although is a significant risk of energy security.*
- *Construction of the new, 500 kV transmission line connecting to Russia is already launched. The benefits of closer link with Russia have been duly analyzed along with risks that such linkages may cause.*

¹¹ The energy balance of 2013 was created first time since 2001 by the end of 2014

¹² www.weg.ge

- *About half of Georgian hydro energy production (Enguri/Vardnili Cascade) is located partly on the territory which is not controlled by Georgian government. It is not known, whether there are adequate measures applied to prevent potential risks for short-term or long-term period. Georgia has likely not carried out a thorough analysis of potential emergency situations and related action plans for risk mitigation have not been developed.*

Lack of robust approach to energy security risks has resulted in numerous shortcomings, which need to be addressed. For example: Construction of a Georgia-based gas storage was given up and the task of balancing seasonal variation of natural gas supply and demand, was delegated to the state energy company of Azerbaijan at the cost of potential economic and security loss. Georgia has no reserves for demand balancing and winter emergency cases, which significantly increases the risks of energy dependence. At the same time, this is an obstacle to European integration, since EU legislation requires the countries to have own energy security reserves.

3. **Internal environment of energy security** – gaps in Georgian energy sector legislation and non-systematic governance style makes it difficult to improve energy security as decisions are made for short-term, often based on narrow interests, without adequate analytical support, long-term vision and public involvement.

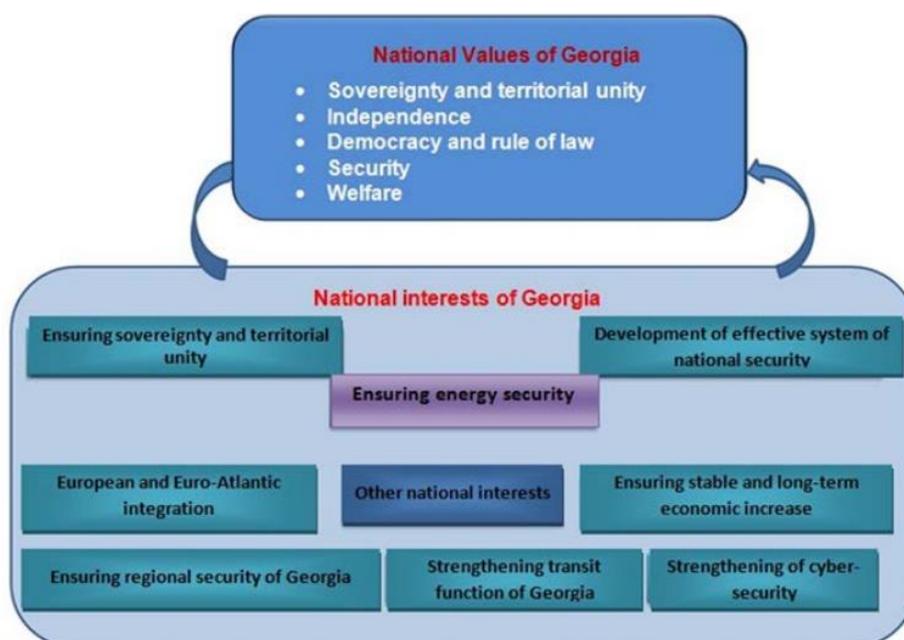
Definition of energy security – links to national values and interests of the country

There is no universally accepted definition for Energy security, however, in all definitions (International Energy Agency, World Bank etc.) Energy security is related to other main interests and values of countries.

As mentioned above, Georgian energy security risks and challenges are especially high because of high energy dependence and unstable political environment. Therefore, *it is necessary to have a clear definition of energy security, which will accurately reflect the current conditions and serve as a guideline for energy policy and strategic actions.*

Georgian National Security Concept defines Energy Security as one of country’s main interests and places it alongside other national interests. This relationship can be depicted as follows:

Pic. 1. Energy Security among Country’s Values and Interests



The concept does not offer a definition of energy security which is an important gap. We offer the definition of Energy Security which, we believe, should be added to the country's strategic documents:

Energy security is an integral part of national security, which ensures provision of sufficient amount of, continuous and quality supply of different types of energy in line with national values and in support of national interests.

This definition expands the context of energy threats and risks and covers not only the threats of supply interruption, limitation, price increase and low quality, but also makes unacceptable energy supply at the expense of country values and other interests.

Russia is known for using energy as a tool of political influence. For example, in 2013 Russia offered Moldova one third lower price for natural gas in return for giving up joining Energy Community. Agreeing to this proposal would be a step against Moldova's fundamental values and therefore was unacceptable, so Moldova defended its foreign-policy choice and joined the Energy Community.

The proposed definition of energy security would make an alternative route of compromise an energy security violation and thus unacceptable; The same way it makes unacceptable strengthening of energy security and ignoring environmental security or other national interests, as well as actions that would contradict principles of transparency and requirements of EU integration.

Energy Security Risk Management

There is no state of absolute energy security. There is always a threat of long-term or short-term disruptions in energy supply for various reasons, or the risks of price increase. Hence there is a need of permanent monitoring and developing the mitigation and preventive measures.

Energy security risks and their types can be categorized as follows.

Table 1.

Types of Risk	Risks
Natural risks	Extreme climatic conditions (temperature, wind, precipitation, drought, floods, storms) climate change Reduction of water resources, changes in hydrology Earthquakes, landslides and other natural disasters,
Technological risks	Deterioration of infrastructure Technical accidents and damages Lack of flexibility of energy sector Lack of reliable data

	Lack of technical standards, regulations and normative documents Absence of energy storage Absence of energy facilities technical monitoring and an early warning system.
Political Risks	Termination(ceasing) import during the winter Political instability of supplier countries International Conflicts Internal political instability
Social / Human Risks	Physical terorizm Cyberterrorism Public resistance to healthy changes Corumpion – inside and outside the country Lack of competence in management Unqualified personnel mistakes in planning and implementation
Economic Risks	high market concentration and monopolies Impact of Turkish energy prices on the prices in Georgia Possible increase of imported energy prices Low level of investment

The above list can be expanded further.

Energy threats listed above can result in: energy shortages, high prices, supply interruptions, (SAIFI¹³, SAIDI¹⁴), seasonal supply difficulties, deviation from quality standards etc. These risks are long-term or short-term. However, avoidance of these risks should not be done at the expense of country's other core interests. The impacts should be assessed not only through the number of affected consumers or the amount of non-supplied energy, but also with the account of an impact on national values and interests, political and social stability, economic development, political orientation etc.

It should be noted that due to the hydrological characteristics of rivers and seasonality of energy consumption in Georgia, risks are much different in winter and summer, therefore, more attention should be paid to this seasonality.

In 2008, we have proposed an Energy Dependence Index as a tool to measure the share of imports in energy consumption by months.

Mitigation measures / barriers

Protecting against risks can be achieved through implementation of mitigation/protection measures (barriers):

¹³ System Average Interruption Frequency Index

¹⁴ System Average Interruption Duration Index

- ✚ **Technology barriers** – include: Increase in energy reserves, improvement of energy transmission systems, construction of new power plants and increase of generation reserves, improved efficiency and reliability of the facilities, development of local renewable energy sources and increased energy efficiency, construction of gas storage and etc.
- ✚ **Political and social barriers** – cooperation with international organizations and securing political support, transparency and public engagement, promotion of international energy transit projects, development of highly qualified personnel, etc.
- ✚ **Economic barriers** - Financial stability supporting investments, enabling of competition, development strong regulatory system and stable internal and regional markets etc.
- ✚ **Organizational Barriers** - Transparent and quality legislation preventing arbitrary actions, emergency response plans and structures, effective management structures, mutual assistance agreements, etc.

Creation of such barriers should be the main concern of the energy policy and energy security strategy

Examples:

Georgia is negotiating membership in Energy Community. In case of successful completion of these negotiations, Georgia will become a member of the community, which will result in closer political association (**political barrier**) and will introduce transparency principles of European energy legislation (**organizational barrier**) that will limit threats of corruption, monopoly and political influence.

For a number of years EU has been actively working to reduce the dependence on Russian gas. In these efforts, supply of Caspian natural gas through Southern Gas Corridor can play a vital role. More energy flows will have to cross Georgia. By implementing this project, international interest in Georgia's stability and security can significantly increase, as well as energy security of the country. The importance of this project goes beyond energy security and provides the huge perspectives for country's independent development (**political and economic security barrier**).

In case of conflict escalation between Azerbaijan and Armenia, the gas pipelines of strategic importance supplying Georgia and further Turkey may become the direct target. It is necessary to develop an adequate emergency plan for Force Majeure conditions, which is an example of **organizational barrier**.

Along with the benefit of balancing the gas supply, natural gas reservoir may play a huge role in reducing the impact as well as probability of interruption in gas provision during winter. Building such a reservoir is an example of **technological barrier**.

Enguri-Vardnili cascade, which produces half of Georgian hydro power, is partly on the territory occupied by Russia. Interruption in electricity supply from the cascade

may have a dramatic effect on the power system. Such a threat will have a huge impact and could be used for political pressure. This threat should be analyzed by government and the public should be duly informed about such possible threat in advance, so that this lever cannot be used for achieving political goals and creation of social disturbance in Georgia. This is an example of **social barrier**.

In summary, Georgian strategic documents do not provide a robust definition of energy security with the links to country's basic values and interests. This impedes the proper positioning of energy sector goals and their due implementation.

It should be underlined, that besides infrastructure projects, energy security risks can be substantially reduced via zero or low-cost activities. Such as: systemic analysis of energy threats, planning and consideration of potential threats, introducing energy threats to the public and its preparation for possible results, preparation of energy emergency plans, improved governance and personnel qualification, membership in international organizations, such as Energy Community etc. The generally suggested measures for improvement of energy security are only a small portion of possible actions.

Recommendations

1. Energy security analysis should be based on a full understanding of the role and purpose of energy sector. The definition of energy security, linked to the national values and interests should be properly reflected in Energy Policy and taken into account while developing energy strategy.
2. State agencies –Ministry of Energy and the National Security Council should conduct a comprehensive assessment of energy sector challenge including all energy security risks, and properly reflect in the process of developing energy strategy document.
3. The full range of safety improvement measures should be assessed and considered for implementation including:
 - a. Consumer awareness raising and preparation social positions,
 - b. Developing emergency response plans,
 - c. Cooperation with international organizations, such as Energy Community,
 - d. Risk assessment in energy planning and development scenarios.
4. Implementation of immediate energy security activities
 - a. Start the search of domestic energy supply alternatives for rural population, such as efficient wood stoves, alternative biofuels, efficient use of forest resources, etc.,
 - b. Increase the support of international transit projects,
 - c. Expedite the construction of underground gas storage facility
5. It is necessary to bring an issue to National Security Council, to define Sustainable Development as one of the highest values in National Security Concept.

Energy Security in Gas Sector

Teimuraz Gochitashvili, Dr of Sci, Professor
15 December, 2014

Georgia's demand for natural gas is mainly balanced by the import. Currently gas supply is provided through three foreign sources based on four independent contracts, while Russia was the sole supplier of natural gas until 2007. Although, the fact that Russia used this factor for political pressure, which was expressed in politically motivated gas price increase and unjustifiable supply delay, forced Georgia to care about diversification of gas supply sources and currently the main supplier of natural gas is Azerbaijan. During 2013-2014 total volume of gas exported from Azerbaijan's different sources, is about 90% of gas consumed in country.

Supply of gas from Azerbaijan Shakh - Deniz field in Georgia is provided through South Caucasus Pipeline (SCP). The Agreement signed between SCP project participants and the Government gives Georgia an opportunity to buy particular amount of gas. General conditions of buying and selling are defined in relevant Option and Supplemental Gas Sale and Purchase agreements.

Based on the agreement signed with "GasExport" (subsidiary of "GazProm"), the North-South gas pipeline gas operator - Georgian Gas Transportation Company, is annually receiving in kind fee for transit of natural gas from Russia to Armenia. Gas volume received as fee for Russian gas transit is steadily maintained at the level of 200-220 mcm per year.

SOCAR (or its subsidiary companies) supplies certain volumes of natural gas (upon 350 mcm per year) to the "Social Sector" (residential consumers and thermal power generation objects) at relatively favorable prices, which also provide the country's industry and commercial sector with natural gas at market prices.

In theory, natural gas import can also be provided from Central Asian countries (Kazakhstan and Turkmenistan) through Russia and/or Azerbaijan and from Iran, through Azerbaijan and/or Armenia. In case of Russia, due to the high cost of transportation, complexity and relatively high costs of supply schemes, inaccessibility of transit infrastructure (in some cases), possibility of gas supply from these countries to the Georgian market is unlikely in short and long-run.

In general, Georgia represents an important country for Europe with the strategic importance in the military-political and energy resources transit fields, due to the favorable geographic location to control Caucasus and Central Asia, onshore transport infrastructure and opportunity to organize transit through the Black Sea ports.

Attitude of the Georgian people towards European political and economic integration is clearly declared and properly recognized by the progressive international community. At the same time, the process of integration in the energy sector is still hindered.

Currently, Georgia is assigned one of the determining roles in Azerbaijan and Caspian recourses availability for Europe and entire West, however transit routes passing through our country

are neither the only one nor indispensable. At the current stage they are most acceptable for West but in the process of dynamic development of global political and economic processes, it's quite possible the orientation vector based on the Western pragmatism to be thoroughly changed.

On the other side, Russia is actively working on recovery of the political and economic hegemony in Caucasus, including strengthening the leader's position in Azerbaijan-Armenia conflict resolution. Accordingly, it's possible that "Nagorno Karabakh" will be exchanged for a new pipeline route - it will be cheaper to deliver gas from Azerbaijan to Turkey through Armenian route. Of course, it's quite long term prospect but in the near future construction of the new pipeline in the South Caucasus isn't considered, because of: a) Azerbaijan will have additional volume of gas, that SCP can't deliver after completion of expansion works, not earlier than 2023-2025; b) delivery of Turkmen gas through Caspian sea is interrupted and final political decision isn't taken, while experience shows that after decision on similar project is made, at average 7-10 years are needed for project realization; c) due to the Kashagan field development delay and development of China direction, Kazakhstan will have necessity to construct a new oil pipeline not earlier than 2020 year.

The events following the Russian-Ukrainian crisis have confirmed that the problem isn't in ignoring Russian role by Georgia, as it is sometimes incorrectly interpreted, but on the contrary, which is evidenced by construction-enactment of the Russian offshore "Blue Stream" project in the early beginning of this century, while onshore route with the same purpose and performance through Georgia could cost 3-4 times cheaper. Currently Russia is pursuing similar policy towards Ukraine – it is trying to downplay Ukraine's political weight and the status of an important energy transit country, through disregarding potential of gas pipelines located on Ukraine's territory. Prevention of the dramatic development of the process, basically, was achieved on the basis of Ukraine's integration in Europe's Energy Community. As a result, the country's natural gas market is protected from the potential destructive action of a monopolist supplier.

The recent developments in the region, among them, price volatility in international markets of hydrocarbon resources, natural and man-made disasters and global warming negative effects, also consideration of Ukraine's experience, require to take right political decisions and promotion of appropriate measures for country's integration into international energy structures and maximum support to the transit projects in frames of Southern Corridor concept.

On the other side, Georgia like other transition economy countries needs satisfaction for increasing demand for energy resources, which must be ensured through reduction of dependence on imported fuel, also with the usage of new energy saving and on renewable resource mastering based technologies, with the sector's structure further modernization and market liberalization.

Accordingly, Georgia should make every effort in order to promote: new transit infrastructure development considered in Southern Gas Corridor concept; maximum load of existing oil and

gas pipelines; speeding up the negotiations on the association agreement with the EU in the field of energy, while taking into the view country's interests and domestic market specifics.

Ensuring the security level is necessary to provide the country's political and economic independence, in addition to political will, arrangement of production, transportation and storage (reserve) infrastructure requires significant additional investments, while it should be noted that during the transition period, under conditions of available capital deficit, as well as the high levels of unemployment and low living conditions, state funding mobilization will be given priority, mostly in social direction.

Analysis shows that formation of the most critical situation in our country's gas sector may be related to the absence of strategic reserves, it leads to a particularly low level of flexibility of the system, while the country is almost entirely dependent on imported fuel and gas together with the petroleum products has been imposed the leading role in the energy balance. Construction of strategic UGS facility and reserve of oil or petroleum products is a method adapted in international practice for such risk mitigation and is supported by the requirements of EU regulations.

Strategic infrastructure concessions for foreign companies and concentration of distribution of distribution companies assets in the hands of the foreign state owned companies (Socar, KazTransGas) are highly risky, due to the complexity of anticipation of the effectiveness of the existing contracts in the long term perspective.

There is a very high probability of occurrence of emergencies and critical situations caused by natural disasters, which is due to the features of the landscape and low technical reliability (due to the long duration of operation of their significant part) of pipelines. Such emergency was observed in Dariali Gorge in May 2014 when due to the glacier's intensive melting and high precipitation, flood was originated and damaged 700mm (aerial crossing) and 1200mm (underground crossing) trunk pipelines arriving from Russia, leaving a situation when during a few days gas transit to Armenia was fully suspended, and Georgia's consumption was provided under temporary (forced) scheme.

A list of major emergencies of the pipelines linked to the natural disasters or corrosive injuries caused by pipeline's critical age of operation is provided in the Table.

Emergency site	Emergency character	Date	Result of emergency
Meneso, 224,5 km - North-South Trunk Pipeline, 1200 mm	Landslide rupture	11.05.1993	5,8 mln.cm gas emissions, termination of supply and transit
Meneso, 132 km-North-South Trunk Pipeline, 700 mm	Landslide rupture	14.05.1993	4,5 mln.cm gas emissions, termination of supply and transit
Lemshveniera, 61 km - Kazakhi-Saguramo, 1000 mm	Leakage caused by corrosion	20.08.1996	2,8 mln.cm gas emissions, termination of supply and transit

Mckheta, 122 km - North-South Trunk Pipeline, 1000 mm	Landslide rupture	27.09.1996	4,7 mln.cm gas emissions, termination of supply and transit
Goriscikhe, 78 km - Vladikavkaz-Tbilisi, 700 mm	Landslide rupture	11.11.1999	3,5 mln.cm gas emissions, termination of supply
Kesalo, 55 km - Kazakhi-Saguramo, 1000 mm	Pipeline corrosion	28.01.2003	3,6 mln.cm gas emissions, termination of supply and transit
Naniani, 233 km - North-South Trunk Pipeline, 1200 mm	Landslide rupture	17.12.2006	2,4 mln.cm gas emissions, termination of transit
Devdoraki, 143,1 km - North-South Trunk Pipeline, 1200 mm; 55,5 km - Vladikavkaz-Tbilisi, 700 mm	Rupture caused by the flood	17.05.2014	0,5 mln.cm gas emissions, termination of supply and transit during 5 days

Unplanned gas supply disruptions caused by the political sabotage or due to the technological necessity have been observed in Georgia in recent years. As a result, gas supply was suspended from various sources or was reduced by at least 33% of the total planned volume. In January 2006, after gas supply termination from Russia due to the two parallel pipeline explosions, during winter, the most critical two-week cold period, the country had a serious social and economic problems facing the threat of disaster, because at that time Russia was the sole exporter of gas in the domestic market. Full restoration of gas supplies from Russia became possible only after 15 days from sabotage. Accordingly, during the crisis period gas supply for major consumers was limited. The average consumption in January compared to the average consumption fell by about 3 times, compared to the peak consumption by 5.7 times. At the same time, gas transit to Armenia was completely ceased.

Temporary interruption of gas supplies and practical termination of delivery of contractually agreed volumes of gas from SCP were observed from 14 August to 5 September 2012. Delivery delays related to the unpredictable nature of technological malfunction at the Shah-Deniz field or the need for preventive works on pipelines or on the measuring unit or the need for testing are observed periodically.

Generally Georgia owns the appropriate infrastructure to receive the required amount of gas under ordinary conditions and it will be sufficient for the next 15-20 years as well. At the same time, as analysis shows, in case of unplanned supply disruption during peak load, severe shortage of gas emerges and provision of fuel to the customers is jeopardized.

In case of peak consumption conditions, if unplanned interruption of the gas supply from Russia or Azerbaijan takes place (see below chart 1), the country does not have the means to compensate generated significant gas deficit on their own. Therefore, during winter peak load time, in order to eliminate generated deficit it will be needed to limit consumption of gas by certain categories of customers.

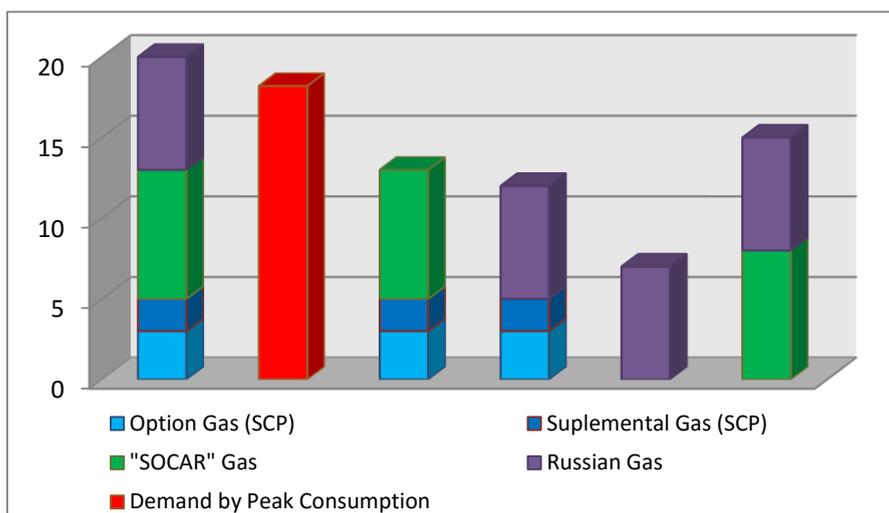


Chart. 1. Peak demand and technical and/or supply restrictions caused by contractual conditions (2020 year forecast), mln.cm per day.

Judging from the calculation, in possible critical situations, it is recommended to reserve about 120 mcm of gas for country's so called "social customers" (population and electricity) guaranteed supply and 200 mcm of gas for the country's total demand satisfaction.

Georgia's gas consumption in winter and summer periods are characterized by a distinct inequality. This is mainly due to the necessity of thermal power plants for electricity production only in the winter period, when hydropower generation potential is drastically reduced because of the shallow waters. Underground Gas Storage is effective means of regulating the supply-demand imbalance.

Analysis shows that from 2027, when supply of Supplemental gas will be ceased, the country will have to permanently receive about 200 mcm of additional, yet not contracted gas in order to satisfy "social customers" demand. If Georgia reaches an agreement to extend (modify or sign a new contract) Additional gas contract with consortium, in which supply of additional 200 mln.cm of gas annually will be considered, owing to flexibility and reserves created in UGS the country can provide "social customers" with necessary gas volumes, in full compliance with mandatory terms for competitive market creation and energy security provision, provided in the EU Association Agreement.

Improving the reliability of the infrastructure through using interconnectors and on the basis of the rehabilitation/reconstruction of the existing, among them transboundary transport system on the one side and further market liberalization and opening through real competition contributing and anti-monopolistic structure initiatives, on other side may become a real opportunity for reduction of the risks and threats linked to the natural disaster, political sabotage and technological malfunction.

Critical infrastructure areas of the Georgian Main Pipelines located in hardly accessible mountainous regions are shown on Chart 2 and in case of emergency during bad weather conditions, their instantaneous rehabilitation will be difficult.

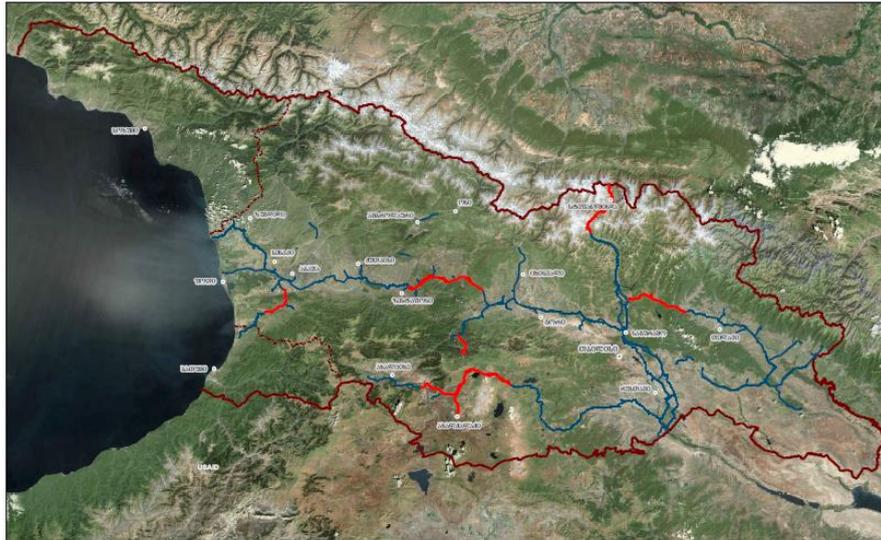


Chart 2. Critical infrastructure areas of the Georgian Main Pipelines (red colored)

On the marked sections, in case of violation of the integrity of the pipeline, remaining pressurized gas will be used until rehabilitation works completion. This can prolong supply for residential customers for one day. Afterwards, in order to protect consumers it should be taken into consideration to provide them with alternative energy or fuel, and it also requires the timely informational support.

It is also necessary to take long-term mitigating measures to provide “vulnerable customers” with uninterrupted gas supply, in any reasonably foreseeable emergency situation:

- Construction of new and/or parallel pipelines;
- Ring type supply scheme arrangement for Kakheti, Southern and Western branches of infrastructure;
- Construction of UGS facility.

Under conditions, when the country is significantly dependent upon import of the main fuel resources, UGS facility represents one of the primary attributes to have energy resources strategic stock and to provide energy security. Besides, using UGS facility is the best and cheapest tool to regulate gas supply and seasonal imbalance of consumption. Under liberalized market conditions, when certain segment of demand is satisfied by gas received on the basis of spot agreements, UGS facility is gaining commercial function too. UGS facility gives opportunity to receive significant additional revenue, when any supplier or customer can buy and store gas at desired time and use (or sell it more favorably) it in necessity. It's noteworthy that from 2019-2020 a significant increase in transit flows and in volumes receivable from SCP, will make gas supply, rational distribution and consumption activities even more problematic. Consequently, construction and operation of underground gas storage belongs to the most important infrastructure projects for supply reliability in the foreseeable future.

Renewable Energy



Renewable Energy and Its Role in Modern Society

Renewable Energy (RE) comes from renewable sources of wind, sun, water, and biomass, geothermal or tidal energy. Nowadays, RE is successfully used in power generation in commercial, residential, transport sector or etc.

According to the World Bank¹⁵, RE make up almost 17% of the total global electricity supply, or about one fifth of the global energy supply mix while fossil fuels make up over 80%. However, renewable energy is the fastest growing part of energy mix, especially wind and solar technologies. Traditional biomass is the most widespread technology and constitutes over half of renewable energy capacity.

Importance of RE is defined by different social, economic, environmental and political factors. RE also plays an essential role in the fight against climate change and is one of the possibilities to promote energy security, employment or development of research and innovation.

It's also noteworthy, that the costs of renewable energy is gradually decreasing in recent years. The decreasing trend is expected to continue into the future as the technologies improve and the scale of production increases in large manufacturing countries such as china.

Global new investments in RE have increased substantially between 2004 and 2014, increasing from \$39 billion to \$270 billion. China, the USA, Germany, Italy and India were the top countries for total investment for 2014.

Pic 1 investments in RE¹⁶

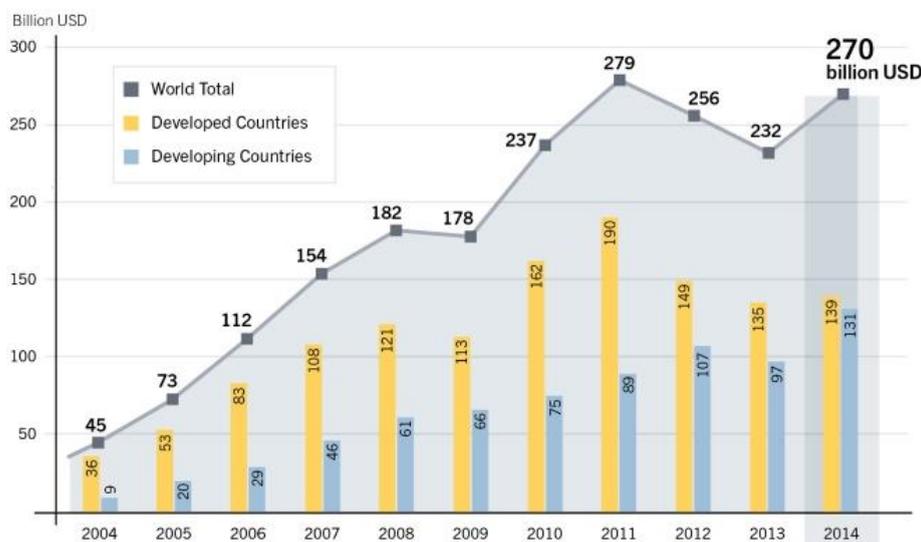


Image: Global investment in renewable power and fuels, from the *REN21 Renewables 2014 Global Status Report*

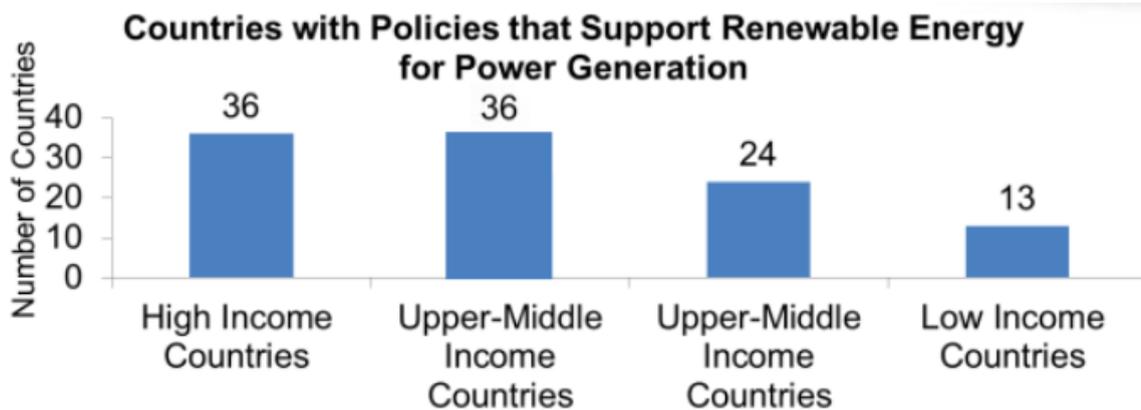
¹⁵ The material was prepared by World Bank online course "Energy Sector Strategies to Support Green Growth" 2014

¹⁶ REN21 (2012)

Different stakeholders are involved in the RE development, like governments, ministries, international donors, consumers, experts, engineers, scientists, CSOs , banking sector, local municipalities, private companies etc.

In 2011, 118 countries had some type of policy target or renewable support policy at the national level. Developing countries represent more than half of all countries with RE policies. By early 2011, this number more than doubled to 118 countries,

Pic 2. Countries with RE policies ¹⁷



RE policies are complex and consist of different components 4 main directions can be identified:

1. Regulations and standards
2. Quality instruments
3. Government procurements
4. Price instruments

These components must be considered in countries willing to promote Renewable Energy sources and technologies.

¹⁷ RENS21 (2012)

Renewable Energy Support Mechanisms - The World Experience

Nino Maghradze, WEG

26 September 2014

Renewable Energy promotion is one of the main directions for environmental and economic development, European Union countries leading in this direction. The driving forces for promotion of Renewable Energy growth are:

- Irreversible trend in the reduction of traditional energy supplies;
- Diversification of energy sources: reducing dependence on imported energy, and increasing security in this regard;
- Climate change: the Kyoto Protocol, EU directives driving the reduction of Greenhouse gas emissions;

Different countries have established different support schemes to promote Renewable Energy in their countries. Success of each support mechanism depends on the specified style of the deployed Renewable Energy.

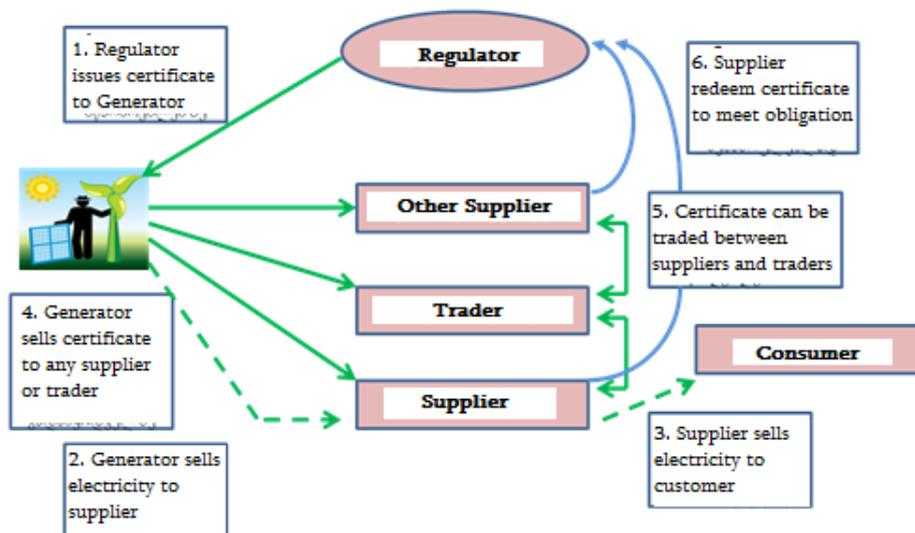
Electricity generated from Renewable Energy Sources requires big investments; therefore the cost for such electricity is very expensive. Without help of State such projects cannot be developed.

Transition to a sustainable energy system will require total cumulative renewable energy investment of 963 Euro billion by 2020, going up to about 1620 billion by 2030¹.

Three main direct mechanisms for support of deployment of Renewable Energy are used:

1. Feed in Tariff/Feed in Premium, implemented in Germany, Spain, Denmark and other countries;
2. Quota mechanism or quantity mechanism known as a market mechanism (Green Certificate), implemented in France, Great Britain, Latvia etc;
3. Competitive auctions – implemented in Italy, Sweden, China etc

Green Certificate trading system



The main difference between the Feed in Tariff, the Feed in Premium system and Competitive Auction system is that, for the first one electricity volume is defined by market participants

and price is established fully or partially by Regulator. For the second one electricity volume is defined by Regulator, but the price is determined competitively between market participants. Other mechanisms are Renewable Energy Charge, which is paid by the consumer in proportion with its consumption level, per kWh and Guarantee of Origin – in 2011, 33% of all Renewable Electricity consumption in Europe was documented with Guarantee of Origin. The major markets were Germany, Sweden, Belgium, Norway, and Netherland¹⁸.

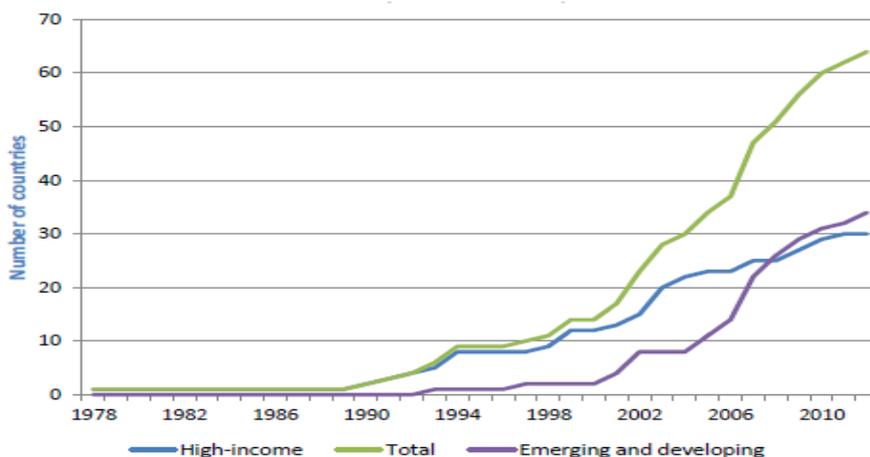
General concept of auctions is that there is a large numbers of offers and projects are selected according to their energy price; also there are transparent procedures and prices.

Strength and weakness of promotion mechanisms

	Strength	Weakness
Feed in Tariff	<ul style="list-style-type: none"> - Less risk for investors; -New market players; -Mostly financed by consumers, rather than State budget; -Development of the sector by long-term investments. 	<ul style="list-style-type: none"> -High price; -Complexity for determination a price; -Irrelevance of generation with market prices.
Feed in Premium	<ul style="list-style-type: none"> - Less risk for investors; - Fixed premiums; - Well suited for liberalized markets; - Very flexible on market signals. 	<ul style="list-style-type: none"> - Project complexity; - Risk associated with absence of floor price.
Auction	<ul style="list-style-type: none"> - High efficiency due to price competition; - Useful instrument to establish competitive prices; - High investor security for long-term power purchase agreements; - Increasing predictability in renewable energy supply. 	<ul style="list-style-type: none"> - Discontinuous market development; - Risk of not winning the auction; - High administrative costs; - Penalties.

By 2013 about 64 countries had adopted feed in tariff or feed in premium systems; These systems have increasing popularity in emerging and developing countries.

Pic. 2. Number of countries adopting Feed in Tariff/Feed in Premium¹⁹

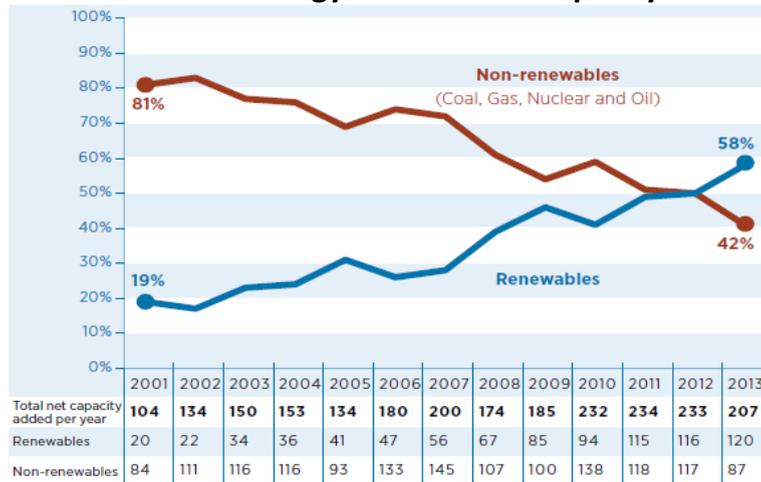


¹⁸ International Renewable Energy Agency. *Re-thinking 2050*

¹⁹ *Global Status Report, REN 21.*

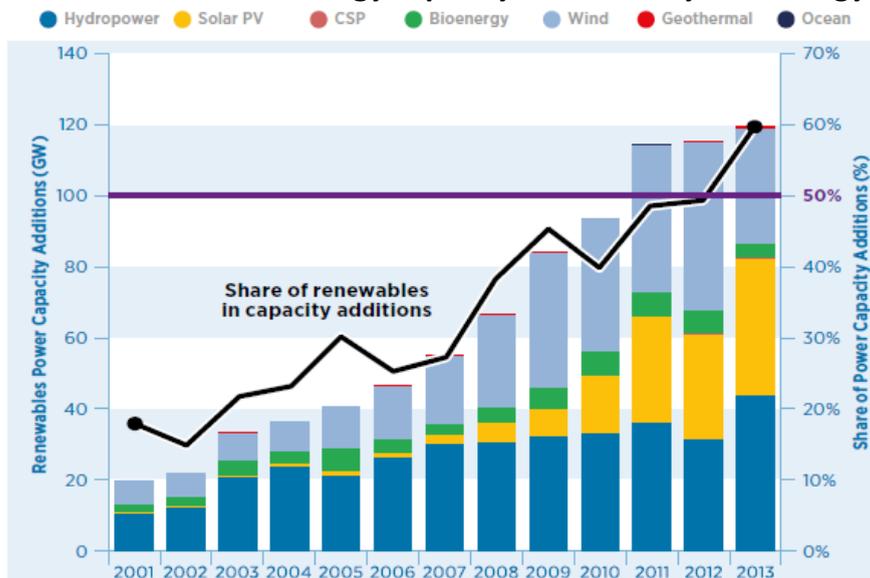
Renewable energy deployment in emerging countries is supporting growth globally. New renewable capacity installations outside the OECD have exceeded deployment within the OECD for the first time in 2013, with China dominating new capacity additions of both solar PV and wind.

Pic. 3. Renewable Energy as a share of capacity additions



The rapid expansion in deployment is spurred by declining costs of renewable energy technologies. As a figure below demonstrates, renewable energy is often competitive with fossil fuel power at utility scale, and is generally cheaper in decentralized settings. Markets will expand and costs are expected to fall further. Moreover, renewable energy is sheltered from volatile global fossil fuel costs.

Pic. 4. Renewable Energy capacity additions by technology



Renewable Energy technologies have grown more robust and more efficient and are increasingly able to generate power even in suboptimal conditions such as low wind speeds and low solar irradiation. Energy storage technologies are improving fast.

Germany is the leader in renewable energy and has the first position in terms of installed capacity in wind energy and the second position in PV solar energy. The success of such development in Germany is due to adopting feed in tariff system.

Table 1. Feed in Tariffs in Germany

FIT Germany	€ cent/kWh
Hydro	
<500 kW	7,67
From 500 kW to 5 MW	6,65
Wind	7,9
Solar	31,9
Biomass	
<500 kW	9,3
From 500 kW to 5 MW	8,3
From 5 MW to 20 MW	7,9

Spain also achieved its success by adopting regulatory framework, which is based on a feed in premium system.

Table 2. Feed in Premium in Spain²⁰

FIP Spain	€ cent/kWh		
	Reference	Upper limit	Lower limit
Wind			
<=5 MWh	2,929	8,494	7,127
<=5 MWh (Offshore)	8,43	16,4	
Solar thermal	25,4	34,397	25,403
Biomass			
Energy Crops	11,529	16,63	15,41
Agricultural and forestry waste	8,211	13,31	12,09

For the efficiency of promotion mechanisms:

1. Promotion mechanisms should increase demand of supply;
2. Give the long-term planning opportunities;
3. Renewable Energy sources should have free access to transmission grid;
4. Promotion mechanisms should be limited time by time;
5. Diversifying promotion mechanisms by technologies.

Results of different countries show that development of renewable energy should be limited in order to avoid surplus in production and not to create financial problems in the future.

²⁰ *Analysis of the success of feed-in tariff for renewable energy promotion mechanism in the EU: lessons from Germany and Spain, 2012.*

Development of renewable energy technologies produces clean energy, increases employment, contributes to GDP growth and creates a new industrial sector by investing in research, development and innovation.

Georgian government promotes hydropower development from 2008 by implementing State Program - "Renewable Energy 2008" - rules on construction of new renewable energy source adopted on 18/04/2008 and also the second one adopted on 21.08.2013.

Another program implemented in Georgia is Energy Credit, which allows interested parties to get the loans amount and 10-15% of the investment subsidy, which is available from the European Bank of Reconstruction and Development and its donors. The total amount of this program in whole Caucasus region is only 100 mln USD and it will be finished in April 2016.

There are still many problems in renewable energy development in Georgian energy sector, namely:

- Lack of promotion mechanisms for renewable energy (particularly solar, wind and biomass) development;
- The need for development of appropriate legislative framework;
- Need for more investor guarantees;
- Succession/replacement of existing memorandums and power purchase agreements after transition to new electricity trading model of Georgia; Nowadays most of the newly built HPP's, or HPP's under construction have agreements with Electricity System Commercial Operator (ESCO). After transitioning to a new open market, ESCO will change its function, becoming a Market Operator. The question of how the existing agreements will work and who will be the successor of ESCO in terms of purchasing electricity from HPP's, remains unclear.
- Instability - failure of planned export.

In order to make Renewable Energy Sources more popular in Georgia, we need:

- To develop a strong legislative base;
- To create special conditions for attracting foreign investment;
- More guarantees for electricity sale (export);
- A clear set of procedures;
- Joint work with various state agencies and investors;
- Implementation of Renewable energy sources in terms of research, development and innovation.

Renewable Sources of Energy – EU Directive and the Policy of Georgia

*Giorgi Mukhigulishvili, WEG
26 September, 2014*

The development of renewable sources of energy is one of the main directions of the EU energy policy in the context of preservation of the environment and economic development. This facilitates the implementation of the goals described in The Kyoto Protocol and makes it feasible to take advantage of socio-economic spheres, such as diversification of sources of energy, employment, regional development and so on.

The preamble of the EU-Georgia Association Agreement indicates that the parties take the responsibility to increase the energy efficiency and utilization of renewable energy sources; regarding the renewable sources, the main emphasis is made on the use of hydro resources as well as the facilitation of bilateral and regional integration.

According to the EU-Georgia Association Agreement, the latter is committed to gradual approximation towards the legislation of the EU and international legal institutions in energy sector. The main guiding document for utilization of renewable sources is the Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources.

The directive describes the main principles and goals that should be implemented in the specified timeframe. According to it, the state is obliged to define the target level of the total energy consumption from renewables to be reached in 2020.

The states are also obliged to have at least 10% share of the renewable sources in the transport sector by 2020. The creation of the National Action-Plan will indicate the target of total consumption in 2020, including the transport sector and total production of heat. The action-plan should include the policies for the support of renewable energies.

It is essential for the states to provide the access to the information on the origin of produced energy from the renewable sources for electricity and heating/cooling in order to allow the consumers to get comprehensive information on energy sources. For the implementation, the state has to create required infrastructure and to include into the Building Code the mechanisms that will facilitate the consumption of renewable energy in the building processes.

It is important to understand that the implementation of the directive requirements is a complex and consuming process, especially in case of Georgia when the country faces the lack of comprehensive regulatory framework. While considering the policy and legislation of Georgia in view of 2009/28/EC directive, the following circumstances should be outlined:

1. Georgia has no law on renewable energy that would regulate and facilitate the consumption of the renewable sources
2. There is no official information on the renewable energy potential, which creates problems in assessing the share of total energy consumption to be achieved for certain period (2020).

3. The vertically integrated companies (Energo-Pro, Telasi) operating in electricity sector, own distribution networks, generation plants and at the same time are suppliers, which makes it difficult to develop the generation from small renewable sources. The long-term memorandums between the state and these companies complicate the situation further.
4. Complex administrative procedures for the access to distribution networks and the high costs prevent the development of small-power generation objects.

In “Socio-economic Development Strategy of Georgia” (“Georgia 2020”) it is mentioned that “the Government of Georgia plans to form an efficient mechanism for public-private partnerships which is especially important for attracting investments to infrastructure and hydropower sectors.” The strategy also indicates, “Georgia’s potential in terms of wind power and solar energy generation is also quite significant. The country also has geothermal water resources, which could decrease imports of expensive energy products; the efficient management of water resources is very important in terms of exploiting hydroelectric resources.”

Thus, it is important for the state to promote the development of renewable energy sources not only in the supply sector, concentrating on hydro resources but also taking into regard other sources on demand side. The implementation and practical performance of the directive is important for Georgia and will be beneficial for state’s energy security.

Energy Efficiency



Significance of Energy Efficiency²¹

In the last 20 years, rapid economic growth resulted in 80% increase in GDP per capita in developing countries. Living standards have improved for more than 500 million people rising out of poverty and notable progress in literacy, child mortality, access to clean water and in reduced air pollution.

However, the question now is whether our planet has an ability to feed 9 billion wealthier people and absorb the waste they produce or not? There are growing concerns about climate change and the degradation of ecosystems and biodiversity.

This is a reason a number of multilateral institutions, policy makers and researchers are launching initiatives on ‘green growth’, ‘green economy’, or ‘green development’.

Green growth refers to a focus on addressing the twin challenges of expanding economic opportunities and mitigating environmental pressures in an integrated manner. In the context of energy sector, green growth has an explicit focus on climate change mitigation and low-carbon energy. Energy efficiency and related issues are especially important in this respect.

According to the World Bank, global energy demand will grow at an annual rate more than 2%. Most of the growth will originate in large developing countries - China and India. However profitable investments in efficient technologies can sustainably offset this increase in demand, cutting global energy demand growth from 2.2% down to 0.7%. These saving would be equivalent of 64 million barrels of oil per day. Energy savings refers to commercial sector as well as households and transport sector.

The question is why does so much potential for cost-effective energy saving go unrealized? What are the main barriers for implementing energy efficiency policies, why are not existing policies effectively used? The answer for this question has three main components such as: Market Failure, Behavioral Barriers and Government Failure and the role of government.

Market failure refers to externalities and incomplete information; the externalities might be greenhouse gas emissions, water and air pollution, if these externalities are not included in the tariff, the total price of energy will not be clear. Market failure is also connected to the building and their construction, when energy issues are settled by investors and building companies without involving future owners. Different interests affect negatively on energy efficiency issues. The role of government is especially important in this process. Government should act as a facilitator, provide the future owners with the information about energy efficient technologies and how much can they save during different scenarios.

Behavioral barrier is connected to the “energy efficiency paradox”, and the phenomena of considering investing in energy efficiency as risky.

“Energy efficiency paradox” occurs, when investors look for big financial outcomes in order to invests in energy efficiency technologies, the paradox is that, they are trying to increase energy

²¹ The material was prepared by World Bank online course “Energy Sector Strategies to Support Green Growth” 2014

consumption and then invest in energy efficient technologies. In this case, government can persuade citizens to make right choices.

The government failure is connected to the government policies and decisions. For example, sometimes governments set a low tariff on energy and make subsidies on fossil fuel. This is not appropriate for energy efficiency promotion and has reverse impact. Therefore, correct policies and their monitoring measures are especially important.

The first step in policy making can be setting energy efficiency targets. The targets can be national, sub-national or sectorial and they can be expressed in many ways. Governments might have several policy options:

- Information and communication measures – labeling, public awareness and information campaigns.
- Regulatory instruments- - standards, building codes, regulations for designated consumers. Energy efficiency plans etc.
- Market-based instruments- price instruments- economic and fiscal instruments, quantity instruments

Energy efficiency – EU Directives and Georgian legislation²²

*Murman Margvelashvili; Tutana Kvaratskhelia, WEG
29 May, 2015*



Energy efficiency is using less energy to provide the same service. E.g. fluorescent light bulb is more energy efficient than regular incandescent light bulb as it consumes less energy to produce the same light quantity. Similarly, energy efficient stove consumes less fuel than a conventional one, and the heat produced is the same.

Investments in energy efficient technologies can save more energy, than several power plants can generate. Energy efficiency plays an important role in substitution of fossil fuels and the fight against climate change.

The benefits of energy efficiency could be listed in 5 main points

1. It helps to save money;
2. It contributes to economic development;
3. It is environment-friendly;
4. It leads to further strengthening of energy security;

²² Funded by OSGF under the project implemented by Green Alternative

5. It improves the quality of life.

It is easily known that energy efficiency activities save consumers' finances by cutting down the energy consumption and, respectively its cost. At the same time, implementation of energy efficiency activities and the savings therein support the economic growth of the nation. They also contribute to job creation and are the basis for innovation, because one of the prerequisites for the introduction of energy efficient technologies is the creation and development of nonexistent hitherto technologies.

An important factor related to energy efficiency is the environment. Energy saved is one of the prerequisites for reducing pollution since it is well known that release of pollutants (greenhouse gases) accompanies the use of fossil energy resources in social and commercial, and transport sectors. Energy efficiency also increases security level by reducing the country's dependence on external energy sources, and, finally, energy efficiency improves quality of life by creating home comforts.

Due to the above factors developed countries pay increased attention to energy efficiency. Internationally, environmental protection and reduction of greenhouse gases is the main priority as this is linked with the fight against climate change. In this regard the EU directives, which shall be implemented within the Association Agreement of Georgia with the EU, are especially important for Georgia. These are:

- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 **On energy end- use efficiency and energy services**
- Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 **On the energy performance of buildings**
- Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 **On energy efficiency**

The purpose of directive 2006/32/EC on energy end-use efficiency and energy services is to enhance the cost-effective improvement of energy end-use efficiency. To this end it calls member states to provide the necessary indicative targets as well as the mechanisms, incentives and institutional, financial and legal frameworks to remove existing market barriers and imperfections that impede the efficient end use of energy.

The directive, basically, applies to energy distribution and retail sales. Basic target indicator is the national indicative energy savings within NEEAP²³, calculated using appropriate methodology. In this respect the directive emphasizes a special role of public institutions and public procurements. Public institutions shall undertake the following:

- Develop and implement financial measures to support energy saving;
- Purchase energy efficient technologies and transport means;
- Purchase energy efficient product.

²³ National Energy Efficiency Action Plan

Besides, the states shall establish independent public service or agency to monitor the Action Plan implementation process. The states shall ensure that energy distributors, distribution system operators and/or retail energy sales companies provide information to final customers on energy efficiency programs. States shall ensure that final customer are provided with individual meters and the billing based on actual energy consumption, presented in clear and understandable terms, comparisons of current energy consumption with consumption for the same period in the previous year and contact information from which information may be obtained on available energy efficiency improvement measures.

Another important directive touches on energy performance of buildings (Directive 2010/31/EU on the energy performance of buildings). First of all it should be noted that buildings consume much more energy than other sectors of the economy. Within the EU Buildings account for 40% of total energy consumption which is more than in industry and transport sectors. Therefore, reduction of energy consumption plays important role in reaching the goal of EU energy strategy i.e. achieve the objective of reducing by 20 % the Union's energy consumption by 2020.

The directive requires from member states to develop methodology to calculate the energy performance of buildings, which includes, in addition to thermal characteristics, other factors such as heating and air- conditioning installations, hot water supply, indoor air-quality, adequate natural light and design of the building etc. Minimum energy performance requirements shall be reviewed every five years and, these requirements may differ for old and new buildings. These requirements shall not apply to buildings officially protected because of their special architectural or historical merit, buildings used as places of worship, temporary buildings etc.

By 31 December 2020, all new buildings shall be nearly zero energy buildings and new buildings occupied and owned by public authorities shall meet these requirements already by 31 December 2018. Besides, a system of certification of the energy performance of buildings shall be laid down to include the energy performance of a building and recommendations for the cost-optimal or cost-effective improvement of the energy performance. When buildings or building units are sold or rented out, the energy performance certificate is shown to new tenant/ buyer and mentioned in an advertisement.

One of the main prerequisites of implementation of the directive is the development of building code on a national level. It is noteworthy that most of the developed countries have adopted building codes in 1970-yes and they have undergone serious changes since then. Energy efficiency of buildings in Europe and the USA has improved by 60% since. Developing countries started drafting of the respective codes in 1990-IEs, but economic and institutional barriers were deterrent to this process. Building codes become especially important against the background of incomparably large amount of construction and the enormous potential of energy efficiency. Already available technologies allow reducing buildings energy consumption by 30% by 2030⁸⁴. Energy saving potential is particularly high in developing countries and countries with transition economies.

The most recent directive regarding energy efficiency is that of 25 October 2012 – directive 2012/27/EU of the European Parliament and of the Council on Energy Efficiency, which,

over time, will repeal directive 2006/32/EC. Under the directive, countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption.

The directive underscores that the world is facing unprecedented challenges resulting, on one hand from increased dependence on energy imports, and, on the other hand the need to limit climate change to overcome the economic and environment problems. Previous directive failed to reach its goal and the need for additional arrangements arose in order to reach the 20 % reduction of energy consumption by 2020 throughout the EU. The directive allows the states to set an indicative national energy efficiency target, based on either primary or final energy consumption.

The new directive underscores the importance of well-established energy audit system and exemplary role of public buildings. The public sector is required to purchase new technologies and to renovate its buildings to meet the minimum energy performance requirements. Besides, it requires from the states, that they promote the availability of high quality, energy audits to all final customers and to strengthen the incentive mechanisms thereto. Member States shall also develop programs to raise awareness among households about the benefits of such audits through appropriate advice services. The States shall encourage training programs for the qualification of energy auditors in order to facilitate sufficient availability of experts. Big enterprises are required to carry out energy audit every 4 year.

The Association Agreement with Georgia does not include specific timing for implementation of this directive. The timeline should be defined in the framework of negotiations on the accession of Georgia to the energy association or, if the accession does not take place within two years, new timing shall be presented to the Association Council in the third year after signing the agreement.

What is the situation in the country in terms of government programs to support energy efficiency and what barriers will Georgia have to overcome when implementing the directive requirements.

First of all Georgia is one of those exceptional states where there is no energy efficiency law or a uniform energy law to comprehensively address this issue. Draft law developed in 2008 with the WEG support was not adopted by the government. The efforts of Ministry of Energy to include energy efficiency in Building Code did not produce results either. The law “on Electricity and Natural Gas” - basic law governing energy sector – provides that one of the functions of the Ministry of Energy is to develop a single government program to improve the efficiency of consumption and to monitor its implementation. However the importance of energy efficiency is not explained. According to a 2014 preliminary document of energy policy– “Development and Implementation of a Common Approach to Energy Efficiency” – energy efficiency shall be one of the key policies. Another document – “Social-economic Development Strategy of Georgia

2020” – provides that energy efficiency will be enhanced and relevant legislative mechanisms will be drawn up in accordance with international and European norms”. But this is just a

formal part of the issue. In order to implement the directive appropriate programs and action plans need to be developed.

Georgia so far has not developed target energy efficiency national indicators and the action plan, although 8 big cities, including Tbilisi²⁴, have signed the Covenant of Mayors²⁵. By their commitment, Covenant signatories aim to meet and exceed the European Union 20% CO2 reduction objective for which they develop Sustainable Energy Action Plans (SEAP). To date only four cities (Tbilisi, Batumi, Gori and Rustavi) have such plans. Sources of financing are not defined, and given the tight budgets, they hope only for donor funding.

Practically, there are no professional energy services companies; their supporting financial or other mechanisms are not in place either. There is no energy audit system and no official document has been developed so far to establish the buildings' energy audit procedures.

Energy efficiency measures are being introduced spontaneously, using only market mechanisms. Insulation of buildings, use of energy saving bulbs and other consumer electronics has become part of the practice, but without proper government support the process is moving forward very slowly.

Installation of individual meters for electricity consumers has been going on for years and is still not finished. According to Georgian National Energy and Water Supply Regulatory Commission (GNERC) 2015 report the statistics of consumers without individual meters is as follows: "Telasi" – 8,9%; "Energopro-Georgia" – 8,8%; "Kakhetis energodistribucia" – 18%;

Introduction of stepped electricity tariffs in 2006 may be considered as one of the factors encouraging energy efficiency but in that time the real value of rates almost halved and its encouraging function works only for the poorest segment of population. If the government decides to refuse the harmful practice of backing tariffs, and given significant increase in energy consumption and imports, we should expect a significant increase in tariffs too, which will be a heavy economic burden on the population. It is today that the maturation of the existing potential gains in importance.

As for energy efficiency of buildings, this demand of the directive in Georgia shall be nailed down by law on Construction Activities, but there is nothing said about energy efficiency there. There is no formal requirement for certification of buildings, no standards and no institution to work in this respect. Currently, Ministry of Economy of Georgia is developing a draft code of "Spatial layout and construction". Articles 108 and 109 of its preliminary version deal with insulation and energy efficiency of buildings and use of renewable energies.

²⁴ Tbilisi (2010), Batumi (2011), Rustavi (2011), Kutaisi (2011), Gori (2012), Poti (2012), Zugdidi (2013) and Telavi (2014) - www.eumayors.eu

²⁵ The Covenant of Mayors is the mainstream European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and use of renewable energy sources on their territories

It is noteworthy that EBRD has announced a tender for consultancy services to support the development of an energy efficiency action plan of Georgia, as well as government arrangements to enhance energy efficiency of buildings.

Conclusion

A basic impediment to energy efficiency in Georgia is the lack of understanding of its importance by the government, which is an exception in the region and among more or less developed countries. Due to the lack of state vision of energy efficiency, it is becoming impossible to get related economic, energy, environmental, social, technological and political benefits of energy efficiency.

It is important for the government to develop laws, effective institutions, financial mechanisms, action plan and its monitoring system; assures a free market environment to sustain energy efficiency. Firstly, the government shall develop energy efficiency national policy to define a common framework for all the above systems. Effective utilization of current and future donor projects and international assistance, which can be picked up through Green Climate Fund is really important in this respect.

Trainings and other educational activities for energy auditors, managers, construction sector representatives and service providers would also be supportive of the advancement of these processes. Information campaigns for awareness raising on energy efficient technologies and energy saving arrangements are necessary, because introduction of energy efficiency improves living standards and contributes to economic development and creates the secure environment.

Energy Consumption Patterns and Energy Planning in Georgia



Household Energy End-Use Survey

Giorgi Chikovani, Deloitte Georgia

27 June, 2014

In 2014, under the USAID funded HPEP project implemented by Deloitte, AYPEG conducted the household energy end-use survey in Georgia.

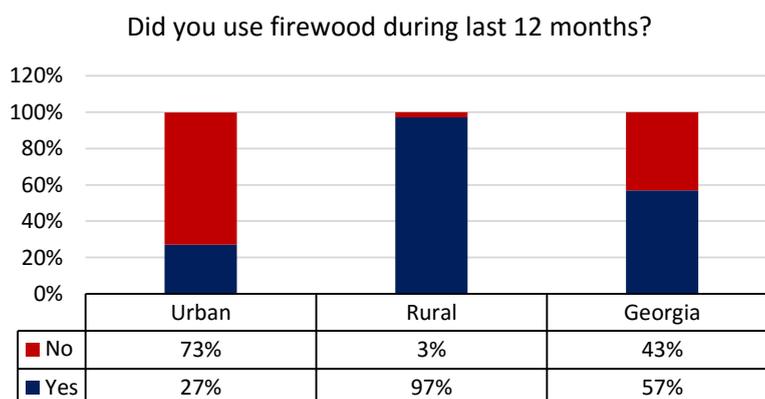
The main objective of the survey was to support the energy sector development that drives economic growth through diversifying and improving the efficiency of energy resources of Georgia as well as to enhance research and development through national energy end-use survey. Improved statistics on household energy end-use will contribute to the Energy Strategy development for Georgia

Survey Design

The survey began in February and lasted for 4 months; the territory of the country was broken down into two independent strata-urban and rural settlements, each stratum was further divided into substrata based on geographic regions ('quadrants'). In stratum URBAN, 33 and in stratum RURAL 23 voting precincts (clusters) were randomly selected from the sampling frame with probability proportional to the number of registered voters. In general, the sampling frame includes information about 3,605 electoral districts throughout Georgia. The survey is representative, with 2% Margin of error.

Survey Results

Based on the survey results 57% of households used firewood during last 12 months for water heating, and/or space heating and/or cooking purposes, across Georgia. Almost all households (97%) in rural settlements consumed firewood.



Another important observation from the survey was, that from 43 % of the households who did not consume firewood currently, 20% were consuming it for water heating, and/or space heating and/or cooking purposes during past 5 years. Average yearly firewood consumption by a household, does not differ for urban and rural settlements. The average firewood consumption by an urban household is 6.9 cubic meters while this indicator is 6.99 cubic meters for a rural household.

Even though estimated firewood consumption is very high for Georgia, its energy value is not as high, due to the fact that most of the firewood users consume newly cut wood 46 %

of households who consumed wood during last 12 month used non-dry wood. Non-dry wood has calorific value 40% less than the dry wood.

To satisfy households' energy needs for space heating, water heating and cooking, different energy sources are used for rural and urban households in Georgia. Survey results illustrate that most used source for space heating is firewood, followed by natural gas at the national level. The reverse situation is in energy needs for water heating – firewood is the second most used energy source after natural gas at the national level. However in both activities firewood is the most used source in rural settlements, while natural gas dominates in urban settlements. The natural gas is the most used energy source for cooking needs for Georgian households, followed by firewood and LPG. However, still in rural settlements 43% of interviewed households use firewood for cooking purposes.

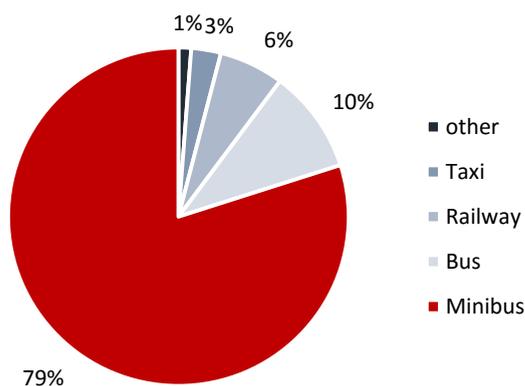
Based on the survey results, on average, households heat 45% of their dwelling. Only 4.2% of households use central heating appliances for space heating and all of them run on gas fired boilers.

Transportation

According to the survey results, on average a household spends 151 GEL for fuel and the average load factor is 1.99 people per vehicle. During the recent years, more and more households convert their cars from gasoline to natural gas. Survey shows that the number of cars that moved from gasoline to natural gas is increasing significantly. Based on the survey results, 20% of the cars use natural gas as a primary fuel.

Based on the survey results, respondents mainly use minibus for the intercity transportation. The second major source for inter settlement transportation is a bus and third – railway, respectively (see Figure 2).

Fig. 2. The main source for inter settlement travel



Energy Efficiency

At the end of the survey few general questions were asked about energy efficiency. According to the survey results 72% in rural and 64% in urban areas did not know the meaning of energy efficiency. The share of households, who knew what the term energy efficiency

implies, almost coincides to the share of the households who are using energy efficient light bulbs for lighting (27%)

Those households who did not know the meaning of energy efficiency, interviewers were instructed to explain basic concepts of energy efficiency and its measurements such as installing energy efficient bulbs, solar collectors and PV, central heating system, buying appliances with high energy class, performing thermal insulation of dwelling and installing windows with better thermal insulation, etc. According to the survey, most desired energy efficiency measurement that households are willing to perform is installing central heating system. The main obstacle for households willing to implement energy efficiency measurements is the lack of financial resources

Forest Management and Wood Supply Problems in Georgia

Revaz Getiashvili, CENN

27 June, 2014

Major part of Georgian population uses firewood for heating (75-91%). Timber business is the main source of self-employment for many and thus causes certain problems; trees in large volumes are being cut without planning and this causes serious threats to forests. According to existing data, inappropriate forest management results in 200-250mln GEL loss annually. Forest management problems can be divided into several components.

Forest infrastructure:

Forests that are easy to access or provided with good infrastructure are already degraded. In order to stop farther degradation, logging areas are allocated only in remote inaccessible areas. The lack of transportation facilities and forest rangers in Georgian villages aggravates the problem even more. As families living in rural areas do not own necessary transportation technologies, they cut wood in nearby forests illegally. In addition, as households take only high quality timber, large amount of the wood logs remain in the forests and create additional logjams that are reasons preventing young forest growth and restoration, increase the disease and fire risks. The frequency of forest damage is becoming critical and results in land erosion. Inadequate forest infrastructure finally results in natural disasters.

1. Illegal logging

In the end of the 2013, the Ministry of Environment and Natural Resources Protection approved the limit for the amount of timber harvest per household to 7m³ per year. According to the surveys²⁶, the annual consumption of wood in Georgian regions varies from 8m³ to 13m³. Therefore, 7m³ is not enough for most families to satisfy their energy needs.

²⁶ Source: Household Energy Consumption Survey conducted by Association of Young Professionals in Energy of Georgia (AYPEG) supported by USAID under Hydro Power and Energy Planning Project (HPEP).2013

In addition, there is not sufficient timber resource even to provide 7m³ fuel wood for each family. This makes, it impossible for households to get enough firewood legally.

Firewood consumption must be reduced in the future. Rational usage of forests, development of energy efficiency and alternative sources of energy can contribute to achieving this goal. Involvement of different governmental entities is also required.

2. Additional volumes of fuel wood – cooperation with private sector

It is possible to decrease illegal cuttings by getting additional timber; due to this purpose, the following must be considered:

- a) Forest cleaning- large amount of wood cuttings left in forests can be given to households if agreed with License holders.
- b) Sanitary cuttings– remove diseased, dry and rotten trees from already thinned forests and make firewood from this material.
- c) Give households wood left from different infrastructural projects and industrial firms.
- d) Encourage private sector to produce briquettes from sawdust. Firms have very limited possibilities for residues' disposal since municipal landfills are not used for this purpose. Thus if government will support producers, they might consider Recycling of the residues.
- e) Research and popularization of energy efficient technology – the survey conducted by the OECD confirms that households use energy effective stoves more and more often, they also use nutshell for space heating. Government must support these initiatives.

3. Functional limitations

Woodcutting monitoring conducted by CENN and OECI has revealed a strong degradation of special function forests. The change in legislation that reduced the density limit of cut forests to 0.4 caused degradation of resort forests. The famous Georgian resorts are losing their development prospects. This will cause significant damage for Georgian economy and create social problems. Households, living near protected areas cut wood in the same area repeatedly, consequently forests in these areas are degraded. Ecological and social problems increase from year to year.

Severe problems were reported in the forest grove, where, due to the illegal extraction of firewood, the frequency of the forest has been reduced by 0.1-0.2. Social cutting areas are excreted in the forest territories, which are performing specific security functions.

Residents living near the protected areas extract timber in the same place, because of that these areas are degraded. Environmental and social problems get worse from year to year.

4. Support Plantation business

According the OECI information citizens of villages in Zugdidi and Senaki Municipality began to cultivate plantations on own agricultural land by their own initiative. So called “private forests”

became their source of income, in addition plantations serve as a recreation and conservation forests. This fact indicates that support of plantation business in these areas will give desired results.

Cultivation of fast growing species will be especially effective in the areas of forestless municipalities left without gasification.

5. Determine optimal periods for firewood preparation

Monitoring has shown that families begin to take care of firewood only in winter. This creates several problems.

First: Because of bad weather, timber logging is difficult, thus pressure on forests that are easy to access and are already degraded increases. In some cases, households are left without any firewood.

Second: newly cut timber is used as firewood that generates 30-40% less heat compared to dry firewood. In Europe common practice is to cut wood two years earlier before it is used; this ensures maximum efficient usage of timber resources. Thus, it is necessary to work out short-term programs for wood supply and create storage of firewood for two years.

6. Inform the population about changes

Reduction of illegal timber logging can be achieved by restricting rules of firewood production and transportation and providing effective control. In addition, informing residents about these rules and improving the qualification of appropriate employees of state supervision department is needed. During the meeting with residents, an idea was mentioned to give residents annotation about producing firewood together with ticket of timber production.

7. Monitoring of Biodiversity

According to surveys, species that are included in Georgian Red Book are also used as timber. To suppress these activities stricter monitoring and programs for increased awareness of population are needed.

Long-Term Energy Planning Model MARKAL and Its Capabilities

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4 July, 2014

MARKAL is an input-output “bottom-up” optimization model that is highly flexible, multi-time period, linear programming model of a generalized energy system. Through complicated optimization process MARKAL determines configuration of technologies and fuels that represent the least cost means of satisfying the demand for energy services over the forecast time period (up to 20-50 years). It represents all types of fuel (electricity, natural gas, oil, coal, wood, etc.) and supply technologies (production, import, transmission, etc.). Demand side in

the model is represented with 6 economic sectors (Commercial, Industry with 7 subsectors, Agriculture, Residential, TED²⁷ and Transport) and all types of end uses (heating, cooling, hot water, lighting, etc.). Model has the flexibility to use different types of energy carriers for satisfying the same final energy need and thus provides for fuel switching optimization.

The model also has policy analysis role. It helps policy-maker to estimate effects of different policies and analyze cost and benefits of policy changes. The model is technology rich and depicts the comprehensive energy system including supply (imports/production), upstream (refineries, power plants, and pipelines and grids) and demand devices providing demand services (e.g., heaters, lights, machine drives, cars). Tied together these components form Reference Energy System (figure 1 and 2)

Figure 1. Reference Energy System components

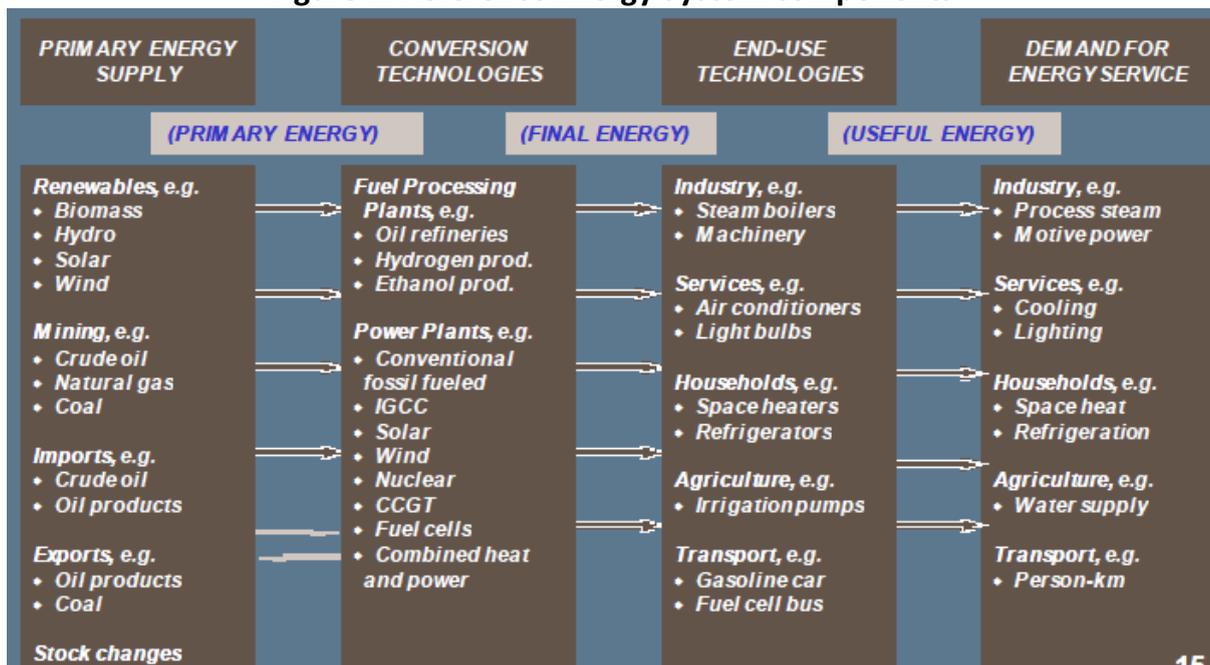
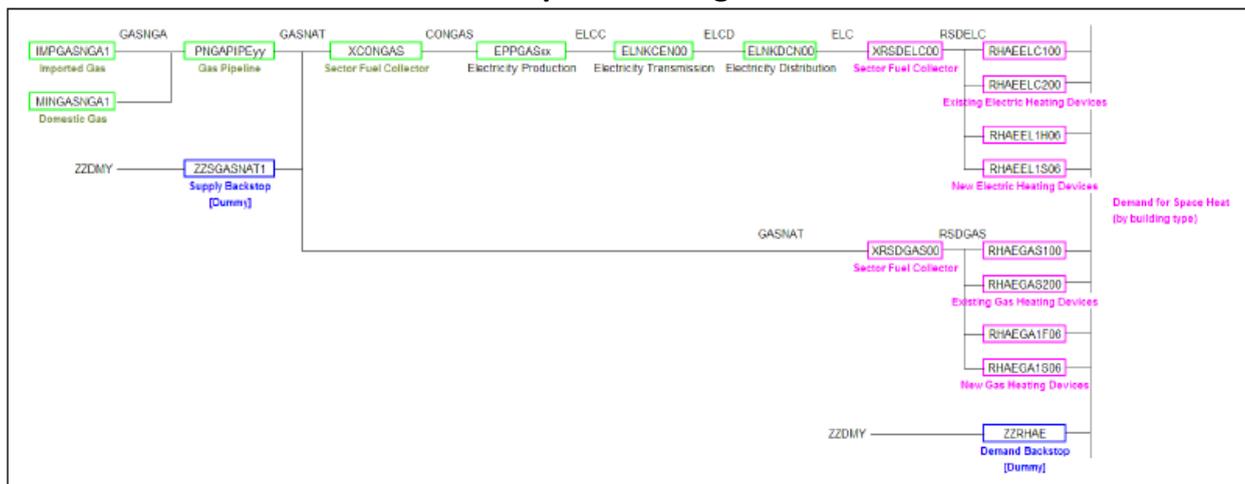


Figure 2. RES graphical representation. Use of Natural Gas and Electricity for Apartment Space Heating



²⁷ TED represents Abkhazia's electricity consumption

Recently MARKAL Georgia model has been developed under several USAID projects: Regional EC-LEDS (DWG/WEG) included capacity building of Analytical Department of Ministry of Energy as well as MARKAL Georgia preliminary configuration and rough data processing, HPEP/Deloitte/WEG project included model's further development and training of Analytical Department of the Ministry of Energy as well as input of HPEP/Deloitte/AYPEG residential survey results, EC-LEDS (Winrock/Remissia/DWG) includes GHG emissions accounting Base Scenario's development.

The first and main scenario that is modeled is the Base Case (Business as Usual- BAU) scenario. This scenario assumes there are no shocks and economy, as well as energy sector development patterns do not change substantially over time. The main drivers of development are population growth and GDP growth that should be both inputted into the model. Other drivers are elasticity in each sector, which shows contribution to GDP/Population growth from each particular sector/subsector.

The Base Case scenario requires the following input parameters:

- Energy Balance
- GDP growth rate projection
- Population growth rate projection
- Power plants data (existing and new)
- Energy prices (import, production, distribution)
- Seasons and load curves
- Export and import possibilities
- Electricity consumer TED
- Gasification of the country
- Economic sub sectors' growth rate projection

The model has four seasons in accordance with hydrological regimes²⁸. Using the hourly load data the model generates the load curves for an average day of each season (Pic. 3, 4).

Figure 3. Average daily Load, winter

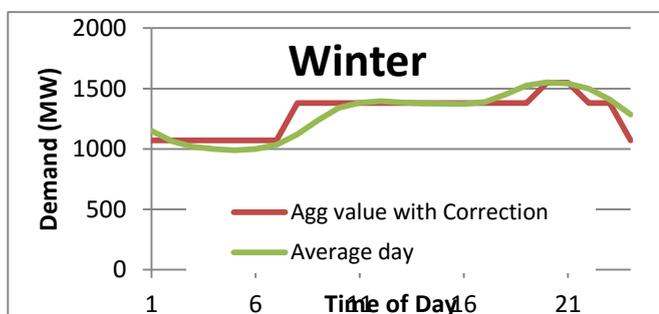
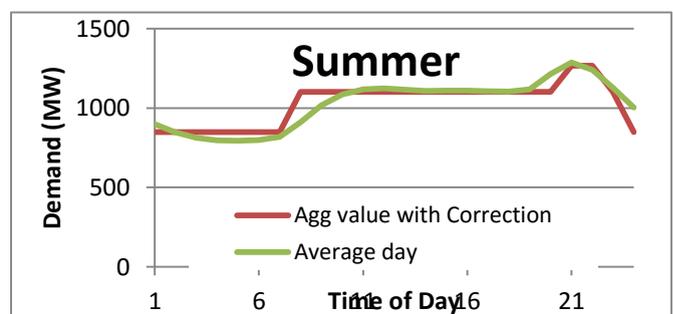


Figure 4. Average daily Load, summer



Existing and new power plants in the model are presented in the table 1.

²⁸ Spring (April-July), Summer (August-September), Autumn (October-November), Winter (December-March)

Table 1. List of existing and new power plants

Existing		New	
Plant	MW	Plant	MW
Enguri and Vardnili	1480	Khudoni	702
Other Regulating HPPs	471	Khobi 1, 2	47, 40
Run of river HPPs	629	Namakhvani	450
Mtkvari TPP (9 block)	300	Oni Cascade	270
G-Power TPP	110	Pharavani	85
Tbilsresi TPP	270	Mtkvari	46
New		Nenskra	210
Gardabani	230	Dariali	108
Coal Power plant	160	Minor HPPs (Less than 15 MW)	1460
New HPPs that will be commissioned in -20132015	164	Minor HPPs (less than 15 MW)	410

Example of output provided by the model is shown in Pic.s 5, 6.

Fig. 5. Electricity consumption

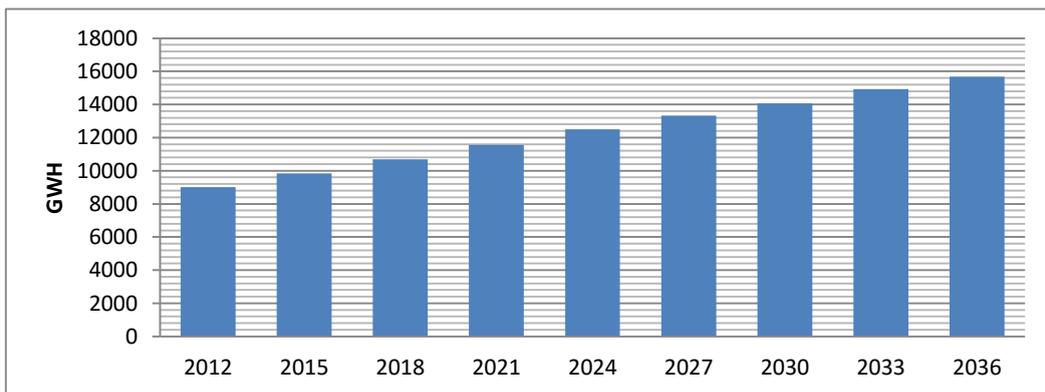
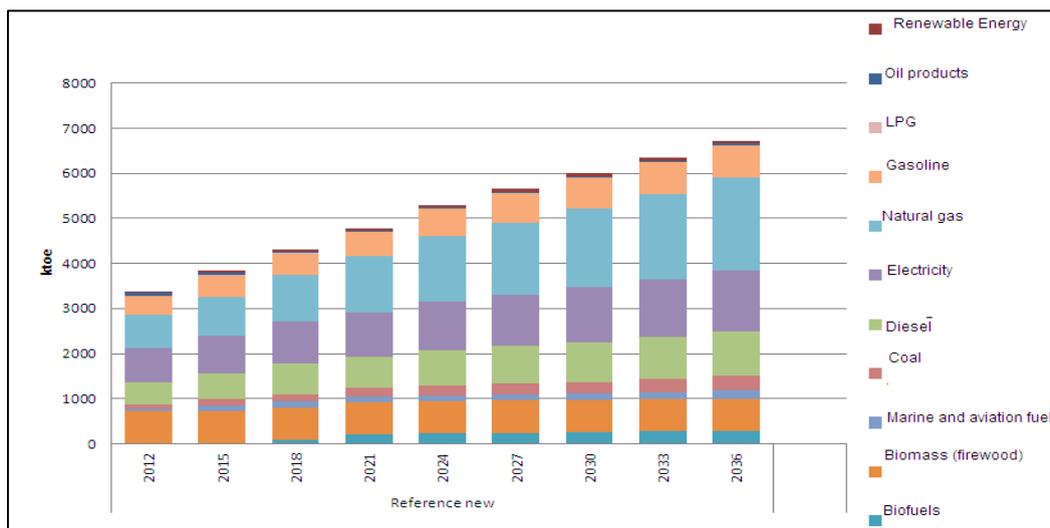


Fig 6. Final energy consumption by fuel type



In summary, MARKAL model not only gives long-term projections but also gives a clear picture of existing situation both from economic and energy points of view. It provides modeler with the detailed energy balance, depicting the whole path of energy from the moment it is produced to the final consumption. Moreover, the model has policy analysis role, since it can be used for evaluation of effects of certain policy change both from economic and energy points of view.

Electricity Demand Forecasting: Methods and Results

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4 July, 2014*

The main goal of this article is to explain the importance of energy demand forecasting²⁹, review its methods, and finally, based on the WEG's estimation, present Georgia's electricity demand forecasting for the period of 2014-2030.

Knowledge of future energy demand is a valuable commodity. It allows energy sellers to plan and develop the appropriate capacity, governments - to define main directions of energy policy and strategic projects and financial institutions - to choose the projects to support and those to reject.

A variety of methods, such as: historical trends, univariate time series, multivariate time series, econometric models, optimization models and etc. have been used for energy demand forecasting. One of the simplest and longest-used tools for forecasting is historical trends or growth rates. In such technique, if energy demand has been growing by 2% per annum, it is

²⁹ For not to mix the terms, it is important to define difference between energy demand forecasting and projection. Forecasting is a valuation of demand based on mutually agreed development scenario and projection includes various development scenarios for policy analyses.

assumed that it will grow by this same rate in the future. A somewhat more sophisticated technique of historical extrapolation is univariate time series analysis. In this technique, the current value of an energy demand is a function of past values of it along with an error term to represent random events that affect it. Univariate time series may provide reasonably good short-term forecasts, but it does not forecast turning point very well. Further, neither extrapolation nor univariate time series allow policy analysis because they do not include any policy instruments like taxes or regulations as variables. Multivariate time series incorporates other variables such as prices, income, demographic trends and etc. Statistical techniques and historical values are used to estimate unknown coefficients of variables. Time series analysis works best when there are lots of data over the consistent period with lots of variation. In reality, there is a short of data for a long time period, in such case econometric techniques may be applied instead of time series. Econometric techniques are similar to time series except more attention is paid to the variables that should be included in the model. Optimization models such as MARKAL/TIMES, MESSAGE using mathematical linear programming, minimize cost with exogenous variables and calculate demand and respective supply.

To estimate future demand for electricity in Georgia we have used different methods: econometric, time series, and historical trend in combination. Firstly, six consumption sectors were identified and selected corresponding demand drivers³⁰ (see the table below).

Table 1: Energy Demand Drivers

Power consumption sector	Demand driver
Household	<ul style="list-style-type: none"> ▪ Population growth ▪ Social welfare (real GDP/capita)
Industry	<ul style="list-style-type: none"> ▪ Production (constant GEL) ▪ Industry energy intensity factor
Commercial/Public sector	<ul style="list-style-type: none"> ▪ Production (constant GEL)
Agriculture	<ul style="list-style-type: none"> ▪ Production (constant GEL)
Transport	<ul style="list-style-type: none"> ▪ Historical trends (average of last years)
Abkhazia Region	<ul style="list-style-type: none"> ▪ Historical trends (average of last years)

Power network losses³¹ and auto energy efficiency³² in consumption sectors have also been taken into account for electricity demand estimation. Demand drivers link to their corresponding sector with elasticity or intensity coefficient³³ (see the table below).

³⁰ Demand Drivers –factors which define/cause power consumption.

³¹ Rate of power network losses (7.5%) has been taken from GNERC annual report (2013)

³² Auto energy efficiency rate takes into account technology development and energy conservation measures.

³³Elasticity - is the measurement of how responsive an economic variable is to a change in another; Intensity – amount of energy consumed for one unit of good/service production.

Table 2: Demand formula by sectors

Sector	Demand formula
Residential Sector	$\ln(\text{HHE}/\text{cap}) = \beta_0 + \beta_1 * \ln(\text{GDP}/\text{capita}) + \varepsilon$
Industry	$E_t = I_{\text{GDP}_t} * \text{Intensity} * \lambda_t$
Commercial sector	$E_t = C_{\text{GDP}_t} * \text{Intensity}$
Agriculture	$E_t = A_{\text{GDP}_t} * \text{Intensity}$
Transport sector	$E_t = E_{t-1} * (1 + G_t)$
Demand of Abkhazia	$E_t = E_{t-1} * (1 + G_t)$

Main problems during electricity demand analyses were: low level of data accessibility, short historical data and non-harmonized billing system by demand categories among suppliers.

The following assumptions were made by WEG experts on electricity demand drivers' growth rates.

Table 3: Assumptions for demand drivers' growth rates

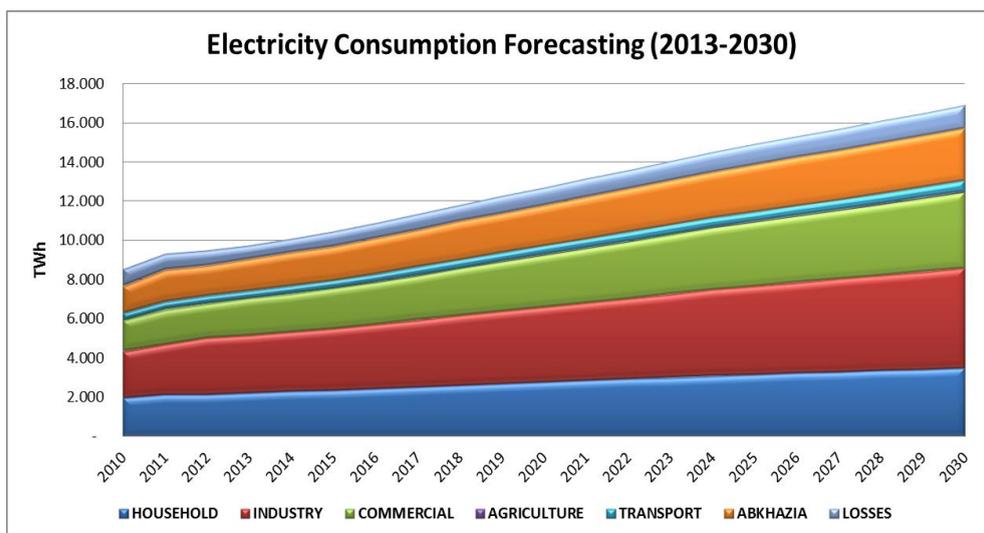
	2013	2015	2018	2021	2024	2027	2030
Real GDP growth (%)	4.1%	5%	6%	5%	5%	4%	4%
GDP/capita growth (%)	1%	3%	5%	4%	4%	3%	3%
Population growth (%)	0.13%	0.5%	0.5%	0.5%	0.5%	0.25%	0.25%
Industry production growth (%)	1%	3%	5%	4%	4.0%	3.0%	3.0%
Commercial sector growth (%)	4.3%	5%	6%	6%	5.0%	4.0%	4.0%
Agriculture production growth (%)	9.8%	8%	6%	5%	5.0%	5.0%	4.0%
Demand growth of Transport (%)	2%	2%	4%	2%	2.0%	2.0%	2.0%
Demand growth of Abkhazia (%)	4.7%	4%	4%	3%	3.0%	2.7%	2.0%
Network losses (%)	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%

Based on the demand drivers' growth rates following estimations were resulted.

Table 4. Estimates for demand drivers' growth rates

	2013	2020	2030	2020-2013	2030-2013
Real GDP (2003 bln. GEL)	14	21	32	45%	119%
Real GDP/capita (2003 GEL)	3,211	4,483	6,556	40%	104%
Population (mln.)	4.5	4.7	4.8	4%	7%
El. consumption/capita (kWh)	2,167	2,729	3,506	26%	62%
Industry production (2003 bln.GEL)	3.1	4.2	5.9	35%	89%
Commercial sector production (2003 bln.GEL)	9.8	14.4	22.1	46%	125%
Agriculture production (2003 bln.GEL)	1.5	2.3	3.7	53%	142%

Fig.1: Electricity Consumption Forecasting by demand sectors (2013-2030)



According to the reference scenario electricity consumption increases from 10 to 17 TWh for 2013-2030 period. Along with reference scenario two additional scenarios (strong and moderate growth scenarios) were also estimated. Compared to the reference scenario, strong growth scenario assumes stronger development of electricity intensive industry and moderate growth scenario assumes higher growth rate of commercial sector production.

Fig. 2. Electricity Consumption Forecasting by demand sectors (2013-2030), Strong growth

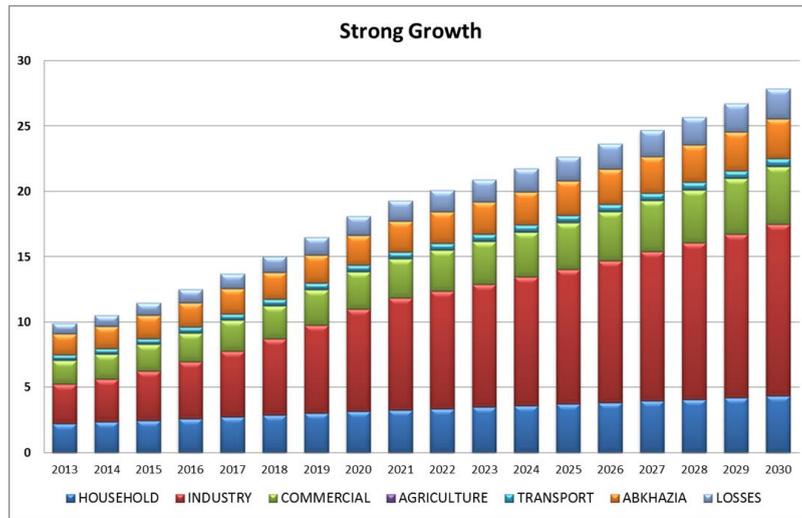
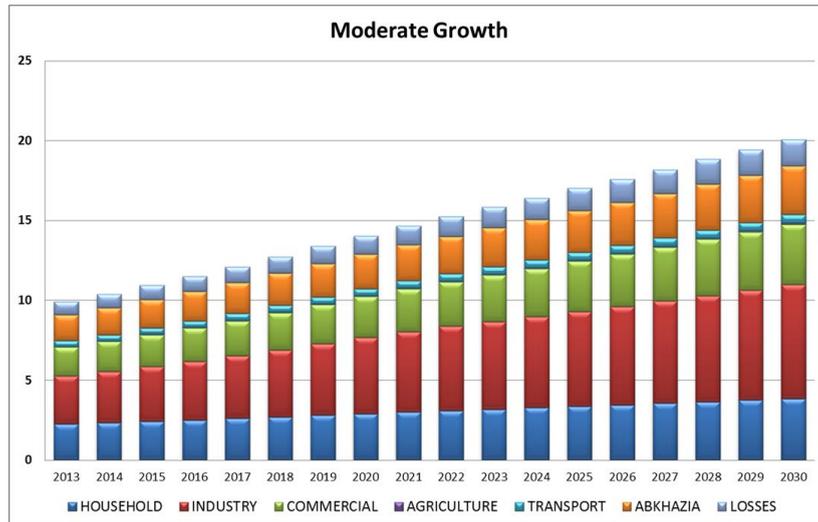


Fig. 3. Electricity Consumption Forecasting by demand sectors (2013-2030), Strong growth



According to moderate and strong growth scenarios, electricity consumption increases from 10 to 20 and 27 TWh accordingly.

For more robust forecasting of electricity demand data systematization and harmonization, officially known long-term forecasts of demand drivers and more coordination within government institutions are needed.